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Eastland Port

Twin Berth Seawall Redevelopment

Detailed Site Investigation (DSI)

Eastland Port Ltd

August 2022

REPORT INFORMATION AND QUALITY CONTROL

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Document Name	R_8705_EPL_Twin Berth DSI_V4.0 (August 2022)

Version History:	1.0	December 2021
	2.0	February 2022 (addition of photolog and inclusion of stormwater upgrades)
	3.0	July 2022 (updates to Site description)
	4.0	August 2022 (alignment with revised plans)

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EXECUTIVE SUMMARY

4Sight Consulting Ltd (4Sight) has been engaged by Eastland Port Ltd (EPL) ('the Client') to undertake a Detailed Site Investigation (DSI) in relation to proposed soil disturbance required for reclamation works as part of the proposed Twin Berths development at Eastland Port, Kaiti Beach Road, Gisborne (the Property). This DSI has focused on the Southern Log Yard (SLY) seawall as the area of the Property proposed for redevelopment, along with the northern most area of the proposed stormwater upgrade ('the Site'). The Site subject to this investigation excludes the southern area of the SLY subject to stormwater upgrades; however, this area has been addressed in previous investigations which are summarised as part of this DSI.

The objective of this DSI is to assess:

- Whether an activity or industry listed on the Ministry for the Environment (MfE) Hazardous Activities and Industries List (HAIL) is being, has been, or is likely to have been conducted at the Site;
- Concentrations of contaminants in soil through targeted sampling;
- Potential effects on human health and the environment; and
- Potential implications for the proposed Twin Berths development works under the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS) (MfE, 2011).

The scope of this DSI has included a review of the Site history, existing reports, and undertaking a targeted soil investigation across areas of proposed soil disturbance at the Site. The findings of this DSI include the following:

- The Site was part of the seabed in the Pacific Ocean prior to 1988. By 1988, evidenced through historic aerial imagery, significant reclamation had occurred. Reclamation is considered 'landfilling' which is an activity listed on the MfE HAIL as activity G3: Landfill Sites;
- Soil sampling involved the collection of 32 samples from eight locations at depths of between 0.0 – 2.5 meters (m) below ground level (bgl) throughout the Site. Soil samples were analysed for a range of contaminants of potential concern (CoPC) associated with land filling activities including heavy metals, total petroleum hydrocarbons (TPHs), polycyclic aromatic hydrocarbons (PAHs) and asbestos;
- Concentrations of all key CoPC were below the adopted NESCS Soil Contaminant Standards (SCS) for the protection of human health for Commercial / Industrial land use (consistent with the proposed future use of the Site) in all soil samples submitted for analysis from the Site. Concentrations of CoPC were also generally below the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZWQG) Default Guideline Values (DGVs) for sediment quality, with the exception of marginal exceedances of copper, lead and/or zinc in four samples;
- Concentrations of heavy metals in soils were variable when compared to the adopted background concentration ranges (for the Hawkes Bay Region). Concentrations of arsenic, boron, cadmium, chromium, mercury and nickel were typically within the respective typical background concentration ranges, while concentrations of copper, lead and zinc typically exceeded the respective background concentration ranges. Concentrations of PAH congeners were also typically above the laboratory limit of reporting (LOR), and therefore above the adopted background concentration ranges;
- Asbestos was identified in seven soil samples analysed in the form of both asbestos containing matter (ACM) debris and loose fibres. However, reported concentrations of asbestos in soils were all below the adopted human health assessment criteria (<0.001% wt/wt);
- It is highly unlikely that sediment CoPC in soils will pose a risk to the marine environment during the reclamation given toxicity concentrations of these contaminants only marginally exceed ANZWQG DGV's for lead, zinc and copper in five of the 32 samples analysed and were below GV high values;
- The concentrations of copper and zinc in leachate collected following completion of Toxicity Characteristic Leaching Procedure (TCLP) marginally exceeded the ANZWQG DGV's (95% level of species protection) in one sample (SS8). The concentration of copper, lead and/or zinc exceeded the ANZWQG DGVs (99% level of species protection) in all samples; and,
- While soils proposed for disturbance associated with the stormwater system upgrades in the southern section of the SLY were not sampled as part of this investigation, based on previous investigations undertaken by EAM and

WSP (refer to Section 3.1), it is inferred that levels of contaminants encountered during stormwater works will be representative of what was encountered in this DSI;

Based on the findings of this DSI, the following recommendations have been made:

- The Site and Property are subject to the NESCS, based on historic landfilling and ongoing port related activities;
- Concentrations of identified CoPC in soil at the Site are highly unlikely to pose a risk to human health or the marine environment as part of the proposed reclamation. Specifically, it is considered highly unlikely that CoPC in sediment will pose a risk to the marine environment during the reclamation given toxicity concentrations of these contaminants only marginally exceed ANZWQG DGV's (lead, zinc and copper) in four samples, and the proposed reclamation will contain contaminants beneath hardstand and behind an armoured seawall;
- Notwithstanding that concentrations of some CoPC are above typical background concentrations and the expected presence of some asbestos containing material, soil contamination does not exceed the applicable standards for commercial / industrial landuse in regulation 7 of the NES-CS;.
- To support the Resource Consent application a Site Management Plan (SMP) prepared by a Suitably Qualified and Experienced Person (SQEP), that details the necessary procedures to mitigate any potential human health and environmental risks, and procedures for managing unexpected discoveries of contamination, will be required;
- Given suspected asbestos containing material (ACM) pipe was observed in the sub-surface, soil disturbance works, including as part of stormwater upgrades must be undertaken in accordance with WorkSafe's Approved Code of practice, the New Zealand Guidelines for Assessing and Managing Asbestos in Soils (NZGAMS) guidelines for Class B asbestos removal, and be overseen by a licenced asbestos removalist;
- Soil to be excavated from the Site is suitable for re-use / retention on-site and for use as part of the reclamation from a human health and environmental risk perspective due to the nature of and very low levels of soil contaminants, the containment of soils beneath hardstand and behind an armoured seawall, and the industrial nature of the landuse;
- If soil is to be removed from the Site, it will require appropriate disposal at a suitably licensed facility and cannot be considered cleanfill due to the presence of heavy metals and PAHs above adopted background concentrations and due to the presence of asbestos fragments; and
- Any soil that is to be imported to Site for the purpose of reinstating the ground should be suitable to comply with the definition of 'cleanfill', as per the MfE document 'A Guide to the Management of Cleanfills (MfE, 2002).

This investigation and associated reporting have been carried out and reviewed by a SQEP in accordance with the requirements of the NESCS.

1 INTRODUCTION

4Sight Consulting Ltd (4Sight) has been engaged by Eastland Port Ltd (EPL) ('the Client') to undertake a Detailed Site Investigation (DSI) to support the soil disturbance required as part of reclamation works as part of the proposed Twin Berths development at Eastland Port, Kaiti Beach Road, Gisborne (the Property). This DSI has focused on the area of the Property proposed for redevelopment. In particular the Southern Log Yard (SLY) seawall and location of the northern most proposed stormwater upgrades ('the Site'). The Site subject to this investigation excludes the southern area of the SLY subject to stormwater upgrades; however, this area has been addressed in previous investigations which are summarised as part of this DSI.

The objective of this DSI is to assess:

- Whether an activity or industry listed on the Ministry for the Environment (MfE) Hazardous Activities and Industries List (HAIL) is being, has been, or is likely to have been conducted at the Site;
- Concentrations of contaminants in soil through targeted sampling; and
- Potential implications for the required soil disturbance as part of the proposed Twin Berths construction works under the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NESCS) (MfE, 2011).

Consideration of the NESCS is required for the activities of subdivision, change of land use and soil disturbance on pieces of land that have been subject to any activities or industries listed on the Ministry for the Environment (MfE) Hazardous Activities and Industries List (HAIL).

This DSI report has been prepared in general accordance with Ministry for Environment (MfE) Contaminated Land Management Guidelines No.1 Reporting on Contaminated Sites in New Zealand (Revised 2021) (CLMG No. 1).

1.1 Scope of Works

The scope of this DSI has included the following:

- A review of selected publicly available information for the Site, including previous investigations, council files, historical aerial photographs, and a Site Manager interview to determine whether or not any activities or industries on the HAIL are, have been, or might have been undertaken on the Site;
- A Site inspection to visually assess the presence of any activities or industries listed on the HAIL or evidence of potential contamination;
- Consideration of the nature of works proposed at the Site (including soil disturbance associated with proposed stormwater upgrades);
- Targeted collection of 32 soil samples from eight locations across the Site;
- Analysis of selected soil samples for contaminants of potential concern (CoPC) associated with the historic use of the Site; and
- An overall assessment of the applicability of the NESCS and TRMP.

2 SITE DETAILS

The location of the Site (being the section of SLY seawall proposed for redevelopment and the northern most area of the proposed stormwater upgrade) within the Port of Gisborne is shown in Figure 1. Figure 1 also shows the location of the southern area of the SLY subject to stormwater upgrades where previous sampling has been undertaken by EAM.. Site and property details are provided in Table 1 belwo.

Table 1: Property and Site information

The Property / Site	Location
Port of Gisborne, (the Property)	1 Kaiti Beach Road, Gisborne

Southern Seawall including northern SLY stormwater upgrades (the Site)	Part of Lot 1 DP 327614 and Part of Lot 43 DP 7819 within the Port of Gisborne
Southern SLY stormwater upgrades	Part of Lot 43 DP 7819 within the Port of Gisborne

2.1 Land Use – Current and Proposed

The Gisborne District Council (GDC) plan maps illustrate that the Site is currently zoned 'Port B'. The Site is utilised as an armoured seawall that acts as a vital line of defence to protect the port from disruptive swells and large waves. It is understood that the proposed activity associated with the Twin Berth redevelopment relevant to this DSI involves reclamation and soil disturbance.

The proposed reclamation relates to the adjacent marine environment extending west from the end of the SLY with a new armoured revetment proposed around the perimeter of the reclamation. Sections 1 – 3 of the existing SLY seawall are proposed to be reused as part of the reclamation. The development will include soil disturbance associated with proposed stormwater upgrades. Preliminary plans (Appendix A) completed by Quadrant Land and Engineering Surveys show that the existing volume of Sections 1 – 3 of the seawall equates to approximately 7,494 m^3 over an area of 5,078 m^2. The redevelopment proposes to reuse suitable material from the seawall in the reclamation, up to this volume.

The proposed stormwater upgrades will involve soil disturbance to provide for the installation of lamella clarifiers in the northern and southern sections of the SLY, along with associated pipework. The development plans showing areas for stormwater upgrades are provided in Appendix A. Preliminary plans for stormwater upgrades show that minimal soil disturbance will be required, and soils disturbed as part of stormwater upgrades are proposed to remain onsite and be either contained within a bund or be disposed of to an appropriately consented landfill.

2.2 Site Setting

2.2.1 Topography

The Site is approximately 6 m above sea level datum (asl). The topography of the Site is flat with a gentle slope to the southwest. The closest water body is the Pacific Ocean (Kaiti Beach) directly connected (southwest) to the Site.

2.2.2 Geology

Tonkin+Taylor (T+T) conducted a geotechnical investigation at the Site in 2017/ 18 (ref, T+T, 2018 – *Eastland Port Redevelopment Geotechnical Investigation).* Borelogs from this investigation indicate the southern area of the Property, adjacent to the Site is predominantly gravel / cobbles with brick fragments overlying uniformly graded sand at various depths. Layers of silts and clay are also present below the gravel / cobble layer.

The Institute of Geological and Nuclear Sciences (GNS) 1:250,000 online geological map shows the regional geology consists of Holocene Ocean Beach Deposits, described as sand. Site specific soil information as encountered during soil investigation works completed as part of this DSI is detailed in Section 4.

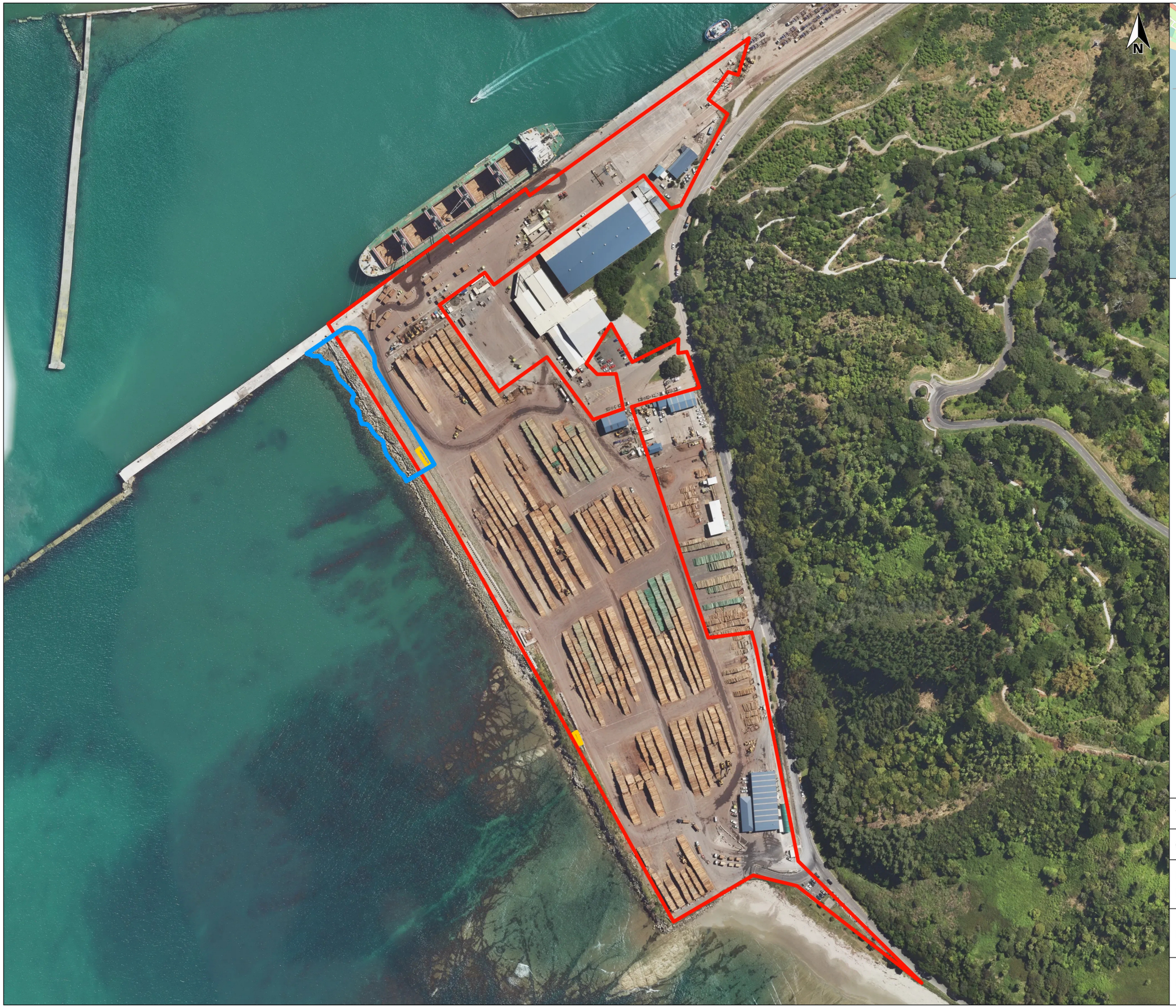
2.2.3 Hydrogeology

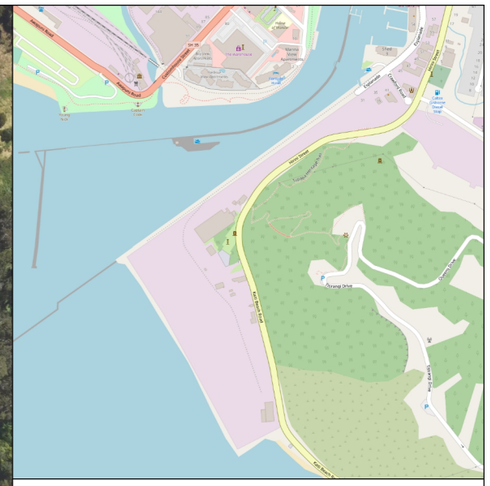
A search of the GDC groundwater maps indicated that there are no groundwater bores within the Site, and three groundwater bores within 500 m of the Site as presented in Table 2. No information was provided regarding the purpose of the groundwater take, or permitted take volumes. Groundwater is anticipated to be shallow (<10 metres below ground level (m bgl) and likely tidally influenced given the proximity to the Pacific Ocean.

Table 2: Nearby Groundwater Bores

Bore No.	Name	Address	Distance & Direction from Site	Well Depth
GPA167	Drillwell Exploration NZ	Port of Gisborne	170 m east of the Site	20 m

GPA159	Caltex Oil Terminal	Kaiti Beach Road	280 m south of the Site	4 m
GPA065	Watties	Awapuni Road	430 m north of the Site	292 m





Legend

- Site Boundary
- Property Boundary
- Stormwater Infrastructure

0 50 m 100 m

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Produced by **Datanest.earth**

Title: Site and Property Location Plan		
Client: Eastland Port Ltd		Figure No: 1 Size: A3
Project: Twin Berth DSI	Drawn: BF	
Date: 15-11-2021	Checked: NM	
Proj No: 8705	Scale: 1:2973	Version: Final

2.2.4 Marine Environment

The local marine environment adjoining the Site is not considered to be a sensitive habitat for the purposes of this DSI on the basis of it being previously reclaimed, delineated by man-made structures and in close proximity to a well established operational port.

The marine area around the Site is tidally well flushed as evidenced by monitoring data collected from the basin and discussed in the 4Sight Wharfside Logyard (WLY) DSI (2016) and the 4Sight Port Entry Area Redevelopment DSI (2019).

3 SITE HISTORY

To understand the history of the Site and particularly the nature and location of any potentially contaminating activities, a review of selected publicly available information for the Site was undertaken. This included searches of:

- Previous investigations completed at or in close proximity of the Site.;
- GDC HAIL Enquiry;
- Selected historical aerial photographs available through Google® Earth™ and Retrolens;
- Hazardous Substances and Incidents report provided by the Environmental Protection Agency (EPA); and
- An on-site walkover and interview with the current Site Manager.

3.1 Previous Investigations

Below is a summary of relevant aspects of previous investigations undertaken at or in close proximity of the Site. All reports can be provided upon request.

3.1.1 Port Entry Area Redevelopment DSI, 4Sight 2019

This report provided information regarding a DSI undertaken by 4Sight at the Port Entry Area located approximately 90 m northeast of the Site subject to this investigation, and within the wider Property area. The purpose of the DSI was to assess the potential implications of proposed stormwater infrastructure upgrades and surface regrades, under the NESCS. The following information is of relevance to the present investigation:

- The soil profile was variable and generally had intermixed clays and sands, with moderate quantities of cobbles, bricks, glass, steel horseshoes, concrete and steel evident in the profile. Soil sample profiles in the southern portion of the Site were sandy cobble fill, with minor quantities of bricks, steel, and glass, overlying natural sand from circa 1000 mm bgl;
- Eight of the 44 soil samples analysed contained chrysotile (white asbestos). Those eight samples identified fibrous asbestos (FA) and asbestos fines (AF) and bonded asbestos containing matter (ACM), with all but one sample containing asbestos below detection limits and therefore below the adopted New Zealand Guidelines for Assessing and Managing Asbestos in Soils (NZ GAMAS) guidelines. The remaining 36 soil samples did not contain the presence of asbestos;
- Concentrations of heavy metals and polycyclic aromatic hydrocarbons (PAHs) were below the adopted NESCS Soil Contaminant Standards (SCS), and MfE Petroleum Hydrocarbon Guidelines for commercial / industrial use in all soil samples analysed;
- The concentrations of contaminants in soil were considered highly unlikely to present a risk to human health or the environment during soil disturbance activities (provided good earthworks and dust controls measures are implemented) or for ongoing commercial industrial land use;
- A controlled activity consent under Clause 9 of the NESCS was required on the basis that soil disturbance and removal volumes exceeded the permitted activity thresholds in the NESCS;
- Due to the heterogenous soil and fill material at the Site, it was recommended that soil disturbance activities in the asbestos management areas were to be completed as asbestos related work under the NZ GAMAS guidelines; and,

- A Contaminated Site Management Plan (CSMP) was recommended to manage the potential risk to human health of excavation workers and port employees during excavation activities, and to outline appropriate soil handling and disposal requirements.

3.1.2 Wharfside Logyard DSI, 4Sight 2016

This report provided information regarding a DSI undertaken by 4Sight at the Wharfside Logyard (WLY), located on the north-side of Rakaiatane Road, Gisborne. The WLY is within the wider Property area; however, is not within the Site area of this investigation. The purpose of the DSI was to assess the proposed wharf upgrade project against the requirements set out in NESCS and the GDC Proposed Regional Freshwater Plan. The following information in the report is of relevance to the present investigation:

- HAIL activities are currently conducted (port activities), and have historically been undertaken (chemical and fuel storage, and fellmongery) on the Site;
- Soil samples were collected from a total of 16 test pits advanced to a maximum depth of 3.0 m bgl across the WLY. Sampling identified an isolated hotspot of soils impacted with naphthalene and total petroleum hydrocarbons (TPH) C_{10} – C_{14} at a depth of 1.50 m bgl near the southwest corner of the Site, likely attributable to drips and leaks from the heavy machinery parked in this area. The concentration of naphthalene was above the MfE Petroleum Hydrocarbon Guidelines for the protection of groundwater quality, and TPH C_{10}-C_{14} was above the Petroleum Hydrocarbon Guidelines for commercial / industrial use. The leachable concentrations (analysed using the toxicity characteristic leaching procedure (TCLP)) were below their respective MfE Landfill Waste Acceptance Criteria for Class A landfill leachability limits; and
- Application for a resource consent was lodged with the GDC, in May 2016, as required under the NESCS for the disturbance and remediation (through excavation) of contaminated soils.

3.1.3 Validation of Soil Asbestos at Wharfside Logyard, EAM 2019

GDC, following consideration of a Remediation Action Plan (RAP), and prior to the redevelopment works at the WLY, requested that EAM Environmental Consultants investigate the potential for asbestos to be present within soils across the WLY. Initial asbestos screening was carried out, with 30 surface samples collected across the WLY. Further testing was undertaken following initial screening, consisting of 54 test pits and a total of 108 samples. Asbestos was widespread in soils sampled from this area of the WLY, with 11 of the 30 initial samples analysed, and 19 of the further 108 samples analysed having concentrations of FA and AF above adopted guideline values.

Based on these results, the soils at WLY known to contain FA / AF above the soil asbestos investigation criteria of 0.001 % w / w asbestos, for all land use scenarios, were proposed to be stockpiled and covered on-site. These were to be re-used (buried and sealed) at the WLY as part of the proposed upgrade.

3.1.4 Tonkin + Taylor (T+T) Eastland Port Redevelopment Geotechnical Investigation (2017/18)

T+T completed a geotechnical investigation in 2017 / 18 across the Property adjoining the Site. During the investigation soil samples were collected from three locations at depths ranging from 0.2 to 1.5 m bgl, and subsequent analysed for the presence of heavy metals (arsenic, cadmium, chromium, copper, lead, nickel, and zinc), PAHs, and asbestos (presence/absence). Sample results identified slightly elevated heavy metals and PAHs above background concentrations. No asbestos was detected in any of the samples analysed.

3.1.5 Site Assessment of Asbestos in Eastland Port Ltd Earth Bund, EAM (2021)

This report was undertaken to support the proposed reshaping of the southern end of the Seawall Bund. The report scope included assessment for the presence of asbestos in the Seawall Bund. The bund is approximately 265m x 6m and has an approximate volume of 700m^3. This investigation covered the area of proposed soil disturbance associated with Twin Berth stormwater upgrades in the southern portion of the SLY. The following information from that report is of relevance to the present investigation:

- The bund was formed with material from the historic freezing works;
- 12 test pits were excavated across the bund and 24 soil samples were collected at depths ranging from 0.15 to 0.5 m bgl and analysed for the presence of asbestos;

- Sample results identified the presence of asbestos in eight of the 24 samples analysed. Of these eight samples, the concentration of FA / AF and/or asbestos as ACM exceeded the adopted criteria in four samples. Three of these samples represented soil from approximately 0.5 m depth, and the fourth was from surface soils;
- The report concluded that the concentration of asbestos in soils was highly unlikely to present a risk to human health or the environment during soil disturbance activities, provided good earthworks and dust controls were implemented;
- It was recommended that soil disturbance in areas where asbestos was identified be completed as asbestos related work and should be completed by a licenced asbestos removalist;
- The implementation of a SMP was recommended for use during soil disturbance activities, and following that the completion of a Works Completion Report (WCR); and,
- The report provided details for soft and hard cap options for encapsulation of asbestos containing soils

3.1.6 Port Seawall Investigation, WSP (2020)

WSP completed an investigation in October 2020. This investigation covers the seawall bund and the area of proposed soil disturbance associated with stormwater upgrades in the southern portion of the SLY. As part of this investigation, five test pits were excavated and soil samples were collected at varying depths and analysed for the presence of heavy metals, PAH and asbestos. Analysis of asbestos was only undertaken for presence / absence. While this report has not been provided for review in full, the following information from the sampling data obtained (Appendix F) is of relevance to this investigation:

- Concentrations of PAH in all samples were below the adopted NES guidelines for commercial/Industrial land use;
- Concentrations of heavy metals were below the adopted NES guidelines for commercial/Industrial land use; and,
- Asbestos (Loose Fibres and ACM debris) were present in all test pits.

3.1.7 Site Validation Report for Asbestos Containment in Eastland Port Ltd Earth Bund, EAM (2022)

EAM completed a Site Validation Report for the Seawall Bund reshaping project. The report describes the remedial work undertaken, which included excavation of areas in the Seawall bund where asbestos was identified as part of the Site assessment (EAM, 2021) and burial of this back into the seawall at depths of at least 0.5 m. The bund was reshaped, and then Biddim cloth was then placed over the entire length of the bund. The bund was then capped with cleanfill with a minimum depth of 0.2 m.

As part of validation activities, 4 soil samples were collected at depths ranging between 0.0 – 0.2 m bgl. All four samples were negative for asbestos. The report stated that, based on the validation work, the Site is compliant with the Building Research Association of New Zealand (BRANZ) 2017 - New Zealand Guidelines for Assessing and Managing Asbestos in Soil using the commercial land use scenario.

3.2 Council Records

3.2.1 GDC HAIL Enquiry

An email response provided by GDC is presented in Appendix B and confirmed that the Site is listed on the GDC land use register as G3: “landfilling activities” which was part of the harbour reclamation.

3.2.2 Hazardous Substances and Incidents Report

The EPA maintained a list of reported hazardous substance incidents over the period July 2006 – December 2011. A review of the EPA register over this period, accessed August 2021, identified no incidents at the Site or within a 200 m radius of the Site.

3.3 Aerial Photographs

Historical aerial photographs were reviewed and sourced from Retrolens and Google® Earth™. These are described in Table 3 and can be found in Appendix C.

Table 3. Aerial Photography Summary

Year	Reference	Observations
1942	Retrolens (black & white)	**Site:** The Site is within the Pacific Ocean. **Property:** The Property is predominantly within the Pacific Ocean. Buildings and roads are present within the north-eastern section of the Property. Port training walls and slipway have been developed to the north of Property, and a freezing works is present to the east and Kaiti Beach Road.
1953	Retrolens (black & white)	**Site:** No significant changes are visible to the Site. **Property:** No significant changes are visible to the Property.
1957	Retrolens (black & white)	**Site:** No significant changes are visible to the Site. **Property:** The Property has been redeveloped and multiple buildings occupy the WLY. A vehicle accessway has been constructed from the dry dock through the southern side of Property.
1965	Retrolens (black & white)	**Site:** No significant changes are visible to the Site. **Property:** No significant changes are visible to the Property.
1972	Retrolens (black & white)	**Site:** No significant changes are visible to the Site. **Property:** Part of the wider Property to the southwest has been significantly reclaimed, extending into the Pacific Ocean and is in use for log storage activities. Two tanks also appear to be present in the north-eastern section of the Property. A slipway has been developed on Wharf 8.
1988	Retrolens (black & white)	**Site:** The Site appears to have been reclaimed. The southwestern boundary of the Site adjoins the Pacific Ocean. **Property:** The majority of the Property appears to have been reclaimed from the Pacific Ocean and is now in use as a Port. Logs appear to be stored across the Property with more tanks located in the north-eastern section.
2005	Google Earth (colour)	**Site:** There appears to be more armouring (as part of a seawall) across the Site. No other significant changes are visible to the Site. **Property:** An additional warehouse has been constructed on the southern side of Wharf 7 and on the Property. The remainder of Property is hardstand. The freezing works has been demolished to the east of the Property, and land reclamation outside of the Property shows no significant change.
2018	Google Earth (colour)	**Site:** No significant changes are visible to the Site. **Property:** Warehouses have been demolished and removed. The remainder of Property and surrounding land shows no significant changes.

3.4 Site Walkover

A Site visit was undertaken by 4Sight staff on 21 October 2021. Photos of the Site visit are presented in Appendix D, and the Site location and features are presented in Figure 1. The following observations were made during the Site walkover and inspection:

- The Site is currently in use as an armoured sea wall to protect the Port against swells and large waves;
- The Site adjoins the Pacific Ocean on the southwestern side and is accessed via the SLY;
- The Site extends from the Pacific Ocean up towards the SLY and is approximately 6 m in height;
- The Site is built up with amour consisting of concrete, brick, and other rubble;
- Asbestos and copper pipe was identified in surface soils; and
- The adjoining SLY is in use for the storage and movement of treated logs.

3.5 Site History Summary

Based on a review of publicly available information in relation to the history of the Site, the following can be summarised:

- Prior to 1988 the Site was part of the seabed within the Pacific Ocean;
- The Site area and wider Property was reclaimed circa-1988;
- The Site area has remained in use as a seawall since reclamation circa 1988;
- There is no evidence to suggest that logs have been stored or treated on or within the Site area;
- At the time of the Site walkover, asbestos and copper pipe was identified within the Site area;
- The Property area adjacent to the Site has been in use as a log storage yard since circa 1972; and,
- Activities undertaken on the adjacent Property area include port activities, the treatment and storage of logs, and the movement and storage of heavy machinery.

3.6 HAIL Assessment

Based on the information reviewed above the following potential contaminating activities have been identified as having been undertaken at the Site:

- **G3:** Landfill Sites.

The Site is therefore subject to the NESCS. CoPC associated with landfilling are largely dependent on the type of waste disposed of at the landfill during operation, but typically include: heavy metals, PAHs, TPH, and asbestos.

The Property is also subject to the NESCS as it has been subject to a range of port activities, including historic filling.

3.7 Initial Conceptual Site Model

An initial conceptual Site model (CSM) has been prepared and is presented in Table 4. A CSM provides a detailed description of the identified potential sources, pathways and receptors, and a qualitative assessment of complete or potentially complete source-pathway-receptor (SPR) linkages. A risk is only present if there is a complete SPR linkage. The CSM detailed in Table 4 is based on the results of the background review only, and was intended to guide and inform the soil sampling and analysis discussed in section 4.

Table 4: Initial Conceptual Site Model

Source	Pathway	Receptor	Human Health & Environmental	Discussion	SPR Linkage
Heavy metals, PAH and TPH in Soils	Direct contact, inhalation and/or ingestion	Maintenance / excavation Workers	Human Health	The background review of available information identified a number of potentially contaminating activities associated with the historic use of the Site. These activities were generally identified to be widespread, and may have the potential to result in the presence of various contaminants in soil, such as heavy metals, PAH, TPH and asbestos.	**Potentially Complete** Determination of whether the SPR linkage is complete requires soil sampling and analysis to assess the concentrations of contaminants in soil, and a risk assessment to determine the potential risk to human health and/or the environment.
		Site users			
	Leaching to groundwater and/or ocean	Groundwater / Ocean	Environmental		
Asbestos	Direct contact, inhalation and/or ingestion	Maintenance / excavation Workers	Human Health		
		Site users			

4 SITE INVESTIGATION

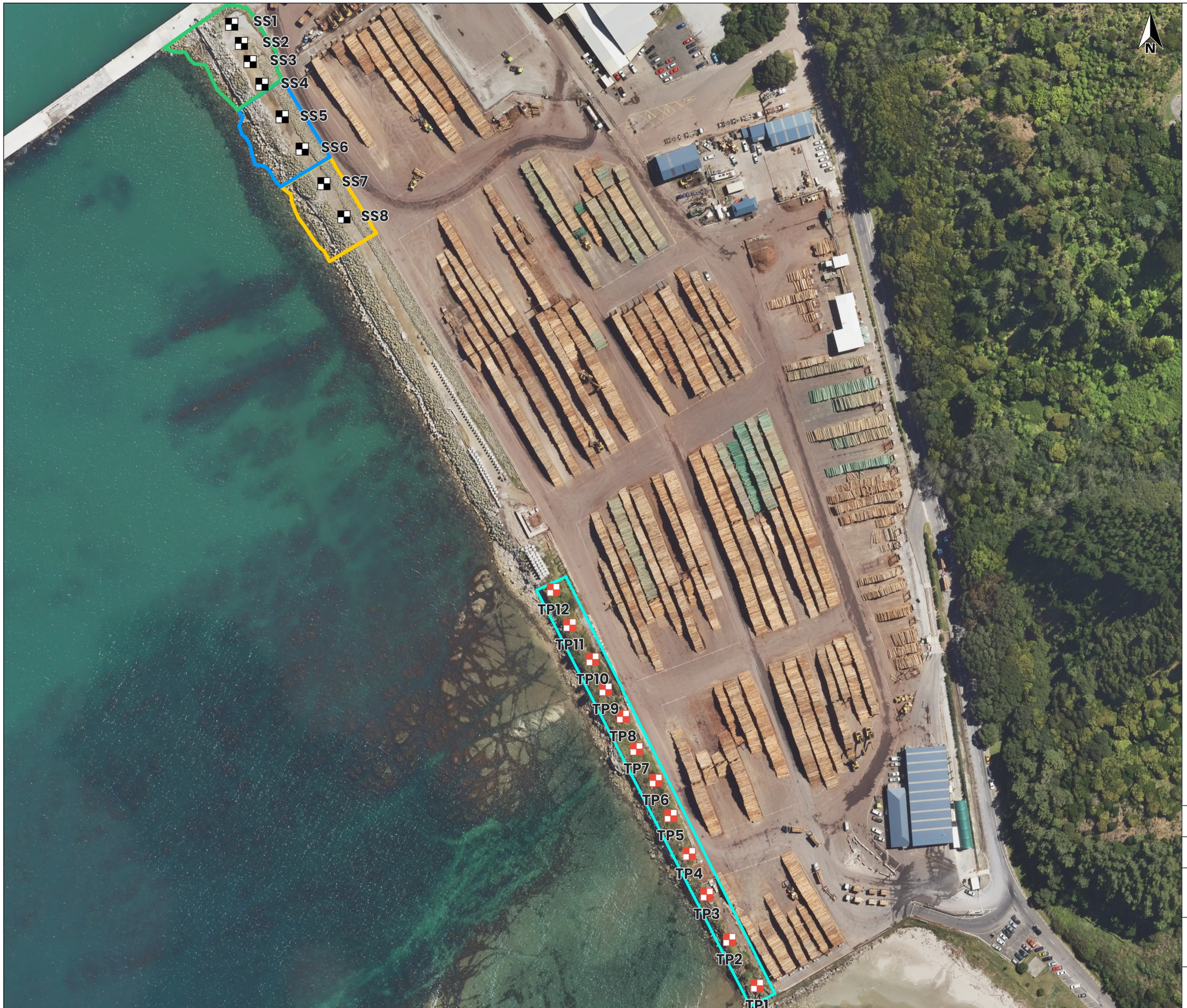
4.1 Soil Sampling

Soil sampling works were completed on 21 October 2021. Siteworx Civil were contracted for the excavation work on Site, and soil sampling was undertaken by EAM Environmental Consultants (EAM). 4Sight provided a detailed scope of work to EAM and reviewed EAM's reported results.

A total of 32 soil samples were collected from eight soil sampling locations (SS1 – SS8) across the Site at depths between 0.0 – 2.5 m bgl (refer to Figure 2 and Table 5). The targeted soil sampling was designed in general accordance with the Contaminated Land Guidelines No.5 Site Investigation and Analysis of Soils (MfE, 1999, revised 2021) (CLMG No. 5) to provide broad coverage across the investigation area including the area for soil disturbance associated with the northern stormwater upgrades.

Soil sampling within the area of proposed stormwater works in the southern part of the Site has not been undertaken as part of this investigation. Previous investigations (refer to Section 3.1) have characterised soils in this area. As such, soil sampling of this location is not repeated as part of this investigation.

The methodology for soil sampling is set out below.



Legend

- Sampling Locations (4Sight, 2021)
- Sampling Locations (EAM, 2021)
- Section 1
- Section 2
- Section 3
- EAM Investigation Area

0 25 m 50 m

4SIGHT CONSULTING

Produced by **Datanest.earth**

Title: Twin Berth Sampling Locations		
Client: Eastland Port Ltd		Figure No: 2 Size: A3
Project: Twin Berth DSI	Drawn: JH	
Date: 11-08-2022	Checked: NM	
Proj No: 8705	Scale: 1:1800	Version: Final

4.1.1 Sampling Methodology

The following methodology was adopted during the soil sampling works:

- All soil samples collected were subject to screening in the field for the presence of volatile organic compounds (VOCs) using initial visual and olfactory assessment and subsequent visual screening for the presence of asbestos or ACM;
- Soil samples were placed in clean plastic ziplock bags followed by laboratory provided clean sample jars and identified with a unique sample identifier, which was documented on the sample label; sample log; and chain of custody form;
- A soil sample description (included in Table 5) was completed for each soil sample location including: a description of materials encountered; olfactory and visual evidence of contamination; and sample intervals and identifiers; and,
- All soil samples were placed in an ice-cooled storage box (i.e. Chilly Bin) immediately after collection and transported under chain of custody documentation to the analytical laboratory.

EAM initially collected soil samples in laboratory approved asbestos containers (for asbestos samples) and plastic ziplock bags (for heavy metals, TPHs and PAHs samples). 4Sight promptly informed EAM that the use of ziplock bags were not appropriate containers for the storage and preservation of soil samples for environmental analysis for the identified CoPC. Within 12 hours, soil samples were transferred by 4Sight to appropriate laboratory provided sample containers for submission to the laboratory under chain of custody documentation, with efforts made to minimise the loss of volatile compounds.

Given soil samples were scheduled for analysis for hydrocarbons, there is potential that during the transfer of soil samples from ziplock bags to laboratory containers there may have been the loss of some volatile components, despite measures taken to minimise this. It is acknowledged that this sampling methodology is not in accordance with the CLMG. However, given field observations did not indicate the presence of hydrocarbon odours or staining, and there are no known source of hydrocarbons on-site, it is considered unlikely that significant hydrocarbon impact was present in soil samples for there to be a loss of volatile compounds.

The rationale for sampling locations and an analytical suite of heavy metals, TPHs, PAHs and asbestos was based on activities at the Site as identified in Section 3. Twenty soil samples were selected and submitted to the analytical laboratory for subsequent analysis for identified CoPC, with the twelve remaining samples being cold held at the analytical laboratory. The 20 soil samples selected for analysis were considered appropriate to provide a broad coverage both laterally and vertically across the Site. Soil samples for laboratory analysis were selected based on Site observations, and to obtain representative coverage across the Site, both laterally and vertically.

Table 5: Soil Sampling Details and Laboratory Analytical Schedule

Sample ID	Depth (m bgl)	Activity/Location	Soil Type	Lab Analysis
SS1	0.0-0.1	Sea wall	Grey and black sand, mixed with rubble consisting of brick, concrete, asbestos pipe, and copper pipe.	Heavy metals, PAH, TPH. Asbestos
	0.5			Hold cold
	1.0			Heavy metals, PAH, TPH. Asbestos
	2.5			Hold cold
SS2	0.0-0.1	Sea wall	Grey and black sand, mixed with	Heavy metals, PAH, TPH. Asbestos

Sample ID	Depth (m bgl)	Activity/Location	Soil Type	Lab Analysis
	0.5		rubble consisting of brick, concrete, asbestos pipe, and copper pipe.	Heavy metals, PAH, TPH. Asbestos
	1.0			Hold cold
	2.5			Heavy metals, PAH, TPH. Asbestos
SS3	0.0-0.1	Sea wall	Grey and black sand, mixed with rubble consisting of brick, concrete, asbestos pipe, and copper pipe.	Heavy metals, PAH, TPH. Asbestos
	0.5			Hold cold
	1.0			Heavy metals, PAH, TPH. Asbestos
	2.5			Hold cold
SS4	0.0-0.1	Sea wall	Grey and black sand, mixed with rubble consisting of brick, concrete, asbestos pipe, and copper pipe.	Heavy metals, PAH, TPH. Asbestos
	0.5			Heavy metals, PAH, TPH. Asbestos
	1.0			Hold cold
	2.5			Heavy metals, PAH, TPH. Asbestos
SS5	0.0-0.1	Sea wall	Grey and black sand, mixed with rubble consisting of brick, concrete, asbestos pipe, and copper pipe.	Heavy metals, PAH, TPH. Asbestos
	0.5			Hold cold
	1.0			Heavy metals, PAH, TPH. Asbestos
	2.5			Hold cold
SS6	0.0-0.1	Sea wall	Grey and black sand, mixed with rubble consisting of brick, concrete, asbestos pipe, and copper pipe.	Heavy metals, PAH, TPH. Asbestos
	0.5			Heavy metals, PAH, TPH. Asbestos
	1.0			Hold cold
	2.5			Heavy metals, PAH, TPH. Asbestos

Sample ID	Depth (m bgl)	Activity/Location	Soil Type	Lab Analysis
SS7	0.0-0.1	Sea wall	Grey and black sand, mixed with rubble consisting of brick, concrete, asbestos pipe, and copper pipe.	Heavy metals, PAH, TPH. Asbestos
	0.5			Hold cold
	1.0			Heavy metals, PAH, TPH. Asbestos
	2.5			Hold cold
SS8	0.0-0.1	Sea wall	Grey and black sand, mixed with rubble consisting of brick, concrete, asbestos pipe, and copper pipe.	Heavy metals, PAH, TPH. Asbestos
	0.5			Heavy metals, PAH, TPH. Asbestos
	1.0			Hold cold
	2.5			Heavy metals, PAH, TPH. Asbestos

Laboratory Analysis

All primary soil samples were submitted to an International Accreditation New Zealand (IANZ) accredited laboratory (RJ Hill Laboratory (Hills) in Hamilton) with accredited methodologies for analysis for the presence of a broad suite of identified and potential CoPC associated with historical horticultural and uncontrolled filling activities, including:

- Heavy metals (arsenic, boron, cadmium, chromium, copper, lead, mercury, nickel, and zinc);
- TPH;
- PAHs; and,
- Asbestos (semi-quantitative method).

QA/QC

Hills are an International Accreditation New Zealand (IANZ) accredited laboratory with IANZ accredited methodologies for the analysis requested. Their primary quality standard is NZS/ISO/IEC 17025:2005 which incorporates the aspects of ISO 9000 relevant to testing laboratories. Refer to the laboratory analysis report in Appendix E for further information on accreditation.

As noted in Section 4.1.1, a potential field quality assurance issue has been identified as soil samples following collection were not immediately stored within laboratory approved and provided containers suitable for the analysis to be requested. Soil samples were initially collected and stored in ziplock bags before being transferred to appropriate laboratory provided sample containers. Efforts were made to minimise the potential loss of volatile contaminants during the transfer of samples soil from ziplock bags to sample containers. As the storage of soil samples in ziplock bags was only temporary (samples were transferred to appropriate containers within 12 hours), and no obvious indicators of hydrocarbon odours or staining were observed during fieldworks, coupled with no known source of hydrocarbons on-site, it is unlikely that this QA/QC non-conformance will affect the outcome of this investigation.

Furthermore, no quality assurance sampling was conducted as part of the work scope. Although not in accordance with the CMLG, the nature of the material being sampling (mixed fill) and absence of concentrations of contaminants

above adopted criteria for protection of human health and the environment (refer to Section 4.4), this QA/QC non-conformance is considered unlikely to affect the outcome of this investigation.

4.2 Soil Sampling Observations

Photos of selected soil sample locations and the typical soil profile are presented in Appendix D.. The following soil characteristics and observations are described below:

- Asbestos pipe fragments were identified throughout the sampling locations;
- Waste pieces of copper pipe was identified throughout the sampling locations;
- Soils within the Site were typically black and grey sand mixed in with fill; and,
- Test pits were homogenous in nature.

4.3 Soil Evaluation Criteria

To provide an appropriate assessment of CoPC concentrations in soil sampled from the Site, the soil sample analytical results have been screened against the following criteria (based on future land use):

- Landcare Research Manaaki Whenua (2014) Hawkes Bay Region: Background soil concentrations for managing soil quality (adopted in the absence of published background soil concentrations for Gisborne). These guidelines have been adopted to provide a general assessment of typical background concentrations of contaminants in soil. They are also used as a threshold to determine whether soil at the Site can be considered cleanfill if removed for off site disposal;
- National Environmental Standards for Managing and Assessing Contaminants in Soil to Protect Human Health' - Soil Contaminant Standards (SCS), (MfE, 2012) Commercial/industrial (outdoor worker) land use scenario. The commercial industrial SCS is considered appropriate to represent the current and ongoing land use at the Site, and the potential exposure pathways for people from this landuse;
- Australian National Environmental Protection (Assessment of Site Contamination) Measure (NEPM), Amendment No.1 (2013) – commercial / industrial health investigation level Table 1A(1) (adopted for nickel and zinc in accordance with the hierarchy of CLMG No.2 Hierarchy and application in New Zealand of environmental guideline values (MfE, 2003, revised 2011) in the absence of published SCS in the NESCS). In absence of SCS, and in accordance with guidance provided in the GLMG No. 2 regarding the hierarchy and application of guidelines in New Zealand, these values are used to represent the current and ongoing land use at the Site;
- New Zealand Guidelines for Assessing and Managing Asbestos in Soil, 2017 (GAMAS – formally referred to as BRANZ Guidelines), using the commercial land-use scenario. As noted above, the commercial industrial guideline value is considered appropriate to represent the current and ongoing land use at the Site, and the potential exposure pathways for people from this landuse;
- Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (MfE Petroleum Guidelines) (MfE, 1999) for Commercial / Industrial land use ALL PATHWAYS. Values are taken from Table 4.11 for Sand at >1 m bgl. These guidelines are specific to the risk to people presented from hydrocarbons in soil;
- Australian and New Zealand Guidelines for Fresh Marine Water Quality (ANZWQG, 2018) Toxicant Default Guideline Values for Sediment Quality. Values are taken from toxicant Default Guideline Values (DGV's) and upper Guideline Values (GV-high). These guidelines have been selected to determine potential environmental impact from re-use of the soil within the marine environment; and
- ANZWQG Toxicant Default Guideline Values for Sediment Quality for Marine Water Quality. These guidelines have been used to assess potential environmental impact from leaching of contaminants if placed within the marine environment.

4.4 Soil Analytical Results

A summary of the laboratory results is presented in Table 6. The full results are contained in the laboratory analysis report provided in Appendix E. The following is also noted in regard to the soil sample laboratory analytical results:

- Concentrations of all key CoPC were below the adopted NESCS SCS and respective Soil Guideline Values (SGVs) criteria for the protection of human health for Commercial / Industrial land use (consistent with the proposed future use of the Site) in all soil samples submitted for analysis from the Site;
- **Heavy Metals:**
  - Concentrations of arsenic, boron, cadmium, chromium, mercury and nickel were typically within respective typical background concentration ranges (for the Hawkes Bay region). Where concentrations did exceed the adopted background concentrations, such exceedances were marginal and did not appear to be representative of a contaminant source;
  - Concentrations of copper, lead and zinc exceeded typical background concentration ranges (for the Hawkes Bay region) in soils sampled from all three 'Sections' but were below the adopted NESCS SCS / SGVs; and,
  - Concentrations of copper and zinc in one sample (SS8_2.5) and concentrations of lead in four samples (SS3_1.0, SS5_1.0, SS8_0.5 and SS8_2.5) exceeded ANZWQG DGV's but were below the GV-high.
- **Asbestos:**
  - Asbestos was identified in seven samples (SS2_0.0, SS2_0.5, SS3_1.0, SS5_1.0, SS7_1.0, SS8_0.5 and SS8_2.5) consisting of chrysotile (white asbestos) and amosite (brown asbestos) in the form of both ACM debris and loose fibres; and,
  - Concentrations of asbestos in all samples were below NZ GAMAS guidelines.
- **TPH:**
  - Low-level concentrations of TPH were reported in five soil samples analysed. These concentrations were typified by 'heavy-end' C_{15}-C_{36}; and,
  - Concentrations of all TPHs were within the adopted MfE Petroleum Guidelines for commercial / industrial used and the protection of maintenance / excavations workers in all soil samples analysed;
- **PAH:**
  - Concentrations of all PAHs of interest exceeded exceed typical background concentration ranges (for the Hawkes Bay region) but were below the adopted MfE Petroleum Guidelines for commercial / industrial use and the protection of maintenance / excavations workers.

4.5 Toxicity Characteristic Leaching Procedure (TCLP)

Four samples with concentrations of heavy metals at the higher end of the range of concentrations were submitted to Hill Laboratories for TCLP analysis. These were samples SS3_1.0, SS4_2.5, SS6_2.5, and SS8_2.5. Leachate from the TCLP was subsequently analysed for heavy metals.

TCLP results were assessed against a 95% level of species protection given the immediately adjacent marine environment is high energy and tidally well flushed and not considered to be a sensitive habitat (noting details regarding sensitivity of adjacent environments in the 4Sight Ecology report – refer to Section 5 for further detail on this).

The concentrations of CoPC in leachate collected following completion of a Toxicity Characteristic Leaching Procedure (TCLP) on selected soil samples only marginally exceeded the ANZWQG Default Guideline Values (DGV's) for copper and zinc in one location.

Summary of Heavy Metal TCLP in Soil Samples

Soil Sample Name	Sample Depth (m bgl)	Heavy Metals (g/m3)								
		Boron	Mercury	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
SS3	1.0	0.17	< 0.0021	< 0.021	< 0.0011	< 0.011	< 0.011	0.0033	< 0.011	0.036
SS4	2.5	0.14	< 0.0021	< 0.021	< 0.0011	< 0.011	< 0.011	< 0.0021	< 0.011	0.049
SS6	2.5	0.13	< 0.0021	< 0.021	0.0011	< 0.011	< 0.011	< 0.0021	< 0.011	0.051
SS8	2.5	0.12	< 0.0021	< 0.021	0.0011	< 0.011	0.015	0.0023	< 0.011	0.185
ANZWQG Marine DGV's - 95% Protection[1]		0.94	0.0004	0.024	0.0055	0.0044	0.0013	0.0044	0.07	0.08
ANZWQG Marine DGV's - 99% Protection[2]		0.34	0.0001	0.001	0.0007	0.00014	0.0003	0.0022	0.007	0.0033

Notes:

All results are expressed in g/m3
Any results exceeding adopted criteria are shaded accordingly.

1: ANZWQG Toxicant Default Guideline Values for Sediment Quality for Mmarine Water Quality - 95% Level of Species Protection. Exceedances are in green.
2: ANZWQG Toxicant Default Guideline Values for Sediment Quality for Mmarine Water Quality - 99% Level of Species Protection. Exceedances are in blue.

Summary of Heavy Metals, PAH and OCP Concentrations in Soil Samples

Soil Sample Name	Sample Depth (m bgl)	Sample Date	Heavy Metals (mg/kg)									Asbestos				Total Petroleum Hydrocarbons (TPH)				PAH																							
			Boron	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Presence / Absence	Description of Asbestos Present	% W/W ACM	% W/W Fibrous Asbestos or Asbestos Fines	C7-C9	C10-C14	C15-C36	Total hydrocarbons (C7 - C36)	1-Methylnaphthalene	2-Methylnaphthalene	Acenaphthylene	Acenaphthene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene (BAP)	Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	Benzo[a]pyrene Toxic Equivalence (TEF)	Benzo[e]pyrene + Benzo[j]fluoranthene	Benzo[j]fluoranthene + Benzo[k]fluoranthene	Benzo[ghi]perylene	Benzo[k]fluoranthene	Chrysene	Dibenzo[a,h]anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Perylene	Phenanthrene	Pyrene	Total PAHs
SS1	0.0	21-Oct-21	< 20	5	0.1	9	11	8.8	< 0.10	8	42	NAD	-	< 0.001	< 0.001	< 20	< 20	< 40	< 80	< 0.011	< 0.011	< 0.011	< 0.011	0.014	0.064	0.072	0.11	0.1	0.07	0.041	0.044	0.033	0.057	0.011	0.1	< 0.011	0.039	< 0.06	0.016	0.045	0.111	0.7
	1.0	21-Oct-21	< 20	8	< 0.10	9	11	20	< 0.10	13	59	NAD	-	< 0.001	< 0.001	< 20	< 20	< 40	< 80	< 0.012	< 0.012	0.021	< 0.012	< 0.012	0.059	0.091	0.13	0.13	0.098	0.053	0.065	0.04	0.052	0.012	0.118	< 0.012	0.059	< 0.06	0.026	0.03	0.124	0.9
SS2	0.5	21-Oct-21	< 20	7	< 0.10	12	22	48	< 0.10	12	91	Chrysotile (White Asbestos) detected.	Loose fibres	< 0.001	< 0.001	< 20	< 20	< 40	< 80	< 0.012	< 0.012	0.056	0.013	0.064	0.24	0.3	0.45	0.45	0.31	0.164	0.28	0.132	0.2	0.047	0.46	0.03	0.27	< 0.06	0.068	0.28	0.5	3.5
	2.5	21-Oct-21	< 40	8	< 0.2	13	18	48	< 0.2	14	98	Chrysotile (White Asbestos) detected.	Loose fibres	< 0.001	< 0.001	< 20	< 20	< 40	< 80	< 0.012	< 0.012	0.022	< 0.012	0.02	0.11	0.142	0.2	0.2	0.144	0.078	0.099	0.067	0.091	0.015	0.21	< 0.012	0.1	< 0.06	0.031	0.074	0.165	1.4
SS3	0.0	21-Oct-21	< 20	5	< 0.10	14	17	10.2	< 0.10	16	60	NAD	-	< 0.001	< 0.001	< 20	< 20	< 40	< 80	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	0.032	0.039	0.05	0.05	0.04	0.025	0.029	0.015	0.025	< 0.011	0.067	< 0.011	0.024	< 0.06	< 0.011	0.021	0.049	0.4
	1.0	21-Oct-21	< 20	7	0.13	11	24	50	< 0.10	12	131	Chrysotile (White Asbestos) detected.	ACM debris and Loose fibres	< 0.001	< 0.001	< 20	< 20	57	< 80	0.014	< 0.012	0.094	0.035	0.125	0.57	0.86	1.23	1.22	0.91	0.49	0.64	0.34	0.47	0.113	0.86	0.028	0.65	< 0.06	0.22	0.35	0.94	7.7
SS4	0.0	21-Oct-21	< 20	5	< 0.10	10	12	8.5	< 0.10	10	55	NAD	-	< 0.001	< 0.001	< 20	< 20	< 40	< 80	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	0.015	0.013	< 0.03	< 0.03	0.021	0.012	0.014	< 0.011	0.011	< 0.011	0.026	< 0.011	0.011	< 0.06	< 0.011	0.011	0.024	< 0.3
	0.5	21-Oct-21	< 20	6	0.16	10	15	41	< 0.10	12	110	NAD	-	< 0.001	< 0.001	< 20	< 20	102	107	< 0.012	< 0.012	0.04	< 0.012	0.052	0.21	0.27	0.39	0.39	0.29	0.163	0.187	0.127	0.188	0.034	0.4	0.016	0.163	< 0.06	0.072	0.14	0.44	2.8
	2.5	21-Oct-21	< 20	8	0.13	11	16	37	< 0.10	14	144	NAD	-	< 0.001	< 0.001	< 20	< 20	< 40	< 80	< 0.012	< 0.012	0.034	< 0.012	0.033	0.17	0.23	0.33	0.32	0.24	0.137	0.16	0.106	0.159	0.026	0.3	< 0.012	0.158	< 0.06	0.053	0.131	0.46	2.4
SS5	0.0	21-Oct-21	< 20	5	< 0.10	6	7	9.3	< 0.10	6	36	NAD	-	< 0.001	< 0.001	< 20	< 20	91	93	< 0.012	< 0.012	< 0.012	< 0.012	0.037	0.047	0.06	0.06	0.047	0.027	0.03	0.018	0.034	< 0.012	0.068	< 0.012	0.028	< 0.06	< 0.012	0.035	0.069	0.5
	1.0	21-Oct-21	< 20	8	0.13	10	18	57	< 0.10	10	111	Chrysotile (White Asbestos) detected.	ACM debris and Loose fibres	< 0.001	< 0.001	< 20	< 20	44	< 80	< 0.012	< 0.012	0.013	< 0.012	0.013	0.059	0.082	0.12	0.12	0.08	0.055	0.069	0.028	0.053	0.012	0.103	< 0.012	0.049	< 0.06	0.02	0.033	0.12	0.8
SS6	0.0	21-Oct-21	< 20	6	< 0.10	9	51	14.4	< 0.10	9	59	NAD	-	< 0.001	< 0.001	< 20	< 20	< 40	< 80	< 0.011	< 0.011	< 0.011	< 0.011	0.013	0.048	0.064	0.08	0.08	0.068	0.038	0.044	0.027	0.051	< 0.011	0.1	< 0.011	0.041	< 0.06	0.015	0.063	0.101	0.7
	0.5	37	7	0.14	15	24	26	0.14	12	106	NAD	-	< 0.001	< 0.001	< 20	< 20	< 40	< 80	< 0.011	< 0.011	0.018	< 0.011	0.013	0.075	0.107	0.15	0.15	0.104	0.065	0.076	0.047	0.065	0.011	0.127	< 0.011	0.066	< 0.06	0.022	0.064	0.104	1
	2.5	21-Oct-21	< 20	10	0.13	16	23	43	< 0.10	12	132	NAD	-	< 0.001	< 0.001	< 20	< 20	< 40	< 80	< 0.012	< 0.012	0.072	0.027	0.077	0.39	0.45	0.65	0.65	0.51	0.27	0.29	0.21	0.35	0.052	0.79	0.024	0.28	< 0.06	0.101	0.42	0.81	5.1
SS7	0.0	21-Oct-21	< 20	6	0.13	12	15	13.2	< 0.10	11	55	NAD	-	< 0.001	< 0.001	< 20	< 20	< 40	< 80	< 0.011	< 0.011	< 0.011	< 0.011	0.011	0.016	0.016	< 0.03	< 0.03	0.025	0.015	0.019	0.011	0.014	< 0.011	0.03	< 0.011	0.013	< 0.06	< 0.011	0.015	0.031	< 0.3
	1.0	21-Oct-21	< 20	8	0.15	11	20	45	< 0.10	16	167	Chrysotile (White Asbestos) detected.	Loose fibres	< 0.001	< 0.001	< 20	< 20	< 40	< 80	< 0.012	< 0.012	0.018	< 0.012	0.025	0.193	0.24	0.34	0.34	0.23	0.139	0.156	0.107	0.172	0.024	0.43	< 0.012	0.157	< 0.06	0.05	0.093	0.48	2.6
SS8	0.0	21-Oct-21	49	5	< 0.10	13	33	38	< 0.10	9	98	NAD	-	< 0.001	< 0.001	< 20	< 20	< 40	< 80	< 0.011	< 0.011	< 0.011	< 0.011	0.015	0.059	0.073	0.1	0.1	0.079	0.045	0.052	0.028	0.066	< 0.011	0.147	< 0.011	0.05	< 0.06	0.015	0.106	0.142	0.9
	0.5	< 20	12	0.17	14	37	72	< 0.10	11	176	Amosite (brown Asbestos) and Chrysotile (White Asbestos) detected.	ACM debris and Loose fibres	< 0.001	< 0.001	< 20	< 20	< 40	< 80	0.011	0.011	< 0.011	< 0.011	0.012	0.061	0.096	0.12	0.12	0.092	0.054	0.042	0.037	0.057	< 0.011	0.112	< 0.011	0.043	< 0.06	0.021	0.053	0.128	0.9
	2.5	< 20	10	0.19	14	76 #1	68	< 0.10	13	320 #1	Chrysotile (White Asbestos) detected.	Loose fibres	< 0.001	< 0.001	< 20	< 20	114	117	0.015	0.015	0.019	< 0.012	0.021	0.114	0.155	0.22	0.22	0.161	0.097	0.113	0.068	0.108	0.017	0.21	< 0.012	0.103	< 0.06	0.032	0.099	0.21	1.6
Background Concentrations (Hawkes Bay) [1]			-	9	0.7	24	32	27	-	17	105	BDL	-	BDL	BDL	-	-	-	-	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
NESCS SCS – Commercial / industrial outdoor worker (unpaved) [2]			>10,000	70	1,300	> 10,000	> 10,000	3,300	4,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NEPM - Commercial / industrial [3]			-	-	-	-	-	-	-	6 000	400,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NZ GAMAS - Semi Quantitative Asbestos Guidelines [4]			-	-	-	-	-	-	-	-	-	NAD	-	0.05	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MfE Petroleum Guidelines - Commercial / Industrial use less than 1m [5]			-	-	-	-	-	-	-	-	-	-	-	-	-	120 (m)	(1,500) (7,x)	NA (2)	-	-	-	-	-	-	-	(11) [d]	-	-	-	-	-	-	-	-	-	(190) [e]	-	-	NA (2)	-
MfE Petroleum Guidelines – Maintenance/excavation workers [6]			-	-	-	-	-	-	-	-	-	-	-	-	-	120	6,500	NA (2)	-	-	-	-	-	-	-	25	-	-	-	-	-	-	-	-	-	640	-	-	NA (2)	-
MfE Petroleum Guidelines - Commercial / Industrial use 1-4m [7]			-	-	-	-	-	-	-	-	-	-	-	-	-	120 (m)	(1,900) (7,x)	NA (2)	-	-	-	-	-	-	-	(25) (4,m)	-	-	-	-	-	-	-	-	-	(230) (4,v)	-	-	NA (2)	-
ANZWQG Sediment Guidelines - Toxicant Default Guideline Values [8]			-	20	1.5	80	65	50	0.15	21	200	-	-	-	-				280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10, 000
ANZWQG Sediment Guidelines - Toxicant Upper Guideline Values [9]			-	70	10	370	270	220	1	52	410	-	-	-	-				550	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50, 000

Notes:

All metal, PAH and OCP results and criteria are expressed in mg/kg dry weight
Any results exceeding adopted criteria are shaded accordingly.
PAH = Polycyclic Aromatic Hydrocarbons
OCP = Organochlorine Pesticides
BDL = Below Detection Limit

1: Hawkes Bay Region: Background soil concentrations for managing soil quality (Landcare Research Manaaki Whenua, 2014). Exceedances are in green
2: 'National Environmental Standards for Managing and Assessing Contaminants in Soil To Protect Human Health' - Soil Contaminant Standards (SCS), (MfE, 2012) Commercial/industrial (outdoor worker) land use scenario.
3: National Environment Protection (Assessment of Site Contamination) Measure, (NEPC, 2011) commercial/industrial health investigation level - Table 1A(1) Health investigation levels for soil contaminants - Commercial/industrial D.
4: GAMAS - New Zealand Guidelines for Assessing and Managing Asbestos in Soils.
5: MfE Petroleum Guidelines (Tables 4.11 and 4.14) - Commercial / Industrial - All Pathways (<1m bgl) – Sand. The following notes the limiting pathway for each criterion: v - volatilisation, s - soil ingestion, d - dermal, m - maintenance/excavation worker, p - produce, x - PAH surrogate. Brackets denote values exceed the threshold likely to correspond to formation of residual separate phase hydrocarbons.
6: MfE Petroleum Guidelines (Table 4.19) - Maintenance/excavation workers – Sand. NA - Indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered onsite . Values are taken from Tables 4.19.
7: MfE Petroleum Guidelines (Tables 4.11 and 4.14) - Commercial / Industrial - All Pathways (1 - 4m bgl) – Sand. The following notes the limiting pathway for each criterion: v - volatilisation, s - soil ingestion, d - dermal, m - maintenance/excavation worker, p - produce, x - PAH surrogate. Brackets denote values exceed the threshold likely to correspond to formation of residual separate phase hydrocarbons.
8: ANZWQG Sediment Guidelines - Toxicant Default Guideline Values (DGV's) indicate the potneital sediment toxicity. Concerntrations of contaminants below DGV's represent a lower risk.
9: ANZWQG Sediment Guidelines - Toxicant Upper Guideline Values (GV-high) indicate the potneital sediment toxicity. Concerntrations of contaminants above GV-high represent a higher risk.
#1 Replicate analyses performed on this sample as part of Hills in-house Quality Assurance procedures showed greater variation than would normally be expected. This may reflect the heterogeneity of the sample. The average of the results of the replicate analyses has been reported.

5 DISCUSSION

Based on a review of the background information, and from the Site walkover and inspection, the Site has been subject to HAIL G:3 "Landfill sites" associated with historic filling. Field observations as part of this DSI indicated the presence of buried waste, typified by concrete, brick, rubble, asbestos pipe and copper pipe. As the scope of this DSI involved targeted sampling associated with the proposed reclamation, the full lateral and vertical extent of the previous uncontrolled filling activities have not been delineated.

The NESCS Users Guide details that commercial / industrial outdoor worker (unpaved) is based on the following assumption: "*Commercial / industrial site with varying degrees of exposed soil. Exposure of outdoor workers to near-surface soil during routine maintenance and gardening activities with occasional excavation as part of maintaining subsurface utilities (i.e., a caretaker or site maintenance personnel). Also conservatively applicable to outdoor workers on a largely unpaved site*." SCS have been derived for this land use.

Contaminants in Soil

Concentrations of selected heavy metals, PAHs and TPHs in all soil samples analysed were elevated above the adopted background concentrations ranges; however, the concentration of CoPC (arsenic, boron, cadmium, chromium, copper, lead, mercury nickel, zinc, PAH, TPH and asbestos) in all samples analysed (SS1 – SS8) were below the NESCS SCS criteria for commercial / industrial outdoor worker (unpaved) and maintenance / excavation worker land use scenarios. Potential depth and receptor pathway changes to soil samples are not considered relevant due to the proposed reuse of soils for redevelopment works, and due to the generally homogenous nature of the encountered sub-surface soils.

Asbestos

ACM fragments were identified throughout the Site in the form of asbestos pipe. While soil samples were collected in the general vicinity of ACM fragments, soil sampling results are not considered sufficient to delineate the quantity of ACM fragments present on Site. As the quantities of non-friable ACM fragments on Site are unknown, the proposed redevelopment works are required to comply with controls set out in the WorkSafe Approved Code of Practice for Class B asbestos removal and the NZGAMS guidelines. The proposed redevelopment works must be overseen by a licenced asbestos removalist.

Sediment

The ANZWQG GV-high represents the median value at which adverse effects are anticipated in half of the organisms exposed, and is an indicator of potential toxicity in sediment. The ANZWQG note that as such, the GV-high could be considered more likely to be associated with biological effects than the DGV but the extent of that impact is not necessarily known. Concentrations of contaminants above or below the DGVs or GV-high should not be considered acceptable or unacceptable, but rather a representation of higher or lower risk. As the concentrations of all selected heavy metals, PAHs and TPHs were generally below the ANZWQG DGVs (with the exception of selected heavy metals in four samples), and all were below the ANZWQG GV-high, the reuse of these soils in reclamation activities is considered unlikely to present a risk to the marine environment.

Concentrations of CoPC in TCLP marginally exceeded the ANZWQG DGV's (95% level of species protection) for zinc and copper in one sample. However soils for reuse as part of the reclamation are proposed to be compacted and sealed within a hardstand and armoured seawall to prevent stormwater and seawater infiltration. Therefore, the risk of leachate with elevated concentrations of heavy metals entering the marine environment is considered low. In addition, should some leachate discharge into the marine environment, the tidal prism and open ocean present a high dilution factor. This is support by the 4Sight Ecology Report which notes that '*Water quality effects such as visible sediment plumes, associated with the construction of the reclamation, including any discharges from within the reclamation area, should be localised. Given the open coastal aspect to the site, and its high energy, it is a well flushed locality. Any plumes should rapidly dissipate and not cause off site adverse ecological or significant water quality related impacts*'.

Overall, it is considered highly unlikely that the reuse of soils at the Site and in the adjacent marine environment will pose a risk to human health or the marine environment as none of the CoPC were found to exceed NESCS SCS, NZGAMAS, ANZWQG GV-high, NEPM or MfE petroleum guidelines. In addition, the physical characteristics of the

receiving environment, as described in the 4Sight Ecology report, are such that if contaminants are released in sediment during establishment of the temporary protective bund for the works area and the filling of the area being reclaimed, these are unlikely to have an adverse environmental effect. The area around EPL is also tidally well flushed as evidenced by monitoring data collected from the basin and discussed in the 4Sight WLY DSI (2016) and the 4Sight Port Entry Area Redevelopment DSI (2019). Dilution potential for small amounts of residual contaminants which may be leached or lost from EPL soils is expected to be high and to negate any associated water quality risk.

Contaminants in Soil - Stormwater Upgrade

While soils proposed for disturbance associated with the stormwater system upgrades in the southern section of the SLY were not sampled as part of this investigation, based on previous investigations undertaken by EAM and WSP (refer to Section 3.1), it is inferred that levels of contaminants encountered during stormwater works will be representative of what was encountered in this DSI. The Site Assessment of Asbestos Report (EAM, 2021) confirmed the presence of asbestos within the Site area proposed for stormwater upgrades in the southern section of the SLY. These findings align with the findings of this DSI which sampled the remaining sections of the SLY seawall.

Soil sampling undertaken by WSP found that concentrations of heavy metals and PAH were below the adopted assessment criteria for commercial / industrial outdoor worker land use scenario with some minor exceedances above the predicted Hawkes Bay region background concentrations. The soil sampling results in the WSP report align with the results of this DSI. As such, we consider that soils in the bund to be disturbed as part of stormwater upgrades are highly representative of soils to be encountered as part of seawall redevelopment works.

Furthermore, it is understood (based on WSP and EAM reports) that soils across the wider historically reclaimed Property area are consistent with those sampled as part of the DSI in the sense that they contain brick, rubble, sand and asbestos fragments. Therefore, soils to be disturbed as part of stormwater upgrades are expected to contain asbestos and potentially low levels of heavy metals, PAH and TPH within the assessment criteria for commercial / industrial outdoor worker (unpaved) and maintenance / excavation worker land use scenarios, and management of soils excavated from these areas should be managed in the same way as soils excavated from the Site.

Recommended mitigation measures

Preparation and implementation of a Site Management Plan (SMP), which will form part of the overarching Construction Management Plan (CMP), is considered an appropriate means to achieve the desired outcome of avoiding and managing potential environmental effects associated with the proposed work. The SMP should be developed in accordance with the CLMG, and should include the following:

- Contaminated soil management procedures
  - Erosion and sediment controls
  - Dust control
  - Stockpile management
  - Soil handling controls
  - Soil disposal requirements
  - Asbestos contaminated soil management
  - Decontamination procedures
  - Unexpected discovery protocols
- Water Management
  - Stormwater management
  - Disposal of water
- Health and Safety Controls
  - Work area restrictions
  - Personal protective equipment
  - Personal hygiene
  - Hazardous identification
  - Emergency procedures.

5.1 Regulatory Assessment

Concentrations of CoPC in soil across the Site are acceptable for the proposed commercial / industrial worker and maintenance / excavation worker uses and are at concentrations which are highly unlikely to pose a risk to human health.

Soil sampling undertaken across the Site and the use of findings from existing reports are considered suitable to quantify contaminants within soils and analytes are considered reflective of the Site's current and historical land use. However, due to the nature of the soils / fill on Site there is potential for unexpected discovery of contaminants. The use of a Site Management Plan (SMP) is recommended to outline protocols for unexpected discoveries.

In light of the above, it is considered acceptable for EPL to reuse disturbed soils on Site for the proposed redevelopment and stormwater upgrade works from a contaminated land perspective, provided protocols outlined in a SMP are followed, and given works are undertaken in accordance with WorkSafe's Approved Code of practice, the NZGAMS guidelines for Class B asbestos removal and be overseen by a licenced asbestos removalist.

NESCS

Soil disturbance thresholds associated with the proposed development and stormwater upgrades will not meet the Permitted Activity criteria under Regulation 8(3) of the NESCS as the volume of soil to be disturbed, and potential removed, from the Site together with the duration of soil disturbance will exceed the permitted activity thresholds.

Although concentrations of CoPC are above typical background concentrations, they do not exceed the applicable NESCS SCS, and therefore Controlled Activity consent under Regulation 9 of the NESCS will be required for the proposed soil disturbance and reuse of disturbed soils on Site.

6 CONCEPTUAL SITE MODEL

Central to the requirement of the assessment of risk is the development of a CSM, identifying each contaminant source and the associated receptor exposures. The environmental risk assessment is based on a 'contaminant (source) → exposure pathway → receptor' (SPR linkage) methodology. This relationship allows an assessment of potential environmental risk to be determined in accordance with the requirements of MfE CLMG No.5.

The CSM presented in the Table 7 applies to the seawall development and provides a detailed description of the identified potential sources, pathways and receptors, and a qualitative assessment of complete SPR linkages. A risk is only present if there is a complete SPR linkage. The CSM detailed in Table 7 is not intended to be an exhaustive assessment of all potential SPR linkages. The CSM has been developed based on available information, any omissions are not indicative of no risk.

Table 8: Conceptual Site Model

Source	Pathway	Receptor	Human Health and Environmental	Discussion	SPR Linkage
CoPC (heavy metals, TPH and PAHs) in soils	Direct contact, inhalation and/or ingestion	Maintenance / excavation Workers	Human Health	Soil sample data from both surface soils and from depth across the sections of the sea wall to be disturbed and are generally consistent with typical background concentrations (with only limited exceedances). Where exceedances of background concentrations are present (lead, zinc, TPH, PAHs) they are below the adopted human health assessment criteria.	**Incomplete** Concentrations of heavy metals, PAH and TPH do not exceed the adopted NESCS SCS / MfE Petroleum Hydrocarbon Guidelines criteria for the proposed Site use (commercial / industrial land use).
		Site users			**Incomplete** The risk to future users to the Site is considered incomplete given concentrations of heavy metals, PAH and TPH do not exceed the NESCS assessment criteria for the proposed Site use (commercial / industrial and maintenance / excavation use). The proposed development is also within a secure area of Eastland Port, therefore limiting the number of users to the Site.
	Leaching to groundwater and/or ocean	Groundwater / Ocean	Environmental	Assessment of leachable concentration of heavy metals has been undertaken (by Toxicity Characteristic Leaching Procedure (TCLP). The TCLP results have shown marginal exceedance of DGV's for zinc and copper.	**Unlikely** Although TCLP results indicate marginal exceedances for copper and zinc for 95% level of species protection in one sample, the potential for this to occur is considered highly unlikely on basis that reclaimed material will be compacted, sealed in hardstand to prevent infiltration, and bunded with a sea wall. In addition, should some leachate discharge into the marine environment, it will enter a high energy open ocean with a high degree of tidal flushing and significant potential for dilution. Overall, the potential risk to the marine environment is considered highly unlikely.

Source	Pathway	Receptor	Human Health and Environmental	Discussion	SPR Linkage
Asbestos in Soils	Inhalation and/or Ingestion	Maintenance / excavation Workers Site users	Human Health	Although asbestos in soil samples did not exceed NZ GAMAS guidelines, fragments of asbestos were identified in the form of buried asbestos pipe. As fragments of asbestos were identified, the quantity and exposure risk of these fragments are unknown and therefore controls are required to be put in place during redevelopment works.	**Possible** Asbestos is not present as fibrous asbestos / asbestos fines in soil at concentrations which would pose a risk to human health. However, asbestos fragments / ACM were noted on soils across the Site. These will require removal/ management in accordance with WorkSafe's Approved Code of practice, the NZ GAMAS guidelines for Class B asbestos removal and be overseen by a licenced asbestos removalist. Without removal, the asbestos / ACM has the potential to pose a risk to human health if not managed properly.

7 CONCLUSIONS

This DSI has focused on the Southern Log Yard (SLY) seawall as the area of the Property proposed for redevelopment, along with the northern most area of the proposed stormwater upgrade ('the Site'). The Site subject to this investigation excludes the southern area of the SLY subject to stormwater upgrades; however, this area has been addressed in previous investigations which are summarised as part of this DSI.

The findings of this DSI include the following:

- The Site was part of the seabed of the Pacific Ocean until prior to 1988. By 1988, evidenced through historic aerial imagery, significant reclamation had occurred. Reclamation is considered 'landfilling' which is an activity listed on the MfE HAIL as activity G3: Cemeteries and waste recycling, treatment and disposal – Landfill Sites;
- Soil sampling involved the collection of 32 samples from eight locations at depths of between 0.0 – 2.5 meters (m) below ground level (bgl) throughout the Site. Soil samples were analysed for a range of contaminants of potential concern (CoPC) associated with land filling activities including heavy metals, total petroleum hydrocarbons (TPHs), polycyclic aromatic hydrocarbons (PAHs) and asbestos;
- Concentrations of all key CoPC were below the adopted NESCS Soil Contaminant Standards (SCS) for the protection of human health for Commercial / Industrial land use (consistent with the proposed future use of the Site) in all soil samples submitted for analysis from the Site. Concentrations of CoPC were also generally below the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZWQG) Default Guideline Values (DGVs) for sediment quality, with the exception of marginal exceedances of copper, lead and/or zinc in four samples;
- Concentrations of heavy metals in soils were variable when compared to the adopted background concentration ranges (for the Hawkes Bay Region). Concentrations of arsenic, boron, cadmium, chromium, mercury and nickel were typically within the respective typical background concentration ranges, while concentrations of copper, lead and zinc typically exceeded the respective background concentration ranges. Concentrations of PAH congeners were also typically above the laboratory limit of reporting (LOR), and therefore above the adopted background concentration ranges;
- Asbestos was identified in seven soil samples analysed in the form of both asbestos containing matter (ACM) debris and loose fibres. However, reported concentrations of asbestos in soils were all below the adopted human health assessment criteria (<0.001% wt/wt);
- It is considered highly unlikely that sediment from CoPC will pose a risk to the marine environment during reclamation given toxicity concentrations of these contaminants only marginally exceed ANZWQG DGV's for lead, zinc and copper in four of the 32 samples analysed;
- The concentrations of copper and zinc in leachate collected following completion of Toxicity Characteristic Leaching Procedure (TCLP) marginally exceeded the ANZWQG DGV's (95% level of species protection) in one sample (SS8). The concentration of copper, lead and/or zinc exceeded the ANZWQG DGVs (99% level of species protection) in all samples; and,
- While soils proposed for disturbance associated with the stormwater system upgrades in the southern section of the SLY were not sampled as part of this investigation, based on previous investigations undertaken by EAM and WSP (refer to Section 3.1), it is inferred that levels of contaminants encountered during stormwater works will be representative of what was encountered in this DSI.

Based on the findings of this DSI, the following recommendations have been made:

- The Site and Property are subject to the NESCS, based on historic landfilling and ongoing port related activities;
- Concentrations of identified CoPC in soil at the Site are highly unlikely to pose a risk to human health or the marine environment as part of the proposed reclamation. Specifically, it is considered highly unlikely that CoPC in sediment will pose a risk to the marine environment during the reclamation given toxicity concentrations of these contaminants only marginally exceed ANZWQG DGV's (lead, zinc and copper) in four samples, and the proposed reclamation will contain contaminants beneath hardstand and behind an armoured seawall;

- Notwithstanding that concentrations of some CoPC are above typical background concentrations and the expected presence of some asbestos containing material, soil contamination does not exceed the applicable standards for commercial / industrial landuse in regulation 7 of the NES-CS;
- To support the Resource Consent application a Site Management Plan (SMP) prepared by a Suitably Qualified and Experienced Person (SQEP), that details the necessary procedures to mitigate any potential human health and environmental risks, and procedures for managing unexpected discoveries of contamination will be required; and,
- Given suspected asbestos containing material (ACM) pipe was observed in the sub-surface, soil disturbance works, including as part of stormwater upgrades must be undertaken in accordance with WorkSafe's Approved Code of practice, the New Zealand Guidelines for Assessing and Managing Asbestos in Soils (NZGAMS) guidelines for Class B asbestos removal, and be overseen by a licenced asbestos removalist;
- Soil to be excavated from the Site is suitable for re-use / retention on-site and for use as part of the reclamation from a human health and environmental risk perspective due to the nature of and very low levels of soil contaminants, the containment of soils beneath hardstand and behind an armoured seawall, and the industrial nature of the landuse;
- If soil is to be removed from the Site, it will require appropriate disposal at a suitably licensed facility and cannot be considered cleanfill due to the presence of heavy metals and PAHs above adopted background concentrations and due to the presence of asbestos fragments; and,
- Any soil that is to be imported to Site for the purpose of reinstating the ground should be suitable to comply with the definition of 'cleanfill', as per the MfE document 'A Guide to the Management of Cleanfills (MfE, 2002).

This investigation and associated reporting have been carried out and reviewed by a SQEP in accordance with the requirements of the NESCS.

SQEP STATEMENT

I, James Blackwell of 4Sight Consulting Ltd certify that this DSI meets the requirements of the NESCS because it has been:

- Reviewed and certified by a suitably qualified and experienced practitioner (SQEP);
  - Evidence of my qualifications as a SQEP is in the form of me being a Certified Environmental Practitioner – Site Contamination Specialist (CEnvP SC) No. SC41083. My approved seal is included on the signature page of this report; and
- The report has been prepared in general accordance with CLMG No. 1 and CLMG No. 5 (revised 2021).

This DSI has concluded that concentrations of identified CoPC are above background concentrations, but are highly unlikely to pose a risk to human health or the marine environment. Consent as a Controlled Activity under Regulation 9 of the NESCS is recommended for the proposed soil disturbance.

A QA/QC non-conformance has been identified through sample collection and inappropriate temporary storage of samples by the client engaged contractor, engaged to undertake soil sampling. Based on the results of this DSI it is considered highly unlikely that the QA/QC non-conformance has impacted on the outcomes of the investigation.

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LIMITATIONS

This document does not include any assessment or consideration of potential health and safety issues under the Health and Safety at Work Act 2015. 4Sight Consulting has relied upon information provided by the Client and other third parties to prepare this document, some of which has not been fully verified by 4Sight Consulting. This document may be transmitted, reproduced or disseminated only in its entirety.

From a technical perspective, the subsurface environment at any Site may present substantial uncertainty. It is a heterogeneous, complex environment, in which small subsurface features or changes in geologic conditions can have substantial impacts on water, vapour and chemical movement. 4Sight Consulting's professional opinions are based on

its professional judgement, experience, and training. This document was prepared based on information provided by others. Should additional information become available, this report should be updated accordingly.

Appendix A:

Development Plans

Appendix B:

GDC HAIL Enquiry

Appendix C:

Historic Aerial Photographs

Appendix D:

Site Photographs

Appendix E:

Laboratory Analysis Results

Appendix F:

Seawall Bund Sampling Results