

6.1 INTRODUCTION

This *Section* presents an environmental assessment of potential land contamination impacts. Portions of the study area are listed in the San Tin Outline Zoning Plan (No. S/YL-ST/1, 1994) for "Other Uses" which includes Container Back Up Uses and Service Stations. Site visits confirmed that a number of container storage yards, lorry parking areas, and truck maintenance areas are present in the vicinity of the proposed development. These properties and land uses may potentially have contaminated the underlying soil and groundwater at the proposed development. However, as the proposed MDC will mainly be excavated through fish ponds and rural wetlands, volumes of potentially contaminated soils are not expected to be significant.

This assessment aims to identify any potential land contamination impacts associated with the proposed Eastern MDC works based on the preliminary design, and to identify and investigate issues of key concern that require further investigation in a later stage, including any soil or groundwater sampling.

The issue of handling and disposal of contaminated materials, including mud/sediment is discussed in *Section 4: Water Quality* and *Section 5: Solid Waste Management*. Further requirements for assessment of site conditions and a quantification of the exact extent of any contamination should be performed in accordance with the recommended Contamination Assessment Plan (CAP) presented in *Annex 6-A*, at the detailed design stage. This CAP should be reviewed immediately prior to the site investigation works and submitted to the EPD for approval.

6.2 ENVIRONMENTAL LEGISLATION AND NON-STATUTORY GUIDELINES

Assessments of land contamination sources and the potential impacts to particular development projects are investigated under the EPD's direction and oversight in accordance with their Practice Note for Professional Persons (*ProPECC PN 3/94*), *Contaminated Land Assessment and Remediation*, and the 1997 Technical Memorandum on Environmental Impact Assessment Process (EIA TM).

In accordance with *ProPECC PN 3/94*, the assessment evaluation should be made to:

- provide a clear and detailed account of the present use of the land in question and the relevant past land use history, in relation to possible land contamination;
- identify those areas of potential contamination and associated impacts, risks or hazards; and
- as required, submit a plan to evaluate the actual contamination conditions for soil and/or groundwater.

In *ProPECC PN 3/94*, the Dutch Ministry of Public Housing, Land-Use and Environment Guidelines (1994) are used as criteria by the EPD for evaluating what is classified as a contaminated material.

Under the EIAO TM, *Annex 19: Guidelines for Assessment of Other Impacts*, consideration shall be given to a number of potentially contaminating historical land uses, including oil installations and repair workshops. As these potentially contaminating land uses are identified, a CAP has been prepared separately. Depending upon the results of the contamination assessment, a Remedial Action Plan (RAP) may have to be prepared in consultation with EPD to mitigate the contamination.

In this report, an assessment of the site is provided and, where appropriate, the sampling programme, which fulfils the requirements of the CAP is recommended.

The following legislation is also relevant to the issue of land contamination, due to the handling and disposal of contaminated materials arising from the development of contaminated land:

- *Water Pollution Control Ordinance (WPCO)*;
- *Waste Disposal Ordinance (Cap 354)*; and
- *Waste Disposal (Chemical Waste) (General) Regulation (Cap 354)*.

As stated above, dredging and excavation activities are likely to cause some disturbance to potentially contaminated soils and sediments in the channels. These issues are discussed in *Section 4: Water Quality* and *Section 5: Solid Waste Management*.

6.3 **BASELINE CONDITIONS AND SENSITIVE RECEIVERS**

6.3.1 **Baseline Conditions**

Site visits observed a number of properties in or adjacent to the proposed Eastern MDC to have visible staining and apparent surficial contamination, which was suspected to be derived from the particular land uses. In these cases, the land uses in question were noted to be trailer storage yards, scrap yards or vehicle maintenance facilities.

Although contamination in each case appeared to be localised, the implications for development relate to the following:

- Disposal of potentially contaminated soils which will arise during excavation in the proposed channels. It is noted that contaminated soil is considered separately from contaminated sediment, which is assessed separately (see discussion below). For the purposes of this assessment, a total undifferentiated volume of 115,000 m³ of spoil was projected to be generated in the scheme.

- Disposal of ground water where excavations take place below the water table. As the Study site is located in low lying coastal margins near the Shenzhen River, shallow ground water may therefore be encountered during the construction programme.
- Potential health risks to site construction workers during development works. This is likely to involve a short term risk, and as the majority of the works is likely to involve the use of mechanical excavators the potential interface with workers is not considered to be significant.
- Potential health risks to future site users. This is not considered to be a major concern as the channels will be paved and the area is not heavily populated.

Site Developments

Roadways with associated container storage areas and vehicle maintenance yards have been developed over the last ten years near the Lok Ma Chau Control Point. The vicinity of the San Tin Interchange has seen a significant increase in the volume of cross border traffic, and as a result, a corresponding increase has been seen in the number of truck and trailer storage areas and small scale maintenance areas in the vicinity. Some of these locations are paved; some are not. The location of these general areas in relation to the proposed works is shown on *Figure 6.3a*.

Parts of the proposed Eastern Main Drainage Channel alignment is located near or adjacent to several container storage areas and some small scale vehicle maintenance areas, where potential uncontrolled releases and run-off of hazardous materials or petroleum products may have occurred.

Discussions with the EPD indicate that there are no environmental records of any major contamination investigations, incidents, or spillages on the sites within the vicinity of the Eastern MDC. However, during field observations on 2 April 1998, as part of the development of the preliminary CAP, some staining with unidentified petroleum products were noted on the ground, and in the vicinity of channel banks in several areas around these sites including the following areas:

- generally near the northern side of the main intersection of San Sham Road and New Territories Circular Road (a portion of this area falls within the proposed works area, and includes container storage yards and maintenance areas);
- along the southwestern side of San Sham Road (this falls within the proposed works area, and along a proposed maintenance road); and
- to the west of the San Sham Road and the northbound vehicle holding area, within the existing drainage reserve.

The staining was observed to be localised and generally occupied areas of less than a few square metres in each location. The source or sources could not be positively identified, but are suspected to be from the particular maintenance and storage activities at those properties.

Table 6.3a presents the identified potential contaminated locations in question. These sites are the principal locations chosen for assessment during the revised contamination investigation (see below), and are shown in *Figure 6.3b*.

Table 6.3a Potential Contaminated Locations

Number	Location	Contamination Concern
1	Drum and material storage areas, adjacent to Highways Department Lok Ma Chau Maintenance Yard.	Several old leaking drums were noted at edge of property in April 1998, with staining on ground. (Note: may be outside of works area)
2	At boundary area of trailer storage yard, along edge of existing channel.	Unprotected fuel drums were noted stored around here in April 1998 without any secondary containment.
3	From ditch/run-off point adjacent to vehicle service bay at rear of a trailer storage yard.	Several stained areas and fuel drums were noted stored around herein April 1998.
4	Near existing channel area, in a location of apparent grading or reclamation activities	A large soil pile (primarily fill material) was observed here in April 1998, apparently part of pond or marsh reclamation activities, and which contained numerous fuel filters and oil canisters.

Refer to *Figure 6.3b* for specific locations.

Typical contaminants associated with these present and historic land use activities are summarised in *Table 6.3b*.

Table 6.3b Potential Contaminants Associated with Land Uses

Historical Use	Potential Site Contaminants	Comments
Scrap and trailer storage yards	Heavy metals, petroleum oils, acids	- Localised spillages
Vehicle maintenance areas and possible machining works	Oils, fuel storage, possible solvents, acids, degreasants	- Spillages from maintenance and dismantling of equipment - Localised areas of contamination - Possible presence of underground storage tanks

The main expected contaminants from container storage yards, container vehicle parks and vehicle repair workshops are fuels, light and heavy petroleum oils, heavy metals, solvents, and possibly some acids. During the site inspections only small scale, localised staining was observed. However, a description of general hazardous properties of typical compounds which may have been used or stored in these areas is presented in *Table 6.3c*.

Table 6.3c *General Properties of Hazardous Substances Potentially Found in Storage Yards*

Typical Material	General Hazardous Properties
Petroleum hydrocarbons (including benzene, toluene, xylenes, and ethyl benzene - BTEX)	<ul style="list-style-type: none"> • Can be toxic by inhalation, ingestion and contact • Concentrations may be flammable
Oils, oily wastes	<ul style="list-style-type: none"> • Can be toxic by contact • Concentrations may be flammable
Thinners, solvents, degreasants	<ul style="list-style-type: none"> • Toxic by contact, inhalation and ingestion
Heavy Metals (including copper, chromium, lead, and zinc)	<ul style="list-style-type: none"> • Can be toxic by ingestion and contact • Most are toxic to fish, plants, and marine plants (especially copper) • Specific precautions may be required in relation to monitoring and dust control in site formation works
Acids	<ul style="list-style-type: none"> • Toxic and harmful by contact • Corrosive to metal, concrete
Polycyclic Aromatic Hydrocarbons (PAHs)	<ul style="list-style-type: none"> • Toxic by contact and ingestion

6.3.2 *Geology and Hydrogeology*

Review of the Hong Kong Geological Survey (HKGS) *Solid and Superficial Geology Map Sheet 2* (1989) covering San Tin indicates that bedrock in the region is covered mainly by undivided Holocene estuarine silty clays, and marine muds of the Hang Hau Formation, which in turn overlies undivided rocks (metasandstone and metasiltstones, phyllite and schist) of the Lower Carboniferous Lok Ma Chau Formation. The marine deposits represent the former intertidal areas, which are now occupied by fish ponds. In general, the thickness of the superficial silty clay deposits is a maximum of 10 to 20 metres. Minor outcrops of Upper Jurassic volcanic rocks are found in the southern portion of the study area near the villages, with associated Quaternary alluvium and debris flow deposits.

These undivided surface sediments generally have low permeabilities, and any localised spillages of surface contaminants are likely to have been absorbed or bound up in the clayey soil matrix. Downward migration of contaminants is likely limited by the low permeability of clayey alluvial sediments. However, where coarser grained alluvial sediments are encountered, the potential of migration of contaminants through the soil horizon is greater.

A review of the Hong Kong Geological Survey (HKGS) *Memoir No. 2 (Geology of the Western New Territories)* indicates that the regional structure is dominated by the northeast trending Lo Wu - Tuen Mun fault and fold belt, and associated faults. The study area is generally located in this area of the faults, along the geologic boundary where two distinct geologic provinces meet: Mesozoic volcanic and sedimentary rocks, and Paleozoic sedimentary rocks. However, the regional structure is not expected to play a major role in terms of contamination due to the observed localised nature of contamination.

The hydrogeology of the Project works area is complex. Groundwater is expected to be located at shallow depths, due to the proximity to Deep Bay. However, the specific depth to groundwater in the area is unknown, and thus potential impact to groundwater from uncontrolled spillages may occur, although this is likely to be limited due to the generally clayey nature of the underlying soil. There is currently no available information on groundwater quality in the area, but it is expected to be saline, and thus not used for irrigation or drinking water purposes. The groundwater flow direction is likely to be towards the north and northwest, toward the Shenzhen River and Deep Bay.

6.3.3 *Sensitive Receivers*

The development works will entail construction of the Eastern MDC, near which there are several trailer storage areas along the proposed alignments. The main works will involve excavation of fish ponds and existing channel from New Territories Circular Road to the Shenzhen River and Border. In addition, the works will include excavation and building a pump station and maintenance roads.

According to previous estimates (See *Section 5: Solid Waste Management*), the total volume of spoil to be removed in the construction phase is 115,000 m³, of which the majority will be excavated from fishponds, wetlands and agricultural land in the area. Only a small percentage of the channel areas pass through the land currently occupied by the potentially contaminating operations. Approximately 9% of the total excavated volume of spoil (less than 10,000 m³) was estimated to comprise contaminated sediment, which is classified according to the concentrations of heavy metals as per the WBTC (See *Section 5.4.3*). However, since the entire design has yet to be finalised, and specific soil borings for collection and analysis of samples according to the *ProPECC PN 3/94* note and EIAO TM have not been completed yet, a detailed estimate of the percentage of this spoil that comprises contaminated soil cannot be made.

For this assessment, it is assumed that only a very small percentage (i.e. maximum of 4,000 m³) of contaminated soil will be generated, based on the limited extent of staining and apparent contamination previously observed. It should be noted that the soil contamination classification will be dependent upon concentrations of specific contaminants such as TPH, VOCs, SVOCs and heavy metals.

Potential sensitive receivers who may come into contact with contaminated soils excavated during the construction and operational programme are construction workers and surrounding land users such as local villagers. However, no major impacts are expected as long as standard mitigation measures are employed during the earth works programme.

In addition, excavation of potentially contaminated areas could potentially lead indirectly to increased soil disturbance and migration of any contaminants present on the sites into the surrounding fish ponds and channels. However, this is considered unlikely to be significant, due to the localised nature of contamination, and provided that standard mitigation measures are employed.

6.4 CONSTRUCTION PHASE

6.4.1 Introduction

The primary potential source of contaminated land impact for this project arises from uncontrolled localised spillages in the vehicle maintenance yards and container storage, which impact upon the proposed excavation works. However, as previously indicated above, the main area of potential contamination for the development is the proposed MDC locations which pass through storage yards, where spillages may have resulted in soils being contaminated with heavy metals or petroleum hydrocarbons. Visual observations indicated that only staining and limited contamination appears to have occurred from fuel or oil pollution on these areas, however, the depth of any impact is currently unknown. In addition, any migration of contamination is likely to be limited by the presence of alluvial sediments comprising fine to medium sands or clay, as well as river or pond sediments (muds) (See Section 4).

Although detailed information about the construction methodology and schedule for the Eastern MDC is limited, it is considered that the approach will include the use of land based excavators to remove soils. As only limited potentially contaminated materials are likely to be present, off-site disposal of any contaminated soils is judged to likely be the most cost effective approach.

6.4.2 Potential Sources and Evaluation of Impact

The potential impacts resulting from excavation of contaminated land in this case are judged to be minor and include:

- health risks to site workers during excavation of the channel alignment that is located in contaminated land areas or immediately adjacent to contaminated land;
- pollutant impacts associated with disposal of any contaminated soil or excavated material; and
- disposal of contaminated water arising from run-off and drainage during construction on any contaminated land.

Health and Safety for Site Workers

The main exposure routes for site construction workers are inhalation of dusts and direct ingestion of contaminated materials through eating or smoking at the site, or through direct contact with potentially toxic or harmful contaminants in sediments or groundwater. The majority of the excavation works are likely to involve the use of plant and mechanical excavators. The underlying soils are likely to be saturated or very moist and therefore the potential exposure of site workers to any potentially contaminated soils is likely to be minimal. Even during dry conditions, any exposure is likely to be for a relatively short period of time only.

Soil Disposal

On the order of 115,000 m³ of soil are expected to be excavated in the works, which will primarily involve excavating at fish ponds and existing channel (see *Section 5*). Only a small percentage of the works are expected to have had some form of contaminative land use, as potentially contaminated land within channel areas was observed to be localised during the site inspection. However, any contaminated soils encountered will need to be handled in accordance with relevant regulations, and any disposal will need to be made in consultation with the EPD or Facilities Management Group to ensure disposal at a suitable site. *Section 5, Solid Waste Management* presents a discussion of the disposal of wastes, including contaminated soils.

Contaminated Water Disposal

Channel excavations are likely to take place below the water table in the potentially contaminated areas where trailer storage and maintenance yards are located. If there is a requirement to dewater during construction works, there may be a need to pump and dispose of any contaminated surface or groundwater present. Depending on the level of contamination encountered, and subject to the agreement of the EPD, this surface or groundwater will also need to be disposed of in an appropriate manner to prevent potential contamination, and to ensure compliance with the *Water Pollution Control Ordinance (WPCO)*. Disposal of potentially contaminated groundwater is not considered to represent a major concern as only minor staining was noted in the site visit in the trailer storage yards and the depths of excavation of any contaminated areas are expected to be relatively shallow. Thus major volumes of potentially contaminated groundwater are not expected to be encountered.

Future Concerns

During the Operational Phase of the development, the impacts associated with the potential presence of contaminated soils are likely to be minimal as no major industrial or contaminating land uses have been identified, and there will be no interface between any residual land contamination and human receptors once the mitigation and channel works are completed.

6.4.3 Mitigation Measures / Contamination Assessment

- 6.4.3.1 Land contamination impacts are not considered to represent a major concern during the construction phase. However, the extent of any potential land contamination will be determined in the assessment programme performed according to the CAP as recommended in *Section 6.6.1*. This will assess the types and degree of any contamination, and therefore any required mitigation in terms of disposal. The results of the sampling programme and any remedial requirements will be presented in a Contamination Assessment Report (CAR), which will include requirements for a RAP, based on the EIAO TM and the ProPECC PN 3/94 guidance note, and under consultation with EPD. The RAP will include an estimate of the volume of contaminated soil that can be reused or requiring disposal, based on the results of the limited sampling, and determine access constraints for the use of bulk earth-moving equipment, to minimise the potential interface of contaminated materials with site construction workers.

6.4.3.2

To minimise the potential impact on health and safety/contamination exposure during construction works, the following mitigation measures should be followed:

- No unauthorised persons shall be allowed into the work area, and necessary precautions shall be taken to prohibit unauthorised entry to the Site or works areas.
- Eating, drinking, smoking or any practice that increases the probability of hand to mouth transfer and ingestion of material is prohibited in any area designated as being contaminated.
- Food, beverages, tobacco products, etc. are prohibited in any area designated as being contaminated. Adequate warning signs shall be posted to this effect.
- Hands must be thoroughly washed upon leaving the work area, and before eating, drinking or any other activities.
- Specific work areas for various operational activities shall be established. Any excavation shall be roped off or appropriately secured to prevent unauthorised entry.
- Contact with contaminated surfaces or with surfaces suspected of being contaminated shall be avoided. Whenever possible, one shall not walk through puddles, mud or other discoloured surfaces; kneel on the ground; lean, sit or place equipment on drums, containers, vehicles or the ground.
- No trench or other excavation greater than 1m deep shall be entered unless the atmosphere has been tested and found to be safe, or the sides of the excavation have been shored up or prepared in such a way, as required, to remain stable. Personnel and equipment in the contaminated area shall be minimised, consistent with effective site operations.
- During site operations with contaminated soil, all field personnel must be on the alert for potentially hazardous materials including odorous solids or liquids, and accumulations or seepages of liquids which are tarry, oily, fuming, bubbling, or discoloured.
- Adequate first aid kits shall be present on site.
- Prior to starting work workers shall determine the location of the nearest telephone and washing facilities. If accidental contact is made with hazardous or unknown chemicals the contact point shall immediately be washed, and if necessary, medical aid sought.

6.4.4

Residual Impacts

Based on the limited information available at this stage, it is unlikely that there is a potential for major residual land contamination concerns at the Project works site. Provided the above measures are adopted, it is anticipated that mitigation will be successful and there will be minimal impact associated with contaminated land at the site.

6.5 OPERATIONAL PHASE

Since necessary remedial measures will be developed in consultation with EPD and instituted prior to Construction Stage activities, no additional significant land contamination issues are expected to arise after the construction works during the Operational Stage of the programme.

6.6 REQUIREMENT FOR FURTHER STUDY

6.6.1 Contamination Assessment Plan

6.6.1.1 Prior to the commencement of construction and at the Site Investigation stage, it is recommended that the contamination assessment should be performed in accordance with the CAP, which is presented in *Annex 6-A*. The site assessment activities will comprise three main tasks:

- Site Sampling;
- Laboratory Analysis Programme; and
- Assessment and Reporting

6.6.1.2 Upon completion of the CAR, the data will be discussed with EPD in order to determine the most appropriate course of action. This may include mitigation activities, in which case the RAP will be developed and approved.

Task 1: Perform Site Sampling

6.6.1.3 As per the CAP, the task will include performing selective sampling of a number of locations in potentially contaminated areas identified around channel areas or storage and maintenance yards, where contamination is suspected or identified. The investigation will be performed in those locations where excavation is due to be undertaken and contamination impact (i.e. oil from spillages) may have occurred but has not yet been characterised.

6.6.1.4 The task will be performed following ERM's *Standard Sampling Methodologies*, which are based on the US Environmental Protection Agency (US EPA), but modified and adapted to Asian standards of practice as appropriate. These methods include decontamination, sample preparation and preservation, and chain-of-custody documentation.

Task 2 Laboratory Analysis Programme

6.6.1.5 The second task shall involve performing chemical analysis for a range of contaminants in soil as per the *ProPECC PN 3/94* note and EIAO TM. This analysis will include priority pollutant heavy metals (antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc) and total petroleum hydrocarbons (TPH). Where indicated by evidence of field screening (i.e. detectable organic vapours from a photoionisation detector, odours, obvious staining, etc), a selected number of the samples will be analysed for volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs). Analysis will also be performed on a number of samples of the Toxicity Characteristic Leaching Procedure (TCLP), as a measure to determine disposal requirements with the landfill

6.6.1.6 All samples shall be handled under chain of custody protocols, and analysis performed by an appropriate HOKLAS accredited laboratory.

Task 3: Assessment and Reporting

6.6.1.7 The final task will be to present the results of the analysis in the RAP and Detailed Design Report, along with requirements for any additional investigations to confirm appropriate disposal options. The assessment of land contamination will be conducted in accordance with the *ProPECC PN 3/94* document and the EPD's EIAO TM (*Annex 19*), and will be undertaken as part of pre-construction site investigations, to provide a preliminary assessment of environmental concerns and/or liabilities.

6.6.1.8 The volume of contaminated material is expected to be small, but if any contaminated soils are identified and required to be excavated during the subsequent development programme, apart from following appropriate protocols, the following measures should be adopted:

- No soils should be stockpiled. If this cannot be avoided, they should be covered with tarpaulin to minimise the potential for runoff and prevent any pollution, especially during heavy rainstorms.
- Vehicles containing any contaminated materials should be suitably covered to limit potential dust emissions, or contaminated wastewater run-off during transportation or under wet conditions.
- Permitted waste hauliers should be used to collect and transport contaminated soils to an appropriate disposal site.
- Prior agreement should be sought with the Facilities Management Group or Fill Management Committee regarding the acceptability of disposal of any contaminated soils to landfill or other suitable disposal points. Although not officially designated, the only landfill site in Hong Kong that is likely to be able to accept contaminated material is the SENT landfill.
- All excavation activities in contaminated areas and the handling of contaminated groundwater shall be performed by the Contractor and observed and directed, as required, by the environmental specialist.
- A record of all correspondence with the Facilities Management Group regarding the disposal of soils from the site shall be maintained.
- For contaminated soil disposal, trip tickets shall be issued to ensure proof to disposal at the landfill facility.
- The necessary waste disposal permits should be obtained from the appropriate authorities, in accordance with the *Waste Disposal Ordinance* (Cap 354), *Waste Disposal (Chemical Waste) (General) Regulation* (Cap 354), as required (See *Section 5: Solid Waste Management*).
- Procedures should be developed to ensure that illegal disposal of wastes does not occur, and records of the quantities of wastes generated and disposed of should be maintained.

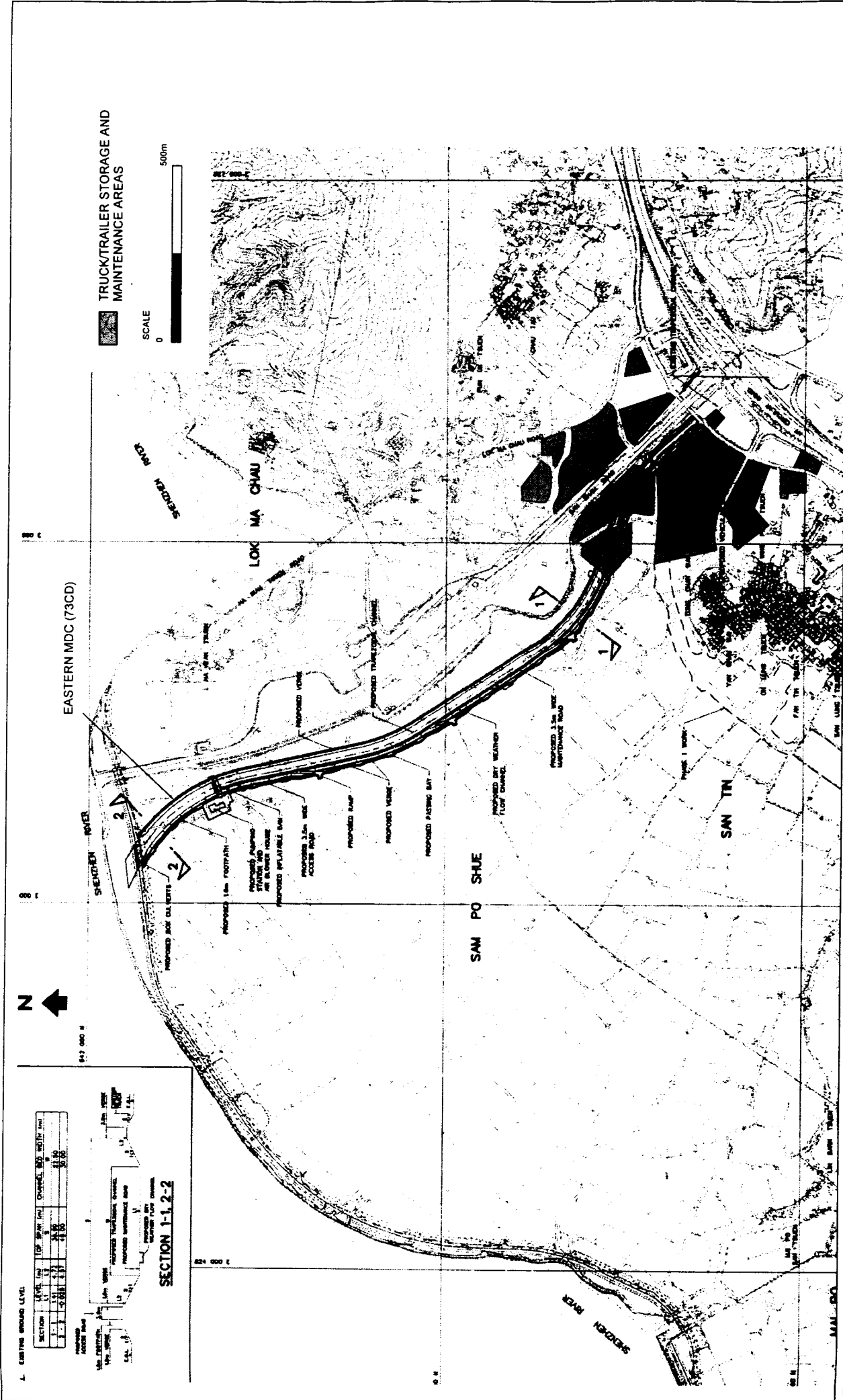
- In accordance with good construction practice silt traps should be used to reduce the level of suspended solids arising from particles of disturbed ground and soil. Contaminated surface or groundwater, where encountered, should be disposed of in accordance with the WPCO.
- Surface waters should be diverted around any areas currently being worked, or materials being stockpiled, to minimise potential run-off into excavations, as run-off may increase the volume of contaminated water requiring disposal and suspended solids in the wastewater stream.
- Wheel washing of vehicles leaving the site shall be undertaken to ensure that any contaminated materials or dusts are not carried over onto the public highway.
- Upon completion of the soil excavation activities, additional confirmatory soil samples shall be collected, as required, for analysis.
- Upon completion of the soil excavation programme, clean fill material may be imported and placed in the excavations as required, to bring the site level to grade.
- A discharge license shall be obtained from EPD for the disposal of any groundwater from the site in accordance with the appropriate protocols to meet applicable regulations.
- Groundwater shall be pumped at such a rate as to ensure that it does not create ground stability and subsidence problems for the surrounding work areas or any buildings. The actual rate of pumping, if required, shall be dependant upon field observations and following discussion with the environmental specialist and the contractor's engineers.
- While no measurable free product is not expected in groundwater at the site, any separated oil or product that is recovered during groundwater pumping activities shall be disposed of at a suitable oil recycling/disposal facility such as the Government Chemical Waste Treatment Centre at Tsing Yi.
- A sample of water shall be collected from any storage tank for appropriate chemical analysis (i.e. TPH) after passing through the oil water separator, prior to disposal, to confirm that there is no oil contamination. Further treatment shall be required if the water does not meet the WPCO standards.
- Groundwater shall be pumped until an acceptable level of TPH or other contaminants, as warranted, is noted within the groundwater, as agreed with EPD prior to the commencement of any abstraction programme.

6.6.2 *Operational Phase*

There will be no expected requirement for further study during the Operational Stage of the development.

The main environmental impacts related to contaminated land arise from those lands which have been used for vehicle maintenance, trailer storage and scrap metal works, and are located in areas which are to be excavated during the upcoming programme. The detailed design is not presently available. However, as the proposed channel will mainly be excavated through fish ponds and rural wetlands, volumes of potentially contaminated soils are not expected to be significant, and thus land contamination impacts are not considered to represent a major concern.

Mitigation, including handling and disposal of excavated soils from any contaminated areas, should be performed following specific protocols to minimise potential negative impacts. Provided that the mitigation measures specified are properly implemented in the Construction Phase, there are no significant concerns relating to contaminated land, and the environmental impacts of handling and disposal of any contaminated soils is likely to be minimal. Therefore, land contamination is not expected to be a key issue in relation to the proposed works or following completion of the works.

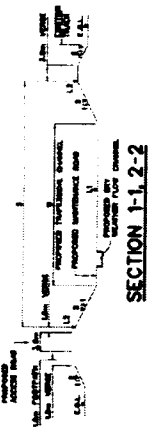


LOCATIONS OF TRUCK AND TRAILER STORAGE AREAS

FIGURE 6.3a

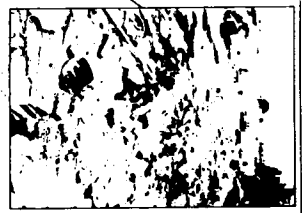
1. EXISTING BOUND LEVEL

SECTION	LINE	TOP	BANK	EXISTING	BANK	BOUND	LEVEL
1	1	1.1	1.1	1.1	1.1	1.1	1.1
2	2	2.1	2.1	2.1	2.1	2.1	2.1
3	3	3.1	3.1	3.1	3.1	3.1	3.1





SITE LOCATION 4



SITE LOCATION 3





SITE LOCATION 2



SITE LOCATION 1



KEY

-  TRAILER STORAGE AND MAINTENANCE AREAS
-  SITE LOCATIONS FOR FURTHER INVESTIGATION

SCALE 0  100m

FIGURE 6.3b

SAMPLING AND INVESTIGATION LOCATIONS

FILE NO. 1
DATE 2008/01/15

Environmental Resources Management

