

CONSTRUCTION ENVIRONMENTAL & SUSTAINABILITY MANAGEMENT PLAN

BPW005 – PEACOCKE STRATEGIC WASTE WATER: PUMP STATION

Revision: 003

Construction Environmental & Sustainability Management Plan

Document Number: D07.01

Project Document History and Status

Revision	Status	Author	Date	Revision Description
A	First Draft	Rachel Blake, Reshma Jose, Tim Bertram	13.10.21	Draft
01	Superseded	Rachel Blake	19.10.21	For Engineers Approval
02	Superseded	Rachel Blake	5/11/2021	Incorporating new consents and comments in NTC005. Changes in blue text.
03	Final for regulatory approval	Rachel Blake	17/11/2021	Incorporating comments from NTC018. Final for submittal to HCC as Regulator for approval.

Document Approval

Approvals					
Revision	Action	Name	Position	Date	Signature
01	Reviewed by	Rachel Blake	Environmental Manager	19.10.21	
	Approved by	Grant Gedye	Project Manager	19.10.21	On file
02	Reviewed by	Rachel Blake	Environmental Manager	9/11/2021	
	Approved by	Grant Gedye	Project Manager		
03	Reviewed by	Rachel Blake	Environmental Manager	17/11/2021	
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1 Introduction

1.1 Purpose

The purpose of the Construction Environmental and Sustainability Management Plan (CESMP) is to address those matters required by the contract requirements, Project resource consents and designation requirements, relevant by-laws, Acts and Regulations.

All environmental risks with potential for a significant negative impact must be identified and controlled. The CESMP provides the necessary detail for Project staff to meet relevant environmental management requirements by identifying how environmental effects will be controlled on a day-to-day basis.

It further outlines how sustainability requirements will be addressed to meet Fletcher sustainability objectives with respect to carbon, water, and waste management.

The CESMP is supported by Fletcher Construction Standard Operating Procedures which are available within the Fletcher One Environmental Library. BPC holds certification from Telarc as meeting ISO 14001:2015 Environmental Management Systems. This plan also meets the requirements of the Environmental Management Plan Greenstar Checklist, which is attached as appendix I.

Relevant regional and district plans, guidelines, have been considered when preparing this plan.

1.2 Approvals

Client

This Plan is to be submitted to The Engineer for approval by Hamilton City Council (the Client) within 2 weeks of this contract being awarded. Refer to Specification Clause 6.2.22.

Some elements of this plan also meet requirements Specification Clause 6.2.9.1 which is to be supplied to HCC (the Principal) 40 days prior to construction.

Territorial Authority

This plan is to be submitted to the Territorial Authority, Hamilton City Council, 40 working days prior to commencement of works within the designation. The plan must be certified by HCC prior to works commencing within the designation area.

This plan is to satisfy the Designation conditions:

- ▶ 9.1 – Construction Management Plan
- ▶ 19.1 – Dust Management Plan
- ▶ 21 – Hazardous Substances Management Plan

This plan is also to fulfil consent requirements for works in the Tsai Property and in the Council Reserve at 10 Waterford Road.

- ▶ 010.2021.00011843.001 Condition 9 – Construction Management Plan for Tsai Pipeline
- ▶ 010.2021.00011378.001 Condition 9 – Construction Management Plan for 10 Waterford Road

1.3 Author

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This plan has been drafted by the Brian Perry Civil Environmental Manager, Rachel Blake, meeting the designation requirement for the CMP to be drafted by a suitably qualified and experienced person. Rachel has been the National Environmental Manager for Brian Perry Civil since 2017 and has over 12 years' experience in environmental management roles, including the Waterview Connection, Ngaruawahia Expressway and New Lynne Rail Trench. Rachel holds a BA and Post Graduate Diploma in Environmental Management. She has an excellent understanding of the consent process - anticipating, planning, and implementing the practices and procedures that ensure relevant conditions of consent are fulfilled.

Rachel has in-depth knowledge and practical experience of erosion and sediment control techniques, waste reduction and sustainability measures, hazardous substances management and carbon emissions.

1.4 Project Plans

The following project plans related to environment and sustainability are to be developed by BPC and submitted the Engineer and regulator prior to commencing the relevant stage of the project.

Management plans required by designation and consent conditions and provided by BPC are summarised below. In some cases multiple plans have been combined into a single document, and names of plans have been adjusted. Plans and approval requirements are summarised in the table below.

Table 1 Management Plan Summary

Consent Condition	Management Plan Required by Consent/ Designation	BPC Management Plan	Due Date
Waikato Regional Council			
AUTH141620.01.01 - AUTH141620.10.01 Schedule One - General Conditions – Condition 10	Erosion and Sediment Control Plan (ESCP)	Construction Erosion and Sediment Control Plan (CESCP)	10 working days before earthworks
AUTH141620.01.01 - AUTH141620.10.01 Schedule One - General Conditions – Condition 23	Flocculation Management Plan (FMP)	Flocculation Management Plan (FMP)	Prior to any flocculation.
AUTH141620.01.01 - AUTH141620.10.01 Schedule One - General Conditions – Condition 36	Dust Management Plan (DMP)	Construction Erosion and Sediment Control Plan (CESCP)	10 working days before earthworks
AUTH141620.01.01 - AUTH141620.10.01 Schedule One - General Conditions – Condition 36	Dewatering Management Plan (DWMP)	Construction Dewatering Management Plan (DWMP)	10 working days before water take
Hamilton City Council			
Southern Links Designation – Condition 8.2	Construction Communication and Consultation Plan (CCCP)	Construction Stakeholder Communications and Management Plan (CSCMP)	40 working days prior to commencement of works
Southern Links Designation – Condition 9.1	Construction Management Plan (CMP)	Construction Environmental and Sustainability Management Plan (CESMP)	40 working days prior to commencement of works
Southern Links Designation – Condition 11.1	Construction Noise and Vibration Management Plan (CNVMP)	Construction Noise and Vibration Management Plan (CNVMP)	40 working days prior to commencement of works

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Southern Links Designation – Condition 12.1	Construction Traffic Management Plan (CTMP)	Construction Traffic Management Plan (CTMP)	40 working days prior to commencement of works
Southern Links Designation – Condition 19.1	Dust Management Plan (DMP)	Construction Environmental and Sustainability Management Plan (CESMP)	40 working days prior to commencement of works
Southern Links Designation – Condition 21.1	Hazardous Substances Management Plan (HSMP)	Construction Environmental and Sustainability Management Plan (CESMP)	40 working days prior to commencement of works
010.2021.00011378.001 HCC consent for utility/earthworks within gully hazard – Condition 5	Construction Management Plan (CMP)	Construction Environmental and Sustainability Management Plan (CESMP)	One month prior to commencement of earthworks
010.2021.00011378.001 HCC consent for utility/earthworks within gully hazard – Condition 8	Construction Noise and Vibration Management Plan	Construction Noise and Vibration Management Plan (CNVMP)	One month prior to construction work
010.2021.00011843.001 Earthworks for the works in the road on Plateau Drive – Condition 9	Construction Management Plan (CMP)	Construction Environmental and Sustainability Management Plan (CESMP)	Prior to commencement of earthworks or construction activities

These will become appendices to this document, as indicated.

- ▶ Project Construction Environmental and Sustainability Management Plan (this document)
- ▶ Construction Noise and Vibration Management Plan – N4 Pump Station Construction (Appendix C)
- ▶ Construction Traffic Management Plan (Appendix D)
- ▶ Construction Erosion and Sediment Control plans (Appendix F)
- ▶ Construction Dust Management Plan is included in this document to satisfy designation requirements, and in the ESCP to satisfy WRC consent requirements (Appendix F)
- ▶ Flocculation Management Plan (Appendix G)
- ▶ Dewatering Management Plan (Appendix H)

The Flocculation Management Plan may not be required if flocculation is not used.

The Dewatering Management Plan is likely to be superseded by a Groundwater Settlement Monitoring and Contingency Management Plan expected to be required by a yet to be awarded groundwater consent. This will be confirmed with WRC.

Management plans have been developed by HCC and their agents which must be complied with during the project. Some plans only apply to part of the project. The relevant client provided plans and those to be provided by BPC are summarised below.

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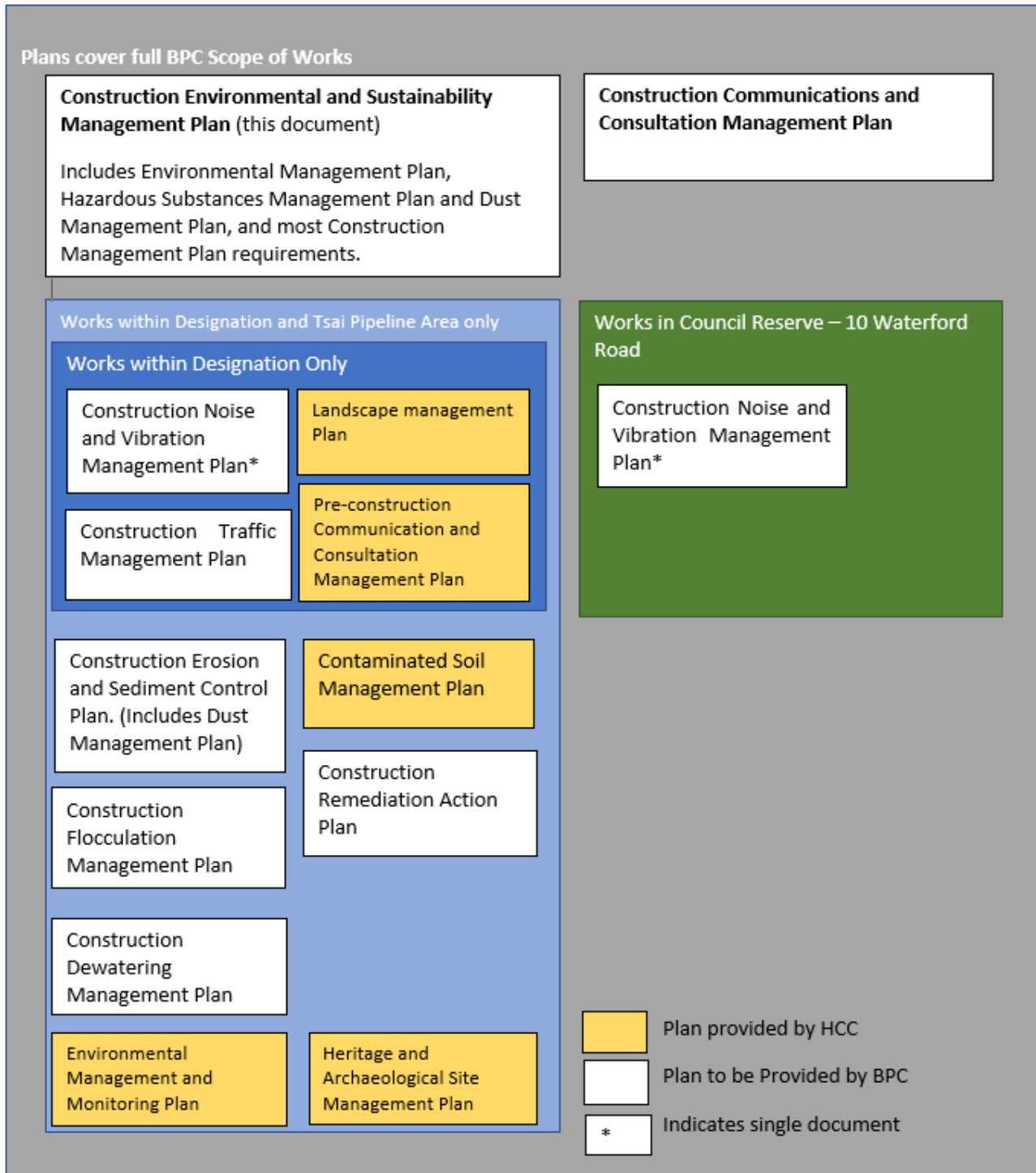


Figure 1 Management Plan Overview

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2 Project Overview

2.1 Project Description

The Peacocke Strategic Wastewater: Pump Station Project (the Project) is being delivered by Brian Perry Civil (BPC) for Hamilton City Council (HCC).

The Project includes the Construction of a 330l/s capacity wastewater transfer pump station, called the Peacocke Transfer Station (commonly referred to as N4). This transfer pump station will transfer wastewater from the planned Peacocke development to the existing gravity main (Far Eastern Interceptor, FEI) via the new Northern Transfer Main. It further includes the construction of gravity and pressure sewer lines in residential streets and council reserve.

The Project forms part of the broader Southern Links roading project being undertaken jointly between the NZ Transport Agency and HCC to manage the anticipated transport implications of projected growth and development around the southern part of Hamilton City. These parties are working together to ensure that the future state highway routes will be well integrated with local roads, and the planned residential and industrial developments within this area. In this respect, the Southern Links project incorporates both sections of state highway extending through the rural land in Waipa and Waikato Districts around the outskirts of Hamilton City along with a proposed network of arterial roads extending through the southern part of Hamilton City which has been designed to provide an integrated connection between the surrounding state highway lengths and the existing city roading network and also factoring planned development outcomes within this part of the city.

2.2 Project Location

The pump station is to be constructed on a 1.4ha site at 118 Peacockes Road. This sits within the designation for the broader Southern Links Project. The site is in a pasture area on alluvial sands and silts, with residential properties on Peacockes Road immediately adjacent to the site access and approximately 50m from the main work site. A day care centre is near the site entry on Peacockes Road.

The wastewater lines are in pasture, roads, residential streets, and reserves in Fitzroy as shown below. This includes works close to residential properties and in the Mangakotukutuku Stream gully. This activity is outside of the Southern Links designation.

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2.3 Site Maps

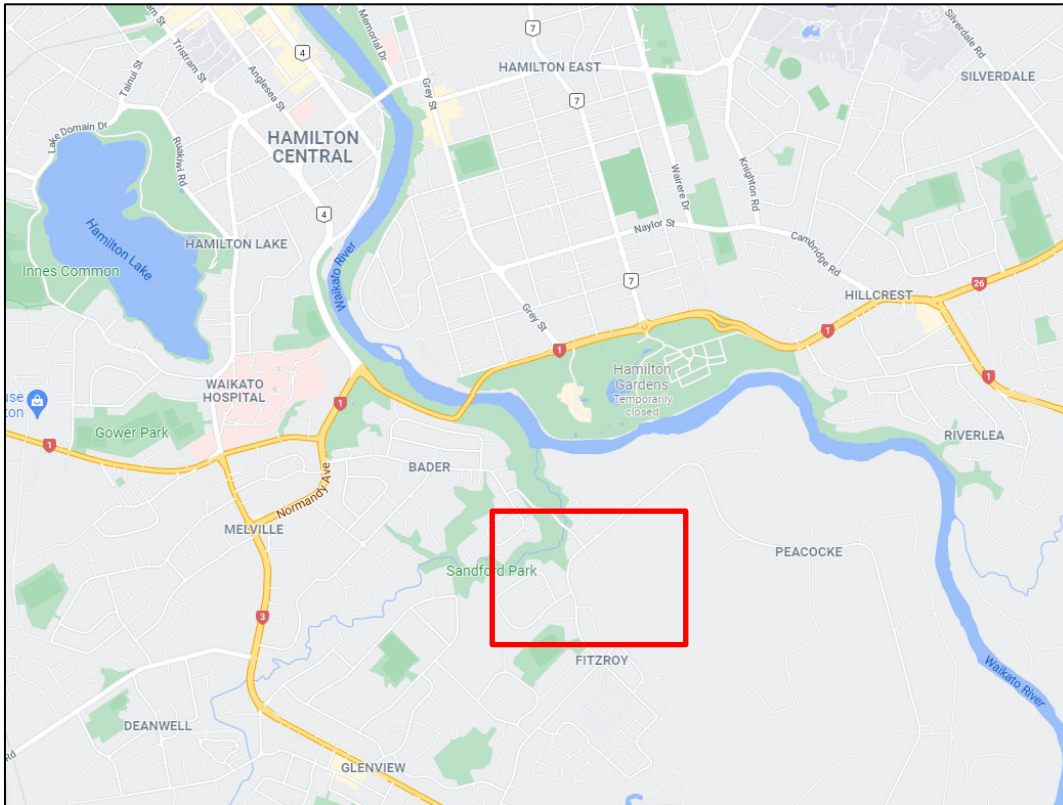


Figure 2 Project Location

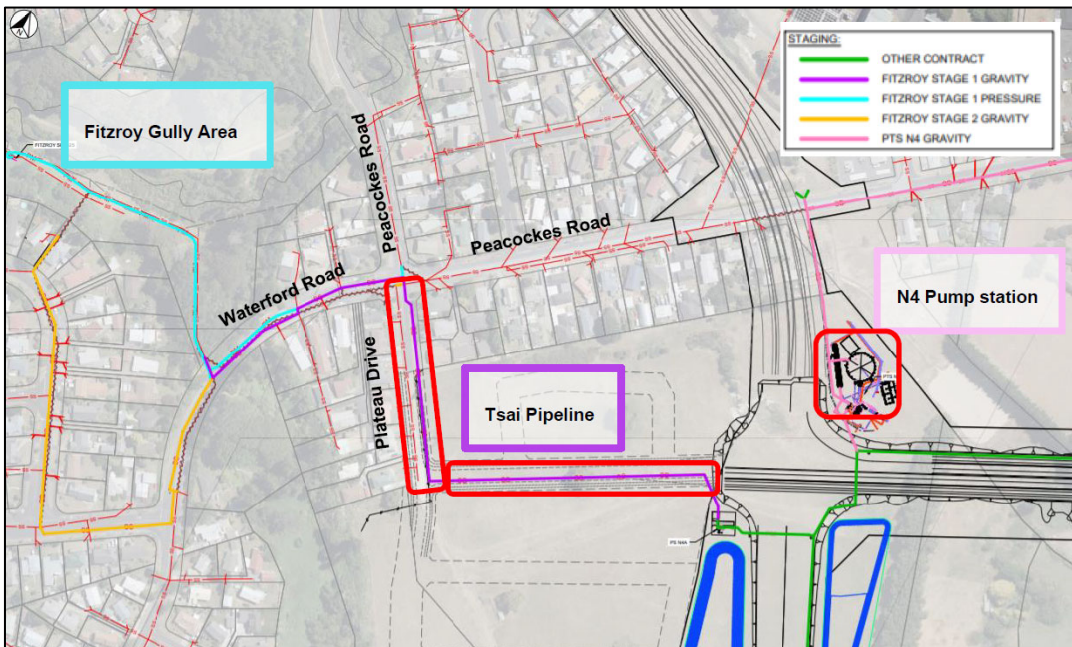


Figure 3 Location of Work Areas

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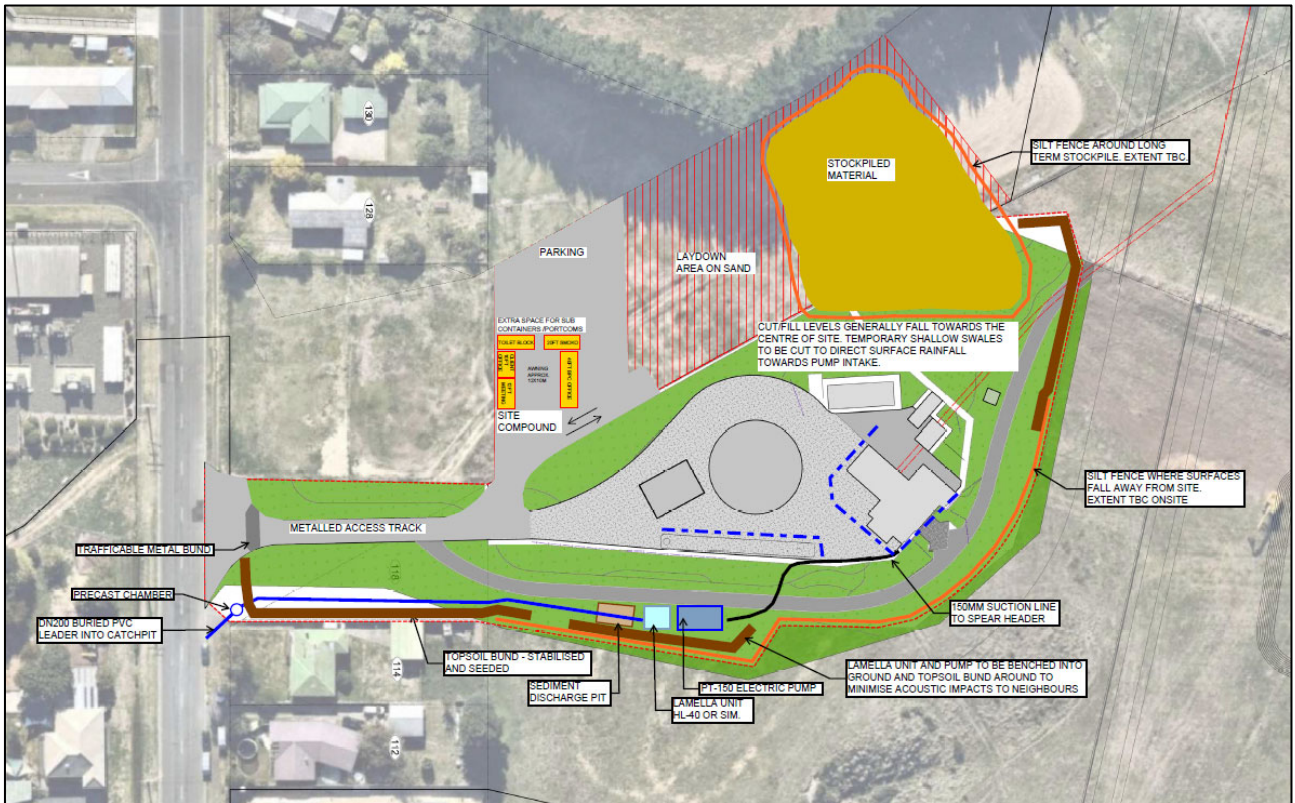


Figure 3 Pump Station Site Layout

2.4 The Contract

The form of contract to be used is NZS 3910 Measure and Value with some Lump Sum elements. BPC has agreed to execute and complete the Contract Works typically described in section 2.4 below on the terms and conditions set out or referred to in Contract Reference 640-2020.

2.5 The Programme

The Project is scheduled to start on 11/01/22 and be completed in 18 months. There are no key traffic switches, diversions or mile stones that will impact on the travelling public.

Key sections of work and milestones are planned as follows:

Programme / key milestones			
Description	Target start	Target finish	Target duration
Contract Award	01/10/21	01/10/21	-
Design Build Components	-	11/01/22	-
Early Procurement	30/09/21	23/03/22	113 days
Possession of Site	14/10/21	-	-
Site Establishment	10/01/22	12/01/22	3 days

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Bulk Earthworks	11/01/22	30/09/22	183 days
Wet & Dry Well Concrete Work	01/03/22	11/10/22	157 days
Building Construction	30/08/22	04/11/22	48 days
Electrical and Mechanical	03/08/22	03/03/23	141 days
Peripheral Pipe Construction	11/01/22	14/03/23	288 days
Final Tie-ins & Commissioning	26/10/22	19/05/23	114 days
SP1-3 Complete	29/09/23	-	-

2.6 Hours of Work

General work hours will be between 7.00 am - 6.00 pm Monday to Saturday. Relevant stakeholders will be notified of key works outside of typical construction work hours as per the Project Communication and Consultation Management Plan. Examples of early morning and late-night activities may include:

- Significant concrete pours
- Erection and dismantling of temporary plant and equipment (e.g., Cranes, site facilities)
- Work that has been accelerated
- Planned shift work
- Dewatering

Some activities may have restricted hours to ensure compliance with noise limits.

Relevant management plans with respect to:

- The Project Construction Noise and Vibration Management Plan – N4 Pump Station (Appendix C.)
- The Project Communication & Consultation Management Plan

In accordance with consent 010.2021.00011378.001 works in the Council Reserve at 10 Waterford Road will not be carried out in hours of darkness.

In accordance with Designation condition 13 there will be no off-site project related bulk HCV traffic on

- On workdays outside of 7am and 7pm.
- After 4pm on a workday prior to a long weekend.
- On Sundays or on public holidays.

Refer to the Project Construction Traffic Management Plan (to be attached as appendix D).

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2.7 Key Project Contact Details

Company	Position	Contact	Email Address	Mobile
Axell Consultants	Engineer to the Contract	David Proctor	Dave.Proctor@axellconsultants.com	021 223 9207
BECA	Engineers Representative	Andrew Higby	Andrew.Higby@beca.com	027 575 5041
BECA	Engineers Representatives Assistant	David Zhang	Dave.Zhang@beca.com	021 194 3612
BECA	Design Lead	TBC		
Hamilton City Council	Project Manager	Sven Erickson	sven.ericksen@hcc.govt.nz	021 451 103
Hamilton City Council	Environmental Coordinator	Clare Barton	Clare.Barton@hcc.govt.nz	022674 7934
4Sight	Contaminated Land SQEP	Andrew Barr		021716 416
WRC	Resource Officer	Connie Daws	Connie.Daws@waikatoregion.govt.nz	
Wainui Environmental	Compliance Monitoring - WRC	Richard Duirs	richard@wainuienvironmental.co.nz	
HCC	Compliance	Peter Kirk	Peter.Kirk@hcc.govt.nz	021 823 112
Sian Keith Archaeology	Project Archaeologist	Sian Keith	sian@siankeitharchaeology.com	021 141 1802
Marshall Day	Noise & Vibration Consultant	Matthew Cottle	Mat.Cottle@marshallday.co.nz	021 028 59884
Brian Perry Civil	Regional Manager	Adam Plimmer	AdamP@fcc.co.nz	021 321 405
Brian Perry Civil	Contracts Manager	Andrew Richards	AndrewRi@fcc.co.nz	027 482 5924
Brian Perry Civil	Project Manager	Grant Gedye	GrantG@fcc.co.nz	027 517 5859
Brian Perry Civil	Project Administrator	Emma McPherson	emmamcp@fcc.co.nz	027 205 0869
Brian Perry Civil	Quantity Surveyor	Anton Bester	AntonBe@fcc.co.nz	027 320 9171
Brian Perry Civil	Construction Manager	Eamon Stynes	EamonS@fcc.co.nz	021 0831 9075
Brian Perry Civil	Project Engineer	Timothy Bertram	TimothyB@fcc.co.nz	027 552 1045
Brian Perry Civil	Site Engineer	Charlie Czepanski	CharlieCz@fcc.co.nz	027 248 1211
Brian Perry Civil	Site Engineer & Environmental Rep	Reshma Jose	reshmaj@fcc.co.nz	027 223 6442
Brian Perry Civil	Commissioning Manager	Steve Glenn-Campbell	SteveGC@fcc.co.nz	021 564 062
Brian Perry Civil	Geotechnical Engineer	Natasha Jokhan	natashaj@fcc.co.nz	027 299 8381

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Brian Perry Civil	Health & Safety Manager (off-site support)	Michael Wynne	MichaelWy@fcc.co.n z	027 250 4635
Brian Perry Civil	Environmental Manager (off-site support)	Rachel Blake	RachelB@fcc.co.nz	027 221 4699
Brian Perry Civil	Quality Manager (off-site support)	Scott Meads	ScottMe@fcc.co.nz	027 210 5762

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2.8 Roles and Responsibilities

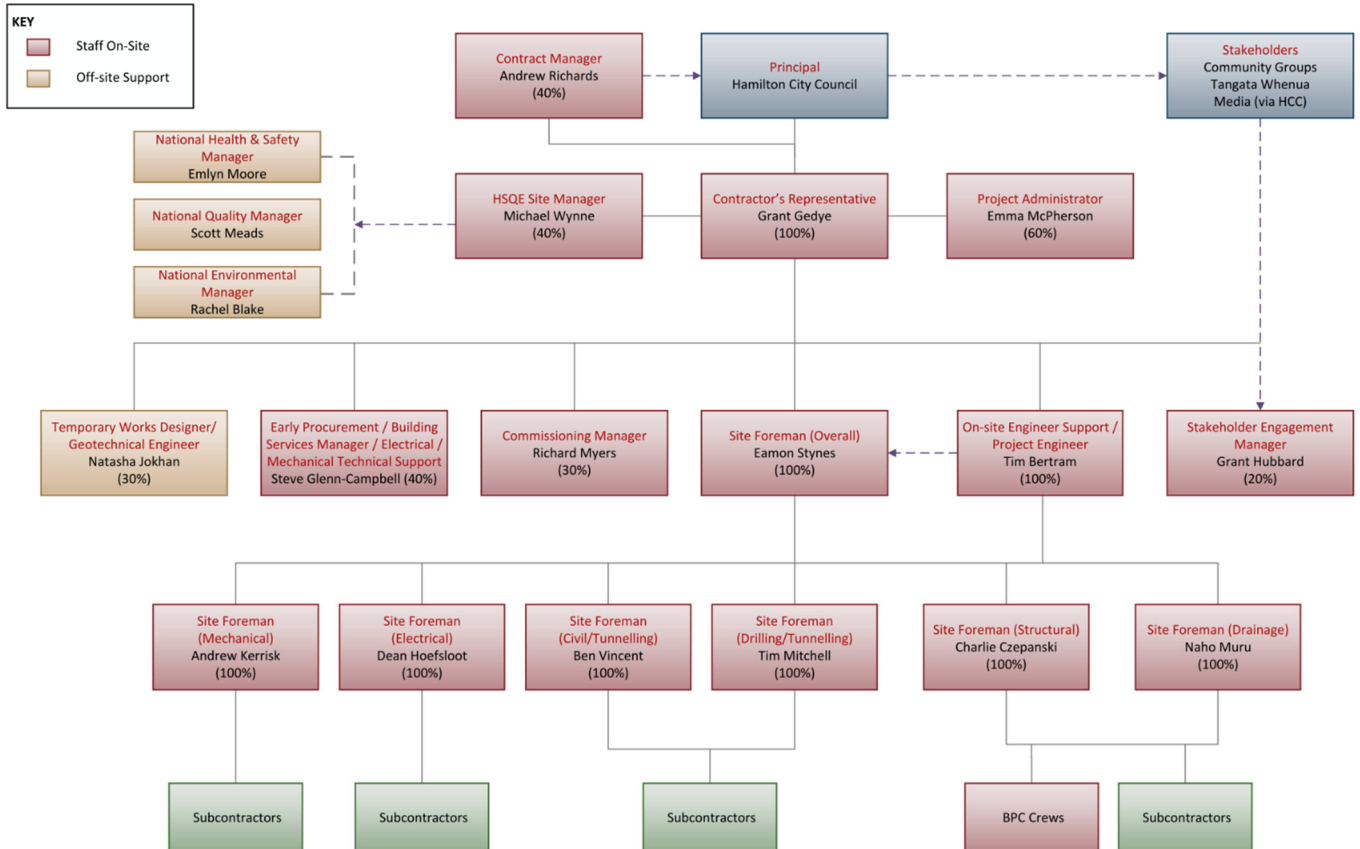
Key management roles of project staff relevant to environmental management for this project are the following:

Role	Responsibility
Project Manager	<ul style="list-style-type: none"> • Ensure the CSEMP is prepared prior to the commencement of construction activities. • Takes ultimate responsibility for compliance with the specification and regulatory requirements (i.e., resource consent or archaeological authority conditions). • Ensures adequate resources are available to meet environmental and stakeholder obligations. • Provides leadership to ensure all employees and subcontractors comply with the project management plans; and • Notifies the Client’s Representative and regulatory authorities of any non-compliances.
Construction Manager	<ul style="list-style-type: none"> • Monitors the implementation of the plan and the achievement of objectives. • Ensures employees and subcontractors are adequately inducted and trained in site environmental and sustainability procedures including emergency procedures. • Coordinates environmental and sustainability management interfaces with BU Environmental Manager, external agencies and stakeholders, Managing Dewatering process and Permit to Pump Authorisation, oversees CS-VUE updates by BPC.
Project Engineer /Site Engineer/ Superintendent /Supervisor/ Foreman	<ul style="list-style-type: none"> • Develops, implements and reviews CSEMP for the project, • Ensures that all site personnel have undertaken induction training in relation to environmental and sustainability issues and procedures prior to works commencing. • Ensures that all environmental and sustainability issues are discussed at Share Meetings. • Initiates and coordinates internal environmental and sustainability monitoring and maintains relevant records, • Ensure the timely closeout of all environmental incident and audit reports. • Ensures environmental controls works are installed and maintained. • Follows environmental procedures in all activities undertaken, • Leads the emergency response crew.
Environmental Representative	<ul style="list-style-type: none"> • Undertake / co-ordinate environmental monitoring and inspections as required. • Tracks and records compliance with regulatory requirements, updates CS-VUE • Maintain environmental risk register. • Stocking of spill kits, and • Environmental champion at share meetings and other site opportunities.
All Employees and Subcontractors	<ul style="list-style-type: none"> • Report all environmental incidents and observations promptly to supervisory staff. • Carry out routine maintenance and emergency work when directed. • Care for all environmental works. • Follows environmental procedures and sustainability practices in all activities undertaken, and • Ensure the site is kept tidy and litter is placed in bins.

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2.9 Project Organisation Chart



2.10 Project Specific Environmental and Sustainability Objectives

During the execution of the works, environmental controls will be implemented to avoid, remedy, or mitigate the effects of activities on the environment and ensure the project is executed in accordance with the relevant provisions of the contract. Sustainable practices will be implemented to improve social, environmental, and economic outcomes and to minimise the projects impact.

The environmental and sustainability requirements as determined by review of:

- Head Contract
- Analysis of site-specific environmental risk, including review of consents and designations
- Discussions with the customer, head contractor and/or Fletcher Construction environmental professionals as appropriate.
- Details of regulatory compliance matrix to be included in Appendix A

2.11 Project Targets

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Measurable indicators of success as a Brian Perry Civil project are:

- No prosecutions, abatement notices or infringement notices
- Regional Council compliance inspection scores of 1
- No dust complaints
- Environmental audit score of B or above with corrective actions closed out
- No overdue actions in monthly consent compliance report
- Environmental topics discussed at least monthly at toolbox talks
- All employees and contractors inducted to environmental requirements
- Environmental weekly inspections completed and closed out
- High rate of lead indicator reporting – Level 1 environmental incidents and observations
- All scope 1 & 2 carbon data captured for the site
- Sustainability in Practice initiatives shared
- All available recycling options implemented, and waste data captured

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3 Project regulatory approvals

Hamilton City Council has obtained a suite of consents from WRC and HCC to deliver a programme of works in the Peacockes Strategic Transport area.

HCC also has a designation for the Southern Links Project which the pump station and some pipe works sit within, as indicated below. The Designation Conditions apply to works within the area outlined in yellow.

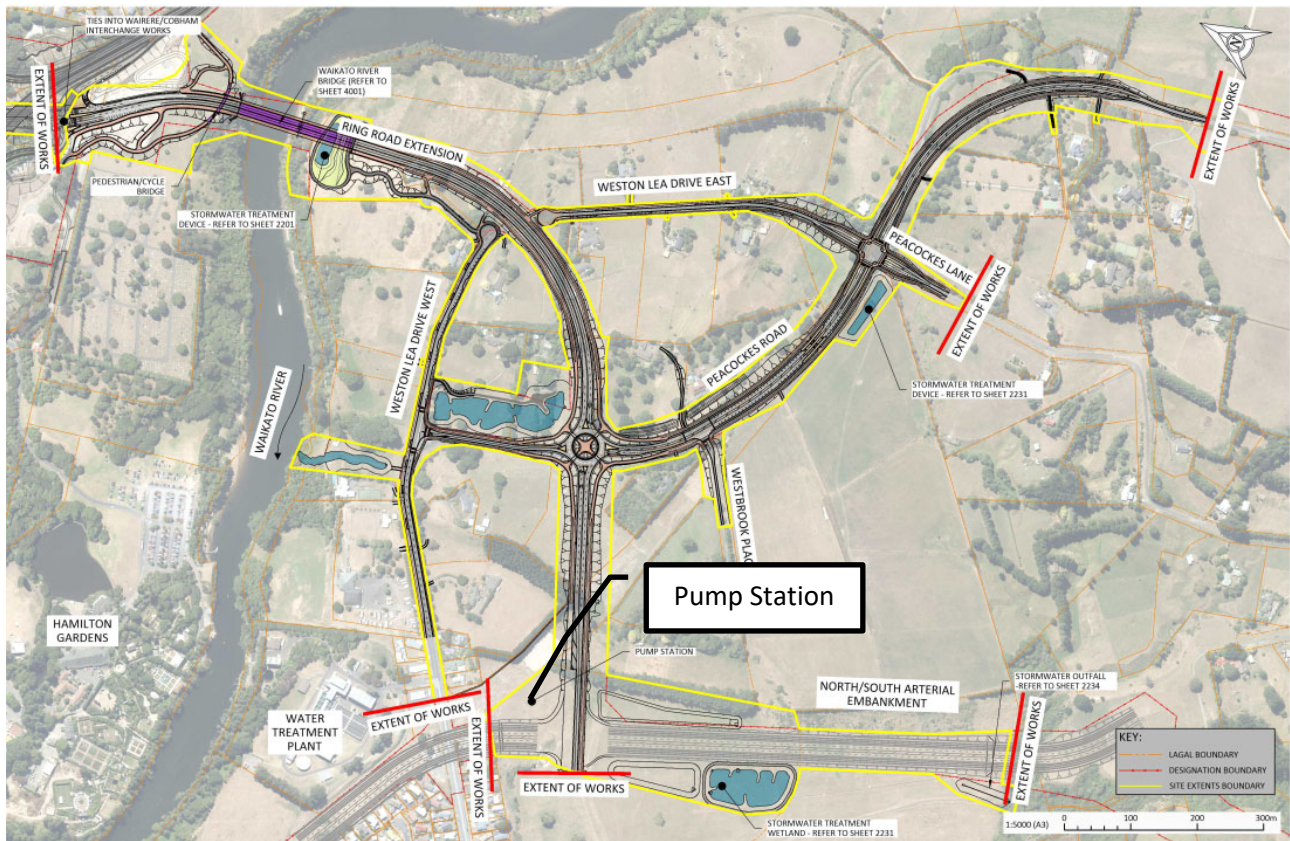


Figure 4 PSTS Designation Area

A full schedule of the consent and designation conditions and where they are addressed in the Peacockes Wastewater Pump Station project documents is attached as appendix A for reference.

Note that at time of writing (October 2021) HCC is currently applying for the following consents:

- WRC Land Use Consent – Water take: for construction dewatering. Allows a greater combined surface and ground water volume to be taken overall and extends the scope of the consent to include the Fitzroy Stage 1 Gravity and Emergency Storage Tank (PTS N4 Gravity).

There are no Archaeological Authorities.

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Consent Number	Consent Type	Key Requirements Relevant to this Project	Relevant Scope of Works
WRC AUTH 141620.01.01	To temporarily take groundwater during construction dewatering activities	Authorises up to 345m3 of groundwater take to allow construction of wet wells and trenches. The volume is combined with surface water take allowance. A dewatering management plan is required.	Pumpstation works, within designation and Tsai Pipeline
WRC AUTH 141620.02.01	To temporarily divert groundwater and take surface water during construction dewatering activities	Authorises up to 345m3 of surface water take to allow construction of wet wells and trenches. The volume is combined with ground water take allowance. A dewatering management plan is required.	Pumpstation works, within designation and Tsai Pipeline
WRC AUTH 141620.03.01	To divert and discharge stormwater in association with the Peacockes Strategic Transport Network	Authorises permanent stormwater diversion and treatment.	Pumpstation works, within designation and Tsai Pipeline
WRC AUTH 141620.04.01	To drain and remove a wetland associated with construction of a stormwater outfall	Not applicable to this project.	NA
WRC AUTH 141620.05.01	To permanently divert a surface water flow path	Not applicable to this project.	NA
WRC AUTH 141620.06.01	To drill below the water table associated with the construction of the bridge piers	Not applicable to this project.	NA
WRC AUTH 141620.07.01	To construct stormwater outfall structures in the bed of the Waikato River and Mangakotukutuku Stream	Not applicable to this project.	NA
WRC AUTH 141620.08.01	To undertake land disturbance activities within high-risk erosion areas and associated	All relevant conditions covered under Schedule One.	Pumpstation works, within designation and Tsai Pipeline

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	earthworks and clean filling activities associated with the construction of the Peacockes Strategic Transport Network		
WRC AUTH 141620.09.01	To disturb and discharge soil for remediation of contaminated land in association with the Peacockes Strategic Transport Network	All relevant conditions covered under Schedule One.	Pumpstation works, within designation and Tsai Pipeline
WRC AUTH 141620.10.01	To undertake temporary riverbed disturbance and use of temporary dam structures in the bed of the Waikato River in association with bridge construction	Not applicable to this project.	NA
WRC AUTH 141620.01.01 – AUTH 141620.10.01	Schedule One General Conditions	Preconstruction notification and meeting required 10 days prior to consented works.	Pumpstation works, within designation and Tsai Pipeline (Excludes Plateau Drive road reserve and gravity main on Peacockes Rd).
		Winter Works Restrictions apply between 1 May and 30 Sept.	
		ESCPs including any amendments are to be approved by WRC prior to implantation/ earthworks. Controls to be as built.	
		ESC design and monitoring requirements.	
		WRC approval required to remove any controls.	
		DEBs and SRPs to be flocculated. Flocculation management plan to be approved by WRC.	
		WRC may request water quality sampling. Criteria for sediment, soluble aluminium, and pH.	

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		<p>Dust management requirements. DMP to be approved by WRC prior to works.</p> <p>Plant hygiene requirements</p> <p>Requirement to stabilise against erosion as soon as practical. Untreated run off to be approved by WRC.</p> <p>Accidental discovery of archaeological or cultural sites.</p> <p>Only clean fill to be imported to site. Monitoring and records of fill to be kept.</p> <p>Reporting requirements in the event of contaminated soil being discovered.</p> <p>Dewatering management plan to be approved by WRC prior to dewatering.</p> <p>Ecological requirements.</p>	
<p>HCC 10.2020.00010888.001</p>	<p>Soil disturbance within an identified HAIL site</p>	<p>Pre-start meeting requirement.</p> <p>Soil sampling required prior to earthworks. Remedial Action Plan and Validation Report Requirement if contamination discovered. CSMP to be updated following soil sampling.</p> <p>Works completion report required within 2 months of earthworks completion.</p>	<p>Pumpstation works, within designation and Tsai Pipeline</p>
<p>HCC 010.2021.00011378.001</p>	<p>Earthworks and a lifeline utility at 10 Waterford Road</p>	<p>Works to be as per application, construction within daylight hours, no</p>	

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		tree felling in Natural Open Space Zone.	Fitzroy Stage 1 Pressure Main at 10 Waterford Road
		Construction Management Plan Requirement	
		Construction Noise and Vibration Management Plan Requirements	
		Earthwork's requirements, including need to control sediment and dust.	
		Archaeological discovery protocol	
HCC 168A	Notice of Requirement Conditions for the Southern Links Designation (20 April 2020)	General conditions and works to be in accordance with application.	Pump Station works within Designation
		Management Plans Required prior to works starting.	
		Communications Plan, Consultation and Community Liaison	
		Conditions relevant to Te Awa Cycleway, Protected Trees, Concept Landscape Management Plan, Archaeological investigation.	
		Construction Communications Plan Requirements	
		Construction Management Plan requirements	
		Complaints Management	
		Construction Noise and Vibration	
		Construction Traffic Management	
		Landscape Management Plan Requirement	
		Ecological Management and Monitoring Plan	

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		Heritage and Archaeological Site Management Plan	
		Drainage & Network Infrastructure	
		Dust Management Plan	
		Hazardous Substances Management Plan	
		Construction Lighting	
		Operational Conditions, relevant to noise, traffic, and landscaping.	
HCC 010.2021.00011843.001	Earthworks Consent	Noise and Vibration limits.	Tsai Property
		Engineering requirements	
		Construction Management Plan	
		Earthworks and Erosion and Sediment Control	
		Road reinstatement	
		Tikanaga Maori blessing and induction. Accidental Discovery Notification.	

The Resource Consents Permits and Authorities in the table above are entered into the Consents/ Permits Module of Radar, which is Fletcher Buildings risk management tool. Where actions are required, they assigned to a member of the project team and actions tracked to confirm compliance.

Consent requirements are also incorporated into project Work Packs, ITP's and JSEAs where appropriate.

Prestart notification and meetings noted in the table above will be arranged in consultation with the Engineer.

Copies of all consents and designation conditions are attached as appendix A to this CESMP.

HCC uses CS-VUE to monitor and record consent compliance. BPC staff have been made available for training and will manage CS-VUE for the consents as they apply to the BPC scope of works.

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4 Implementation and Operation

4.1 Environmental risk identification

Construction activities have the potential to result in adverse environmental effects if not managed appropriately and in accordance with project specifications, resource consent conditions and best practice.

Risks and controls have been identified through review of drawings, specifications, contract, consents, and associated specialist reports. Site walkovers have been undertaken and Fletcher One risk registers and standard operating procedures have been reviewed to determine best practice.

All significant environmental risks and controls are captured in the environmental risk register attached as Appendix B. Significant risks are those with a potential outcome of medium or higher (greater than 7 on the matrix). The purpose of the register is to provide an up to-date list of site-specific environmental risks and details of controls.

The project manager (or delegate) will be responsible for ensuring the register remains up to date and available to relevant staff, (e.g., Those staff preparing specific Work Packs and Job Safety Environmental Analyses.) The register is a live document and will be reviewed and updated as the project progresses. Following any significant environmental incident, the register will be updated accordingly.

4.2 Management of Environmental Issues

Specific detail on the management of environmental and sustainability issues will also be included in the Work Pack and in the Project risk register.

4.2.1 Site clearance work

No site clearance works are expected to be required for any works. The pumpstation and associated peripheral works are on an empty site.

Most of the pipelines will be installed using horizontal direction drilling (HDD) or micro-tunnelling. These methods both require a launch and retrieval pit to be excavated but the footprint is considerably smaller in comparison to open trenching. This will minimise the impacts on the surrounding ecology.

The Fitzroy Stage 1 pressure main is located through a section of the Mangakotukutuku Stream gully. The exact alignment and impact of this pipeline is yet to be confirmed due to the unknown nature of existing ground levels. The method of installation will be confirmed; opening trenching is the preferred option, but HDD will be employed if the alignment underpasses foliage driplines. The confirmation of the alignment will prioritise avoiding existing foliage and trees to minimise damage to a potential habitat.

If work within driplines or clearing of trees is required, an application will be submitted to HCC for approval. No pruning or removal of trees is permitted within the reserve land without the prior written approval from the Councils Parks and Recreation Unit. All construction activities within the reserve must be undertaken according to the conditions outlined in RC 010.2021.00011378.001.

4.2.2 Erosion and sediment control

Earthworks are required to recontour the wastewater pump station site, and to excavate for the dry and wet wells. The pump station site is 1.4ha including 0.5ha of laydown, site amenity and stockpile area.

Trenching, directional drilling and micro tunnelling to install sewer lines will require excavation and construction of minor access and laydown areas.

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These works have the potential to generate sediment which if uncontrolled can damage freshwater habitats, particularly where working close to the Mangakotukutuku Stream.

Erosion and sediment discharge will be prevented or minimised at source through:

- Protecting Surfaces from Erosion
- Control of Run-on Water
- Separating Clean and Dirty Water
- Preventing Sediment from Leaving the Site

In all cases, erosion and sediment controls will be installed in accordance with the WRC Guidelines for Soil Disturbing Activities, unless an alternative is agreed with WRC. Works will be managed to ensure overland flow paths are not affected so that a flood risk is created for neighbouring properties.

All dewatering will be controlled by a Permit to Pump and managed in compliance with Fletcher Dewatering SOP ENV-11. These will be authorised by the Construction Manager. Permits will describe pump intake and outlet set up, monitoring requirements, volume and discharge criteria. Central management of dewatering will allow total water take volumes to be complied with.

Where possible sediment tracking from site entry points will be prevented through providing stabilised haul roads, however a wheel wash facility will be provided for use if required at the Pump Station site exit.

Documented weekly and weather-related inspections will be undertaken to ensure the effectiveness of controls.

Pump Station and Tsai Pipeline

Earthworks in this area are subject to a WRC earthworks consent. The designation conditions with respect to earthworks apply to the pump station site. Earthworks in Tsai land are also subject to a HCC earthworks consent 010.2021.00011843.001.

No Sediment Retention Ponds or Decanting Earth Bunds are planned, however should this change it is noted that these require chemical treatment. Lamella units may be used to remove sediment during dewatering trenching activities and these may be flocculated. A flocculation management plan will be approved by WRC prior to any chemical treatment on site.

Dewatering of trenches and excavations will be carried out in accordance with the Dewatering Management Plan to be attached as appendix H once developed. Where possible water will be discharged to land where it is able to soak to groundwater. If this is not possible, then water will be directed to the HCC stormwater system where discharge will be via a stabilised outfall.

Discharge criteria for all dewatering will be outlined in the Dewatering Plan. This must be approved by WRC prior to implementation.

Documented weekly and weather-related inspections of erosion and sediment controls will be made available to the WRC on request.

The ESCP for this area, and all subsequent amendments are to be approved by WRC prior to implementation. Winter works restrictions (1 May – 30 September) apply to this area.

Finished areas will be stabilised as soon as practical and within 3 months of completion or works stopping.

Sewer Main Installation Fitzroy Stage 1 Pressure Main in Council Reserve

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Works in this area are subject to an HCC consent 010.2021.00011378.001 to allow earthworks in a gully hazard.

Finished areas will be stabilised as soon as practical and within 3 months of completion or works stopping.

Protection of trees will be considered when selecting sediment controls to avoid excavation within tree driplines.

There is potential for flooding in the gully as the Mangakotukutuku Stream is restricted at the culvert under Peacockes Road downstream of the site. Works will be planned to ensure sediment controls and any stockpiles are clear of the flood plain wherever possible.

Erosion and sediment controls will be installed as per the WRC Guidelines. Controls will include:

- ▶ A stabilised construction entrance to prevent tracking onto the road.
- ▶ A silt fence or silt socks below earthwork area. (Silt socks may be used where it is not possible to trench in a silt fence due to protected trees.)
- ▶ Clean water diversion bund up-slope of the work area, to minimise water collected in open trenches and catchment area treated by silt fence.

All controls will be located to prevent flooding due to changes to overland flow paths.

WRC Permitted Activity Rules for Discharges to Water

All works outside of the Designation and the Tsai Pipeline are not subject to a WRC consent for earthworks or dewatering.

In most cases trenching will be above the groundwater table, and meet the permitted activity rules (5.1.4.11). Discharges from dewatering excavations are to meet suspended solid standards (3.2.4.6) must not increase TSS in the receiving water body by more than 10% and, as the receiving area is an indigenous fisheries and fish habitat class waters, the discharge must not result in 80g/m³ TSS in the receiving water course.

Discharges from any dewatering where groundwater is intercepted will meet Waikato Regional Plan permitted activity rules (3.5.4.4). No adverse effects must be noted in the receiving water body and WRC must be notified 10 days in advance of works requiring any discharge to stormwater or watercourse.

Sample jars will be made up to allow visual assessment of compliance on site. All dewatering will be managed by a permit to pump and monitoring records and photos used to confirm compliance.

Where possible water will be discharged to land where it is able to soak to groundwater. If this is not possible, then water will be directed to the HCC stormwater system where discharge will be via a stabilised outfall. Water will be treated to ensure sediment has been removed prior to discharge. This may be through sediment controls established on site or devices such as turkeys nest or lamella units. Flocculants are not to be used in this area as this requires a consent from WRC.

Where the permitted activity criteria cannot be met removal by sucker truck or to trade waste may be required. A trade waste permit will be obtained as a contingency measure.

All Erosion and Sediment Control Plans will be attached as appendix F.

4.2.3 Dust

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As with any earthworks site there is potential for dust to be generated. All works will be managed so that dust is minimised and does not discharge beyond the site boundary where it may be a nuisance to neighbouring residents.

Pump Station

The pump station site entry is close to neighbours, however the bulk earthworks for the pump station will be approximately 50m to the west or 85m south of the closest neighbours so that residents will be up wind of the site in prevailing weather conditions. The closest resident to the east of the site is over 250m away.

Tsai Pipeline Site

HCC earthworks consent 010.2021.00011843.001 applies to this area.

The site entry point at Prospect Terrace is close to neighbouring properties. The pipe laydown area is over 20m southeast of the closest properties on Peacocks Road which back onto the field.

Where the pipeline runs parallel to Prospect Terrace the work site will be 10m to the north east of the closest neighbours. The pipeline works running perpendicular to Prospect Terrace will be over 60m south east of properties that back onto the field from Peacocks Road.

10 Waterford Road

HCC earthworks consent 010.2021.00011378.001 applies to this area.

Works in the gully require minor trenching and will be below residential properties and screened by vegetation. Dust is not expected to be a significant risk.

The risk of dust being generated for trenching and micro tunnelling works is considered to be low as spoil will be removed immediately or covered with geotextile. The work area around the trench will be stabilised.

Dust will be controlled through:

- Minimising exposed surfaces by progressively stabilising completed areas.
- Use of trenchless methods (micro tunnelling and HDD)
- Maintaining a stabilised accesses road close to neighbouring residents.
- Progressive stabilisation of stockpile on site.
- Locating stockpile as far from residents as possible.
- Immediate removal of spoil from site (for trenching in roads and directional drilling in roads).
- Taking note of the wind direction, especially easterly and southerly winds, and modifying work practices, or halting work in certain areas where dust generation is excessive.
- Considering risk of dust when closing the site for the weekend or holiday periods (e.g., over long weekends during summer).

Weather conditions and dust mitigation will be discussed at daily briefings. The daily diary in Procore includes weather data and allows for daily observations to be reported.

The project manager or delegate will be available at all times in case of dust complaints, including outside of work hours. During work hours the site foreman/ supervisor will be responsible for making sure dust is managed within their work area. Any issues and response will be recorded in the site diary. All dust complaints or discharges will be recorded as Environmental Incidents in Radar.

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The Construction Manager will ensure that resources are available to monitor for dust during high risk periods and respond to dust complaints immediately. Methods that may be employed in this case include:

- ▶ Use of watercarts or sprinklers
- ▶ Stabilising of areas not worked for long durations
- ▶ Covering stockpile with geotextile or other temporary means of stabilisation
- ▶ Wheel wash facilities for dusty vehicles leaving site.

Site specific management of dust is also discussed in the project CESC attached as appendix F to meet WRC Consent Conditions for the Designation and Tsai Pipeline areas.

4.2.4 Contaminated Land

A Contaminated Site Management Plan has been developed on behalf of HCC by 4 Sight Consulting for areas within the PSTP site boundary. This includes the location of the pump station and Tsai Pipeline.

The CSMP notes that managed fill has been placed in a former sand quarry site, and some areas are potentially contaminated with asbestos. This includes the location of the pump station. Refer to figure below and to the CSMP for details.



Figure 5 Managed Fill and Potential Asbestos Areas taken from Figure 4 of CSMP

The preliminary site investigation carried out on the pipeline alignment through the Tsai property in September 2019 concluded there is potential for contamination based on historic use.

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Figure 6 Tsai Pipeline Site (outlined in red)

HCC has obtained consent 010.2020.00010888.001 from Hamilton City Council to allow soil disturbance on the site under the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.

Prior to soil disturbance in the Pump Station and Tsai Pipeline work areas:

- A prestart meeting will be held with the contaminated land specialist, HCC contaminated land officer and the construction supervisory team.
- Soil sampling must be carried out by 4Sight and if necessary, a Remediation Action Plan must be developed in consultation with BPC.
- The CSMP must be updated by 4sight once soil sampling has been undertaken.

We note the WRC consents requires copies of the CSMP, RAP and Validation Reports to be submitted for information should contaminated land be discovered.

All works in this area must be managed in accordance with the updated CSMP which will be appended to this document as it is updated.

Revision 2, February 2021, of the CSMP is attached to this CESMP as appendix E.

Work Areas in Road and Council Reserve

No other areas of contamination are known of in the remaining works areas.

Accidental Discovery Protocol

Should signs of contaminated land be found the discovery protocol in the CSMP or RAP will be followed where it applies.

In all cases works will cease immediately and the area made secure to prevent potential discharge of contaminants to the environment or any impact on human health. Discharge of contaminants via plant movement, dust, surface run off and dewatering activities will all be controlled.

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The Engineer will be advised and advice sought from the contaminated land SQEP for the project.

4.2.5 Visual Effects and Housekeeping

Construction sites can accumulate rubbish, generate litter, and attract pests if not well managed. The project will be maintained in a tidy manner and this will be checked as part of the weekly site inspection.

Skips and bins will be provided for waste and recycling and emptied regularly. The site yards will be fenced to discourage fly tipping.

4.2.6 Biosecurity

Transportation of earthworks machinery and fill material can result in the spread of pest plant species. This can put valuable habitat at risk and reduce the productivity of farmland. No pest species have been noted as being on site in the contract documents, however they may be present and must not be spread. Pest species are listed on the WRC website <https://www.waikatoregion.govt.nz/services/plant-and-animal-pests/>.

All plant and machinery will be cleaned before being transported to site to prevent this. Any fill material imported will be clean fill free of vegetation and meeting the definition of clean fill in the Waikato Regional Plan. Plant will be inspected on arrival to ensure it is clean.

4.2.7 Imported Fill

Where fill is required to be imported this will be clean fill as defined by the Waikato Regional Plan, being quarry sourced aggregate or sand material or virgin soil material sourced from a location which has been confirmed as free of soil contamination risks, as detailed in the consent.

The Project Engineer will conduct monitoring of any clean fill material delivered and keep records of material source, volume and type to confirm this. These records can be made available to WRC on request.

Large volumes of imported fill are not expected to be required.

4.2.8 Ecological Impacts

Ecological assessments for works in the designation area have not identified any areas of value within the Wastewater Pump Station work area.

Works to install sewer pressure and gravity mains by trenching, directional drilling and micro tunnelling will primarily be in road reserve or pasture.

The trees and vegetation in the council reserve at 10 Waterford Place are protected as they provide habitat for bats. Directional drilling will be used to avoid damage to trees. No works are to be done outside of daylight hours to avoid disturbing bats.

4.2.9 Noise and Vibration

Construction activities can disturb occupants of neighbouring properties and cause property damage if not well managed in compliance with the district plan or designation noise and vibration limits. Communication with residents close to construction work will be done as described in the Communications Plan.

Pump Station Site

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A Construction Noise and Vibration Management Plan (CNVMP) will be completed for this work area. This will be submitted to HCC for approval 40 working days prior to work starting. All works will be carried out in compliance with that plan which is to be attached as appendix C.

Tsai Pipeline

The earthworks consent for work on the Tsai property (010.2021.00011843.001) sets noise limits under condition 2. Limits are detailed in the table below.

Works for this site, particularly construction of the on line storage capacity, will require machinery as close as 20m to residential properties. Vibration is not expected to effect neighbouring residents.

Use of 20t excavators, truck and trailer, some generators and extraction fans within 20 – 25m of properties may not comply with the 70dB Leq day time limit and works will be planned so that these are set back further where possible or screened may be required. Noise monitoring will be undertaken to confirm compliance.

Vibro hammers will not be used in this area. These would exceed noise limits unless set back 83m.

Time period	Monday to Friday		Saturdays		Sundays and Public Holidays	
	Leq (dBA)	Lmax (dBA)	Leq (dBA)	Lmax (dBA)	Leq (dBA)	Lmax (dBA)
06:30am to 07:30am	55	75	45	75	45	75
07:30am to 06:00pm	70	85	70	85	55	85
06:00pm to 08:00pm	65	80	45	75	45	75
08:00pm to 06:30am	45	75				

10 Waterford Road Council Reserve

The earthworks consent for works in the Council Reserve at 10 Waterford Road (010.2021.00011378.001) requires a CNVMP under condition 5. This will be submitted to HCC as regulator for approval at least one month before works commence in that area.

Works will be carried out in compliance with that CNVMP which will be attached at appendix C.

Works in Road Reserves

Assessments undertaken to consent the works do not consider noise or vibration to be a significant risk. No impact or vibratory piling is required.

All works will be completed in compliance with the Standard Operating Procedure for Noise ENV-03 available on Fletcher One and attached in Section 7. Prior to works commencing in an area the Waka Kotahi construction noise calculator will be used to determine if there is a risk of the noise limit being exceeded. If noise limits cannot be met then alternative methodologies or mitigation will be considered in conversation with the Engineer.

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Time of week	Time Period	Duration of Work					
		Typical duration (dBA)		Short-term duration (dBA)		Long-term duration (dBA)	
		Leq	Lmax	Leq	Lmax	Leq	Lmax
Weekdays	0630-0730	60	75	65	75	55	75
	0730-1800	75	90	80	95	70	85
	1800-2000	70	85	75	90	65	80
	2000-0630	45	75	45	75	45	75
Saturdays	0630-0730	45	75	45	75	45	75
	0730-1800	75	90	80	95	70	85
	1800-2000	45	75	45	75	45	75
	2000-0630	45	75	45	75	45	75
Sundays and Public Holidays	0630-0730	45	75	45	75	45	75
	0730-1800	55	85	55	85	55	85
	1800-2000	45	75	45	75	45	75
	2000-0630	45	75	45	75	45	75

Figure 7 Noise Limits from NZS 6803:1999 for noise received in residential zones.

Vibration monitoring if required in case of a complaint will be carried out in accordance with the Environmental Standard Operating Procedure ENV-16 Construction Vibration Monitoring.

4.2.10 Ground Settlement from Earthworks and Dewatering

Earthworks and dewatering have the potential to cause ground settlement. Where buildings are close to the works these settlement effects can result in property damage.

Dewatering below the level of the groundwater table is required in three locations:

- At the Pump Station to allow construction of the wet/ dry well and Emergency Storage Tank. The pump station excavation is over 50m from the nearest residential property.
- For the Fitzroy Stage 1 Gravity Main (known as the Tsai Pipeline)
- For the N4 Gravity Main along Peacockes Road.

Dewatering of 345m³/day is currently consented within the designation and Tsai Pipeline. This is not expected to result in any groundwater settlement.

Sections of the pipeline to be installed by directional drilling or micro tunnelling will not require dewatering other than to establish and remove access pits. The open trenching through Fitzroy Gully will be above the groundwater table.

This dewatering is to be monitored to ensure compliance and all pump operation will require a permit to pump. Refer to the Dewatering Management Plan attached as appendix H.

Additional consents have been applied for by HCC to increase the groundwater take, and to include the PTS N4 Gravity main. This may result in settlement effects that will be assessed as part of that consent process.

Deep excavations will require temporary supports such as sheet piling and trench shields to reduce the amount of earthworks required to safely construct at the required depth. These excavations will be carried out in

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compliance with Fletcher Constructions Temporary Works Management and Design Procedure. Adjacent structures, buildings and services will be considered in this process and monitoring carried out if required.

The Temporary Works Procedure places roles and responsibilities on those who estimate, specify, design, check, build and use temporary works across all Fletcher Construction divisions projects and activities and to ensure that all temporary works tasks used on our projects, are managed and designed in accordance with local law, regulations, standards and Approved Codes of Practice (ACOP).

4.2.11 Dewatering

Groundwater drawdown can impact on availability of ground water for other uses.

Dewatering of 345m³/day is currently consented for the Pump Station and Tsai Pipeline. Additional consents for increased volume are being sought, as described above. A condition of this consent is that water take is not used for any purpose and is returned directly to the environment either by soaking into the ground or discharge to stormwater system.

Dewatering will be controlled by a permit to pump and controls to mitigate any impacts of dewatering are outlined in the Dewatering Management Plan, to be approved by WRC and attached to this plan as appendix H.

4.2.12 Management of Cement and Grout Slurries

The pump station construction will require multiple concrete pours at the low point of the site which will require dewatering. There is a risk of high pH water being discharged from the site during this time.

A Permit to Pump system will be used to manage all dewatering, and monitoring will be undertaken to ensure pH is acceptable. All dewatering will be managed as per a Dewatering Management Plan, approved by WRC, and attached as appendix H.

Washout of concrete trucks, concrete pumps and waste concrete can also generate high pH run off which can contaminate watercourses if not managed. Washouts will be in skips or small excavations isolated from overland flow paths.

All concrete washouts will be to a signed washout point, and waste concrete returned to the batching plant. Washout points must not be within 20m of watercourses or in overland flow paths, or under the drip line of trees.

Further information is available in ENV-10 Waste Concrete and Grout Procedure.

4.2.13 Protected Trees

There are no protected trees at the pump station or Tsai Pipeline worksite. This was previously a pasture, and all trees have been cleared prior to BPC gaining occupation of the site.

Trees in the council reserve at 10 Waterford Road, alongside the Mangakotukutuku Stream, are protected. Directional drilling will be used to avoid damage to trees where necessary.

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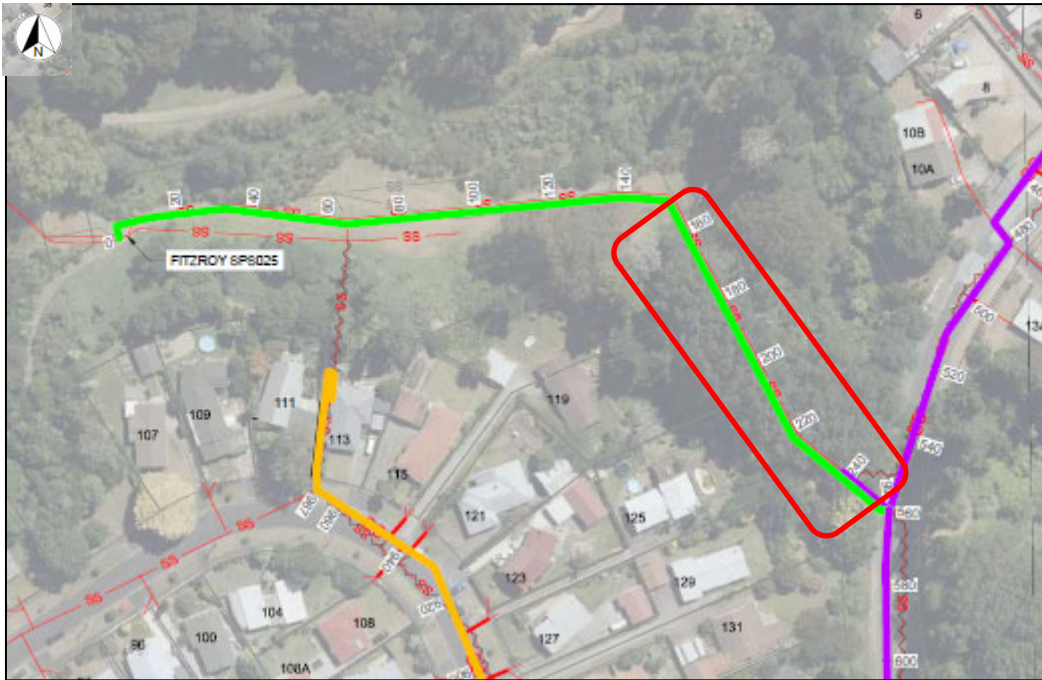


Figure 8 Council Reserve Protected Trees – showing area where directional drilling is likely to be required to avoid trees.

Prior to any tree clearance or work within the drip line of any trees the consent status and landowner permission will be confirmed. Any protected trees near to works will be clearly marked with tape or temporary fencing to protect them from accidental damage.

4.2.14 Archaeological and Cultural Discovery

There is always a risk of unexpected discovery during earthworks. Should this occur the Engineer will be advised and the following protocol provided in the contract documents (Specification Clause 6.2.1.3) will be followed:

- a) Advise (Te Haa O Te Whenua O Kirikiriroa Trust representative Rawiri Bidois), the project Archaeologist and the appropriate territorial authority for the particular site, within one day of the discovery.
- b) Cease works within 20 metres of any part of the project site affected by the discovery;
- c) The archaeologist should attend site to confirm if the material is archaeological in nature and to confirm if kōiwi is discovered;
- d) Contact the NZ Police, Coroner and Heritage New Zealand as appropriate;
- e) Undertake specific preservation measures to address any discovery that includes water-logged or wet archaeological materials; and
- f) Not recommence works in the parts of the project site affected by the discovery until all necessary statutory authorisations or consents have been obtained.

An archaeological assessment has been undertaken for the Peacockes Strategic Transport area. There are no registered archaeological features in the pump station or Tsai pipeline work areas. An archaeological assessment is being undertaken by HCC for the Fitzroy works area.

To meet the designation conditions, the project will notify the Project Archaeologist, Territorial Authority and Tangata Whenua Working Group 20 working days prior to earthworks to establish a working relationship and contact details.

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Accidental discovery within the Pump Station and Tsai Pipeline area must also meet consent conditions. They must be reported to WRC and the Tangata Whenua Working Group (where artefacts are of Maori origin). Written approval from WRC is required to restart works.

Accidental discovery within the designation area is also subject to designation conditions and a Heritage and Archaeological Site Management Plan.

Relevant aspects of this protocol and signs of potential sites to look for will be communicated to all staff via the induction process and posted on site noticeboards.

4.2.15 Hazardous Substances Management

Hazardous substances have the potential to damage the environment through spills and harm workers who come in contact with them. Where hazardous goods are to be used staff will be trained in their use and PPE and handling considerations will be included in the JSEA for each task.

All hazardous goods will be managed in compliance with relevant procedures:

- ENV-21 Refuelling and Maintenance Procedure
- HSG-15 Hazardous Substances Handling and Storage
- ENV-02 Fuel, Oil and Chemical Spills

Refuelling will be done by mini tankers. Refuelling and any onsite maintenance will be done over 20m from water courses, storm water, protected vegetation and groundwater abstraction. No bulk fuel or chemicals will be stored on site.

Fuels and chemicals will be labelled & kept covered in secure in secondary containment. MSDS sheets and hazardous substances inventory will be available on site. These are also attached as appendix J.

Weekly inspections will include inspections of fuels and hazards goods storage.

4.2.16 Polymer /Bentonite Management

Directional drilling and to a lesser extent, micro tunnelling operations require drilling fluids. Works must not allow any uncontrolled discharge of these drilling fluids particularly to stormwater or watercourses where they can do environmental damage. This work will be required to install sections of sewer.

Controls will be detailed in the drilling subcontractors JSEA and work plan. Minimum controls will include:

- ▶ Mixing plants being located at least 20m from watercourses and away from overland flow paths and flood plains.
- ▶ Bunding to be in place around any mixing plant.
- ▶ Waste drilling fluids to be disposed to licenced disposal facilities.
- ▶ Monitoring of pressure to identify any frac out promptly.
- ▶ Secondary controls or monitoring and contingency plan to be in place where frac out may occur.
- ▶ Visual inspection and monitoring of waterways during adjacent horizontal drilling works.

Weekly inspections will include inspection of operations with drilling fluids.

4.2.17 Imported Fill

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The cut fill balance on site will not require importing of fill material. Should any material be imported for any reason then this will be checked to ensure it meets the WRC clean fill criteria.

It must not include:

- a) material that has combustible, putrescible or degradable components
- b) materials likely to create leachate by means of biological or chemical breakdown
- c) any products or materials derived from hazardous waste treatment, hazardous waste stabilisation or hazardous waste disposal practices
- d) materials such as medical and veterinary waste, asbestos, or radioactive substances that may present a risk to human health; and
- e) soils or other materials contaminated with hazardous substances or pathogens.

The imported material will be from a source confirmed to be free from contamination risks. Quality checks will be incorporated into the Inspection Test Plan for any imported soil and inspection and test records will be available to WRC on request.

4.2.18 Property Access

Contractors can impact on project neighbours by parking so that access is blocked or disturbance is caused by congregations in the street early in the morning.

Where space allows at the N4 Pump Station and Tsai Pipeline some off road parking will be provided for staff. On street parking will be utilised by staff and subcontractors at times. The team will be reminded to park legally, without blocking driveways, and not to have meetings, slam doors and use radios outside properties prior to starting works in the morning. This will be included in the project induction.

4.3 Work Packs

Work Plans and associated Inspection and Test Plans are developed for each significant element of construction to ensure that the project quality objectives are met. The structure of breakdown of works into ITPs will be confirmed as work progresses.

Quality assurance is detailed in the project Quality Management Plan. This outlines how the project will be managed in line with Fletcher management systems, which are ISO9001 certified.

Environmental and sustainability requirements are to be incorporated into construction Work Plans as relevant to the task.

The primary source of information for engineers writing work plans will be this Environmental and Sustainability Management Plan, Risk Register, Project Management Plans and the Fletcher Construction SOP's. The Construction Manager (or as delegated by the Project Manager) must review all Work Plans.

4.4 JSEA's

A Job Safety and Environmental Analysis (JSEA) form will also be used to further identify significant project risks, including health and safety, environmental and quality.

These forms will be prepared in advance of major aspects of work. Environmental risk areas that will be covered will include those areas identified in the Environmental Risk Register.

Construction Environmental & Sustainability Management Plan

Document Number: D07.01

The Construction Manager (or as delegated by the Project Manager) must review all JSEA's. These are live documents which are reviewed as required throughout the project.

4.5 Take 5 Risk Assessment

In addition to a JSEA, site staff may use a Take 5 personal risk assessment to assist in completing a low-risk task or change of task without harm to people or the environment. This is a tool to encourage a person to stop before they undertake an activity, think about what could go wrong and what they need to do to prevent harm to themselves, others and the environment before going ahead.

These must be signed off by the person undertaking the task and are only appropriate for management of low-risk activities. They do not replace JSEAs or daily briefings.

4.6 Training and Awareness

Training and awareness programmes are critical to ensuring that there is an appropriate level of environmental and sustainability knowledge for those staff and subcontractors involved in the project.

Training of site staff will be provided through project inductions, weekly Share meetings (toolbox talks) monthly Share meetings, information posters such as spill response plans and any site-specific training considered necessary such as archaeological discovery protocols, spill kit training, erosion and sediment control training and waste reduction/recycling training. Protect Share boards will include environmental information including EHS Alerts, Sustainability in Practice Alerts and Learn documents from across the business.

Resources including posters covering the management of key environmental nuisance issues such as dust, noise and spill response are available on Fletcher One website.

All staff and subcontractors will be inducted to the site prior to starting works. This induction will include the identification of sensitive ecological areas in the vicinity of the works, key environmental issues, key environmental controls such as sediment control devices, archaeological site protection, dust and noise mitigation procedures and sustainability practices to be followed i.e., waste avoidance, recycling routine and energy saving measures.

Environmental and sustainability issues will form a regular part of Share Meetings (toolbox meetings) to ensure all workers are aware of the key issues. Opportunities will also be made available for selected staff members to attend industry training programmes where they would benefit from further training.

Site staff will be made aware of the restrictions in operations when working near designation, property boundaries, and areas of vegetation that are required to be protected as part of the Work Pack communication process. Areas will be marked or fenced wherever possible.

This Environmental and Sustainability Management Plan is supported by the Fletcher Environmental SOP's which gives practical guidance on typical construction site environmental management and is available on the Fletcher One website.

Copies of training records and Share Meetings should be kept in compliance with G01 Information Management found on the Fletcher One website.

4.7 Incident Response

The Project Manager is responsible for ensuring that all actions relating to environmental incidents are adequately attended to, investigated and closed out.

Construction Environmental & Sustainability Management Plan

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The Fletcher Construction Crisis Management Plan provides guidance on emergency actions, this is located on the Fletcher One website under G05 Crisis Management.

4.7.1 Incident and Near Miss Reporting and Investigation

All environmental incidents, near misses and observations (environmental hazards or positive events) must be reported and recorded on either an Incident Field Report or Observation Card and entered into Fletcher Building's electronic incident reporting system (Radar).

Incidents are ranked from 1 (minor) to 4 (catastrophic). The scope of the investigation depends on the complexity and actual and potential impact of the incident as outlined in the EHS Event Observation, Identification, Notification and Investigation Process. This is available on [Fletcher One](#) and included in section 7 Standard Forms and SOPs.

4.7.2 Notification Procedures

Incidents shall be notified within set timeframes depending on their actual or potential severity as outlined in the document referenced above; additionally, they shall be notified to external organisations as required by local authorities.

Where a risk is identified that may be applicable to other sites an EHS Alert will be issued internally and externally if appropriate.

The Engineer will be notified of serious incidents affecting the environment immediately. Details of any compliance issues and corrective actions will be included in the Monthly Environmental Compliance Report.

To meet designation requirements, any spill greater than 10 litres will be reported to HCC (as regulator) within 24 hours.

4.7.3 Spill Response

Hydrocarbon spill kits are to be maintained on site where there is a risk of a spill. Staff have regular training on spill response. Work plans are developed to provide guidance on actions for specific types of spill.

A Spill Response Plan has been developed for the project and will be displayed in communal areas.

4.7.4 Complaints

Complaints on environmental issues may be received by the project staff directly from the person(s) affected, indirectly through a regulatory authority, or via senior management. All complaints will be treated with the respect and responded to in a timely manner. Details will be recorded and reported to The Engineer.

Complaints and enquiries will be managed by the Projects Stakeholder Manager in consultation with the Project Manager and Environmental Manager as necessary.

In addition to details and location of the complainant, additional information relevant to the complaint must be recorded from the site team, including

- ▶ Weather conditions, including wind direction and cloud cover
- ▶ Activities on site
- ▶ Other activities in the area that may have contributed to the issue
- ▶ Relevant environmental monitoring

Construction Environmental & Sustainability Management Plan

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For more information regarding the management of environmental complaints refer to the Project's Stakeholder and Communications Management Plan.

4.8 Monitoring and Inspections

Monitoring the achievement and success of environmental control measures and sustainability practices will be achieved through site inspections, tests and audits.

A documented weekly inspection of the site will be undertaken by a project representative with the aim to identify any issues and rectify them as soon as possible to maintain compliance and improve performance.

Depending on the duration of the project, audits by environmental and sustainability staff external to the project will be undertaken. Audits are a good way of identifying areas for improvement. Audit results must be communicated to staff and action items closed out in a timely manner.

The Project Manager is responsible for ensuring environmental monitoring and inspections are undertaken.

Project Managers and Supervisors will carry out EHS walks focusing on top risks to demonstrate leadership commitment to EHS.

Audits and inspections will be completed in Procore and will be available to the Engineer for review.

More guidance on inspections and auditing can be found in the Environmental and Sustainability Manual located on the Fletcher One Environmental Library.

4.8.1 Construction Environmental and sustainability management plan monitoring and review

This Management Plan will be reviewed at least annually throughout the project to ensure that any changes in the project scope, environmental effects, sustainability issues and learnings from incidents have been adequately addressed/included.

Changes to aspects of this plan that have been provided to meet consent conditions will require the approval of the regulator (HCC) and the Engineer prior to implementation.

Audits of the implementation of the Environmental and Sustainability Management System on the Project will be undertaken at least annually during the project to ensure internal and external requirements are being met.

4.8.2 Corrective and preventative actions

Corrective and preventative actions resulting from compliance monitoring, routine inspections, internal and external audits and regulatory compliance monitoring will be undertaken in a timely manner. Ultimate responsibility for this sits with the Project Manager, however this will be appropriately delegated to the Project Team.

Corrective and preventative actions will also be developed following the identification of root causes during an incident investigation. Once the corrective and preventative actions have been successfully implemented, future incidents of a similar nature should be prevented from reoccurring. Environmental Alerts shall also be issued as per the Incident Reporting, Notification and Investigation Flowchart to increase awareness of the risk and reduce the likelihood of similar incidents occurring across the business unit.

Construction Environmental & Sustainability Management Plan

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5 Sustainability

5.1 Water Conservation

Water conservation is of increasing importance as areas are subject to drought, and water infrastructure comes under increasing pressure. We will record water use by the project.

On this project we will conserve water by:

- Use non potable water sources where available (note dewatering water is not available for this purpose).
- Have trigger controls on all hoses.

Additional controls will be added as identified as the detailed construction method is developed.

5.2 Waste Minimisation

Fletcher Construction is committed to reducing construction waste.

Data capture

To better manage waste, the weight of waste disposed to landfill and recycling and estimated reuse are captured centrally by Fletcher Construction and reported for each Business Unit, or by branch or project where applicable. This project will record waste data.

Waste and recycling options on this site are detailed on the table below.

This is to be completed once waste contractors confirmed.

Waste Type	Supplier	Address	Account #	Account Name	Monthly Reporting by Project Y/N?	
Landfill					<input type="checkbox"/>	<input type="checkbox"/>
Organic (Commercial Composting)					<input type="checkbox"/>	<input type="checkbox"/>
Co-mingled Recycling					<input type="checkbox"/>	<input type="checkbox"/>
Steel					<input type="checkbox"/>	<input type="checkbox"/>
Timber					<input type="checkbox"/>	<input type="checkbox"/>
Paper					<input type="checkbox"/>	<input type="checkbox"/>
Cardboard					<input type="checkbox"/>	<input type="checkbox"/>

Site specific waste minimisation initiatives

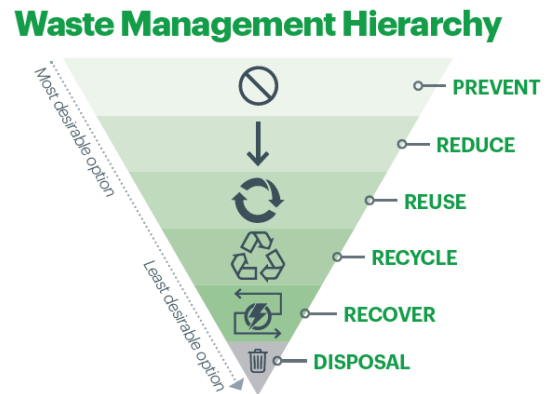
Fletcher Construction recognises the waste hierarchy when considering options for waste disposal, as shown below. (Source MfE). Reducing the volume of materials required, planning for reuse of materials and recycling.

On this site we will use the following methods where possible:

Construction Environmental & Sustainability Management Plan

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- Use reusable steel/ wooden form works.
- Reuse of spoil at pump station for backfill
- Recycle HDPE offcuts
- Recycle PVC Pipe offcuts
- Work with our supplier to eliminate packaging.



5.3 Carbon emissions

Fletcher Building reports its Green House Gas emissions annually and has set a science-based target to reduce its GHG emissions by 30% by 2030. Fletcher Construction has developed a strategy to deliver its part in this challenge.

Data capture

This project captures direct emissions from fuel use and purchased energy emissions (Scope 1 & 2) for reporting to Fletcher Building. This data is collected centrally by FCC accounts where regular and preferred suppliers are used.

Where resources are shared with other organisations, the proportion of carbon allocated to the BU, branch or project will be the same as the proportion of the cost of the resource.

For this project relevant suppliers are:

Waste Type	Supplier	Address	Account #	Account Name	Business Unit Proportion	Monthly Reporting by Project Y/N?	
Electricity						<input type="checkbox"/>	<input type="checkbox"/>
Mini Tankers						<input type="checkbox"/>	<input type="checkbox"/>
LPG						<input type="checkbox"/>	<input type="checkbox"/>

The site contact for carbon suppliers is Emma McPherson.

Carbon reduction initiatives

Our projects endeavour to reduce embedded carbon where possible. Typical hot spots for carbon are concrete and steel. Both are carbon intensive, however, working out which options will result in the greatest carbon saving is not always simple. As a member of ISCA, Fletcher Construction may use the ISCA materials calculator to determine how much carbon is embedded in a material.

It is recognised that carbon reduction opportunities are greatest in the planning stages of a project, where the design can be changed. On this project there is still opportunity to eliminate carbon through value engineering and finding efficiencies in the construction methodology.

The following opportunities have been identified to reduce carbon on this project and will be utilised where possible:

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- Use of electricity rather than diesel generators
- Optimisation of vehicle movements through planning of deliveries
- Carpooling to site
- Use of trenchless technology to install sewer mains, reducing spoil transport and backfill manufacture and transport emissions.
- Working with HEB to find opportunities to reuse spoil within site, reducing carbon emissions associated with transport
- Use of recycled aggregates where possible

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6 Stakeholder liaison

It is important that stakeholders are kept informed of project progress where this may affect them.

There is potential for neighbouring residents to be impacted by construction effects, including traffic, noise, vibration, dust and property access. Construction sites also present a hazard to the public should they enter the site.

6.1 Communication

The Project will notify surrounding residents of key information around the Project, including start dates, traffic management which may impact them, project contact details and works that may cause noise or vibration. Notification will be through:

- ▶ Project signage will be installed at 3 locations around the works, including the Pump Station site access.
- ▶ Information sheets delivered to local neighbourhood.

6.2 Public Safety

The N4 Pump Station site will be secured with 1.8m high deer fencing to protect the public from hazards within the site.

Drainage works will be clearly marked in line with Traffic Management Plan requirements. Any hazards to the public will be isolated. In particular 1.8m high temporary fences will be used to isolate excavations.

Refer to the Stakeholder Communications and Management Plan for details.

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7 Standard Forms and SOP's

This Environmental and Sustainability Management Plan is supported by the following standard forms and standard operating procedures that are contained in the Fletcher Construction Environmental Library located on Fletcher One.

Templates will be adapted to fit the specific requirements of the project and where practical these will be added to Procore.

- ▶ Fuel, Oil and Chemical Spills SOP
- ▶ Refuelling and Maintenance of Vehicles and Equipment SOP
- ▶ Hazardous Substances Handling and Storage SOP
- ▶ Dewatering Disposal SOP
- ▶ Permit to Work - Pumping & Monitoring Forms
- ▶ Noise Monitoring Operational Process
- ▶ Vibration Operational Process
- ▶ Tree Works Operational Process
- ▶ Discovery of Contaminated Soils SOP
- ▶ Archaeology SOP
- ▶ Erosion & Sediment Control SOP
- ▶ Sediment Discharge Emergency SOP
- ▶ Environmental Inspection Checklist
- ▶ Waikato Regional Council fact sheets and as-built templates

Permit to Pump



PipeWorks



Piletech

Seovic

Project Name:

Permit No:

Permit Request

Person/ Company requesting permit

Location to be dewatered

Description of area to be dewatered

Note any factors affecting water quality e.g. grouting, or contaminated ground.

Person in charge of work

Contact No.

Position

Pumping Details

Any impurities other than sediment

e.g. cement, oil

Final discharge point

if water will leave site

e.g. stormwater drain/ creek/ river/ wetland

Size of pump / rate of discharge/
volume to dewater

Pumping hours of operation

Overnight or work hours only?

Start date

Expiry Date

Controls and Monitoring

Pump Inlet controls

How will we exclude fish & excess sediment?

Pump Outlet controls

How will we prevent scour?

Sediment control

intermediate discharge point

How will we remove sediment? e.g. pump to turkeys nest first/ pump to pond (raised decant)

Discharge Criteria

Water must not leave site unless this criteria is met

How do we define clean water? Refer to consent conditions. Consider sediment, pH & contaminated land.

Monitoring location

Where will we check water meets discharge criteria?

Monitoring frequency

Every 2, 4, 8, 24 hours?

Other Monitoring Requirements

*Refer to Environmental Procedures:
ENV-10 Waste Concrete and Grout
ENV-11 Dewatering Discharge*

We must check water meets discharge criteria before it leaves site. You may also need to monitor the pump intake and outlet for scour etc. It is useful to monitor the receiving environment downstream of the outlet for signs of disturbance/ discoloration.

Person responsible for monitoring

Contact No.

Authorisation *The person authorising this permit must understand the project resource consents and ESCPs or Regional Plan Rules.*

Name

Date

Role

Receipt of Permit *Person in Charge of Work to complete*

As the Person In Charge of Work I understand that I am responsible for informing the personnel under my control of the content and limits of this Permit. I confirm that the specified environmental requirements have been taken and authorise this Permit to go into effect.

Name

Signature

Date

Permit Closeout *Person in Charge of Work to complete and return closed out permits and monitoring records to the Authoriser*

As the Person In Charge of Work I confirm that pumping activities described in this permit have now been completed.

Name

Signature

Date

Permit to Pump Monitoring Sheet



PipeWorks



Piletech

Seovic

Project Name:

Permit No:

Monitoring Requirements:

Note the discharge criteria, pump intake and outlet monitoring from the Permit to Pump

- Clarity >100mm visibility pH is between 5.5 & 8.5
 No oily sheen, discolouration or odour Turbidity < _____ NTU
 Jar sample for visual match/ lab testing (criteria < _____ mg/L) Photos

Other:

Monitoring Frequency:

Every 1, 2, 4, 8, 12, 24 hours (circle).

Mark box with ✓ or × to indicate if above monitoring criteria has been met. If criteria is not met - stop pumping and contact the permit authoriser immediately.

Week Starting:	7 am	9 am	11 am	1 pm	3 pm	5 pm	7 pm	Staff member undertaking monitoring	Monitoring Location	Comments
Mon										
Tues										
Wed										
Thur										
Fri										
Sat										
Sun										

Sketch Site Layout

Note Pump Inlets, Outlets and Monitoring Locations. Note any protected environments where relevant.

Note that taking and discharging water within 100m of a Natural Wetland is now restricted by the National Environmental Standard – Fresh Water introduced in September 2020.

If in doubt contact your Environmental Manager. More info is in ENV-11 Dewatering Disposal or refer to Ministry for Environment factsheets on Freshwater Reforms.

Environmental Checklist - Peacockes Waste Water Pump Station

Locations Inspected:

Inspected By:		Date:	
Weather:		Time	
Aspect	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Comments
General			
JSEA's and Prestarts include environmental issues	<input type="checkbox"/>	<input type="checkbox"/>	
Toolbox talks include environmental issues	<input type="checkbox"/>	<input type="checkbox"/>	
Spill response plan displayed	<input type="checkbox"/>	<input type="checkbox"/>	
Spill kits onsite and fully stocked	<input type="checkbox"/>	<input type="checkbox"/>	
Site wastewater disposed appropriately	<input type="checkbox"/>	<input type="checkbox"/>	
Erosion & Sediment Control – This Section to be completed before and after Rain Events.			
Completed areas effectively stabilised (e.g. grassed)	<input type="checkbox"/>	<input type="checkbox"/>	
Exposed areas minimised (mulched/covered)	<input type="checkbox"/>	<input type="checkbox"/>	
Silt fences in good order.	<input type="checkbox"/>	<input type="checkbox"/>	
Cess pit protection maintained	<input type="checkbox"/>	<input type="checkbox"/>	
Road exit points free from dirt/debris	<input type="checkbox"/>	<input type="checkbox"/>	
Wheel wash operational (when required)	<input type="checkbox"/>	<input type="checkbox"/>	
Clean water diversions in place, as per ESCP	<input type="checkbox"/>	<input type="checkbox"/>	
Permits to pump in place	<input type="checkbox"/>	<input type="checkbox"/>	
Stormwater drains free of contamination	<input type="checkbox"/>	<input type="checkbox"/>	
Site dust under control	<input type="checkbox"/>	<input type="checkbox"/>	
Waste Control			
Concrete washout area used	<input type="checkbox"/>	<input type="checkbox"/>	
General site tidiness	<input type="checkbox"/>	<input type="checkbox"/>	
Waste Separation and Bins emptied	<input type="checkbox"/>	<input type="checkbox"/>	
Contaminated Soil appropriately managed	<input type="checkbox"/>	<input type="checkbox"/>	
Contaminated Water appropriately managed	<input type="checkbox"/>	<input type="checkbox"/>	
Chemical Control			
Bulk fuels and oils covered and banded	<input type="checkbox"/>	<input type="checkbox"/>	
No leaky equipment (or drip trays in place)	<input type="checkbox"/>	<input type="checkbox"/>	
No visual evidence of spills	<input type="checkbox"/>	<input type="checkbox"/>	
Other			
	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	

This record is to be made available to the Waikato Regional Council on Request.

Name: **Phone Number:**

Environmental Checklist - Peacockes Waste Water Pump Station

Area Specific Issues:							
Closeout Priority	High	Immediate action required <1 day	Medium	Within 1-2 days and / or prior to rain	Low	Within 1 week or as nominated	
1.	Paste photo in here		Area:	Detail area of site			
			Action:	What needs to be done			
			Select to delete priority you don't want				
			Priority:	High	Medium	Low	
			Responsible:	Who is going to make it happen			
2.			Area:				
			Action:				
			Priority:	High	Medium	Low	
			Responsible:				
3.			Area:				
			Action:				
			Priority:	High	Medium	Low	
			Responsible:				
4.			Area:				
			Action:				
			Priority:	High	Medium	Low	
			Responsible:				
5.			Area:				
			Action:				
			Priority:	High	Medium	Low	
			Responsible:				
6.			Area:				
			Action:				
			Priority:	High	Medium	Low	
			Responsible:				
7.			Area:				
			Action:				
			Priority:	High	Medium	Low	
			Responsible:				

Environmental Checklist - Peacockes Waste Water Pump Station

Area Specific Issues:						
Closeout Priority	High	Immediate action required <1 day	Medium	Within 1-2 days and / or prior to rain	Low	Within 1 week or as nominated
8.			Area:			
			Action:			
			Priority:	High	Medium	Low
			Responsible:			
9.			Area:			
			Action:			
			Priority:	High	Medium	Low
			Responsible:			
10.			Area:			
			Action:			
			Priority:	High	Medium	Low
			Responsible:			

Permit to Pump



PipeWorks



Piletech

Seovic

Project Name:

Permit No:

Permit Request

Person/ Company requesting permit			
Location to be dewatered			
Description of area to be dewatered	<i>Note any factors affecting water quality e.g. grouting, or contaminated ground.</i>		
Person in charge of work		Contact No.	
Position			

Pumping Details

Any impurities other than sediment	<i>e.g. cement, oil</i>		
Final discharge point <i>if water will leave site</i>	<i>e.g. stormwater drain/ creek/ river/ wetland</i>		
Size of pump / rate of discharge/ volume to dewater			
Pumping hours of operation	<i>Overnight or work hours only?</i>		
Start date		Expiry Date	

Controls and Monitoring

Pump Inlet controls	<i>How will we exclude fish & excess sediment?</i>		
Pump Outlet controls	<i>How will we prevent scour?</i>		
Sediment control <i>intermediate discharge point</i>	<i>How will we remove sediment? e.g. pump to turkeys nest first/ pump to pond (raised decant)</i>		
Discharge Criteria <i>Water must not leave site unless this criteria is met</i>	<i>How do we define clean water? Refer to consent conditions. Consider sediment, pH & contaminated land.</i>		
Monitoring location	<i>Where will we check water meets discharge criteria?</i>		
Monitoring frequency	<i>Every 2, 4, 8, 24 hours?</i>		
Other Monitoring Requirements <i>Refer to Environmental Procedures: ENV-10 Waste Concrete and Grout ENV-11 Dewatering Discharge</i>	<i>We must check water meets discharge criteria before it leaves site. You may also need to monitor the pump intake and outlet for scour etc. It is useful to monitor the receiving environment downstream of the outlet for signs of disturbance/ discoloration.</i>		
Person responsible for monitoring		Contact No.	

Authorisation *The person authorising this permit must understand the project resource consents and ESCPs or Regional Plan Rules.*

Name		Date	
Role			

Receipt of Permit *Person in Charge of Work to complete*

As the Person In Charge of Work I understand that I am responsible for informing the personnel under my control of the content and limits of this Permit. I confirm that the specified environmental requirements have been taken and authorise this Permit to go into effect.

Name		Signature		Date	
------	--	-----------	--	------	--

Permit Closeout *Person in Charge of Work to complete and return closed out permits and monitoring records to the Authoriser*

As the Person In Charge of Work I confirm that pumping activities described in this permit have now been completed.

Name		Signature		Date	
------	--	-----------	--	------	--

Permit to Pump Monitoring Sheet



PipeWorks



Piletech

Seovic

Project Name:

Permit No:

Monitoring Requirements:

Note the discharge criteria, pump intake and outlet monitoring from the Permit to Pump

- Clarity >100mm visibility pH is between 5.5 & 8.5
 No oily sheen, discolouration or odour Turbidity < _____ NTU
 Jar sample for visual match/ lab testing (criteria < _____ mg/L) Photos

Other:

Monitoring Frequency:

Every 1, 2, 4, 8, 12, 24 hours (circle).

Mark box with ✓ or × to indicate if above monitoring criteria has been met. If criteria is not met - stop pumping and contact the permit authoriser immediately.

Week Starting:	7 am	9 am	11 am	1 pm	3 pm	5 pm	7 pm	Staff member undertaking monitoring	Monitoring Location	Comments
Mon										
Tues										
Wed										
Thur										
Fri										
Sat										
Sun										

Sketch Site Layout

Note Pump Inlets, Outlets and Monitoring Locations. Note any protected environments where relevant.

Note that taking and discharging water within 100m of a Natural Wetland is now restricted by the National Environmental Standard – Fresh Water introduced in September 2020.

If in doubt contact your Environmental Manager. More info is in ENV-11 Dewatering Disposal or refer to Ministry for Environment factsheets on Freshwater Reforms.

Document Status

The most recent revision of this document is listed on FCC-MN-8001 Integrated Management System Documentation Schedule.

Introduction

1.1 Purpose

This procedure describes the measurement and assessment of vibration caused by specific construction activities such as:

- ▶ Piling,
- ▶ Surface compaction,
- ▶ The use of vibratory rollers,
- ▶ Heavy vehicle movements,
- ▶ Excavation works, and
- ▶ Blasting in close proximity to neighbouring buildings.

This procedure will enable staff to accurately assess the risks associated with construction vibration impacts and the degree of discomfort which may be experienced by workers and residents in close proximity.

1.2 Scope

This procedure applies to all construction work on a project where vibration monitoring is a contract, legal or resource consent requirement. In addition, this procedure is also to be used when the risk of complaints from perceived vibration effects has been identified as being likely to occur. It should be noted that this procedure is designed for short duration indicative monitoring as a result of complaints or to confirm compliance with required standards. Extensive baseline or long term, post construction vibration monitoring should be completed by suitably qualified experts. This procedure does not address the health and safety aspects of construction vibration.

References

German Standard DN-4150-3 (Feb 1999) *Structural Vibration Effects of Vibration on Structures*

[NZTA State Highway Construction and Maintenance Noise and Vibration Guide](#)

British Standard BSS 5228-2:2009 *Code of Practice for noise and vibration control on Construction and Open Sites: Part 2: Vibration*

Vibration Monitoring Equipment Manual

Project Construction Vibration Management Plan (or similarly named document, if applicable)

Standard Form and Template

Construction Vibration Monitoring Record

Construction Vibration Monitoring Register

1.3 Definitions

Annoyance	The level at which people feel vibration strongly enough to make a complaint.
Category A criteria	The level at which vibration generally creates a level of annoyance. At this level, vibration will not result in damage although there may be the perception that this has or will occur.
Category B criteria	Designed to protect buildings against damage.
Peak particle velocity (ppv)	The instantaneous maximum velocity reached by the vibrating surface as it oscillates about its normal surface. Typically measured in mm/s.

Transient vibration	Vibration that is temporary in nature but may be repeated frequently. An activity which produces transient vibration is impact piling.
Continuous vibration	Vibration that is maintained for an extended period of time. An example being vibrations associated with a tunnel boring machine.
Protected Premises and Facilities (PPFS)	Spaces in buildings used for residential facilities, marae, overnight medical care, teaching (and sleeping) in educational facilities, playgrounds that are part of educational facilities that are within 20m of buildings used as educational facilities.
Vibration	The period motion of an object about a normal position.

2 Notes

2.1 Vibration

An object or surface is said to vibrate when it oscillates or has another form of periodic motion about a position.

Vibration can be measured in a number of ways, however typically peak particle velocity (ppv) in millimetres per second (mm/s) is used for construction. Peak particle velocity is the maximum velocity reached by a vibrating object or surface as it is moved out of position or its state of equilibrium at any one time during the period of measurement. The number of times the object or surface moved through a complete cycle during one second is called the frequency and is measured in hertz (Hz).

The movement of the object or surface (or vibration) can be measured in three directions, 'vertical ppv', 'transverse ppv' and 'longitudinal ppv' or in a combination of the measurements, the 'resultant or component ppv'.

Vibration is generated during construction operations such as piling, demolition, surface compaction, drilling or the movement of vehicles, this vibration travels through the ground (or air if blasting) where it may be felt or heard by members of the public.

In some cases, construction vibration can cause re-radiated noise in dwellings. This is where construction vibration (typically arising from vibratory compactors or tunnelling) causes internal parts of the structure to vibrate which produces low frequency noise inside the dwelling. Noise is also often generated from vibration of household items, such as china rattling.

2.2 Vibration Receivers

Whether or not construction vibration effects are considered an annoyance by potentially affected parties is a very personal consideration. However, with communication and education of stakeholders, the number of complaints will reduce. Nevertheless, having the knowledge, equipment and ability to undertake vibration monitoring during high risk construction activities or near neighbours who may complain can help a project immensely. Through monitoring construction activities, evidence can be produced identifying the level of compliance (or not) with the required standards.

Complaints resulting from vibration effects often arise due to a misunderstanding of the potential impacts of vibration. Also noise generated by vibration often makes the vibration seem worse than it really is, often the vibration itself is not actually felt by the receiver and vibration is only noticed due to the noise generated.

An informative education programme for stakeholders covering off the levels at which humans can feel vibration and the levels at which vibration can impact and damage buildings is a critical first step when undertaking high risk vibration activities.

Factors associated with whether or not vibration will be considered a nuisance, depends on a number of factors including:

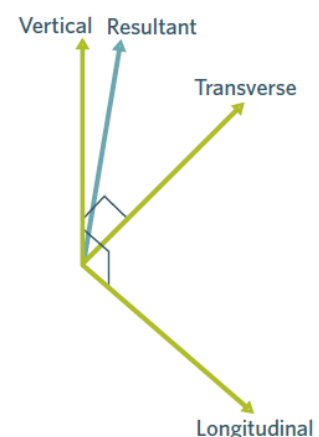


Figure 1: Directions that vibration can be measured.

Credit: NZTA State Highway Construction and Maintenance Noise and Vibration Guide

- ▶ The sensitivity of receivers e.g. schools, hospitals, retirement villages, industries with sensitive machinery in operation.
- ▶ Whether or not residents have been exposed to recent earthquake activity.
- ▶ Distance from the source to the receiver.
- ▶ The geology of the surrounding area.

The following values from the British Standard BSS 5228-2:2009 indicates the level of vibration and degree of annoyance perceived.

Vibration Level (component ppv)	Effect
0.14 mm/s	Vibration might be just perceptible in the most sensitive of situations. At lower frequencies, people are less sensitive to vibration.
0.3 mm/s	Vibration might be just perceptible in urban environments
1.0 mm/s	Likely to cause complaint in residential environments but can be tolerated if prior warning and explanation has been given to residents.
10 mm/s	Vibration is likely to be intolerable for more than a very brief period of exposure

Figure 2: Table showing levels of vibration and possible effects (from BSS 5228-2:2009).

2.3 Vibration Effects

The effects of vibration will vary depending on the type, level and duration. While the following diagram indicates that cosmetic damage will only occur above 5 ppv, it should be noted that there is still the potential for cosmetic damage to occur at less than this depending on the type of building or structure.

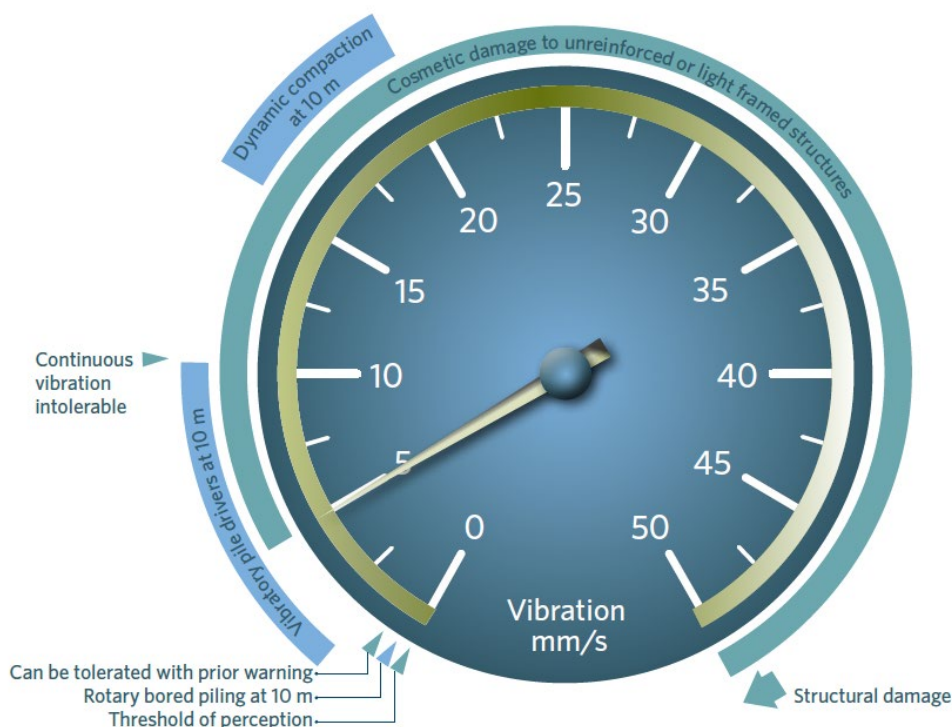


Figure 3: Diagram showing potential effects of vibration.

Credit: NZTA State Highway Construction and Maintenance Noise and Vibration Guide

The Figure 4 identifies the vibration limits generally included in resource consent conditions. The conditions typically require that if construction vibration:

- ▶ Exceeds Category A criteria limits - then a suitably qualified expert should be engaged to assess and manage construction vibration so that it complies with the Category A limits as far as practicable.
- ▶ Exceeds Category B criteria limits - then construction activity should only proceed with a suitably qualified expert monitoring the vibration levels and the buildings at risk of exceeding the Category B criteria.

Additional limits or monitoring requirements may be imposed in relation to heritage sites or culturally significant sites. Also note, the vibration limits for Sundays usually apply on Public Holidays.

The decision as to whether pre and post construction condition assessment reports are to be undertaken for potentially affected properties will be made on a project by project basis. Increasingly this is a requirement of the resource consent conditions. If not stipulated, an assessment of the risk to the project from complaints will be undertaken and a decision made.

Receiver	Details	Category A	Category B	Monitoring Location
Occupied Protected Premises and Facilities	Monday to Friday 6:30am to 8:00pm	1.0mm/s ppv	5.0mm/s ppv	Inside the building
	All hours Sunday and Monday to Saturday 8:00pm to 6:30am	0.3mm/s ppv	1.0mm/s ppv	
Other occupied buildings	All hours Monday to Sunday	2.0mm/s ppv	5.0mm/s ppv	
All other buildings	Transient vibration	5.0mm/s ppv	BS 5228.2 Table B2 values	Building foundation
	Continuous vibration		50% of BS 5228.2 Table B2 values	
Underground services	Transient vibration	20.0 mm/s ppv	30.0mm/s ppv	On pipework
	Continuous vibration	10.0 mm/s ppv	15.0mm/s ppv	

Figure 4: Typical vibration resource consent condition limits.

3 Monitoring Process

Monitoring duration is generally between 10-60 minutes. However dependent on the nature of monitoring the duration may be longer. Care should be taken to ensure monitoring does not capture other disturbances/activities, shorter monitoring duration will allow better control of what activities are monitored.

Deciding where to monitor is critical to successfully achieving valuable and technically correct monitoring results. Sometimes it is best to monitor inside a house (particular if it is unoccupied), on the foundation of the building or on the ground immediately adjacent to the building or structure in question. The correct place to measure vibration and it is often a judgement call based on what is easily accessible and what is being measured – comfort levels or the potential for structural damage.

Monitoring should only be undertaken by a suitably experienced team member or under the supervision of a suitably qualified expert.

3.1 Equipment Required

- ▶ Vibration Monitoring Record Sheet
- ▶ Vibration Monitoring Device including carry case
- ▶ Carpet or Ground Spikes
- ▶ Sandbag – weighing between 6 kg to 12 kg
- ▶ Clamps
- ▶ Block of wood the size of transducer



Figure 5: Transducer set up with ground spikes.



Figure 6: Transducer set up with carpet spikes.

3.2 Vibration Equipment Setup

For the assessment of the potential for structural damage of buildings, measurements should be undertaken at the building foundation on the side closest to the source of the vibration. Where annoyance vibration is to be measured, this should occur where the annoyance is considered to be greatest i.e. in a bedroom or at an office desk. However, if a house or building is occupied during monitoring, interference may result through people walking past the monitoring equipment or doors slamming. As a general rule, vibration frequencies from construction effects are in the 5 -50 Hz range while human induced vibration is in excess of 100 Hz.

Correct placement of the transducers is critical to successful monitoring with transducers being held securely in place. It is important that the transducer does not experience vibration independently to the structure or surface, this is why it is important to weigh it down onto the surface or securely fix it to the structure. This can be done a variety of ways, such as:

- ▶ Carpet spikes with a sand bag placed on top,
- ▶ No spikes with a sand bag placed on top,
- ▶ Ground spikes (a sand bag is not used), or
- ▶ Clamped to part of the structure.

The size and weight of the sandbag may vary, however care must be taken to ensure the bag sufficiently weighs down the transducer and can overlap the transducer to lay on the ground. Larger and heavier bags can be difficult to carry at the same time as carrying the monitoring equipment so a good medium needs to be identified.

When placing the transducer on concrete, tiles, wood, or lino etc. spikes are not used.

A small amount of Bluetac can be used to help secure the transducer on the surface, however care should be taken to ensure the Bluetac doesn't cause the transducer to become unbalanced on the surface.



Figure 7: Vibration monitoring underway on the concrete slab foundations of a garage. The transducer is placed directly on the concrete (i.e. no spikes are used) and the transducer is weighed down with a 7kg sandbag.

When particularly concerned about structural damage it is best to try to monitor the vibrations received by the foundations of a structure. This can be done by securely attaching the transducer to a piece of wood large enough for the whole transducer to sit on/within. The piece of wood (and therefore transducer) is then securely clamped onto a foundation pile of the structure of interest. This method can be used on both concrete and timber piles provided that you have clamps large enough.



Figure 8: Monitoring annoyance vibration. Monitoring device set up next to an office desk using a piece of wood clamped to an internal pile. A bolt with wing nut is used to fix the transducer to the block of wood.



Figure 9: Vibration monitoring for structural damage. Vibration monitoring device set up on a building pile using a piece of wood clamped to the pile. The transducer sits within the block of wood.

When access to foundations or inside the dwelling is limited the transducer may be buried. When burying the monitor a small hole is dug, large enough for the transducer to be placed within and approximately 15cm deep. Ensure the bottom of the hole is relatively flat with no obstructions such as rocks. The transducer is placed in with ground spikes going into the ground at the bottom of the hole. The hole is then refilled, ensuring the ground is securely packed around the transducer.

The transducer may also be buried on site at varying distances from the working area to gather attenuation data (data about the reduction of the vibration experienced at varying distances).



Figure 10: Vibration monitoring device set up with the transducer buried in the ground.

3.3 Monitoring Records

Use the Construction Vibration Monitoring Record to keep an accurate record of monitoring that has been undertaken. However, prior to using the monitoring record, ensure that it complies with the requirements of your resource consent conditions and the Project's Construction Vibration Management Plan (if one exists for the project).

Results of the monitoring records can be summarised and included in a Construction Vibration Monitoring Register. This will help keep track of monitoring which has been undertaken and is a useful resource for estimating the effects of future work based on past vibration results.

Document History and Status

Revision	Status	Author	Date	Revision Description
1	Issued	Sandra Edwards	08/02/2017	Initial procedure developed

Approvals					
Revision	Action	Name	Position	Date	Signature
1	Reviewed by	Sandra Edwards	National Environmental and Sustainability Manager	08/02/2017	
	Approved by	Sandra Edwards	National Environmental and Sustainability Manager	08/02/2017	
	Reviewed by				
	Approved by				

1 Introduction

1.1 Purpose

The purpose of this procedure is to identify the requirements for working around trees to ensure works are undertaken in accordance with local council, land owner and contract requirements.

It also provides guidance for undertaking works in close proximity to protected trees.

It should be noted that all District Councils have differing requirements for protected trees in their regions and the relevant District Plan should be reviewed or District Council arborist consulted prior to works starting.

References

Resource Consent Conditions
District Plan Requirements
Regional Plan Requirements
Resource Management Act (RMA)
National Environmental Standard – Freshwater 2020 (NES-FW)
Land Owner Agreements/ Land Access Agreements
Fletcher Environmental Toolkit
AS4970-2009 Protection of trees on development sites.

Standard Forms

Environmental and Sustainability Management Plan (ESMP)
Environmental Risk Register (Generic)
Environmental Risk Register (Project)
Incident Investigation Report
Work Plans
JSEA's
Weekly HSE Site Inspection/ Environmental Check Sheet

1.2 Definitions

Diameter at Breast Height (DBH)	Standard measurement for trees, taken at 1.4m above ground level, and calculated by dividing the circumference by pi.
Drip Zone	The area of ground directly below the canopy of the tree, for a spreading tree. For a columnar tree, the radius of the drip zone is equal to half the height of the tree.
Drip Line	The edge of the drip zone.
STEM	Standard Tree Evaluation Method (STEM) is a standardised method of evaluating heritage and notable trees. It was developed in NZ and is used by many Local Authorities.
Structural Root Zone (SRZ)	The area of ground around a tree required for the tree's structural stability. This area is generally circular but may be influenced by the environment, e.g. slope, adjacent structures, soil type.

Tree Protection Zone (TPZ)	An area of ground around a tree which is isolated to protect both the roots and crown of a tree, to ensure its ongoing viability and stability. This is generally circular and typically extends beyond the drip zone.
Urban environment	Properties are considered in the urban environment if it is not greater than 4000m ² , is connected to a reticulated water and sewerage supply system, there is a building used for industrial, commercial or residential purposes and it is not a reserve.
Wetland	Permanently or intermittently wet areas, shallow water, and land water margins that support a natural ecosystem of plants and animals that are adapted to wet conditions.
Natural Wetland	A wetland that is not: <ul style="list-style-type: none"> a) constructed by artificial means, (unless it was constructed to offset impacts on, or restore, an existing or former natural wetland); or b) a geothermal wetland; or c) any area of improved pasture that, at the commencement date, is dominated by (that is more than 50% of) exotic pasture species and is subject to temporary rain-derived water pooling.

2 Procedure

As a minimum standard, no works are to be undertaken which impact a tree or its drip zone without necessary resource consent and owner's permission.

Activity	Responsibility	Key Actions	Records	References
Identify activities which could impact on trees	Project Environmental Manager/ Construction Manager	<ul style="list-style-type: none"> ▶ Identify works which may impact on existing trees. ▶ Impacts could be by excavation or occupation of the drip zone or by impact with the trunk or canopy by vehicles, plant or lifting activities. ▶ Consider access to the site and any trees that may be affected by oversized deliveries. ▶ Consider directional drilling alignments less than 2m below the base of a tree as having a potential impact. 		Drawings Aerial photos Workplan
Identify legal status of potentially affected trees	Project Environmental Manager/ Construction Manager	<ul style="list-style-type: none"> ▶ Check if a consent been obtained for any works affecting trees and that you can meet the consent requirements. ▶ If there is no consent in place, check if the trees are protected under the District Plan or Significant Ecological Area in Regional Plan. Obtain a consent if necessary. ▶ Check that the trees are not habitat to protected species (e.g. bats, birds, or lizards). ▶ Consent may be required for vegetation clearance within 10m of a Natural Wetland. 		Consents Arborist report in consent application Ecologist reports in consent application District Plan Regional & District Plan Maps

Activity	Responsibility	Key Actions	Records	References
		<ul style="list-style-type: none"> ▶ Heritage Authorities may restrict work affecting trees with heritage values. ▶ Check the land owner has given permission for any works affecting trees. ▶ Review any Land Access Agreements. ▶ Review Environmental Requirements in Contract Documents. ▶ Review Landscape Drawings. 		<p>NES-Freshwater Heritage Authorities Land Access Agreements Contract Documents Drawings</p>
<p>Update construction methodology to include tree protection. Gain approval of methodology if required.</p>	Construction Manager/ Project Engineer	<ul style="list-style-type: none"> ▶ Update construction methodology to ensure compliance with legal requirements and land owner agreements. ▶ Add hold points to work pack where necessary, e.g. for Arborist stand over. ▶ Where works will encroach on TPZ engage an arborist to give advice on tree protection measures, or discuss directly with the Council Arborist where they are the owner. ▶ Include Foreman in planning. ▶ Document risk and method for protecting trees in ESMP. ▶ Obtain Council and/or Landowner approval for tree protection methods as required. This could be through approval of ESMP or an Arborist's Report. ▶ Add tree protection to JSEAs. 	<p>Environmental and Sustainability Management Plan (ESMP) Workplan JSEA Drawings Email/ meeting minutes</p>	
Pre start meeting prior to works near trees	Construction Manager/ Foreman	<ul style="list-style-type: none"> ▶ Identify protected trees ▶ Agree extent TPZ to be fenced off and extent of any pruning. ▶ Identify and clearly mark trees to be removed. ▶ Ensure property and designation boundaries are correct. ▶ Invite Project Arborist and Tree Removal Subcontractor. ▶ Invite land owner representative if appropriate. (This could be the Council Arborist.) 	<p>Workplan JSEA Meeting minutes Mark up Drawings</p>	<p>ESMP Work plan JSEA Drawings</p>
Install Tree Protection	Foreman/ Project Arborist/ Tree removal sub-contractor.	<ul style="list-style-type: none"> ▶ Fence off TPZ for protected trees. ▶ Install other tree protection measures. ▶ Carry out pruning/ relocation 	Photos	<p>Mark up Drawings JSEA</p>

Activity	Responsibility	Key Actions	Records	References
		<ul style="list-style-type: none"> ▶ Any tree removal could be carried out at the same time. 		
Undertake construction activities Monitor tree protection	Project Engineer / Site Engineer/ Foreman	<ul style="list-style-type: none"> ▶ Notify the arborist to stand over during excavations, as required. ▶ No “pruning” of roots with excavators. ▶ Check tree protection during weekly site inspections. Repair protection and remove any material from drip zones immediately. ▶ Arborist to carry out regular inspections, if required by consent. ▶ Notify Construction Manager / Arborist if changes are required that may affect trees. If necessary, stop work until new approval is obtained. ▶ Report any damage to trees to Project or Council Arborist immediately. 	Weekly site inspections Arborist Reports Incident Reports ESMP	ESMP Work Plan JSEA Drawings

3 Guidance Notes on Legal Protection

3.1 Value of Trees

Trees are protected for a variety of reasons, including historical significance, age, cultural value and amenity value. Others are protected as they form part of a valuable ecosystem.

Many councils will use a STEM assessment to determine the level of protection that a tree should have under their District Plan. This assessment scores the tree based on its condition, amenity and notability.

The score can be converted into a monetary value, by multiplying the score by the value of a 5-year-old tree ready for planting, plus other maintenance factors. This value is generally determined by the District Council. Scores for established trees with average condition and amenity values are generally in the tens of thousands.

Putting a monetary value on a tree can be useful when evaluating severity of consequences in a risk assessment.

3.2 Protection under the RMA

The RMA allows District Councils to protect trees under their District Plans. It also requires councils to identify and protect areas of significant indigenous vegetation and significant habitats of indigenous fauna.

In urban areas protected trees, or groups of trees, must be scheduled in the District Plan. Where significant vegetation or habitat is identified these will be shown on planning maps and the trees within that area are will have a higher level of protection.

All trees on Council Reserve Land, including street trees are usually protected.

The NES-Freshwater protects vegetation in and around wetlands. This came into effect on 3 September 2020. A consent under the NES-Freshwater is typically required for vegetation clearance within 10m of the wetland and permitted activity rules including Council Notification will apply. This process is managed by the Regional Council.

3.3 Land Owner Protection

It is important to confirm that the land owner has given approval for any work affecting a tree.

Where the client is the land owner this may be part of the contract. Where works are on local, regional or conservation reserves then approval must be confirmed with the relevant authorities (Council or Department of Conservation). This includes street trees on road reserves.

Council owned trees usually require resource consent to do anything, even tree trimming. In this situation talk to the Council Arborist.

Where trees are situated on a property boundary ensure that both owners have been consulted and given permission. This is often recorded in Land Access Agreements.

3.4 Trees within a Designation

District Council resource consent is not required for tree removal or trimming within a designation provided the relevant designation conditions are adhered to. Trees may be noted as protected in the Outline Plan of Works.

If a tree is not protected but is particularly significant or considered to be a local landmark, consideration should be given to protecting or relocating the tree (if practical). Discussions should be entered into with the local council. If trees are located within the designation, it should not be considered that wholesale tree clearance should proceed. Local residents and the local council can become very emotive over issues associated with trees so all tree clearance should be clearly justified.

3.5 What Happens If Works Are Undertaken Without Consent?

If works are undertaken without required consent, stop works immediately and contact the Environmental Manager, Project Manager or Project Arborist to help facilitate conversations with the District Council Arborist.

Works without consent are a breach of the Resource Management Act and depending on the seriousness of the incident, a fine or other enforcement action may be undertaken. The owner of the tree may claim damages.

Illegal tree works are considered to be an Environmental Incident and should be reported and investigated as such.

4 Potential Effects of Construction on Trees

The full impact of construction on trees is often not evident for some time, often years after the damage has occurred. It may not be obvious that any damage has occurred. Decline of the tree's health may be the cumulative effect of many activities.

4.1 Crown and Trunk Damage

Damage to the crown or trunk of a tree is generally by mechanical impact. Broken branches or damaged bark put stress on the tree and reduce its ability to function normally. Wounds may result in infection or rot and may weaken the trees structure.

4.2 Direct Root Damage

Trees are most at risk from damage to their roots by removal, wounding and compaction.

Excavation of structural roots can affect the stability of the tree. Excavation of non-structural roots reduces the trees ability to take up water and nutrients.

Removal of roots with an excavator results in tearing of the roots that extend back towards the tree. The damage is much greater than that done by a clean cut, resulting in wounds that are susceptible to infection and eventual decay.

4.3 Indirect Root Damage

Compaction of the ground through vehicles, plant and stockpiling can cause significant compaction of the upper depths of the soil where the trees roots are located. This reduces aeration of the soil, dropping oxygen levels, reducing infiltration of water and eventually changing the chemical makeup of the soil and diversity of beneficial organisms. It also limits the trees ability to grow roots.

Changes to the surrounding ground level and water table can also affect trees long term viability. Fill placed around a tree can cause ponding, reducing aeration. Fill placed on the roots causes compaction and reduces aeration. Cuts near a tree can drop the water table, so that water is no longer available to the tree.

Chemical spills can contaminate the soil and affect tree health.

5 Guidance Notes on Tree Protection Methods

The following is guidance for protection of trees. In situations where the tree is protected under the District Plan or consent condition you will need to consult with and gain approval of the Regulators arborist. It may be necessary to engage a project arborist.

5.1 Isolate the Tree from Construction Activities

Isolate the tree from construction activities with a protective fencing.

Consents typically refer to the drip zone as the area to be fenced off, however tree roots commonly extend well beyond this. Protection of the drip zone is standard practice.

Best practice is to protect the TPZ. The radius of the TPZ is calculated as 12 times the DBH and measured from the centre of the trunk at ground level. The radius of the TPZ must be no less than 2m and no greater than 15m, unless the drip line extends beyond 15m.

As the shape of trees varies greatly it is best for an arborist to determine the extent of a TPZ for highly valued trees. More information is available in AS4970-2009.

(Available via the [SAI Global link](#) on the Protect Portal.)

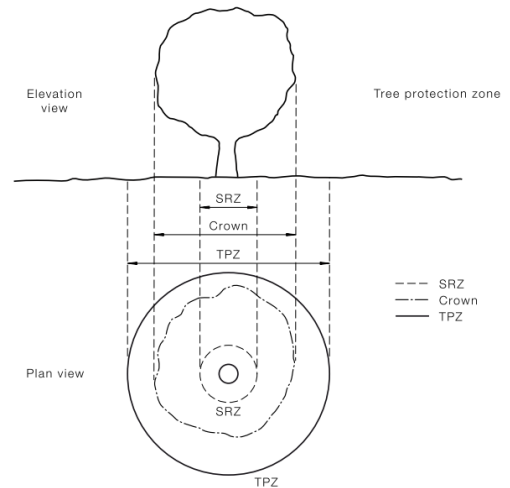


Figure 1 – Indicative Tree Protection Zone AS4970-2009

5.2 Tree Protection Fences

Review the consent to see what standard of fencing is required.

In some situations, orange safety mesh or flags are sufficient to delineate the protected area. Where heavy machinery, demolition, water blasting or lifting operations will be close to trees then a higher standard of fencing is appropriate.

To meet AS 4970-2009 protective fencing must be 1.8m high. It can be formed by plywood or similar solid panels or mesh covered with shade cloth to prevent overspray or debris entering the protected area. Ensure bracing for the fence does not impact on roots.

5.3 Reduced Tree Protection Zone

Often construction works will need to encroach on the TPZ. Depending on the situation, it may be possible to alter the TPZ to allow closer access. This can be mitigated by increasing the size of the protection zone on the opposite side of the tree. Encroachment must not be into the Structural Root Zone.

Note that where pavements and hard surfaces already exist under a tree, compaction is not an issue, however the remainder of the drip zone is of more value to the tree.

5.4 Excavations within the Tree Protection Zone

Consents will typically require excavations within drip zones to be overseen by an arborist. The arborist will identify roots for protection and ensure any roots that must be removed are severed as per best arboriculture practice.

Excavations should be by hand although hydro excavation or air excavation may be appropriate alternatives. (If roots are to be retained care is needed not to damage roots during hydro-excavation). The methodology

must be agreed by the arborist and may be influenced by the sensitivity of the tree species. Exposed roots should be wrapped with hessian and kept damp.

5.5 Directional Drilling

This is a good way to avoid trenching within drip zones although the location will restrict future access and maintenance.

Where directional drilling under a tree, a minimum depth of 600mm is recommended by AS 4970-2009. Ensure drill pits are outside of the TPZ.

5.6 Trunk and Branch Protection

Where there is a risk of trees being impacted by construction works within the TPZ, it may be possible to install a protective covering around the trunk or branches. Padding around the tree would be covered by timber batons. This can be strapped in place and must not be fixed to the tree with nails.

Where branches are at risk of being hit or block access for temporary works, lifting, piling it may be possible for them to be tied back to give temporary access. This is preferred to pruning.

5.7 Protecting Roots from Compaction

Access within the TPZ by machinery and foot traffic can be mitigated by placement of material to reduce ground compaction and root damage. This can be achieved by placing up to 100mm deep bark mulch covered with steel plates, swamp mats or aggregate. No excavation should occur.

Geotextile should be placed below any material to be removed, so that roots are not damaged during removal.

The ground below scaffolds should be protected by plywood or scaffold plank over geotextile. The scaffold supports should not be directly on the ground.

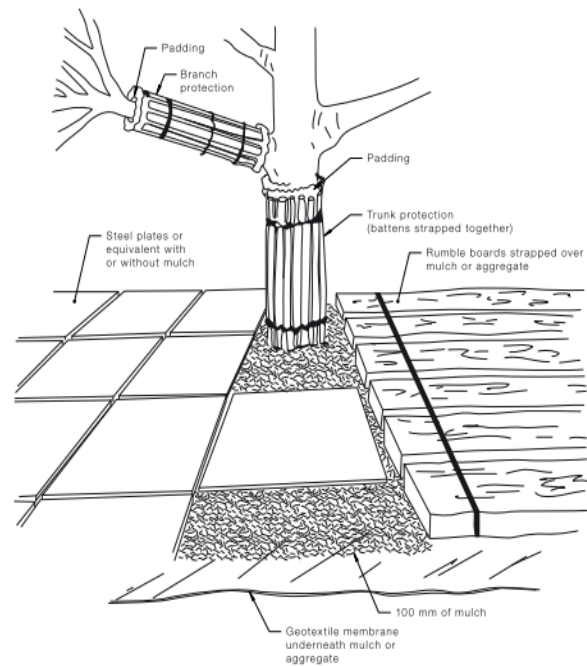
6 Monitoring and Maintenance

Should damage occur it must be reported immediately. Damaged roots and branches can be trimmed to mitigate the extent of the damage, however compaction and other impacts are difficult to remediate.

Placement of bark mulch (50-100mm deep) can assist in improvement of the soil condition.

During construction regular landscape maintenance contractors may not have access to carry out maintenance. For a long term project it may be necessary to engage a landscape contractor to maintain around trees.

Weekly HSE site inspections should include tree protection measures and check for materials placed within the TPZ.




NOTES:

- 1 For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.
- 2 Rumble boards should be of a suitable thickness to prevent soil compaction and root damage.

Figure 2 – Trunk, branch and ground protection from AS4970-2009

Document History and Status

Revision	Status	Author	Date	Revision Description
1	Issued for use	Stu Chapman	22/02/2011	
2	Issued	Sandra Edwards	19/12/2016	Revision
3	Issued	Rachel Blake	4/04/2019	Updates to incorporate elements of AS 4970-2009, rebrand.
4	In review	Rachel Blake	8/10/2020	Update to include NES-Freshwater.

Approvals					
Revision	Action	Name	Position	Date	Signature
1	Reviewed by	Stu Chapman	Env Representative	22/02/2011	
	Approved by	Stu Chapman	Env Representative	22/02/2011	
2	Reviewed by	Sandra Edwards	National Environmental and Sustainability Manager	19/12/2016	
	Approved by	Sandra Edwards	National Environmental and Sustainability Manager	19/12/2016	
3	Reviewed by	Rachel Blake	Environmental Manager	04/04/2019	
	Approved by	Peter Engelbrecht	Quality Manager	23/04/2019	
4	Reviewed by	Rachel Blake	Environmental Manager	8/10/2020	
	Approved by	Emlyn Moore	HSE Manager	8/10/2020	

Introduction

1.1 Purpose

This procedure describes how to prevent adverse health, safety and environmental effects associated with the refuelling of vehicles, mobile plant and equipment.

Fuels are toxic to people and the environment, and prolonged or repeated exposure can result in skin and respiratory irritation. Petrol is highly flammable and creates a combustible vapour when heated.

This procedure also describes environmental controls when carrying out plant maintenance on site, and when storing plant and machinery near water. Maintenance can result in oil and hydraulic fluid spills.

1.2 Scope

This procedure covers activities relating to the transfer of liquid fuels, refuelling mobile plant and vehicles on site, maintenance of plant and equipment on site, and storage of mobile plant near water.

This procedure applies to refuelling with diesel and petrol. It does not apply to vehicles refuelled at commercial service stations or with gas fuels (LPG).

1.3 References

Resource Consents and Project Specifications (as applicable)

District Plans (set volume limits and controls for storing fuels based on adjacent land use)

Worksafe Hazardous Substances Toolkit

HSG-15 Hazardous Substance Storage and Handling

ENV-02 Fuel, Oil and Chemical Spills

SP-36 – Mobile Plant Management Procedure

Land Transport Rule Dangerous Goods 2005

Health and Safety at Work Act (Hazardous Substances) Regulations 2017

1.4 Definitions

ESMP – Environmental and Sustainability Management Plan, details how environmental risks are managed for a specific site.

Auto stop fuel nozzles – allow refuelling to continue when the fuel attendant is not holding the nozzle and shuts off when the end of the nozzle is submerged when the tank is full. These are known to fail.

MSDS/ SDS – (Material) Safety Data Sheets contain details of the health, safety and environmental risks and controls associated with a substance.

Stationary Container Compliance Certificate – Certification that fixed tanks on site comply with HSWA rules over threshold capacities.

Location Compliance Certificate – Certification that your site meets the HSWA rules for storing explosive and flammable materials over threshold quantities.

Spill Kit – A collection of materials that can assist in the recovery and clean up of a spill. Hydrocarbon spill kits are required for refuelling.

Fuel Attendant – Person operating the fuel nozzle, generally the min-tanker driver.

Secondary Containment – A bund around a storage container, designed to hold 110% of the volume of the largest container.

EV-21 Refuelling and Maintenance of Vehicles and Equipment

2 Procedure

Activity	Responsibility	Key Actions	Records	References
Planning the Work	Project Manager	<ul style="list-style-type: none"> ▶ Identify fuel requirements and any restrictions on refuelling and maintenance activities and document in site ESMP and risk register. ▶ Ensure any bulk fuel storage will comply with HSG15 and HSWA and District Plan requirements. ▶ Ensure a spill response plan is in place. ▶ Ensure appropriate spill response equipment and fire extinguishers are available at all refuelling, fuel storage and maintenance sites. ▶ Ensure regular HSEQ inspections include site specific controls for maintenance and refuelling. 	Spill Response Plan Training Records ESMP Risk Register	Project Specifications Consents ENV-02 HSG-15
Construction/ Operation	Project Manager	<ul style="list-style-type: none"> ▶ Communicate refuelling and maintenance requirements to all site personnel via a Site-Specific Induction. ▶ Carry out risk assessment for refuelling and document in JSEA. ▶ Ensure all persons involved in refuelling and maintenance are signed onto the relevant JSEA. 	Induction Toolbox talks JSEA	ESMP Risk Register
	Supervisor	<ul style="list-style-type: none"> ▶ Ensure regular HSEQ inspections include refuelling and maintenance activities ▶ Ensure maintenance and refuelling is not carried out within 20m of watercourses or stormwater unless specific JSEA is in place. ▶ Ensure plant is not immobilised for maintenance in a floodplain. 	Inspection records	ESMP
	Operators/ Drivers	<ul style="list-style-type: none"> ▶ Ensure CO2 fire extinguishers is available in vehicle/ plant. ▶ Ensure a hydrocarbon spill kit is near their plant. ▶ After refuelling, walk around vehicle/ plant to ensure it is clear of other plant or people. ▶ Check that fuel cap has been replaced after fuelling. ▶ Park plant >20 from watercourses/ stormwater and outside flood plains for maintenance or storage. 	JSEA 5x5 Card	Induction
	Fuel Attendant/	<ul style="list-style-type: none"> ▶ Must not leave the nozzle unattended while refuelling. ▶ Ensure machine is switched off during refuelling. 	JSEA 5x5 Card	Induction

EV-21 Refuelling and Maintenance of Vehicles and Equipment

Activity	Responsibility	Key Actions	Records	References
	Mini Tanker Driver	<ul style="list-style-type: none"> ▶ Ensure foam fire extinguishers (>4kg) is available. ▶ Have a spill kit in the mini-tanker or with the trailer bowser. ▶ Use additional PPE suitable for the fuel type (e.g. Rubber Gloves). ▶ Have MSDS Available. 	MSDS	
	Mechanic	<ul style="list-style-type: none"> ▶ Provide drip trays to contain minor spills where required. ▶ Know location of nearest spill kit and fire extinguishers. ▶ Carry out risk assessment prior to starting minor maintenance on site. ▶ Obtain project manager approval of risk assessment prior to carrying out major maintenance on site. 	JSEA 5x5 Card	Induction
	All Staff	<ul style="list-style-type: none"> ▶ Report all spills as incidents to the site supervisor immediately ▶ Assist in spill containment and clean up. 	Incident Report Radar Spill Response Plan	Induction ESMP

2.1 Environmental Effects

The key potential environmental aspects and impacts related to waste generation include the following:

Aspects	Impacts
Release of diesel and other fuel oils to land or water bodies during refuelling.	Contamination of soils, groundwater and surface waters, damage to riparian and aquatic ecology including fish kills.
Release of diesel and other fuel oils to land or water bodies during vehicle and equipment maintenance.	

3 Refuelling

Refuelling is ideally done by a min-tanker which removes the requirement to hold large volumes of fuel on site. Road registered vehicles should be refuelled at a commercial service station where practical.

When planning for site fuel requirements be aware that transporting more than 250 litres of fuel as a tool of trade triggers requirements under the Land Transport Rule Dangerous Goods 2005, which must be met.

3.1 Fuel Storage

For small volumes, and where mini-tankers are not available, fuel can be stored on site in accordance with HSG-15 Hazardous Substance Use, Handling and Storage. The volumes stored on site must be included on the sites Hazardous Substances Inventory.

When establishing bulk fuel storage on site, the requirements for a compliance certificate under the HSWA Hazardous Substances Regulations must be met. Relevant thresholds to be aware of are:

- ▶ Storing >5,000 litres of diesel requires a Stationary Container Compliance Certificate
- ▶ Storing >50 litres of petrol requires a Location Compliance Certificate

Refer to Worksafe Hazardous Substances Toolkit for full details.

Bulk fuel storage must also meet the requirements of the District Plan and any relevant designation conditions, consent conditions and project specifications.

Fuel storage locations must as a minimum comply with the following:

- ▶ Be located at least 20m from water bodies and cess pits, or further where required by consent;
- ▶ Be located at least 20m from the drip line of native bush areas and protected trees;
- ▶ Have secondary containment;
- ▶ Have hydrocarbon spill kits;
- ▶ Have fire extinguishers;
- ▶ Be located away from ignition sources and incompatible substances;
- ▶ Be secure and well ventilated;
- ▶ Be clearly sign posted as a flammable and environmental hazard and no smoking.

3.2 Refuelling Locations

Where practical refuelling will be undertaken within the bulk fuel storage areas.

On large sites a refuelling location may be established. This must meet the same requirement as for fuel storage. These locations should be inspected at least weekly.

On most sites refuelling of mobile plant and machinery will take place at the workface. The following minimum requirements must be met:

- ▶ Be at least 20m from water bodies and cess pits;
- ▶ Be at least 20m from the drip line of native bush areas and protected trees;

Where these requirements cannot be met, for instance during work on temporary staging over water, additional controls must be put in place to prevent spills. This could include drip trays or additional supervision. These controls must be documented and communicated to relevant staff, this could be done in the ESMP, Work Pack, Project Induction and JSEA.

3.3 Transferring Fuel

The risk of spill or fire are increased during refuelling or when transferring fuel between containers.

The minimum standards for transferring fuel are:

- ▶ Never leave refuelling unattended;
- ▶ No smoking, use of cell phones, hot works or other ignition sources within 20m;
- ▶ Turn off ignition before refuelling;
- ▶ Use a fuel nozzle, funnel or pouring spout;
- ▶ Use correct gloves (rubber) to prevent skin contact;
- ▶ Transfer fuel in a ventilated area to avoid breathing vapour;
- ▶ Have a spill kit available at refuelling location;
- ▶ Have fire extinguishers available;
- ▶ The MSDS must be available at the site office, or with the fuel delivery vehicle.

Return containers to their secure storage once refuelling is complete. Never leave fuels in an unsecured or unsupervised location.

Use the correct containers for petrol (Red) and diesel (yellow) with secure lids. When filling petrol containers only fill 95% of the container to allow for expansion. Do not leave petrol containers in direct sunlight. Allow hot petrol engines 10 minutes to cool before removing the fuel cap and refuelling.

Fire extinguishers must be available in the plant being refuelled (CO2 type) and with the mini-tanker or trailer bowser (foam type >4kg). CO2 extinguishers are useful for fires on engines and machines, while foam is more effective for burning fuels on the ground.

Before refuelling the operator shall position their machine away from adjacent activities, so that the refuel attendant is not at risk.

After refuelling the plant operator must do a visual check to ensure the fuel cap is replaced and the necessary exclusion zone is clear of people and equipment before commencing work.

Staff and contractors handling fuels must be familiar with the relevant MSDS and requirements of this procedure.

4 Plant Maintenance

Wherever practical, plant maintenance will be carried out at one of the yards or workshops operated by the Asset Hub.

Where maintenance or repairs must be carried out on site, works will be carried out in locations at least 20m away from natural water courses or stormwater cess pits, and outside of flood plains. Spill kits must be available.

Where plant cannot be moved away from water or stormwater, additional controls must be put in place and documented in the JSEA, work plan or 5x5 card. Controls could include:

- ▶ Blocking cess pits with rubber mats or sand bags during maintenance
- ▶ Placing drip trays or mats under machinery

For any operations involving the drain down and replacement of oils, appropriate measures to prevent spills and contamination will be implemented (e.g. drip trays and spill kits). These controls and the location of the works must be documented in a JSEA. The location of this work must be approved by the Project Manager or Projects Environmental Manager to ensure that any consent conditions are met.

5 Storage of Mobile Plant and Machinery Near Water

Where practical no plant or vehicles are to be stored within 20m of a watercourse or within a flood plain.

This is to mitigate damage the environment as a result of plant being damaged or vandalised while the site is unattended. It also reduces the risk of plant being submerged in case of flooding, resulting in damage to plant and contamination of the watercourse.

Where plant must be stored in a flood plain or near water a contingency plan must be in place for its removal where flooding is forecast. This must be documented in a work pack or site-specific emergency response plan.

EV-21 Refuelling and Maintenance of Vehicles and Equipment

Document History and Status

Revision	Status	Author	Date	Revision Description
1	Issued for use	Sandra Edwards	27/02/2017	Initial Procedure
2	Issued	Rachel Blake	17/12/2019	General review. Add safety risks around refuelling.

Approvals					
Revision	Action	Name	Position	Date	Signature
1	Reviewed by	Sandra Edwards	National Environmental and Sustainability Manager	27/02/2017	
	Approved by	Sandra Edwards	National Environmental and Sustainability Manager	27/02/2017	
2	Reviewed by	Malcolm McWhannell, Paul Berriman, Warren Rogers	Various	17/12/2019	
	Approved by	Rachel Blake	Environmental Manager	18/12/2019	<i>R Blake</i>

Document Status

The most recent revision of this document is listed on FCC-MN-8001 Integrated Management System Documentation Schedule.

Purpose

To define emergency action required in the event of a failure of an erosion and sediment control system on site.

1 Scope

This procedure applies to all erosion and sediment control systems including stormwater collection, treatment and discharge on or from the site

An emergency may occur as a result of:

- ▶ A severe rain storm event
- ▶ Incorrect installation
- ▶ Inadequate maintenance

References

Environmental Toolkit

2 Procedure

Activity	Responsibility	Key Actions	Records	References
Site Monitoring	Project Environmental Rep/Supervisor	<ul style="list-style-type: none"> ▶ Carry out regular monitoring and maintenance of sediment control systems 	Monitoring records Inspection records	Designation Condition(s) Resource Consent(s) Regional Authority Erosion and Sediment Control Guidelines
Storm Events	Project Engineer/ Supervisor	<ul style="list-style-type: none"> ▶ Monitor the site during storm events to provide early detection of potential failure of water collection and sediment control systems. Include after-hours coverage as necessary. ▶ Notify other team members if an emergency situation is developing. ▶ Ensure fuel and chemical storage areas are secure. ▶ Ensure all sediment control devices are in good working order ▶ Mobilise sufficient resources to undertake all necessary remedial action if required. 		
	Project Engineer	<ul style="list-style-type: none"> ▶ Assess emergency and advise Supervisor on engineering or remedial measures to limit damage or impact 		
	Supervisor	<ul style="list-style-type: none"> ▶ If subsidence occurs remove spoil to designated emergency dump site. 		

Activity	Responsibility	Key Actions	Records	References
		<ul style="list-style-type: none"> ▶ Ensure any water diversion channels are clear. ▶ Ensure containment of contaminated water is maximised. 		
	Project Engineer	▶ Notify Project Manager, Project Environmental Representative, Divisional Operations or Construction Manager, Client's Representative and Consenting Authority (if required or appropriate).		Incident Reporting, Notification and Investigation Flowchart and Matrix
	Supervisor	▶ Restore site and control structures to originally approved condition when circumstances allow.		
	Project Engineer	▶ Complete environmental incident report and investigation.	Incident Report	

Document History and Status

Revision	Status	Author	Date	Revision Description
1	Issued for use	Stu Chapman	22/02/2011	
2	In Review	Sandra Edwards	19/12/2016	Legislation Update

Approvals					
Revision	Action	Name	Position	Date	Signature
1	Reviewed by	Stu Chapman	Env Representative	22/02/2011	
	Approved by	Stu Chapman	Env Representative	22/02/2011	
2	Reviewed by	Sandra Edwards	National Environmental and Sustainability Manager	19/12/2016	
	Approved by	Sandra Edwards	National Environmental and Sustainability Manager	19/12/2016	

Standard Operating Process for Construction Noise Monitoring (ENV-03)

1 Introduction

1.1 Purpose

This Standard Operating Procedure describes the measurement and assessment of noise during construction work. It enables the monitoring of noise limits which have been set to reduce the likelihood of annoyance, nuisance and adverse effects to residents in the vicinity of the construction site.

1.2 Scope

This procedure applies to all construction work on a project where noise monitoring is a contract, legal or resource consent requirement.

Risks to site employee's health associated with noise induced hearing loss are outside the scope of this procedure. This aspect is covered as part of the job safety analysis process under the Health and Safety Management Plan.

This procedure does not cover vibration.

Continuous noise monitoring for extended periods of time is not covered by this procedure.

1.3 References

Waka Kotahi	State Highway Construction and Maintenance Noise and Vibration Guide
NZS 6801:2008	Acoustics - Measurement of Environmental Sound
NZS 6802:2008	Acoustics – Environmental Noise
NZS 6803:1999	Acoustics - Construction Noise (scope only)

1.4 Definitions

L_{eq}	Time average level
L_{max}	Maximum sound pressure level
Short-term	Construction work at any one location for up to 14 calendar days
Typical duration	Construction work at any one location for more than 14 calendar days but less than 20 weeks
Long-term	Construction work at any one location with a duration exceeding 20 weeks

1.5 Associated Standard Forms and Templates

Standard Form	Construction Noise Monitoring Sheet
Template	Construction Noise and Vibration Manament Plan Template

2 Process to be Followed

2.1 Consider Factors Which Effect Noise Received

Standard Operating Process for Construction Noise Monitoring (ENV-03)

Whether or not sound from construction work is likely to constitute a noise problem depends upon a number of factors, such as:

- The existing background noise level,
- The distance between the source of the noise on the site and any local residents, businesses or schools likely to be affected by sounds of construction work,
- The nature and level of the sounds of construction work,
- The nature of the buildings and the activities where construction sounds are likely to be heard, and
- The likely duration of the construction operations and the hours during which work will be carried out, whether during the day, night, weekends or public holidays.

2.2 Understand Project Specific Requirements

Construction noise requirements are identified in:

- Contractual requirements, and
- Resource consent conditions, or if there is no resource consent that applies to construction noise,
- Local Plan Permitted Activity rules.

A Construction Noise Management Plans (CNMP) may be required by consent, to identify how this issue will be managed, appropriate to the scale and sensitivity of the project. Content of the plan will be specified in the consent.

The project may have had an acoustic assessment undertaken as part of the consenting process. Review this to understand assumptions made about construction methods during consenting and if these match your current methodology.

2.3 Noise Modelling

Waka Kotahi has a Construction Noise Calculator which can be used to help carry out noise assessments for many typical construction activities. This can be found on their website under the Highways Information Portal.

The tool includes a database of construction equipment and associated noise levels. Factors are then entered into the tool including distance to receiver, whether the construction equipment is stationary, the speed at which it is moving and a resultant noise level is calculated. These predicted noise levels can be used for planning mitigation works. Noise monitoring can be undertaken to confirm the accuracy of the predicted levels and compliance with the construction noise limit.

Note that custom noise sources can be entered into the calculator where the level in dB LAeq at 10m from the source is known.

Mitigation measures such as noise walls can reduce noise levels for the receiver by 5 to 15dB, however this depends on:

- the weight of the barrier (heavier is better),
- proximity to the source (closer to the source is more effective), and
- blocking line of sight between source and receiver.

Standard Operating Process for Construction Noise Monitoring (ENV-03)

Refer to section 4 of the Waka Kotahi document - State Highway Construction and Maintenance Noise and Vibration Guide.

More complex modelling will require a specialist acoustic consultant.

2.4 Noise Monitoring

Care is to be taken that the sample of noise which is measured is representative of the sounds under investigation. The NZ Standard indicates that a continuous period of 15 minutes is appropriate.

Attended measurements should be undertaken at 1 to 2 metres from the facade of the most affected building, at the level of the occupied floor of the building. Supporting the meter outside an open window is an acceptable method for elevated living areas.

Ensure permission to access the property is gained prior to entry. If permission is not forthcoming, standing on the edge of the property boundary is suitable.

Hard surfaces near the noise meter can reflect noise and affect noise monitoring results. Where possible measure noise 3.5m from hard surfaces that can reflect noise, and site the meter 1.2m to 1.5m above the ground. Note in the monitoring form where this cannot be achieved. Noise monitoring results in close proximity to hard surfaces can be adjusted down 3dB in some cases. Refer to NZS6801:2008.

When noise levels are measured it is important that all machinery operations and any other relevant site and environmental conditions, are fully documented ie. noise originating off site, eg trucks, aircraft, motorbikes and their respective maximum sound levels.

Measurements to assess construction work noise shall be made according to consent and contract requirements and the results recorded on the Construction Noise Monitoring Record sheet. Noise monitoring will normally be carried out at positions determined by resource consents and/or contract specifications.

Noise monitoring is to be carried out by staff suitably trained in use of the equipment, NZS6801:2008 and this Standard Operating Procedure.

2.5 Noise Monitoring Equipment

To meet the requirements of NZS6801:2008 a sound level meter compliant with IEC specifications, class 1 or 2, and a valid calibration certificate is required.

Calibration of meters must be completed at least every 2 years by an IANZ Accredited laboratory.

In field calibration must be carried out prior to and after each set of monitoring being undertaken and results recorded on the construction noise monitoring form. Calibration of in field calibrators must be completed annually.

2.6 Noise Monitoring Records

The standard form for Noise Monitoring should be used. This is available on Fletcher 1.

All noise monitoring records must include:

- Date, time and duration of monitoring period
- Monitoring location and relation to site and any sensitive receiver
- Description and location of works on site

Standard Operating Process for Construction Noise Monitoring (ENV-03)

- Description of other noises not related to the site
- Description and maximum noise level of significant events during monitoring (eg passing fire engine).
- Weather, including wind speed, direction, cloud cover and temperature.
- Details of monitoring equipment used

A sketch detailing the monitoring location and location of the sources of noise is useful.

Completed forms must be circulated to the Project Environmental Manager or Project Manager and filed in the project records system. These may need to be submitted to the local Council or other bodies depending on the resource consent conditions for the project.

2.7 Noise Limits

As a general rule noise limits are usually set in accordance with NZS 6803:1999 as laid down in Tables 1 and 2 of this Standard Operating Process. In the event of the noise limits being exceeded, the Project Manager and/ or Environmental Manager should be informed immediately.

Mitigation measures such as screening, changing equipment or varying the construction methodology may be required to ensure compliance.

Table 1 - Recommended upper limits for construction noise received in residential zones and dwellings in rural areas

Time of week	Time Period	Duration of Work					
		Typical duration (dBA)		Short-term duration (dBA)		Long-term duration (dBA)	
		Leq	Lmax	Leq	Lmax	Leq	Lmax
Weekdays	0630-0730	60	75	65	75	55	75
	0730-1800	75	90	80	95	70	85
	1800-2000	70	85	75	90	65	80
	2000-0630	45	75	45	75	45	75
Saturdays	0630-0730	45	75	45	75	45	75
	0730-1800	75	90	80	95	70	85
	1800-2000	45	75	45	75	45	75
	2000-0630	45	75	45	75	45	75
Sundays and Public Holidays	0630-0730	45	75	45	75	45	75
	0730-1800	55	85	55	85	55	85
	1800-2000	45	75	45	75	45	75
	2000-0630	45	75	45	75	45	75

Standard Operating Process for Construction Noise Monitoring (ENV-03)

Table 2 - Recommended upper limits for construction noise received in industrial or commercial areas for all days of the year

Time of week	Time Period	Duration of Work		
		Typical duration (dBA)	Short-term duration (dBA)	Long-term duration (dBA)
		Leq	Leq	Leq
Every day of the year	0730-1800	75	80	70
	1800-0730	80	85	75

Note:

Where background noise levels are high, construction noise may not be measurable against the ambient environment.

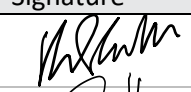
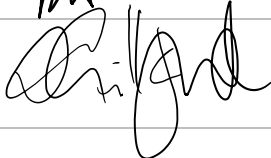
Background adjustments can be made in accordance with Annex A of NZS6803:1999.

Clause 7.2.6 of NZS6803:1999 allows for a “background plus” approach where background sounds in the area are very high.

Adjustment to any stated level on this basis will need to be determined on a case by case basis and agreed with the relevant local authority.

3 Document History and Status

Document Details			
Revision	Date	Author	Status
1	22/02/2011	Stu Chapman	Issued
2	19/12/2016	Sandra Edwards	Issued
3	13/7/2021	Rachel Blake	Issued

Approvals					
Revision	Action	Name	Role	Date	Signature
3	13/7/2021	Rachel Blake	BPC Env Manager	Reviewer	
	26/07/2021	Fletcher 1 Enviro SME Group	BPC Env Manager, Higgins Env Manager	Approvers	

Archaeology Procedure

The Heritage New Zealand Pouhere Taonga Act 2014 makes it unlawful for any person to modify or destroy or cause to be modified or destroyed an archaeological site or part of an archaeological site without the permission of Heritage New Zealand Pouhere Taonga (formerly the Historic Places Trust). An Archaeological Authority must be applied for if the work you are about to undertake may modify or destroy an archaeological site.

Evidence of an archaeological site may include shells, bottles, broken crockery, charcoal, bones, building foundations pits or terraces in the hillside. Archaeology often shows up as clear cut dark areas in the subsoil.



An archaeological site is defined as any place in New Zealand including buildings, structures or shipwrecks that were associated with pre-1900 human activity.



Do not assume that an area is not culturally rich just because it's been disturbed previously. Not all parts of New Zealand have been systematically surveyed to record archaeology and heritage.



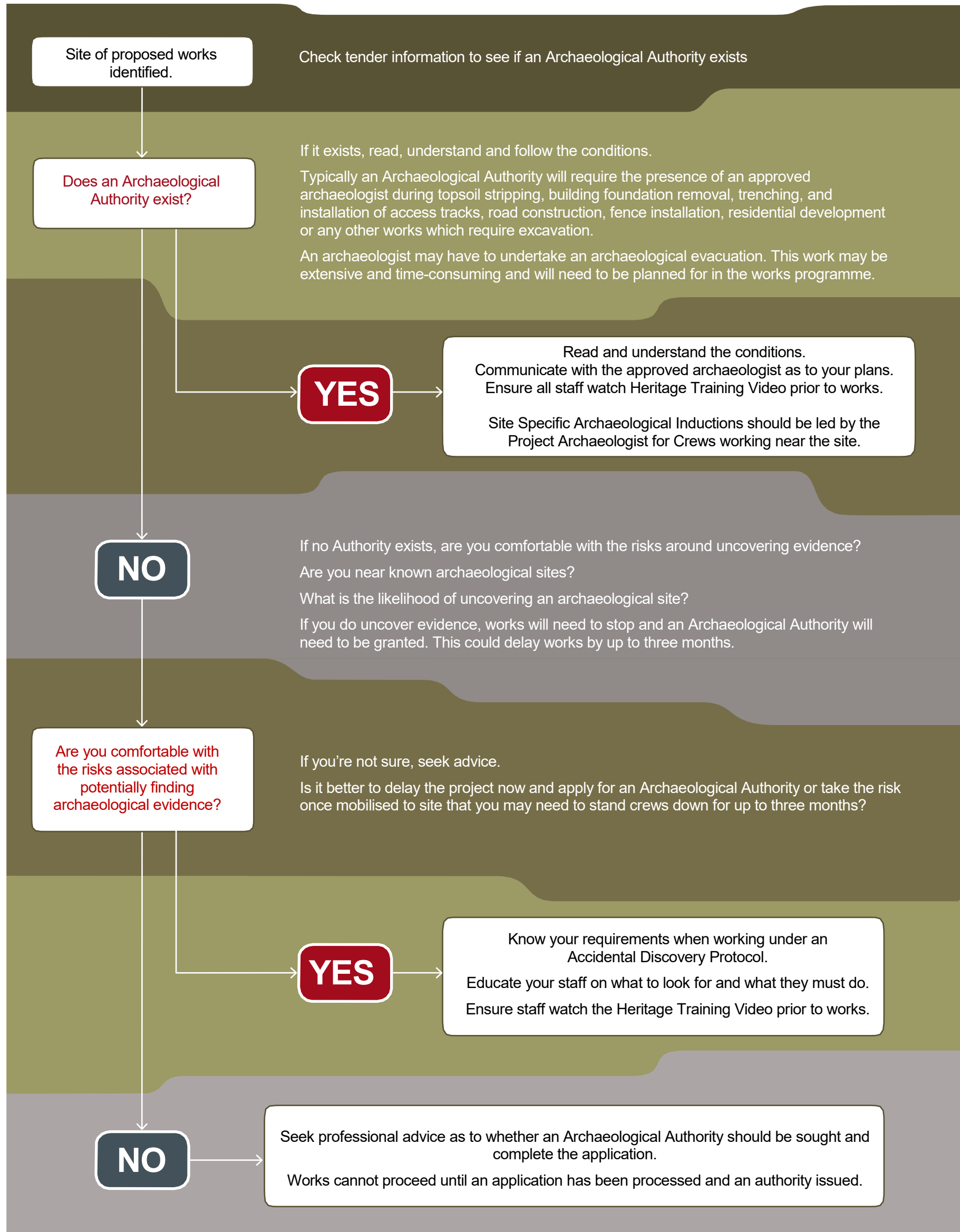
So what's the difference between an Archaeological Authority, an Archaeological Management Plan and an Accidental Discovery Protocol?

An Archaeological Authority is a legal document issued by HNZPT which allows the holder to modify or destroy an archaeological site under strict conditions, and under the supervision of an archaeologist who can record or remove the evidence or artefacts prior to damage. This work may involve an extensive and potentially time consuming archaeological excavation.

An Archaeological Management Plan is prepared when it is required under the provisions of the Archaeological Authority. It will detail who the approved archaeologist is, what type of activities are to be undertaken, the areas where it is known or suspected that archaeological evidence will be uncovered and the indicators of that evidence.

An Accidental Discovery Protocol (ADP) details what we will do in the event that archaeological evidence is uncovered. This is only used on sites where there is a very low risk of finding archaeological evidence because there are no known sites in the vicinity.

Archaeological Pre Works Process



Accidental Discovery Protocol

ONLY TO BE USED WHEN:

The risk of uncovering archaeological evidence low as no known sites located in the vicinity of works and therefore no Archaeological Authority is required.

Archaeological evidence discovered

→ Stop works within at least a 20m radius of find and heavy machinery moved out of the area.

STOP

→ Area marked off and all personnel are to be instructed to leave the area.
Secure the site to prevent public access and do not inform the media unless authorised.
Out of respect - Don't take photos of bones in case they are human remains (koiwi tangata).

SECURE

→ Notify Supervisor immediately.
Supervisor to notify the Environmental Manager/Representative and Project Manager.

TELL THE BOSS

Environmental Manager/Representative to notify:

- Project Archaeologist,
- Heritage NZ,
- NZ Police (in event of bones), and
- Identified Iwi.

Ensure you comply with your contract obligations eg NZS 3910, Cl.5.14 'Treasure'.

Is the discovery evidence of an Archaeological Site?
Confirmation is required from an Archaeologist

YES

If an Archaeological Site is discovered then an Incident Report needs to be completed by the Project Team.

An Archaeological Authority needs to be applied for with Heritage NZ.

The Archaeologist will prepare an Accidental Discovery Report.

Works are not to proceed in the vicinity until the Authority has been issued.

NO

Works can proceed until further evidence uncovered.

Purpose

The purpose of this guideline is to enable Fletcher Construction Infrastructure staff, subcontractors and visitors on our sites to understand the requirements of our Company with regard to **handling and storing of substances hazardous to health and the environment**.

The goal is to ensure that employees and contractors have the necessary knowledge and training to ensure they do not cause harm to themselves or others.

The requirements of this guideline set the minimum standards to be included in all project/branch safety plans where handling and storage of hazardous substances and materials occurs.

This guideline must be complied with unless approved otherwise by a competent, qualified and suitably experienced engineer. Any alternative to this guideline must be based on sound engineering and safety principles and practices.

Referencing and Statutory Compliance

Reference should be made to:

- ▶ Health and Safety at Work Act 2015,
- ▶ Hazardous Substances New Organisms Act 1996
- ▶ Health and Safety at Work (Asbestos) Regulations 2016
- ▶ Health and Safety at Work (Hazardous Substances) Regulations 2017
- ▶ Worksafe Approved Code of Practice for the Management and Removal of Asbestos
- ▶ Worksafe Approved Code of Practice for the Management of Isocyanates
- ▶ Working Safely with Hazardous Substances (Worksafe Practical Guide)
- ▶ Hazardoussubstances.govt.nz/calculator
- ▶ Fletcher Construction Guideline to the Management of Airborne Contaminants
- ▶ FCI-HSW-PRC-0032 - General Safe Practices
- ▶ FCI-HSW-TMP-0001 - Emergency Response Plan Template
- ▶ FCI-ENV-PRC-0002 - Fuel, Oil and Chemical Spills Procedure
- ▶ Fletcher Construction Hazardous Substances Inventory Template

In planning tasks involving hazardous materials and substances these documents must be consulted.

If legal standards are more stringent than the guidelines in this document, then those standards shall also be complied with.

Potential Hazards

- ▶ Exposure to hazardous substances and materials
- ▶ Exposure to airborne contaminants
- ▶ Exposure to contaminated ground
- ▶ Fire or explosion
- ▶ Spills resulting in contamination of air, ground or water

Requirements

During the planning phase of all works the following steps must be taken:

- ▶ Can the substance or material be substituted with a safer or less hazardous option
- ▶ All materials and substances must have an up to date (less than 5 years) safety data sheet available in the workplace (electronic or hard copy).
- ▶ Storage and handling must be in accordance with requirements of Safety Data Sheets.
- ▶ Ensure all workers are suitably trained and competent to handle and store hazardous materials and substances.

- ▶ The maximum quantities of all hazardous materials or substances held in the place of work (including in vehicles) must be recorded in a hazardous substances inventory (refer to Hazardous Substances Inventory Form on Promapp).
- ▶ Where trigger quantities under the Health and Safety at Work (Hazardous Substances) Regulations 2017 are exceeded, Location Test Compliance Certificate and additional signage may be required.
- ▶ This inventory must be made available to the Emergency Services at all times on every site.
- ▶ Where trigger levels are exceeded, the emergency response plan must comply with section 6 of this guideline.
- ▶ Hazardous waste substances e.g. oil must be included in the Hazardous Substances Inventory and labelled appropriately.

Consumer products (e.g. detergents, household cleaners, soap, photocopy toner, etc.) are not required to be included in Hazardous Substances Inventory's where the quantity is not deemed to be commercial or industrial.

1 Demolition, Renovations and Alterations to an Existing Structure

Before any demolition or alteration of an existing building takes place, an examination of the building fabric must be made for hazardous material/substance content.

Samples of any suspect materials must be taken and analysed for asbestos, methamphetamine, formaldehyde (found in MDF), etc. Any work including exposure to the suspect material must cease until results from an IANZ certificated laboratory confirm that the suspect material/substance is not asbestos.

All examining and testing facilities must be approved by Worksafe.

If no asbestos or other hazardous material/substance is found, a hazardous material free certification showing details of the inspections and test results must be retained in the project files.

If asbestos or any other hazardous material is found, all work including exposure to the hazardous material/substance must cease. Worksafe must be notified and a plan for the safe removal and disposal of the material/substance by a Worksafe certificated removal company is submitted to Worksafe and to our Company for approval.

NO Fletcher Construction or subsidiary company personnel are to be involved in the removal of any asbestos materials.

The inspections and tests must determine the type of asbestos (white, brown, blue etc.) found, and what form it is found in (i.e. lagging, roof sheeting etc.).

The inspection must estimate the quantity of asbestos or other hazardous material in the structure so approved disposal sites can be found under the direction of Worksafe.

If you suspect a material contains hazardous substances or asbestos, treat it as the worst case scenario and do not handle until tested.

2 Safety Plan for Removal of Asbestos

NO Fletcher Construction or subsidiary company personnel are to be involved in the removal or handling of asbestos products.

The Safety Plan for asbestos removal must include the following:

- ▶ The notification to Worksafe of the suspicion of there being asbestos on the site.
- ▶ The contracting of a Worksafe certificated asbestos removal company.
- ▶ The certificated asbestos removal company must provide our Company with a safety plan containing the following information:
 - Method and procedure for stripping the asbestos, which is approved by Worksafe.
 - The protective equipment that is to be used (including air extracts, showers, decontaminated rest areas etc.) must be approved by Worksafe.
 - The method and procedure for disposal of the asbestos, including bagging, warning identification, transportation, approved dump sites etc.

- How contamination of the environment is to be prevented, including airborne, water coursed, ground cover etc. and what tests are to be carried out to prove that contamination is avoided.
- How the public protection around and in the site/building is to be managed.
- How the above procedures and protective measures are to be monitored and checked.
- On completion, how the area or structure is to be signed off as safe including inspection by Worksafe.

3 Materials/Substances Requiring Special Precautions

During the course of work on construction sites a number of materials and substances will be encountered which, because of the risk of combustibility, explosion or toxic effects, must be treated with care and attention by all workers. The handling of hazardous substances and materials must be eliminated where practicable, where not practicable special handling techniques must be used, specific additional protective clothing/equipment provided and worn. All controls must be documented in the JSEA. If in doubt about how to handle the material or substance, refer to the Safety Data Sheets for the material or substance.

The following safe practices shall be followed when handling substances and materials requiring special precautions.

- ▶ Read labels or warnings, precautions and First Aid information.
- ▶ Wear personal protective equipment and monitoring devices when required as specified on the Safety Data Sheet.
 - Safety glasses, goggles, or face shield should be worn when applying materials overhead or in areas where particles may get into the eyes.
 - Correct type of gloves (as specified on the Safety Data Sheet) must be worn as the last line of defence and barrier cream applied to any exposed skin areas to provide protection against skin irritation prior to handling any material which may irritate the skin and re-applied according to instructions.
- ▶ No smoking.
- ▶ Good housekeeping work methods and practices that will not create excessive dust or rubbish should be adhered to.
- ▶ If particles accumulate on exposed skin areas, do not rub or scratch. Particles should be removed by washing thoroughly with soap and warm water or dry wash materials (waterless soap and towel).
- ▶ Good personal hygiene practices are essential. Thoroughly wash exposed skin areas during breaks, prior to eating or smoking and shower at the end of the work day.
- ▶ Ensure contaminated or exposed work clothing is separated from other articles of clothing during laundering.
- ▶ Adequately designed dust collecting systems should be provided and used to remove dust at the source where practicable. Refer FCC airborne contaminants guide.
- ▶ In case of hazardous spill or exposure, know and follow emergency procedures. Get medical help right away.

Special precautions must be taken when working with the following substances and materials (this includes gases, liquids, solids, plasma):

3.1 Explosives

Where explosives are required on site, the use, handling and storage must be strictly in accordance with the relevant legislation and guidelines.

3.2 Radioactive materials

Equipment incorporating radioactive materials must be under the care of, and only handled by a trained, competent and licensed person as required by the National Radiation Laboratory.

3.3 Skin Irritants

The following activities are high risk for those susceptible to dermatitis:

- ▶ Applying synthetic resins

- ▶ Handling transformer oil, cutting oil, form oil, diesel oil, paints, kerosene, cleaning agents, cements, etc. for periods exceeding ten minutes.

All employees shall wear appropriate specified gloves (as per Safety Data Sheet), giving the correct protection.

Any employees susceptible to dermatitis must be monitored when undertaking such works and if necessary removed from the work place.

3.4 Isocyanates

Are a chemical found in polyurethane material which in NZ consist mainly of flexible and rigid polyurethane foam. Other products include polyurethane paints, lacquers, urethane rubbers, adhesives and binders. Special care must be taken when heating or burning these materials.

When in frequent use, the Worksafe guideline on the Safe use of Isocyanates must be followed.

3.5 Lead Based Paints

These should not be used if an acceptable alternative can be found.

Gas cutting, grinding, or drilling existing plant, equipment and structures must not be undertaken unless an assessment is done to confirm the paint does not contain lead.

Refer [FCI-HSW-PRC-0014 Lead Paint Management](#) for further details.

4 Use of Materials Hazardous to Health

The use of substances or materials known to be hazardous to health must not be designed into, or ordered for, or built into a building or structure.

Where such substances or materials are proposed to be used, their use must be approved by Worksafe and submitted with safe and approved handling and fixing procedures to our Company for review.

Materials of unknown make up must not be used or specified until they can be certified not to contain materials hazardous to health.

Use of class 6.1A and 6.1B (Acutely Toxic Substances that can be fatal) or Substances Needing Licence must meet the requirements of Part 4 of the HSWA (Hazardous Substances) Regulations 2017.

For certified handlers, supervision and training of workers direct supervision may be required. You may need to allow for more than one certified handler to cover shift work, employees away sick or on holiday.

5 Storage Requirements

All sites with hazardous substances must identify the maximum quantities likely to be held on site in their Hazardous Goods Inventory. The inventory must identify storage locations taking into account incompatible classes as well as requirements for signage, location compliance certificates, fire extinguishers, security, and hazardous substance locations under the HSWA (Hazardous Substances) 2017. Refer to the schedules in the HSWA or Work Safe Hazardous Good Calculator for guidance.

Regardless of the trigger levels above, all hazardous liquids on sites must be stored in secondary containment. All hazardous goods must also:

- ▶ be secured from damage or vandalism
- ▶ be in clearly labelled containers (in English and including pictogram)
- ▶ have SDS sheets readily available to all users

6 Emergency Response Plans

Where volumes are above the threshold quantities in schedule 5 of the HSWA (Hazardous Substances) Regulations 2017, sites are required to have an emergency response plan (ERP) that includes the following in addition to the standard requirements:

- ▶ Identification of all foreseeable potential emergency events,
- ▶ Describe actions to be taken to warn people who could be affected (both on site and in neighbouring areas),

- ▶ Advise people of actions to be taken to protect themselves, others and the environment,
- ▶ How to help or treat any person affected in the emergency,
- ▶ Manage the emergency to limit the adverse effects including impacts on the environment,
- ▶ Identify each person with actions/responsibilities for the above,
- ▶ Roles, responsibilities and training to be defined,
- ▶ Allocated responsibilities and contact details for the persons referred to above.

The ERP must be tested and reviewed annually.

Where there is a change in person (who as an allocated responsibility within the plan), or a change to the procedure, with regards to the storage, handling and use of the substance or material, the ERP must be retested within three months to ensure it remains operable.

All tests must be documented and records kept.

When required, the ERP and Hazardous Goods Inventory must be stored where it is available to Emergency Services on arrival to site once the building has been evacuated.

7 Safety Data Sheets

Where materials (such as epoxies, special paint systems, fuels solvents cleaners silicones etc.) which contain chemicals or other elements which are potentially hazardous to health are being used on site, contractors will be required to supply SDS's from the manufacturer to our Company Site Management.

Safety Plans will reference and include SDS's.

Document History and Status

Revision	Status	Author	Date	Revision Description
Historic Fletcher Works Document History				
2	Final	Ian Haigh	01/03/17	Reviewed content for currency, updated legislation referrals and placed in Fletcher Works template
3	In Review	Sandra Edwards, Gary Kempster, Rachel Blake	19/12/17	Updated to include requirements of Health and Safety at Work (Hazardous Substances) Regulations 2017
Business Unit realignment 2019				
01	Final	Andy marsh	23/09/2019	Issued new document and revision number to meet BU requirements

Approvals					
Revision	Action	Name	Position	Date	Signature
2	Reviewed by	Ian Haigh	National H&S Manager	01/03/2017	On file
	Approved by	Ian Haigh	National H&S Manager	01/03/2017	On file
3	Reviewed by	Sandra Edwards, Gary Kempster, Rachel Blake	Various	19/12/2017	On file
	Approved by	Ian Haigh	National H&S Manager	19/12/2017	On file
01	Reviewed by	Andy Marsh	Interim HSEQ National Manager	23/09/2019	On file
	Approved by	Andy Marsh	Interim HSEQ National Manager	23/09/2019	On file

Document Status

The most recent revision of this document is listed on FCC-MN-8001 Integrated Management System Documentation Schedule.

Introduction

1.1 Purpose

To define erosion and sediment control requirements and responsibilities.

1.2 Scope

This procedure applies to all activities and locations that may be susceptible to erosion and/or sedimentation and the related potential to discharge sediment to the environment.

References

Resource Consent and Project Specification requirements (as applicable)

[Environmental Toolkit](#)

[ENV-07 Sediment Discharge Emergency](#)

[ENV-11 Dewatering Disposal](#)

Regional Erosion and Sediment Control Guideline

Templates

Erosion and Sediment Control Plan Template

Erosion and Sediment Control Device Inspection Checks

1.3 Definitions

Erosion Control	Methods to prevent or minimise the erosion of soil, in order to minimise the adverse effects that land disturbing activities may have on a receiving environment.
CESCP	Construction Erosion and Sediment Control Plan, a specific plan which includes the details of the actual erosion and sediment controls and construction methodologies to be used for a specific work area or work type, i.e. for Haul Roads or for the North Eastern Bridge Abutment.
ESCP	Erosion and Sediment Control Plan, a plan which describes the measures and systems to be used to prevent/control erosion and sedimentation.
Sediment Control	Capturing sediment that has been eroded and entrained in overland flow before it enters the receiving environment.

2 Procedure

Activity	Responsibility	Key Actions	Records	References
Planning the Work	Project Manager / Project Environmental Rep / Environmental Manager	<ul style="list-style-type: none"> ▶ Review Specifications, Resource Consents, Designation Conditions and Environmental Toolkit. ▶ Ensure required environmental plans, erosions and sediment control plans and any other required documentation is submitted and approved to the relevant 	Erosion and Sediment Control Plan	

Activity	Responsibility	Key Actions	Records	References
		<p>parties, e.g. the Regional Council, prior to commencing site works.</p> <ul style="list-style-type: none"> ▶ Ensure a copy of the appropriate permits i.e. Permit to Pump or Permit to Dig are kept up to date and available to staff implementing erosion and sediment controls. ▶ Ensure systems are in place to monitoring the effectiveness of the erosion and sediment control measures. ▶ Ensure the relevant people have received the appropriate training to competently carry out their duties. 		
Site Monitoring	Environmental Manager/ Project Environmental Rep/Supervisor	<ul style="list-style-type: none"> ▶ Carry out regular monitoring and maintenance of erosion and sediment control systems. 	Monitoring records Inspection records	Designation Condition(s) Resource Consent(s) Regional Authority Erosion and Sediment Control Guidelines
Storm Events		Refer to ENV-07 Sediment Discharge Emergency		

2.1 Environmental Effects

Construction activities have the potential to result in erosion and the subsequent discharge of sediment into waterways. The discharge of sediment, either directly to waterways or indirectly via the storm water system is known to result in adverse environmental effects including:

- ▶ Smothering of aquatic wildlife
- ▶ Loss of aquatic habitat
- ▶ Loss of food sources for aquatic wildlife
- ▶ Damage to the gills and mouths of fish
- ▶ Turbidity of streams increasing stream temperature and making it difficult for fauna to find food.

2.2 Best Practice Measures

Wherever possible erosion and sedimentation must be prevented or minimised at source through:

- ▶ Control of run-on water
- ▶ Separation of clean and dirty water
- ▶ Protect surfaces from erosion
- ▶ Prevent Sediment from leaving the site
- ▶ Planning the earthworks methodology.

2.2.1 Control of Run-on Water

Run-on water is runoff from above the construction site that flows down into it. This is to be intercepted and diverted away from the site to prevent it running over exposed areas, thereby reducing erosion and associated sediment discharges. Run-on water can be diverted by using existing kerb and channels or bunds of no-erodible materials (e.g. hot mix. Sandbags or diversion pipes).

Diverted water will be discharged into existing storm water systems or onto grassed/permeable surfaces. Interception of clean run-on Water will reduce the volume of water requiring treatment before leaving the site.

2.2.2 Separating Clean and Dirty Water

On some sites it may not be possible to intercept and divert clean water completely around the site. In these situations, where practical measures should be installed to let the clean water pass through the site without mixing with sediment laden run-off (dirty water). An example of this would be stockpile diversion pipes.

It is important that clean water diversions are stabilised i.e. with polythene or bidim, to prevent the erosion of the diversion. Also they must be kept clear of dirt and debris to reduce the risk of flooding.

2.2.3 Protect Surfaces from Erosion

Effective management of erosion will reduce the need for sediment treatment. The following techniques should be used to manage erosion:

- ▶ Where possible, match project scheduling with known climatic variations, e.g. avoid undertaking river works during periods of high flows.
- ▶ Stage construction to minimise open and unstabilised areas, e.g. backfill/stabilise a trench before opening a new section.
- ▶ Progressively grass/stabilise disturbed areas, particularly high-risk area such as steep slopes, areas of concentrated flows and those close to waterways.
- ▶ Minimise onsite stockpiling and cover stockpiles/install measures to encircle the stockpile if practical.

2.2.4 Prevent Sediment from Leaving the Site

Run-off unable to be diverted around the site will be treated using an appropriate sediment control practice, as recommended by the Regional Erosion and Sediment Control Guideline. These practices will vary depending on the particular site, climatic conditions and soil type. The various measures may include Sediment Retention Ponds, Decanting Earth Bunds, Silt Fences, or Settlement Tanks. Refer to the [Environmental Toolkit](#) for more information about the construction considerations for these measures.

Wherever possible, permanent stormwater treatment devices and drainage channels will be used. The individual sizing of the measure will be the larger of either the sediment or stormwater requirements.

2.3 Planning the Earthworks Methodology

Erosion and Sediment Control Plans (ESCPs) and the related site specific Construction Erosion and Sediment Control Plans (CESCPs) are required to be developed for activities involving disturbance of sediment where there is the potential to discharge sediment into the environment.

Also, project requirements and consent conditions are likely to include the submission of an overarching ESCPs and CESCPs which must be approved by the local regulatory authority.

Even if the project requirements and consent conditions do not require an ESCP or CESCP, this does not preclude the need for detailed erosion and sediment control planning. A risk based approach should be undertaken.

2.3.1 Erosion and Sediment Control Plans

The ESCP should provide the methodology to be adopted and approximate locations of erosion and sediment control measures. It must be developed in consultation with the relevant Project Engineer.

As a minimum, these plans must include the following:

- ▶ A title block clearly identifying the area covered by the ESCP and the scale used.
- ▶ Contour information at a suitable interval
- ▶ Details of erosion and sediment controls within two weeks of the details being finalised including:
 - ▶ Specific pond design
 - ▶ Temporary stormwater treatment devices
 - ▶ Outfall structures, their locations and

- ▶ Estimated treatment
- ▶ Positioning and stabilisation of clean water diversions
- ▶ Standard designs
- ▶ Supporting calculations
- ▶ Catchment boundaries for the sediment controls and clean water diversions
- ▶ Position of diversions and clean water impoundments
- ▶ Location and extent of the works, and cut and fill operations.
- ▶ A map detailing all slope angles within the designation
- ▶ Locations of all devices, plus areas, volume (where applicable) and location relative to the road chainage and archaeological sites
- ▶ Details of construction methods to be employed, including timing and duration details and details of the proposed strategy to reduce the risk of erosion.
- ▶ A programme for managing exposed area, including progressive stabilisation considerations.
- ▶ Monitoring and maintenance schedules.

The ESCP will also include all requirements for erosion and sediment control set out within the Site Specific Environmental Requirements (SSERs) and consent conditions.

2.3.2 Chemical Treatment Management Plan

Where chemical treatment of sedimentation devices is required, a separate Chemical Treatment Management Plan will be developed in accordance with consent requirements and in line with controls set out in the ESCP.

This document shall, as a minimum, include the following:

- ▶ Criteria for assessing the need for chemical treatment
- ▶ Design for the chemical treatment system
- ▶ A monitoring and maintenance programme
- ▶ Procedure for the storage of chemical(s) on site (see also Hazardous Substance Storage and Handling)
- ▶ Procedure for the transportation of the chemical(s)
- ▶ Chemical spill contingency plan (See also Environmental Emergency Procedure)
- ▶ Identification of staff who are appropriately trained and who have clearly defined roles and responsibilities to ensure adherence with the Chemical Treatment Management Plan.

2.4 Maintenance and Inspection

In order to maintain efficiency, erosion and sedimentation controls will be regularly inspected by the Project Environmental Rep/Environmental Manager (or their delegate). The findings of these inspections will be documented and discussed with the relevant Site/Project Engineer and Supervisor and closeout of the maintenance required and issues raised will be followed up on by the Project Environmental Rep/Environmental Manager.

Document History and Status

Revision	Status	Author	Date	Revision Description
1	Issued for use	Sandra Edwards	27/02/2017	Initial Procedure

Approvals					
Revision	Action	Name	Position	Date	Signature
1	Reviewed by	Sandra Edwards	National Environmental and Sustainability Manager	27/02/2017	
	Approved by	Sandra Edwards	National Environmental and Sustainability Manager	27/02/2017	

Introduction

1.1 Purpose

This procedure describes how to prevent adverse health, safety and environmental effects associated with the refuelling of vehicles, mobile plant and equipment.

Fuels are toxic to people and the environment, and prolonged or repeated exposure can result in skin and respiratory irritation. Petrol is highly flammable and creates a combustible vapour when heated.

This procedure also describes environmental controls when carrying out plant maintenance on site, and when storing plant and machinery near water. Maintenance can result in oil and hydraulic fluid spills.

1.2 Scope

This procedure covers activities relating to the transfer of liquid fuels, refuelling mobile plant and vehicles on site, maintenance of plant and equipment on site, and storage of mobile plant near water.

This procedure applies to refuelling with diesel and petrol. It does not apply to vehicles refuelled at commercial service stations or with gas fuels (LPG).

1.3 References

Resource Consents and Project Specifications (as applicable)

District Plans (set volume limits and controls for storing fuels based on adjacent land use)

Worksafe Hazardous Substances Toolkit

HSG-15 Hazardous Substance Storage and Handling

ENV-02 Fuel, Oil and Chemical Spills

SP-36 – Mobile Plant Management Procedure

Land Transport Rule Dangerous Goods 2005

Health and Safety at Work Act (Hazardous Substances) Regulations 2017

1.4 Definitions

ESMP – Environmental and Sustainability Management Plan, details how environmental risks are managed for a specific site.

Auto stop fuel nozzles – allow refuelling to continue when the fuel attendant is not holding the nozzle and shuts off when the end of the nozzle is submerged when the tank is full. These are known to fail.

MSDS/ SDS – (Material) Safety Data Sheets contain details of the health, safety and environmental risks and controls associated with a substance.

Stationary Container Compliance Certificate – Certification that fixed tanks on site comply with HSWA rules over threshold capacities.

Location Compliance Certificate – Certification that your site meets the HSWA rules for storing explosive and flammable materials over threshold quantities.

Spill Kit – A collection of materials that can assist in the recovery and clean up of a spill. Hydrocarbon spill kits are required for refuelling.

Fuel Attendant – Person operating the fuel nozzle, generally the min-tanker driver.

Secondary Containment – A bund around a storage container, designed to hold 110% of the volume of the largest container.

EV-21 Refuelling and Maintenance of Vehicles and Equipment

2 Procedure

Activity	Responsibility	Key Actions	Records	References
Planning the Work	Project Manager	<ul style="list-style-type: none"> ▶ Identify fuel requirements and any restrictions on refuelling and maintenance activities and document in site ESMP and risk register. ▶ Ensure any bulk fuel storage will comply with HSG15 and HSWA and District Plan requirements. ▶ Ensure a spill response plan is in place. ▶ Ensure appropriate spill response equipment and fire extinguishers are available at all refuelling, fuel storage and maintenance sites. ▶ Ensure regular HSEQ inspections include site specific controls for maintenance and refuelling. 	Spill Response Plan Training Records ESMP Risk Register	Project Specifications Consents ENV-02 HSG-15
Construction/ Operation	Project Manager	<ul style="list-style-type: none"> ▶ Communicate refuelling and maintenance requirements to all site personnel via a Site-Specific Induction. ▶ Carry out risk assessment for refuelling and document in JSEA. ▶ Ensure all persons involved in refuelling and maintenance are signed onto the relevant JSEA. 	Induction Toolbox talks JSEA	ESMP Risk Register
	Supervisor	<ul style="list-style-type: none"> ▶ Ensure regular HSEQ inspections include refuelling and maintenance activities ▶ Ensure maintenance and refuelling is not carried out within 20m of watercourses or stormwater unless specific JSEA is in place. ▶ Ensure plant is not immobilised for maintenance in a floodplain. 	Inspection records	ESMP
	Operators/ Drivers	<ul style="list-style-type: none"> ▶ Ensure CO2 fire extinguishers is available in vehicle/ plant. ▶ Ensure a hydrocarbon spill kit is near their plant. ▶ After refuelling, walk around vehicle/ plant to ensure it is clear of other plant or people. ▶ Check that fuel cap has been replaced after fuelling. ▶ Park plant >20 from watercourses/ stormwater and outside flood plains for maintenance or storage. 	JSEA 5x5 Card	Induction
	Fuel Attendant/	<ul style="list-style-type: none"> ▶ Must not leave the nozzle unattended while refuelling. ▶ Ensure machine is switched off during refuelling. 	JSEA 5x5 Card	Induction

EV-21 Refuelling and Maintenance of Vehicles and Equipment

Activity	Responsibility	Key Actions	Records	References
	Mini Tanker Driver	<ul style="list-style-type: none"> ▶ Ensure foam fire extinguishers (>4kg) is available. ▶ Have a spill kit in the mini-tanker or with the trailer bowser. ▶ Use additional PPE suitable for the fuel type (e.g. Rubber Gloves). ▶ Have MSDS Available. 	MSDS	
	Mechanic	<ul style="list-style-type: none"> ▶ Provide drip trays to contain minor spills where required. ▶ Know location of nearest spill kit and fire extinguishers. ▶ Carry out risk assessment prior to starting minor maintenance on site. ▶ Obtain project manager approval of risk assessment prior to carrying out major maintenance on site. 	JSEA 5x5 Card	Induction
	All Staff	<ul style="list-style-type: none"> ▶ Report all spills as incidents to the site supervisor immediately ▶ Assist in spill containment and clean up. 	Incident Report Radar Spill Response Plan	Induction ESMP

2.1 Environmental Effects

The key potential environmental aspects and impacts related to waste generation include the following:

Aspects	Impacts
Release of diesel and other fuel oils to land or water bodies during refuelling.	Contamination of soils, groundwater and surface waters, damage to riparian and aquatic ecology including fish kills.
Release of diesel and other fuel oils to land or water bodies during vehicle and equipment maintenance.	

3 Refuelling

Refuelling is ideally done by a min-tanker which removes the requirement to hold large volumes of fuel on site. Road registered vehicles should be refuelled at a commercial service station where practical.

When planning for site fuel requirements be aware that transporting more than 250 litres of fuel as a tool of trade triggers requirements under the Land Transport Rule Dangerous Goods 2005, which must be met.

3.1 Fuel Storage

For small volumes, and where mini-tankers are not available, fuel can be stored on site in accordance with HSG-15 Hazardous Substance Use, Handling and Storage. The volumes stored on site must be included on the sites Hazardous Substances Inventory.

When establishing bulk fuel storage on site, the requirements for a compliance certificate under the HSWA Hazardous Substances Regulations must be met. Relevant thresholds to be aware of are:

- ▶ Storing >5,000 litres of diesel requires a Stationary Container Compliance Certificate
- ▶ Storing >50 litres of petrol requires a Location Compliance Certificate

Refer to Worksafe Hazardous Substances Toolkit for full details.

Bulk fuel storage must also meet the requirements of the District Plan and any relevant designation conditions, consent conditions and project specifications.

Fuel storage locations must as a minimum comply with the following:

- ▶ Be located at least 20m from water bodies and cess pits, or further where required by consent;
- ▶ Be located at least 20m from the drip line of native bush areas and protected trees;
- ▶ Have secondary containment;
- ▶ Have hydrocarbon spill kits;
- ▶ Have fire extinguishers;
- ▶ Be located away from ignition sources and incompatible substances;
- ▶ Be secure and well ventilated;
- ▶ Be clearly sign posted as a flammable and environmental hazard and no smoking.

3.2 Refuelling Locations

Where practical refuelling will be undertaken within the bulk fuel storage areas.

On large sites a refuelling location may be established. This must meet the same requirement as for fuel storage. These locations should be inspected at least weekly.

On most sites refuelling of mobile plant and machinery will take place at the workface. The following minimum requirements must be met:

- ▶ Be at least 20m from water bodies and cess pits;
- ▶ Be at least 20m from the drip line of native bush areas and protected trees;

Where these requirements cannot be met, for instance during work on temporary staging over water, additional controls must be put in place to prevent spills. This could include drip trays or additional supervision. These controls must be documented and communicated to relevant staff, this could be done in the ESMP, Work Pack, Project Induction and JSEA.

3.3 Transferring Fuel

The risk of spill or fire are increased during refuelling or when transferring fuel between containers.

The minimum standards for transferring fuel are:

- ▶ Never leave refuelling unattended;
- ▶ No smoking, use of cell phones, hot works or other ignition sources within 20m;
- ▶ Turn off ignition before refuelling;
- ▶ Use a fuel nozzle, funnel or pouring spout;
- ▶ Use correct gloves (rubber) to prevent skin contact;
- ▶ Transfer fuel in a ventilated area to avoid breathing vapour;
- ▶ Have a spill kit available at refuelling location;
- ▶ Have fire extinguishers available;
- ▶ The MSDS must be available at the site office, or with the fuel delivery vehicle.

Return containers to their secure storage once refuelling is complete. Never leave fuels in an unsecured or unsupervised location.

Use the correct containers for petrol (Red) and diesel (yellow) with secure lids. When filling petrol containers only fill 95% of the container to allow for expansion. Do not leave petrol containers in direct sunlight. Allow hot petrol engines 10 minutes to cool before removing the fuel cap and refuelling.

Fire extinguishers must be available in the plant being refuelled (CO2 type) and with the mini-tanker or trailer bowser (foam type >4kg). CO2 extinguishers are useful for fires on engines and machines, while foam is more effective for burning fuels on the ground.

Before refuelling the operator shall position their machine away from adjacent activities, so that the refuel attendant is not at risk.

After refuelling the plant operator must do a visual check to ensure the fuel cap is replaced and the necessary exclusion zone is clear of people and equipment before commencing work.

Staff and contractors handling fuels must be familiar with the relevant MSDS and requirements of this procedure.

4 Plant Maintenance

Wherever practical, plant maintenance will be carried out at one of the yards or workshops operated by the Asset Hub.

Where maintenance or repairs must be carried out on site, works will be carried out in locations at least 20m away from natural water courses or stormwater cess pits, and outside of flood plains. Spill kits must be available.

Where plant cannot be moved away from water or stormwater, additional controls must be put in place and documented in the JSEA, work plan or 5x5 card. Controls could include:

- ▶ Blocking cess pits with rubber mats or sand bags during maintenance
- ▶ Placing drip trays or mats under machinery

For any operations involving the drain down and replacement of oils, appropriate measures to prevent spills and contamination will be implemented (e.g. drip trays and spill kits). These controls and the location of the works must be documented in a JSEA. The location of this work must be approved by the Project Manager or Projects Environmental Manager to ensure that any consent conditions are met.

5 Storage of Mobile Plant and Machinery Near Water

Where practical no plant or vehicles are to be stored within 20m of a watercourse or within a flood plain.

This is to mitigate damage the environment as a result of plant being damaged or vandalised while the site is unattended. It also reduces the risk of plant being submerged in case of flooding, resulting in damage to plant and contamination of the watercourse.

Where plant must be stored in a flood plain or near water a contingency plan must be in place for its removal where flooding is forecast. This must be documented in a work pack or site-specific emergency response plan.

EV-21 Refuelling and Maintenance of Vehicles and Equipment

Document History and Status

Revision	Status	Author	Date	Revision Description
1	Issued for use	Sandra Edwards	27/02/2017	Initial Procedure
2	Issued	Rachel Blake	17/12/2019	General review. Add safety risks around refuelling.

Approvals					
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1	Reviewed by	Sandra Edwards	National Environmental and Sustainability Manager	27/02/2017	
	Approved by	Sandra Edwards	National Environmental and Sustainability Manager	27/02/2017	
2	Reviewed by	Malcolm McWhannell, Paul Berriman, Warren Rogers	Various	17/12/2019	
	Approved by	Rachel Blake	Environmental Manager	18/12/2019	<i>R Blake</i>

EV-11 Dewatering

Introduction

1 Purpose

To define the environmental requirements for discharging water from construction sites. Dewatering may occur because of trenching, piling, or earthworks. Contaminants addressed are sediment, flocculants and cement.

References

Resource Consent and Project Specification requirements (as applicable)

ENV-10 Waste Concrete and Grout

Fletcher Construction Environmental Toolkit

Regional Council Guidelines

National Policy Statement – Freshwater

National Environmental Standard - Freshwater

Standard Forms

Permit to Pump

Permit to Pump – Register

Dewatering Monitoring Form

Incident/Investigation Report

Incident Register

1.1 DEFINITIONS

Dewatering Removal, treatment and discharge of sediment laden water from the bottom of piles, trenches and excavations

Tremmie A method of placing concrete under water

Wetland Permanently or intermittently wet areas, shallow water, and land water margins that support a natural ecosystem of plants and animals that are adapted to wet conditions.

Natural Wetland A wetland that is not:

- a) constructed by artificial means, (unless it was constructed to offset impacts on, or restore, an existing or former natural wetland); or
- b) a geothermal wetland; or
- c) any area of improved pasture that, at the commencement date, is dominated by (that is more than 50% of) exotic pasture species and is subject to temporary rain-derived water pooling.

2 Procedure

Activity	Responsibility	Key Actions	Records	References
Preventive measures	Project Manager / Project Environmental Manager	<ul style="list-style-type: none">▶ Review Specifications, Resource Consents or Regional Plans, Designation Conditions and Environmental Toolkit.▶ Ensure dewatering and discharge points will not be within 100m of a natural wetland unless consented.	Permit to Pump Monitoring records	Resource Consents Env. Toolkit Permit to Pump Form

EV-11 Dewatering

Activity	Responsibility	Key Actions	Records	References
		<ul style="list-style-type: none"> ▶ Check if consent is required to take groundwater and meet all consent conditions. ▶ Ensure required environmental plans and any other required documentation is submitted and approved to the relevant parties e.g. the Regional Council, prior to commencing site works. ▶ Ensure the water quality criteria in the resource consents or regional plan are detailed in the EMP or ESCP. ▶ Ensure a Permit to Pump is used for all dewatering. ▶ Ensure Permit's to Pump are authorised by staff familiar with site sediment control requirements and resource consents. ▶ Ensure systems are in place to monitor the effectiveness of the dewatering control measures. ▶ Keep monitoring records on project files. 		
Action in the event of a control failure	Project Engineer/ Supervisor	<ul style="list-style-type: none"> ▶ Monitor activity and discharges during pumping to provide early detection of potential failure of dewatering control systems. ▶ Mobilise sufficient resources to undertake all necessary remedial action if required. 	Diary notes, Dewatering Monitoring Form, photos, samples	
Reporting control failures	Project Engineer/ Site Engineer/ Supervisor	<ul style="list-style-type: none"> ▶ Notify Project Manager, Project Environmental Representative, BPC Environmental Manager, Client's Representative and Consenting Authority (if required or appropriate). 		Resource Consents EMP Contract Incident Trigger Level Matrix and Incident Reporting Flowchart
Investigation	Project Manager	<ul style="list-style-type: none"> ▶ Ensure environmental incident report and investigation are completed and actions closed out. 	Incident Report, Investigation	

EV-11 Dewatering

3 Guidance Notes

3.1 Preventive Measures

The following measures provide generic guidance on management of the effects of sediment discharges to the environment from dewatering activities. However, each project should identify their site-specific requirements.

All water from trenches and piles should be considered potentially contaminated. For example, there may be contaminated soils and groundwater or cement contamination. Further checks may be required to ensure it can be safely discharged to the environment.

Further advice on treatment options can be sought from the Project or BU Environmental Manager.

3.2 Authority to Take Groundwater

Where dewatering will lower the groundwater table, a consent is often required. These typically put in place monitoring and contingency measures to ensure that ground settlement and property damage will not occur. They may also require monitoring of adjacent freshwater environments to ensure that these are not drained during the works.

Under the NES Freshwater which came into effect on 3 September 2020, dewatering and earthworks are not permitted within 100m of a natural wetland without a consent.

3.3 Water Quality Standards

As general rule of thumb, a minimum of 100mm visibility and pH between 5.5 and 8.5 is considered clean however resource consents and regional plans may stipulate specific criteria and these vary between regions.

Each project must determine the water quality standard that applies to their site based on the relevant consent or permitted activity standards.

3.3.1 Regional Plans

Regional Plans set the standard for discharges to water, or to land where the discharge is likely to enter water.

As a guide, these typically prohibit the following effects, after reasonable mixing:

- Conspicuous oil or grease films, scums and foams, or floating or suspended material;
- Conspicuous change in water colour or clarity;
- Objectionably odour;
- Significant impact on aquatic life and suitability of water for farm animals;
- Change in temperature.

3.3.2 National Policy Statement for Freshwater 2020

In August 2020 the National Policy Statement for Freshwater was made law. This defines 22 water quality attributes that councils must measure to monitor the quality of water for human recreation and ecosystem health.

Sediment in rivers is an attribute which has a national bottom line for both Suspended Sediment and Deposited Sediment. Regional Council will need to limit resource use to ensure the Suspended Sediment attribute will be met. The bottom line varies depending on the watercourse type.

These new standards for water quality will be added to Regional Plans by 2026.

3.3.3 National Environmental Standard – Freshwater 2020

The NES - Freshwater restricts works close to natural wetlands. The discharge of water within 100m of a wetland requires a consent. This is with effect from 3 September 2020.

EV-11 Dewatering

3.4 Water Quality Measurement

The following methods can be used to measure water quality.

3.4.1 Clarity

This is how far into the water column you can see, measured in mm. It is simple to measure with a turbidity tube or a secchi disk. 100mm is generally considered a good standard, however this is not often used by Councils as an official standard.

Some Regional Councils stipulate no change of colour or visual clarity after reasonable mixing has occurred downstream, at a set distance or distance to be determined based on the size of the water course.

3.4.2 Turbidity

A turbidity meter measures how light passing through water is scattered by sediment. A turbidity meter is expensive and need to be calibrated at each site to match it to the type of sediment. This is not generally used as a standard in a consent but is useful as it gives an instant result. Unit of measurement is NTU.

3.4.3 Total Suspended Sediment (TSS)

This can only be measured in a laboratory as the sample has to be dried and the sediment weighed. Measured in mg/L or g/m³ this is the most accurate means of measurement and often used as critical in consent conditions or in the Regional Plan. For example, ECan sets limits of 100g/m³ or 50g/m³ for some areas.

As lab results can take a couple of days, a common practice is to create a set of reference samples above, on and below the set criteria. These can be used for visual comparison on site. Alternatively, a correlation between TSS and turbidity can be determined and a turbidity meter used.

3.4.4 pH

Measures how alkaline or acid water is on a scale of 1 – 14. Neutral water is pH 7. Water must be between 5.5 & 8.5 to be safe to discharge to fresh water. Limits are often set in the consent conditions if flocculation is required.

Cement and lime will result in a pH too high to discharge, while some flocculants (e.g. Poly-aluminium Chloride (PAC)) will lower pH so that it is too acidic to discharge.

This is simple to measure with pH strips. (Suppliers include Fisher Scientific and Geotechnics). Electronic meters can also be used.

3.5 Dewatering Options for Sediment Removal

Effective dewatering of piles, trenches or deep excavation requires consideration of sediment controls to prevent sediment laden water leaving the site.

3.5.1 Settlement Options

Settlement of water in-situ, followed by controlled pumping from a suspended pump. All discharged water must be clean. Pumping must be closely monitored.

Pumping dirty water to large holding tanks or bins to allow dirty water to settle out followed by controlled pumping to stormwater.

Discharge water to a site Sediment Retention Pond (SRP) or Decanting Earth Bund (DEB). Note these devices have limited capacity to accept large volumes of water from dewatering activities and must be carefully monitored to ensure they are not overloaded particularly during wet weather.

Water must be pumped to the fore bay or furthest point from the outlet. The outlet should be stopped while pumping by raising the floating decants or putting a bung in the primary spillway. Once the water quality is acceptable the outlet can be reopened.

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3.5.2 Through Pumping (Water Treatment Tanks or Plants)

Continuous pumping through tanks with baffles, or a series of tanks can allow sediment to settle out before water reaches the outlet. This usually requires chemical treatment and will require close monitoring to ensure that treatment is always adequate.

Pumping to purpose-built lamella flow tanks is useful for small sites and can be more efficient than simple tanks. Suppliers include Seditrol, Erosion Control, Filtec, Enviowaste (Siltbuster distributor for NZ).

3.5.3 Chemical Treatment with Flocculants

Flocculants can accelerate the settlement of sediment. Chemical dosing should only be undertaken by those trained in the use of the chemicals as it may result in other negative effects and requires regional council approval or consent in some cases.

Specialist companies, such as Erosion Control, RST can advise on product and dose rates for different soil types. Solutions include electronic dosing units, floc socks, floc blocks, simple drip feeds or batch dosing.

3.5.4 Discharge to Land

Pump to grassy or loose aggregate areas well away from natural water or stormwater. Monitor and adjust regularly to prevent concentrating flows that may result in erosion. Filter socks can be used as check dams to assist in spreading the flow and capturing sediment. This technique should only be used for dewatering small volumes and must be carried out with care.

In some situations, water may be pumped between pile holes or excavations where it may soak away or be disposed of at a later date.

3.5.5 Silt Fence

Take care to not overload fences, which are not designed to take large volumes of water in concentrated flows. They hold water, rather than filter it.

Place the outlet to hose at least 5 metres back from the silt fence and ensure the discharge does not cause erosion, overwhelm or outflank the fence.

3.5.6 Geotextile filters

Pumping to a Turkeys nest can be appropriate for dewatering small volumes. This involves creating a geotextile bowl by slinging the fabric over a frame, typically a ring of 4 plastic road barriers. Make sure that there are no holes or joins in the geotextile that allow water through quickly. Fix the pump outlet so it does not jump out of the nest and monitor closely.

Dewatering Bags can be used to filter out sediment. They come in many sizes and fabrics so a trial is advisable to see what works for the soil type you have.

3.5.7 Removal for Treatment Off Site

Pumping to sewer requires authorisation from the asset owner and may require pre-treatment to reduce sediment load and pH.

Remove by sucker truck to a licenced disposal site. This more expensive option is usually only necessary when soil is contaminated, or water has high or low pH.

Further guidance on dewatering can be found in the Fletcher Construction Environmental Toolkit or contact the Project Environmental Manager or the BPC Environmental Manager for more information.

3.6 Tremie Pours

Dewatering from tremie pours can increase the risk of environmental damage due to the presence of the lime present in cement. Where tremie overflow discharges to the environment then additional controls over and above normal dewatering controls need to be applied

Controls may include:

- ▶ Pump tremie water using a sucker truck and remove to approved offsite disposal.

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- ▶ Discharge tremie water to sewer with the asset owner approval (this may require further pre-treatment).
- ▶ Pump tremie water to an onsite treatment device and chemically adjust pH to neutral, followed by controlled pumping. Chemical treatment should only be undertaken by those trained in the use of the chemicals. Refer to the Project Environmental Manager or BPC Environmental Manger for more information.
- ▶ Pump tremie water to grassy areas well away from natural water or stormwater. Monitor and adjust regularly. Note: This technique should only be used for dewatering small volumes and must be carried out with care.

3.7 Action In The Event Of Dewatering Failure

3.7.1 Immediate Actions

Take whatever immediate actions are required to repair the failure and prevent further sediment or cement laden water discharging into stormwater drains, cesspits, natural waterways or the sea.

If dirt, debris or cement slurry enters a stormwater system or cesspit then they should be immediately cleaned out. This may require manual removal or the use of a vacuum sucker truck.

Check the receiving environment downstream of the stormwater line or cesspit for any evidence of discharge. If necessary, arrange for clean-up in consultation with the Regulatory Authority, Project Manager, Environmental Manager or Clients Representative.

If it is necessary to call in external assistance to assist clean up a significant spill, advise the Project Manager or Clients Representative who will contact the relevant Regional Council.

3.7.2 Follow-Up Actions

Where sediment laden water or cement slurry has entered a waterway, the area should be examined by the Project Environmental Representative as soon as possible following the incident.

The Project Environmental Representative should consult with the Project Manager, BPC Environmental Manager and/or Clients Representative as appropriate to the situation and if necessary, implement remedial action.

Close communication with the Regulatory Authority should also be maintained (see 'Reporting Discharges' section below).

3.7.3 Reporting Discharges

Any unauthorised discharge of sediment to the stormwater system or natural waterways is to be reported using the Incident Field Report form.

The incident is to be reported and added to Radar as per the Incident Trigger Level Matrix and Incident Reporting Flowchart.

The Client's Representative is to be informed of any discharges to natural waterways (the sea, stormwater drains or natural waterways) where required by the contract.

The Project Manager, Environmental Manager and/or Client's Representative is responsible for identifying whether or not the Regional Council should be advised of a spill as appropriate to the situation. Further guidance can also be sought from the BU Environmental Manager.

3.7.4 Investigation

Any discharge having a significant or potentially significant environmental impact requires an investigation as per the Incident Trigger Level Matrix and Incident Reporting Flowchart. This is to be done by the Project under the direction of the Project Manager.


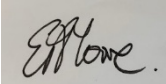
A copy of this report is to be uploaded to Radar.

A copy may also be required to be provided to the Client's Representative and/or Regulatory Authority.

EV-11 Dewatering

Document History and Status

Revision	Status	Author	Date	Revision Description
1	Issued for use	Stu Chapman	22/02/2011	
2	Issued	Sandra Edwards	19/12/2016	Legislation Update
3	Issued	Rachel Blake	25/2/2019	General update and rebrand for BPC. Add guidance on water quality and treatment.
4	In Review	Rachel Blake	7/10/20	General review. Add NPS Freshwater guidance.

Approvals					
Revision	Action	Name	Position	Date	Signature
1	Reviewed by	Stu Chapman	Env Representative	22/02/2011	
	Approved by	Stu Chapman	Env Representative	22/02/2011	
2	Reviewed by	Sandra Edwards	National Environmental and Sustainability Manager	19/12/2016	
	Approved by	Sandra Edwards	National Environmental and Sustainability Manager	19/12/2016	
3	Reviewed by	Rachel Blake	BPC Environmental Manager	25/3/2019	
	Approved by	Peter Engelbrecht	BPC Quality Manager	25/3/2019	
4	Reviewed by	Rachel Blake	BPC Environmental Manager	7/10/2020	
	Approved by	Emlyn Moore	BPC HSE Manager	8/10/2020	

Document Status

The most recent revision of this document is listed on FCC-MN-8001 Integrated Management System Documentation Schedule.

Introduction

1 Purpose

Contamination of soils or ground water may have occurred due to the action of previous site owners. Contaminants may include the heavy metals, organo-pesticides, hydrocarbons or other man made substances.

The purpose of this procedure is to define the requirements for control of any unexpected finds of contaminated soils and groundwater during site works.

The procedure does not contain information on health and safety aspects of working with contaminated materials. Refer to procedures in the Fletcher Construction Health & Safety Manual.

References

National Environmental Standard (NES) – Assessing and managing contaminated soils to protect human health

Resource Consents and Project Specifications requirements (as applicable)

Ministry for the Environment “A Guide to the Management of Cleanfills” (2002)

Fletcher Construction Environmental Toolkit

Liquid & Hazardous Waste Code of Practice

Standard Forms

Incident Report

Incident Register

1.1 Definitions

Contaminated soils Soils that may require further Council authorisations and / or off-site disposal to an authorised waste facility due to their contaminant concentrations

Clean fill Soils that contain contaminant concentrations at or below background concentrations

2 Procedure

Activity	Responsibility	Key Actions	Records	References
Preventative measures	Bid Manager / Project Manager	<ul style="list-style-type: none"> Review Specifications, applicable Resource Consents and Environmental Toolkit. Evaluate the risk of encountering contaminated soils. 		Client Specs. Resource Consents NES Consents Environmental Toolkit

Activity	Responsibility	Key Actions	Records	References
	Project Manager	<ul style="list-style-type: none"> ▶ Ensure required environmental plans and any other required documentation has been submitted and approved by the relevant parties e.g. the regional & district council, prior to commencing site works. These documents will have normally been prepared by the Client in advance of the works. ▶ Ensure a copy of any contaminated site management plans are kept up to date and available to staff carrying out earthworks ▶ Ensure systems are in place to monitor the effectiveness of the contamination control measures. ▶ Ensure offsite disposal requirements are adequately defined in any subcontract agreements. Maintain disposal records. 	Monitoring records	MfE Cleanfill Guidelines
	Project Engineer / Supervisor / Project Environmental Rep	<ul style="list-style-type: none"> ▶ Ensure workers and subcontractors are adequately briefed on the markers of contaminated soils and groundwater prior to commencing works. 	Inductions, Toolbox records	Environmental Toolkit
Action in the event discovery of contaminated soils	Project Engineer/ Supervisor	<ul style="list-style-type: none"> ▶ Monitor activity during site works to provide early detection of potentially contaminated ground or groundwater. ▶ 	Diary notes, inspection forms	
	Project Manager	<ul style="list-style-type: none"> ▶ For offsite disposal of contaminated soils ensure adequate proof of disposal to approved landfill is obtained. ▶ Ensure client has obtained appropriate authorisations for any contaminated soils to be left in-situ 	Tip docket NES Consents	
Reporting discovery of contaminated soil or groundwater	Project Engineer	<ul style="list-style-type: none"> ▶ Notify Project Manager, Project Environmental Representative, Divisional Operations or Environmental Manager, Client's Representative and Consenting Authority (if required or appropriate). 		
	Project Manager	<ul style="list-style-type: none"> ▶ Ensure appropriate notifications are made to Client's representative so that appropriate actions can be taken. 		

3 Notes

3.1 Preventative Measures

Prior to commencing works on a site the Client should have undertaken sufficient investigations to determine whether or not contaminated soils and/or groundwater is present. The Client will normally detail in the Contract the required procedures to be followed by the Contractor to ensure contaminated material is appropriately managed.

The Bid Manager should review the contract documents to determine the risk of encountering contaminated soils and how this will be handled by the contract. In many situations, a tender clarification may be required.

It is the responsibility of the Contracts Manager or Project Manager to ensure that any required controls are established in advance and that any offsite disposal of contaminated soils or groundwater is carried out in accordance with the Client Specifications, any NES Consents or Trade Waste Disposal authorisations.

This procedure provides generic guidance on management of potentially contaminated soils in the event of an unexpected discovery.

The management of contaminated soils and groundwater is a complex area and further advice should be sought from the FCI National Environmental and Sustainability Manager or a specialist contaminated soils consultant.

3.2 Action In The Event Of Discovery

Indicators of potentially contaminated soils or groundwater may include:

- ▶ Presence of old refuse materials
- ▶ Fibrous materials e.g. asbestos
- ▶ Discoloured water, including sheens and slicks
- ▶ Unnatural soil mounding or unnatural staining
- ▶ Unusual odours
- ▶ Gas bubbles in pooled surface water
- ▶ Dead or stressed vegetation

Where potentially contaminated soils are discovered the area should be isolated and the Client's Representative notified as soon as practical. Regulatory authorities should be contacted in line with the Client requirements for external communications.

Temporary backfilling to secure the excavation may be required. Stockpiles can potentially be covered with geotextile cloth to avoid it from further contaminating storm water. Clean runoff should be diverted away from contaminated areas to avoid cross contamination. Potentially contaminated soil stockpiles should be kept separate from other clean soils, as special treatment or disposal may be required.

Where contaminated groundwater needs to be pumped offsite it should not be discharged to the storm water system without prior testing. Contact the Project Environmental Manager for advice. Contaminated groundwater may be able to be pumped to the sewer with Asset owner prior approval or collected and disposed by Liquid Waste Contractors.

Further guidance on contaminated soils can be found in the Fletcher Construction Environmental Toolkit.

3.3 Reporting

The Client's Representative is to be informed of the discovery of any potentially contaminated soils or groundwater.

The Client's Representative and/or the Project Manager is responsible for identifying whether or not the Regional Council should be advised of potentially contaminated soils as appropriate to the situation. Further guidance can also be sought from the FCI National Environmental and Sustainability Manager, or specialist environmental consultants.

The management of contaminated soils is a complex area that normally requires specialist input. Additional NES consents, remedial reports and / or environmental monitoring may be required by the Regulatory authority. The scope of these requirements is beyond this procedure.

Where any contaminated groundwater enters the storm water system or natural waterways this is to be reported using the Incident Report form.

A copy of the Incident Report is to be forwarded to the Project Manager and copied to the Operations Manager and National Environmental and Sustainability Manager.

The Incident Report is to be logged on the Environmental Incident Register by the Project Environmental Representative.

Document History and Status

Revision	Status	Author	Date	Revision Description
1	Issued for use	Stu Chapman	22/02/2011	
2	In Review	Sandra Edwards	19/12/2016	Legislation Update and Review

Approvals					
Revision	Action	Name	Position	Date	Signature
1	Reviewed by	Stu Chapman	Env Representative	22/02/2011	
	Approved by	Stu Chapman	Env Representative	22/02/2011	
2	Reviewed by	Sandra Edwards	National Environmental and Sustainability Manager	19/12/2016	
	Approved by	Sandra Edwards	National Environmental and Sustainability Manager	19/12/2016	

Construction Environmental & Sustainability Management Plan

Document Number: D07.01

Appendices

- A number of standard operating procedures and forms are available from the Fletcher One website, specifically the [Environmental Library](#). Project environmental and sustainability management plan (this document)

Construction Environmental & Sustainability Management Plan

Document Number: D07.01

A1 Regulatory Requirements Matrix

Construction Environmental & Sustainability Management Plan

Document Number: D07.01

B1 Environmental Risk Register

Environmental Risk Register

Project Number & Name: BPW005 - Peacocke Strategic Waste Water: Pump Station

Risk Rating	Low (1-7) Record and monitor. Proceed with work. Review regularly, and if any equipment/people/materials/work processes or procedures change.	Medium (8-11) Maintain control measures. Proceed with work. Monitor and review regularly, and if any equipment/people/materials/work processes or procedures change. Risks with medium consequences are significant in terms of ISO14001 and must be managed.	High (12-17) Review before commencing work. Introduce new controls and/or maintain high-level controls to lower the risk level. Monitor frequently to ensure control measures are working.	Very High (18-25) DO NOT PROCEED. Requires immediate attention. Introduce further high-level controls to lower the risk level. Re-assess before proceeding.
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Item No.	Hazard	Risk Description	Primary Risk Assessment			Controls	Residual Risk Assessment			Last Review	Next Review Due
			Likelihood	Consequence	Risk Score		Likelihood	Consequence	Risk Score		
1	Refuelling, storage and use of fuels, oils and chemicals.	Spills cause contamination of land and waterways. Toxic to aquatic life and vegetation. Fire causing environmental and property damage.	LIKELY	MODERATE	High - 17	<p>ISO-15 Hazardous Substances Handling and Storage</p> <p>ENV-02 Fuel, Oil and Chemical Spills Refuelling and maintenance will be done >20m from water courses/ storm water/ protected vegetation and groundwater abstraction. Spill kits will be provided for all large plant and fuel or chemical stores, & training provided. Fuels and chemicals will be labelled & kept covered in secure in secondary containment. SDS sheets and hazardous substances inventory will be available on site Refuelling must always be supervised.</p>	RARE	MINOR	Low - 3	19-Oct-21	Oct-22
2	Use of tools, large plant and machinery which can generate noise and vibration near members of public and neighbouring properties.	Potential for disturbance of neighbours. Potential non-compliance with consent or District Plan noise and vibration limits. Potential for actual or perceived damage to structures or infrastructure. Negative publicity, repair costs, abatement notice enforcement action possible.	POSSIBLE	MODERATE	High - 12	<p>ENV-03 Noise Monitoring Procedure ENV-16 Vibration Procedure All works to be within regular hours of 7.00am to Sunset, Mon – Friday, and 8.00am to 4.00pm Saturday. unless noise/ vibration assessment completed and permissions obtained from client and regulator where required. Good communication with stakeholders re work hours. Complete building condition assessments in case of vibration risk. Selection of most appropriate plant (e.g. smaller plant, static roller). Monitor noise/ vibration levels to confirm compliance where there is a risk of non-compliance. Works completed as per CNVMPs where applicable</p>	UNLIKELY	MINOR	Low - 5	19-Oct-21	Oct-22
4	Earthworks resulting in discovery of unknown archaeological sites.	Damage to sites of cultural or heritage value. Note prosecution, reputational damage and repair costs may result.	UNLIKELY	MODERATE	Medium - 10	<p>Archaeology Procedure - ENV-05 Project induction to include accidental discovery protocol to raise awareness. If a suspected archaeological discovery is made (e.g. midden, bones, bricks): Stop works in the immediate area (10 – 20m) Notify the Engineer/ Archaeologist immediately, do not restart until directed. Notify the BPC Environmental Manager.</p>	UNLIKELY	MINOR	Low - 5	19-Oct-21	Oct-22

Environmental Risk Register

			Likelihood	Consequence	Risk Score	Mandatory Controls are in Bold	Likelihood	Consequence	Risk Score	Review	Due
	Work with Cement, Lime & Concrete. Includes concrete pouring, curing, grouting, concrete cutting, hydro-demolition, cement stabilising and lime drying.	Pollution of water, particularly freshwater, with cement or lime results in fish kills. Water mixed with wet cement or cutting slurry is highly alkaline causing chemical burns. Discharge to air of cement dust.	UNLIKELY	MODERATE	Medium - 10	ENV-10 Waste Concrete and Grout Procedure Set up a signposted washout facility for concrete pours, or require concrete trucks to wash out back at their own yard. Cement contaminated waste water from tremie pours/ concrete cutting/ grout mixing/ curing to be collected by wet vac or sucker truck for offsite disposal. Contain grout mixing operations within a bunded area away from stormwater. Minimise use of water for curing concrete pours and establish controls to contain, reuse if possible, and safely dispose of curing water.	RARE	MINOR	Low - 3	19-Oct-21	Oct-22
	Earthworks. Includes trenching, topsoil stripping for yard or haul road establishment, stockpiling, and general ground disturbance where soil is left unstabilised.	Water pollution due to sediment laden runoff entering watercourse or storm water system.	POSSIBLE	MODERATE	High - 12	ENV-17 Erosion and Sediment Control Procedure ENV-19 Haul and Access Roads ENV-18 Stockpiling Procedure Follow approved ESCP developed in line with WRC Guidelines. Monitor works as per ESCP and ESMP. Ensure sediment controls have been installed and as built before earthworks starts and inspect regularly. Progressively stabilise site as works are completed.	UNLIKELY	MINOR	Low - 5	19-Oct-21	Oct-22
	Taking surface or groundwater for construction purposes, including water carts.	Exceeding consented combined ground & surface water take volume. Potential ground settlement if groundwater table lowered.	POSSIBLE	MINOR	Medium - 9	Ensure consent requirements for water take are incorporated into the project ESMP and relevant workpack and JSEA. Condition assessments carried out where structures may be impacted by settlement. Monitoring and contingency plans developed by hydrogeologist. Monitoring to be installed on dewatering system. Follow approved Dewatering Management Plan. Permit to pump process to be used to control taking of water, including monitoring records.	RARE	MINOR	Low - 3	19-Oct-21	Oct-22
	Water treatment to remove sediment using chemical flocculants, including silt buster and small water treatment plants.	The flocculant PAC can result in acidic discharges containing toxic levels of aluminium, affecting fish. Site based water treatment plants can fail resulting in over/ under dosing and toxic discharges which can kill fish life. Storage of bulk flocculants, acids and alkaline.	UNLIKELY	MODERATE	Medium - 10	ENV-11 Dewatering Disposal Procedure HSG-15 Hazardous Substances Handling and Storage ENV-17 Erosion and Sediment Control Council approved ESCP & Flocculation Management Plan to be developed and followed. Regular monitoring of discharge quality.	UNLIKELY	MINOR	Low - 5	19-Oct-21	Oct-22
	Working with contaminated or potentially contaminated soils, including disposal off site.	Unauthorised disposal of contaminated soil to unmanaged site, resulting in contamination of clean land and potential discharge by air and water. Mixing clean soils with contaminated soils due to poor management. Generating contaminated water, which may run into watercourses and kill fish. Exposure of staff/ public to contaminated dust. Especially asbestos contaminated soils. Odour nuisance for neighbours.	POSSIBLE	MODERATE	High - 12	ENV-12 Discovery of Contaminated Soils Contaminated Land consultant to direct how contaminated soils are managed and disposed of. Clearly identify contaminated areas. In case of unexpected discovery of contaminated land, stop works, including dewatering. Keep contaminated material covered or damp to avoid dust. Do not allow material to mix with water and discharge from site. All contaminated land must be disposed of to an authorised (consented) landfill and dockets kept.	RARE	MODERATE	Low - 7	19-Oct-21	Oct-22
	Vehicle movements	Dirt being tracked off site and generating dust, or washing into stormwater and polluting watercourses.	LIKELY	MODERATE	High - 17	ENV-13 Dust Nuisance ENV-19 Haul and Access Roads Keep vehicles on clean surfaces where practical or provide a wheel wash at site exit. Maintain haul roads in good condition. Provide catchpit protection and regularly sweep roads at site exit.	UNLIKELY	MINOR	Low - 5	19-Oct-21	Oct-22

Environmental Risk Register

			Likelihood	Consequence	Risk Score	Mandatory Controls are in Bold	Likelihood	Consequence	Risk Score	Review	Due
	Dewatering excavations and piles.	Discharge of sediment or concrete contaminated water to environment polluting watercourses and harming fish.	POSSIBLE	MODERATE	High - 12	ENV-11 Dewatering Disposal Procedure Permit to Pump must be used to authorise dewatering. Monitor dewatering regularly and record results. Ensure high pH water is removed from site by sucker truck or to a holding tank for treatment or disposal.	UNLIKELY	MODERATE	Medium - 10	19-Oct-21	Oct-22
	Dewatering to lower groundwater table using spears or well pointing.	Ground settlement affecting neighbouring buildings or infrastructure. Exceeding consented combined ground & surface water take volume.	UNLIKELY	MODERATE	Medium - 10	Follow approved Dewatering management Plan. Follow an approved groundwater settlement and monitoring contingency management plan where required by consent. Follow Temporary Works Process for shoring. Condition assessments carried out where structures may be impacted by settlement. Meter to be installed on dewatering system. Permit to pump process to be used to control taking of water, including monitoring records.	RARE	MODERATE	Low - 7	19-Oct-21	Oct-22
	Working near trees.	Potential for trees to be damaged by plant movements and roots to be damaged by excavation or crushing. Spills of chemicals may harm vegetation.	POSSIBLE	MODERATE	High - 12	ENV-14 Tree works procedure Follow consent requirements. Protected trees are to be isolated by fences or tape before works start. Engage an arborist to supervise works within dripline of protected trees. Obtain landowner approval and resource consent (if required) prior to pruning or removing trees, or impinging on their drip zone. No refuelling or chemical stores near trees.	RARE	MODERATE	Low - 7	19-Oct-21	Oct-22
	Generation of construction and smoko shed waste	Unnecessary use of landfill space. Generation of litter. Attracting vermin.	LIKELY	MINOR	Medium - 11	ENV-20 Waste Management Procedure Practice good house keeping and regularly empty bins. Waste is to be recycled where possible. Smoko facility wastewater is to be plumbed to sewer/ collected in tanks for disposal.	UNLIKELY	MINOR	Low - 5	19-Oct-21	Oct-22
	Tree and general vegetation clearance.	Loss of habitat supporting nesting birds, roosting bats or other species. Loss of lizards or gekos during scrub/ flax clearance. Unauthorised removal of protected trees.	POSSIBLE	MODERATE	High - 12	ENV-14 Tree works procedure Work in accordance with consent conditions. No tree clearance permitted on this site.	RARE	MODERATE	Low - 7	19-Oct-21	Oct-22
					#N/A				#N/A		
					#N/A				#N/A		

C1 Construction Noise and Vibration Management Plan

D1 Construction Traffic Management Plan

Construction Environmental & Sustainability Management Plan

Document Number: D07.01

E1 Contaminated Soil Management Plan

F1 Construction Erosion and Sediment Control Plan

Construction Environmental & Sustainability Management Plan

Document Number: D07.01

G1 Construction Flocculation Management Plan

Construction Environmental & Sustainability Management Plan

Document Number: D07.01

H1 Construction Dewatering Management Plan

I1 Green Star Checklist

APPENDIX A - ENVIRONMENTAL MANAGEMENT PLAN REVIEW CHECKLIST

This checklist has been designed to assist government agencies and others in reviewing service providers' Environmental Management Plans. It may also assist service providers in developing their Environmental Management Plans and reviewing their service providers' Environmental Management Plans.

Key to symbols to be used in check-boxes is:

✓ = *Yes* 0 = *Not*
 x = *No* *applicable*

Minimum requirements for all contracts

Does the Environmental Management Plan include:

- a statement of objectives?
- a listing of the environmental aspects, (with risks and opportunities) and significant related impacts associated with the work?

Do the environmental aspects and impacts listed include:

- specific undertakings arising from any formal environmental impact assessment?
- relevant development consent conditions?
- pollution control approvals/licences/permits and any conditions attached to these?
- other statutory and contract obligations?
- environmental risks and opportunities with significant impacts with the activities involved?
- environmental objectives, targets and measures (where practical) for the significant impacts, risks and opportunities?

Does the Environmental Management Plan include:

- documented procedures to be followed to manage the identified aspects and significant impacts, risks and opportunities identified? (These measures are subject to compliance with the contract involved)
- a clear indication of the respective environmental management roles and responsibilities of the service provider and its service providers?
- emergency response procedures, covering the details required?

Is it demonstrated that all personnel:

- are or will be familiar with the Environmental Management Plan?
- understand the Plan, including with the following:
 - application of the Plan to them?
 - assessment of training needs?
 - communication, training and induction procedures?
 - training programs?

Enhancements for major contracts

Does the Environmental Management Plan include the following, as they apply to the nature and scope of the contract:

- Identification of organisational and individual roles, responsibilities and authorities for establishing, implementing and maintaining procedures, and monitoring activities and performance, to ensure conformity with each environmental management requirement (documenting all such responsibilities)?
With:
 - supervisory/management protocols for personnel and service providers?
 - appointment of an environmental manager?
- Documented procedures, with roles, responsibilities and authorities, for controlling all activities/processes and performance to ensure conformity with each environmental management requirement (listing all such requirements)?
Including for:
 - management of service providers?
 - training of personnel?
 - communicating requirements, including legislation/regulations, and approval/permit/licence and contract conditions?
 - keeping records?
 - providing regular reports on the implementation of the Environmental Management Plan?
 - activities with compliance bonds/undertakings and penalties for nonconformity?
 - Other activities? (give details)
- Cross-references to, or inclusion of, other environmental and other management related documents such as:
 - work method statements? (give details)
 - design plan?
 - landscape plan?
 - soil and water management plan/erosion control plan?
 - statement of heritage significance?
 - incident management plan?
 - traffic management plan?
 - communications plan?
 - industrial relations/training plan?
 - WHS management plan?
 - quality management plan?
 - Others? (give details)
- Monitoring, measurement, evaluation and review (including audit) procedures, including provisions for:

- review criteria/measures/scope/personnel/program?
- addressing the consequences of nonconformities?
- investigation, analysis, evaluation and follow-up verification?
- corrective and preventive action?
- Others? (give details)

Construction Environmental & Sustainability Management Plan

Document Number: D07.01

J1 Hazardous Substances Inventory





Hazardous Substances Inventory





Project Name & Location: BPW005 PEACOCKE PUMPSTATION Date: 28/10/2021







Notes:
This inventory is based on the BPC Chemwatch File. A download of the current MSDS for these all items is available and must be held on site along with this inventory. This must be available to emergency services if required.

Hazardous goods listed below are an indication of what will be stored onsite from project commencement. Additional hazardous materials and liquids to be added as required.

INCOMPATIBLE SUBSTANCES - GENERAL GUIDANCE	
Hazardous substance type	Keep away from
Flammable gases (class 2.1)	Flammable aerosols (class 2.2); flammable liquids (class 3); class 4 substances; oxidising substances; organic peroxides (class 5).
Flammable liquids (class 3)	Flammable gases and aerosols (class 2); class 4 substances; oxidising substances; organic peroxides (class 5).
Oxidising substances (class 5.1)	All other types of hazardous substances (including organic peroxides).
Organic peroxides (class 5.2)	All other types of hazardous substances (including oxidisers).

MATERIAL NAME	UN NUMBER	DG PRIMARY CLASS GOLD	DG DIAMOND GRAPHIC GOLD	MAXIMUM VOLUME	UNIT	STORAGE LOCATION	SAFE STORAGE REQUIREMENT	STORAGE INCOMPATABILITY
BP Ultimate Diesel	3082	9		1000	L	Bowser	Store in original containers. Keep containers securely sealed. Store in a cool, dry, well-ventilated area. Store away from incompatible materials and foodstuff containers. Protect containers against physical damage and check regularly for leaks. Observe manufacturer's storage and handling recommendations contained within this SDS.	Avoid reaction with oxidising agents
CRC 5.56 (Aerosol) (NZ)	1950	2.1		NA	L	Tool Container	Keep dry to avoid corrosion of cans. Corrosion may result in container perforation and internal pressure may eject contents of can Store in original containers in approved flammable liquid storage area. DO NOT store in pits, depressions, basements or areas where vapours may be trapped. No smoking, naked lights, heat or ignition sources. Keep containers securely sealed. Contents under pressure. Store away from incompatible materials. Store in a cool, dry, well ventilated area. Avoid storage at temperatures higher than 40 deg C. Store in an upright position. Protect containers against physical damage. Check regularly for spills and leaks. Observe manufacturer's storage and handling recommendations contained within this SDS.	CARE: Water in contact with heated material may cause foaming or a steam explosion with possible severe burns from wide scattering of hot material. Resultant overflow of containers may result in fire. Avoid reaction with oxidising agents
Dricon Concrete	Not Applicable			500	kg	Tool Container		
Fraser Brown & Stratmore Humebond Epoxy Hardener	Not Applicable	Not Applicable		20	L	Tool Container	Store in original containers. Keep containers securely sealed. Store in a cool, dry, well-ventilated area. Store away from incompatible materials and foodstuff containers. Protect containers against physical damage and check regularly for leaks. Observe manufacturer's storage and handling recommendations contained within this SDS.	Avoid reaction with oxidising agents
Fraser Brown & Stratmore Humebond Epoxy Mortar Resin	Not Applicable	Not Applicable		20	L	Tool Container	Store in original containers. Keep containers securely sealed. Store in a cool, dry area protected from environmental extremes. Store away from incompatible materials and foodstuff containers. Protect containers against physical damage and check regularly for leaks. Observe manufacturer's storage and handling recommendations contained within this SDS. For major quantities: Consider storage in banded areas - ensure storage areas are isolated from sources of community water (including stormwater, ground water, lakes and streams). Ensure that accidental discharge to air or water is the subject of a contingency disaster management plan; this may require consultation with local authorities.	Glycidyl ethers: may form unstable peroxides on storage in air, light, sunlight, UV light or other ionising radiation, trace metals - inhibitor should be maintained at adequate levels may polymerise in contact with heat, organic and inorganic free radical producing initiators may polymerise with evolution of heat in contact with oxidisers, strong acids, bases and amines react violently with strong oxidisers, permanganates, peroxides, acyl halides, alkalis, ammonium persulfate, bromine dioxide attack some forms of plastics, coatings, and rubber Avoid reaction with oxidising agents
Fraser Brown & Stratmore Mediube	Not Applicable	Not Applicable		2	L	Tool Container	Store in original containers. Keep containers securely sealed. Store in a cool, dry, well-ventilated area. Store away from incompatible materials and foodstuff containers. Protect containers against physical damage and check regularly for leaks. Observe manufacturer's storage and handling recommendations contained within this SDS.	Reacts with mild steel, galvanised steel / zinc producing hydrogen gas which may form an explosive mixture with air. Avoid strong bases. Avoid reaction with oxidising agents
LPG (liquefied petroleum gas)	1075	2.1		9	kg	Site Compound (BBQ)	Store in an upright position. Outside or detached storage is preferred. Store below 38 deg. C. Cylinders should be stored in a purpose-built compound with good ventilation, preferably in the open. Such compounds should be sited and built in accordance with statutory requirements. The storage compound should be kept clear and access restricted to authorised personnel only. Cylinders stored in the open should be protected against rust and extremes of weather. Cylinders in storage should be properly secured to prevent toppling or rolling. Cylinder valves should be closed when not in use. Where cylinders are fitted with valve protection this should be in place and properly secured. Gas cylinders should be segregated according to the requirements of the Dangerous Goods Act(s). Cylinders containing flammable gases should be stored away from other combustible materials. Alternatively a fire-resistant partition may be used. Check storage areas for flammable or hazardous concentrations of gases prior to entry. Preferably store full and empty cylinders separately. Full cylinders should be arranged so that the oldest stock is used first. Cylinders in storage should be checked periodically for general condition and leakage. Protect cylinders against physical damage. Move and store cylinders correctly as instructed for their manual handling. NOTE: A 'G' size cylinder is usually too heavy for an inexperienced operator to raise or lower.	Propane: reacts violently with strong oxidisers, barium peroxide, chlorine dioxide, dichlorine oxide, fluorine etc. liquid attacks some plastics, rubber and coatings may accumulate static charges which may ignite its vapours Compressed gases may contain a large amount of kinetic energy over and above that potentially available from the energy of reaction produced by the gas in chemical reaction with other substances Avoid reaction with oxidising agents

MATERIAL NAME	UN NUMBER	DG PRIMARY CLASS GOLD	DG DIAMOND GRAPHIC GOLD	MAXIMUM VOLUME	UNIT	STORAGE LOCATION	SAFE STORAGE REQUIREMENT	STORAGE INCOMPATABILITY
methylated spirits	1170	3		2	L	Tool Container	<p>Store in original containers in approved flame-proof area. No smoking, naked lights, heat or ignition sources. DO NOT store in pits, depressions, basements or areas where vapours may be trapped. Keep containers securely sealed. Store away from incompatible materials in a cool, dry well ventilated area. Protect containers against physical damage and check regularly for leaks. Observe manufacturer's storage and handling recommendations contained within this SDS.</p>	Avoid oxidising agents, acids, acid chlorides, acid anhydrides, chloroformates. Avoid strong bases. *
petrol, unleaded	1203	3		50	L	Hazardous Goods Container	<p>Store in original containers in approved flame-proof area. No smoking, naked lights, heat or ignition sources. DO NOT store in pits, depressions, basements or areas where vapours may be trapped. Keep containers securely sealed. Store away from incompatible materials in a cool, dry well ventilated area. Protect containers against physical damage and check regularly for leaks. Observe manufacturer's storage and handling recommendations contained within this SDS.</p>	Avoid reaction with oxidising agents
Portland cement	Not Applicable	Not Applicable		0	L	Tool Container	<p>Store in original containers. Keep containers securely sealed. Store in a cool, dry area protected from environmental extremes. Store away from incompatible materials and foodstuff containers. Protect containers against physical damage and check regularly for leaks. Observe manufacturer's storage and handling recommendations contained within this SDS.</p> <p>For major quantities: Consider storage in banded areas - ensure storage areas are isolated from sources of community water (including stormwater, ground water, lakes and streams). Ensure that accidental discharge to air or water is the subject of a contingency disaster management plan; this may require consultation with local authorities.</p>	<p>Derivative of electropositive metal. For aluminas (aluminium oxide):</p> <p>Incompatible with hot chlorinated rubber.</p> <p>In the presence of chlorine trifluoride may react violently and ignite.</p> <p>-May initiate explosive polymerisation of olefin oxides including ethylene oxide.</p> <p>-Produces exothermic reaction above 200 C with halocarbons and an exothermic reaction at ambient temperatures with halocarbons in the presence of other metals.</p> <p>-Produces exothermic reaction with oxygen difluoride.</p>
Sika Formol	Not Applicable	Not Applicable		60	L	Hazardous Goods Container	<p>Store below 38 deg. C. Store in original containers. Keep containers securely sealed. No smoking, naked lights or ignition sources. Store in a cool, dry, well-ventilated area. Store away from incompatible materials and foodstuff containers. Protect containers against physical damage and check regularly for leaks. Observe manufacturer's storage and handling recommendations contained within this SDS.</p>	CARE: Water in contact with heated material may cause foaming or a steam explosion with possible severe burns from wide scattering of hot material. Resultant overflow of containers may result in fire. Avoid reaction with oxidising agents
Sika SikaDur 31/41 Part A	3082	9		10	kg	Tool Container	<p>Store in original containers. Keep containers securely sealed. Store in a cool, dry, well-ventilated area. Store away from incompatible materials and foodstuff containers. Protect containers against physical damage and check regularly for leaks. Observe manufacturer's storage and handling recommendations contained within this SDS.</p>	Avoid cross contamination between the two liquid parts of product (kit). If two part products are mixed or allowed to mix in proportions other than manufacturer's recommendation, polymerisation with gelation and evolution of heat (exotherm) may occur. This excess heat may generate toxic vapour Avoid reaction with amines, mercaptans, strong acids and oxidising agents
Sika Sikadur UA - Part A	3082	9		10	kg	Tool Container	<p>for bulk storages: If slight coloration of the ethyleneamine is acceptable, storage tanks may be made of carbon steel or black iron, provided they are free of rust and mill scale. However, if the amine is stored in such tanks, color may develop due to iron contamination. If iron contamination cannot be tolerated, tanks constructed of types 304 or 316 stainless steel should be used. (Note: Because they are quickly corroded by amines, do not use copper, copper alloys, brass, or bronze in tanks or lines.) This product should be stored under a dry inert gas blanket, such as nitrogen, to minimize contamination resulting from contact with air and water Store in original containers. Keep containers securely sealed. Store in a cool, dry, well-ventilated area. Store away from incompatible materials and foodstuff containers. Protect containers against physical damage and check regularly for leaks. Observe manufacturer's storage and handling recommendations contained within this SDS.</p>	Avoid reaction with oxidising agents

MATERIAL NAME	UN NUMBER	DG PRIMARY CLASS GOLD	DG DIAMOND GRAPHIC GOLD	MAXIMUM VOLUME	UNIT	STORAGE LOCATION	SAFE STORAGE REQUIREMENT	STORAGE INCOMPATIBILITY
Sika Sikadur UA - Part B	3082	9		10	kg	Tool Container	Store in original containers. Keep containers securely sealed. Store in a cool, dry, well-ventilated area. Store away from incompatible materials and foodstuff containers. Protect containers against physical damage and check regularly for leaks. Observe manufacturer's storage and handling recommendations contained within this SDS.	Avoid reaction with oxidising agents
Sika Sikadur-31/41 Part B	1759	8		10	kg	Tool Container	Store in original containers. Keep containers securely sealed. Store in a cool, dry, well-ventilated area. Store away from incompatible materials and foodstuff containers. Protect containers against physical damage and check regularly for leaks. Observe manufacturer's storage and handling recommendations contained within this SDS. DO NOT store near acids, or oxidising agents No smoking, naked lights, heat or ignition sources.	Avoid strong acids, acid chlorides, acid anhydrides and chloroformates. Avoid contact with copper, aluminium and their alloys. Avoid reaction with oxidising agents
WD-40 Aerosol	1950	2.1		1	L	Tool Container	Store in original containers in approved flammable liquid storage area. DO NOT store in pits, depressions, basements or areas where vapours may be trapped. No smoking, naked lights, heat or ignition sources. Keep containers securely sealed. Contents under pressure. Store away from incompatible materials. Store in a cool, dry, well ventilated area. Avoid storage at temperatures higher than 40 deg C. Store in an upright position. Protect containers against physical damage. Check regularly for spills and leaks. Observe manufacturer's storage and handling recommendations contained within this SDS. Keep dry to avoid corrosion of cans. Corrosion may result in container perforation and internal pressure may eject contents of can	CARE: Water in contact with heated material may cause foaming or a steam explosion with possible severe burns from wide scattering of hot material. Resultant overflow of containers may result in fire. Avoid reaction with oxidising agents
Sika grout 212,214,215				100	kg	Tool Container	Use respiratory protection unless adequate local exhaust ventilation is provided or exposure assessment demonstrates that exposures are within recommended exposure guidelines. The filter class for the respirator must be suitable for the maximum expected contaminant concentration (gas/vapour/aerosol/particulates) that may arise when handling the product. If this concentration is exceeded, self-contained breathing apparatus must be used-	
Epcon C6				5	L	Tool Container	Store in a cool dry place between 40deg and 80 deg, don't not store above 110 deg F. Avoid open flames	
Rugisol C extra				50	L	Hazardous Goods Container	Keep container tightly closed in a dry and well-ventilated place. Store in accordance with local regulations.	
Antisol A				50	L	Hazardous Goods Container	Keep container tightly closed in a dry and well-ventilated place.	