Assessment of Effects from Proposed Development at 166 Mapua Drive on Wetland 2382

Report prepared for Mount Hope Holdings Ltd

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23 September 2021

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TABLE OF CONTENTS

LIST OF FIGURES

1. INTRODUCTION

Mount Hope Holdings Ltd wish to develop a site at 166 Mapua Drive, Mapua, Tasman (Figure 1). The site borders a wetland to the east of the property, identified by TDC as ID 2382. The boundary of the wetland was reassessed and reported on in the report 'Preliminary Wetlands Assessment – 166 Mapua Drive' dated 23 November 2020, by Envirolink Ltd (Figure 2). This report should be read in conjunction with the report dated 23 November 2020.

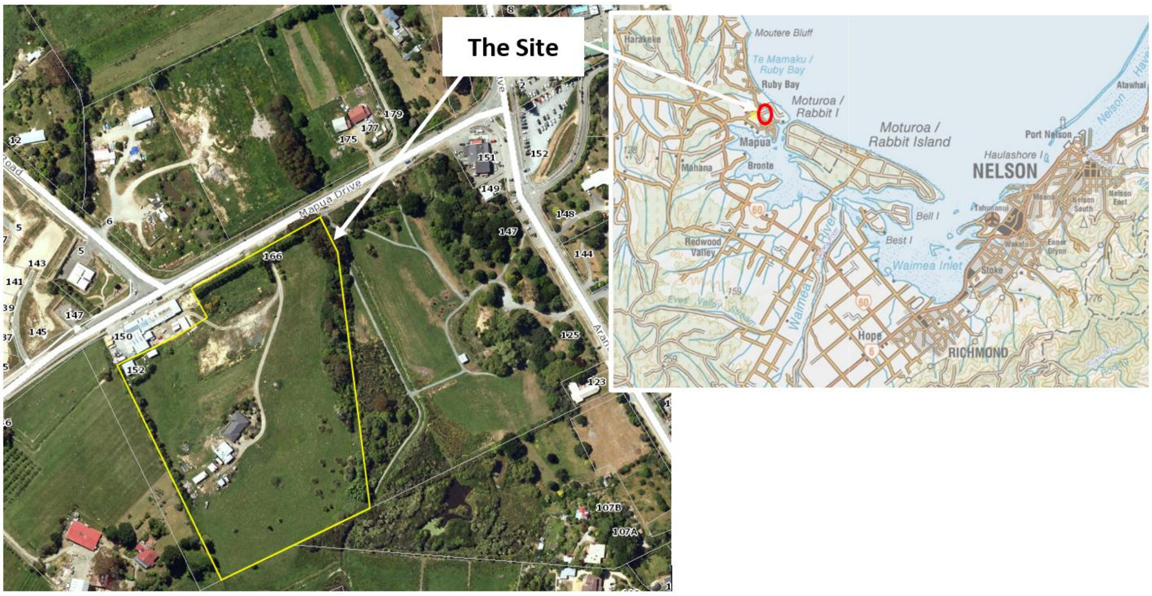

Figure 1: The location of the site, 166 Mapua Drive, outlined in yellow

Figure 2: The wetlands (ID 2382), as identified by TDC (yellow) and the revised western boundary (pink)

The revised western boundary of the wetland was surveyed in December 2020. This revised boundary was used to inform the drawings and stormwater report by Davis Ogilvie. The Davis Ogilvie Report entitled 'Preliminary Stormwater and Sewer Servicing Report' Version 2, February 2021, should be read in conjunction with this report.

The proposed development at 166 Mapua Drive includes the building of a retaining wall to contain contaminated soils from within the property. Lengthy assessments have shown that retaining the contaminated soils within the property is the most effective environmental solution for the management of the contaminated soils. The building of the retaining wall and the infilling of the area with contaminated soils, derived from within the site, requires the removal of six mature trees. Three of these trees are within 10 m of the wetland (Figure 2). An excerpt from the Davis Ogilvie drawings, (Figure 3) shows the location of the retaining wall and contaminated soils and the proposed stormwater pond location. The stormwater pond will be setback 2 m from the revised wetland boundary. The retaining wall will have a minimum of a 2 m setback form the revised wetland boundary (pers comm Davis Ogilvie).

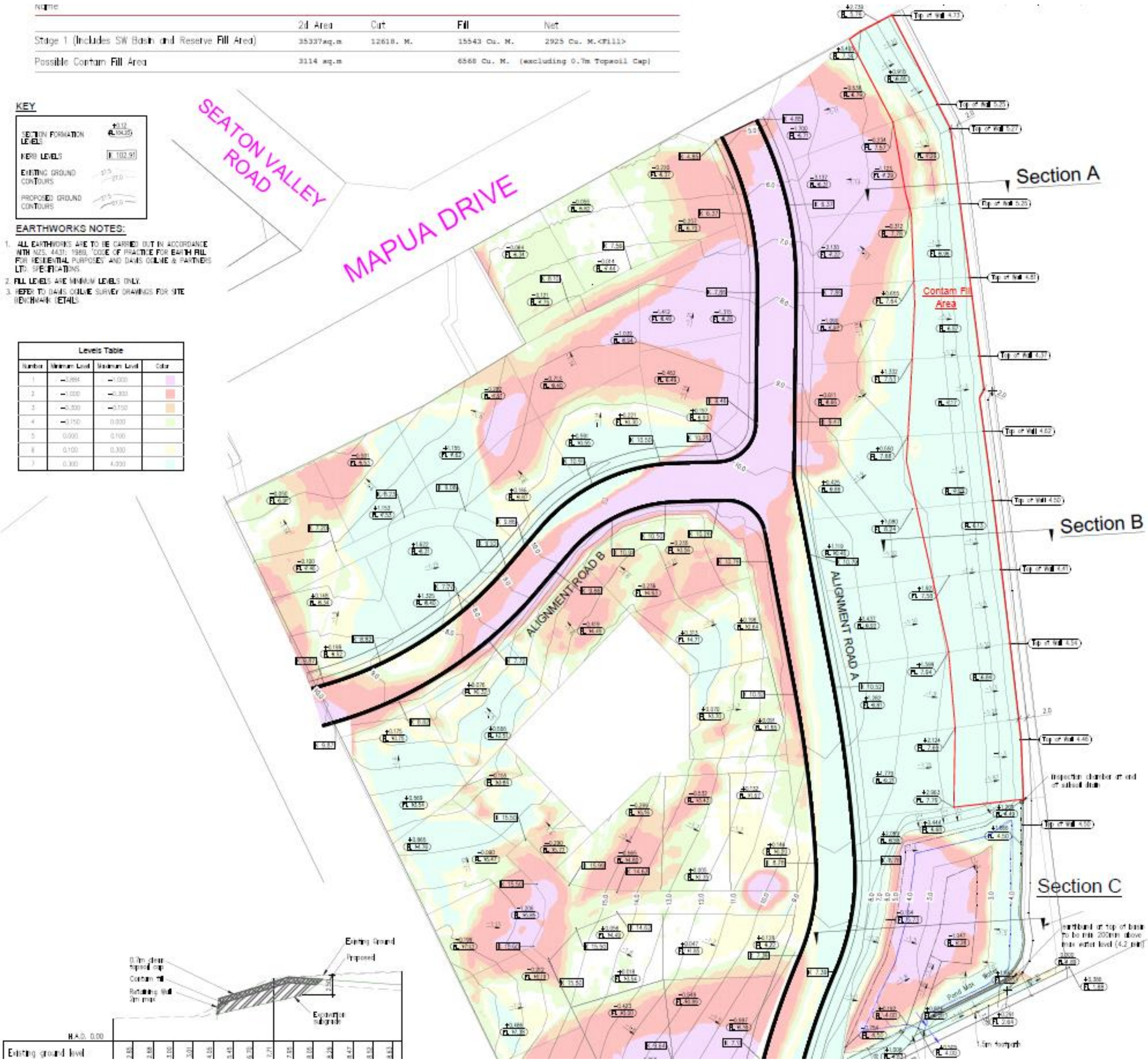

Figure 3: Location of retaining wall and stormwater pond (from: Davis Ogilvie Drawing 101 issue L)

1.1 Wetland Legislation

The National Policy Statement for Freshwater Management 2020 (Freshwater NPS 2020) provides local authorities with updated direction on how they should manage freshwater under the Resource Management Act 1991. It came into force on 3 September 2020. A key requirement is to avoid any further loss or degradation of wetlands and streams, to map existing wetlands and to encourage their restoration.

The Resource Management (National Environmental Standards for Freshwater) Regulations 2020 (Freshwater NES) regulates activities that pose risks to the health of freshwater and freshwater ecosystems. The regulations came into force on 3 September 2020. The Freshwater NES set requirements for carrying out certain activities that pose risks to freshwater and freshwater ecosystems. A key requirement is to protect existing inland and coastal wetlands, which is covered in Part 3 subpart 1 under 'Natural Wetlands' of the regulations.

The Resource Management Act (RMA) defines a **wetland** as:

> ***Wetland*** includes 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.

The Freshwater NPS 2020 defines a **natural wetland** as:

> **Natural wetland** means a wetland (as defined in the Act) that is not:
>
> > (a) a wetland 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
>
> **Natural inland wetland** means a natural wetland that is not in the coastal marine area

1.2 Objectives

Specifically, this report aims to assess potential effects on the wetland from the following activities:

1. The removal of trees located within 10 m of the wetland
2. The proposed retaining wall located along the eastern boundary of the site and within 10 m of the wetland
3. The proposed stormwater pond located in the south-east corner of the site and within a 100 m of the wetland

Regulation 54 of the Freshwater NES describes these activities as non-complying activities:

> **54 Non-complying activities**
>
> The following activities are non-complying activities if they do not have
>
> another status under this subpart:
>
> (a) vegetation clearance within, or within a 10 m setback from, a natural wetland:
>
> (b) earthworks within, or within a 10 m setback from, a natural wetland:

(c) the taking, use, damming, diversion, or discharge of water within, or within a 100 m setback from, a natural wetland.

2. ASSESSMENT OF EFFECTS

2.1 Removal of Trees Within 10 m of a Wetland

The six trees identified on the site (Figure 2) comprise of rimu, totara and tanekaha, all of which are considered facultative upland tree species. Facultative upland species do not require wetland conditions to grow nor do they provide any functional service specific to wetland flora and faunal communities. The three trees which are within the 10 m setback of the wetland are marginally within the setback, being located approximately 9 m from the wetland boundary. There is sufficient space within the site to allow for the removal of the trees without affecting the nearby trees and shrubs within the wetland. In addition, the removal of the trees will be carried out be a specialist arborist to ensure no nearby trees or shrubs (within the wetland) are damaged by treefall during their removal.

The removal of the trees will not adversely affect the hydrological conditions within the wetland. Their removal will likely result in a greater flow of water to groundwaters and ultimately to the wetlands as there will be less net uptake of water from the soils, however this is likely to be negligible to the overall water budget of the wetland. Their removal is thus considered to have a neutral effect on the wetland.

2.2 Earthworks within 10 m of a Wetland

The building of the retaining wall, to contain the contaminated soils and the stockpiling of the contaminated soils behind the retaining wall, requires earthworks to be carried out within 10 m of the wetland.

The wetland bordering the site is classified as a swamp wetland. Swamp wetlands are dominated by trees and shrubs and receive water from both groundwater and surface water sources, the amounts of which fluctuate throughout the year. In this case, the primary source of water to the wetland is via groundwater, the level of which can be estimated by the fluctuations in water levels in the drain on the western boundary of the wetland. The drain runs in a south-north direction along the western boundary of the wetland, of which the northern most extent marks the boundary of the wetland. A piezometer[1], located on Aranui Road, has been recording groundwater levels since October 2018. A secondary source of water to the wetland is via a pond and drain (which feeds the drain on the eastern boundary of the site) located in the south-east corner of the site, upgradient of the retaining wall location.

A Remediation Action Plan (RAP) has been prepared for the site (dated May 2021). Synthetic Precipitation Leaching Procedure (SPLP) analyses were carried out, as part of the RAP, on a number of soil samples within the site. The SPLP analyses simulate rainfall percolating through soils and is used to determine the potential for contaminants to leach from the soils into subsurface flows and subsequently groundwater and surface waters. A technical note is attached in Appendix 1 explaining the analysis. The results show that both lead and arsenic can be leached from the soils in times of rainfall, subsurface flows will then potentially transport dissolved metals to surface waters, including the adjacent wetland.

[1] See 'Preliminary Wetlands Assessment – 166 Mapua Drive' dated 23 November 2020, by Envirolink Ltd for further details

The RAP (May 2021) proposes to backfill contaminated soils behind the retaining wall and to line using a HDPE plastic liner. A 500 mm thick layer of clean compacted fill will be overlain on the liner, followed by a 200 mm layer of clean topsoil (Figure 4). Effectively this will prevent rainfall infiltrating into the contaminated soils layer and leaching metals (arsenic and lead) into the wetland. The contaminated soils will be effectively 'encapsulated' within the HDPE layer. Clean rainfall runoff will continue to flow downslope towards the wetland over the clean topsoil and clay layers via a swale with free draining material and weep holes located on the bottom of the retaining wall.

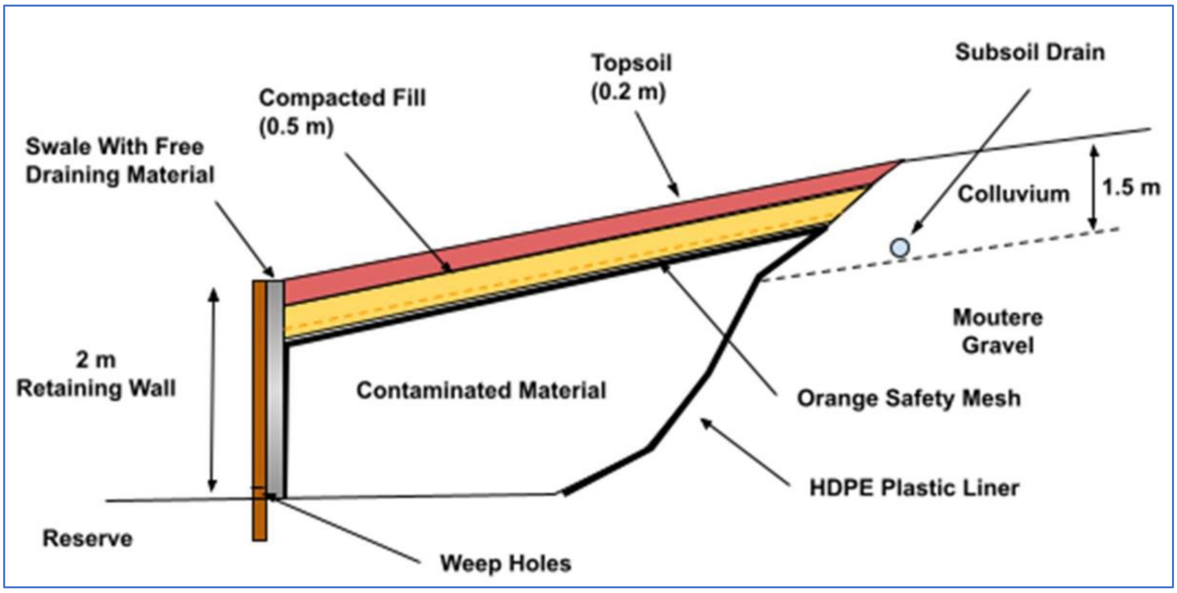

Figure 4: Schematic of proposed management of contaminated soils on site (Remediation Action Plan 166 Mapua Drive, May 2021)

A subsoil drain (Figure 4) will be placed on the western side of the containment cell to collect stormwater that passes through the clean colluvium layer. This drain will discharge to the stormwater basin. Therefore, there will be no increase in contaminant loads from the backfilled soils and there will be no decrease in rainfall runoff into the wetland.

The retaining wall and backfill soils are unlikely to have an adverse effect on groundwater levels within the wetland and thus are unlikely to have an adverse impact on water levels within the wetland. Furthermore, runoff from the recontoured area will continue to flow towards the wetland and/or stormwater pond, which will ultimately discharge to the wetland.

It is highly unlikely that the soil contaminants (arsenic and lead) will have an adverse impact on the water quality of the wetland as any potential leaching of contaminants will be minimised through the use a liner.

2.3 Discharge of Stormwater within 100 m of a Wetland

The hydrology of a location can be altered when the percentage of hard stand area is increased. The main difference being that there is a more rapid generation of surface water runoff than would occur for permeable surfaces such as grassed areas. This can lead to an inundation of surface waters with regard to quantity and quality of runoff. Surface water runoff generated from roads, driveways and roofs is termed stormwater. Slowing the eventual discharge of stormwater to waterways can mitigate any potential adverse effects. Stormwater and stormwater contaminants can be attenuated by the use of swales, rain gardens and stormwater ponds, amongst other measures.

Stormwater runoff, discharged to the proposed stormwater pond, will comprise of surface water runoff from residential roofs, the access road to the subdivision and driveways and footpaths. Stormwater from residential settings has lower levels of contaminants when compared with commercial or industrial settings or high-density residential settings. A contaminant is defined in the RMA as any substance that either by itself or in combination with other substances, changes (or is likely to change) the physical, chemical, or biological condition of water.

Potential contaminants that could be introduced to surface waters through the discharge of stormwater to the detention pond include sediment, metals such as copper and zinc from cars, hydrocarbons from cars and nitrogen and phosphorus generated from gardens and detergents from car washing.

The Davis Ogilvie Stormwater and Service report (V2 February 2021), takes into consideration the Nelson Tasman Land Development Manual (NTLDM). The NTLDM states that there is no requirement for the treatment of metals such as copper and zinc due to the limited number of traffic movements anticipated. Furthermore, should housing in the development propose to use unpainted or treated building materials such as copper or zinc roofing then treatment would be required for those buildings, which would be dealt with at the house construction stage. Therefore, it is anticipated that any metal contamination associated with stormwater runoff to the detention pond will be minimal. The report states that there is not expected to be a requirement for infiltration to ground, however if required infiltration can be achieved by directing roof water to ground and/or placing soakage devices behind the kerb connected to stormwater inlet sumps. Imperviousness can also be reduced through the use of permeable paving or permeable concrete in the construction of driveways and footpaths within the development.

The report states that a 2-year average recurrence interval 2-hour duration stormwater event will be retained within the pond and slowly released over 24 hours. This is to ensure that there is an appropriate degree of settlement with the pond and also to ‘slow’ the flows into the drain and wetland system to ensure that erosion is minimised. This type of slow release of stormwater to the wetland system will essentially mirror the conditions currently at the site where groundwater/wetland water levels rise slowly during the course of a rainfall event and then slowly subside afterwards.

The report also accounts for the post-development peaks, in 10-year and 100-year ARI events, not to exceed pre-development peaks. An additional 400 m^3 of storage over the extended detention volume was required to achieve post to pre-development peak flow attenuation, leading to an overall total volume of 800 m^3.

Pond water temperatures can become elevated in summertime. High water temperatures are associated with lower oxygen concentrations which can adversely impact instream fauna by reducing the available oxygen for respiration.

A discharge of high temperature pond water to surface waters can adversely affect water quality and instream fauna. The attenuation of stormwater within the pond and the relatively rapid discharge to the wetland (over 24 hours) will ensure that water temperatures do not become excessively elevated. The fauna of lowland wetland swamps are generally adapted to higher water temperatures than upland stream fauna, therefore it is unlikely that water temperatures or oxygen concentrations within the wetland will be adversely affected by the discharge of stormwater.

It is likely that any potential contaminants, generated from surface water runoff from the roads, roofs and driveways, will be minimal and that the stormwater pond will help attenuate contaminant loads. Therefore, it is considered that any net loading of contaminants generated from within the subdivision will be negligible with regard to water quality and the ecological functioning of the wetland.

The net change in the quantity of water being discharged from the site to the wetland is unlikely to be significant, instead it will be mostly directed towards the stormwater pond, from where it will ultimately be discharged to the wetland system. Any contaminants intercepted by stormwater will undergo some degree of attenuation prior to discharge to the wetland. Furthermore, in times of high rainfall, when the stormwater pond will be discharging, contaminants, such as sediment, nitrogen and phosphorus from the wider catchment will be elevated and it is unlikely that net contaminant loads will be significantly different.

2.4 Earthworks and Construction Activities

Preliminary Erosion and Sediment Control Plans (ESCP) have been prepared by Davis Ogilvie and are attached in Appendix 2. It is expected that during the construction phase that sediment controls, such as the use of silt fences and the diverting of silt laden water away from the wetland will ensure that activities associated with the construction of the retaining wall will have a minimal impact on the wetland. The sediment control devices will be regularly inspected to ensure they are functioning adequately, maintenance will include the removal of any sediment build-up to prevent any 'breakthrough' or overtopping of the fences.

2.4.1 Failure of the Retaining

The effects from a failure of the proposed retaining wall is dependent on the magnitude of the failure. The likelihood and magnitude of a failure of the retaining wall needs to be assessed by a geotechnical and/or structural engineer. In theory, if the wall was to fail and if contaminated fill was to enter the wetland it would result in some loss to the extent of the wetland. The covering of vegetation and wet areas with fill would result in a greater adverse effect than the contamination associated with the fill, nonetheless, the contaminated fill, once located within the wetland would be difficult to remediate and would involve damage to some areas of the wetland, which would subsequently require restoration.

3. CONCLUSIONS

The western boundary of the wetland has been revised to take account of the most recent information which shows that the vegetation along the boundary was and is dominated with upland and/or non-wetland species. The revised boundary was surveyed in December 2020 and the taken into account in the drafting of the Davis Ogilvie stormwater report and the proposed management of the contaminated soils found on the site. The NES FW (2020) has been taken into consideration in this assessment of effect of the proposal on the wetland, namely:

1. Removal of trees within 10 m of a wetland
2. Earthworks within 10 m of a wetland
3. Discharge of stormwater within 100 m of a wetland

It is considered, based on the information to date that the proposed development at 166 Mapua Drive will not adversely affect the current state and functioning of the wetland.

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Appendix 1

SPLP Technical Note

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TECHNICAL NOTE

TCLP and SPLP

Toxicity Characteristic Leaching Procedure

(TCLP US-EPA 1311)

TCLP is the US-EPA Method 1311 used for evaluating whether a waste material is hazardous or non-hazardous under municipal landfill conditions. The results of the TCLP then dictate the type of landfill the waste material is disposed into. Please contact the landfill for specific testing required.

The TCLP procedure is a sample processing procedure that precedes any analytical procedure (eg Organic or In-organic analyses).

Semivolatile Organic and Inorganic Parameters

A sample of waste must first have any associated liquid phase separated. This liquid phase is later combined with the TCLP extract. The separated solids are then subjected to particle size reduction to less than 1 cm then a 100 gram portion weighed out and extraction buffer added.

The buffer chosen for the extraction depends on the pH of the sample. For acidic or neutral samples an acetic acid – sodium acetate buffer (pH of 4.93+0.05) is used while for basic materials, an acetic acid solution (pH 2.88 + 0.05) is used.

The extraction involves a rotating extraction at 20ºC for 18 + 2 hr at 30 + 2 rpm (see figure 1). Following the extraction the TCLP extract is separated from the solids by filtering through a glass fiber filter paper with a pore size of 0.6 to 0.8 µm. It is this extract that is then analysed as a water sample for the parameters of interest.

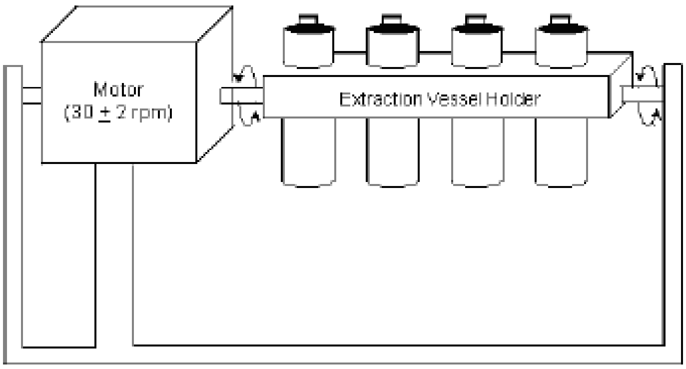

Figure 1. Rotary Agitation of TCLP

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The procedure sounds simple enough but in practice there are a lot of complications as a result of the method being very dependant on the sample matrix, obtaining a representative sample from a pile of assorted waste material (soils are normally not a problem) and the method is very dependant on exacting conditions during the extraction. Interlaboratory comparisons demonstrate notoriously poor precision.

Samples that are multi-phasic such as a solid waste with associated water and oil phases present many complications and require analysis of the TCLP extract and separate analysis of the oil phase with the final TCLP reported as a mathematical recombination of both sets of results.

A flow diagram of the method is presented in figure 2 below.

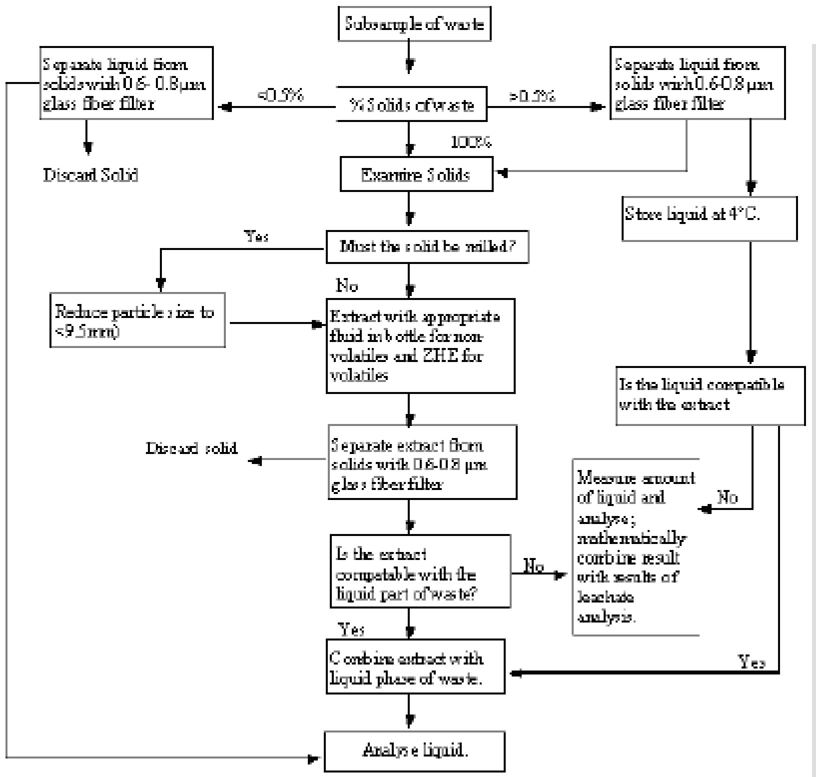

Figure 2. TCLP Extraction Procedure

Volatile Organic Compounds by TCLP

In the case of volatile organic compounds (VOCs) a special type of extraction apparatus is required in order to minimise loss of the volatile compounds during the extraction procedure. This extraction apparatus is referred to as a Zero Headspace Extractor (ZHE, see figure 3) and the only buffer that is used is the acetic acid – sodium acetate buffer (pH of 4.93+0.05). The extraction process is the same as for the usual procedure and the final filtering is done via the ZHE and under gas pressure. The extract is collected directly into a VOC vial ready for analysis.

KB Item: 34248 Version: 2 Page 2 of 3

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TECHNICAL NOTE

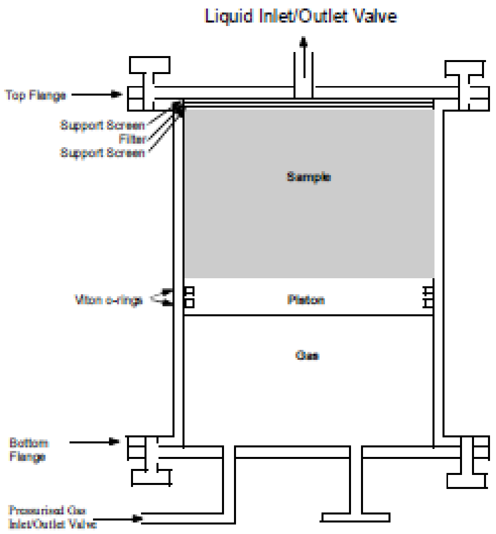

Figure 3. Zero Headspace Extractor.

Synthetic Precipitation Leaching Procedure

(SPLP, US-EPA Method 1312)

This method is designed to mimic the effect of acidic rainfall on wastes and soils. Operationally it is very similar to the TCLP procedure except the extraction fluids are;

- #1 is pH 4.20 (made of sulfuric/nitric acid in reagent water) for soil samples east of the Mississippi river and for all wastes and wastewaters.
- #2 is pH 5.00 (made of sulfuric/nitric acid in reagent water) is for testing leachability of soils west of the Mississippi river
- #3 is reagent water for extraction of volatile organics and cyanide.

In NZ many people are choosing to use reagent water as the extractant for all analytes.

Contact

For further information contact one of our Environmental Client Services Managers: 0508 HILL LAB [0508 44 555 22]

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Appendix 2

Preliminary Sediment and Erosion Control Plans

/ issue	/ date	/ reason	/ approved
A	29/04/21	Preliminary Issue - For Discussion	


NOTES

1. GENERAL

REFER TO TASMAN DISTRICT COUNCIL ENGINEERING STANDARDS 'SECTION 5 EARTHWORKS' AND AUCKLAND CITY COUNCIL'S 'EROSION AND SEDIMENT CONTROL GUIDELINES FOR LAND DISTURBING ACTIVITIES IN THE AUCKLAND REGION' (TP90).

ALL WORKS DETAILED ON THIS PLAN SHALL COMPLY WITH TDC'S GUIDELINES.

2. SILT MANAGEMENT

EROSION AND SEDIMENT CONTROL IS TO BE CARRIED OUT USING BEST PRACTICE METHODS AND CONTROLS AND IN ACCORDANCE WITH THE RELEVANT CONSENTS.

SILT FENCES MUST BE ESTABLISHED AROUND ALL EARTHWORKS, STOCKPILES, WATERWAYS AND ADJACENT PROPERTIES TO COLLECT SILT RUNOFF.

TOPSOIL IS TO BE STRIPPED AND PLACED IN TEMPORARY STOCKPILES. RESPREADING AND GRASSING IS TO BE CARRIED OUT WITHIN 14 DAYS OF COMPLETION OF EACH AREA.

VEGETATION COVERING THE SITE MUST BE MAINTAINED BY THE CONTRACTOR WHERE POSSIBLE TO REDUCE RUNOFF RATES, AND PREVENT EROSION OF SOILS.

WHERE VEGETATION MUST BE REMOVED, AREAS MUST BE PROMPTLY GRASSED, OR RETAINING STRUCTURES BUILT, REFER TO THE TDC ENGINEERING STANDARDS FOR FURTHER INFORMATION.

3. DUST MITIGATION

DUST IS TO BE KEPT TO A MINIMUM BY THE EFFECTIVE USE OF:

1. WATER CARTS AND/OR IRRIGATION (I.E. K-LINES) WETTING STOCKPILES AND EXPOSED EARTHWORK AREAS.
2. MINIMISING DROP HEIGHT FROM LOADERS/DIGGERS INTO VEHICLES AND STOCKPILES TO REDUCE DUST NUISANCE.
3. SUITABLE WINDBREAK MUST BE CONSTRUCTED ALONG THE BOUNDARY OF 99 MCSHANE ROAD AND MCSHANE ROAD TO MINIMISE EFFECT DUST MAY HAVE ON NEIGHBOURING PROPERTIES.

4. DEWATERING

WHERE DEWATERING IS REQUIRED, ANY WATER WITH A TSS (TOTAL SUSPENDED SOLIDS) READING IN EXCESS OF 50ppm MUST BE DIRECTED TO A SEDIMENT CONTROL DEVICE FOR TREATMENT. WHERE THE WATER IS BELOW THIS THRESHOLD IT MAY BE DIRECTED TO THE EXISTING WATERCOURSE (BORCK CREEK) IF PERMITTED BY THE TDC CONSENTS.

5. CONSTRUCTION NOISE

HOURS OF WORK ARE 7.00AM TO 6.00PM MONDAY TO SATURDAY.
MAXIMUM ACCEPTABLE SOUND LEVELS ARE 50 DBA (L10) AT BOUNDARY OF SITE OR AS DETAILED IN THE TDC CONSENTS.

6. MAINTENANCE - CONTRACTORS RESPONSIBILITY

THE SEDIMENT CONTROL DEVICES MUST BE MONITORED AND INSPECTED BY THE CONTRACTOR TO ENSURE THEIR EFFECTIVENESS.

IN THE CASE OF HEAVY RAINFALL EVENTS SILT WILL BE REMOVED FROM COLLECTION AREAS BY MECHANICAL MEANS (IF NECESSARY), AND ANY SILTATION OF SURROUNDING DRAINS CLEANED UP BY THE CONTRACTOR.

DURING THE CONSTRUCTION THE CONTRACTOR MUST INSTALL A SITE NOTICE, WITH SUITABLE CONTACT DETAILS.

ALL TRAFFIC MANAGEMENT IS THE RESPONSIBILITY OF THE CONTRACTOR.

WATER CLARITY SHALL BE MEASURED IN ACCORDANCE WITH THE TDC CONSENTS. ALL WATER CLARITY MEASUREMENTS SHALL BE UNDERTAKEN USING A SHMAK CLARITY TUBE BY A SUFFICIENTLY TRAINED PERSON OR AS REQUIRED BY THE TDC CONSENTS. THIS IS THE RESPONSIBILITY OF THE CONTRACTOR.

NOTE: THE TEMPORARY TREATMENT SYSTEMS ARE THE RESPONSIBILITY OF THE CONTRACTOR, AND SHALL NOT BE LIMITED TO THE METHODS INDICATED ON THE PLAN HEREIN.

7. CHEMICAL TREATMENT

CHEMICAL TREATMENT (FLOCCULATION) MAY BE NECESSARY TO ENSURE THAT SEDIMENT-LADEN WATER MEETS THE TSS REQUIRED OF TASMAN DISTRICT COUNCIL PRIOR TO THE DISCHARGING TO THE RECEIVING ENVIRONMENT.

THE EFFECTIVENESS OF THE FLOCCULENT SHALL BE MONITORED BY VISUAL INSPECTION TO ENSURE VISUAL CLARITY IS BEING ACHIEVED.
SHMAX / CLARITY TUBE AND TSS TESTING IS TO BE UNDERTAKING TO CONFIRM REQUIREMENTS ARE BEING MET PRIOR TO DISCHARGE.

SILT FENCE

STABILISED TOPSOIL

DUST CONTROL

KEY

- STOCKPILE
- SILT FENCE
- DUST FENCE
- DIRTY WATER RUNOFF DRAIN
- CLEAN WATER CONVEYANCE CHANNEL
- CATCHMENT / EARTHWORKS AREA ①
- EXISTING CONTOUR LABLES

CAD ref: 38890.Civil.dwg

do DAVIS OGILVIE ENGINEERS / SURVEYORS / PLANNERS

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PROPOSED MT HOPE SUBDIVISION
MAPUA DRIVE, NELSON

EROSION SEDIMENT CONTROL
ESCP PLAN

/ design	/ drawn	/ QA check	/ dwg
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/ scale @ A1	/ date	/ file	/ issue
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