DAVIS OGILVIE
ENGINEERS / SURVEYORS / PLANNERS

SITE MANAGEMENT PLAN

42454 / 3 ARANUI ROAD, 5, 6, 8 AND 11 TAHI STREET, MĀPUA / MĀPUA BOAT RAMP COMMUNITY TRUST

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QUALITY ASSURANCE

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DISCLAIMER

This report has been prepared on the specific instructions of Māpua Boat Ramp Trust in connection with proposed earthworks at 3 Aranui Road, 5, 6, 8 and 11 Tahi Street, Māpua. The Māpua Boat Ramp Trust and the Local and Regional Territorial Authorities are entitled to rely upon this report. Davis Ogilvie & Partners Limited (Davis Ogilvie) accepts no liability to anyone other than Māpua Boat Ramp Trust in any way in relation to this report and the content of it and any direct or indirect effect this report may have. Davis Ogilvie does not consider anyone else relying on this report or that it will be used for any other purpose.

Davis Ogilvie did not complete an assessment of all possible conditions or circumstances that may exist at the site. Davis Ogilvie has provided an opinion based on information reviewed, site observations and investigations, and analysis methodologies current at the time of reporting. Variations in conditions may occur, and there may be conditions onsite which have not been revealed by the investigation, which have not been taken into account in the report. No warranty is included —either expressed or implied— that the actual conditions will conform to the assessments contained in this report. If any unexpected contamination is discovered during any soil disturbance works at the site, Davis Ogilvie should be notified to assess contamination conditions and possible management requirements.

Should anyone wish to discuss the content of this report with Davis Ogilvie & Partners Ltd, they are welcome to contact us on (03) 366 1653.

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1.0 INTRODUCTION

Davis Ogilvie & Partners Ltd. (Davis Ogilvie) has been engaged by Māpua Boat Ramp Trust (the client) to provide this Site Management Plan for proposed development works at 3 Aranui Road, 5, 6, 8 and 11 Tahi Street, Māpua in Tasman District ("the site", Figure 1). The proposed development includes the construction of a new boat ramp, access road, associated car parking and boat storage building.

The site was previously the location of the Fruit growers Chemical Company (FCC) which closed in 1988 and is understood to have been remediated between 2004 and 2008. A significant number of reports document the conditions prior to remediation, the results of the remedial works and monitoring of the groundwater and sediment quality post remediation.

Change of land use, soil disturbance and potential soil disposal as required by the proposed development are activities listed under the NESCS which require assessments when HAIL and / or potential HAIL activities have been identified on the site.

The Davis Ogilvie (2023) Detailed Site Investigation (DSI) report identified concentrations of organochlorine pesticides predominately DDT, dieldrin and aldrin are present on site and require management during the proposed earthworks.

This SMP is designed to manage the risks related to disturbing impacted soil during the proposed redevelopment earthworks. This SMP has been prepared and supervised by a suitably qualified and experienced practitioner (SQEP) in accordance with the NES Regulations (2011) and Ministry for the Environment Contaminated Land Management Guidelines (CLMG) No.1: Reporting on Contaminated Sites in New Zealand.

The SMP is a live document and will be required to be updated as and when further soil, groundwater or surface water contamination data becomes available. The SMP will also be required to be updated once redevelopment plans are finalised and consented. Following the issue of resource consents, further updates of the SMP may be necessary.

1.1 Objectives of the Assessment

The objectives of this site management plan are to provide procedures for potential excavations, handling, and potential disposal of the impacted soils.

The scope of the plan is to provide procedures for managing the following:

- Earthworks and controls to manage exposure to the impacted soil;
- Stockpiling of soil, if required;

- Soil disposal;
- Stormwater and sediment controls; and
- Environmental monitoring requirements.

This SMP has been completed in order to provide suitable mitigation controls related to the identified contaminants so that the Māpua Boat Ramp Trust and its appointed contractors can minimise the potential for significant adverse environmental or human health effects to arise during the redevelopment earthworks.

This SMP and other required contractor documentation will assist Māpua Boat Ramp Trust in meeting its duties under the Health and Safety at Work Act 2015. Should additional hazards or should asbestos be identified this SMP will need to be updated to be able to comply with the Asbestos Regulations.

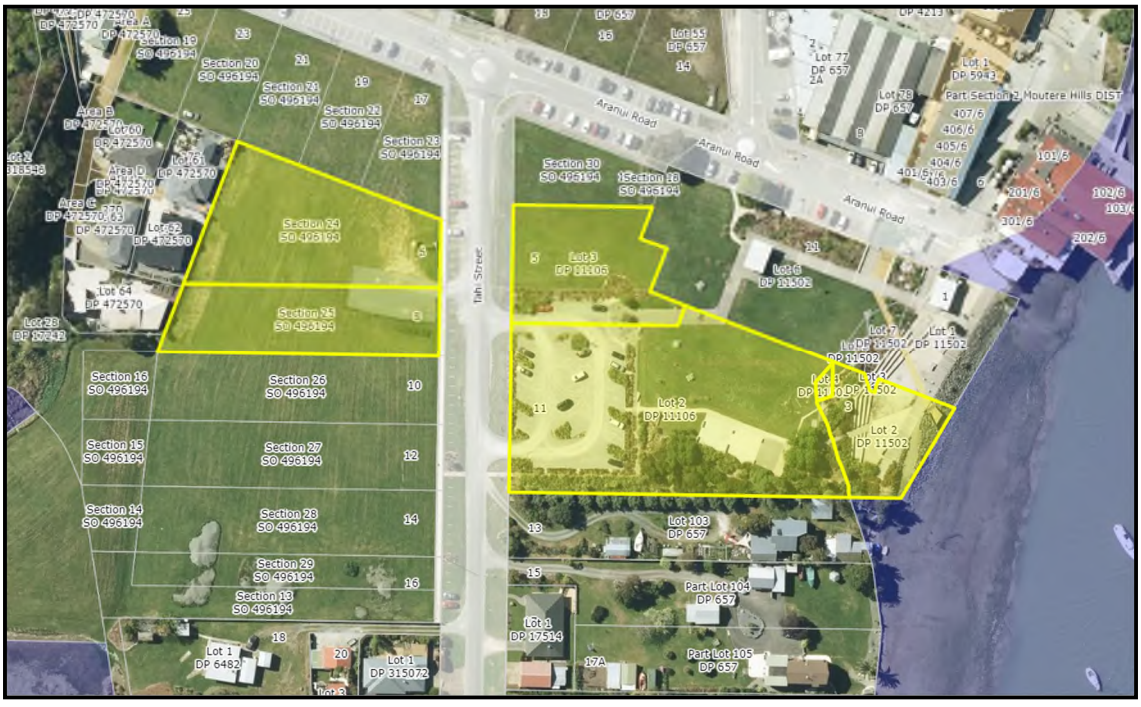

Figure 1: Site Location. Existing lot boundaries in grey and site in yellow. Source: Grip.

The Ministry for the Environment (MfE)'s 2011 Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NESCS[1]) applies to activities on sites that have, have had, or are more likely than not to have had an activity on the Hazardous Activities and Industries List (HAIL) carried out.

[1] Ministry for the Environment (MfE) (2012). Users' Guide. National Environmental Standard for Assessing and Managing Contaminants in Soils to Protect Human Health. Ministry for the Environment, Wellington, New Zealand.

1.2 Proposed Redevelopment

We understand the proposed development on the site includes the following:

- Construction of a Boat ramp: 11 m width with circa 2 m wide floating pontoon, at gradient of 1V:8H with pedestrian crossing on flat area immediately to west of the ramp to accessway transition point.
- Eastern Site - a new vehicle crossing off Tahi Street and exposed aggregate accessway of width 7 m transitioning to 11 m and turning head to service a new boat ramp. The accessway siting requires relocation of the existing pétanque area. A barrier arm is proposed to be installed near the proposed Sea Scout building to control boat ramp usage.
- Sea Scout and Community Building 40 m x 20 m area with car parking and perimeter hardstand located on the existing reserve car park area. This building will be subject to a building consent later, noting the bulk and location of the proposed building is shown on plans.
- New metalled car park to the west of Tahi Street to compensate for future loss of car parks due to the Sea Scout and Community Building and loss of informal parking on Tahi Street due to vehicle crossing installation. Some stormwater dish channels, sumps and pipework to be installed to convey stormwater from car park into existing swale to the east of Tahi Street.

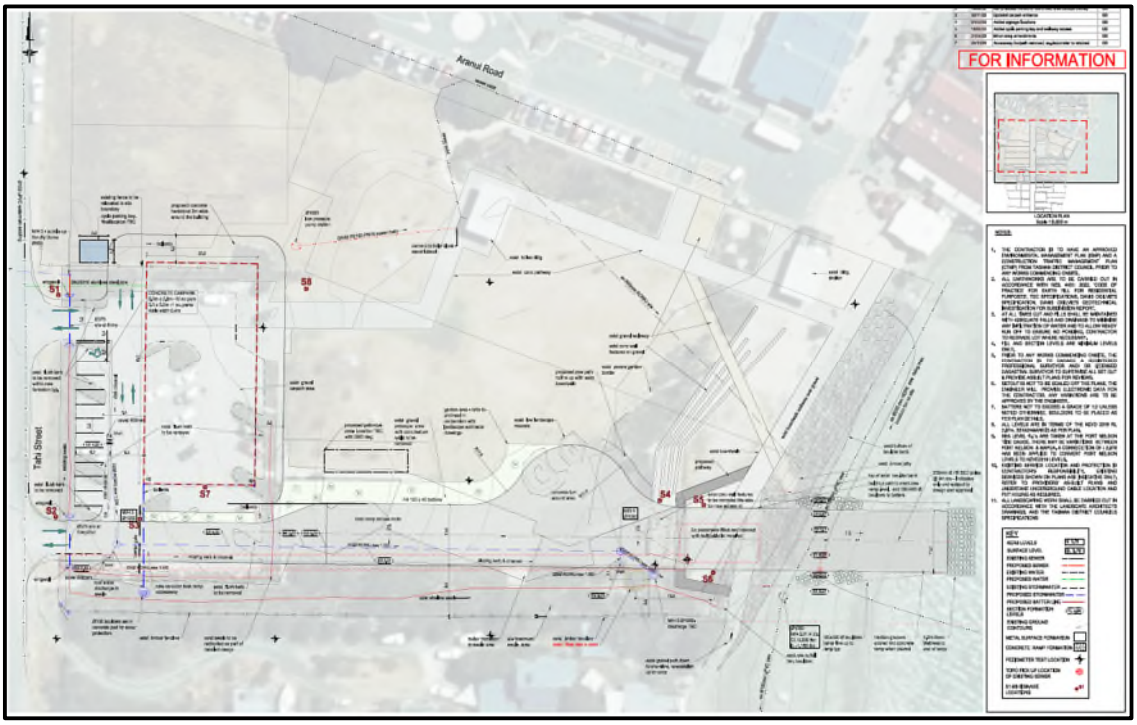

Figure 2: Proposed Mapua Boat Ramp. Source: Davis Ogilvie, Drawing P1-7.

The preliminary design for the car parking within 6 & 8 Tahi Street is shown in Figure 3. This includes the construction of a landscaped earth bund containing surplus soil that meets residential standards.

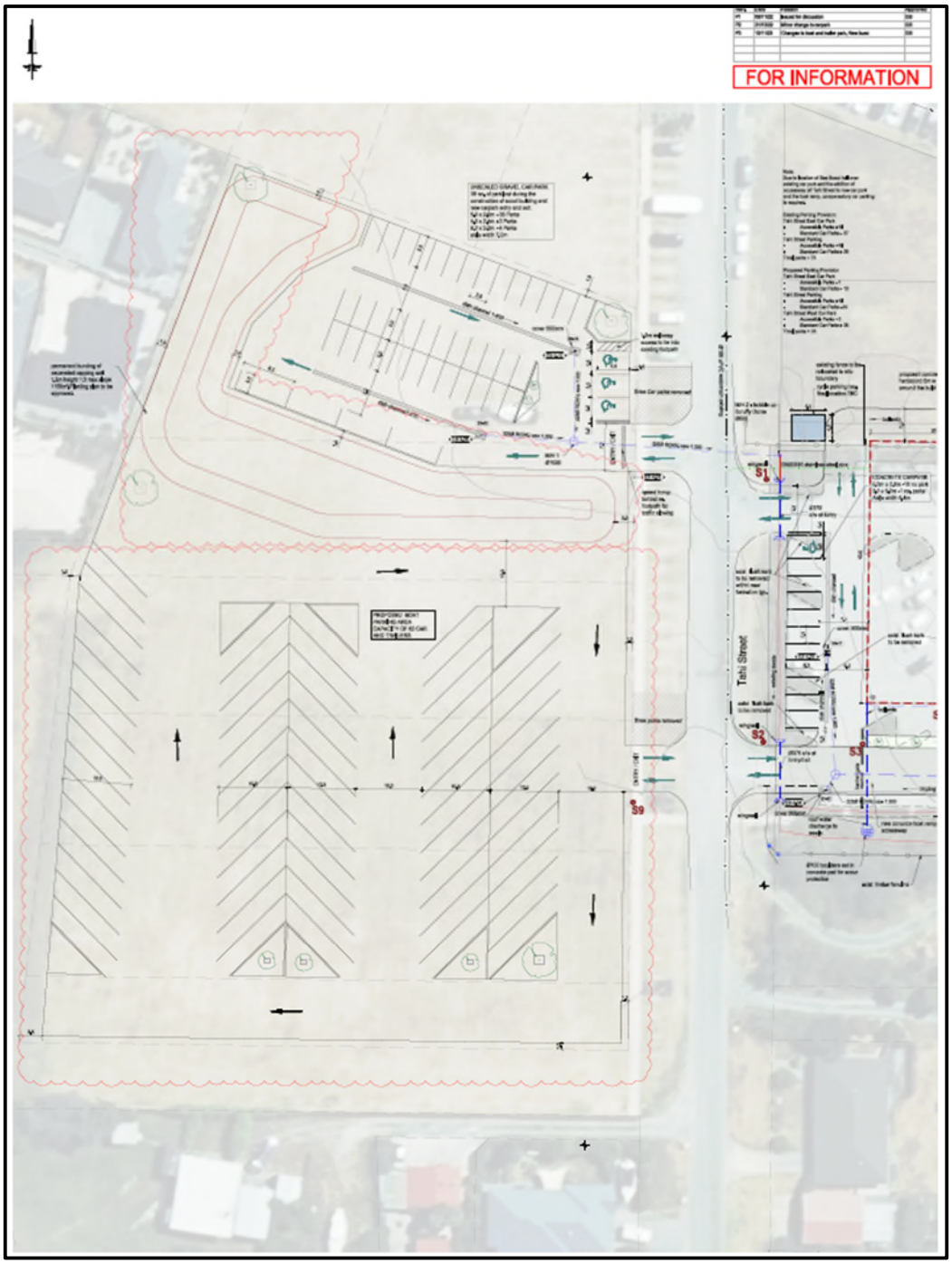

Figure 3: Proposed preliminary car park design. Source: Davis Ogilvie, Drawing P4-3 Carpark Rev 4.

2.0 SITE DESCRIPTION AND SETTING

2.1 Site Identification

A summary of the site identification is provided below in Table 1 and displayed in Figure 2[2].

Table 1: Site Identification

Item	Description					
Site Address	3 Aranui Road	5 Tahi Street, Mapua	11 Tahi Street, Mapua	6 Tahi Street, Mapua	8 Tahi Street, Mapua	-
Legal Description	Lot 2 DP 11502	Lot 3 DP 11106	Lot 2 DP 11106	Section 24 SO 496194	Section 25 SO 496194	Lot 4 DP 11502
Current Land Use	Reserve / Recreational					
Site Area	1044 m²	1626 m²	5008 m²	2366 m²	1734 m²	32 m²
Territorial Authority	Tasman District Council					
Owner	Tasman District Council					

2.2 Site Description

The roughly rectangular site is located between Tahi Street to the west, the foreshore and Waimea inlet to the east, adjoining lots owned by Tasman District Council (TDC) and Aranui Road to the north, and residential sections to the south (Figure 1). The site is comprised of a car park in the west accessed from Tahi Street, recreational park area, footpaths, seating, and picnic areas across 11 Tahi Street leading to further seating, viewing platform and footpath access through the coastal protection down to the foreshore. No structures exist on the site, however there are several large concrete landscaping features particularly in 3 Aranui Road. 6 – 16 Tahi Street are relatively flat, grassed, residential zoned sections owned by TDC.

The site is generally flat lying, although slightly (approximately 1 m) higher than surrounding land, particularly in the centre of the site with a gradual slope east toward the foreshore and Waimea inlet. According to LiDAR contours the difference in elevation between the highest and lowest areas of the site is approximately 1.5 m. The higher elevation land extends through the site in a slightly mounded ridge running north to south to the east of the car park. The topography steepens towards the south of the site within the landscaped areas (refer to Figure 4).

[2] Information sourced from GRIP Online Cadastral Mapping, accessed November 2023.

2.3 Site History

As described in the introduction, the site has a significant history in the context of land contamination and remediation. Relevant information related to the proposed redevelopment of the site, soil contaminant data and applicable potential exposure pathways and their controls are described in this SMP.

2.3.1 Existing Reporting

The following available reports have been reviewed, and findings from those reports relating to soil contamination have been considered in the production of this SMP.

- SKM, 11 December 2008, Site Validation Report for the Former Fruitgrowers Chemical Company Site, Mapua. Final Version 3.0. Ref AE03621.
- Tasman District Council, 8 March 2012, Former Fruitgrowers Chemical Company Site, Mapua, FCC East and FCC Landfill Sites, Site Management Plan v2.
- Davidson Environmental Ltd, March 2019, Summary of post-remediation contaminant monitoring of sediments and shellfish from estuarine areas adjacent to the former Fruitgrowers Chemical Company (FCC) site, Mapua, Nelson (2019).
- Envirolink Ltd, 2022. Mapua Boat Ramp Sediment Sample Analysis. Ref. 000451.
- Davis Ogilvie, 2023. Detailed Site Investigation: 11 Aranui Road, Māpua 7005. V2 April 2023. Ref 42454.

This is not an exhaustive list of the reports on the site but a selection with information and findings relevant to the boat ramp proposal. Further reports related to the FCC site investigation, remediation, validation, and on-going monitoring can be found on the TDC and Ministry for the Environment (MfE) websites[3,4].

3.0 SMP RESPONSIBILITIES

Excavation works, soil handling and soil disturbance activities at the site shall be controlled in accordance with the guidance provided in this SMP. These activities include, but are not limited to:

- Bulk earthworks, including cutting, filling and compacting;
- Excavation of service trenches;
- Loading and transport of material around the site;
- Stockpiling of soil containing contaminants;
- Reinstatement of landfill cap; and
- Equipment decontamination.

[3] https://www.tasman.govt.nz/my-region/environment/environmental-management/land/hail-sites/historic/
[4] https://environment.govt.nz/publications/audit-of-the-remediation-of-the-former-fruitgrowers-chemical-company-site-mapua/

If contamination is found that varies from what has been assumed in preparing this SMP, the SMP will be updated to account for the changed site understanding. If a revised SMP is prepared, it will be re-distributed to Council and the project team (Table 2).

All personnel assigned to this project must sign the Agreement and Acknowledgement Sheet to confirm that they understand and agree to abide by the provisions of this SMP (see **Appendix A**). TDC as the site owner has a separate SMP for the site (see as **Appendix B**).

Table 2: Assigned Responsibilities for Site Work

Role	Responsibility
Site Owner **Tasman District Council**	The TDC Property Manager represents TDC as the current site owner. The Property Manager is responsible for: • the implementation of the TDC (2012) SMP whilst TDC remains the site owner; • ongoing compliance with the TDC (2012) SMP whilst TDC remains the site owner; • producing all Earthworks Management Plans (EMPs) for the site and ensuring these are approved by the TDC Environment & Planning Manager before any work is carried out at the site; • ensuring that any people carrying out subsurface works on the site are aware of the SMP (this includes underground service providers); • maintaining adequate records of works controlled by the TDC (2012) SMP; • ensuring the TDC (2012) SMP is adapted to changing circumstances; and • ensuring work is carried out in accordance with approved EMPs and any additional conditions imposed by the Environment & Planning Manager.
Consent Holder **Māpua Boat Ramp Trust**	To distribute this SMP to all appointed contractors and consultants undertaking work at the site. Responsible for ensuring that the site works are undertaken in accordance with any TDC consents and this document and any revisions to this document. This also includes ensuring that all site staff and subcontractors are aware of and comply with the procedures and health and safety requirements contained within this document.
Principal Site Contractor **TBC**	To distribute the SMP including updated versions to all site workers and visitors, and to ensure that the correct copy of the SMP is on site at all times. To undertake earthworks in accordance with the recommended controls provided in this SMP. It is recommended that a designated, suitably trained Site Supervisor is present to oversee the works. The Site Supervisor would address changes to site procedures, as necessary, should unanticipated conditions arise. Should an incident occur on-site which may result in discharges, the supervisor will take control of the situation and coordinate the efforts of all on site to minimise the impact. Health and Safety concerns will take precedence over environmental discharges and should it be unsafe to employ controls or emergency measures immediately, worker and public health and safety take priority.
Contaminated Land Specialist (SQEP) **Davis Ogilvie**	Liaise with the contractor during the course of the works, and to ensure works are conducted in accordance with the SMP, and provide environmental support and to undertake environmental monitoring and soil validation sampling as required by this SMP and any subsequent consents.

4.0 SUMMARY OF EXPECTED CONTAMINANT CONDITIONS

4.1 Soil

4.1.1 Capping Layer (0 – 0.5 m bgl) and Treated Soil (>0.5 m bgl)

The Soil Validation Report (SVR) produced by SKM documents the extensive soil sampling completed during and following remediation. The following is a summary of conditions reported in 2008:

- Based on information provided in the SKM validation report, and further elaborated on by PDP (2009) the fill material was occasionally placed on a crushed concrete base with the fill material over 3.5 m thick in places. The contaminated fill material is then capped with approximately 0.35 m thick layer of clay subsoil and 0.15 m of topsoil.
- SG8 Southwest cell of FCC East where the scout building is proposed. Sub cells K17 – K20 show approximately 0.6 m of capping material consisting of topsoil and residential grade soil (DDT <5 mg/kg) over treated fines (DDT concentrations max. of 300 mg/kg, 95% UCL of the mean 114 mg/kg, aldrin and dieldrin max 16.8, 59.9 mg/kg).
- Land to the west of Tahi Street, within the proposed footprint of the car parking area and where stormwater infrastructure is proposed was also remediated. All contaminated soil was excavated, treated and only soil that met residential levels was returned to the cells in the west of the site. Within the proposed area of the car park and stormwater services, remedial works within cells SG30, SG32 and SG40 were required to approx. 0.5 m bgl. With SG24 remedial works went to approx. 1.7 m bgl.

4.1.2 Capping Soil (<0.5 m bgl) DSI (2022)

- Soil encountered in the three shallow test pits in the west of the site (S01, S02 and S03) consisted of a brown silty topsoil with frequent medium to coarse gravel between ground surface and a depth of approximately 0.2 m bgl.
- Topsoil included frequent rootlets and multiple earthworms observed with no visual or olfactory evidence of significant contamination.
- The subsoil fill material consisted of a light orange / brown gravelly clay. Gravel was predominately medium to coarse sub angular to sub rounded and included occasional cobbles. No visual or olfactory evidence of contamination was observed.
- No topsoil was observed at soil sampling locations S04 or 5a, instead the orange gravelly clay was encountered at ground level.
- No concentrations were detected in excess of SCS for recreational land use.

- Copper concentrations in excess of background levels were detected in the majority (10/12) of soil samples analysed. Concentrations of other metals were at or below background concentrations.
- Total DDT concentrations ranged from 0.3 to 4.8 mg/kg (peak concentration in S04 at 0.2 m bgl).
- Aldrin and dieldrin concentrations ranged from 0.014 to 2.4 mg/kg (peak concentration in S04 at 0.05 m bgl).
- Heavy metal concentrations in the samples analysed did not exceed the ANZG sediment guideline values - GV-high. Total DDT, aldrin and dieldrin concentrations in all samples exceeded ANZG sediment guideline values - GV-high.

4.2 Marine Sediments (0 – 0.2 m bgl)

- Davidson Environmental collected shallow sediment samples (shallow 0 – 2 cm, deep 6 – 10 cm) for the analysis of contaminant concentrations in May 2018. Six sediment samples were collected from the foreshore to the east of the site as during the previous sampling rounds.
- Five of the six surface (0 – 2 cm) and all six deeper (6 – 10 cm) sediment samples contained detectable concentrations of total DDT in excess of the Soil Acceptance Criteria (SAC, 0.01 mg/kg). Total DDT concentrations were reported in 2019 to have ranged from 0.022 – 0.064 mg/kg (0 – 2 cm) and 0.014 – 2.2 mg/kg (Peak DDT in sample *"East FCC new2"* (south)).
- Concentrations of aldrin and dieldrin were lower than those of DDT and only exceeded the SAC (0.01 mg/kg) in two of the 12 samples analysed.
- In the Envirolink Ltd. (2022) report the results from five shallow (a composite of sediment within the top 0.15 – 0.25 m) sediment samples collected to the east of the site within the proposed location of the boat ramp are described. Four of the five sediment samples contained concentrations of total DDT in excess of the ANZ Sediment Quality Value, while the fifth sample detection limit was higher than the guideline value and therefore may have also exceeded the value. DDT concentrations ranged between 0.14 – 0.55 mg/kg.
- Aldrin was also detected at a concentration in excess of the ANZ Sediment Quality Value in one sample, while four other samples were below the laboratory detection limit (0.012 mg/kg) which is above the Sediment guideline value (0.0028 mg/kg).

4.3 Groundwater

The published geological map identifies that the site is underlain by marine gravels, boulders, sand, and mud of Holocene age (Q1b). Given the previous remediation of the site, the natural ground has been excavated, remediated through an ex-situ process, and deposited into various remedial cells constructed at the site. Contaminated soil was reported to have been placed below the water table during the remedial process and therefore groundwater is known to be contaminated beneath both the eastern and western parts of the site.

Groundwater has been recorded by PDP at the site in numerous monitoring wells to be at a depth of between 2 – 3 m bgl and inferred to flow east across the site towards the Waimea inlet. Groundwater monitoring is conducted annually by TDC to evaluate groundwater quality at the site and potential discharges from the site to the marine environment. Monitoring well BH1a is located in the proposed route of the boat ramp and will need to be relocated during construction.

Groundwater is not anticipated to be encountered during the proposed earthworks however it is known to be tidally influenced and known to respond rapidly to large rainfall events. Groundwater is not proposed to be abstracted during dewatering and this information is provided only for the purposes of highlighting that groundwater should not be pumped out from any earthwork areas as additional consents from council may be required and additional controls would be required to mitigate health and environmental risks.

The latest groundwater monitoring report publicly available (PDP, 2013) shows that groundwater in 2012 at numerous monitoring wells contained nitrate, DDX, aldrin & dieldrin, lindane, ammoniacal nitrogen and dissolved iron at concentrations that significantly exceeded the New Zealand Drinking Water Standards maximum acceptable values at the time and copper and dissolved reactive phosphorous above ANZECC criteria.

According to an audit of the remediation process by PDP (2009) on behalf of the MfE the following is detailed in relation to the containment provided by the eastern bund:

'A number of service penetrations through the clay bund along the eastern foreshore were discovered during the remediation works and these were repaired. The removal of the surge chamber at this location resulted in a section of the clay bund being removed, with the excavation extending to a depth of over 5 m. However, the bottom 2.5 m of this excavation was backfilled with sand and gravel rather than clay (MWH, 2008b). Consequently, the eastern clay bund is discontinuous as a barrier to groundwater movement'

Several monitoring wells (Figure 4) were observed during the site walkover and generally appeared to be in a suitable condition. BH1a appeared to be located close to or within the proposed path of the boat ramp. Through discussions[5] with TDC, we understand the monitoring wells are accessed annually to conduct groundwater sampling to evaluate discharges from the site to the marine environment.

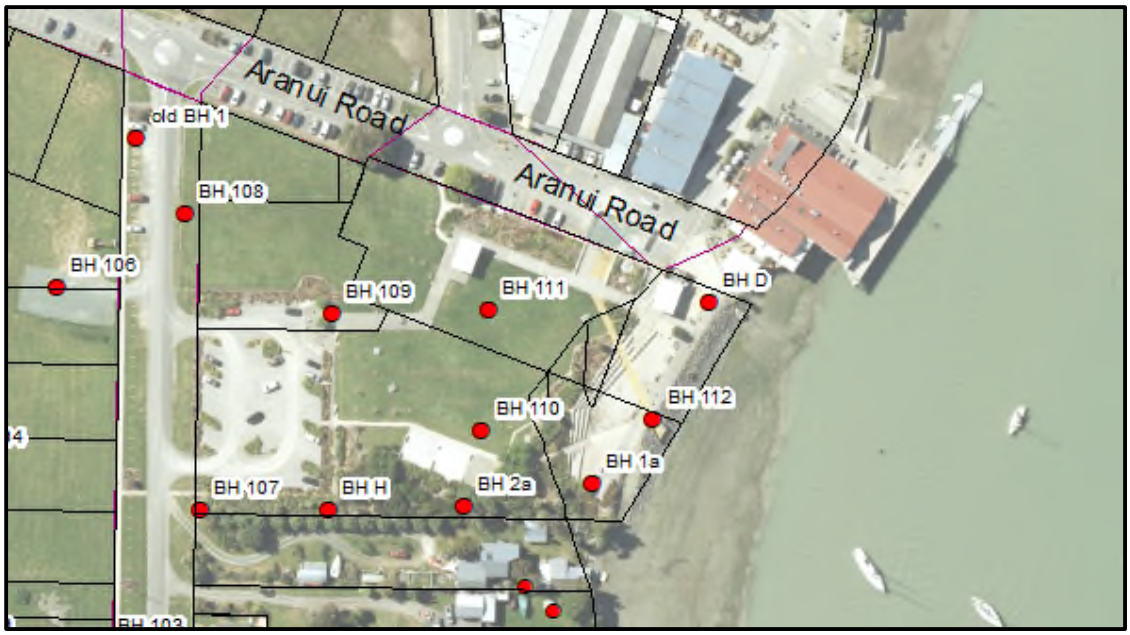

Figure 4: Site Plan showing groundwater monitoring wells. Source TDC.

All site monitoring wells are required to be protected during all earthworks and incorporated into the finished level. Failure to do this will result in a replacement monitoring well being installed.

4.4 Contaminant Properties

4.4.1 DDT

DDT is the primary contaminant of concern on site anticipated to be encountered in concentrations exceeding the land use criteria. The properties of DDT together with typical controls to mitigate the risk presented are summarised in Table 3. Other contaminants of concern to health including aldrin and dieldrin have similar exposure routes and mitigation controls to DDT. Copper and ammoniacal nitrogen and DRP which are associated with the treated fines pose a risk to surface water quality and need to be managed to prevent their discharge from site.

[5] Pers. comm. Glenn Stevens (TDC) and Gareth Oddy (Davis Ogilvie) on 29/07/2022.

Table 3: Contaminant Properties				
Contaminant	**Exposure & Health Effects**		**Exposure limits**	**Recommended Controls**
	Routes of exposure	**Effects of short-term exposure**		
p,p'-DDT DDT CAS# 50-29-3	**Ingestion:** The substance can be absorbed into the body by ingestion  Toxic if swallowed.	May cause mechanical irritation. The substance may cause effects on the central nervous system. This may result in convulsions and respiratory depression. Exposure at high levels could cause death. Medical observation is indicated.	-	Use gloves when handling soil and where dust mask to prevent accidental ingestion of dust. Dust suppression. Decontamination, remove soil from clothing and footwear prior to leaving 'dirty' site zone. Wash hands and face prior to consuming food or water on site.
	Inhalation: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly, especially if powdered. 		TLV: 1 mg/m^3, as TWA; A3 (confirmed animal carcinogen with unknown relevance to humans).	Do not take work clothes home; Dust suppression; PPE and RPE required; Air monitoring.
	Stormwater discharges to the aquatic environment 	Very toxic for aquatic organisms.	-	Erosion and sediment controls to minimise sediment loss from earthworks area. Capture and treatment of stormwater prior to discharge from site.

5.0 SITE CONTROL PROCEDURES

5.1 General Site Protocols and Procedures

Given the contaminants of concern identified in the site soils, the following site wide general risk mitigation measures are recommended to be followed:

- Personnel operating excavators in the removal area shall stay within their machinery while undertaking the works, with the exception of the site foreman or spotter.
- All personnel disposable coveralls shall be removed when leaving the removal area, and placed into waste bags, which shall be disposed of to a suitable landfill.
- If disposable shoe covers are not worn, all shoes shall be lace free and cleaned with warm water at the end of each day and left within the decontamination area. Alternatively, disposable shoe covers can be worn. Prior to demobilising from site, shoes shall be thoroughly cleaned using soapy water and rinsed using clean water.
- Prior to exiting site, all equipment shall be wet brushed and washed down. Wash water and sediment shall be contained and disposed of or directed to ground.
- To minimise exposure to airborne dust, the excavator and any trucks used to move or dispose of soil on site shall keep cab windows closed and only use air conditioning with HEPA filters (including internal recirculating) when within the earthworks area.
- Eating, drinking, smoking, use of mobile phones and applying cosmetics / sunscreen should only occur outside of the active earthworks area and after face and hands have been thoroughly washed with potable water.

5.2 Decontamination

All personnel entering the active earthworks area shall be wearing the specified PPE. On leaving the active earthworks area, all personnel will be required to pass through the decontamination zone. This can consist of a decontamination tent or unit and may be self-contained or require a power and water supply. The decontamination zone will consist of, at a minimum, the following:

- Dirty stage where soapy water is used to remove soil from the outside of PPE. RPE is left on during this stage.
- Intermediate stage where external PPE such as cleaned gloves, hard hats, boots can be removed.
- Waste disposal collection for disposable PPE such as Tyvek suits.
- Cleaning stage consisting of showers or sinks to enable washing of workers.
- Clean stage where worker exits decontamination unit in clothes not worn in earthworks area.

- All personnel shall complete the personal decontamination procedures whenever they leave the work area (including leaving for meal breaks, toilet breaks, etc.) and following direct contact with potentially contaminated soil or ground (e.g., in the case of a ripped glove).

Personal work clothing that has come into contact with potentially contaminated soils should be commercially laundered with appropriate warnings to the operator or disposed of. Clothing should not be washed at home.

6.0 HEALTH AND SAFETY PROTECTION MEASURES

6.1 Administration Controls

Before starting earthworks, the Contractor (and sub-contractors) should develop and issue a Site-Specific Safety Plan (SSSP) to complement this SMP and to address other (none-soil contamination) health and safety requirements that may be applicable to their site works. A copy of the SSSP should be communicated to all parties before undertaking the work. All site personnel will be required to review this SMP and SSSP before commencing work on site.

A hazard board should be erected on fencing at the entrance to the site. The hazard board is required to reflect the soil contamination hazards described in this report. A kick off meeting is recommended to be held between the nominated earthworks contractor and other trades with the contaminated land specialist so that the hazards and SMP controls can be described.

At the start of each day a brief “tool box” meeting should be held to review the SSSP and the proposed work for the day, discuss potential perceived health and safety risks as well as environmental management procedures and to communicate these issues to the project team.

Appropriate emergency procedures must be established before the commencement of earthworks on-site. The appointed Contractor is responsible for detailing these procedures, which will include the location of first aid kits, emergency telephones and medical emergency numbers. A decontamination procedure is provided in this SMP to summarise the steps to take should anyone on site be potentially exposed to soil contaminants.

6.1.1 Training

All staff completing earthworks at the site shall be familiar with this SMP and the TDC (2012) SMP. In addition, all staff completing below ground works will be required to be inducted at the site. This training should be provided to the appointed primary contractor for all components of the SSSP, including this SMP, with support provided by the SQEP where required.

6.2 Personal Protective Equipment

This SMP identifies potential hazards associated with the presence of soils impacted with pesticides and recommends procedures to mitigate these risks. Risks associated with elevated concentrations of the pesticides DDT and dieldrin and aldrin relate to accidental ingestion of soil/dust, inhalation, and dermal contact with contaminated soil.

Use of appropriate PPE, dust suppression controls and behavioural practices will minimise exposure to contamination to a reasonably practicable standard. The following is required to be worn during all earthwork activities or follow on trades that may come into contact with soil below 0.5 m below existing ground level:

- Each worker is required to wear a Type 5 disposable coverall in either in orange or white.
- Chemical resistant disposable gloves, such as neoprene gloves, shall be worn at all times when contact with soil containing >5 mg/kg DDT is likely.
- Rubber Safety gumboots should be worn in preference over those safety boots with laces.
- Half face respirators offering at least P2 protection should be worn. These respirators are to be face-fit before work commences and are to be stored in sealed containers when not in use.
- Safety glasses.
- Hard hat.

For areas outside of the active earthworks area, standard PPE requirements required for an earthwork site should be implemented by all site staff.

6.3 Respiratory Protective Equipment (RPE)

Workplace PCBUs must make sure that exposure to hazards is eliminated, so far as is reasonably practicable, or if not possible to eliminate must be minimised so far as is reasonably practicable. This section provides recommendations on how to minimise exposure via the wearing of Respiratory Protective Equipment (RPE).

There are two main types of RPE, air purifying and supplied air. The site work only warrants air purifying RPE for air purifying RPE, these should be fitted with as a minimum a particulate filter. Particulate filters are rated based on their efficiency to prevent the passage of particulates with P1 being the least efficient and P3 filters being the most efficient. In addition to the filters the type of mask that the filters are either part of or installed in also provides varying degrees of protection.

The overall performance and protection factor offered is dependent upon the type of facemask (half-face or full-face) and the type of filter (P1-P3), Refer to Table 4 below.

Table 4: RPE Protection Factors

Respirator Type	Protection Factor	
	Half-face	Full-face
P1	≤ 10	≤ 10
P2	≤ 10	≤ 50
P3	≤ 10	≤ 100

RPE with the highest protection factor should always be the starting point when considering which RPE to select. Additional factors such as length and nature of the site works, work-related factors, wearer's facial characteristics, medical fitness and comfort may also be required to be considered. There are numerous guidelines and standards which describe the selection of respirators (AS/NZS1715, AS/NZS1716 and HSG247) which should be consulted prior to selecting RPE.

We recommend that a P2 disposal respirator as a minimum is made available to all site workers conducting earthworks or with contact to the underlying contaminated soil.

6.4 First Aid Measures

A full description of first aid measures are presented in the chemical material safety data sheet presented in **Appendix C**. A summary of first aid measures related to DDT are presented in Table 5.

Table 5: First Aid Measures

Compound	DDT
Inhalation First Aid	Fresh air, rest.
Skin First Aid	Remove contaminated clothes. Rinse and then wash skin with water and soap.
Eye First Aid	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.
Ingestion First Aid	Rinse mouth. Give a slurry of activated charcoal in water to drink. Rest. Refer for medical attention.

Headaches, nausea, and fatigue are symptoms of potential exposure to DDT and should these be identified in staff, assessment of cause and steps to remedy should be taken immediately.

7.0 ENVIRONMENTAL MANAGEMENT PROCEDURES

7.1 Minimising Off-site Tracking

Site vehicles accessing the rear of the site are recommended to drive through two rubble strips to dislodge soil from the tires prior to them leaving and entering the remainder of the site.

- Trucks shall have their wheels either swept down or washed before they leave site in accordance with site decontamination procedures.
- Trucks shall have their loads covered by tarpaulins during transport of material to the approved disposal / stockpile site.
- Each truck will have a tracking document signed out onsite and collected at the landfill / disposal facility to track each load of material.
- All weighbridge dockets shall be retained by the contractor and provided to Davis Ogilvie.

7.2 Environmental Control (Air, Land, and Water)

A site log of the weather and earthworks completed should be recorded using the site log or similar. In order to minimise the potential for adverse effects to human health or the environment resulting from site works, a series of protective measures shall be put in place during any soil disturbance activities:

7.3 Dust Management

Site works shall be carried out so that they do not result in any odours or airborne and deposited dust beyond the property boundary of the site that is determined to be noxious, objectionable, or offensive. Generation of dust shall be appropriately managed by employing standard dust suppression techniques:

- Don’t complete earthworks during or when wind speeds over 10 km/h are expected.
- Dampening down using water sprays.
- Where stockpiling is necessary, the material will be kept damp to avoid dust generation and covered with HDPE if to be left in location for over half a day.
- HDPE shall be weighed down and a bund created around the stockpile to capture run-off.
- Stockpiles shall be shaped and compressed with excavator bucket to produce a firm less erodible face.
- Any additional relevant dust mitigation measures such as those described in the Ministry for the Environment (2001) Good Practice Guide for Assessing and Managing the Environmental Effects of Dust Emissions.
- Weather reports will be checked at the beginning and before the end of each day and if high wind speeds are expected the above mitigation measures will be implemented. When wind speed is sufficient to generate dust, operations shall cease.

- The critical wind speed for entrainment of dust from the surface is 18 km/hr and above 36 km/hr entrainment increases rapidly (Davis, 2000). While it is noted that the generation of dust will be dependent on particle size and moisture, these wind speeds will be adopted as a trigger to visually monitor for dust generation. The site foreman will be responsible for ensuring that the dust mitigation measures are implemented when necessary. If conditions dictate that dust at the remediation area boundary cannot be controlled via the above methods, remediation works shall cease until conditions are favourable.
- Minimal soil shall be cut and exposed at any one time. Earthworks shall be staged and reinstated as soon as possible. If unsealed soil is left exposed for any significant length of time and unable to be reinstated with vegetation or hardstanding, then a temporary sealant such as a dust suppression polymer shall be used.
- Vehicle access shall be over a gravel rumble strip and shall drive only on dedicated vehicle access routes. A sprinkler system or water cart shall be used on this vehicle access route.

7.4 Erosion and Sediment Control

The below are recommended procedures to be completed with regards to erosion and sediment control during the remedial earthworks. These procedures are to be completed alongside the Erosion & Sediment Control Plan (ESCP) Davis Ogilvie drawings provided with the application and presented in **Appendix D**.

Earthworks shall be undertaken in accordance with the TDC Erosion & Sediment Control Guidelines. Compliance with the procedures set out in this guideline should be sufficient to manage the risks from sediment and erosion. All controls detailed in the consented ESCP drawings shall be installed prior to earthworks commencing.

As a minimum the following control measures will be undertaken:

- Effort shall be made to undertake the excavation works in a period of dry weather to minimise the risks of stormwater entering the excavations or sediment contaminated water escaping from the excavations.
- Erosion and sediment controls as detailed in the Davis Ogilvie ESCP drawings shall be put in place around the excavations as necessary to inhibit potentially contaminated soil / sediment from being transported away from the area.
- Trucks used to transport contaminated soil (if any) must be covered, and as reasonable, any loose contaminated material on the side of the trucks or on the wheels shall be removed before the truck leaves the site.
- The site shall be sealed with aggregate as soon as possible to minimise the amount of time soils are exposed.

- Frequent checks should be made on any stormwater leaving the earthworks site to ensure it is clear and does not contain significant amounts of sediment (>50 mg/L TSS).
- Catch pits / sumps in the vicinity site shall be covered with silt socks and geotextile to prevent sediment entering the drains.
- Any wash water or stormwater from the truck loading areas will be directed back into the excavation to ensure that any contaminated stormwater and wash water is captured by the excavation and then removed from the excavation for disposal to registered landfill or the TDC waste water network, if appropriate and permitted to do so.
- A sacrificial layer of gravel is recommended to be placed at the vehicle site entrance. The layer of gravel should be constructed so as to remove entrained soil from vehicle tyres prior to exiting the site.
- Dust and debris on the site entrance and off-site related to the works shall be removed via road sweeper.
- The above measures will be inspected after every period of rainfall for erosion or breach. Any repairs required will be carried out immediately.
- Stockpiles of soil to be retained on-site should be covered with HDPE as a temporary measure.
- Soil bunds to be created shall be shaped and formed and hydro seeded / planted as soon as practicable.
- Earthworks of contaminated soil should not be undertaken during inclement weather.

To ensure potential environmental discharges are minimised during the earth works the controls shall remain in place until the area has been reinstated.

7.4.1 Stormwater treatment

A construction phase stormwater channel shall be constructed as per the ESCP. This will direct ‘dirty’ sediment laden stormwater to a stormwater basin to allow the removal of sediment. DDT, dieldrin and aldrin have low solubility and a strong adherence to organic matter. Sediment removal using flocculants is therefore considered likely to remove the majority of pesticides mass flux in the stormwater. However, if sampling shows that DDT is still present in stormwater above acceptable ecological criteria, water from the stormwater pond will be pumped into a final treatment system consisting of granular activated carbon, which will discharge by gravity back into the outlet to discharge off-site.

7.5 Spill Containment

Soil should only be loaded into vehicles for transport around the site or for off-site disposal within an area that has established erosion and sediment control protection. If soil is spilt during loading of vehicles or other handling, spilt soil shall be moistened with water to reduce dust potential and shall be swept up into a container and placed in the intended destination. The employee completing the task shall wear appropriate PPE including gloves and respirator.

Should construction phase stormwater spill out of the erosion and sediment control system and not undergo treatment discharge from the established system then, water containing sediment shall be captured and pumped back into the beginning of the system.

7.6 Noise

Given the site is located in an urban area with moderate background noise levels and the timing of the works occurring during typical 07:00 – 18:00 hours, the earthwork activities are considered to have a low potential to result in adverse noise impacts.

7.7 Traffic Management

Given the small volume of material required to be excavated and disposed of off-site there will be a limited number of truck movements. Adverse traffic conditions are therefore not expected to occur adjacent to the site or the wider area as a result of the project related trucks. The site provides sufficient area for the manoeuvring and covering of trucks prior to and following loading or unloading of materials.

8.0 SOIL TESTING AND DISPOSAL REQUIREMENTS

8.1 Soil Re-use

Soil to be re-used on site must meet the existing soil/sediment acceptance criteria. Soil that does not meet this will need to be removed from site and disposed of at a Class 1 Landfill Facility.

The relevant soil assessment criteria used to establish the appropriate destination for surplus soil is summarised in Table 6.

Table 6: Adopted Re-use Criteria				
Land Use	**Depth (m bgl)**	**DDX (total DDT, DDD, DDE) (mg/kg)**	**Aldrin + Dieldrin + 10% Lindane(mg/kg)**	**Copper**
Residential	All	5	3	300
Commercial	0 – 0.5	5	3	300
	Below 0.5	200	60	5000
Recreational or open space	0 – 0.5	5	3	300
	Below 0.5	200	60	5000
Marine sediment	All	0.01	0.01	65

Surplus topsoil generated from earthworks can be stockpiled onsite for testing before being transported directly to a facility authorized to accept it or re-used on site.

It should be noted that the Contractor shall obtain the necessary approvals / permits from the landfill prior to transportation of any materials off-site. Some landfills may require additional analysis, such as leachate (TCLP).

Efforts should be made to separate the topsoil from subsoils during developmental earthworks so as not to increase the volume of potentially contaminated material. It is recommended that the contractor segregate and stockpile differing soil types separately. It is recommended that the fill be excavated in increments of 150 mm depth while excavating through the upper 0.5 m.

8.2 Soil Disposal

All excess soil material required to be excavated from below 0.5 m bgl which contains contaminant concentrations above residential standards will either be disposed of off-site or re-used on site at a depth of greater than 0.5 m bgl below finished levels. Soil removed from site will need to be disposed of to a managed disposal fill facility consented to accept the soil. Soil from any depth and location on site is unlikely to meet cleanfill criteria.

Additional testing of surplus soil is likely to be required by the disposal facility. Disposal of soils off-site will be in accordance with instructions provided by the disposal facility operator.

It is our preference for sustainability, financial and safety reasons to not cart soil to Christchurch for a project in Tasman District and to use local disposal facilities first, if possible. Given the very low solubility of DDT and dieldrin in water, it is envisaged that TCLP results may meet the York Valley Landfill leachate acceptance criteria. This will be confirmed during the early works and site establishment stage. A summary of the soil disposal and re-use routes for the project are presented in Table 7.

Table 7: Summary of Soil Disposal Routes				
Contaminant of Concern and Location	**Concentrations present**	**Disposal Destination**	**Criteria to be met**	**Comments**
DDX (0 – 0.5 m)	<5 mg/kg	Re-use on site	<5 mg/kg (TDC soil/sediment acceptance criteria, SMP 2012)	Residential NES SCS at 70mg/kg, recreational 400 mg/kg.
DDX (>0.5 m)	<200 mg/kg	Re-use on site	Only where a cover of 0.5 metres of topsoil/hardstanding can be placed over the impacted soil. Location will need to be recorded.	
		NCC York Valley Landfill, Nelson	0.4 mg/kg of DDT in the soil TCLP leachate of 0.02 mg/L.	Should the concentrations exceed York Valley Landfill criteria Burwood Landfill in Christchurch to be used.
		CCC Burwood Landfill, Christchurch	DDT 400 mg/kg	NES SCS recreational
Dieldrin and aldrin	60	NCC York Valley Landfill, Nelson	0.4 mg/kg in soil TCLP leachate of 0.02 mg/L.	Site specific
		CCC Burwood Landfill, Christchurch	70 mg/kg	NES SCS recreational
Copper	5000	NCC York Valley Landfill, Nelson	200 mg/kg	-
		CCC Burwood Landfill, Christchurch	10,000 mg/kg	NES SCS recreational

The following procedures shall be followed when transporting soils or material off-site:

- Special 15 m^3 waste bins / skips or trucks, approved for the transport of containing soil to the designated landfill. The bin will be lined with 200 micrometre (µm) thick sealed HDPE plastic.
- Once the bin is full, the material shall be sealed in the plastic liner and the bin cover pulled over.

- The bins shall be loaded within the site where runoff and possible spills during loading will be controlled and contained.
- Trucks shall have their loads securely covered during off-site transport of material.
- All weighbridge / disposal dockets shall be retained by the contractor and a copy given to the SQEP (Davis Ogilvie) so that evidence of the soil disposal can be provided to the regulator.

8.3 Water Disposal

The addition of water to contaminated soil maybe necessary during the earthworks to supress dust. As water is essential for suppressing dust, a large, consistent, and reliable source of water should be available on-site at all times. Water should be applied to dampen the area only and prevent the visible generation of dust. If excessive water is applied, ponding or runoff may occur which could permit the transport of contaminants outside of the site. Water from the work area should be retained inside the boundary of the site and wash water directed back into excavations and the site.

8.4 PPE Waste

All waste disposable PPE should be placed in a 200 µm HDPE plastic bag within the decontamination area. The bag should be taped closed (in a goose neck fashion) after each item is added and kept damp via the addition of water. Once full the bag should be added to a second HDPE bag and labelled as to warn of its contents.

8.5 Waste Tracking

All waste soil removed from site should be tracked using industry standard waste manifest forms (see **Appendix E**). The waste manifest form essentially is transported with the waste from the waste source to its disposal location. There are three main stages which should be controlled to ensure the waste is handled appropriately and reaches its intended disposal destination. The three steps are the source site, the transporter and the disposal destination. At each step the waste consignment and waste manifest are released to the next PCBU, the manifest is signed by the next recipient and so on. Once disposed, the signed form is returned to the principal contractor and / or SQEP for inclusion in a soil completion/validation report.

9.0 UNEXPECTED CONTAMINATION DISCOVERY PROTOCOLS

9.1 Discovery of Unexpected Contamination

In the event that the Contractor or any other site workers encounter any contamination of unknown origin, including but not limited to underground storage tanks, waste fuel or chemical drums, asbestos, buried wastes, or soil containing obvious contamination (odours or staining) beyond that identified in the DSI, the area should be evacuated and secured immediately with no further access allowed to that portion of the site until appropriate response and control measures can be implemented as follows:

- If it appears that there is an immediate risk to staff and / or the environment (for example leaking containers, strong odours, or any observed health effects), emergency services should be contacted, and a HAZMAT response requested.
- If the contamination does not appear to present an immediate risk to staff and / or the environment, the client should be informed of the discovery so that an appropriate assessment can be undertaken by suitably qualified and experienced practitioner.
- Work on site shall only continue when it has been confirmed by monitoring data and/or the appropriate agencies to be safe to continue.

10.0 SITE MONITORING

10.1 General

The following monitoring and supervision requirements are recommended:

- A suitably qualified and experienced environmental practitioner (SQEP) will liaise with the contractor on the controls in this SMP and conduct a site visit during the project to complete environmental monitoring as required.
- A SQEP shall complete air monitoring during the during the earthworks only. Should concentrations exceed trigger levels additional controls and air monitoring may be required.
- An assessor shall collect soil validation samples once the works have been completed and will issue a soil validation report to document the monitoring and sampling completed during the project.

In addition to the SQEP monitoring, the Contractor shall maintain a daily site logbook (**Appendix F**) containing the following information:

- Daily weather conditions, particularly wind direction, speed, and temperature.
- Progress / issues associated with contaminated soil and the site work.
- Numbers of personnel on site and use of personnel protective equipment.
- SMP Induction sheets.
- Dust and air monitoring data.

- Safety, health, and environmental discussions (including Toolbox meetings) and safety non-compliance issues.
- Third party complaints lodged regarding the works, as well as all corrective measures implemented.
- All incidents and near misses including staff sickness.
- Records of waste tracking and imported fill material.
- Any other relevant information.

The log book data shall be provided to the SQEP following completion of the works and made available to the Council for a minimum period of two years after the completion of the works.

No discharges from site activities shall produce emissions, to an extent which is considered noxious, dangerous, offensive, or objectionable to site occupants or neighbours. The site foreman will be responsible for ensuring no visible or olfactory discharges occur via air or water during the works.

10.2 Air Monitoring – DDT

Samples of air shall be collected during earthworks to assess concentration of airborne DDT attached to soil particles present as dust. The sampling will be conducted during dry weather where rain is not forecast and has not occurred in the past 2 days. Sampling will be conducted in accordance with approved standards (ASTM D 4861 or similar). Sampling pumps will be completed to assess for evaluation of occupational health and safety requirements as well as on the site boundary to evaluate nuisance dust.

In the absence of a New Zealand Workplace Exposure Standards for DDX, time weighted averages (TWA) from international agencies shall be used. A TWA of 1 mg/m^3 shall be used. Analysis of the filters takes 3 - 4 days to complete and therefore monitoring results will be retrospective but shall be used to inform the need for further controls to be implemented. All results shall be compiled and submitted with the site closure report.

10.3 Soil Monitoring

As developmental works on site are expected to generate surplus soils, waste characterisation of soils excavated from below the capping layer will be required before disposal off site. To achieve this, these soils should be tested in-situ before excavation or stockpiled onsite and subjected to testing.

10.4 Spoil and fill monitoring

As described in Section 7.4.3, all excavated fill / soil generated from the works shall be disposed to a landfill licensed to accept contaminated material (subject to acceptance by the landfill operator).

The following records shall be maintained:

- Waste disposal acceptance receipts, and associated laboratory analysis (if any).

10.5 Stormwater Monitoring

Samples of stormwater within the stormwater pond prior to discharge shall be sampled for TSS and DDT, dieldrin and aldrin.

Samples will be compared to trigger values based on the protection of marine ecological aquatic life.

11.0 REPORTING

A post construction completion report is recommended to be produced and submitted to TDC. The report will document the construction, soil re-use location, waste characterisation, soil disposal records, finished topographical and cap thickness records and environmental monitoring results.

RAP/SMP Induction Agreement and Acknowledgement Sheet

NAME	COMPANY	DATE	SIGNATURE

Former Fruitgrowers Chemical Company Site, Mapua

FCC East and FCC Landfill Sites

Site Management Plan

- Version 2.0
- 8 March 2012

Contents

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Revision of Document, originally prepared by Bruce Clarke of Sinclair Knight Mertz: SKM, PO Box 9806, Newmarket, Auckland

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1 Introduction

A remediation project has been completed at the former Fruitgrowers Chemical Company (FCC) site located at Mapua, New Zealand. Soil and groundwater at the site were affected by organochlorine pesticide (OCP) contamination from the operation of the FCC plant from 1932 until 1988. The remediation was required to reduce the risk posed by the site to future site users, the local inhabitants and the environment. In their report, "Audit of the Remediation of the Former Fruitgrowers Chemical Company Site, Mapua" (2009), the Site Auditor, Pattle Delamore Partners Limited (PDP) has advised that the site is now fit for its intended purpose, subject to the implementation of the management measures set out in this Site Management Plan (SMP).

This SMP sets out the requirements for the post-remediation management of the health, safety and environmental risks associated with the FCC East site, FCC Landfill site, Tahi Street roadway between FCC East and FCC West and the creek adjacent to the FCC Landfill site, Mapua. Adherence to this plan for all works covered by the plan is mandatory.

The application of this SMP is slightly different for each site. Where a section or part of a section of the SMP does not apply to all sites, this is made clear in the text.

This SMP is intended to cover risks from residual contamination and is not intended to be a health and safety plan for normal construction activities. Separate health and safety plans specific to particular construction works may need to be prepared by the site owner, tenants or site contractors, on a case by case basis.

This SMP is not intended to provide detailed information on site contamination, investigation results or site remediation. Details of the remediation and current site status are given in the SKM report "Site Validation Report for the Former Fruitgrowers Chemical Company, Mapua" (2008). The site remediation and the SKM Site Validation Report have been assessed and approved by the independent auditor, PDP. The reader is referred to the PDP report "Audit of the Remediation of the Former Fruitgrowers Chemical Company Site, Mapua" (2009).

This SMP has been created in accordance with guidelines set out by MfE Contaminated Land Management Guidelines No. 1: "Reporting on Contaminated Sites in New Zealand" (MfE, 2001) and NSW DEC (2006) guidelines.

Tasman District Council (TDC), acting through its Property Manager, is the owner of the site. As owner, TDC may carry out work in its own right or ensure compliance with this plan by contractors or tenants on the site.

TDC, acting through its Environment & Planning Manager, is responsible for regulating activity on the site and controlling discharges, and will consider any approvals or consents required for this site, including any approvals sought by TDC's Property Manager acting on behalf of TDC. TDC's various roles are discussed further in Section 4.3.

2 Objectives

The main objective of the SMP is to ensure that any residual contamination on the FCC East and FCC Landfill sites, the area of Tahi Street between the FCC East and FCC West sites and the creek adjacent to the FCC Landfill site does not cause adverse effects on human health or the environment for the proposed site use, by specifying controls on development and maintenance activities, particularly excavation.

This SMP is not intended to provide detailed information on site history, site contamination, investigation results or the remediation of the sites. Reference should be made to the following reports for more detailed information:

- "Site Validation Report for the Former Fruitgrowers Chemical Company, Mapua" SKM (2008); and
- "Audit of the Remediation of the Former Fruitgrowers Chemical Company Site, Mapua" PDP (2009).

3 Site Status

3.1 Overall Site Conditions

The site, apart from the Tahi Street southern road reserve and the creek, has been remediated to meet Soil Acceptance Criteria (SAC) as set out in the resource consents for the site remediation project and according to the Site Auditor is therefore fit for its intended purpose as open space (FCC Landfill) and open space/commercial land (FCC East). The SACs were set in conditions to resource consents granted for the Mapua site remediation.

Contaminated soils above relevant SAC (shown in Table 1) have either been removed from site or treated and reused. The FCC East and FCC Landfill sites have been capped with 500mm of residential quality material. This cap is composed of 150mm of imported topsoil (cleanfill) and the layer from 150mm to 500mm depth is a mixture of imported material, and residential soil sourced from the site during remediation and has been validated as meeting the residential SAC.

Beneath this layer, both sites have been reinstated using materials that are, on average, below the relevant SACs for the intended future land use of the sites. These subsurface materials are generally soils which were either left in place (because they were found to already conform to the appropriate SACs), or were excavated and moved around the site during the remediation works. The excavated soils have been validated as suitable for reuse in an appropriate area of the site without treatment or treated then validated as suitable for reuse.

Although the sites have been validated as remediated to the appropriate SACs, concentrations of contaminants above 'natural' background levels (and above SACs for unrestricted use) are still present in the subsurface soils of the site. The relevant SACs for each land use and for each contaminant are presented in Table 1. Residual contaminant concentrations remaining in the subsurface soils of the different areas of the site will be below these relevant SACs. Soils at the FCC East and FCC Landfill sites have been remediated to Open Space/Commercial SACs.

Table 1: Selected Soil/Sediment Acceptance Criteria

Land Use	***Depth (m)***	***DDX (total DDT, DDD, DDE) (mg/kg)***	***Aldrin + Dieldrin + 10% Lindane3 (mg/kg)***	***Copper***
Residential	All	51	31	300
Commercial	0–0.5	51	31	300
	Below 0.5	2002	602	5000
Recreational or open space	0–0.5	51	31	300
	Below 0.5	2002	602	5000
Marine sediment	All	0.01	0.01	65

Notes:

1 Based on protection of the off-site environment through rainfall run-off. This will also be protective of human health and groundwater.

2 Based on protection of groundwater.

3 Based on a WHO ADI of 0.001 mg/kg/day for lindane (Egis, April 2002).

3.2 Soil Subcategories

Various soil sub-categories have been placed on the sites. These are:

- topsoil;
- residential;
- commercial;
- treated fines (including 5-10mm component);
- concrete (crushed);
- oversize material (>10mm);
- oversize marine sediments (>10mm);
- sand;
- marine sediments;
- clay;
- imported gravel; and
- path and rocks (at surface).

Details of the placement depths of each material are presented in the as-built drawings in Appendix F of the validation report (SKM 2008).
Sinclair Knight Merz

3.3 Current Site Use

The FCC East and FCC Landfill sites are currently vacant. The site owners should ensure that there is no disturbance of the sites' soils whilst they remain vacant.

3.4 Associated Hazards

The FCC East and FCC Landfill sites have been capped with 500mm of residential quality material. This cap is composed of 150mm of imported topsoil (cleanfill) and the layer from 150mm to 500mm depth is a mixture of imported material, and residential soil sourced from the site during remediation. This layer contains residual OCP which presents a hazard to the estuary.

Any soils at the sites containing residual contamination require careful management. Failure to control soil movement at the site could result in the following hazards:

Soil from surface to 500mm depth

- The surface 150mm is topsoil (cleanfill) and presents no contaminant hazard for the future use of the site. Maintaining the 150mm of topsoil (cleanfill) over the next layer down or some other cover, eg, grass, is important (see below); and

- The soil from 150 – 500mm depth has OCP residues at concentrations that present no human health risk but could present a risk to the marine environment if brought to the surface or disposed of in a location where it could be transported to the marine environment in significant quantities via run-off.

Soil deeper than 500mm has:

- Contaminant residues that present a risk to the marine environment if brought to the surface or disposed of in a location where the soil could be readily transported to the marine environment in surface run-off;

- Contaminant residues that present risk to the environment if disposed of off-site to a more sensitive environment, eg, residential land, and that may otherwise require a resource consent for discharge to land if not disposed of to an appropriate disposal facility, eg, landfill;

- Ammonia and copper residues within treated soil at some locations which may present risk to plant health for some deeper rooted plants; and

- Groundwater under the site which has concentration of contaminants that may present a risk to the marine environment if disposed of to TDC's stormwater system or directly to the marine environment.

4 General Site Management Implementation Strategy

4.1 Site Area

The areas controlled by this SMP are:

- FCC Landfill Site – Lot 1 DP 14311;
- FCC East Site – Lots 2, 3 and 4 DP 11106, Lots 1, 2, 4, 5, 6 and 7 DP 11502;
- Tahi Street between FCC East and FCC West;
- The creek adjacent to the north-west boundary of FCC Landfill.

A site plan of these areas in context with the other areas of the former Fruitgrowers Chemical Company site are annotated as “Landfill FCC”, “East FCC”, “Creek” and “Tahi Street” on the drawing in Appendix A.

4.2 Implementation Mechanisms

Adherence to this plan by any person carrying out work at the site is mandatory.

Those carrying out work on any part of the site shall be familiar with this plan. This includes, but is not limited to, employees, consultants, contractors and sub-contractors of TDC, tenants or other occupiers, whether temporary or permanent, of the site or parts of the site.

4.2.1 FCC EAST

It is important for the future users of the FCC East site that this SMP is adhered to by site owners/tenants, and any agents or contractors of future owners or tenants. To ensure the implementation of and compliance with the SMP, TDC will retain ownership of the site and will lease the site, or parts of the site, for future development. Compliance with the SMP will be made a condition of any lease agreement.

If TDC sells the site, or part of the site, a mechanism must be established to ensure that the requirements of the SMP are adhered to by the future owners.

4.2.2 FCC LANDFILL

To ensure the implementation of and compliance with the SMP, TDC will retain ownership of the site including any future developments with the long term site use as a recreational facility.

If TDC sells the site, a mechanism must be established to ensure that the requirements of the SMP are adhered to by the future owners.

4.2.3 TAHI STREET AND THE CREEK

Implementation of this SMP in Tahi Street and the creek will be controlled by TDC retaining ownership/responsibility of these areas.

4.3 Responsibilities

The following parties have responsibilities relating to the implementation of the SMP.

4.3.1 THE SITE OWNER (TDC PROPERTY MANAGER)

The TDC Property Manager represents TDC as the current site owner. The Property Manager is responsible for:

- the implementation of this SMP whilst TDC remains the site owner;
- ongoing compliance with the SMP whilst TDC remains the site owner;
- producing all Earthworks Management Plans (EMPs) for the site and ensuring these are approved by the TDC Environment & Planning Manager before any work is carried out at the site;
- ensuring that any people carrying out subsurface works on the site are aware of the SMP (this includes underground service providers);
- maintaining adequate records of works controlled by the SMP;
- ensuring the SMP is adapted to changing circumstances; and
- ensuring work is carried out in accordance with approved EMPs and any additional conditions imposed by the Environment & Planning Manager.

In the case of parts of the site that are leased for commercial use, the TDC Property Manager, acting as site owner and leaseholder, will pass responsibility for adhering to the requirements of the SMP and any relevant consent conditions to tenants through the lease agreement.

4.3.2 PLAN APPROVALS (ENVIRONMENT & PLANNING MANAGER)

The Environment & Planning Manager at TDC shall be responsible for ensuring the Property Manager complies with this SMP, considers and grants approvals, as appropriate, for any EMPs or other work-specific plans submitted pursuant to this SMP, and ensures any conditions in such plans are complied with. The Environment & Planning Manager is responsible for:

- setting conditions that will need to be met by site developers and occupiers that will be overseen by the site owner (TDC Property Manager). Adherence to the requirements of this SMP will form one of these conditions. Further conditions may include ongoing monitoring requirements (for example, a future groundwater monitoring programme).

4.3.3 SITE OCCUPIERS/TENANTS

4.3.3.1 FCC East

The long term site use for the FCC East site is envisaged to be open space and commercial. TDC intends to retain ownership of the FCC East site and will lease parts of the FCC East site for redevelopment. TDC will be responsible for ensuring that the site occupiers/tenants comply with the SMP as discussed in Section 4.3.1. This will ensure that this SMP is implemented during site use.

4.3.3.2 FCC Landfill

The long term use for the FCC Landfill site is envisaged to be recreational. As TDC will retain ownership of the FCC Landfill site, it will be responsible for developing and administering the recreational land use facility which is scheduled to be developed on the FCC Landfill area.

4.4 SMP Review

The SMP is a live document that will be updated to reflect any changes to relevant laws, industry best practices or site circumstances.

As TDC is to retain ownership of the sites, the TDC Property Manager will also be responsible for the regular reviewing and updating of the SMP if required. The SMP shall be reviewed after 1 year, or after additional investigations recommended by the site audit report have been completed. The SMP shall also be reviewed if ownership of any part of the site changes. The SMP shall subsequently be reviewed on a 5 yearly basis.

Note that the first review was after 3 years in 2012, after the results of the ammonia soil gas testing.

5 General Management Measures

Prior to any works commencing on site, the following procedures shall be followed for the sites:

- an Earthworks Management Plan (EMP) must be submitted to the TDC Environment & Planning Manager for approval prior to undertaking any earthworks or excavation on the site;
- excavation shall be minimised; and
- the removal of groundwater shall be minimised.

Earthworks include digging, drilling, piling, trenching, installation and maintenance of underground services, foundation works, roading, landscaping and any other subsurface activity that has the potential to bring commercial quality soil to the surface, or which might reduce the thickness of the 500mm residential quality capping layer.

Earthworks do not include landscaping and garden maintenance activities within the depth of imported topsoil validated to comply with residential quality soil.

It should be noted that the requirements of this plan are in addition to any requirements under existing applicable legislation, planning instruments or by-laws.

Specific management measures for FCC East, FCC Landfill, the creek and Tahi Street are stated in the following sections of this SMP.

6 Specific Management Measures

6.1 General

An EMP must be submitted to the TDC Environment & Planning Manager and approval attained before any earthworks or excavation occurs. The EMP shall describe the proposed works and detail the proposed methods that are to be employed to ensure compliance with the SMP requirements. The approval of the TDC Environment & Planning Manager is not required where the works do not penetrate the base of or compromise the thickness of the 500mm capping layer or, if within 30m of the foreshore, the 150mm topsoil layer.

6.2 Control of Soil Movement

The following sections will describe the controls required for each distinct layer of material at the FCC East and FCC Landfill sites.

6.2.1 Excavation and Replacement of Soils

The soils at the site have been placed in distinct layers as described in below. These discrete layers shall be maintained during and after excavation by excavation in stages. All soils should be excavated and replaced in the excavation in the sequence they were removed, with the ground surface layer being removed first and placed back last. The following methodology shall be followed during any excavation on the site:

1 Soil from ground surface to 150mm depth

Material to be excavated and stockpiled separately, it should be removed first and placed last.

2 Soil from 150mm to 500mm depth

Material to be excavated and stockpiled separately, it should be removed second and replaced second to last.

3 Soil from 500mm depth and deeper

Material to be excavated and stockpiled separately, it should removed last and replaced first.

4 Soil replacement

The soil shall be replaced in the reverse order of excavation to ensure that the discrete layers are preserved.

6.2.2 SURFACE TO 150MM DEPTH

Topsoil (cleanfill) has been placed over the site from surface to 150mm depth.

It is imperative that the 150mm topsoil (cleanfill) layer is maintained within 30m of the FCC East boundary adjacent to the foreshore. If this layer is removed within 30m of the boundary, it should be immediately replaced by a protective layer to prevent mobilisation of the underlying residential soils by sediment run-off. For example, this could be achieved by using paving, grass, geotextile and bark layer, etc.

Should flower beds or gardens with bare soil be planned within the 30m buffer zone, a greater depth of topsoil (cleanfill) should be imported to these areas to ensure that the soil below the existing 150mm topsoil (cleanfill) layer is not exposed during garden maintenance.

6.2.3 150MM TO 500MM DEPTH

A 500mm capping layer of residential quality soil exists on the site (including the 150mm surface layer of topsoil). This layer shall be maintained unless replaced by a structure such as a building or pavement.

6.2.4 500MM DEPTH AND BELOW

Soil below 500mm depth is suitable for commercial site use but has residual contamination with the potential to cause adverse effects in a more sensitive environment. The movement of this soil must be controlled to ensure that no such adverse effects occur. Soil from below 500mm depth shall only be placed or disposed of as follows:

- within the FCC East site boundary, below the 500mm capping layer of residential quality material;
- within the boundary of FCC Landfill, below the 500mm capping layer of residential quality material;
- to an off-site facility such as a landfill that is licensed to accept such soil; or
- to an off-site location with appropriate consents to allow discharges of contaminants to land.

Temporary stockpiling of the commercial quality soil will need to be controlled to ensure that the stockpiled soil does not contaminate clean areas. Stockpiles shall be constructed within designated areas, and kept separate from stockpiles of topsoil or residential soil, labelled with appropriate signage. Unless constructed on paved areas, topsoil and residential quality soil shall be stripped from commercial stockpile locations before commencing stockpiling.

Run-off from the stockpiles will require controls.

Transport of commercial quality soil within the site shall be carried out in a manner that avoids spillage from excavator and front-end loader buckets, trucks, trailers and the like, where that spillage could fall on residential quality soil. Measures to avoid

such spillage or effects from such spillage may include avoiding overfilling buckets and trucks, and temporarily stripping residential quality material from haul roads.

Off-site movement of commercial quality soil will be carried out in such a way as to avoid spillage of soil or liquid and excessive generation of dust. Measures to be considered include not overfilling trucks, sealed trays, high-sided trays and covering of loads.

Controls must also be established to avoid the inadvertent transport of soil by vehicles or machinery to more sensitive parts of the FCC site. This may include measures such as cleaning of vehicle wheels and tracks by manual means within a designated area or establishment of wheel washes. Unless tested to be shown otherwise, soil and sediment from cleaning operations shall be treated as commercial quality material and disposed of as described above.

6.3 Subsurface Works

6.3.1 GENERAL

Soil contaminants at the sites are not expected to impact underground structures. Ammonia gas may be emitted from nitrogenous compounds within the soil matrix. However, investigation in 2010 showed there to be low concentrations of ammonia gas, which will not pose a risk to subsurface workers.

All proposals for underground structures or services below the winter-high groundwater level shall be submitted to the TDC Environment & Planning Manager for approval.

Proposals for piling or drilling that may penetrate the Moutere Gravel formation shall be submitted to the Environment & Planning Manager for approval. Such proposals shall have measures to prevent transfer of contaminated soil or water to the underlying aquifers.

6.3.2 TAHI STREET

Road maintenance, including work in the verges, and maintenance of existing underground services or installation of new services is possible on the section of Tahi Street between FCC East and FCC West, north of 13 and 18 Tahi Street. The management controls set out in this SMP for FCC East are appropriate for the road reserve on the east of Tahi Street and the section of the road reserve on the west of Tahi Street from the boundary of 18 Tahi Street to a point 75 metres north. All construction and maintenance workers shall take suitable precautions including the use of full PPE at all times.

Extra precautions should be taken in the area beneath the watermain along the Tahi Street road reserve adjacent to the southern part of the FCC West site. There is the potential to encounter contamination beneath this section of Tahi Street at concentrations higher than elsewhere on the site. A testing regime should be undertaken in this area prior to the excavation of soils to assess risks to maintenance workers and to determine disposal options for surplus soil.

The Tahi Street sealed roadway has not been sampled or remediated. A testing regime should be undertaken in this area prior to the excavation of soils to assess risks to maintenance workers and to determine disposal options for surplus soil.

Specific control methods and health and safety measures for any trenching or roadworks where the underlying soil in the roadway area is disturbed shall be developed by the TDC Property Manager and submitted for approval by the TDC Environment & Planning Manager.

6.3.3 GROUNDWATER CUT-OFF WALL

A groundwater cut-off wall has been constructed between the FCC West and FCC Landfill areas. The wall has been constructed beneath the ground surface, is made of impermeable clay and forms a barrier preventing groundwater movement between these areas. Excavations through this area which may compromise its integrity should not be undertaken. If excavations in this area cannot be avoided, authorisation to proceed should be gained from the TDC Environment & Planning Manager and the cut-off wall should be reinstated and checked by a qualified engineer.

6.4 Sediment and Erosion Control

Sediment and erosion control measures should be established for the duration of ground-breaking activities. Sediment and erosion control will need to be included in the EMP. Proposed sediment and erosion control measures must be submitted to the TDC Environment & Planning Manager for approval before any works commence. All control measures should be viewed on site by the TDC Environment & Planning Manager or designate during site works to ensure the controls are implemented.

To reduce the potential for sediment discharges off-site, sediment and erosion control measures should include, but are not be limited to:

- staging the construction works to avoid creating large areas of exposed ground at any one time, and allowing progressive stabilisation and reinstatement of previously worked areas;
- installation of all sediment and erosion control measures prior to ground-breaking activities commencing;
- limiting earthworks and any vegetation clearance to the footprint of any proposed development to minimise the disturbed area;
- the sediment and erosion control section of the TDC publication Engineering Standards & Policies 2004 should be referred to for more detail;
- removal of excess or unsuitable excavated materials from site as soon as possible. Where stockpiling is necessary, locate stockpiles away from stormwater drains and water bodies;
- ensure stockpiles are protected by additional sediment and erosion control measures;
- utilising a range of sediment and erosion control measures on and around exposed areas including silt fences, run-off diversion channels draining to on-site sediment ponds, bunding, the creation of stabilised site entrances, stormwater drain and foreshore protection, etc;

- diverting clean run-off away from the exposed areas via bunding and cut-off drains;

- installing sediment and erosion control measures for the duration of the works or until an area can be stabilised/reinstated; and

- regularly inspecting, monitoring, maintaining and repairing all sediment and erosion control measures.

6.5 Dust Control

During any excavation which exposes soil beneath the 500mm capping layer, mitigation measures shall be employed to avoid generation of dust.

Dust control measures will need to be included in the EMP and submitted to the TDC Environment & Planning Manager for approval before any works commence.

To reduce the potential for dust to be generated during site works, the control measures could include but not be limited to:

- excavated or exposed soils should be kept damp to prevent the generation of dust;

- use of water sprays to dampen down work areas, but not so much as to generate run-off;

- excessive dust generated during earthworks may be controlled through the use of wind screens, ceasing the operation until better control can be achieved, or by covering the material;

- areas of the site that are not worked for long periods of time should be covered or stabilised to prevent excessive dust generation; and

- measurement and monitoring of dust generation, and analysis of contaminants contained in dust, may need to be carried out as required by any consent conditions.

6.6 Groundwater Diversion, Disposal and Abstraction

Groundwater may be encountered below the site at depths of between 0.9m and 2.5m below ground level. Any development should be designed to avoid the removal of groundwater wherever possible, however, if interaction with groundwater cannot be avoided, works may require groundwater to be diverted and/or pumped out of excavations for disposal. The groundwater is likely to contain both suspended and dissolved contaminants and shall not be discharged to stormwater drains which discharge into the marine environment.

Groundwater control measures will need to be included in the EMP and submitted to the TDC Environment & Planning Manager for approval before any works commence. The TDC Resource Management Plan (Section 31.1.2) indicates that a resource consent will be required to abstract groundwater on the sites if the amount is more than $5m^3$ per property per day. Diversion or disposal of drainage water is controlled by Section 36.4.2. Diversion or disposal would be a controlled activity according to Section 36.4.3A and will therefore require consent.

Any removal and disposal of groundwater shall be undertaken to avoid adverse impacts to environmental receptors.

The EMP should include the following data regarding groundwater removal and disposal methods:

- anticipated water quality at the time of the request given by recent test data;
- water volumes involved and the duration of the activity;
- proposed disposal methods; and
- groundwater treatment methods, if any, prior to disposal.

Sediment-laden groundwater flows must be controlled and diverted, for example, to settlement ponds on site prior to disposal or via soakaway, or disposed of at appropriate facilities able to accept sediment-laden water. The soil from surface to 500mm depth that remains on site must not be contaminated by sediment-laden water.

Groundwater beneath the site is not suitable for abstraction for potable use, use in stock watering or irrigation.

6.7 Phytotoxic Effects

Phytotoxic chemicals (ammonia or copper) may be present within the plant root zone. Any plants affected could be replaced, or soil in the root zone could be replaced with topsoil (cleanfill).

6.8 Health and Safety for Construction and Maintenance Workers

The soil and groundwater present little risk to site occupants or workers, including excavation workers.

Construction and maintenance workers should minimise exposure to contaminated soil as a matter of good practice with the use of appropriate PPE and personal hygiene practices (washing hands and face before eating, drinking or smoking).

6.8.1 AMMONIA GAS

Although soil testing in 2010 showed very low concentrations of ammonia gas, if the odour of ammonia is detected during any earthworks, appropriate testing should be carried out, and measures undertaken to manage this risk. The measures should adhere to the guidelines given in the Department of Labour, Occupational Safety & Health Service's booklet "Safe Working in a Confined Space".

The risk from ammonia gas on future site users due to migration into buildings should be investigated on a case by case basis. Mitigation measures such as vapour barriers may be required.

6.9 Additional Provisions for the Creek Adjacent to the North-West Boundary of FCC Landfill

The Property Manager is to liaise with the TDC Utilities Asset Manager to ensure the protection of the stream banks and beds of the creek.

The creek banks are to be maintained to avoid erosion by stormwater flows (including increased stormwater flows as a result of upstream modifications to the stormwater network), by maintaining vegetation, rock protection and the like.

Maintenance of the creek so that it fulfils its function as a stormwater drain, such as removal of excessive vegetation, maintaining its flow area by the removal of deposited sediment or increasing its flow area, shall be carried out in accordance with this management plan with the following additional provisions:

- no in-stream works may be carried out without submitting a method statement to, and gaining the approval of, the TDC Environment & Planning Manager; and

- The method statement shall be guided by testing of the banks and bed of the creek over the length of creek where work is to be carried out.

In the event that the material to be disturbed has contaminant concentrations in excess of the marine sediment SACs, methods shall be proposed to avoid transport of sediment to the estuary. Methods that could be considered include diversion of the stream around the works and silt traps and fences. All proposed methods must be submitted to the TDC Environment & Planning Manager for approval before any works commence.

7 References

1) ANZECC, 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Environment and Conservation Council.

2) Department of Labour, OSH, 1994. Health and Safety Guidelines on the Clean Up of Contaminated Sites. Department of Labour and the Occupational Health & Safety Service.

3) Egis, 2001. Risk-Based Acceptance Criteria for FCC Mapua.

4) MfE, 1993. Draft Health and Environmental Guidelines for Selected Timber Treatment Chemicals. Ministry for the Environment.

5) MfE, 1997. Health and Environmental Guidelines for Selected Timber Treatment Chemicals. Ministry for the Environment.

6) MfE, 1999. Guidelines for Assessing and Managing Petroleum Hydrocarbon-Contaminated Sites in New Zealand. Ministry for the Environment.

7) MfE, 2001. Contaminated Land Management Guidelines No. 1 – Reporting on Contaminated Sites in New Zealand. Ministry for the Environment.

8) MfE, 2003. Contaminated Land Management Guidelines No. 2 – Hierarchy and Application in New Zealand of Environmental Guideline Values. Ministry for the Environment.

9) NEPC, 1999. National Environmental Protection Measure (Assessment of Site Contamination): Guideline on the Investigation Levels for Soil and Groundwater. National Environmental Protection Council.

10) NSW Department of Environment & Conservation, 2006. Contaminated Sites: Guidelines for the NSW Site Auditor Scheme, Second Edition, April 2006.

11) PDP, 2009. Audit of the Remediation of the Former Fruitgrowers Chemical Company Site, Mapua.

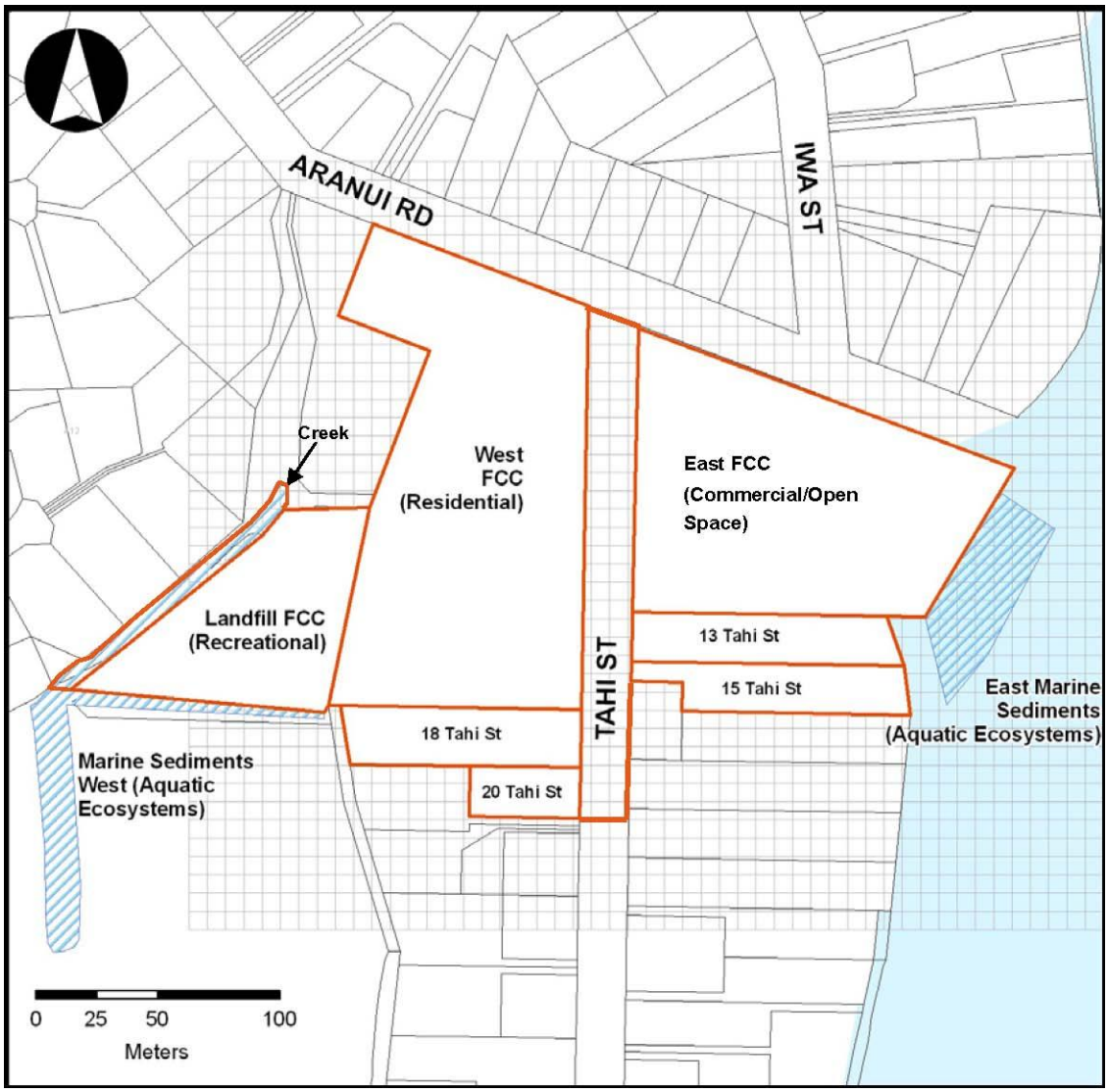
12) SKM, 2008. Site Validation Report for the Former Fruitgrowers Chemical Company, Mapua. Sinclair Knight Merz.

13) RIVM, 2001. Technical Evaluation of the Intervention Values for Soil/Sediment and Groundwater.

14) Theiss, 2004. Remedial Action Plan, Former Fruitgrowers Chemical Company Site, Mapua.

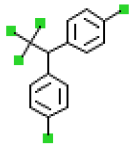
15) URS,2010. Former Fruitgrowers Chemical Company Site (FCC) Mapua – Ammonia Gas Survey Investigation. February and April 2010.

Appendix A: Site Location Plan



COMPOUND SUMMARY > LCSS

Clofenotane

PubChem CID	3036
Structure	 2D
Synonyms	Clofenotane p,p'-DDT Chlorophenothane 50-29-3 dichlorodiphenyltrichloroethane
Molecular Formula	$C_{14}H_9Cl_5$
Molecular Weight	354.5 g/mol *Computed by PubChem 2.1 (PubChem release 2021.05.07)*

Contents

1 GHS Classification

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Pictogram(s)	 Acute Toxic Health Hazard Environmental Hazard
Signal	Danger
GHS Hazard Statements	H301: Toxic if swallowed [**Danger** Acute toxicity, oral] H351: Suspected of causing cancer [**Warning** Carcinogenicity] H372 **: Causes damage to organs through prolonged or repeated exposure [**Danger** Specific target organ toxicity, repeated exposure] H400: Very toxic to aquatic life [**Warning** Hazardous to the aquatic environment, acute hazard] H410: Very toxic to aquatic life with long lasting effects [**Warning** Hazardous to the aquatic environment, long-term hazard]
Precautionary Statement Codes	P203, P260, P264, P270, P273, P280, P301+P316, P318, P319, P321, P330, P391, P405, and P501 (The corresponding statement to each P-code can be found at the GHS Classification page.)

▸ EU REGULATION (EC) No 1272/2008

2 Identifiers

2.1 CAS

50-29-3

▸ CAMEO Chemicals; CAS Common Chemistry; ChemIDplus; DrugBank; DTP/NCI; EPA Chemicals un...

2.2 InChI

InChI=1S/C14H9Cl5/c15-11-5-1-9(2-6-11)13(14(17,18)19)10-3-7-12(16)8-4-10/h1-8,13H

Computed by InChI 1.0.6 (PubChem release 2021.05.07)

▸ PubChem

2.3 InChIKey

YVGGHNCTFXOJCH-UHFFFAOYSA-N

Computed by InChI 1.0.6 (PubChem release 2021.05.07)

▸ PubChem

3 Physical Properties

3.1 Physical Description

Odorless colorless solid. Sinks in water. (USCG, 1999)

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

▸ CAMEO Chemicals

Colorless crystals or off-white powder with a slight, aromatic odor. [pesticide]; [NIOSH]

▸ Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

View More...

3.2 Odor

Odorless or with slight aromatic odor

Lewis, R.J., Sr (Ed.). Hawley's Condensed Chemical Dictionary. 13th ed. New York, NY: John Wiley & Sons, Inc. 1997., p. 333

▸ Hazardous Substances Data Bank (HSDB)

It possesses fruit-like odor

International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 592

▸ Hazardous Substances Data Bank (HSDB)

... Slight, aromatic odor.

NIOSH. NIOSH Pocket Guide to Chemical Hazards & Other Databases CD-ROM. Department of Health & Human Services, Centers for Disease Prevention & Control. National Institute for Occupational Safety & Health. DHHS (NIOSH) Publication No. 2005-151 (2005)

▸ Hazardous Substances Data Bank (HSDB)

3.3 Boiling Point

500 °F at 760 mmHg (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

▸ CAMEO Chemicals

260 °C; 186 °C at 0.05 mm Hg

Lide, D.R. CRC Handbook of Chemistry and Physics 88TH Edition 2007-2008. CRC Press, Taylor & Francis, Boca Raton, FL 2007, p. 3-492

▸ Hazardous Substances Data Bank (HSDB)

View More...

3.4 Melting Point

227 to 228 °F (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

▸ CAMEO Chemicals

108.5 °C

Lide, D.R. CRC Handbook of Chemistry and Physics 88TH Edition 2007-2008. CRC Press, Taylor & Francis, Boca Raton, FL 2007, p. 3-492

▸ Hazardous Substances Data Bank (HSDB)

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3.5 Flash Point

324 to 340 °F (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North

Carolina.

▸ CAMEO Chemicals

162-171 °F (closed cup)

U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.

▸ Hazardous Substances Data Bank (HSDB)

View More...

3.6 Solubility

less than 1 mg/mL at 70 °F (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

▸ CAMEO Chemicals

Soluble in acetone, ether, benzene, carbon tetrachloride, kerosene, dioxane, and pyridine.

Lewis, R.J. Sr.; Hawley's Condensed Chemical Dictionary 15th Edition. John Wiley & Sons, Inc. New York, NY 2007., p. 370

▸ Hazardous Substances Data Bank (HSDB)

View More...

3.7 Density

1.56 at 59 °F (USCG, 1999) - Denser than water; will sink

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

▸ CAMEO Chemicals

0.98 to 0.99

Bingham, E.; Cohrssen, B.; Powell, C.H.; Patty's Toxicology Volumes 1-9 5th ed. John Wiley & Sons. New York, N.Y. (2001)., p. V5:626

▸ Hazardous Substances Data Bank (HSDB)

View More...

3.8 Vapor Pressure

1.5e-07 mmHg at 68 °F (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

▸ CAMEO Chemicals

0.00000016 [mmHg]

▸ Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

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3.9 Decomposition

Decomp at 110 °C; dehydrochlorinates in alkali or org bases when in org solvents

Sunshine, I. (ed.). CRC Handbook of Analytical Toxicology. Cleveland: The Chemical Rubber Co., 1969., p. 507

▸ Hazardous Substances Data Bank (HSDB)

When heated to decomposition it emits toxic fumes of /chlorides/.

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 1068

▸ Hazardous Substances Data Bank (HSDB)

3.10 Corrosivity

Should not be kept in iron containers

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 480

▸ Hazardous Substances Data Bank (HSDB)

3.11 Odor Threshold

Detection threshold in water: 0.35 ppm

Fazzalari, F.A. (ed.). Compilation of Odor and Taste Threshold Values Data. ASTM Data Series DS 48A (Committee E-18). Philadelphia, PA: American Society for Testing and Materials, 1978., p. 43

▸ Hazardous Substances Data Bank (HSDB)

Odor high 5.0725 mg/cu m; odor low 5.0725 mg/cu m.

Ruth JH; Am Ind Hyg Assoc J 47: A-142-51 (1986)

Hazardous Substances Data Bank (HSDB)

4 Toxicity Information

4.1 Toxicity Summary

DDT toxicity occurs via at least four mechanisms, possibly all functioning simultaneously. DDT reduces **potassium** transport across the membrane. DDT inhibits the inactivation of voltaged-gated **sodium** channels. The channels activate (open) normally but are inactivated (closed) slowly, thus interfering with the active transport of **sodium** out of the nerve axon during repolarization and resulting in a state of hyperexcitability. DDT inhibits neuronal **adenosine** triphosphatases (ATPases), particularly Na+K+-ATPase, and Ca2+-ATPase which play vital roles in neuronal repolarization. DDT also inhibits the ability of calmodulin, a **calcium** mediator in nerves, to transport **calcium** ions that are essential for the release of neurotransmitters. All these inhibited functions reduce the rate of depolarization and increase the sensitivity of neurons to small stimuli that would not elicit a response in a fully depolarized neuron. DDT is also believed to adversely affect the reproductive system by mimicking endogenous hormones and binding to the estrogen and adrogen receptors. (T10, L85)

Toxin and Toxin Target Database (T3DB)

4.2 Non-Human Toxicity Values

LD50 Female rat percutaneous 2510 mg/kg

Worthing, C.R. and S.B. Walker (eds.). The Pesticide Manual - A World Compendium. 8th ed. Thornton Heath, UK: The British Crop Protection Council, 1987., p. 231

Hazardous Substances Data Bank (HSDB)

LD50 Mouse oral 150-300 mg/kg

Hartley, D. and H. Kidd (eds.). The Agrochemicals Handbook. 2nd ed. Lechworth, Herts, England: The Royal Society of Chemistry, 1987., p. A118/Aug 87

Hazardous Substances Data Bank (HSDB)

LD50 Dog oral 500-750 mg/kg

Hartley, D. and H. Kidd (eds.). The Agrochemicals Handbook. 2nd ed. Lechworth, Herts, England: The Royal Society of Chemistry, 1987., p. A118/Aug 87

Hazardous Substances Data Bank (HSDB)

LD50 Sheep oral >1000 mg/kg

Hartley, D. and H. Kidd (eds.). The Agrochemicals Handbook. 2nd ed. Lechworth, Herts, England: The Royal Society of Chemistry, 1987., p. A118/Aug 87

- Hazardous Substances Data Bank (HSDB)

For more Non-Human Toxicity Values (Complete) data for DDT (27 total), please visit the HSDB record page.

- Hazardous Substances Data Bank (HSDB)

5 Exposure Limits

5.1 Immediately Dangerous to Life or Health (IDLH)

500 mg/m3 ; A potential occupational carcinogen. (NIOSH, 2023)

- CAMEO Chemicals

500.0 [mg/m3]

Excerpts from Documentation for IDLHs: Human data: Exposure of volunteers to 423 mg/m3 for periods of 1 hour/day for 6 days has been reported to only cause eye irritation [Neal et al. 1994]. It has been reported that 500 mg/kg is the lethal oral dose [Windholz 1983]. [Note: An oral dose of 500 mg/kg is equivalent to a 70kg worker being exposed to about 23,000 mg/m3 for 30 minutes, assuming a breathing rate of 50 liters per minute and 100% absorption.]

- Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

NIOSH considers DDT to be a potential occupational carcinogen.

NIOSH. NIOSH Pocket Guide to Chemical Hazards & Other Databases CD-ROM. Department of Health & Human Services, Centers for Disease Prevention & Control. National Institute for Occupational Safety & Health. DHHS (NIOSH) Publication No. 2005-151 (2005)

- Hazardous Substances Data Bank (HSDB)

5.2 Permissible Exposure Limit (PEL)

1.0 [mg/m3]

- Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

5.3 Threshold Limit Values (TLV)

1.0 [mg/m3]

- Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

8 hr Time Weighted Avg (TWA): 1 mg/cu m.

American Conference of Governmental Industrial Hygienists. Threshold Limit Values of Chemical Substances and Biological Exposure Indices, ACGIH, Cincinnati, OH 2009, p. 23

▸ Hazardous Substances Data Bank (HSDB)

View More...

5.4 Effects of Short Term Exposure

May cause mechanical irritation. The substance may cause effects on the central nervous system. This may result in convulsions and respiratory depression. Exposure at high levels could cause death. Medical observation is indicated.

▸ ILO-WHO International Chemical Safety Cards (ICSCs)

5.5 Effects of Long Term Exposure

The substance may have effects on the central nervous system and liver. This substance is possibly carcinogenic to humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

▸ ILO-WHO International Chemical Safety Cards (ICSCs)

5.6 Explosive Limits and Potential

Contact with strong oxidizers may cause fire and explosion hazard.

Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens, 2002. 4th ed.Vol 1 A-H Norwich, NY: Noyes Publications, 2002., p. 747

▸ Hazardous Substances Data Bank (HSDB)

5.7 Acceptable Daily Intakes

Conditional acceptable daily intake: 0.005 mg/kg/day

WHO; Environ Health Criteria: DDT p.21 (1979)

▸ Hazardous Substances Data Bank (HSDB)

6 Health and Symptoms

6.1 Chemical Dangers

On combustion, forms toxic and corrosive fumes including **hydrogen chloride**. Reacts with **aluminium** and **iron**.

- ILO-WHO International Chemical Safety Cards (ICSCs)

6.2 Symptoms

Acute signs of DDT poisoning include paresthesia after oral ingestion. Studies have shown that a mammal poisoned with DDT-type agents displays periodic persistent tremoring and/or convulsive seizures that are suggestive of repetitive discharges in neurons. These repetitive tremors and seizures can be initiated by tactile and auditory stimuli. (T10)

- Toxin and Toxin Target Database (T3DB)

6.3 Inhalation Symptoms

Cough.

- ILO-WHO International Chemical Safety Cards (ICSCs)

6.4 Eye Symptoms

Redness.

- ILO-WHO International Chemical Safety Cards (ICSCs)

6.5 Ingestion Symptoms

Tremor. Diarrhoea. Dizziness. Headache. Vomiting. Numbness. Tingling sensation. Hyperexcitability. Convulsions.

- ILO-WHO International Chemical Safety Cards (ICSCs)

6.6 Evidence for Carcinogenicity

Evaluation: There is inadequate evidence in humans for the carcinogenicity of DDT. There is sufficient evidence in experimental animals for the carcinogenicity of DDT. Overall evaluation: DDT is possibly carcinogenic to humans (2B).

*IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans. Geneva: World Health Organization, International Agency for Research on Cancer, 1972-PRESENT. (Multivolume work). Available at: **https://monographs.iarc.fr/ENG/Classification/index.php**, p. 53 234 (1991)*

- Hazardous Substances Data Bank (HSDB)

DDT: reasonably anticipated to be a human carcinogen.

DHHS/National Toxicology Program; Eleventh Report on Carcinogens: DDT (50-29-3) (January 2005). Available from, as of July 31, 2009: ***https://ntp.niehs.nih.gov/ntp/roc/eleventh/profiles/s064ddt.pdf***

▸ Hazardous Substances Data Bank (HSDB)

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6.7 Carcinogen Classification

1 of 2	
IARC Carcinogenic Agent	DDT
IARC Carcinogenic Classes	Group 2A: Probably carcinogenic to humans
IARC Monographs	Volume Sup 7: Overall Evaluations of Carcinogenicity: An Updating of IARC Monographs Volumes 1 to 42, 1987; 440 pages; ISBN 92-832-1411-0 (out of print) Volume 53: (1991) Occupational Exposures in Insecticide Application, and Some Pesticides Volume 113: (2018) DDT, Lindane, and 2,4-D

▸ International Agency for Research on Cancer (IARC)

2 of 2	
Carcinogen Classification	DDT is possibly carcinogenic to humans (Group 2B). (L2151)

▸ Toxin and Toxin Target Database (T3DB)

6.8 Exposure Routes

The substance can be absorbed into the body by ingestion.

▸ ILO-WHO International Chemical Safety Cards (ICSCs)

Oral (L85)

▸ Toxin and Toxin Target Database (T3DB)

6.9 Fire Hazards

Special Hazards of Combustion Products: Toxic and irritating gases may be generated

Behavior in Fire: Melts and burns (USCG, 1999)

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

▸ **CAMEO Chemicals**

Combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.

▸ **ILO-WHO International Chemical Safety Cards (ICSCs)**

6.10 Hazards Summary

Still used in some parts of the world, DDT persists in the environment and in animal tissues. It has been especially harmful to predator species of birds. High-dose animal studies show that organochlorine insecticides are toxic to the liver. [LaDou, p. 553] Allergic contact dermatitis reported in farmworkers; [Kanerva, p. 1777] Despite the billions of pounds of DDT that have been manufactured and used, hepatic injury acquired as the result of occupational or environmental exposure to it remains to be reported. [Zimmerman, p. 413]

LaDou - LaDou J, Harrison R (eds). Current Occupational & Environmental Medicine, 5th Ed. New York: McGraw-Hill, 2014., p. 553

Kanerva - Rustemeyer L, Elsner P, John SM, Maibach HI (eds). Kanerva's Occupational Dermatology, 2nd Ed. Berlin: Springer-Verlag, 2012., p. 1777

Zimmerman - Zimmerman HJ. Hepatotoxicity. Philadelphia: Lippincott Williams & Wilkins, 1999., p. 413

▸ **Haz-Map, Information on Hazardous Chemicals and Occupational Diseases**

The major hazards encountered in the use and handling of DDT stem from its toxicologic properties as an organochlorine pesticide. While DDT may exert toxic effects from all routes of exposure, acute effects from ingestion are the most dramatic and frequently experienced, ranging from vomiting and diarrhea to coarse tremors, convulsions, and death. Effects from dermal contact (eg, dermatitis) and inhalation (eg, irritation of the nose and throat) have been noted, but are rare. To protect against its toxic effects in areas where there may be detectable amounts of DDT (eg, formulation and application activities) workers should wear protective clothing (including **neoprene** gloves and apron), and a self-contained or supplied-air respirator with a full facepiece and operated in positive-pressure mode. While OSHA established a PEL of only 1 mg/cu m as an 8 hr TWA in workplace air, it is still recommended that strict adherence to personal hygiene be maintained, including the daily cleaning of protective equipment and clothing, and washing of exposed skin with soap and **water** before eating and at the end of the work day. DDT will not ignite easily (flashpoint 162-171 °F closed cup), but it will burn with the potential of giving off irritating or poisonous gases. For small fires involving DDT, extinguish with dry chemical, CO2, **water** spray, or foam, and for large fires, use **water** spray, fog, or foam. Runoff from fire control **water** may give off poisonous gases or cause **water** pollution and should therefore, be controlled (eg, diked for later disposal). DDT may be stored in bottles, tins, bags, or fiber drums, but not in **iron** drums. DDT is reactive with

iron and aluminum salts, as well as alkaline substances. Shipping containers should bear the label, "Keep Away From Food". Spills of DDT should be quickly contained. Small spills (liquid DDT first absorbed by non-combustible material, eg, sand) are carefully shovelled into a container for later disposal. Large land spills are diked or deposited in excavated pits, ponds, or other holding areas (dry spills are covered with plastic sheet) for later disposal. Large spills on water first may need to be trapped at the bottom with sand bag barriers or treated by an application of activated charcoal, then removed by suction hose or mechanical dredge. Before permanent land disposal of DDT, consult with environmental regulatory agencies. In addition to land disposal, a variety of incineration techniques have been successful in destroying DDT with over a 99% efficiency.

▸ Hazardous Substances Data Bank (HSDB)

6.11 Fire Potential

Behavior in fire: Melts and burns.

U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.

▸ Hazardous Substances Data Bank (HSDB)

Material itself does not burn or burns with difficulty /Organochlorine pesticides, solid, toxic/.

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 672

▸ Hazardous Substances Data Bank (HSDB)

Contact with strong oxidizers may cause fire and explosion hazard.

Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens, 2002. 4th ed.Vol 1 A-H Norwich, NY: Noyes Publications, 2002., p. 747

▸ Hazardous Substances Data Bank (HSDB)

6.12 Skin, Eye, and Respiratory Irritations

Irritating to skin and eyes.

U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.

▸ Hazardous Substances Data Bank (HSDB)

... Eye irritation in human volunteers ... .

American Conference of Governmental Industrial Hygienists, Inc. Documentation of the Threshold Limit Values and Biological Exposure Indices. 6th ed. Volumes I, II, III. Cincinnati, OH: ACGIH, 1991., p. 380

▸ Hazardous Substances Data Bank (HSDB)

7 First Aid

EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment.

INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing.

INGESTION: If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Generally, the induction of vomiting is NOT recommended outside of a physician's care due to the risk of aspirating the chemical into the victim's lungs. However, if the victim is conscious and not convulsing and if medical help is not readily available, consider the risk of inducing vomiting because of the high toxicity of the chemical ingested. Ipecac syrup or salt water may be used in such an emergency. IMMEDIATELY transport the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.

OTHER: Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure. (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

▸ CAMEO Chemicals

7.1 Inhalation First Aid

Fresh air, rest.

- ILO-WHO International Chemical Safety Cards (ICSCs)

7.2 Skin First Aid

Remove contaminated clothes. Rinse and then wash skin with **water** and soap.

- ILO-WHO International Chemical Safety Cards (ICSCs)

7.3 Eye First Aid

First rinse with plenty of **water** for several minutes (remove contact lenses if easily possible), then refer for medical attention.

- ILO-WHO International Chemical Safety Cards (ICSCs)

7.4 Ingestion First Aid

Rinse mouth. Give a slurry of activated **charcoal** in **water** to drink. Rest. Refer for medical attention .

- ILO-WHO International Chemical Safety Cards (ICSCs)

8 Stability and Reactivity

8.1 Reactivity Profile

DDT may react with **iron**, **aluminum**, **aluminum** and **iron** salts, and alkalis. It is incompatible with **ferric chloride** and **aluminum chloride**. It can also react with strong oxidizing materials. (NTP, 1992).

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

- CAMEO Chemicals

9 Storage and Handling

9.1 Safe Storage

Provision to contain effluent from fire extinguishing. Separated from **iron**, aluminium, aluminium salts and food and feedstuffs. See Chemical Dangers.

▸ **ILO-WHO International Chemical Safety Cards (ICSCs)**

9.2 Storage Conditions

... Should not be kept in **iron** containers and should not be mixed with **iron** and **aluminum** salts nor with alkaline substances. High storage temperatures should also be avoided.

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 480

▸ **Hazardous Substances Data Bank (HSDB)**

PRECAUTIONS FOR "CARCINOGENS": Storage site should be as close as practicable to lab in which carcinogens are to be used, so that only small quantities required for ... expt need to be carried. Carcinogens should be kept in only one section of cupboard, an explosion-proof refrigerator or freezer (depending on chemicophysical properties ...) that bears appropriate label. An inventory ... should be kept, showing quantity of carcinogen & date it was acquired ... Facilities for dispensing ... should be contiguous to storage area. /Chemical Carcinogens/

Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory: Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 13

▸ **Hazardous Substances Data Bank (HSDB)**

9.3 Personal Protective Equipment (PPE)

Excerpt from NIOSH Pocket Guide for DDT:

Skin: PREVENT SKIN CONTACT - Wear appropriate personal protective clothing to prevent skin contact.

Eyes: PREVENT EYE CONTACT - Wear appropriate eye protection to prevent eye contact.

Wash skin:

• WHEN CONTAMINATED - The worker should immediately wash the skin when it becomes contaminated.

• DAILY - The worker should wash daily at the end of each work shift, and prior to eating, drinking, smoking, etc.

Remove: WHEN WET OR CONTAMINATED - Work clothing that becomes wet or significantly contaminated should be removed and replaced.

Change: DAILY - Workers whose clothing may have become contaminated should change into uncontaminated clothing before leaving the work premises.

Provide:

• EYEWASH - Eyewash fountains should be provided in areas where there is any possibility that workers could be exposed to the substances; this is irrespective of the recommendation involving the wearing of eye protection.

• QUICK DRENCH - Facilities for quickly drenching the body should be provided within the immediate work area for emergency use where there is a possibility of exposure. [Note: It is intended that these facilities provide a sufficient quantity or flow of water to quickly remove the substance from any body areas likely to be exposed. The actual determination of what constitutes an adequate quick drench facility depends on the specific circumstances. In certain instances, a deluge shower should be readily available, whereas in others, the availability of water from a sink or hose could be considered adequate.] (NIOSH, 2023)

▸ CAMEO Chemicals

... Wear appropriate chemical protective gloves, boots and goggles ... Wear positive pressure self-contained breathing apparatus when fighting fires involving this material. /Organochlorine pesticide, liquid, flammable, toxic; organochlorine pesticides, liquid, toxic, flammable; organochlorine pesticides, solid, toxic/

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 671

▸ Hazardous Substances Data Bank (HSDB)

View More...

9.4 Nonfire Spill Response

Excerpt from ERG Guide 151 [Substances - Toxic (Non-Combustible)]:

Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. Cover with plastic sheet to prevent spreading. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. DO NOT GET WATER INSIDE CONTAINERS. (ERG, 2020)

▸ CAMEO Chemicals

10 Cleanup and Disposal

10.1 Spillage Disposal

Personal protection: particulate filter respirator adapted to the airborne concentration of the substance. Do NOT let this chemical enter the environment. Sweep spilled substance into covered sealable, non-metallic containers. If appropriate, moisten first to prevent dusting. Carefully collect remainder. Then store and dispose of according to local regulations.

▸ ILO-WHO International Chemical Safety Cards (ICSCs)

10.2 Cleanup Methods

SRP: Wastewater from contaminant suppression, cleaning of protective clothing/equipment, or contaminated sites should be contained and evaluated for subject chemical or decomposition product concentrations. Concentrations shall be lower than applicable environmental discharge or disposal criteria. Alternatively, pretreatment and/or discharge to a POTW is acceptable only after review by the governing authority. Due consideration shall be given to remediation worker exposure (inhalation, dermal and ingestion) as well as fate during treatment, transfer and disposal. If it is not practicable to manage the chemical in this fashion, it must meet Hazardous Material Criteria for disposal.

▸ Hazardous Substances Data Bank (HSDB)

Land spill: Dig a pit, pond, lagoon, or holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash, cement powder, or commercial sorbents. /SRP: If time permits, pits, ponds, lagoons, soak holes, or holding areas should be sealed with a impermeable flexible membrane liner./

Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads, Hazardous Materials Systems (BOE), 1987., p. 215

▸ Hazardous Substances Data Bank (HSDB)

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10.3 Disposal Methods

Generators of waste (equal to or greater than 100 kg/mo) containing this contaminant, EPA hazardous waste number U061, must conform with USEPA regulations in storage, transportation, treatment and disposal of waste.

40 CFR 240-280, 300-306, 702-799 (7/1/2008)

▸ Hazardous Substances Data Bank (HSDB)

DDT is a potential candidate for incineration by rotary kiln with a temperature range of 820 to 1600 °C and residence time of seconds for liquids and gases, and hours for solids.

USEPA; Engineering Handbook for Hazardous Waste Incineration p.3-12 (1981) EPA 68-03-3025

▸ Hazardous Substances Data Bank (HSDB)

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11 Additional Considerations

11.1 Toxic Combustion Products

Poisonous gases are produced in fire.

U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.

- Hazardous Substances Data Bank (HSDB)

12 Information Sources

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1. ## CAMEO Chemicals

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https://cameochemicals.noaa.gov/help/reference/terms_and_conditions.htm?d_f=false

DDT
https://cameochemicals.noaa.gov/chemical/3067

2. ## CAS Common Chemistry

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DDT
https://commonchemistry.cas.org/detail?cas_rn=50-29-3

3. ## ChemIDplus

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https://www.drugbank.ca/legal/terms_of_use

Clofenotane
https://www.drugbank.ca/drugs/DB13424

5. DTP/NCI

Clofenotane

https://dtp.cancer.gov/dtpstandard/servlet/dwindex?searchtype=NSC&outputformat=html&searchlist=8939

6. EPA Chemicals under the TSCA

Benzene, 1,1'-(2,2,2-trichloroethylidene)bis[4-chloro-

https://www.epa.gov/chemicals-under-tsca

7. EPA DSSTox

DDT

https://comptox.epa.gov/dashboard/DTXSID4020375

8. European Chemicals Agency (ECHA)

Clofenotane

https://echa.europa.eu/substance-information/-/substanceinfo/100.000.023

Clofenotane

https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/18092

9. FDA Global Substance Registration System (GSRS)

CLOFENOTANE

https://gsrs.ncats.nih.gov/ginas/app/beta/substances/CIW5S16655

10. Hazardous Substances Data Bank (HSDB)

DDT

https://pubchem.ncbi.nlm.nih.gov/source/hsdb/200

11. Human Metabolome Database (HMDB)

Clofenotane

http://www.hmdb.ca/metabolites/HMDB0032127

12. ILO-WHO International Chemical Safety Cards (ICSCs)

DDT

https://www.ilo.org/dyn/icsc/showcard.display?p_version=2&p_card_id=0034

13. The National Institute for Occupational Safety and Health (NIOSH)

Ethane, 1,1,1-trichloro-2,2-bis(p-chlorophenyl)-

https://www.cdc.gov/niosh-rtecs/KJ32BC48.html

14. Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

DDT

https://haz-map.com/Agents/232

15. EU REGULATION (EC) No 1272/2008

DDT (ISO); clofenotane (INN); dicophane;...

https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02008R1272-20230420

16. Hazardous Chemical Information System (HCIS), Safe Work Australia

DDT (ISO)

http://hcis.safeworkaustralia.gov.au/HazardousChemical/Details?chemicalID=1151

17. NITE-CMC

1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane [DDT] - FY2016

https://www.nite.go.jp/chem/english/ghs/16-mhlw-0108e.html

D.D.T. - FY2006

https://www.nite.go.jp/chem/english/ghs/06-imcg-0848e.html

1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane (DDT) - FY2014

https://www.nite.go.jp/chem/english/ghs/14-mhlw-2179e.html

18. Toxin and Toxin Target Database (T3DB)

Clofenotane

http://www.t3db.ca/toxins/T3D0012

19. International Agency for Research on Cancer (IARC)

DDT (4,4'-dichlorodiphenyltrichloroethane)

https://monographs.iarc.who.int/list-of-classifications

20. PubChem

https://pubchem.ncbi.nlm.nih.gov

FILTEC Specialty Water Treatment Media

Filter Media

Filter Coal / Anthracite

Anthracite Filter Coal is used extensively in water filtration and in water treatment because of its excellent filtration properties.

Anthracite coal is a top quality coal that consists of hard, durable coal particles that come in various sizes. Anthracite is used along with silica sand (dual media system) or with silica sand and filter rock (mixed media system) or by itself (mono media system).

Anthracite promotes higher service flow rates and longer filter runs with less head loss than single media filter beds. Backwash rates are reduced as well. Low uniformity coefficient anthracite filter media extends the life of your filter before the media must be changed out

- Higher service flows and longer filter runs than equivalent filters
- Durable material with long life and temperature range
- Requires lower backwash rate
- Ideal for DI sub-fill requirements and hot process filtering applications
- Contains no silica

SKUs: 82-006, 82-006B, 82-006C Filter Coal options

Filter Sand

Filter sand is hard grained quartz or silica sand having no constituent and is not friable or liable to mechanical breakdown when subject to pressure.

The sand contains no carbonaceous matter, clay or silt and the loss on acid washing and ignition in each case is less than 2% by weight. Its specific gravity is not less than 2.2 or more than 2.5, and is within the size range of 0.6 mm to 2 mm.

SKU: SAND-20KG

Filter Gravel

Filter Gravel is an extremely effective filter media because of its ability to hold back precipitates containing impurities.

Filter gravel size, angularity and hardness are the important filter sand characteristics to ensure proper filtering. Specific Gravity: 2.70

SKU: GRAVEL-20

Garnet

Garnet is a high hardness, high density granular filter media. It is normally used as the lower (final) filtration in a multi-media bed down flow filtration system.

A properly designed multi-media system will maintain its unique grading of large grains on top and small grains on the bottom and provide superior performance even after many backwashings. This stable condition of large grains above finer ones is achieved by the use of materials of different sizes and specific gravities.

Garnet with its high specific gravity of 4.0 forms the lower fine grain layer, its 0.3 mm effective size can filter down to the 10-20 micron range. Filter Sand, (effective size of 0.5 mm) and Anthracite, (effective size of 0.9 mm) can form the larger, less dense layers.

- Two grades:

SKU: GARNETA = course
SKU: GARNETC = fine

Aqualite™

Aqualite™ can only be used in FILTEC designed, installed or approved systems and as per NZDWS2008 FILTEC are required to give a written guarantee on performance.

For filtration applications that demand high flow rates and increased water quality, Aqualite™ Engineered Ceramic Media delivers more performance on a smaller equipment footprint. Available in common filtration sizes, Aqualite™ media spheres optimise filtration performance with their remarkably greater surface area. Aqualite™ is tough and durable. It's a chemically inert medium that provides excellent resistance to acids, caustics, oxidants, and ferric salts.

Uniform properties of Aqualite™ include the shape, size, sphericity, density and composition of the filter granules. These qualities bring uniformity to filter bed porosity, bulk density and macroscopic behaviour.

- Ideal for use in surface water filtration and membrane pre-filtration
- Removes Cryptosporidium to 2 logs
- Aqualite™ has been tested by Massey University to meet AS/NZ4348:1995

SKU: AQUALITE

FILTEC
Making Water Safer

Adsorption Media

Activated Carbon

Activated carbon, also called activated charcoal, activated coal, carbo activatus or an "AC filter", is a form of carbon processed to have small, low-volume pores that increase the surface area available for adsorption or chemical reactions.
Due to its high degree of microporosity, just one gram of activated carbon has a surface area in excess of 500 m^2, as determined by gas adsorption. An activation level sufficient for useful application may be attained solely from high surface area; however, further chemical treatment often enhances adsorption properties.

FILTEC supplies a wide range of bulk Granular Activated Carbon (GAC) filter media to handle organics removal in industrial, municipal, remediation and other applications. We have an extensive line of granular activated-carbon filter media for both liquid phase and vapour phase adsorption applications. FILTEC can supply virgin coconut activated carbon and coal-based GAC as well as reactivated carbon for various adsorption processes.

- For standard chlorine and organic removal use SKU: AQUASORB H200

ARSENIC REMOVAL MEDIA

A proven, safe, and simple solution to arsenic removal challenges for potable use.
GFH® DRY Media is a specially designed adsorbent media based on granular ferric hydroxide. It is specifically designed for the removal of arsenic (arsenate (As+5) and arsenite (As+3)) from water and can remove other heavy metals as well. The arsenic removal requires no preconditioning or pre-oxidation. Applied in a downflow packed bed configuration, it is easily applied to municipal wellhead applications.

Features and Benefits

• ANSI / NSF 61 Certified for use in Potable Water Applications

• Consistent removal of both arsenate and arsenite forms of arsenic, even during sudden changes in influent arsenic concentration.

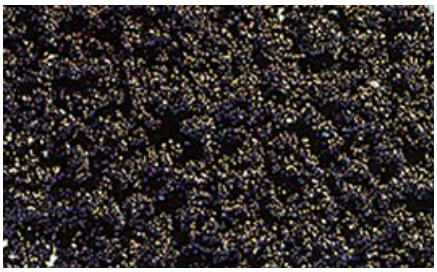
• Standard systems using GFH® DRY Media are designed for flows from 1 to 5,000 gpm and higher.

Compact designs that require minimal operator attention.

• High arsenic capacity resulting in long media bed life and reduced frequency of media exchange.

• Does not impact water pH.

In addition to arsenic, GFH DRY Media has been demonstrated to provide removal of several other contaminants, including:
• Phosphate
• Antimony
• Copper



pH Neutralising Media

Akdolit® CM G (Gran)

Granulated dolomitic material for fast neutralisation

Akdolit® CM G (Gran) is a highly reactive half-burnt dolomitic filter material with a spherical granular form, especially suitable for pneumatic conveying and silo feeding. It is used for the neutralisation of water (by filtering) in order to achieve the calco-carbonic equilibrium and to meet the requirements of the Drinking Water Ordinance. Through this calco-carbonic equilibrium process, an increase in the concentration of the calcium, magnesium and hydrogen carbonate ions is achieved, which is favourable to prevent corrosion.

SKU:AKDOLIT-25 AKDOLIT CM GRAN - 25Kg Bag

Oxidation Media

Greensand Plus™

Greensand Plus™ is a purple-gray filter media used for removing soluble iron, manganese, hydrogen sulfide, arsenic and radium from well water supplies.

The substrate media has a manganese dioxide coated surface that acts as a catalyst in the oxidation- reduction reaction of iron and manganese. The difference between Greensand Plus™ and manganese greensand is in the substrate that forms the core of the media and the method by which the manganese dioxide coating is attached to that substrate. Greensand Plus™ has a silica sand core and the coating is fused to it while manganese greensand has a glauconite core and the coating is ionically bound to it.

The silica sand core of Greensand Plus™ allows it to better withstand operating conditions in waters that are low in silica, TDS and hardness. Thus, if you currently are using manganese greensand and are feeding sodium aluminate, you will likely be able to eliminate the aluminate feed by switching to Greensand Plus™.

Also, Greensand Plus™ can withstand higher operating temperatures and higher differential pressures than can manganese greensand. The higher differential pressure may allow for a longer run length, but, if nothing else, allows for more operational margin of error.

- Greensand Plus™ uses chlorine to regenerate – removing the need to use potassium permanganate

SKU: GREENSAND

Ion Exchange Media

Softener Resin

SKU: CAT100E – **for Standard Domestic and Commercial use**.
SKU: HPR1200H – **for scale (Calcium) removal as well as iron and manganese**

A water softener is packed with resin beads. Hard water with calcium and magnesium flows through this resin and, in a process called ion exchange, the hardness ions in the water trade places with soft ions on the resin beads. The result is soft water.
Over time, the resin beads in the water softener will become covered with calcium and magnesium ions, diminishing their capacity to soften hard water. Through a process called regeneration, water is automatically flushed through the water softener with a concentrated amount of regenerant. Now the resin beads pick up the soft ions from the regenerant in exchange for the hardness on the beads.

Colour Change Resin Beads

SKU: MB-6113 AmberLite H/OH Ion Exchange Resin
SKU: AP12DI-RFL Deionising Refill Pack

This mixed bed (cation and anion) moist spherical bead deionisation resin is ideal for small cartridge deionisation systems where ultra-pure water is required (medical, dental, aquarium, etc.) with LOW flow rates.

- Colour change resin beads throughout the media give visual indication as the media becomes exhausted (from blue-green to amber-yellow)
- Laboratories and low water use applications (<5 L/min)
- Corrosive test chambers
- Dentistry, Laboratories

Deionising Resin (Ion/Cation)

SKU: 4200CL AmberLite HPR4200CL Anion Resin
SKU: 1000H AmberLite HPR1200H Cation Resin

Used in High Quality Water Systems to provide less than 2 micro siemens conductivity water for boilers, membrane rinsing, after Reverse Osmosis Systems (ROs), steaming, etc.

Non-colour Change Resin

SKU: MB20 AmberLite H/OH Ion Exchange Resin

This mixed bed (cation and anion) moist spherical bead deionisation resin is ideal for ultra-pure water applications (medical, dental, aquarium, etc.) with HIGH flow rate.

Used in Reverse Osmosis Polishers (as used by Auckland University), or for making up Deionised Water for power stations, etc.

- This is a more cost effective resin, used in applications with higher water flows up to 75 L/min
- Media is replacement only and not regenerated

Note: FILTEC does not warranty the effectiveness or water quality resulting from equipment using the media in this brochure. The media is supplied to specification only.

Safety data sheet

according to 1907/2006/EC, Article 31 Commission regulation (EU) 2020/878

Printing date 22.12.2022 *Version number 4.0 (replaces version 3.0)* *Revision: 01.12.2022*

SECTION 1: Identification of the substance/mixture and of the company/undertaking

· ***1.1 Product identifier***

· ***Trade name:*** 4,4'-DDT

· ***Article number:*** NS21210100
· ***CAS Number:***
50-29-3
· ***EC number:***
200-024-3
· ***Index number:***
602-045-00-7
· ***Registration number***
A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
· ***1.2 Relevant identified uses of the substance or mixture and uses advised against***
No further relevant information available.
· ***Application of the substance / the preparation:*** Laboratory reagent

· ***1.3 Details of the supplier of the safety data sheet***
· ***Manufacturer/Supplier:***
Scharlab, S.L.
C/Gato Pérez, 33. Pol.Ind. Mas d'en Cisa
08181 Sentmenat (Barcelona) SPAIN
Tel: (+34) 93 745 64 00 - FAX: (+34) 93 715 27 65
email: scharlab@scharlab.com
Internet Web Site: www.scharlab.com
· ***Regional representation:***
Scharlab, S.L.
C/Gato Pérez, 33. Pol.Ind. Mas d'en Cisa
08181 Sentmenat (Barcelona) SPAIN
Tel: (+34) 93 745 64 00 - FAX: (+34) 93 715 27 65
email: scharlab@scharlab.com
Internet Web Site: www.scharlab.com

· ***Further information obtainable from:*** technical department
· ***1.4 Emergency telephone number:***
Please contact the regional Scharlab distributor/dealer in your country
During normal opening times: Scharlab, S.L. (+34) 93 715 18 11

SECTION 2: Hazards identification

· ***2.1 Classification of the substance or mixture***
· ***Classification according to Regulation (EC) No 1272/2008***


skull and crossbones

Acute Tox. 3 H301 Toxic if swallowed.


health hazard

Carc. 2 H351 Suspected of causing cancer.
STOT RE 1 H372 Causes damage to organs through prolonged or repeated exposure.

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Safety data sheet

according to 1907/2006/EC, Article 31 Commission regulation (EU) 2020/878

Printing date 22.12.2022 *Version number 4.0 (replaces version 3.0)* *Revision: 01.12.2022*

Trade name: 4,4'-DDT

(Contd. of page 1)

environment

Aquatic Acute 1 H400 Very toxic to aquatic life.
Aquatic Chronic 1 H410 Very toxic to aquatic life with long lasting effects.

· ***2.2 Label elements***
· ***Labelling according to Regulation (EC) No 1272/2008***
The substance is classified and labelled according to the GB CLP regulation.
· ***Hazard pictograms***

GHS06 GHS08 GHS09

· ***Signal word*** Danger

· ***Hazard-determining components of labelling:***
DDT (common name not adopted by ISO)
· ***Hazard statements***
H301 Toxic if swallowed.
H351 Suspected of causing cancer.
H372 Causes damage to organs through prolonged or repeated exposure.
H410 Very toxic to aquatic life with long lasting effects.
· ***Precautionary statements***
P260 Do not breathe dust/fume/gas/mist/vapours/spray.
P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection.
P301+P310 IF SWALLOWED: Immediately call a POISON CENTER/ doctor.
P321 Specific treatment (see on this label).
P405 Store locked up.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.
· ***2.3 Other hazards***
· ***Results of PBT and vPvB assessment***
· ***PBT:*** Not applicable.
· ***vPvB:*** Not applicable.

SECTION 3: Composition/information on ingredients

· ***3.1 Substances***
· ***CAS No. Description***
50-29-3 DDT (common name not adopted by ISO)
· ***Identification number(s)***
· ***EC number:*** 200-024-3
· ***Index number:*** 602-045-00-7

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Safety data sheet
according to 1907/2006/EC, Article 31 Commission regulation (EU) 2020/878

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Trade name: 4,4'-DDT

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SECTION 4: First aid measures

· ***4.1 Description of first aid measures***
· ***General information:***
Immediately remove any clothing soiled by the product.
Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.
In case of irregular breathing or respiratory arrest provide artificial respiration.
· ***After inhalation:*** In case of unconsciousness place patient stably in side position for transportation.
· ***After skin contact:*** Immediately wash with water and soap and rinse thoroughly.
· ***After eye contact:***
Rinse opened eye for several minutes under running water. Then consult a doctor.
· ***After swallowing:*** Do not induce vomiting; call for medical help immediately.
· ***4.2 Most important symptoms and effects, both acute and delayed***
No further relevant information available.
· ***4.3 Indication of any immediate medical attention and special treatment needed***
No further relevant information available.

SECTION 5: Firefighting measures

· ***5.1 Extinguishing media***
· ***Suitable extinguishing agents:*** Use fire extinguishing methods suitable to surrounding conditions.
· ***5.2 Special hazards arising from the substance or mixture***
No further relevant information available.
· ***5.3 Advice for firefighters***
· ***Protective equipment:*** No special measures required.
· ***Additional information***
Dispose of fire debris and contaminated fire fighting water in accordance with official regulations.
Collect contaminated fire fighting water separately. It must not enter the sewage system.

SECTION 6: Accidental release measures

· ***6.1 Personal precautions, protective equipment and emergency procedures*** Not required.
· ***6.2 Environmental precautions:***
Inform respective authorities in case of seepage into water course or sewage system.
Do not allow to enter sewers/ surface or ground water.
· ***6.3 Methods and material for containment and cleaning up:***
Dispose contaminated material as waste according to item 13.
· ***6.4 Reference to other sections***
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

SECTION 7: Handling and storage

· ***7.1 Precautions for safe handling*** Prevent formation of dust.
· ***Information about fire - and explosion protection:*** No special measures required.

· ***7.2 Conditions for safe storage, including any incompatibilities***
· ***Storage:***
· ***Requirements to be met by storerooms and receptacles:*** No special requirements.
· ***Information about storage in one common storage facility:*** Not required.

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Safety data sheet

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Trade name: 4,4'-DDT

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· ***Further information about storage conditions:***
Keep container tightly sealed.
See product's label for recommended storage temperature.
· ***7.3 Specific end use(s)*** No further relevant information available.

SECTION 8: Exposure controls/personal protection

· ***8.1 Control parameters***
· ***Ingredients with limit values that require monitoring at the workplace:*** Not required.
· ***Additional information:*** The lists valid during the making were used as basis.

· ***8.2 Exposure controls***
· ***Appropriate engineering controls*** No further data; see item 7.
· ***Individual protection measures, such as personal protective equipment***
· ***General protective and hygienic measures:***
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing
Wash hands before breaks and at the end of work.
· ***Respiratory protection:***
In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use self-contained respiratory protective device.
· ***Hand protection***

Protective gloves

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture.
Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation
· ***Material of gloves***
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.
· ***Penetration time of glove material***
The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.
· ***Eye/face protection*** Not required.

SECTION 9: Physical and chemical properties

· ***9.1 Information on basic physical and chemical properties***
· ***General Information***

· ***Physical state***	Solid
· ***Colour:***	Not determined.
· ***Odour:***	Characteristic
· ***Odour threshold:***	Not determined.
· ***Melting point/freezing point:***	105-106 °C
· ***Boiling point or initial boiling point and boiling range***	185 °C
· ***Flammability***	Product is not flammable.
· ***Lower and upper explosion limit***	
· ***Lower:***	Not determined.

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Safety data sheet

according to 1907/2006/EC, Article 31 Commission regulation (EU) 2020/878

Printing date 22.12.2022 *Version number 4.0 (replaces version 3.0)* *Revision: 01.12.2022*

Trade name: 4,4'-DDT

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· **Upper:**	Not determined.
· **Flash point:**	Not applicable.
· **pH**	Not applicable.
· **Viscosity:**	
· **Kinematic viscosity**	Not applicable.
· **Dynamic:**	Not applicable.
· **Solubility**	
· **water at 20 °C:**	0.0000012 g/l
· **Partition coefficient n-octanol/water (log value)**	Not determined.
· **Vapour pressure at 20 °C:**	0.0000001 hPa
· **Density and/or relative density**	
· **Density at 20 °C:**	1.54 g/cm³
· **Relative density**	Not determined.
· **Vapour density**	Not applicable.

· **9.2 Other information**

· **Appearance:**	
· **Form:**	Solid
· **Important information on protection of health and environment, and on safety.**	
· **Auto-ignition temperature:**	Not determined.
· **Explosive properties:**	Product does not present an explosion hazard.
· **Solids content:**	100.0 %
· **Molecular weight**	354.49 g/mol
· **Change in condition**	
· **Evaporation rate**	Not applicable.

· **Information with regard to physical hazard classes**

· **Explosives**	Void
· **Flammable gases**	Void
· **Aerosols**	Void
· **Oxidising gases**	Void
· **Gases under pressure**	Void
· **Flammable liquids**	Void
· **Flammable solids**	Void
· **Self-reactive substances and mixtures**	Void
· **Pyrophoric liquids**	Void
· **Pyrophoric solids**	Void
· **Self-heating substances and mixtures**	Void
· **Substances and mixtures, which emit flammable gases in contact with water**	Void
· **Oxidising liquids**	Void
· **Oxidising solids**	Void
· **Organic peroxides**	Void
· **Corrosive to metals**	Void
· **Desensitised explosives**	Void

SECTION 10: Stability and reactivity

· **10.1 Reactivity** No further relevant information available.
· **10.2 Chemical stability**
· **Thermal decomposition / conditions to be avoided:**
No decomposition if used according to specifications.

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Safety data sheet
according to 1907/2006/EC, Article 31 Commission regulation (EU) 2020/878

Printing date 22.12.2022 *Version number 4.0 (replaces version 3.0)* *Revision: 01.12.2022*

Trade name: 4,4'-DDT

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· ***10.3 Possibility of hazardous reactions*** No dangerous reactions known.
· ***10.4 Conditions to avoid*** No further relevant information available.
· ***10.5 Incompatible materials:*** No further relevant information available.
· ***10.6 Hazardous decomposition products:*** No dangerous decomposition products known.

SECTION 11: Toxicological information

· ***11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008***
· ***Acute toxicity*** Toxic if swallowed.
· ***LD/LC50 values relevant for classification:***

50-29-3 DDT (common name not adopted by ISO)
Oral LD50 113 mg/kg (rat)
Dermal LD50 2,510 mg/kg (rat)
· ***Carcinogenicity*** Suspected of causing cancer.
· ***STOT-repeated exposure*** Causes damage to organs through prolonged or repeated exposure.
· ***11.2 Information on other hazards***
· ***Endocrine disrupting properties***

Substance is not listed.

SECTION 12: Ecological information

· ***12.1 Toxicity***
· ***Aquatic toxicity:*** No further relevant information available.
· ***12.2 Persistence and degradability*** No further relevant information available.
· ***12.3 Bioaccumulative potential*** No further relevant information available.
· ***12.4 Mobility in soil*** No further relevant information available.
· ***12.5 Results of PBT and vPvB assessment***
· ***PBT:*** Not applicable.
· ***vPvB:*** Not applicable.
· ***12.6 Endocrine disrupting properties***
The product does not contain substances with endocrine disrupting properties.
· ***12.7 Other adverse effects***
· ***Remark:*** Very toxic for fish
· ***Additional ecological information:***
· ***General notes:***
Water hazard class 3 (German Regulation) (Assessment by list): extremely hazardous for water
Do not allow product to reach ground water, water course or sewage system, even in small quantities.
Danger to drinking water if even extremely small quantities leak into the ground.
Also poisonous for fish and plankton in water bodies.
Very toxic for aquatic organisms

SECTION 13: Disposal considerations

· ***13.1 Waste treatment methods***
· ***Recommendation***
Must not be disposed together with household garbage. Do not allow product to reach sewage system.

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Safety data sheet

according to 1907/2006/EC, Article 31 Commission regulation (EU) 2020/878

Printing date 22.12.2022 *Version number 4.0 (replaces version 3.0)* *Revision: 01.12.2022*

Trade name: 4,4'-DDT

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· ***Uncleaned packaging:***
· ***Recommendation:*** Disposal must be made according to official regulations.

SECTION 14: Transport information

· ***14.1 UN number or ID number***
· ***ADR, IMDG, IATA*** UN2761
· ***14.2 UN proper shipping name***
· ***ADR*** 2761 ORGANOCHLORINE PESTICIDE, SOLID, TOXIC (DDT (common name not adopted by ISO)), ENVIRONMENTALLY HAZARDOUS
· ***IMDG, IATA*** ORGANOCHLORINE PESTICIDE, SOLID, TOXIC (DDT (common name not adopted by ISO))

· ***14.3 Transport hazard class(es)***

· ***ADR***

· ***Class*** 6.1 Toxic substances.
· ***Label*** 6.1

· ***IMDG, IATA***

· ***Class*** 6.1 Toxic substances.
· ***Label*** 6.1
· ***14.4 Packing group***
· ***ADR, IMDG, IATA*** III
· ***14.5 Environmental hazards:***
· ***Special marking (ADR):*** Symbol (fish and tree)
· ***14.6 Special precautions for user*** Warning: Toxic substances.
· ***Hazard identification number (Kemler code):*** 60
· ***EMS Number:*** 6.1-04
· ***Stowage Category*** A
· ***Stowage Code*** SW2 Clear of living quarters.
· ***14.7 Maritime transport in bulk according to IMO instruments*** Not applicable.

· ***Transport/Additional information:***

· ***ADR***
· ***Limited quantities (LQ)*** 5 kg
· ***Transport category*** 2
· ***Tunnel restriction code*** E
· ***UN "Model Regulation":*** UN 2761 ORGANOCHLORINE PESTICIDE, SOLID, TOXIC (DDT (COMMON NAME NOT ADOPTED BY ISO)), 6.1, III, ENVIRONMENTALLY HAZARDOUS

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Safety data sheet

according to 1907/2006/EC, Article 31 Commission regulation (EU) 2020/878

Printing date 22.12.2022 *Version number 4.0 (replaces version 3.0)* *Revision: 01.12.2022*

Trade name: 4,4'-DDT

(Contd. of page 7)

SECTION 15: Regulatory information

· ***15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture***

· ***Directive 2012/18/EU***
· ***Named dangerous substances - ANNEX I*** -
· ***Seveso category***
H2 ACUTE TOXIC
E1 Hazardous to the Aquatic Environment
· ***Qualifying quantity (tonnes) for the application of lower-tier requirements*** 50 t
· ***Qualifying quantity (tonnes) for the application of upper-tier requirements*** 200 t
· ***15.2 Chemical safety assessment:*** A Chemical Safety Assessment has not been carried out.

SECTION 16: Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· ***Department issuing SDS:*** product safety department
· ***Contact:*** msds@scharlab.com
· ***Abbreviations and acronyms:***
ADR: Accord relatif au transport international des marchandises dangereuses par route (European Agreement Concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
IATA: International Air Transport Association
GHS: Globally Harmonised System of Classification and Labelling of Chemicals
EINECS: European Inventory of Existing Commercial Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
PBT: Persistent, Bioaccumulative and Toxic
vPvB: very Persistent and very Bioaccumulative
Acute Tox. 3: Acute toxicity – Category 3
Carc. 2: Carcinogenicity – Category 2
STOT RE 1: Specific target organ toxicity (repeated exposure) – Category 1
Aquatic Acute 1: Hazardous to the aquatic environment - acute aquatic hazard – Category 1
Aquatic Chronic 1: Hazardous to the aquatic environment - long-term aquatic hazard – Category 1

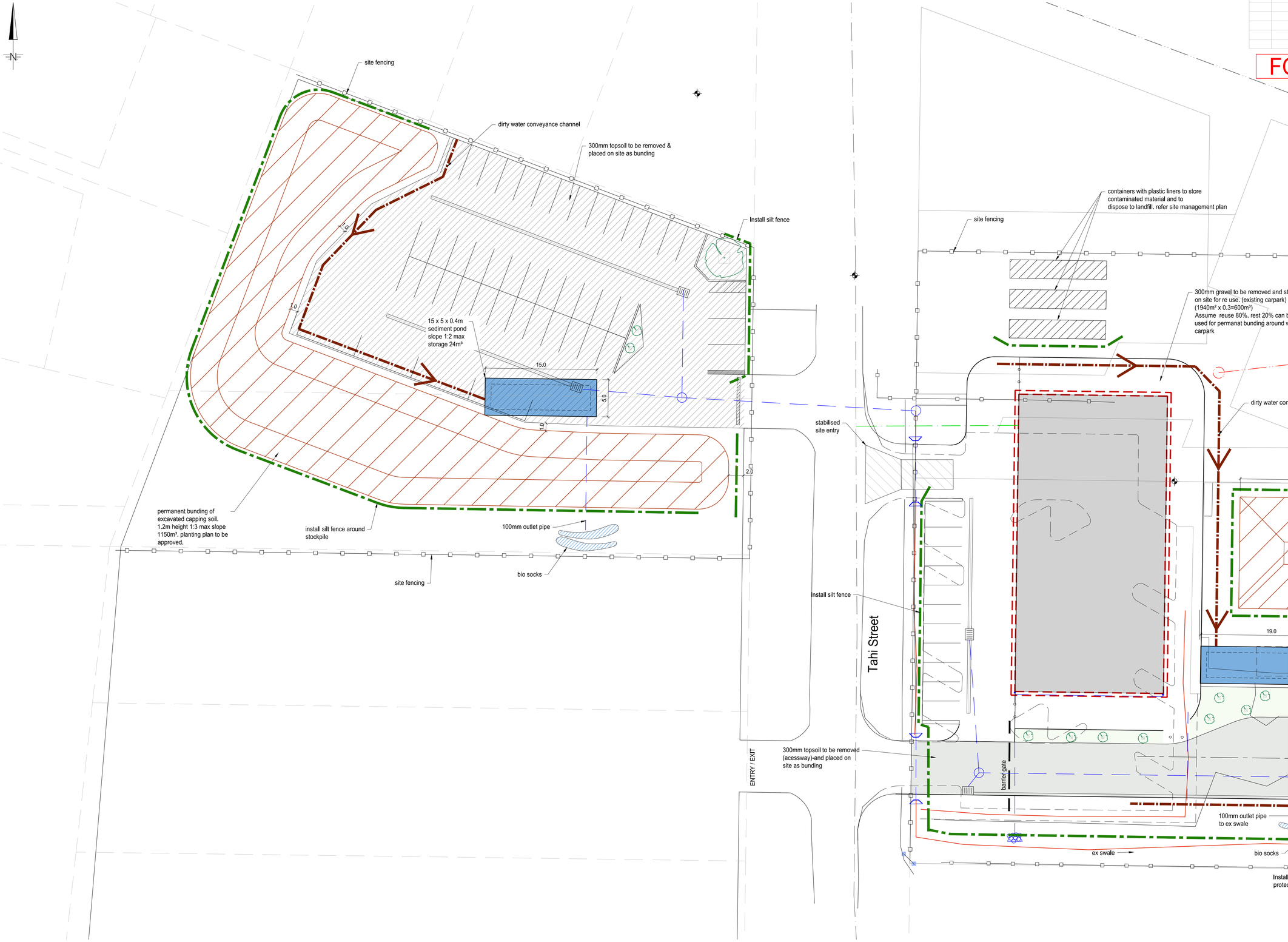
APPENDIX D

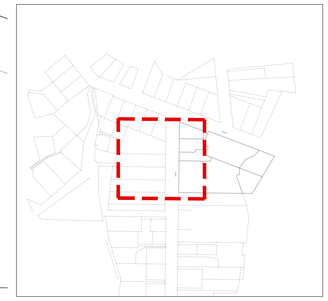
Erosion and Sediment Control Plan Drawings

Contractor to locate all existing services & verify all dimensions before commencing work

Rev.	Date	Reason	Approved
P1	15/11/23	Issued for discussion	GS

FOR INFORMATION





LOCATION PLAN
Scale 1:5,000 m

GENERAL NOTES:

1. REFER TO NELSON TASMAN EROSION & SEDIMENT CONTROL GUIDELINES. ALL WORKS ARE TO COMPLY WITH THIS GUIDELINE & DAVIS OGILVIE'S SITE MANAGEMENT PLAN.
2. THESE PLANS ARE TO BE READ IN CONJUNCTION WITH THE DESIGN STATEMENT.
3. ALL LEVELS ARE IN TERMS OF THE NZVD 2016 RL 2.97M, BENCHMARK IS AS PER PLAN.
4. CONTRACTOR TO FORWARD EARTHWORKS CONSTRUCTION METHODOLOGY TO ENGINEER FOR REVIEW. EARTHWORKS STAGING CATCHMENT AREAS MUST BE NO MORE THAN 2 HA.

SITE MANAGEMENT:

5. EROSION & SEDIMENT CONTROL IS TO BE CARRIED OUT IN ACCORDANCE WITH NELSON TASMAN EROSION AND SEDIMENT CONTROL GUIDELINES, AND RELEVANT CONSENTS.
6. SILT FENCES MUST BE ESTABLISHED AROUND ALL EARTHWORKS, STOCKPILES, WATERWAYS AND ADJACENT PROPERTIES TO COLLECT SILT RUNOFF.
7. TOPSOIL IS TO BE STRIPPED AND PLACED IN TEMPORARY STOCKPILES.
8. RE-SPREADING AND GRASSING IS TO BE CARRIED OUT WITHIN 14 DAYS OF COMPLETION OF EACH AREA.
9. VEGETATION COVERING THE SITE MUST BE MAINTAINED BY THE CONTRACTOR WHERE POSSIBLE TO REDUCE RUNOFF RATES, AND MINIMISE EROSION.
10. WHERE VEGETATION MUST BE REMOVED, AREAS MUST BE PROMPTLY GRASSED, OR RETAINING STRUCTURES BUILT.

DUST MITIGATION:

11. DUST IS TO BE KEPT TO A MINIMUM BY THE EFFECTIVE USE OF WATER CARTS AND/OR IRRIGATION (I.E. K-LINES) WETTING STOCKPILES AND EXPOSED AREAS OR COVERING WITH TARPAULINS
12. MINIMISE DROP HEIGHT FROM LOADERS AND DIGGERS INTO VEHICLES AND STOCKPILES TO REDUCE DUST NUISANCE.
13. SUITABLE WIND BREAKS ARE TO BE CONSTRUCTED ADJACENT TO EXISTING PROPERTIES WHERE REQUIRED.

PUMPING/DE-WATERING:

14. WHEN PUMPING IS REQUIRED INTO THE EXISTING STORMWATER SYSTEM TOTAL SUSPENDED SOLIDS (TSS) MUST BE LESS THAN 50 PPM. CONTRACTOR SHALL HAVE PRE-MADE COMPARISON TSS WATER SAMPLES ONSITE OF 50, 75 AND 100 AS CONTROL SAMPLES.
15. PHOTO EVIDENCE OF 50 PPM TTS SAMPLE IN COMPARISON TO THE CONTROL SAMPLES IS TO BE PROVIDED BEFORE PUMPING INTO THE EXISTING NETWORK IS CARRIED OUT. FLOCCULENT'S SHALL BE USED TO REDUCE TSS
16. WHERE DE-WATERING IS REQUIRED, ANY WATER WITH A TSS (TOTAL SUSPENDED SOLIDS) READING IN EXCESS OF 50 PPM MUST BE TREATED BEFORE DISCHARGE

CONSTRUCTION NOISE:

17. WORK HOURS AND ACCEPTABLE NOISE LEVELS TO BE IN ACCORDANCE WITH CONSENT CONDITIONS AND REQUIREMENTS SPECIFICALLY STIPULATED BY TASMAN DISTRICT COUNCIL.
18. TRAFFIC MANAGEMENT PLAN - TO BE APPROVED BY TASMAN DISTRICT COUNCIL.

MONITORING & MAINTENANCE - CONTRACTORS RESPONSIBILITY

19. ALL SEDIMENT CONTROL DEVICES MUST BE MONITORED AND INSPECTED BY THE CONTRACTOR FREQUENTLY TO ENSURE THEIR EFFECTIVENESS.
20. IN THE CASE OF HEAVY RAINFALL EVENTS, SILT IS TO BE REMOVED FROM COLLECTION AREAS BY MECHANICAL MEANS (IF NECESSARY), AND ANY SILTATION OF SURROUNDING DRAINS CLEANED UP BY THE CONTRACTOR.
21. ALL TRAFFIC MANAGEMENT IS THE RESPONSIBILITY OF THE CONTRACTOR.
22. THE TEMPORARY TREATMENT SYSTEMS ARE THE RESPONSIBILITY OF THE CONTRACTOR, AND SHALL NOT BE LIMITED TO THE METHODS INDICATED ON THE PLAN.

LEGEND:

- Silt Fence
- Dirty water channel
- Existing contours (0.1 m intervals)
- New road construction
- Site fencing

CAD ref: 42454.ESCP

DAVIS OGILVIE
ENGINEERS / SURVEYORS / PLANNERS
Davis Ogilvie & Partners Limited
Level 1, 24 Moorhouse Avenue, Addington, Christchurch 8140
Office 0800 999 333 Email hello@do.nz
www.do.nz

PROPOSED MAPUA BOAT RAMP
NELSON - MAPUA COMMUNITY BOAT RAMP TRUST

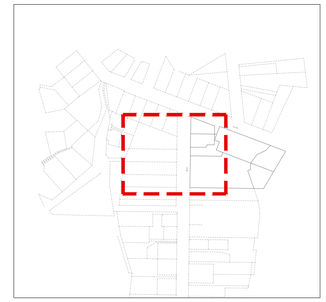
ENGINEERING DESIGN
EROSION & SEDIMENT CONTROL PLAN

Design	Drawn	QA Check	Dwg No.
BSL	NJ	GS	ES1
Scale @ A1	Date	Job No.	Rev.
1:250 (m)	07/2022	42454	P1

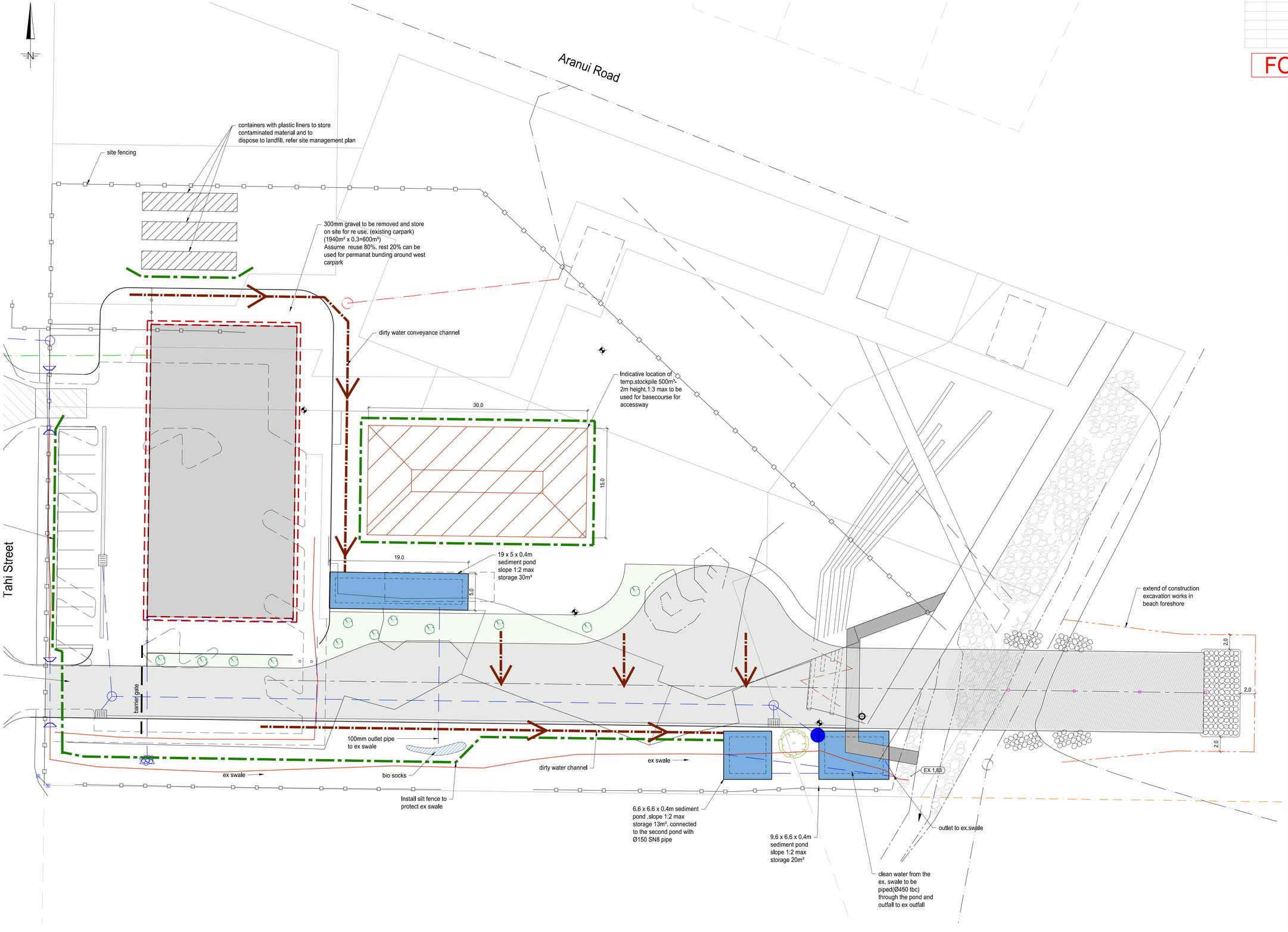
Contractor to locate all existing services & verify all dimensions before commencing work

Rev.	Date	Reason	Approved
P1	15/11/23	Issued for discussion	GS

FOR INFORMATION



LOCATION PLAN
Scale 1:5,000 m



GENERAL NOTES:

1. REFER TO NELSON TASMAN EROSION & SEDIMENT CONTROL GUIDELINES. ALL WORKS ARE TO COMPLY WITH THIS GUIDELINE & DAVIS OGILVIE'S SITE MANAGEMENT PLAN.
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4. CONTRACTOR TO FORWARD EARTHWORKS CONSTRUCTION METHODOLOGY TO ENGINEER FOR REVIEW. EARTHWORKS STAGING CATCHMENT AREAS MUST BE NO MORE THAN 2 HA.

SITE MANAGEMENT:

5. EROSION & SEDIMENT CONTROL IS TO BE CARRIED OUT IN ACCORDANCE WITH NELSON TASMAN EROSION AND SEDIMEN CONTROL GUIDELINES, AND RELEVANT CONSENTS.
6. SILT FENCES MUST BE ESTABLISHED AROUND ALL EARTHWORKS, STOCKPILES, WATERWAYS AND ADJACENT PROPERTIES TO COLLECT SILT RUNOFF.
7. TOPSOIL IS TO BE STRIPPED AND PLACED IN TEMPORARY STOCKPILES.
8. RE-SPREADING AND GRASSING IS TO BE CARRIED OUT WITHIN 14 DAYS OF COMPLETION OF EACH AREA.
9. VEGETATION COVERING THE SITE MUST BE MAINTAINED BY THE CONTRACTOR WHERE POSSIBLE TO REDUCE RUNOFF RATES, AND MINIMISE EROSION.
10. WHERE VEGETATION MUST BE REMOVED, AREAS MUST BE PROMPTLY GRASSED, OR RETAINING STRUCTURES BUILT.

DUST MITIGATION:

11. DUST IS TO BE KEPT TO A MINIMUM BY THE EFFECTIVE USE OF WATER CARTS AND/OR IRRIGATION (I.E. K-LINES) WETTING STOCKPILES AND EXPOSED AREAS OR COVERING WITH TARPAULINS
12. MINIMISE DROP HEIGHT FROM LOADERS AND DIGGERS INTO VEHICLES AND STOCKPILES TO REDUCE DUST NUISANCE.
13. SUITABLE WIND BREAKS ARE TO BE CONSTRUCTED ADJACENT TO EXISTING PROPERTIES WHERE REQUIRED.

PUMPING/DE-WATERING:

14. WHEN PUMPING IS REQUIRED INTO THE EXISTING STORMWATER SYSTEM TOTAL SUSPENDED SOLIDS (TSS) MUS BE LESS THAN 50 PPM. CONTRACTOR SHALL HAVE PRE-MADE COMPARISON TSS WATER SAMPLES ONSITE OF 50, 75 AND 100 AS CONTROL SAMPLES.
15. PHOTO EVIDENCE OF 50 PPM TTS SAMPLE IN COMPARISON TO THE CONTROL SAMPLES IS TO BE PROVIDED BEFORE PUMPIN INTO THE EXISTING NETWORK IS CARRIED OUT. FLOCCULENT SHALL BE USED TO REDUCE TSS
16. WHERE DE-WATERING IS REQUIRED, ANY WATER WITH A TSS (TOTAL SUSPENDED SOLIDS) READING IN EXCESS OF 50 PPM MUST BE TREATED BEFORE DISCHARGE

CONSTRUCTION NOISE:

17. WORK HOURS AND ACCEPTABLE NOISE LEVELS TO BE IN ACCORDANCE WITH CONSENT CONDITIONS AND REQUIREMENTS SPECIFICALLY STIPULATED BY TASMAN DISTRICT COUNCIL.
18. TRAFFIC MANAGEMENT PLAN - TO BE APPROVED BY TASMAN DISTRICT COUNCIL.

MONITORING & MAINTENANCE - CONTRACTORS RESPONSIBILITY

19. ALL SEDIMENT CONTROL DEVICES MUST BE MONITORED AND INSPECTED BY THE CONTRACTOR FREQUENTLY TO ENSURE THEIR EFFECTIVENESS.
20. IN THE CASE OF HEAVY RAINFALL EVENTS, SILT IS TO BE REMOVED FROM COLLECTION AREAS BY MECHANICAL MEANS (IF NECESSARY), AND ANY SILTATION OF SURROUNDING DRAINS CLEANED UP BY THE CONTRACTOR.
21. ALL TRAFFIC MANAGEMENT IS THE RESPONSIBILITY OF THE CONTRACTOR.
22. THE TEMPORARY TREATMENT SYSTEMS ARE THE RESPONSIBILITY OF THE CONTRACTOR, AND SHALL NOT BE LIMITED TO THE METHODS INDICATED ON THE PLAN.

LEGEND:

- Silt Fence
- Dirty water channel
- Existing contours (0.1 m intervals)
- New road construction
- Site fencing

CAD ref: 42454.ESCP

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PROPOSED MAPUA BOAT RAMP
NELSON - MAPUA COMMUNITY BOAT RAMP TRUST

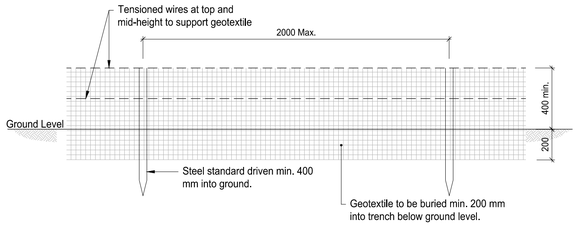
ENGINEERING DESIGN
EROSION & SEDIMENT CONTROL PLAN

Design	Drawn	QA Check	Dwg No.
BSL	NJ	GS	ES2
Scale @ A1	Date	Job No.	Rev.
1:250 (m)	07/2022	42454	P1

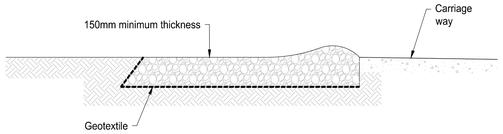
Contractor to locate all existing services & verify all dimensions before commencing work

Rev.	Date	Reason	Approved
P1	15/11/23	Issued for discussion	GS

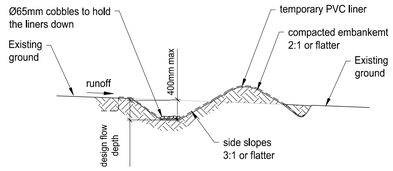
FOR INFORMATION



ELEVATION OF SILT FENCE
NTS



STABILISED ENTRANCEWAY- SIDE VIEW
NTS



TYPICAL SECTION- DIRTY WATER CHANNEL
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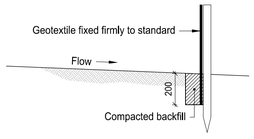

CROSS SECTION - SILT FENCE
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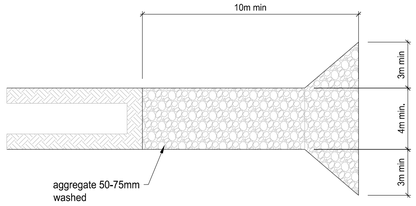
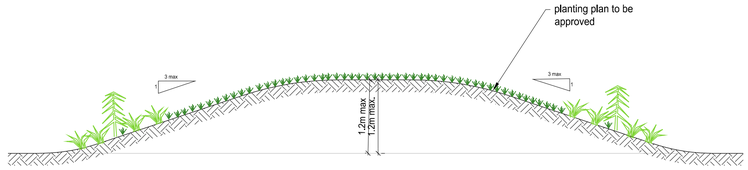
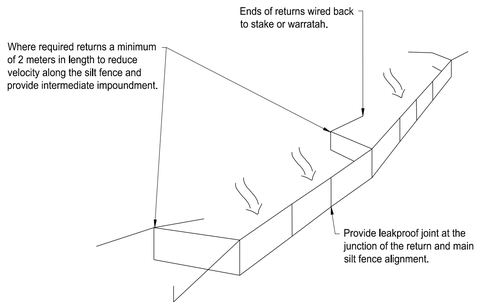


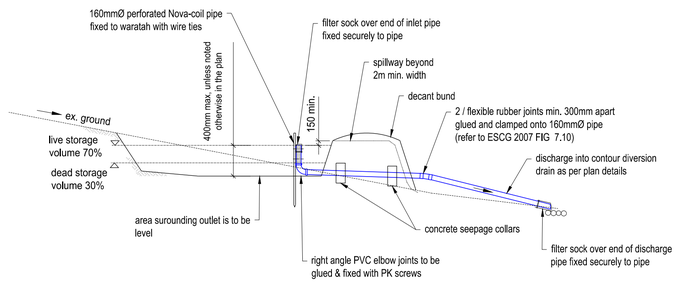
STABILISED ENTRANCEWAY- PLAN VIEW
NTS



TYPICAL CROSS-SECTION- BUND
NTS



SILT FENCE PERSPECTIVE VIEW
NTS



SNORKEL OUTLET DETAIL
SCALE 1:100

CAD ref: 42454.ESCP

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PROPOSED MAPUA BOAT RAMP
NELSON - MAPUA COMMUNITY BOAT RAMP TRUST

ENGINEERING DESIGN
EROSION & SEDIMENT CONTROL DETAILS

Design	Drawn	QA Check	Dwg No.
BSL	NJ	GS	ES3
Scale @ A1	Date	Job No.	Rev.
As shown	07/2022	42454	P1

APPENDIX E

Waste Manifest

Section 1 TO BE COMPLETED BY THE ENVIRONMENTAL CONSULTANT/MAIN CONTRACTOR

Consultant/Main Contractor Site Supervisor……

Project number……

Site Name……..

Site Address… ……

…… ……

Consultant/Main Contractor……

Cleanfill ☐ Controlled Fill ☐ Asbestos present ☐

Description of contamination ……..

Testing results comply with Waste Acceptance Criteria? Yes ☐ No ☐

Comments……..

DECLARATION BY ENVIRONMENTAL CONSULTANT/MAIN CONTRACTOR

I declare that the above waste is accurately described and is in a proper condition for transport in accordance with the applicable national and local regulations.

Name……. Signature …….

Title …….. Date …….. Estimated Quantity of Waste……

Section 2 TO BE COMPLETED BY THE TRANSPORTER

I acknowledge the receipt of the waste consignment describes the above;

Name…… Signature…….

Title…….. Date …… Estimated Quantity of Waste……

Section 3 TO BE COMPLETED BY THE DISPOSER/STORER

I acknowledge that the waste consignment described has been received

Name of Facility……..

Address of Facility……..

Name Signature Qty

Title Date

Method of disposal Landfill Managed Fill Treatment Storage

This form has to be completed and returned to final disposal location and the below address and should accompany waste invoices.

Level 1, 24 Moorhouse Ave, Addington / PO Box 589 / Christchurch 8140

gareth@do.nz, 021 851 349

Site Conditions Log

Date	Weather Conditions	Site Conditions	Progress/Problems associated with site works	No. of personnel on site	Record of Soil taken Offsite	Record of Soil Imported Onsite	Environmental non-compliances	Complaints and Corrective Measures	Comments