

7 LAND CONTAMINATION

7.1 Introduction

7.1.1 This section reviews the potential environmental issues associated with land contamination and assesses its implications for the proposed development. The assessments make reference to the previous EIA Study for the Wan Chai Development Phase II Comprehensive Feasibility Study (WDIICFS EIA) in 2001 and were based on the EIA Study Brief No. ESB-153/2006 issued in September 2006 as well as the Recommended Outline Development Plan for the Wan Chai Development Phase II (WDII) project (RODP) prepared for the HEC Sub-committee Review.

7.2 Environmental Legislation, Policies, Plans, Standards and Criteria

7.2.1 The Practice Note for Professional Persons ProPECC PN3/94 “*Contaminated Land Assessment and Remediation*” and “*Guidance Notes for Investigation and Remediation of Contaminated Sites of: Petrol Filling Stations, Boatyards, and Car Repair / Dismantling Workshops*” issued by the Environmental Protection Department (EPD) provide guidance on land contamination assessment. The Guidance Notes make reference to criteria developed in the Netherlands (the “Dutch Guidelines”), which are most comprehensive and are widely used for contaminated site assessment. The Dutch “B” levels under the Dutch Guidelines stipulated in the ProPECC Note No. 3/94 have been used in this EIA for assessing soil contamination.

7.2.2 Further consideration of contamination issues is provided in Section 3 (Potential Contaminated Land Issues) of Annex 19 “*Guidelines for Assessment of Impact on Sites of Cultural Heritage and Other Impacts*” of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM).

7.3 Assessment Methodology

7.3.1 In this Study, land contamination assessment in the previous WDIICFS EIA Study (Application No. EIA-058/2001 & EIAO Register No. AEIAR-042/2001) was reviewed and the validity and applicability of its findings to the current proposed plan were evaluated. Additional information was obtained through desktop review to further update the findings. In addition, site reconnaissance was also carried out to identify and confirm the potential contaminative landuses within the Study Area.

7.4 Review of Previous WDIICFS EIA Study

7.4.1 A land contamination assessment was carried out under the previous WDIICFS EIA Study in 2001 to review the potential environmental issues associated with land contamination and assess the implications of land contamination for the proposed development at the time. The methodology for the assessment was developed in accordance with the Practice Note *ProPECC PN3/94* and “*Guidance Notes for Investigation and Remediation of Contaminated Sites of: Petrol Filling Stations, Boatyards, and Car Repair / Dismantling Workshops*” issued by EPD.

- 7.4.2 In the assessment at the time, relevant information had been obtained and reviewed which included aerial photographs and geological information. Historical records of chemical spillage and violations of environmental regulations were requested from relevant government bodies. There were no records of chemical spillage and conviction in relation to land contamination within the Study Area. In addition, a site inspection was carried out in May 2000 to investigate the potential contaminative land uses.
- 7.4.3 Two sites, viz. A King Marine (an abandoned shipyard) and Royal Hong Kong Yacht Club (RHKYC), were identified to have the potential to cause land contamination impacts to the proposed Development at the time. The basis was due to the fact that the proposed elevated section of the trunk road would pass through RHKYC and that the A King Marine would be developed into entertainment complexes.

Comparison between Previous WDIICFS EIA and Current Development Scheme

- 7.4.4 In respect to the extent of the site area, the previous WDIICFS and the current development scheme are quite similar. The significant changes are the inclusion of the northern portion of Victoria Park and the North Point Waterfront. Given the long history and landuse of Victoria Park, land contamination would not be expected in the area. For the North Point Waterfront, the project area is situated along the thick concrete seawall protected by paved concrete.
- 7.4.5 In the 2001 EIA Study, the trunk road scheme consisted of tunnel and flyovers along the Wan Chai – Causeway Bay Waterfront. The associated construction activities for flyovers at contaminated sites were therefore of concern for the section through RHKYC. However, for the current road scheme, the trunk road is more than 20m below ground level and so the potential contamination at the RHKYC would not be a concern.
- 7.4.6 The proposed development for WDII at A King Marine Shipyard is different between the previous WDIICFS and the current development scheme. In the previous layout plan, the site is proposed to be entertainment complexes with uses such as indoor interactive theme park, game stalls, restaurants, shops and carpark. In the current RODP, the area is proposed only for the re-provision of the floating Tin Hau Temple. Although the scale of construction at A King Marine Shipyard is expected to be smaller for the current plan, excavations and foundation works may still be necessary for the re-development of the site.
- 7.4.7 The study area is highly urbanised and consists mainly of commercial and government/institution /community landuses. The landuses since the 2001 EIA Study have not changed significantly.
- 7.4.8 Given the similarity in the site boundaries and landuses in the previous and current project layout plan, findings from the 2001 EIA Study are considered valid and applicable for the current Study. A desktop review and site reconnaissance will be necessary to identify additional potential contaminative landuses and to confirm the land contamination impacts associated with A King Marine.

7.5 Potential Contaminative Land Uses

- 7.5.1 A site reconnaissance was carried out on 8 August 2006 under this Study to confirm the contaminative landuses as well as identify any new contaminative sites. Findings from site reconnaissance indicated that A King Marine Shipyard, identified in the WDIICFS EIA, is considered to be potential contaminated site.
- 7.5.2 **Table 7.1** below summarises the potential contaminative landuse within the Study Area and the location is illustrated in **Figure 7.1**.

Table 7.1 Potential Contaminative Land Use within the Study Area

Site ID	Potential Contaminative Land Uses	Location
Site 1	A King Marine (abandoned shipyard)	Eastern corner of Causeway Bay Typhoon Shelter (CWBTS).

Site 1 - A King Marine (abandoned shipyard)

- 7.5.3 A King Marine is an abandoned shipyard (approximately 1,500 m² in land area) located at the eastern portion of the Causeway Bay Typhoon Shelter. Based on the previous WDIICFS EIA Study, the site is considered to be of concern for land contamination impacts during construction phase and a Contamination Assessment Plan (CAP) had been prepared at the time for further site investigations. Although no site access was allowed within the shipyards at the time, preliminary site observations had indicated that the potential contaminative area within the shipyard included winch, slipway, storage tank, workshop, chemical / dangerous goods storage area and waste disposal area.
- 7.5.4 Relevant aerial photographs were reviewed and are summarized below in **Table 7.2**.

Table 7.2 List of Aerial Photographs Reviewed (A King Marine)

Date	Reference No.	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 was abandoned.
19.5.2006	CW71907	4000	Not much change from 2002. The shipyard was abandoned.

Source: Survey and Mapping Office, Lands Department.

7.5.5 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.

7.5.6 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.

7.5.7 Site reconnaissance was carried out within the shipyard, with site owner's representatives, on 13 December 2006 to identify potential contamination hotspots under this Study. Findings of the site reconnaissance are discussed in the subsequent section.

7.6 Sensitive Receivers

7.6.1 Construction workers are the most likely group to be exposed to any potential contaminated materials during construction stage. The principal exposure routes for workers include:

- Direct ingestion of contaminated soils through eating or drinking/smoking on site; and
- Dermal contact with contaminated soils.

7.6.2 There would be no sensitive receivers during the operational phase of the Project.

7.7 Identification of Environmental Impacts

7.7.1 Based on the findings of the previous WDIICFS EIA Report as well as desktop review and site reconnaissance, the potential source of land contamination impacts is shown in **Table 7.3** below.

7.7.2 As shown in the table, A King Marine Shipyard could pose land contamination impacts on the proposed project if excavations, foundations works or other construction activities requiring handling of underlying surface soil were necessary. A site reconnaissance was conducted on 13 December 2006 within the abandoned shipyard to inspect and identify potential contamination hotspots. The site reconnaissance was conducted with Site Owner's representatives. The potential contaminative activities identified include winches, slipways, open boat storage area, workshops, aboveground storage tank and chemical / dangerous goods storage facility.

7.7.3 No land contamination impacts are expected during the operational phase of the Project.

Table 7.3 Details of Existing Potential Contaminative Land Use

Site ID	Potential Contaminative Use/Activity	Site Descriptions	Potential Land Contamination Impacts to Proposed Development	Necessity for Further Investigation
1	A King Marine (abandoned shipyard)	<ul style="list-style-type: none"> - Located at eastern corner of CWBTS. - Ceased operation and was abandoned around 2001 to 2002. - Approximately 1,500 m² in land area. - Based on previous WDIICFS EIA Study and site reconnaissance carried out in December 2006 under this Study, the site consisted of winches, slipway, aboveground storage tank, workshops, open boat storage area and chemical / dangerous goods storage area. 	<p>In the current RODP, the area is proposed for the re-provision of the floating Tin Hau Temple. Redevelopment of the area is proposed which may include excavations, foundation works or other construction activities that may require the handling of the underlying surface soil. If such works were required, the potential contaminated land may pose adverse environmental impacts.</p>	<p>Yes if excavations, foundation works or other construction activities requiring handling of underlying soil.</p>

7.8 Land Contamination Assessment

- 7.8.1 The only potential source of land contamination impact for the Project is the potential contamination from past land uses at A King Marine. The RODP for the area proposes the re-provision of the floating Tin Hau Temple on-shore which may require redevelopment of the area. Construction activities associated with the redevelopment may include excavation and foundation works which would require the handling of potentially contaminated soil. If such construction activities were necessary, land contamination impacts (if any) could be a concern.
- 7.8.2 Findings of the 13 December 2006 for the Shipyard are summarised in **Table 7.5**. For the purpose of 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 7.2**.
- 7.8.3 As required by the EIA Study Brief, a Contamination Assessment Plan (CAP) has been prepared and agreed by EPD (attached in the **Appendix 7.1**). Nine sampling locations are proposed at the potential contaminated area comprising winches, workshops, slipway, open boat storage area, chemical / dangerous goods storage area and aboveground storage tank in the CAP. The sampling locations are shown in **Figure 7.2**. Photographic records for the areas are attached in the CAP.
- 7.8.4 Contaminants such as lubrication oil, petroleum product, chlorinated solvent and paints are likely to be found in the shipyard. However, 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.

Site Investigation

- 7.8.5 Soil boring and sampling works were carried out according to the agreed CAP in the period from 26 to 28 February 2007 by Vibro (HK) Ltd.. Laboratory analysis on the collected soil and groundwater samples were performed by Lam Laboratory Ltd. A Contamination Assessment Report (CAR) presenting the SI data and interpretation of results are attached in **Appendix 7.2**.
- 7.8.6 The sampling strategy adopted for the SI followed the principles of the EPD's Practice Note for Professional Persons ProPECC PN3/94 "*Contaminated Land Assessment and Remediation*" and "*Guidance Notes for Investigation and Remediation of Contaminated Sites of: Petrol Filling Stations, Boatyards, and Car Repair / Dismantling Workshops*". Soil samples, if possible, were taken at approximately 0.5 m, 1.5 m and 3.0 m below ground level and/or at groundwater level. A total of 26 samples were collected and analysed for heavy metals, TPH, BTEX, PAHs, Cyanide, Tributyltin (TBT) and Volatile Organic Compounds.

Summary of Results Analysis and Interpretation

Analysis of Soil Samples

- 7.8.7 The results of the soil samples analysis were compared with the soil criteria used in The Netherlands for contaminated land assessments, viz. the “Dutch List”. The Dutch B levels under the Dutch List were referred to for assessing soil contamination. For concern chemicals (ie TBT and some heavy metals), where no Dutch B levels were available, another guideline ‘USEPA Region IX Preliminary Remediation Goal (PRG)’ which has been widely used in other countries for initial soil screening for remediation were adopted.
- 7.8.8 Based on the analytical results, elevated concentration of TPH, barium, copper, lead and/or zinc which exceeded the Dutch B/C criteria were detected at 5 soil samples collected at BH-3, BH-4, BH-5 and BH-8. Heavy metals are considered to be the major contaminant of the Subject Site, with exceedances at all of the 5 soil samples. TPH exceedance, on the hand, was recorded only at BH-3 (0.5m) and was considered localised as no TPH exceedances were noted at lower soil stratum or at other sampling locations. In addition, other organic contaminants (ie BTEX, PAHs and VOCs) were not detected in all of the collected soil samples. Of the 5 samples that exceeded the relevant assessment criteria, only one sample had exceeded the Dutch C criteria while the remaining 4 had exceeded the Dutch B criteria.

Analysis of Groundwater Samples

- 7.8.9 Nine groundwater samples were collected and analysed from the SI works. Risk assessments on the analytical results were performed. The results of the risk assessment indicated that the risk of all chemicals-of-concerns in groundwater to construction workers were acceptable and groundwater remediation would not be necessary. Details of the risk assessment are discussed in the Contamination Assessment Report (**Appendix 7.2**).

Extent of Contamination and Remediation

- 7.8.10 Based on the analytical results, the extent and quantity of contaminated soil was estimated and a total of 5 contaminated areas were identified and shown in **Figure 7.3**. **Table 7.4** below summarised the details of these contaminated areas. Based on the Remediation Action Plan (RAP) (**Appendix 7.2**), cement solidification / stabilisation and landfill disposal were proposed as the soil remediation method.

Table 7.4 Estimated Quantity of Contaminated Soil

Area ID	Corresponding Sampling Location	Contaminants	Estimated Vertical Contamination Extent (m below ground)	Estimated Horizontal Contamination Extent (m ²)	Estimated Volume of Contaminated Soil * (m ³)
Area B1	BH-3	TPH, copper, lead, zinc and barium	0.0-0.8	49	39.2
Area B2	BH-3 & BH-4	Copper and lead	0.0-0.8	570.5	456.4
Area B3	BH-4	Copper	1.2-2.0	49	39.2
Area C1	BH-5	Lead	2.5-3.5	49	49
Area C2	BH-8	Lead	1.0-2.0	49	49
<i>Total Estimated Volume of Contaminated Soil:</i>					632.8
(TPH and Heavy Metals: 39.2m ³ ; Heavy Metals only: 593.6m ³) [^]					

Notes: * The soil volume may vary subject to the testing of confirmatory samples collected at the defined contaminated zone boundary as well as the site specific conditions (e.g. encountering of boulders).

[^]Based on the RAP (**Appendix 7.2**), heavy metals only contaminated soil (estimated volume of 593.6m³) will be remediated using cement solidification / stabilisation method while TPH and heavy metals contaminated soil (estimated volume of 39.2m³) will be handled by landfill disposal.

Table 7.5 Findings of Site Reconnaissance

Area	Facilities Identified ¹	Area (m ²)	Site Observation	SI Proposed
A	<ul style="list-style-type: none"> ● 2 Winches ● Site Office 	326	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● Slipways ● Open Boat Storage Area 	570.5	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● 2 Workshops ● 1 Winch ● Aboveground Storage Tank. ● (AGT) ● Storage Facility ● Site Office 	703	<ul style="list-style-type: none"> ● 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. 	Yes

Area	Facilities Identified ¹	Area (m ²)	Site Observation	SI Proposed
			<ul style="list-style-type: none"> ● 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. ● 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 7.2** for location.

7.9 Evaluation and Prediction of Impacts

- 7.9.1 Based on the land contamination assessment, land contamination impacts might occur as a result of handling heavy metals / TPH contaminated soil by construction workers during the remediation works. Of the 5 samples that exceeded the relevant assessment criteria, only one sample had exceeded the Dutch C criteria while the remaining 4 had exceeded the Dutch B criteria. This implies that the majority of the contaminated soil was found to be 'polluted' but not identified as 'significantly polluted', as defined by the Dutch List.
- 7.9.2 The proposed remediation methods (ie cement solidification / stabilisation and landfill disposal) would involve excavation, transportation, mixing, treatment and stockpiling of contaminated soil. The estimated volumes of soil contamination for cement solidification / stabilisation and landfill disposal are 593.6m³ and 39.2m³ respectively. Given the relatively small quantity of contaminated soil (632.8m³ in total), duration of remediation is expected to be short.
- 7.9.3 Mitigation measures as discussed in **Section 7.10** below are proposed for the remediation works. It is expected that land contamination impacts would be minimal if the proposed mitigation measures were properly implemented.

7.10 Mitigation Measures

- 7.10.1 The Contractor for the excavation works shall take note of the following points for excavation:
- Excavation profiles must be properly designed and executed;
 - In case the soil to be excavated is situated beneath the groundwater table, it may be necessary to lower the groundwater table by installing well points or similar means;
 - Quantities of soil to be excavated must be estimated;
 - It maybe necessary to split quantities of soil according to soil type, degree and nature of contamination.
 - Temporary storage of soil at intermediate depot or on-site maybe required. The storage site should include protection facilities for leaching into the ground. eg. Liner maybe required.
 - Supply of suitable clean backfill materials is needed after excavation.
 - Care must be taken of existing buildings and utilities.
 - Precautions must be taken to control of ground settlement
 - Speed controls for vehicles should be imposed on dusty site areas.
 - Vehicle wheel and body washing facilities at the site's exit points should be established and used.

7.10.2 The following environmental mitigation measures should be strictly followed during the operation and/or maintenance of the cement solidification / stabilisation facilities:

Air Quality Mitigation Measures

- The loading, unloading, handling, transfer or storage of cement should be carried out in an enclosed system.
- The loading, unloading, handling, transfer or storage of other materials which may generate airborne dust emissions such as untreated soil and oversize materials sorted out from the screening plant and stabilized soil stockpiled in the designated handling area, should be carried out in such a manner to prevent or minimise dust emissions. These materials should be adequately wetted prior to and during the loading, unloading and handling operations.
- All practicable measures, including speed controls for vehicles, should be taken to prevent or minimize the dust emission caused by vehicle movement.
- Tarpaulin or low permeable sheet should be put on dusty vehicle loads transported between site locations.

Noise Mitigation Measures

- The mixing facilities should be sited as far as practicable to the nearby noise sensitive receivers.
- Simultaneous operation of mixing facilities and other equipment should be avoided.
- Mixing process and other associated material handling activities should be properly scheduled to minimise potential cumulative noise impact on the nearby noise sensitive receivers.
- Construction Noise Permit should be applied for the operation of powered mechanical equipment during restricted hours (if any).

Water Quality Mitigation Measures

- Stockpile of untreated soil should be covered as far as practicable to prevent the contaminated material from leaching out. The leachate should be discharged following the requirements of WPCO.

Waste Mitigation Measures

- Treated oversize materials will be used as filling material for backfilling within the site. Sorted materials of size smaller than 5 cm will be collected and transferred to the mixing plant for further decontamination treatment.
- Stabilized soils should be broken into suitable size for backfilling or reuse on site.
- A high standard of housekeeping should be maintained within the mixing plant area.

- If necessary, there should be clear and separated areas for stockpiling of untreated and treated materials.

7.11 Residual Environmental Impact

- 7.11.1 After appropriate remediation actions have been completed, such areas are expected to have been cleaned up to acceptable standards and no adverse residual impact would be envisaged.

7.12 Environmental Monitoring and Audit (EM&A) Requirements

- 7.12.1 Details of the environmental monitoring and audit requirements are provided in Chapter 12 of this EIA and a stand-alone EM&A Manual.

7.13 Conclusion

- 7.13.1 The potential environmental issues associated with land contamination for the WDII Project have been reviewed and any implication for the proposed development has been assessed.
- 7.13.2 Based on the review of the previous WDIICFS EIA Report and investigation on the historical/current land uses, the proposed re-development of A King Marine might pose potential land contamination impacts during the construction phase of the Project. In order to indicate the nature and extent of soil contamination, a Contamination Assessment Plan (CAP) (attached in **Appendix 7.1**) has been prepared under this Study. The CAP discusses the details of the site investigation requirements to be carried out.
- 7.13.3 Site investigation (SI) was subsequently carried out in accordance with the endorsed CAP and a Contamination Assessment Report (CAR), presenting the results and findings of the SI works had been compiled. Based on the analytical results, exceedances in relevant criteria of heavy metals and total petroleum hydrocarbons (TPH) were identified and an estimated 633 m³ of contaminated soil (mainly heavy metals) were required remediation. A Remediation Action Plan (RAP) was thus drawn up to formulate the necessary remedial measures and landfill disposal and cement solidification / stabilisation were proposed as the soil remediation method. Based on the RAP, the estimated volumes of soil contamination for cement solidification / stabilisation and landfill disposal are 593.6m³ and 39.2m³ respectively. The combined CAR / RAP report is attached in **Appendix 7.2**.
- 7.13.4 The land contamination impacts associated with A King Marine would be the handling of contaminated soil by construction works during the remediation works. If the proposed mitigation measures were properly implemented, adverse land contamination impacts are not anticipated.
- 7.13.5 No adverse residual impact in respect to land contamination is expected if the proposed remediation actions had been carried out.