Appendix J

Soil Contamination Information
(Extracts from EIS prepared in 2000)

equipment). The facility would have access to road, rail, ship and other infrastructure that enhances its attractiveness to potential users. The General Cargo Handling Facility would be located immediately adjacent to the Container Terminal and would occupy an area of some 7 ha. The General Cargo Handling Facility would use the larger of the three container berths.

Bulk Handling Terminal

The Bulk Handling Terminal would occupy an area of approximately 8 ha (excluding the area taken up by the rail siding and rail receival facility for the Terminal) and would be a state-of-the-art facility capable of handling a large range of non hazardous dry bulk products including grains, rice and canola. The Terminal would be fitted with efficient, high volume equipment that would be capable of handling a throughput of approximately 1.5 million t per year, and would have direct access to the local and regional road and rail networks. The Terminal would have one berth which would be independent of the three container berths.

6.2 CONTAMINATION ISSUES

6.2.1 Remediation Criteria

The objective of site remediation is to ensure that contaminants in surface soils (soils in the top 0.5m) are below the site specific criteria identified by the Closure Area Risk Assessment. Further discussion on the Closure Area Risk Assessment is provided in Sections 10 and 18.

The Closure Area Risk Assessment determined specific remediation criteria for the Closure Area. As a consequence of the similarity of fill to that found at the Steel River Project Site, the criteria for the Closure Area is the same as that used on the Steel River Project. The criteria are:

- the absence of free tar at the surface (top 0.5 m);
- a total PAH concentration less than 400 mg/kg (top 0.5 m); and
- the concentration of benzo(a)pyrene and equivalents below 15 mg/kg (top 0.5 m).

The proposed remediation option has been prepared in accordance with *Managing Land Contamination Planning Guidelines, DUAP (1998).* It is also consistent with the approach approved by the EPA at other sites exhibiting similar contaminants.

6.2.2 Distribution of Contaminants

Site investigations conducted on the Closure Area identified the distribution of contaminants across the site. For ease of environmental investigation the Closure Area was divided into 16 smaller areas (M11 to M26). These investigations included:

- Area reports presenting all available data on soil and groundwater contaminants collected from investigations within each individual area.
- Soil and groundwater assessment reports providing an overall summary of the distribution of contaminants across the Closure Area.
- The Closure Area Risk Assessment which presented a summary of contamination on an area by area basis, with comparison against relevant health based and environmental investigation guidelines.

Given the relatively large size of the Closure Area and numerous buildings and other site features such as stockpiles that create limited access to underlying soil and fill, there are some parts of the individual areas of the site which have not been investigated. Due to the history of the site however, and the similar nature of the fill materials across it, it is believed that the information collected during environmental investigations provides an adequate assessment of the range of chemicals and concentrations which exist.

Figure 6.2 shows soil sampling locations in the top 0.5m which contained soils above the remediation criteria. It can be seen that the geographical distribution of PAH above the criteria is widespread. The data suggests, however, that this does not necessarily occur as continuous zones of contamination. In other words, the distribution of contaminants above the site specific criteria is highly variable. This fact, in addition to the need to improve stormwater management, provided a firm basis for selection of capping of the entire site as the preferred remedial option.

6.3 STAGING OF SITE PREPARATION AND REMEDIATION

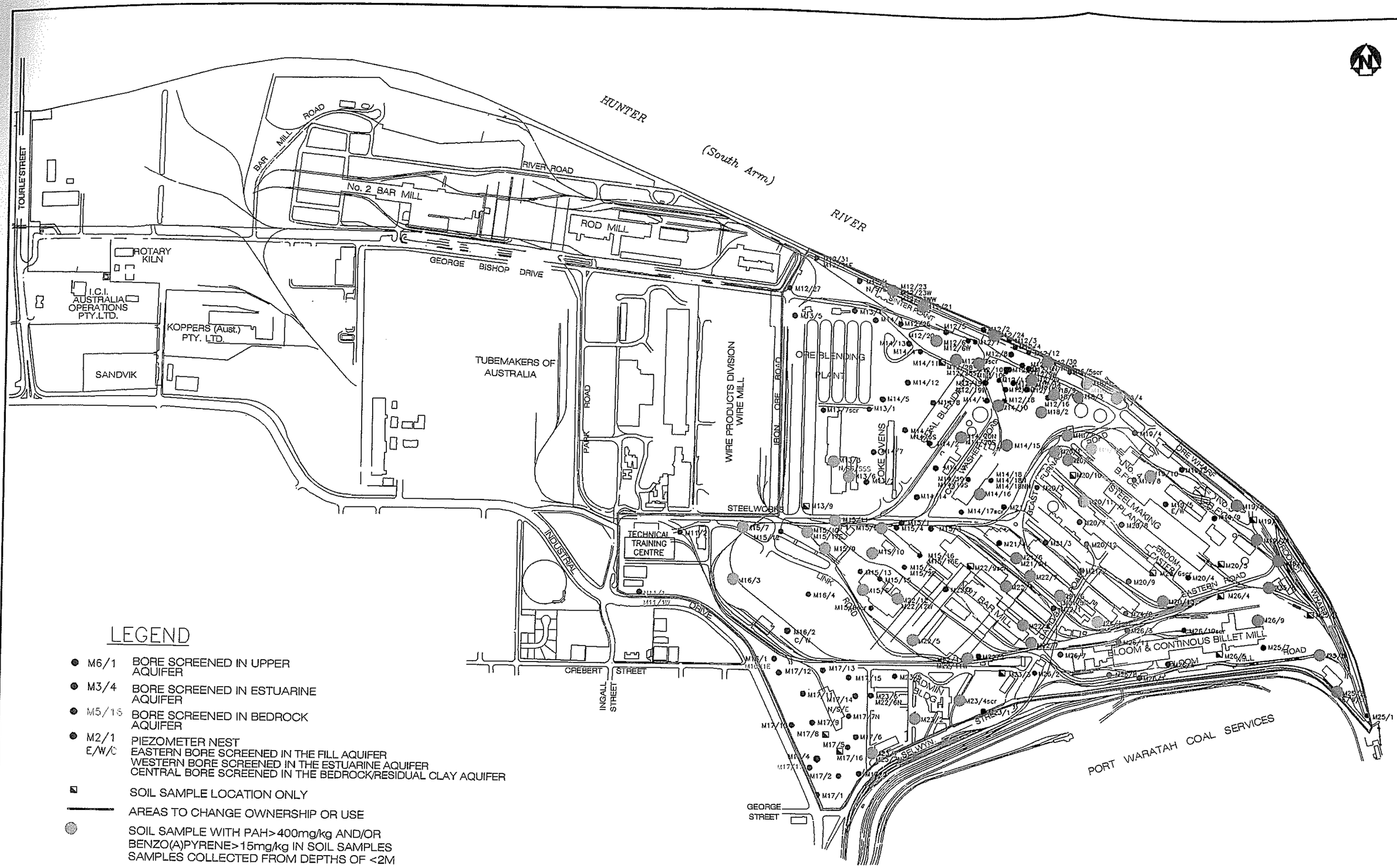
The site preparation and remediation activities would be staged in relation to development proposals for individual parcels of the Closure Area including the MPT, such that each individual parcel would be remediated immediately prior to redevelopment. Staging of the works would occur over a period of some 5 to 20 years and would be driven primarily by the nature of future development footprints and stormwater and drainage management. Activities within the MPT footprint represent the first stage of works at the Closure Area and would be completed within a timeframe of approximately two years.

6.4 SITE PREPARATION

The site preparation activities which form part of this development application would involve the demolition and removal of all remaining structures within the MPT footprint in order to enable remediation and redevelopment.

The first step in the site development process (prior to the commencement of demolition) would include:

- establishment of a monitoring program and equipment;
- induction of site personnel;
- if required, installation of soil removal facilities for vehicles;



LEGEND

- M6/1 — BORE SCREENED IN UPPER AQUIFER
- M3/4 — BORE SCREENED IN ESTUARINE AQUIFER
- M5/16 — BORE SCREENED IN BEDROCK AQUIFER
- M2/1 E/W/C — PIEZOMETER NEST
  EASTERN BORE SCREENED IN THE FILL AQUIFER
  WESTERN BORE SCREENED IN THE ESTUARINE AQUIFER
  CENTRAL BORE SCREENED IN THE BEDROCK/RESIDUAL CLAY AQUIFER
- SOIL SAMPLE LOCATION ONLY
- AREAS TO CHANGE OWNERSHIP OR USE
- SOIL SAMPLE WITH PAH>400mg/kg AND/OR BENZO(A)PYRENE>15mg/kg IN SOIL SAMPLES
  SAMPLES COLLECTED FROM DEPTHS OF <2M

SOURCE: ROBERT CARR & ASSOCIATES Pty Ltd

0 100 200 300 400 500 metres

URS

CLIENT: **BHP**

PROJECT: **DEVELOPMENT OF A MULTI PURPOSE TERMINAL AND REMEDIATION OF THE CLOSURE AREA, BHP NEWCASTLE STEELWORKS EIS**

REVISION: A
SCALE: AS SHOWN
DRAWING No: 18937-016
CAD FILE No: SYD018
DATE: 10/8/00
DESIGNED: SKT
DRAWN: JT
CHECKED: SKT
APPROVED:
STATUS: FINAL

TITLE: **SOIL SAMPLING LOCATIONS ABOVE REMEDIATION CRITERIA**

FIGURE: **6.2**

A3

11.1 METHODOLOGY

The following methods were used to describe the existing landform, geology and soils of the Closure Area and to assess the potential impact of the proposal. Details on the sediments within the dredge basin are provided in Section 14 of this EIS.

Review of:

- Survey data for BHP Main Site.
- 1:25 000 acid sulphate soil risk maps that have been prepared by DLWC.
- Hydrological investigations undertaken by Robert Carr & Associates in 1999.
- *Steel River Project – Remedial Action Plan Environmental Impact Statement* [Woodward-Clyde (1997)].
- The Closure Area Risk Assessment (Appendix B).
- Plans showing the final proposed landform and the layout of the MPT.
- A walk-over inspection of the Closure Area.

11.2 EXISTING ENVIRONMENT

11.2.1 Landform

The surface of the Closure Area is relatively flat with a gentle slope in a north easterly direction towards the South Arm of the Hunter River. The elevation of the site ranges from 1.5 m AHD to 5.5 m AHD (14 m to 18 m BHP datum). The highest point of the site is a natural rise (1 vertical to 1 horizontal) in the south western part of the site, adjacent to Industrial Drive. Other exceptions to the generally flat landform include elevated areas located in Area M26 which were used for stockpiling, an elevated area in the vicinity of the coke ovens and random depressions across the site which contain stormwater drains or occur due to the uneven settlement of fill.

11.2.2 Geology and Soils

The Closure Area originally comprised river channels (namely Platt's Channel and Spit Island), and low lying swamp areas. To enable the establishment of the Steelworks, the river channels and swamp areas were reclaimed and the existing landform created by the placement of slag, ash, coal tailings and general building refuse.

Local Lithologies

The following stratigraphic components make up the geology and soils underlying the Closure Area:

- *Fill Layer* - A layer of variable thickness comprising materials such as blast furnace slag, CWR, general builders rubble, some coking plant wastes (tars etc.), brecketts and fly ash (see below for further details). During establishment of the Steelworks, the material was randomly placed across the former Platt's Channel and Spit Island areas. A shallow unconfined aquifer is associated with the fill layer.
- *Estuarine Deposits, Sand and Clay* - Sediments and estuarine muds from Platt's Channel and Spit Island deposited by the original river were overlaid with man-made filling. These river sediments comprise natural clays with interbedded fine silts and sand layers. A thin layer of residual clay occurs at the base of the sequence and represents materials derived from the underlying bedrock formations (Tomago Coal Measures). An intermediate aquifer is associated with the estuarine deposits.
- *Residual Clay/Bedrock* - The Tomago Coal Measures bedrock formation that underlies the entire Closure Area comprises sandstone, siltstones and shales of Permian age. A deep low permeability aquifer is associated with the Tomago Coal Measures bedrock.

Characteristics of Fill Materials

In general, the fill materials used in reclaiming Platt's Channel included wastes from BHP plant operations and general wastes associated with the works. The main fill materials within these wastes included:

- blast furnace slag and brecketts;
- open hearth operations slag and Basic Oxygen Steelmaking (BOS) slag;
- coal washery slurry;
- flue dusts;
- sinter plant dusts;
- fly ash;
- shale;
- waste from the coke ovens by-products (including sludge from rectification stills, tar from the decanters, oil and tar from spills occurring from the tar tanks at the tar plants);
- wastes from the finishing and rolling mill operations (including spilt oil and lubricants from the mill floors and spent acid from the pickling plants); and
- ash from the locomotives.

Limited information is available which details the precise location of the disposal areas for particular wastes. However, an outline of the waste disposal areas, fill type and volume is provided in the *Site Management Plan Historical Investigation* prepared by BHP Rod and Bar Products Division in 1993.

11.2.3 Contamination of Fill

The findings of the site investigations and the Closure Area Risk Assessment indicated that PAHs are the only group of chemicals present in the surface (ie. the top 0.5 m) of the fill layer which occur at sufficiently high concentrations to warrant management prior to redevelopment of the Closure Area.

Whilst other chemicals may be present at concentrations exceeding relevant health based investigation guidelines, they have not been shown to be present at concentrations sufficiently high to present an unacceptable risk to human health, and tend to be located within areas also having elevated concentrations of PAHs.

There is no evidence of the widespread occurrence of elevated concentrations of volatile organic compounds such as BTEX in surface fill materials. However, elevated concentrations of BTEX compounds were found to occur at depth in Area M12 (refer to Figure 1.2). Based on the available data relating to the presence of volatile organic compounds at the Closure Area, the Risk Assessment does not predict these compounds to be present at sufficiently high concentrations to represent an unacceptable risk to human health.

Site investigations also indicated the presence of tar or tar like materials at some locations. However, the work undertaken to date has not uncovered extensive areas of free tar that might be associated with a feature such as a buried tar pond. It is anticipated, however, that tars or tar affected fill may to be encountered during the proposed site preparation and remediation works in the vicinity of underground structures such as tar lines and sumps. In addition, localised areas of soils affected by elevated concentrations of hydrocarbons, volatile organic compounds and other materials such as creosote and solvents used as degreasers in workshops, could also be expected to occur at the Closure Area.

The risks to human health associated with the soil contamination issues identified during the site investigations could be effectively managed by ensuring that excessively high concentrations of contaminants are not present at the surface of the site, in locations where direct human contact may take place (refer to Section 6 of this EIS for details).

11.2.4 Acid Sulphate Soils

In low lying coastal areas the action of bacteria as it breaks down organic matter in iron rich soils under anaerobic conditions, can lead to the formation of pyrite, which contains sulphides. If these pyrite-containing soils remain submerged or buried and oxygen does not come into contact with the soil, then these soils are known as potential acid sulphate soils (PASS). If left undisturbed, PASS do not pose a threat to the environment.

If PASS are disturbed and exposed to oxygen, the sulphides in the pyrite oxidise and sulphuric acid is produced. The low pH conditions that may exist in the soil and local groundwater due to the formation of sulphuric