Appendix 7.1
Contamination Assessment Plan for A King Marine

Agreement No. CE 54/2001 (CE)

WAN CHAI DEVELOPMENT PHASE II

CONTAMINATION ASSESSMENT PLAN

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1 INTRODUCTION

1.1 Background

1.1.1 This Contamination Assessment Plan (CAP) is prepared under the project Wan Chai Development Phase II (WDII). The overall objective of the WDII is to make provision for the construction of a section of Central-Wan Chai Bypass (the Trunk Road) which runs along the Wan Chai shoreline in tunnel and connects to the existing elevated Island Eastern Corridor (IEC) in North Point. At the same time, any land formed for this transport infrastructure will be developed into an attractive waterfront promenade for the enjoyment of the public.

1.1.2 Based on the EIA Study carried out under this Study, A King Marine (an abandoned shipyard) is considered to be a potential contaminated site that may pose land contamination impacts to the WDII and further site investigation at the Site is required. This CAP outlines the requirements for the subsequent SI works at A King Marine.

1.2 Objectives

1.2.1 The objectives of this CAP are as follows:

- To present the findings of desktop study and site appraisal;
- To identity the locations of potential land contamination in the Study Site; and
- To work out the approach and methodology of site investigation.

2 LAND CONTAMINATION SITE APPRAISAL

2.1 General Site Context

2.1.1 A King Marine is located at the eastern portion of Causeway Bay Typhoon Shelter (CWBTS) and is bounded by Hing Fat Street to the east, Victoria Road to the south and Island Eastern Corridor to the west. The approximate land area is 1,500m^2. The surrounding land uses are mainly commercial and residential properties. Tung Lo Wan Fire Station is located to the east of shipyard while Victoria Park is at the south of the shipyard. The site location is shown in **Figure A7.1**.

2.2 Geology and Hydrogeology

2.2.1 Based on the Hong Kong Geological Survey Map (HGM20), the land within A King Marine is comprised of marine sand overlain by fill and sanitary fill.

2.2.2 Since the Study Site is located adjacent to Victoria Harbour, it is considered that the groundwater flows westerly and discharges into the harbour.

2.3 Review of Historical Aerial Photos

2.3.1 The review of aerial photos was undertaken. The main purpose of reviewing aerial photos is to identify any changes in land uses in the Study Site. **Table 1** summarizes the details of aerial photos and the photos are shown in **Annex A7.1**.

Table 1 Aerial Photos Reviewed

Date	Reference Number	Height (ft)	Key Issues
13.11.1924	11	11100	The site was yet reclaimed. The coastline extended along current Hing Fat Street to Causeway Road.
8.5.1949	6028	8000	Ditto
5.10.1959	0291	40000	Reclamation completed and the site was formed. The shipyard started to operate in small-scale with less than 10 workshops/buildings.
1.2.1963	7223	2700	Shipyard expanding its operation to its West.
16.5.1967	5612	6250	Western portion of the site established.
1968	842	2000	Full-scale operations underway (at least 10 workshops/buildings)
5.11.1980	32259	4000	Decreased number of workshops and buildings (about 6)
19.3.1990	A20665	2000	Not much change from 1980.
5.12.1993	A36934	4000	Decommissioning/Site formation at east portion of the site.
7.12.1995	CN12608	3500	Operation of Fire Station in the "former" decommissioning/site formation area.
3.2.2000	A50906	2000	Not much change from 1995. Only 2 workshops/buildings noted.
15.3.2001	CN30244	4000	Not much change from 2000. The remaining portion of shipyard was still in operation.
7.10.2002	CW44335	4000	The shipyard had ceased operation and

Date	Reference Number	Height (ft)	Key Issues
			was abandoned.
19.5.2006	CW71907	4000	Not much change from 2002. The shipyard was abandoned.

Source: Survey and Mapping Office, Lands Department

2.3.2 The review of relevant historical aerial photographs indicated that the shipyard operation and the reclamations in the area were established some time between 1949 to 1959. The original coastline (prior to reclamation) extended to Hing Fat Street to the east and Causeway Road to the north. Before the reclamations, the site lies in proximity to the former typhoon shelter (perpendicular to and east of the typhoon shelter's breakwater at the time). After the reclamations, the shipyard was established (but in a smaller scale) but since 1963, the shipyard operation was expanded to the western portion of the site. Aerial photograph depicted that full-scale shipyard operation had been commenced in 1968. However, the scale of operation had been gradually diminished and eventually eastern portion of the site ceased operation in 1994 for the provision of the fire station. The shipyard had ceased operation and was abandoned around 2001 to 2002 until now.

2.4 Acquisition of Relevant Information from Government Departments

2.4.1 Based on the EIA Study conducted in 2001 on the WDII (2001 EIA), historical records of chemical spillage and violations of environmental regulations have been requested from relevant government bodies. Based on the review, there were no records of chemical spillage and conviction in relation to land contamination within the Study Area.

2.4.2 According to the Government Lease records from the Land Registry, A King Shipyard Company Limited was the only owner of the Site since 1969. No other land records on the Site were available prior to 1969.

2.5 Site Reconnaissance

2.5.1 According to the 2001 EIA, the contaminative areas within the site include winch, slipway, storage tank, workshop, chemical / dangerous goods storage area and waste disposal area. A site reconnaissance was conducted on 8 August 2006 to identify and confirm the general conditions of the site but no site access was allowed to the shipyard at the time. Observations from outside of the shipyard indicated that the shipyard had been abandoned and that some structures such as slipway and workshop remained on site. **Figure A7.2** showed some of the photos taken outside of the shipyard during the site reconnaissance.

2.5.2 Following the August site reconnaissance, site access was permitted by the Site Owner (A King Shipyard Co. Ltd.) on 29 November 2006. Subsequently, a second site reconnaissance was carried out on 13 December 2006 within the abandoned shipyard to inspect and identify potential contamination hotspots. For the purpose of the assessment, the Subject Site is divided into three areas: Area A (winch and site office), Area B (slipways and open area) and Area C (winch, workshops, storage facilities and site office). The site layout and locations of potential hotspots are shown in **Figure A7.3** while **Table 2** below summarises the findings of the site reconnaissance at each of the three areas. Photographic records for the areas are shown in **Figure A7.4** to **A7.6**.

2.5.3 Site appraisal checklist was sent to the site owners to collect information about the historical activities undertaken at the shipyard. The results of the checklist are shown in **Annex A7.2**. Due to the uncertainties of the shipyard operation by the site owner, no information related to tank spillages, underground storage tanks and usage, storage and generation of contaminants within the Site were provided.

Table 2 Findings of Site Reconnaissance

Area	Facilities Identified[1]	Area (m^2)	Photos Ref.	Site Observation	SI Proposed
A	• 2 Winches • Site Office	326	Fig. A7.4	• The whole area was located on elevated seawall and paved with thick intact concrete. In general, no stains were observed. • No evidence of open burning was observed in the area. • Two winches were observed near the edge of the seawall, paved with thick intact concrete. It is possible that the area is for loading ships for maintenance. • Site office was paved with intact concrete without stains. • Potential contamination is possible near the two winches.	Yes
B	• Slipways • Open Boat Storage Area	536	Fig. A7.5	• The ground is made up of permeable sandy materials. No obvious stains were observed. • No evidence of open burning was observed in the area. • According to 2001 EIA, the area is identified as slipways and open boat storage area. • Remains of the slipways were observed at the western portion of Area B. • Only vegetation and substantial amount of general refuse were observed at the eastern portion of the site. • Based on the permeable nature of the ground and possible past activities in the area, contamination at Area B is possible.	Yes
C	• 2 Workshops • 1 Winch • Aboveground Storage Tank. (AGT) • Storage Facility • Site Office	703	Fig. A7.6	• The whole area was located on elevated seawall and paved with thick intact concrete. • No evidence of open burning was observed in the area. • Only a container was observed at the location of borehole 'BH-4' as proposed in the 2001 EIA. Based on the site reconnaissance, the area was elevated and constructed on intact concrete. No stains were observed. Potential contamination in the area is therefore unlikely. • A storage facility (possibly for chemicals), made up of small compartments, were observed at the southern portion of the Site. Minor stains were observed in one of the compartment. The switch and meter room was also located in one of compartment. The storage area was paved with intact concrete and no stains were observed near the facility • One winch and a workshop (Workshop A) was observed near the edge of the seawall, at the northern portion of Area C. The facilities are located on top of the seawalls and paved with thick intact concrete. Some stains were observed just west of the workshop. • A 9 ton aboveground diesel storage tank (AGT) was observed near the storage facility. The tank was semi-enclosed by concrete walls at four sides. The floor was paved with intact concrete. No stains were observed within / near the AGT. • A shaded workshop (Workshop B) was identified at the western end of the shipyard. The workshop was constructed on the edge of the seawall and paved with thick intact concrete.	Yes

Area	Facilities Identified[1]	Area (m^2)	Photos Ref.	Site Observation	SI Proposed
				• A site office was located just west of the workshop, constructed on the seawall and thick concrete. The office was tiled and no stains were observed. • Potential contamination is expected to be minimized as the area is paved with thick intact concrete. However, due to length of operation of the shipyard and potential contamination of the workshops, AGT and Storage Facility, SI is proposed near the facilities.	

1: Please refer to **Figure A7.3** for location.

3 SAMPLING PLAN FOR SITE INVESTIGATION

3.1 Sampling Location

3.1.1 Based on the findings from the site reconnaissance, a total of 9 sampling locations (8 boreholes and 1 trial pit) are proposed at the contamination hotspots as illustrated in **Figure A7.3**. Details of the sampling locations, with rationale for the sampling, are shown in **Table 3.**

3.1.2 The actual sampling locations shall also be subject to site specific conditions (e.g. locations, presence of foundations, underground utilities, delivery pipes and services).

Table 3 Sampling Locations

Sampling ID	Potential Source of Contamination	Rationale of Sampling
BH-1*	Winch	Possible loading area for ships
BH-2*	Winch	Possible loading area for ships
BH-3	Slipway / Open Boat Storage Area	Potential contamination from past activities on the permeable ground.
BH-4	Slipway / Open Boat Storage Area	
BH-5*	Storage Facility	Potential contamination as a result of spillage / leakage of chemicals near the storage facility / AGT.
BH-6*	Aboveground Storage Tank	
BH7*		
BH-8*	Winch / Workshop	Potential contamination due to operation of Winch C / Workshop A
TP-1*	Workshop	Potential contamination due to operation of Workshop B. (Trial pit is proposed due to headroom constraint).

Note * Sampling would only be required if the underlying ground is made up of permeable materials.

3.1.3 It should be noted that there are no information available in regard to the extent of the seawall. It is possible that the footprint of the seawall could extent back to the proposed boreholes at Area A and C. In such case, no sampling works would be necessary. Sampling works would only be required if permeable layers, such as soil and fill materials, were encountered.

3.1.4 Upon determination of the exact sampling locations, a survey shall be undertaken to measure the Hong Kong Grid Co-ordinates and mPD levels of the sampling locations for delineation of contamination profiles and water table contours.

3.2 Potential Contaminants

3.2.1 Potential contaminants associated with shipyard activities include the following:

- Benzene, Toulene, Ethylbenzene and Xylenes (BTEX);
- Total Petroleum Hydrocarbons (TPH) ;
- Polyaromatic Hydrocarbons (PAHs) ;
- Cyanide;
- Volatile Organic Compounds (VOC);
- Heavy Metals;
- Tributyl-Tin (TBT);

3.2.2 Based on the site reconnaissance, there were no evidence of burning activities occurred within the Shipyard. Advice has been sought from the site owner on this issue, but they were unable to confirm

whether there had been any burning activities during the shipyard operation. In view of the lack of any records or evidence of burning activities at the site, dioxin is unlikely to be presented within the Shipyard.

3.3 Soil Sampling

Soil Sampling Method and Depth of Sampling

3.3.1 Boreholes should be undertaken by means of dry rotary drilling method i.e. without the use of flushing medium. For safety reasons, an inspection pit should be excavated down to 1.5m below ground to inspect for underground utilities at the proposed borehole location. Disturbed soil samples should be collected at depth of 0.5m and 1.5m below concrete slab. Soil boring using drill rigs should then be performed for depth from 1.5m to the maximum boring depth. Undisturbed soil samples should be collected at the groundwater level or 3m below concrete layer, whichever is deeper.

3.3.2 For trial pit method, hand tools, such as stainless steel scoops, shall be used to collect the soil samples. Disturbed soil samples should be collected at depth 0.5m, 1.5m and 3.0m below grade.

3.3.3 The soil sample taken at each proposed depth will be subject to on-site measurements of VOCs with a PID meter. Regarding the PID measurement, a handful of the soil sample will firstly be placed in a ziplock bag. After few minutes, the probe of a calibrated PID will then be inserted into the bag to take the measurement. The PID used on site should be equipped with lamp having energy of at least 9.8eV with a measurement range of at least 0.0 to 99.9ppm or any equivalent model agreed by the Consultant.

3.3.4 After collection, samples should be transferred to new, clean, laboratory-supplied glass jars for sample storage/transport and stored at a temperature of around 0-4°C but never frozen until delivered to the analytical laboratory.

Strata Logging

3.3.5 Strata logging for boreholes and trial pit should be undertaken during the course of drilling/digging and sampling by a qualified geologist. The logs should include the general stratigraphic descriptions, depth of soil sampling, sample notation and level of groundwater (if encountered). The presence of rocks/boulders/cobbles discoloration, odour and foreign materials such as metals, wood and plastics should also be recorded. Photographic records shall also be taken for trial pit.

Free Product and Groundwater Measurement

3.3.6 The thickness of any free product and groundwater level if present at sampling locations should be measured with an interface probe. The free product if encountered in sufficient amount should be collected for laboratory analysis to determine the composition.

3.4 Groundwater Sampling

3.4.1 It is proposed to collect groundwater samples if groundwater is encountered at the sampling locations.

3.4.2 For each proposed borehole location, a groundwater sampling well should be installed into the boreholes if groundwater is encountered or agreed by the land contamination specialist. A typical design of the groundwater sampling well would be prepared by the land contamination specialist for the Engineer's approval prior to the commencement of sampling. After installation of the monitoring wells, the depth to water table at all monitoring wells should be measured at the same period of time with an interface probe in order to delineate the water table contours at the subject site.

Well developments (approximately five well volumes) should be carried out to remove silt and drilling fluid residue from the wells. The wells should then be allowed to stand for a day to permit groundwater conditions to equilibrate. Groundwater level and thickness of free product layer, if present, should be measured at each well before groundwater samples are taken.

3.4.3 Prior to groundwater sampling, the monitoring wells should be purged (at least three well volumes) to remove fine-grained materials and to collect freshly refilled representative groundwater samples. Time for each groundwater purging/recharge should be recorded as well as the estimated groundwater flow.

3.4.4 After purging, one groundwater sample should then be collected at each well using Teflon bailer and decanted into appropriate sample vials or bottles in a manner that minimises agitation and volatilisation of VOCs from the samples. All samples should be uniquely labelled.

3.4.5 Immediately after collection, groundwater samples should be transferred to new, clean, laboratory-supplied glass jars for sample storage/transport. The sampling glass jars should be of "darken" type. Groundwater samples should be placed in the glass jars with zero headspace and promptly sealed with a septum-lined cap. Immediately following collection, samples should be placed in ice chests, cooled, and maintained at a temperature of around 0-4°C until delivered to the analytical laboratory.

3.5 Sample Size and Decontamination Procedures

3.5.1 All equipment in contact with the ground should be thoroughly decontaminated between each excavation and drilling and sampling event to minimise the potential for cross contamination. The equipment (including drilling pit, digging tools and soil/groundwater samplers) should be decontaminated by steam cleaning/ high-pressure hot water jet, then washed by phosphate-free detergent and finally rinsed by distilled/deionized water.

3.5.2 Prior to sampling, the laboratory responsible for analysis should be consulted on the particular sample size and preservation procedures that are necessary for each chemical analysis.

3.5.3 The sample containers should be laboratory cleaned, sealable, water-tight, made of glass or other suitable materials with aluminium or Teflon-lined lids, so that the container surface will not react with the sample or adsorb contaminants. No headspace should be allowed in the containers which contain samples to be analysed for VOCs, TPH or other volatile chemicals.

3.5.4 The containers should be marked with the sampling location codes and the depths at which the samples were taken. If the contents are hazardous, this should be clearly marked on the container and precautions taken during transport. Samples should be stored at between 0-4°C but never frozen. Samples should be delivered to laboratory within 24 hours of the samples being collected and analysed within 7 days of delivery. Chain of Custody (COC) shall be adopted as QA/QC procedure.

3.6 QA/QC Procedure

3.6.1 QA/QC shall be collected in the following frequency during SI. Chain of Custody (COC) shall be adopted.

- 1 equipment blank per 20 samples for full suite analysis
- 1 field blank per 20 samples for full suite analysis

3.6.2 From the proposed sampling plan, it is likely that two equipment blanks and two field blanks are required.

4 LABORATORY ANALYSIS

4.1.1 All samples shall be dispatched to an accredited laboratory for analysis under the Hong Kong Laboratory Accreditation Scheme (HOKLAS). **Table 4** summarises the parameters, detection limits and reference methods for the laboratory analyses of soil and groundwater samples for this Study.

Table 4 Testing Parameters Proposed for Laboratory Analysis

Item	Parameter	Soil		Groundwater	
		Detection Limit (mg/kg) or otherwise stated	Reference Method	Detection Limit (µg/L) or otherwise stated	Reference Method
1	Total Petroleum Hydrocarbons (TPH)	C6-C9: 2 C10-C14: 50 C15-C28: 100 C29-C36: 100	USEPA 8015	C6-C9: 20 C10-C14: 25 C15-C28: 25 C29-C36: 25	USEPA 8015
2	Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)	0.2 for benzene 0.3-0.5 for others	USEPA 8260	1 for benzene 15 for others	USPEA 8260
3	Polyaromatic Hydrocarbons (PAHs) [a]	1.0 for benzo(a)pyrene 2.0 for others	USEPA 8270	0.2 for benzo(a)pyrene 1.0 for others	USEPA 8270C
4	*Heavy Metals*				
	Cadmium (Cd)	0.2	USEPA 6020	1	USEPA 6020
	Lead (Pb)	1	USEPA 6020	1	USEPA 6020
	Copper (Cu)	1	USEPA 6020	1	USEPA 6020
	Tin (Sn)	0.5	USEPA 6020	1	USEPA 6020
	Chromium (Cr)	1	USEPA 6020	1	USEPA 6020
	Nickel (Ni)	1	USEPA 6020	1	USEPA 6020
	Zinc (Zn)	20	USEPA 6020	50	USEPA 6020
	Cobalt (Co)	0.5	USEPA 6020	1	USEPA 6020
	Arsenic (As)	1	USEPA 6020	10	USEPA 6020
	Molybdenum (Mo)	1	USEPA 6020	1	USEPA 6020
	Barium (Ba)	0.5	USEPA 6020	1	USEPA 6020
	Mercury (Hg)	0.05	USEPA 6020	0.5	USEPA 6020
5	*Additional Metals*[b]				
	Antimony (Sb)	1	USEPA 6020	1	USEPA 6020
	Beryllium (Be)	1	USEPA 6020	1	USEPA 6020
	Selenium (Se)	1	USEPA 6020	1	USEPA 6020
	Silver (Ag)	1	USEPA 6020	1	USEPA 6020
	Thallium (Ti)	1	USEPA 6020	1	USEPA 6020
	Vanadium (V)	1	USEPA 6020	1	USEPA 6020
6	Cyanide (CN)	1	APHA4500CD: C & E	30	APHA4500CD: C & E
7	Tributyltin (TBT)	1 gSn/Kg	Krone et al (1989) – CG/MS UNEP/IOC/IAEA	6.5ngSn/L	Krone et al (1989) – CG/MS UNEP/IOC/IAEA
8	Volatile Organic Compounds (VOC)	0.5	USEPA 8260A	5	USEPA 8260A

Remarks:

a) The full list of 6 Polycyclic Aromatic Hydrocarbons (PAHs) are tabulated below:

1) Naphthalene	2) Phenanthrene	3) Anthracene
4) Fluoranthene	5) Benzo (a) pyrene	6) Pyrene

b) At least 3 samples from the most contaminated areas within the Shipyard shall be tested for the additional metals.

4.1.2 Other than the whole suite of heavy metals covered in the Dutch List (ie Cr, Co, Ni, Cu, Zn, As, Mo, Cd, Sn, Ba, Hg and Pb), at least 3 soil and groundwater samples from the most contaminated areas within the Site shall be subject to screening tests for additional metals (ie Sb, Be, Se, Ag, Ti and V). (see remarks (c) in Table 3 above).

4.1.3 In addition to the chemical testing in **Table 4**, physical parameters such as moisture content and Total Organic Carbon (TOC) shall also be tested for each soil samples.

4.1.4 For sampling and laboratory analysis, chain of custody procedure shall be included as QC/QA procedure.

4.1.5 Extra soil samples shall be stored at 0-4°C and tested for Toxicity Characteristics Leaching Procedure (TCLP) before submission of Remediation Action Plan (RAP) if significant contamination were identified and excavation and landfill disposal were proposed as the remediation method.

5 HEALTH & SAFETY

5.1.1 The specific safety measures to be taken depend on the nature and content of contamination, the site conditions and the regulations related to site safety requirements. Workmen Compensation Insurance and third party insurance must be provided for the SI.

5.1.2 Extreme care should be exercised when toxic gases or other hazardous materials are encountered. Any abnormal conditions found shall be reported immediately to the safety officer and the land contamination specialist.

5.1.3 The SI contractor shall establish and maintain a Health and Safety Plan, before commencement of the SI, that will include the following:

- Instruction of works on work procedures, safe practices, emergency duties, and applicable regulations;
- Regularly scheduled and impromptu meetings of the workers in which the possible hazards, problems of the job, and related safe practices are emphasised and discussed;
- Good housekeeping practices; and
- Availability of and instruction in the location, use and maintenance of personal protective equipment.

5.1.4 The SI Contractor shall maintain equipment and supplies reasonably required in an emergency, including lifesaving, evacuation, rescue and medical equipment in good working order and condition at all times. The SI Contractor shall use all reasonable means to control and prevent fires and explosions, injury to personnel and damage to equipment of property. Without limiting the foregoing, the SI Contractor shall:

a) Maintain proper safety devices, barriers to minimise hazards during performance of the work;

b) Prohibit smoking and open flames and the carrying of matches and lighters;

c) Develop and maintain a written emergency plan applicable to the Work and Site;

d) Maintain equipment in good operating condition and have emergency and first aid equipment ready for immediate use, where applicable;

e) Conduct equipment tests to ensure that equipment is properly placed and in good operating condition, and that workers are able to respond to emergency situations;

f) Require all workers employed or retained by the Contractor, or a subcontractor, to at all time wear clothing suitable for existing work, weather and environmental conditions; and

g) The personnel are required to wear respirator and gloves for vapour exposure protection, if necessary. Safety helmet and protective boots should be worn.

6 INTERPRETATION OF RESULTS

6.1.1 The results of the laboratory analyses shall be interpreted in accordance with the guidance documents referred in EPD's ProPECC PN 3/94 "*Contaminated Land Assessment and Remediation*" and "*Guidance Notes for Investigation and Remediation of Contaminated Sites of Petrol Filling Stations, Boatyards, and Car Repairing/Dismantling Workshops*".

6.1.2 The Dutch B levels under the Dutch List shall be referred to for assessing soil contamination. Where no Dutch B levels were available (eg TBT and additional metals: Sb, Be, Se, Ag, Ti and V), another guideline 'USEPA Region IX Preliminary Remediation Goal (PRG)' which has been widely used in other countries for initial soil screening for remediation shall be adopted. The standards for TBT-oxide in the PRGs will be used as the criteria for TBT which had also been adopted as the land contamination assessment criteria for the Decommissioning of Cheoy Lee Shipyard at Penny's Bay. As the analytical results for TBT in soil and groundwater samples are usually reported in concentration of Tin in soil or groundwater (eg g Sn/kg or g Sn/L), the standards for TBT-oxide will also be converted to the same unit.

6.1.3 Two PRGs are applicable for soil medium, namely residential soil and industrial soil. For conservative approach, the PRG for residential soil would be adopted as clean-up criteria in this Study. For groundwater, the PRG for tap water would be applied in this case.

6.1.4 For groundwater results, the Dutch List/PRG is too stringent to be applied in Hong Kong where groundwater is not for potable use. A risk assessment would be used to justify any need of groundwater remediation if exceedance of Dutch B/PRG level is found in the groundwater samples.

6.1.5 A Contamination Assessment Report (CAR) shall be compiled following the SI. The CAR shall present the methodology used during the soil boring and sampling work, details of field observations, and interpretation of laboratory testing results for soil and groundwater contamination.

6.1.6 If land contamination is confirmed, a Remediation Action Plan (RAP) shall be drawn up to formulate necessary remedial measures. The subsequent CAR and RAP shall be endorsed by EPD before implementation of any remediation work.

6.2 Possible Remediation Methods

6.2.1 The actual remediation methods, if required, for A King Marine would depend greatly on a number of factors including nature and extent of contamination as well as site and time availability. Based on previous shipyard decommissioning environmental studies, viz. *Decommissioning of Cheoy Lee Shipyard at Penny's Bay* and *Reclamation of North Tsing Yi*, contaminants such as total petroleum hydrocarbons (TPH), BTEX, semi-volatile organic compounds (SVOCs) and/or heavy metals, exceeding Dutch B criteria, were identified at the sites. Although the nature and extent of contamination would need to be determined at subsequent SI, it is possible that these contaminants are presented at A King Marine.

6.2.2 The possible scenarios with proposed remediation methods (if required) are summarized in **Table 5**. In view of the above potential contaminants, biopiling and/or cement solidification/stabilisation are possible remediation methods for A King Marine. These two remediation methods proved to have successfully treated the contaminated soil in the decontamination projects of Cheoy Lee Shipyard and North Tsing Yi Shipyard.

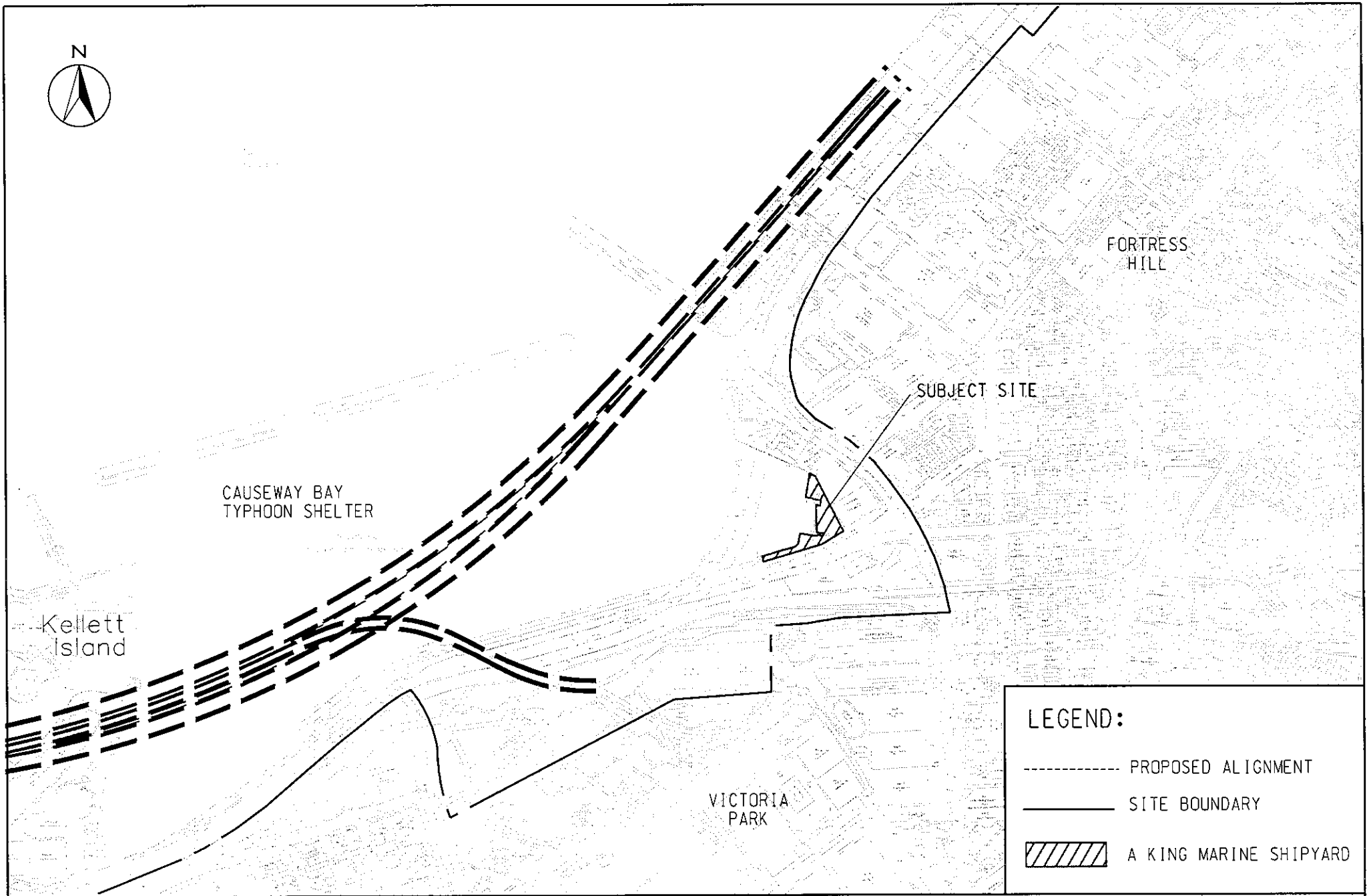
Table 5 Possible Remediation Options for A King Marine

Scenario	Description	Possible Remediation Options [1]
Scenario 1	No contaminated soil	Nil
Scenario 2	Contaminated soil which requires for the set-up of on-site/off-site treatment plant	Option 1 – On-site treatment by biopiling and/or cement solidification/stabilization
		Option 2 – Off-site treatment by biopiling and/or cement solidification/stabilization
Scenario 3	Contaminated soil but without any practical on-site/off-site treatment.	Landfill Disposal

Notes:
(1) A complete comparison of pros and cons of all possible remediation options (plus recommendation) is to be provided in the future RAP submission so as to justify the proposed remediation options and determine the best feasible option for contaminated soil treatment. Scenario 3 (landfill disposal) will only be considered if no remediation methods are considered practical.

6.2.3 Either on-site or off-site treatment would be considered depending on the site and time availability. The contaminated soil should be treated by biopile (if organic contaminants exceedance were found in the SI) and/or CS/S (if heavy metals exceedance were found in the SI). Further evaluation of the remediation options would be conducted after assessments of the SI results and will be addressed in the future RAP submission.

Figures



MAUNSELL

WAN CHAI DEVELOPMENT PHASE II - PLANNING AND ENGINEERING REVIEW

SITE LOCATION PLAN

FIGURE A7.1

K:/A01604/DRAWING/REPORT/MAY07/FIGURE A7.1.DGN SCALE 1:5000 (A4)

1 - Tung Lo Wan Fire Station

2 - Northern Portion of Shipyard
(Taken From Victoria Park Road)

3 - Eastern Portion of Shipyard with
Tung Lo Wan Fire Station in the Background

4 - Eastern Portion of Shipyard with
Tung Lo Wan Fire Station in the Background

5 - Slipways (Facing North)

6 - Workshop A, located at the Western Portion
of the Shipyard

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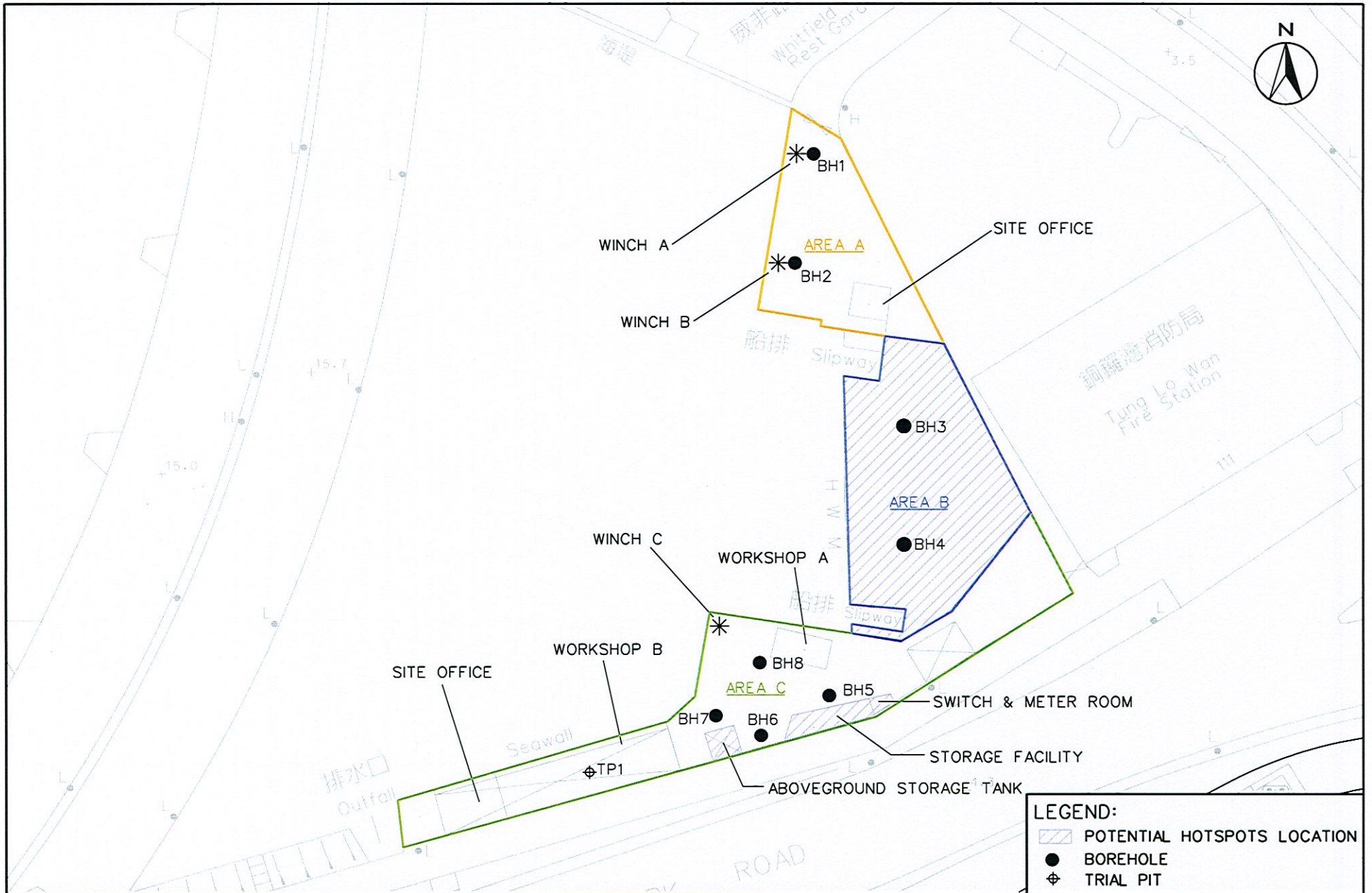
WAN CHAI DEVELOPMENT PHASE II - PLANNING AND ENGINEERING REVIEW

PHOTOS TAKEN OUTSIDE OF THE SHIPYARD ON 8 AUGUST 2006

FIGURE A7.2

K:/A01604/DRAWING/REPORT/JAN07/FIGA7.2.DGN



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WAN CHAI DEVELOPMENT PHASE II - PLANNING AND ENGINEERING REVIEW

SITE LAYOUT, LOCATIONS OF POTENTIAL HOTSPOTS AND PROPOSED SAMPLING LOCATIONS

FIGURE A7.3

K:/A01604/DRAWING/REPORT/JAN07/FIGA7.3.DGN SCALE 1:600 (A4)

1 - Area A Constructed on Seawall & Thick Concrete (Facing Southeast)

2 - Area A Constructed on Seawall & Thick Concrete (Facing Northwest)

3 - Winch A, Right Next to Seawall Edge

4 - Winch B, Right Next to Seawall Edge

5 - Site Office (Facing East)

6 - Inside Site Office

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PHOTOGRAPHIC RECORDS FOR AREA A

FIGURE A7.4

K:/A01604/DRAWING/REPORT/JAN07/FIGA7.4.DGN

1 - Western Portion of Area B and Remains of Slipways (Facing North)

2 - Western Portion of Area B and Remains of Slipways (Facing South)

3 - Eastern Portion of Area B (Facing North)

4 - Eastern Portion of Area B (Facing East)

5 - Eastern Portion of Area B (Facing Southeast)

6 - Area B (Facing East)

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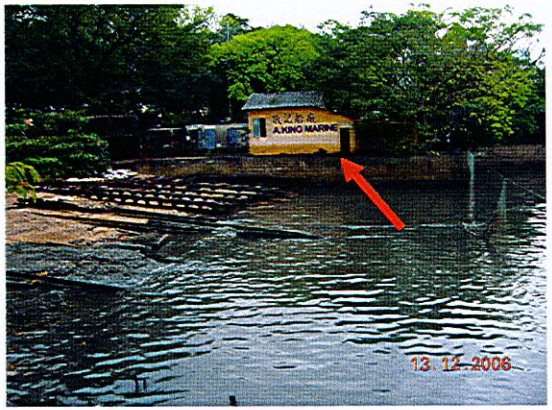
WAN CHAI DEVELOPMENT PHASE II - PLANNING AND ENGINEERING REVIEW

PHOTOGRAPHIC RECORDS FOR AREA B

FIGURE A7.5

K:/A01604/DRAWING/REPORT/JAN07/FIGA7.5.DGN

1 - Workshop B and Site Office on Seawall and Thick Concrete (Facing South)



2 - Workshop A and Winch C on Seawall and Thick Concrete (Facing Sourth)

3 - Storage Facility on Concrete (Facing South)

4 - Location of Borehole 'BH4' as Proposed in the 2001 EIA (Facing East)

5 - Location of Borehole 'BH4' as Proposed in the 2001 EIA (Facing Northeast)

6 - Location of Borehold 'BH4' as Proposed in the 2001 EIA (Facing South)

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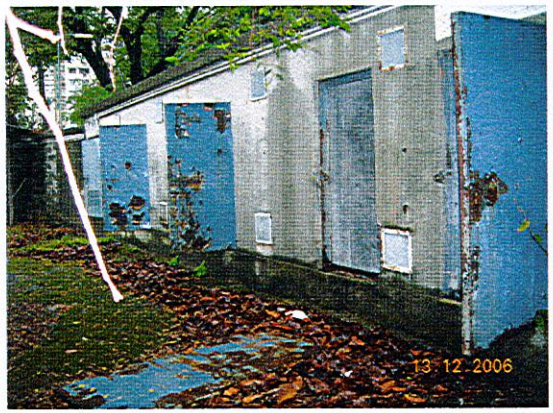
WAN CHAI DEVELOPMENT PHASE II - PLANNING AND ENGINEERING REVIEW

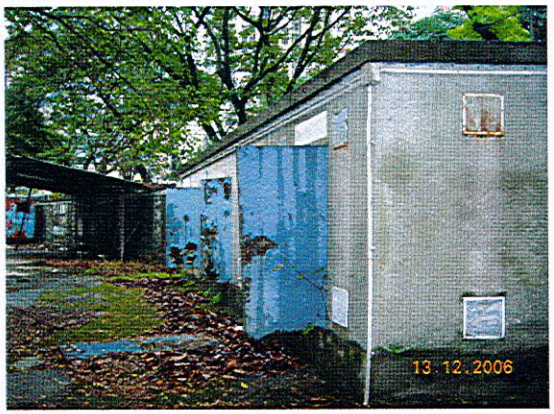
PHOTOGRAPHIC RECORDS FOR AREA C (SHEET 1 OF 3)

FIGURE A7.6

K:/A01604/DRAWING/REPORT/JAN07/FIGA7.6a.DGN



7 - Front of Storage Facility (Facing South)



8 - Storage Facility (Facing East)

9 - Compartment of the Storage Facility

10 - Aboveground Storage Tank (Facing Southwest)

11 - Aboveground Storage Tank (Facing East)

12 - Area next to Workshop A (Facing West)

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WAN CHAI DEVELOPMENT PHASE II - PLANNING AND ENGINEERING REVIEW

PHOTOGRAPHIC RECORDS FOR AREA C (SHEET 2 OF 3)

FIGURE A7.6

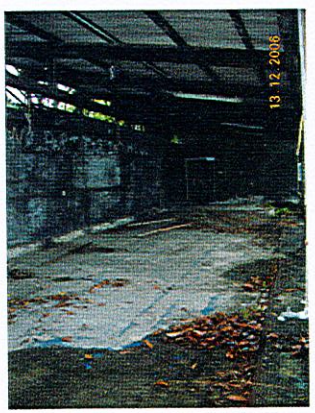
K:/A01604/DRAWING/REPORT/JAN07/FIGA7.6b.DGN

13 - Workshop A (Facing West)

14 - Inside Workshop A

15 - Area Behind Workshop A and Winch C (Facing West)

16 - Workshop B (Facing East)



17 - Workshop B (Facing West)

18 - Inside Site Office (Adjacent to Workshop B, Facing East)

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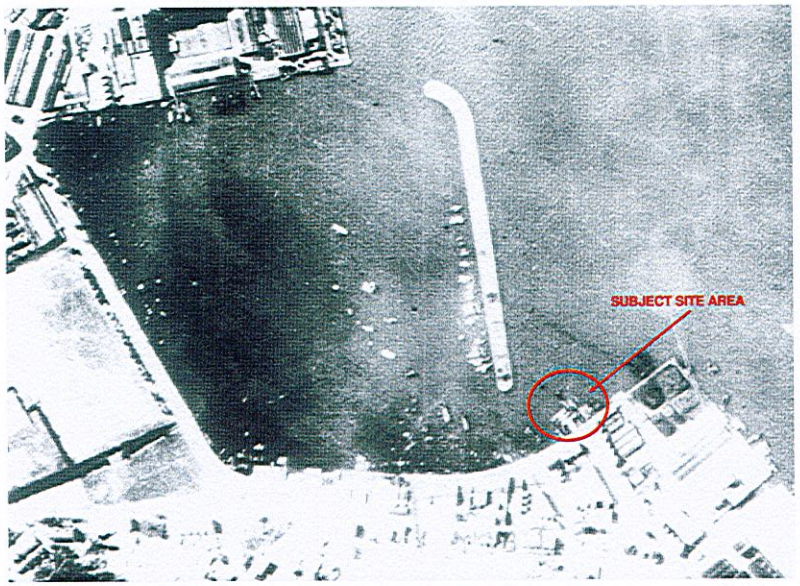
WAN CHAI DEVELOPMENT PHASE II - PLANNING AND ENGINEERING REVIEW

PHOTOGRAPHIC RECORDS FOR AREA C (SHEET 3 OF 3)

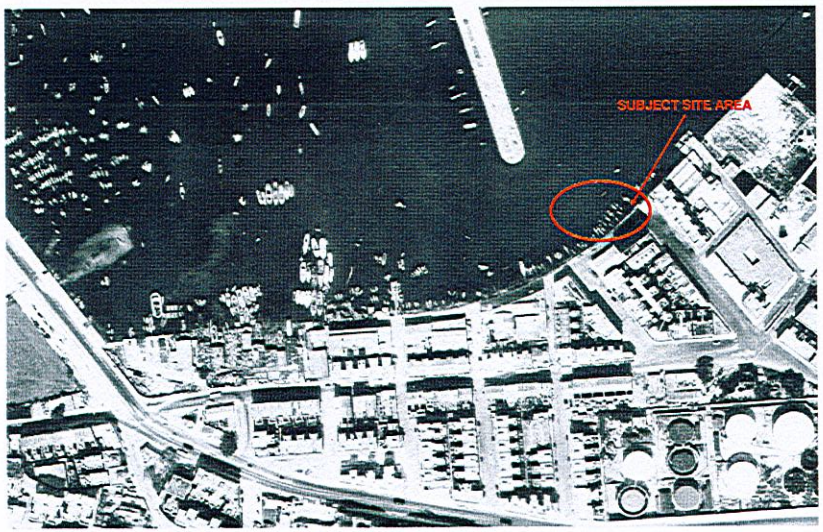
FIGURE A7.6

K:/A01604/DRAWING/REPORT/JAN07/FIGA7.6c.DGN

Annex A7.1
Aerial Photographs

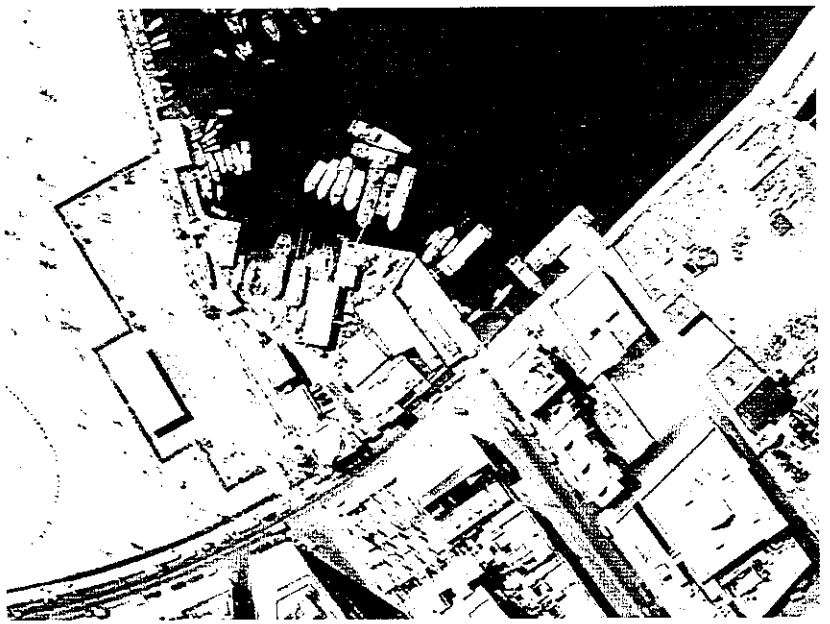


DATE: 13-11-1924 REFERENCE No.: 11 HEIGHT(ft): 11100(ENLARGED) SORTIE No.: N/A

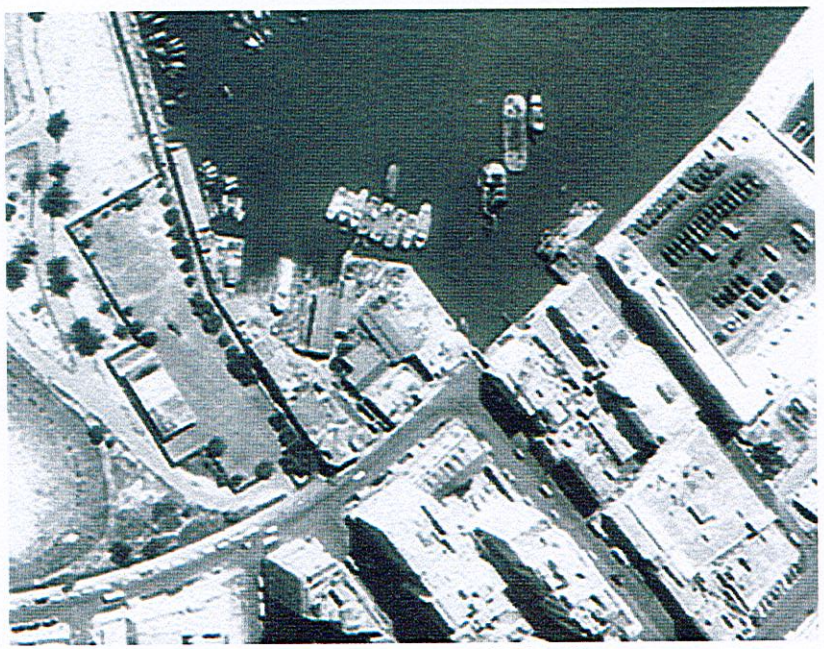


DATE: 8-5-1949 REFERENCE No.: 6028 HEIGHT(ft): 8000(ENLARGED) SORTIE No.: 81A/128

DATE: 5-10-1959 REFERENCE No.: 0291 HEIGHT(ft): 40000(ENLARGED) SORTIE No.: F63/58A/RAF/775

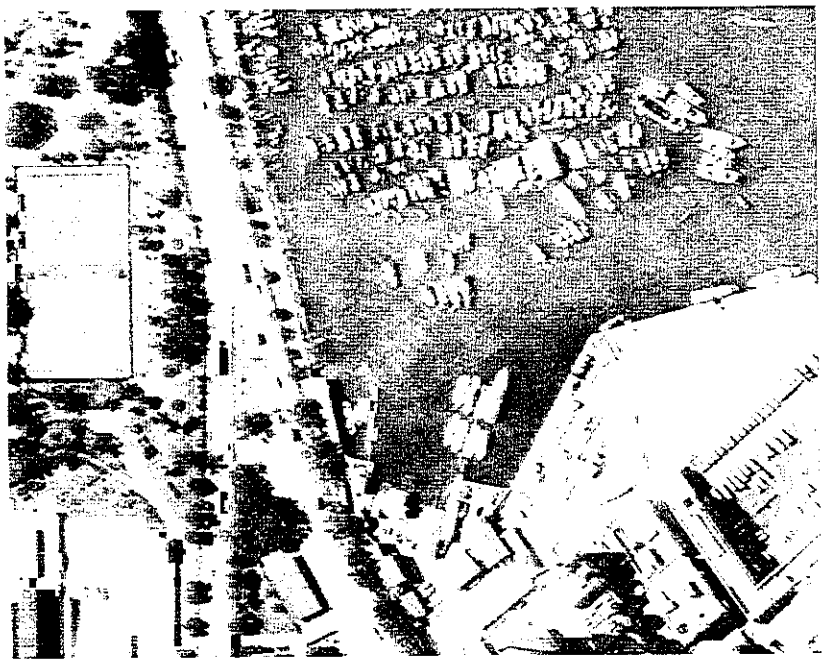


DATE: 1-2-1963 REFERENCE No.: 7223 HEIGHT(ft): 2700 (ENLARGED) SORTIE No.: N/A



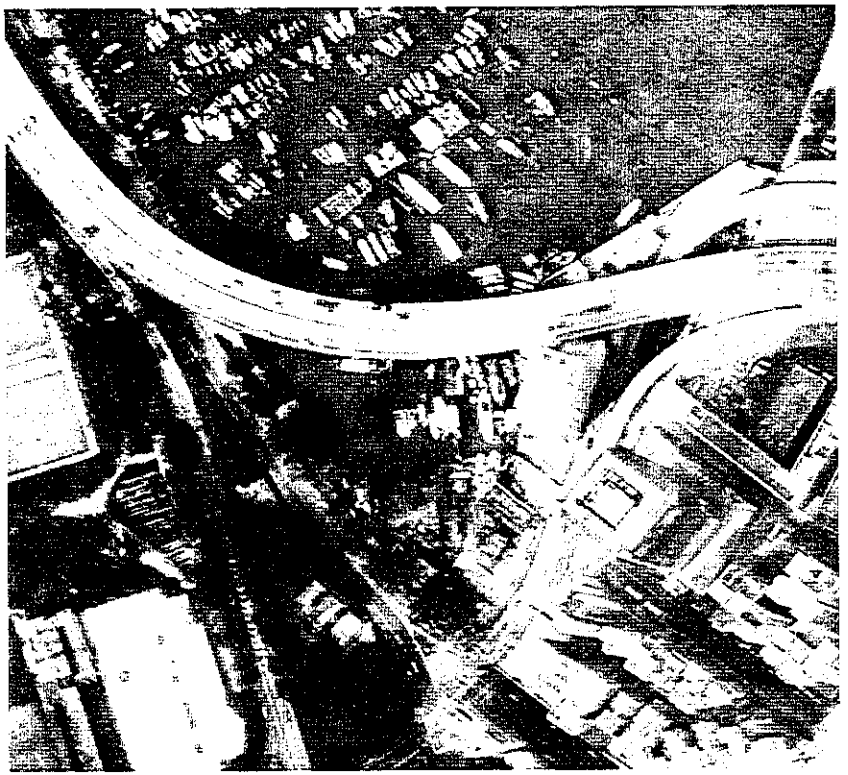
DATE: 16-5-1967 REFERENCE No.: 5612 HEIGHT(ft): 6250(ENLARGED) SORTIE No.: N/A

DATE: 1968 REFERENCE No.: 842 HEIGHT(ft): 2000(ENLARGED) SORTIE No.: N/A



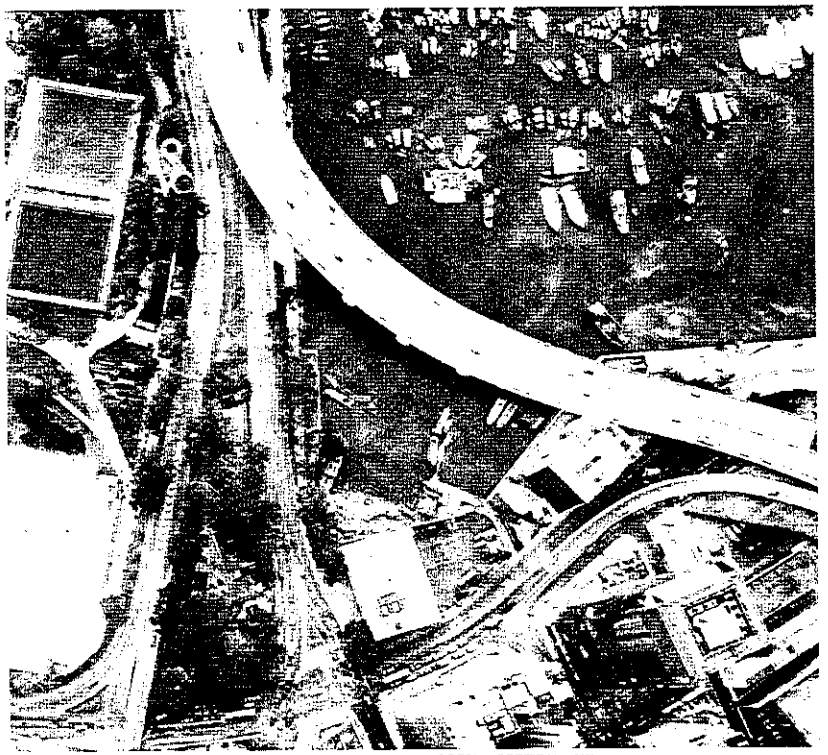
DATE: 5-11-1980 REFERENCE No.: 32259 HEIGHT(ft): 4000(ENLARGED) SORTIE No.: N/A

DATE: 19-3-1990 REFERENCE No.: A20665 HEIGHT(ft): 2000(ENLARGED) SORTIE No.: N/A



DATE: 5-12-1993 REFERENCE No.: A36934 HEIGHT(ft): 4000(ENLARGED) SORTIE No.: N/A

DATE: 7-12-1995 REFERENCE No.: CN12608 HEIGHT(ft): 3500(ENLARGED) SORTIE No.: N/A



DATE: 3-2-2000 REFERENCE No.: A50906 HEIGHT(ft): 2000(ENLARGED) SORTIE No.: N/A

DATE: 15-3-2001 REFERENCE No.: CN30244 HEIGHT(ft): 4000(ENLARGED) SORTIE No.: N/A

DATE: 7-10-2002 REFERENCE No.: CW44335 HEIGHT(ft): 4000(ENLARGED) SORTIE No.: N/A

DATE: 19-5-2006 REFERENCE No.: CW71907 HEIGHT(ft): 4000(ENLARGED) SORTIE No.: N/A

Annex A7.2
Site Appraisal Checklist

ANNEX A

PRELIMINARY SITE APPRAISAL CHECKLIST

Name of company:	HARRIMAN PROPERTY MANAGEMENT LIMITED
Site address:	Hing Fat Street.
Date:	

Checklist for Site Appraisal:

1. What is your company's main current activities/operations in the above address?	NONE
2. Area of your site?	3. 204 m
3. Length of operation?	N/A
4. Do you know the type of land use before you took over the site? (If yes, please give details.)	VACATED SHIP YARD.

5. Have you ever received any notices of violation of environmental regulations or public complaints? (If yes, please give details.)	NO
6. Do you have regular check for any spillage and monitoring of chemicals handled? (If yes, please give details.)	NO
7. Did any tank/truck spillage or leakage happen in your site? Do you have any internal records about the type, duration and quantities? (If yes, please give details.)	N/A
8. Do you have any registered hazardous installations as defined under relevant ordinances? (If yes, please give details.)	NO
9. Do you have any underground storage tank? (If yes, please give details.)	N/A
10. Do you have any records of major renovation of your site or rearrangement of underground utilities, pipework/underground tanks? (If yes, please give details.)	NO

ANNEX B

CHECKLIST OF POSSIBLE CONTAMINANTS

Please indicate whether the following materials have been used, stored or generated on the site.

Materials	Possible Source	Yes/No	Method of Disposal (historical & current), if applicable (see *Note* below)
1. Fuels	Petroleum storage, LPG storage		
2. Lubricating oils, hydraulic fluids	Spillage, maintenance and dismantling of equipment, scrapped tanks and pipeworks, vehicle maintenance		
3. Cleaning solvents	Engine room and equipment maintenance		
4. Used chemical solutions	Engine coolant, battery fluid	N/A	
5. Acids	Treating steel plate to remove millscale		
6. Asbestos	Application and removal of engine room insulation		
7. Transformer oil (PCB)	Scrapped electrical equipment		

CHECKLIST OF POSSIBLE CONTAMINANTS (CONTINUED)

Materials	Possible Source	Yes/No	Method of Disposal (historical & current), if applicable (see *Note* below)
8. Anti-corrosive paints, thinners	Application of anti-corrosive coatings		
9. Coal, ash, oily tank and bilge sludge	Boiler room/engine room maintenance, tank cleaning		
10. Finely divided metal wastes	Grinding and milling operations, especially welding joints		
11. Electrical wiring	Electrical installation, maintenance, scrapped electrical equipment	NA	
12. Low-level radioactive waste	Scrapped instruments		
13. Wood preservatives	Timber treatment		
14. Polyurethane foam	Hull manufacture/ maintenance		

Note: Methods of disposal include:

i) collection by a municipal solid waste collector;
ii) collection by a licensed chemical waste collector;
iii) disposal to foul sewer in liquid form;
iv) disposal to storm drain in liquid form;
v) burial at pits within the site.