Appendix F

Environmental Resources
Management Phase II
Environmental Assessment of
Former National Textiles Site

COPY

FORMER NATIONAL TEXTILES SITE, RUTHERFORD NSW

Phase II Environmental Assessment of Lot 221 and Lot 223

For:
NATIONAL TEXTILES PTY LTD

July 2001
501019JDRAFT

Report No. 501019J Draft

This report has been prepared in accordance with the scope of services described in the contract or agreement between ERM Australia (ERM) ACN 002 773 248 and the Clients. The report relies upon data, surveys, measurements and results taken at or under the particular times and conditions specified herein. Any findings, conclusions or recommendations only apply to the aforementioned circumstances and no greater reliance should be assumed or drawn by the Clients. Furthermore, the report has been prepared solely for use by the Clients and ERM accepts no responsibility for its use by other parties.

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EXECUTIVE SUMMARY

ERM was commissioned by Mr Derek Hodge of National Textiles Ltd to conduct a Phase II Environmental Assessment of the site (Lot 221 and Lot 223 of DP 990651), of the former National Textiles factory, in Rutherford, NSW. The site occupies an area of approximately 10.5 hectares and is located approximately 125 metres south of the New England Highway. The Commonwealth of Australia used the site for production of munitions during World War II between 1943 and 1945. Between 1945 and 2000 the site was used for textile production. The site is zoned for industrial landuse.

The objective of the assessment was to assess the current site condition by investigating the extent of potential soil and/or groundwater impact, as a result of former activities associated with the munitions and textile manufacturing.

Potential contaminants associated with munitions manufacturing include compounds such as dinitrotoluene (DNT), urea, acetone, nitric acid, ammonia nitrate, pentachlorophenol, ammonia, sulphuric acid, calcium cyanamide, ethylene glycol, methanol, di-n-butyl phthalate and sodium hydroxide. Given the range of potential contaminants, volatile organic compound (VOC) and semi-volatile organic compound (SVOC) scans were undertaken as screening tools, as well as analysis for selected inorganic compounds (As, Cd, Cr, Cu, Ni, Pb, Zn and Hg).

Potential contaminants associated with textile manufacturing include solvents and inorganic analytes used for the dyeing process. Most of these compounds would be detected in the VOC group, and as inorganic compounds.

In the areas of ash fill and transformer usage/component storage, polycyclic (polynuclear) aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs), were the respective target analytes. In areas where the fill material was other than that of ash fill, as well as areas adjacent to the oil stores, analysis was conducted for total petroleum hydrocarbons (TPH) and benzene, toluene, ethylbenzene, and xylene (BTEX) compounds.

The scope of works included:

- review of background information;
- identification of potential sources and receptors of impact;
- excavation of fifty six (56) inspection pits in areas of identified potential impact, and at random grid locations. These random grid locations were utilised to assess the nature of fill material and the potential presence of 'burial pits' in vacant areas across the site;

- laboratory analysis of forty five (45) soil samples and five (5) duplicate samples, for either one or a combination of TPH, BTEX compounds, selected inorganic compounds, PAHs, PCBs, VOCs and SVOCs; and

- preparation of a report outlining the results of the assessment and the potential for impact to cause significant risk of harm to human health and/or the environment. In addition, provide recommendations for further work to be conducted in areas where impact to the soils was above the industrial land use criteria, such that these areas could be subsequently validated for the intended land use.

The results of the investigation indicated the following:

- the geology below the site comprises clayey silt alluvium/colluvium to approximately 0.9 metres below ground level, underlain by silty clay residual soil to a depth of approximately 2.0 metres below ground level. The bedrock is siltstone/sandstone of the Lochinvar Formation;

- areas of ash fill to approximately 0.4 metres below ground level, were noted in most inspection pits excavated across the site. A unit of silty sand fill approximately 2.0m thick, was encountered in a 50 square metres area in the 'Ash Disposal Area', located adjacent to the eastern boundary of Lot 223;

- groundwater was not encountered during the assessment, although seepage water was noted at the upper contact of the residual soil in some of the inspection pits excavated;

- information supplied by the DLWC indicated that there are no registered bores within a 2 kilometre radius of the site. The closest bore (GW027289) is located approximately 2.1 kilometres to the north west of the site;

- a thirty three (33) metre deep water bore is located within the adjoining Lot 211. The measured static water level in the fractured rock aquifer was 12.5 metres below ground level. High concentrations of chloride, iron, and total dissolved solids have rendered the groundwater from this bore not suitable for use as raw drinking water, irrigation water, livestock watering and in the textile manufacturing process. The chemical characteristics of the groundwater in the Lot 211 bore is likely to be the consistent on a regional basis, and the groundwater below this site should have similar characteristics;

- PCBs, VOCs and SVOCs in the soils were either below the site investigation criteria or below the laboratory detection limits;

- although PAHs and benzo [a] pyrene were detected in most of the ash fill samples analysed, concentrations were below the site investigation criteria;

- BTEX compounds were not detected in any of the samples analysed;
- TPH in the C_6-C_9 hydrocarbon group was not detected in any of the samples analysed;
- TPH in the C_{10}-C_{36} hydrocarbon group was detected above the sensitive land use criteria of 1000mg/kg in the samples collected from IP19 (0.5-1.2m), IP20 (0-1.5m), and IP46 (1-1.5m);
- TPH in the C_{10}-C_{36} hydrocarbon group was detected above the DIL criteria of 5000 mg/kg used as a screening tool, in the sample of silty sand fill of inspection pit IP46 (1.0m to 1.5m). At all other sampling locations, TPH concentrations were either not detected, or were below the DIL criteria.
- of the selected inorganics analysed (As, Cd, Cr, Cu, Ni, Pb, Zn and Hg), concentrations detected in all samples were below the site assessment criteria;
- a sample of the same silty sand fill found in inspection IP46, was analysed from inspection pit P45 (0.3m to 2.5m). The results indicated that TPH in the $C_{10} - C_{36}$ hydrocarbon group was not detected. The results suggest that localised 'hot spots' of organic impact are located within the silty sand layer, rather than the entire fill unit.

On the basis of the investigations, ERM concludes that the identified areas of potential impact on Lot 221 and Lot 223 have been investigated and that the site is suitable for industrial landuse, with the exception of the fenced 'Ash Disposal Area' on Lot 223. ERM recommends that the lateral extent, of what appears to be a localised 'pocket' of TPH impacted fill within this area, should be delineated to assess whether the impact is localised in the vicinity of inspection pit IP46.

ERM does not consider that the impacted silty sand fill unit has the potential to cause significant risk of harm to human health and/or the environment for the following reasons:

- the material is within the fenced off 'Ash Disposal Area', where assess to this area is via a locked gate;
- the fill unit is covered by approximately 0.3 metres of ash fill which is not impacted. As such, there is limited potential for personnel to gain exposure to the impacted material, as long as the fill unit remains undisturbed;
- odour/aesthetics are not considered an issue as long as the fill remains undisturbed;
- impact has not occurred to the residual clay horizon below the silty sand fill in IP46; and is vertically confined to localised 'hotpots' of impact within the fill; and

- the underlying low permeability residual clay horizon will retard vertical migration of potentially impacted seepage water to the fractured rock aquifer at approximately 12.0 metres below ground level. The current classification of the groundwater indicated that the water quality is poor and not suitable for drinking water irrigation water, livestock watering, or for the textile industry, with respect to one of the following: chloride, total hardness, total dissolved solids or iron.

ERM considers that a sufficient number of inspection pits have been excavated outside areas of identified potential impact, to assess the potential presence of significantly sized 'burial pits' containing textile and/or munitions waste, within the vacant areas of the site.

Finally the southern boundary of Lot 223 extends for approximately 20 metres to the south of the security fence. This boundary is not fenced and future site owners should ensure that a fence is erected along this boundary, to prevent potential dumping of material across this boundary.

Chapter 1

INTRODUCTION

1.1 BACKGROUND

ERM was commissioned by Mr Derek Hodge of National Textiles Pty Ltd to conduct a Phase II Environmental Assessment of Lots 221 and 223, at the former National Textiles factory site in Rutherford, NSW. The site occupies an area of approximately 10.5 hectares and is located approximately 125 metres to the south of the New England Highway. The Commonwealth of Australia used the site for production of munitions during World War II between 1943 to 1945. Between 1945 and 2000, the site was used for textile production.

1.2 OBJECTIVES

The objective of the assessment was to establish whether the site has been impacted by previous activities. In order to achieve this objective a Phase II Assessment was conducted, which targeted the locations of potential impact identified in the following Phase I Audit report, which is provided in *Appendix A:*

- ERM (March 2001) *Phase 1 Environmental Audit – Lots 221 and 223 National Textiles Limited, Rutherford NSW.*

Given that a detailed site history was provided in the ERM (March 2001) *Phase 1 Audit* report, identifying the areas of potential impact, the 'Judgmental Sampling Pattern' methodology, as outlined in the NSW EPA (1995) *Sampling Design Guidelines,* was adopted for the Phase II Assessment. Using this methodology, the 'hot spot' areas of potential impact were targeted.

In addition to targeting 'hot spot' areas of potential impact, a number of inspection pits were excavated outside these areas to assess the nature of the fill material in the vacant areas across the site. These pits also assessed the potential for 'burial pits' containing munitions and/or textile waste, to have been placed within these areas.

Potential contaminants associated with munitions manufacturing include compounds such as dinitrotoluene (DNT), urea, acetone, nitric acid, ammonia nitrate, pentachlorophenol, ammonia, sulphuric acid, calcium cyanamide, ethylene glycol, methanol, di-n-butyl phthalate and sodium hydroxide. Given the range of potential contaminants, volatile organic compound (VOC) and semi-volatile organic compound (SVOC) scans were undertaken as

screening tools, as well as analysis for selected inorganics (As, Cd, Cr, Cu, Ni, Pb, Zn and Hg).

Potential contaminants associated with textile manufacturing include solvents and inorganics used for the dyeing process. Most of these compounds would be detected in the VOC group, and as selected inorganics.

In the areas of ash fill and transformer usage/component storage, polycyclic (polynuclear) aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs), were the respective target analytes. In areas where the fill material was other than that of ash fill, as well as areas adjacent to the oil stores, analysis was conducted for total petroleum hydrocarbons (TPH) and benzene, toluene, ethylbenzene, and xylene (BTEX) compounds.

1.3 SCOPE OF WORK

The scope of work comprised:

- review of information in the ERM (March 2001) *Phase 1 Audit* report, which included data collected from the site inspection, the Newcastle Environmental Protection Authority (EPA) office, the Newcastle City Council, and a search as conducted through the Department of Land and Water Conservation (DLWC) of registered bores;
- excavation of fifty-six (56) inspection pits (IP1 to IP40, IP40A, and IP41 to IP55) and collection of soil samples for laboratory analysis;
- assessment and interpretation of the geological/ hydrogeological conditions below the site;
- laboratory analysis of forty five (45) soil samples and five (5) duplicate samples for either one or a combination of total petroleum hydrocarbon (TPH); benzene, toluene, ethylbenzene, and xylene (BTEX) compounds; selected inorganics (As, Cd, Cr, Cu, Ni, Pb, Zn and Hg); polycyclic (polynuclear) aromatic hydrocarbons (PAHs); volatile organic compounds (VOCs); semi volatile organic compounds (SVOCs); and polychlorinated biphenyls (PCBs); and
- preparation of a report outlining the results of the assessment and the potential for impact to cause significant risk of harm to human health and/or the environment. In addition, provide recommendations for further work to be conducted in areas where impact to the soils was above the industrial land use criteria, such that these areas could be subsequently validated for the intended land use.

1.4 LIMITATIONS OF USE OF THIS REPORT

The findings of this report are based on the Scope of Work outlined above. ERM performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental auditing profession. No warranties, express or implied, are made.

Subject to the Scope of Work, ERM's assessment is limited strictly to identifying typical environmental conditions associated with the subject property and does not evaluate structural conditions of any buildings on the subject property, nor any other issues. Although normal standards of professional practice have been applied, the absence of any identified hazardous or toxic materials on the subject property should not be interpreted as a guarantee that such materials do not exist on the site.

This assessment is based on site inspection conducted by ERM personnel, sampling and analyses described in the report, and information provided by the property owner or other people with a knowledge of site conditions. All conclusions and recommendations made in the report are the professional opinions of the ERM personnel involved with the project and, while normal checking of the accuracy of data has been conducted, ERM assumes no responsibility or liability for errors in data obtained from regulatory agencies or any other external sources, nor from occurrences outside the scope of this project.

ERM is not engaged in environmental auditing and reporting for the purpose of advertising sales promoting, or endorsement of any client interests, including raising investment capital, recommending investment decisions, or other publicity purposes. The client acknowledges that this report is for the exclusive use of the client, its representatives and advisers and any investors, lenders, underwriters and financiers who agreed to execute the reliance letter, and the client agrees that ERM's report or correspondences will not be, except as set forth herein, used or reproduced in full or in parts for such promotional purposes, and may not be used or relied upon in any prospectus or offering circular.

Chapter 2

SITE DESCRIPTION

2.1 SITE LOCATION AND DETAILS

The site comprises the two lots (Lot 221 and Lot 223), which are located to the south of the New England Highway in Rutherford, NSW. The site location in relation to the surrounding area is shown on *Figure 1,* whereas details for Lot 221 and 223 are shown on *Figure 2.*

The southern boundary of Lot 221 adjoins the central northern boundary of Lot 223. The western and eastern boundaries of Lot 221 adjoin Lot 211 and Lot 222, respectively. A twelve (12) metre wide road reserve adjoins the northern boundary of Lot 221.

Kyle Street, a vacant parking bay area, and a portion of Lot 211 adjoin the western boundary of Lot 223. The north boundary of Lot 223 is adjoined by a portion of Lot 211, Lot 221, Lot 222, and Lot 204. The eastern boundary of Lot 223 adjoins a rail siding, while the southern boundary adjoins various parcels of land utilised for light industrial purposes. Vacant land is located to the south-western corner of Lot 223 and is owned by Haxton Haulage Pty Ltd.

The site surface is flat and the location of the grassed areas, bitumen and concrete surfaced areas, is shown on the aerial photograph *Figure 2.* The Hunter River and Stony Creek are located approximately 2.5 kilometres and 1.0 kilometres to the north east and east of the site, respectively.

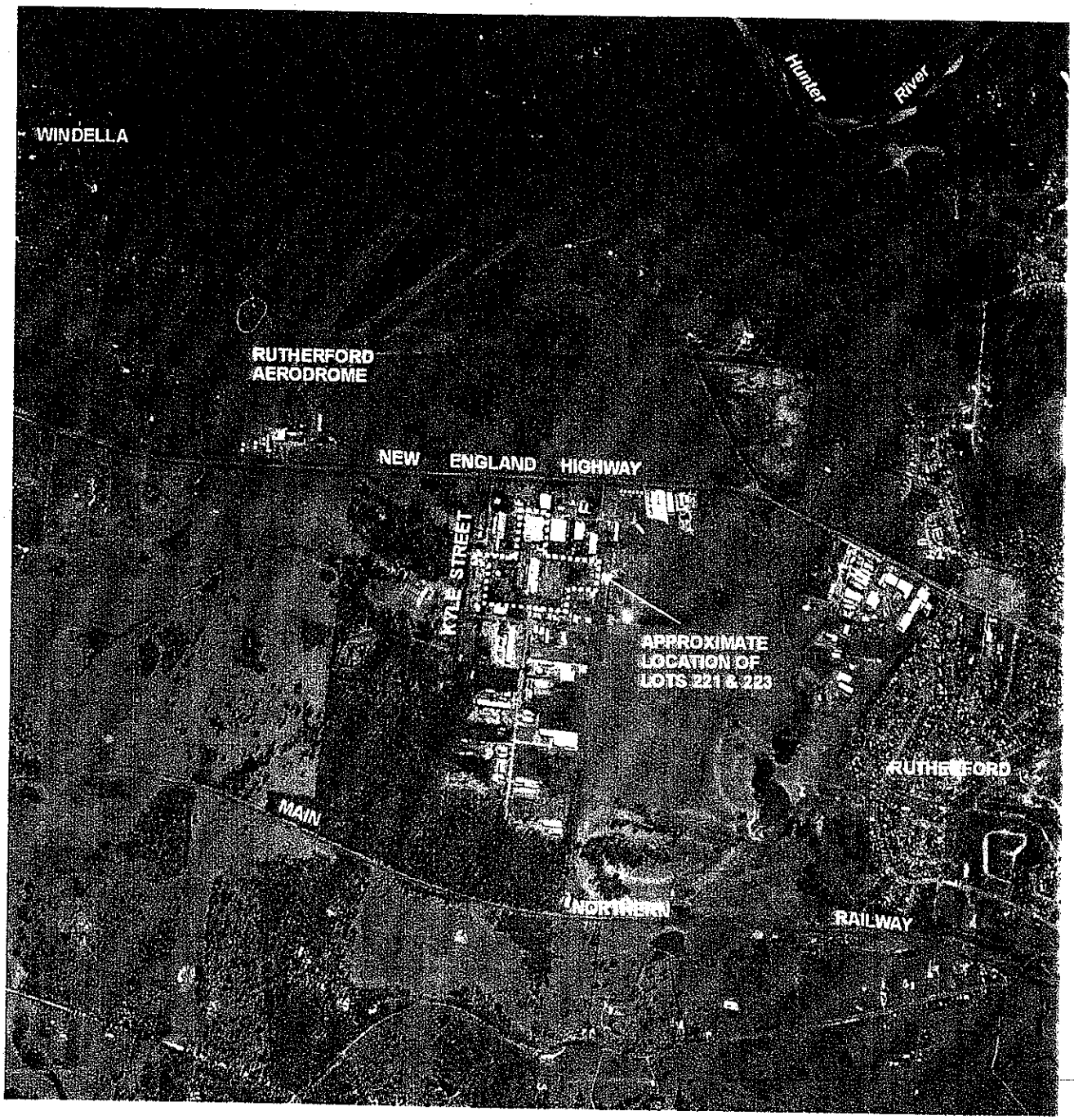
Access to the site is from the main site entrance off the New England highway. The general area surrounding the site comprises light industrial properties including warehouses, printers, cardboard recycling and transport companies, and metal fabrication workshops.

2.2 GEOLOGY AND HYDROGEOLOGY

The 1: 100 000 Newcastle Coalfield Regional Geology Sheet (Geological Series Sheet 9231 Edition 1995), indicates that the site is underlain by basalt, siltstone and sandstone of the early Permian, Lochinvar Formation of the Dalwood Group.

During the intrusive assessment, the generalised geological profile encountered below ground level is described below, and is shown on the geological logs in *Appendix B*:

- Ash fill was encountered in twenty nine (29) of the fifty six (56) inspection pits to a depth of approximately 0.4 metres below ground level. A horizon of Silty Sand - Fill



SOURCE: LAND INFORMATION CENTRE RUN 6 CESSNOCK

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Figure 1 LOCALITY PLAN

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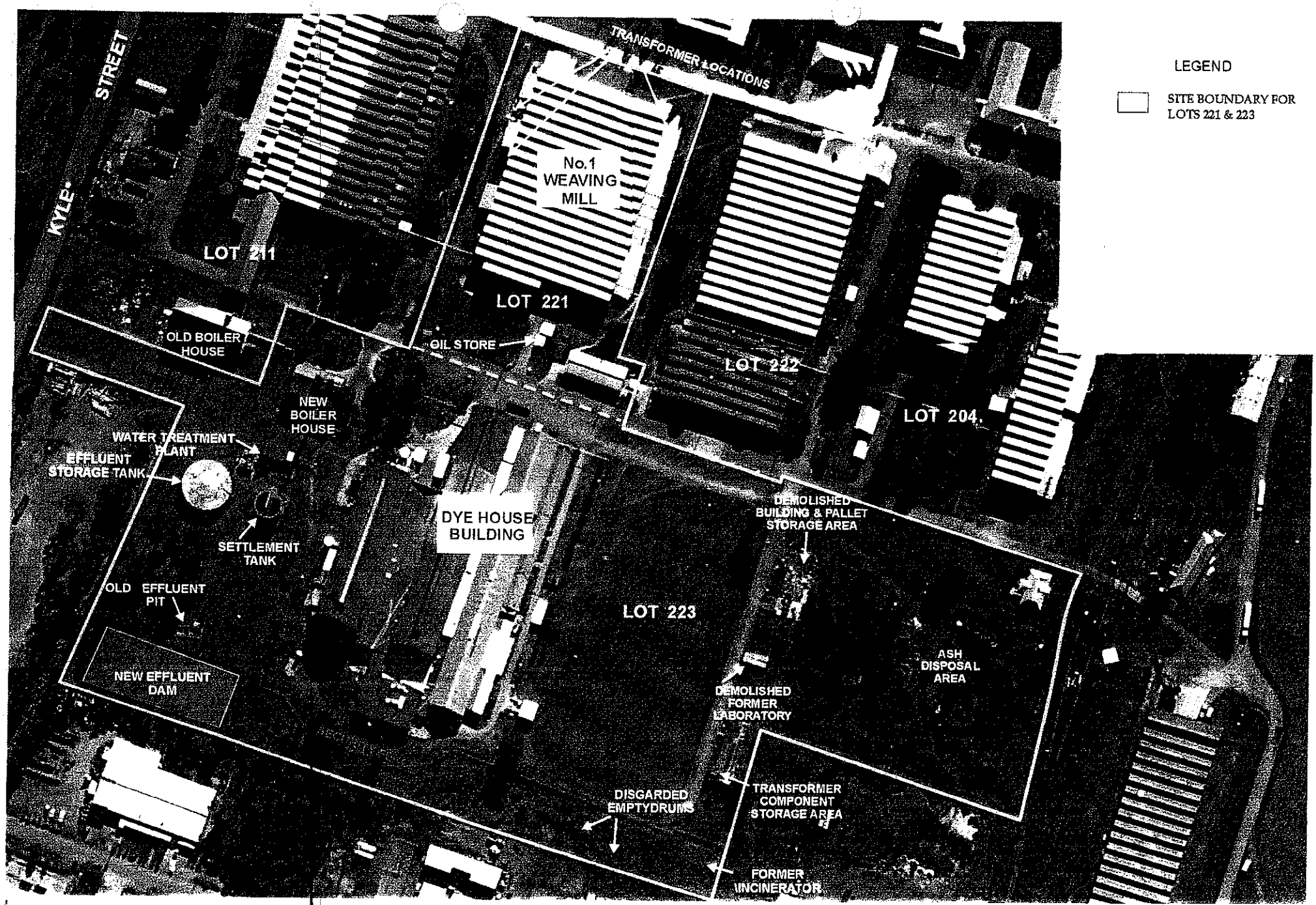

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Figure 2 SITE DETAILS FOR LOT 221 & LOT 223

approximately 2.0 metres thick, was encountered in a 50 square metres area in the 'Ash Disposal Area', adjacent to Lot 223 eastern boundary;

- Clayey Silt, light brown, low permeability, Alluvium/Residual Soil to a depth of approximately 0.9 metres below ground level, overlain in places by a thin horizon of Silty Clay, organic Topsoil;

- Clay, light brown mottled yellow, high plasticity, very low permeability, Residual Soil to a depth of approximately 2.0 metres below ground level; and

- Residual Sandstone was encountered in IP9 and IP14 at a depth of approximately 1.5 metres below ground level.

Seepage water was encountered in IP20 at the interface between the silty sand fill and residual clay soil at approximately 1.4 metres depth, and also in IP40 at the interface of the same horizons at 2.5 metres below ground level.

A groundwater bore search was conducted with the Department of Land and Water Conservation (DLWC). The information supplied indicated that there are no registered bores within a 2 kilometre radius of the site. The closest bore (GW027289) is located approximately 2.1 kilometres to the north west of the site. The details for this bore are presented in the ERM (March 2001) *Phase 1 Audit* report.

A water supply bore was located on the adjacent property of Lot 211. The bore details were supplied by the National Textiles site personnel, and are included in *Appendix C.* The bore was drilled to a depth of 32.5 metres below ground level in 1997, using the cable tool method of drilling. The bore was drilled to supplement the municipal water for use in the factories. Water quality tests indicated a chloride concentration of 3460 mg/L and total dissolved solids of 6980 mg/L. It is not known whether this bore was ever used, but is currently abandoned. The static water level measured in this bore on 21 May 2001 was 12.5 metres below ground level, which corresponds closely with 12.68 metre water level measured by the driller in 1997.

Of importance is that the site surface and the deeper rock fracture aquifer is separated by a low permeable residual soil clay horizon, and that potential impact at the surface is unlikely to migrate vertically and impact the fractured rock aquifer. The beneficial use classification of the groundwater indicates that the water quality is poor and is not suitable for raw drinking water, irrigation water, livestock watering or for the textile industry, with respect to one of the following: chloride, total hardness, total dissolved solids or iron.

Chapter 3

SITE INVESTIGATIONS

3.1 INTRUSIVE INVESTIGATION

The field program was conducted on Thursday 24 and Friday 25 May 2001. Lake Macquarie Pools was appointed to excavate the inspection pits across the site. The investigation locations are shown on *Figure 3* and *Figure 4*.

The investigation locations were selected on the basis of their location in relation to areas of potential impact identified in the ERM (March 2001) *Phase I Audit* report, as well outside these areas to assess the nature of fill material and the presence of potential 'burial pits' in vacant areas across the site. As indicated in the proposal, it would not be possible to assess with certainty that there are no 'burial pit' areas at the site for the limited scope of works proposed. This would require test pitting on a closely spaced grid network across the site, and even then areas of potential 'burial pits' may not be located. Although five (5) inspection pits were proposed for the vacant land to the east of the Dye House on Lot 233, fourteen (14) inspection pits were excavated in this area, providing more detailed information in this area, than originally proposed. Mr Alan Hunter of Hunter Ground Search checked all investigation locations adjacent to the Dye House Building on Lot 223, and the Weaving Mill on Lot 221. In addition all sampling locations adjacent to the transformer substations, were checked.

The inspection pits were excavated to a maximum depth of 3.5 metres below ground level, either through the residual clay horizon to bedrock or to at least one metre into the clay horizon. The samples collected adjacent to the transformer substations were collected using a shovel. On completion of logging the soil profile and collecting the soil samples, the inspection pits were backfilled and the surface reinstated.

The inspection pit locations are summarised below in *Table 3.1* and are indicative for the investigation undertaken on Lot 223, unless otherwise stated in the table for Lot 221. The laboratory analysis conducted on the samples collected from each location is also indicated in the table below. Soil samples were not collected from all inspection pits in the vacant land area to the east of the Dye House on Lot 223, as most of these pits were excavated to assess whether there were 'burial pits' within this area, and/or the presence and nature of the fill material.

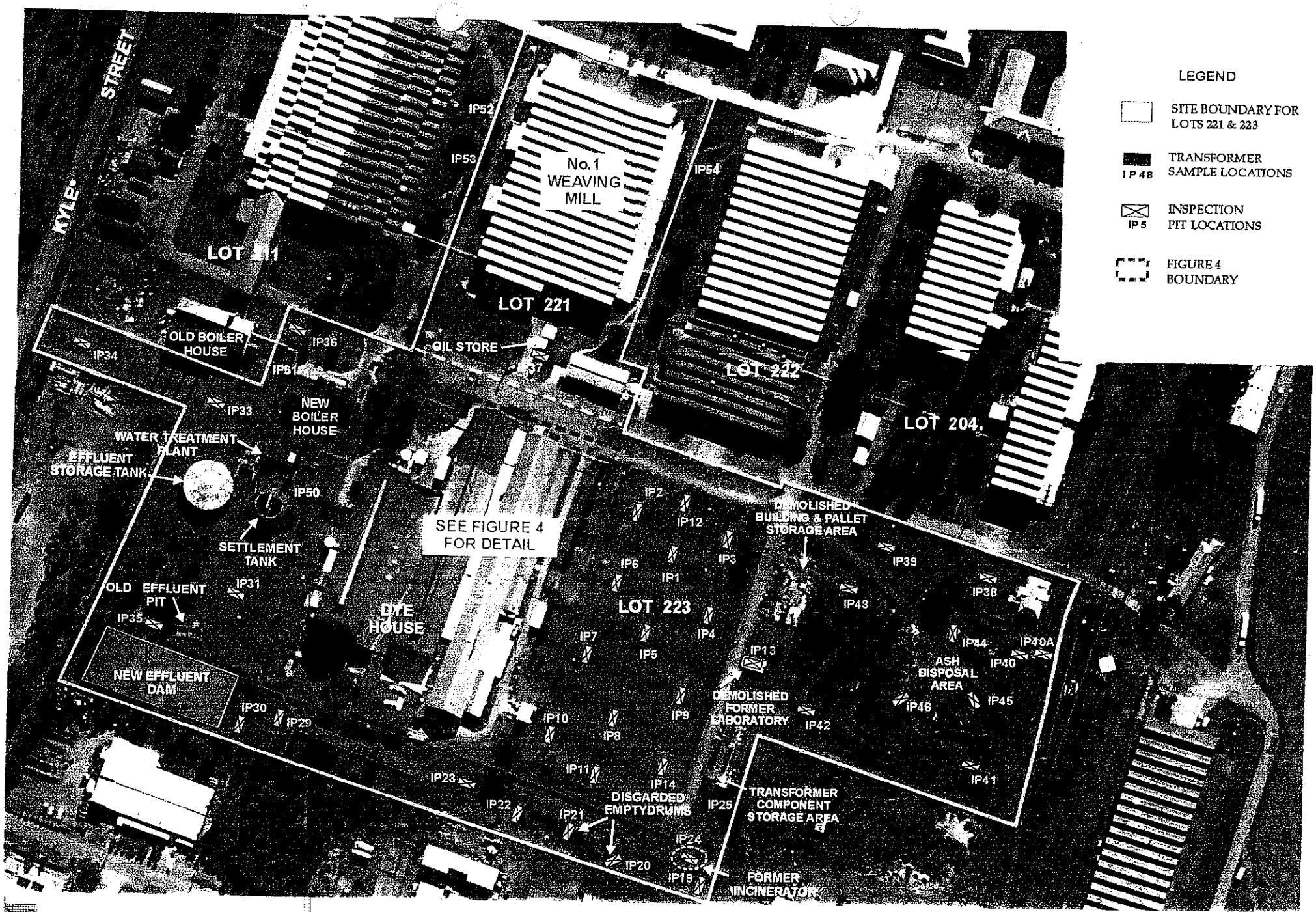

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Figure 3 INVESTIGATION LOCATIONS FOR LOT 221 & LOT 223

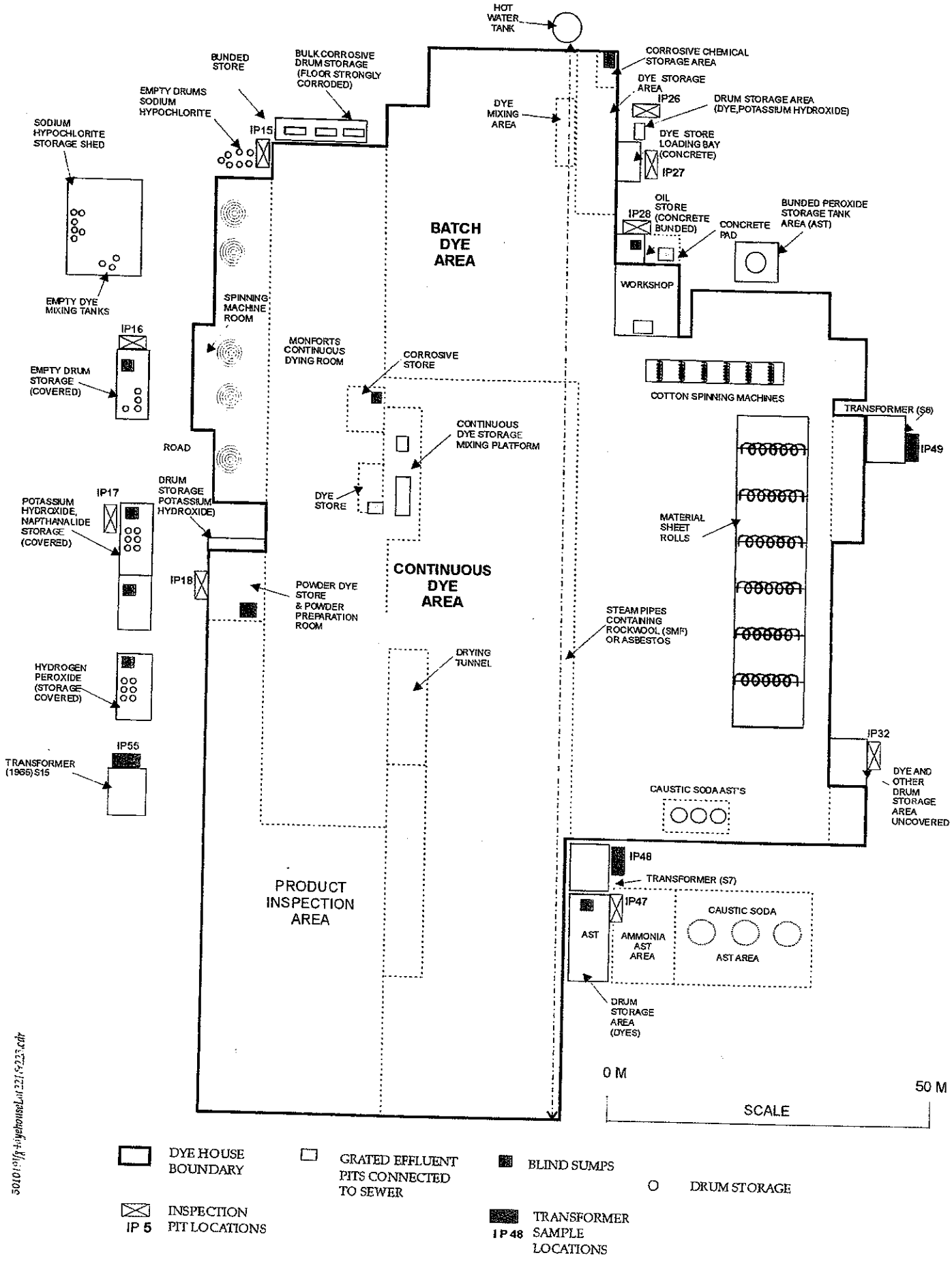


Figure 4 DETAILED PLAN FOR DYE BUILDING AREA INVESTIGATION LOCATIONS

Table 3.1 INSPECTION PIT LOCATIONS, SAMPLE DEPTHS AND ANALYTICAL PARAMETERS

Inspection Pit No.	Location	Lithology	Sample Depth (in metres)	Analysis
IP1	Grassed area east of Dye House to identify potential munition burial pit areas and nature of fill material.	-	(no sample collected)	-
IP2	(as above)	Sand/Gravel, grey, highly permeable – Fill	0 - 0.3	Inorganic analytes, PAH
IP3	(as above)	-	(no sample collected)	-
IP4	(as above)	Sand/Gravel, grey, highly permeable – Fill	0 – 0.15	Inorganic analytes, SVOC
IP5	(as above)	-	(no sample collected)	-
IP6	(as above)	-	(no sample collected)	-
IP7	(as above)	-	(no sample collected)	-
IP8	(as above)	-	(no sample collected)	-
IP9	(as above)	-	(no sample collected)	-
IP10	(as above)	-	(no sample collected)	-
IP11	(as above)	-	(no sample collected)	-
IP12	(as above)	-	(no sample collected)	-
IP13	Below former Laboratory (demolished).	Clay, yellow grey – Residual Soil	0 - 0.3	SVOC, VOC, Inorganic analytes
IP14	Grassed area east of Dye House to identify potential munition burial pit areas and nature of fill material.	-	(no sample collected)	-

Notes:

*m.b.g.l. = metres below ground level; **IP** = Inspection Pit*

*DUP3 = Duplicate Sample Number; **Inorganic analytes** = As, Cd, Cr, Cu, Hg, Ni, Pb, and Zn;*

*PAH = Polycyclic Aromatic Hydrocarbons; **TPH** = Total Petroleum Hydrocarbon; **PCB** = Polychlorinated Biphenyls;*

*BTEX = Benzene, Toluene, Ethylbenzene, and Xylene compounds; **VOC** = Volatile Organic Compounds; and*

SVOC = Semi Volatile Organic Compounds.

Table 3.1 INSPECTION PIT LOCATIONS, SAMPLE DEPTHS AND ANALYTICAL PARAMETERS *(Contd)*

Inspection Pit No	Location	Lithology	Sample Depth (in metres)	Analysis
IP15	In area of empty Drum Storage and adjacent to bunded Corrosive Store.	Silty Clay, black, organic - Fill	0 - 0.2 (DUP1)	Inorganic analytes, pH, VOC, SVOC
IP16	Adjacent to blind sump of Empty Drum Storage area.	Ash – Fill	0 - 0.4	Inorganic analytes, VOC, SVOC
IP17	Adjacent to blind sump of Potassium Hydroxide and Napthanalide Storage area.	Gravelly Sand, with ash - Fill	0 - 0.2	Inorganic analytes, VOC
IP18	Adjacent to the western side of the Powder Dye Store and Preparation Room outside the Dye House.	Ash – Fill	0 - 0.1	Inorganic analytes, VOC
IP18	(as above)	Gravelly Sand - Fill	0.1 – 0.3	Inorganic analytes, VOC
IP19	In stockpile mound south of security fence along southern boundary to identify potential munition burial pit areas and nature of fill material.	Clay gravel sand, black, high permeability – Topsoil & Fill	0.5 – 1.2	Inorganic analytes, TPH, BTEX, SVOC
IP20	In discarded drum area south of security fence along southern boundary to identify potential munition burial pit areas and nature of fill material.	Silty Sand, brown - Fill	0 – 1.5	Inorganic analytes, TPH, BTEX, PAH
IP21	In discarded drum area south of security fence along southern boundary to identify potential munition burial pit areas and nature of fill material.	Silty Sand, brown, - Fill	0 – 1.5	Inorganic analytes, TPH, BTEX, SVOC
IP21	(as above)	Ash - Fill	1.5 – 1.8 (DUP2)	Inorganic analytes, TPH, BTEX, PAHs
IP21	(as above)	Clay, light brown, high plasticity – Residual Soil	1.9	Inorganic analytes, TPH, BTEX
IP22	In area south of security fence along southern boundary to identify potential munition burial pit areas and nature of fill material.	Silty Clay, black, saturated - Topsoil	0 - 0.1	Inorganic analytes

Notes: ***m.b.g.l.*** *= metres below ground level;* ***IP*** *= Inspection Pit*

DUP3 *= Duplicate Sample Number;* ***Inorganic analytes*** *= As, Cd, Cr, Cu, Hg, Ni, Pb, and Zn;*

PAH *= Polycyclic Aromatic Hydrocarbons;* ***TPH*** *= Total Petroleum Hydrocarbon;* ***PCB*** *= Polychlorinated Biphenyls;*

BTEX *= Benzene, Toluene, Ethylbenzene, and Xylene compounds;* ***VOC*** *= Volatile Organic Compounds; and*

SVOC *= Semi Volatile Organic Compounds.*

Table 3.1 INSPECTION PIT LOCATIONS, SAMPLE DEPTHS AND ANALYTICAL PARAMETERS *(Contd)*

Inspection Pit No	Location	Lithology	Sample Depth (in metres)	Analysis
IP23	In fill mound south of security fence along southern boundary to identify potential munition burial pit areas and nature of fill material.	Ash - Fill	0 - 0.2	Inorganic analytes
IP24	In south eastern corner in location of former incinerator used in munitions manufacture period.	Ash - Fill	0 - 0.3	Inorganic analytes, VOC, SVOC
IP25	Transformer component storage area in building adjacent to south eastern boundary.	Ash - Fill	0 - 0.2	PCB
IP26	Adjacent to blind sump of Dye and Potassium Hydroxide Drum Storage area outside in the south-western corner of Dye House.	Gravelly Sand, yellow brown – Fill	0 - 0.9	Inorganic analytes, VOC
IP27	Adjacent to Dye Store Loading Bay outside in the south-western corner of Dye House.	-	(no sample collected)	-
IP28	Adjacent to bunded Oil Store outside in the south-western corner of Dye House.	Gravel - Fill	0 - 0.1	Inorganic analytes, TPH, BTEX
IP29	Grassed area south of Dye House and adjacent to new Effluent Dam to identify potential munition burial pit areas and nature of fill material.	Silty Clay, black, organic - Topsoil	0 - 0.3	Inorganic analytes
IP30	Grassed area south of Dye House and adjacent to new Effluent Dam to identify potential munition burial pit areas and nature of fill material.	-	(no sample collected)	-
IP31	Grassed area west of Dye House to identify potential munition burial pit areas and nature of fill material.	Ash - Fill	0 – 0.3	Inorganic analytes
IP32	Adjacent to Dye Drum Storage area outside the western side of the Dye House.	Ash – Fill	0 – 0.1	Inorganic analytes, VOC

Notes:

***m.b.g.l.** = metres below ground level; **IP** = Inspection Pit*

***DUP3** = Duplicate Sample Number; **Inorganic analytes** = As, Cd, Cr, Cu, Hg, Ni, Pb, and Zn;*

***PAH** = Polycyclic Aromatic Hydrocarbons; **TPH** = Total Petroleum Hydrocarbon; **PCB** = Polychlorinated Biphenyls;*

***BTEX** = Benzene, Toluene, Ethylbenzene, and Xylene compounds; **VOC** = Volatile Organic Compounds; and*

***SVOC** = Semi Volatile Organic Compounds.*

Table 3.1 INSPECTION PIT LOCATIONS, SAMPLE DEPTHS AND ANALYTICAL PARAMETERS *(Contd)*

Inspection Pit No	Location	Lithology	Sample Depth (in metres)	Analysis
IP33	Grassed area west of Dye House to identify potential munition burial pit areas and nature of fill material.	Silty Clay, black, organic – Topsoil	0 – 0.1	Inorganic analytes, PAH
IP33	(as above)	Clay, light brown, high plasticity – Residual Soil	0.1 – 0.7	Inorganic analytes, PAH
IP34	Grassed area west of Dye House to identify potential munition burial pit areas and nature of fill material.	Ash – Fill	0 – 0.3	Inorganic analytes, PAH
IP34	(as above)	Clay, light brown, high plasticity – Residual Soil	0.4	Inorganic analytes, PAH
IP35	Grassed area down-slope of old Effluent Pit.	Ash – Fill	0 – 0.3	Inorganic analytes, VOC, SVOC
IP36	Grassed area north of Boiler House to identify potential munition burial pit areas and nature of fill material.	Topsoil (overlain by ash)	0.5 – 0.6	PAH
IP37	Adjacent to Oil Store on Lot 221.	Topsoil & Residual Soil Clay	0 – 0.1	Inorganic analytes, TPH, BTEX
IP38	Grassed area in east of site and north of ash disposal area, to identify potential munition burial pits and nature of fill material.	-	(no sample collected)	-
IP39	Grassed area in east of site and north of ash disposal area, to identify potential munition burial pits and nature of fill material.	-	(no sample collected)	-
IP40	Ash disposal area in east of site, to identify nature of fill material and potential munition burial pits.	Silty Sand, dark brown – Fill	0 – 2.5	Inorganic analytes, PAH
IP40A	Ash disposal area in east of site, to identify nature of fill material and potential munition burial pits.	-	(no sample collected)	-

Notes:

m.b.g.l. *= metres below ground level;* ***IP*** *= Inspection Pit*

DUP3 *= Duplicate Sample Number;* ***Inorganic analytes*** *= As, Cd, Cr, Cu, Hg, Ni, Pb, and Zn;*

PAH *= Polycyclic Aromatic Hydrocarbons;* ***TPH*** *= Total Petroleum Hydrocarbon;* ***PCB*** *= Polychlorinated Biphenyls;*

BTEX *= Benzene, Toluene, Ethylbenzene, and Xylene compounds;* ***VOC*** *= Volatile Organic Compounds; and*

SVOC *= Semi Volatile Organic Compounds.*

Table 3.1 INSPECTION PIT LOCATIONS, SAMPLE DEPTHS AND ANALYTICAL PARAMETERS *(Contd)*

Inspection Pit No	Location	Lithology	Sample Depth (in metres)	Analysis
IP41	Ash disposal area in east of site, to identify nature of fill material and potential munition burial pits.	-	(no sample collected)	-
IP42	Ash disposal area in east of site, to identify nature of fill material and potential munition burial pits.	Clay, light brown, high plasticity – Residual Soil	0 – 1.0	Inorganic analytes, PAH
IP43	Ash disposal area in east of site, to identify nature of fill material and potential munition burial pits.	-	(no sample collected)	-
IP44	Ash disposal area in east of site, to identify nature of fill material and potential munition burial pits.	Ash – Fill	0 – 0.2 (DUP4)	Inorganic analytes, PAH
IP45	Ash disposal area in east of site, to identify nature of fill material and potential munition burial pits.	Clayey Silty Sand, yellow/red - Fill	0.3 – 2.5	Inorganic analytes, TPH, BTEX, PAH
IP46	Ash disposal area in east of site, to identify nature of fill material and potential munition burial pits.	Silty Sand, black, moist – Fill	1 – 1.5 (DUP5)	Inorganic analytes, TPH, BTEX, PAH
IP46	Ash disposal area in east of site, to identify nature of fill material and potential munition burial pits.	Clay, light brown, high plasticity – Residual Soil	2.5 – 3.0	Inorganic analytes, TPH, BTEX
IP47	Adjacent to blind sump of dye drum storage area outside north western corner of Dye House.	Ash – Fill	0 – 0.1	Inorganic analytes, VOC
IP48	Adjacent to transformer substation outside north western corner of Dye House.	Ash – Fill	0 – 0.1	PCB
IP49	Adjacent to transformer substation outside western side of Dye House.	Ash – Fill	0 – 0.1	PCB
IP50	Adjacent to transformer substation to east of water treatment plant.	Clayey Sand, yellow, moist – Fill	0 – 0.1	PCB
IP51	Adjacent to transformer substation west of new Boiler House.	Ash – Fill	0 – 0.1	PCB

Notes:

***m.b.g.l.** = metres below ground level; **IP** = Inspection Pit*

***DUP3** = Duplicate Sample Number; **Inorganic analytes** = As, Cd, Cr, Cu, Hg, Ni, Pb, and Zn;*

***PAH** = Polycyclic Aromatic Hydrocarbons; **TPH** = Total Petroleum Hydrocarbon; **PCB** = Polychlorinated Biphenyls;*

***BTEX** = Benzene, Toluene, Ethylbenzene, and Xylene compounds; **VOC** = Volatile Organic Compounds; and*

***SVOC** = Semi Volatile Organic Compounds.*

Table 3.1 **INSPECTION PIT LOCATIONS, SAMPLE DEPTHS AND ANALYTICAL PARAMETERS *(Contd)***

Inspection Pit No	Location	Lithology	Sample Depth (in metres)	Analysis
IP52	Adjacent to transformer substation outside western side of No.1 Weaving Mill - Lot 211.	Clayey Sand, light brown, moist – Fill	0 – 0.1	PCB
IP53	Adjacent to transformer substation outside western side of No.1 Weaving Mill - Lot 211.	Clayey Sand, light brown, moist – Fill	0 – 0.1	PCB
IP54	Adjacent to transformer substation outside eastern side of No.1 Weaving Mill - Lot 211.	Clayey Sand, yellow, moist – Fill	0 – 0.1 (DUP6)	PCB
IP55	Adjacent to transformer substation outside east side of Dye House.	Clayey Sand, yellow, moist - Fill	0 – 0.1	PCB

Notes:

***m.b.g.l.** = metres below ground level; **IP** = Inspection Pit*

*DUP3 = Duplicate Sample Number; **Inorganic analytes** = As, Cd, Cr, Cu, Hg, Ni, Pb, and Zn;*

PAH = Polycyclic Aromatic Hydrocarbons; TPH = Total Petroleum Hydrocarbon; PCB = Polychlorinated Biphenyls;

BTEX = Benzene, Toluene, Ethylbenzene, and Xylene compounds; VOC = Volatile Organic Compounds; and

SVOC = Semi Volatile Organic Compounds.

3.2 SOIL SAMPLING AND ANALYSIS

Selection of soil samples for laboratory analysis was based on collection of samples with the highest potential for impact at each of the investigation locations. Additional samples were collected at depth and submitted to the laboratory to hold. In the event that the surface samples were above the site assessment criteria, then the samples placed on hold would be analysed to assess the vertical extent of impact.

The following steps were undertaken to obtain samples for the description of the underlying geological units and for laboratory analysis:

- samples were collected from the walls of the excavation, and were representative of the horizon being sampled;
- samples selected for analysis were placed in laboratory pre-treated glass sample containers and labelled with the following information: sample identification number, job number, date of collection, and job location;.
- sample jars were placed in an esky containing ice;

- the remaining samples were logged to record geological information such as soil/sediment type, colour, grain size, sorting, moisture content, staining and odour; and

- samples were recorded on a chain of custody form and dispatched to a NATA registered analytical laboratory.

All sampling was conducted in accordance with ERM Contaminated Site Solutions standard operating and quality assured field procedures. The field investigation was undertaken by ERM's Environmental Geologist, Mr Chris Hadlow, and Environmental Scientist Brendan Robinson.

3.3 QUALITY CONTROL

Field quality control included sample collection and documentation. Duplicate samples were collected for quality assurance to assess the precision, accuracy and comparability of laboratory analysis. Duplicates were taken at a ratio of 1:10.

All analyses were conducted by Australian Laboratory Services (ALS), which is certified by the National Association of Testing Authorities (NATA), and located in Sydney, NSW. Laboratory Quality Assurance and Quality Control was performed by the laboratory and comprise sample spikes for organic analysis. The results of the QC testing are presented in the laboratory reports, which also indicate how much of a particular analyte was recovered. Internal laboratory duplicate testing is undertaken by the laboratory to compare the results obtained in analysing samples.

Details outlining out internal QA/QC is included within Section 4.2.

Chapter 4

RESULTS

4.1 ENVIRONMENTAL ASSESSMENT CRITERIA

Environmental guidelines selected were used to assess potential impacts to human health and the environment, and the suitability of the site for ongoing industrial land use.

In the absence of appropriate guidelines for commercial/industrial landuse for TPH and BTEX compounds in soils the sensitive land use criteria in the NSW EPA (1994) *Guidelines for Assessing Service Station Sites* were initially utilised. For any areas found to exceed this sensitive guideline criteria of 1000 mg/kg for the hydrocarbon fraction C_{10} to C_{40} range, factors including the following were taken into consideration:

- odour;
- aesthetics;
- the potential impact to groundwater;
- the potential for phase separated hydrocarbon to form; and
- the potential for off site migration.

In addition the Dutch Intervention Level (DIL) criteria of 5000mg/kg for the hydrocarbon fraction C_{10} to C_{40} range, were utilised as a screening tool for international guidelines relevant to ongoing industrial/commercial land use. It is acknowledged that the DIL criteria has not been endorsed or adopted by the NSW EPA. The DIL criteria of 5000mg/kg are referenced in the explanatory notes section for *Table 3* of NSW EPA (1994) *Guidelines for Assessing Service Station Sites.*

Selected inorganics, total PAHs, and benzo [a] pyrene (B([a]P), were assessed against the criteria outlined in the National Environment Protection (Assessment of Site Contamination) Measure (1999), *Schedule B(1) – Guideline on Investigation Levels for Soil, Table 5-A – HIL 'F' (commercial/industrial).* The chromium (Cr) results shown in the results tables are for total chromium ((trivalent chromium Cr (III) and hexavalent chromium Cr (VI)), unless otherwise specified. The Chromium (Cr) criteria shown in the results table refer to the less sensitive criteria for hexavalent chromium Cr(VI), unless otherwise specified.

Given that a number of analytes were not detected above the laboratory detection limits, only the criteria for selected analytes for soils are shown in *Table 4.1.*

Table 4.1 ASSESSMENT CRITERIA FOR SOIL

ANALYTE	SOILS (mg/kg)	
	NSW EPA	HIL – F
Inorganic Analytes		
Arsenic (As)		500
Cadmium (Cd)		100
Trivalent Chromium (Cr III)		600 000 ($6x10^5$)
Hexavalent Chromium (Cr VI))		500
Copper (Cu)		5,000
Nickel (Ni)		3,000
Lead (Pb)		1,500
Zinc (Zn)		35,000
Mercury (Hg)		75
Polycyclic Aromatic Hydrocarbons (PAHs)		
Total PAH		100
Benzo (a)Pyrene		5
Total Petroleum Hydrocarbons (TPH)		
C_6 - C_9		
C_{10} - C_{14}		
C_{15} - C_{28}	1000 (C_{10}-C_{40})*/ 5,000 (C_{10}-C_{40})#	
C_{29} - C_{40}		
BTEX Compounds		
Benzene (B)	1	
Toluene (T)	130	
Ethyl Benzene (E)	50	
Xylene (X)	25	

Notes: *NSW EPA = NSW EPA (1994) Guidelines for Assessing Service Station Sites;*
HIL-F = National Environment Protection (Assessment of Site Contamination) Measure (1999), Schedule B(1) – Guideline on Investigation Levels for Soil, Table 5-A – HIL 'F' (commercial/industrial);
** = Sensitive land use criteria of 1000mg/kg for TPH C_{10} to C_{40} range, referenced in Table 3 in NSW EPA (1994) Guidelines for Assessing Service Station Sites;*
 # = DIL criteria of 5000mg/kg for TPH C_{10} to C_{40} range referenced in the Explanatory Notes for Table 3 in NSW EPA (1994) Guidelines for Assessing Service Station Sites.

4.1.1 Laboratory Results

All soil samples were submitted to Australian Laboratory Services (ALS) Pty Ltd, which is NATA accredited and located in Sydney, NSW. The laboratory reports are presented in *Appendix D*. Soil analysis was conducted for TPH, BTEX compounds, PAHs, PCBs, VOCs, SVOCs and selected inorganics.

Analysis for VOCs included the following groups: Monocyclic Aromatic Hydrocarbons, Oxygenated Hydrocarbons; Sulfonated Compounds; Fumigants; Halogenated Alaphatic Hydrocarbons; Halogenated Aromatic Hydrocarbons; Trihalomethanes and Napthalene.

Analysis for SVOCs included the following groups: Phenols; Polycyclic (Polynuclear) Aromatic Hydrocarbons (PAHs); Phthalate Esters; Nitrosamines; Nitroaromatics and Cyclic Ketones; Haloethers; Chlorinated Hydrocarbons; Anilines and Benzidines; Organochlorine Pesticides (OCPs) and Organophosphorus Pesticides (OPPs).

The laboratory results for individual analysis of TPH, BTEX compounds and PAHs in soils are summarised in *Table 4.2* below. The Monocyclic Aromatic Hydrocarbon group of the VOCs, include the BTEX compounds. The BTEX compounds results are provided in *Table 4.2*. Similarly, the PAH results of the SVOC analyses are included *Table 4.2*.

i. Organic Soil Results

The results for TPH, BTEX compounds, and PAHs indicated:

- BTEX compounds were not detected in any of the soil samples analysed;
- TPH in the $C_6 - C_9$ hydrocarbon group was not detected in any of the soil samples analysed;
- TPH in the $C_{10} - C_{36}$ hydrocarbon group, was detected in samples collected from IP19 (0.5-1.2m), IP20 (0-1.5m), IP21 (0-1.5m, 1.5-1.8m), IP28 (0-0.1m), IP37 (0-0.1m) and IP46 (1-1.5m). Of these samples, all results were below the sensitive land use criteria of 1000mg/kg, except for the samples from inspection pits IP19 (0.5-1.2m), IP20 (0-1.5m), and IP46 (1-1.5m). Of these three (3) samples only the sample from IP46 (1-1.5m) had a concentration above DIL screening tool criteria of 5000mg/kg;
- PAHs were detected in seventeen (17) samples analysed from twenty (20) inspection pits across the site (most of the samples being the Ash Fill). The concentrations detected were below the site assessment criteria of 100 mg/kg for total PAHs; and

- B[a]P was detected in four (4) of the seventeen (17) samples analysed for PAHs. The concentrations detected were below the site assessment criteria of 5 mg/kg, for all samples.

Table 4.2 SUMMARY OF ANALYTICAL RESULTS FOR TPH, BTEX COMPOUNDS AND PAHS (in mg/kg)

Sample No	Sample Depth (m.b.g.l.)	B	T	E	X	TPH C_6-C_9	TPH C_{10}-C_{14}	TPH C_{15}-C_{28}	TPH C_{29}-C_{36}	Total PAHs	B[a]P
LOR		0.2/ 0.5	0.2/ 0.5	0.2/ 0.5	.2/ 0.5	2	50	100	100		0.5/2
IP2	0-0.3	-	-	-	-	-	-	-	-	1.9	nd
IP4	0-0.5	-	-	-	-	-	-	-	-	0.7	nd
IP13	0-0.3	nd	nd	nd	nd	-	-	-	-	9.4	0.8
IP15	0-0.2	nd	nd	nd	nd	-	-	-	-	3.2	nd
DUP1	IP15 0-0.2	nd	nd	nd	nd	-	-	-	-	2.9	nd
IP16	0-0.4	nd	nd	nd	nd	-	-	-	-	3.2	nd
IP17	0-0.2	nd	nd	nd	nd	-	-	-	-	-	-
IP18	0-0.1	nd	nd	nd	nd	-	-	-	-	-	-
IP18	0.1-0.3	nd	nd	nd	nd	-	-	-	-	-	-
IP19	0.5-1.2	nd	nd	nd	nd	nd	nd	389	1300	2.5	nd
IP20	0-1.5	nd	nd	nd	nd	nd	71	1950	2490	nd	nd
IP21	0-1.5	nd	nd	nd	nd	nd	nd	nd	101	1.0	nd
IP21	1.5-1.8	nd	nd	nd	nd	nd	nd	218	117	0.6	nd
IP21	1.9	nd	nd	nd	nd	nd	nd	nd	nd	-	-
Assessment Criteria		*1*	*130*	*50*	*25*	*ns*	*1000 / 5000 (C_{10}-C_{40})*			*100*	*5*

Notes: ***LOR (0.2/0.5)*** *=Laboratory reporting limit for individual analysis and for VOC or SVOC analysis;*
m.b.g.l. *= metres below ground level;* ***ns*** *= not specified;*
nd *- not detected ie. below laboratory detection limits;*
- = not analysed; and
shading indicates exceedance of criteria

Table 4.2 SUMMARY OF ANALYTICAL RESULTS FOR TPH, BTEX COMPOUNDS AND PAHS (in mg/kg) *(contd.)*

Sample No	Sample Depth (m.b.g.l.)	B	T	E	X	TPH C_6-C_9	TPH C_{10}-C_{14}	TPH C_{15}-C_{28}	TPH C_{29}-C_{36}	Total PAHs	B[a]P
LOR		0.2/ 0.5	0.2/ 0.5	0.2/ 0.5	0.2/ 0.5	2	50	100	100		0.5/ 2
IP24	0-0.3	nd	nd	nd	nd	-	-	-	-	nd	nd
IP26	0-0.9	nd	nd	nd	nd	-	-	-	-	-	-
IP28	0-0.1	nd	nd	nd	nd	nd	nd	nd	154	-	-
IP32	0-0.1	nd	nd	nd	nd	-	-	-	-	-	-
IP33	0.1-0.7	-	-	-	-	-	-	-	-	nd	nd
IP34	0-0.3	-	-	-	-	-	-	-	-	4.2	nd
IP34	0.4	-	-	-	-	-	-	-	-	2.4	nd
IP35	0-0.3	nd	nd	nd	nd	-	-	-	-	1.6	nd
IP36	0.5-0.6	-	-	-	-	-	-	-	-	23.1	1.0
IP37	0-0.1	nd	nd	nd	nd	nd	nd	172	177	-	-
IP40	0-2.5	-	-	-	-	-	-	-	-	2.3	nd
IP42	0-1.0	-	-	-	-	-	-	-	-	nd	nd
IP44	0-0.2	-	-	-	-	-	-	-	-	nd	nd
DUP4	IP44 0-0.2	-	-	-	-	-	-	-	-	nd	nd
IP45	0.3-2.5	-	-	-	-	-	-	-	-	15	1.0
IP45	0.3-2.5	nd	nd	nd	nd	nd	nd	nd	nd	-	-
IP46	1-1.5	nd	nd	nd	nd	nd	114	3260	2080	12.6	0.9
DUP5	IP46 1-1.5	nd	nd	nd	nd	nd	110	3480	2410	4.3	nd
IP46	2.5-3.0	nd	nd	nd	nd	nd	nd	nd	nd	-	-
IP47	0-0.1	nd	nd	nd	nd	-	-	-	-	-	-
Assessment Criteria		*1*	*130*	*50*	*25*	*ns*	*1000 / 5000 (C_{10}-C_{40})*			*100*	*5*

Notes: ***LOR (0.2/0.5)*** *=Laboratory reporting limit for individual analysis and for VOC or SVOC analysis;*
m.b.g.l. *= metres below ground level;* ***ns*** *= not specified;*
nd *- not detected ie. below laboratory detection limits;*
- = not analysed;and
shading indicates exceedance of criteria

The results for all other VOC and SVOC compounds are provided in the laboratory reports in *Appendix D.* The results indicated that these compounds were not detected in any of the samples analysed.

Of the nine (9) samples analysed for PCBs, collected from locations adjacent to the transformer substations or transformer component storage areas, concentrations were below the laboratory detection limits. The results for PCB analysis are provided in the laboratory reports in *Appendix D.*

ii. Inorganic Soil Results

The results for the inorganic analysis are summarised in *Table 4.3* and indicated:

- arsenic (As), cadmium (Cd), copper (Cu), nickel (Ni), lead (Pb), zinc (Zn) and mercury (Hg) were either not detected, or were detected at levels below the site assessment criteria; and
- total chromium (Cr) was detected above the hexavalent chromium Cr (VI) criteria of 500 mg/kg in the sample collected from IP46 (1-1.5m), and its respective duplicate (DUP5). The parent sample was reanalysed for hexavalent chromium Cr (VI), and the results indicated that this analyte was not detected. As such, the chromium concentration of 5100mg/kg detected in this sample is trivalent chromium Cr (III) and below the criteria of 600 000mg/kg. Total chromium (Cr) in all other samples analysed, was detected in concentrations below the hexavalent chromium Cr (VI) criteria of 500mg/kg.

Table 4.3 SUMMARY OF ANALYTICAL RESULTS FOR INORGANICS IN SOILS (in mg/kg)

Sample No	Sample Depth (m.b.g.l.)	As	Cd	Total Cr	Cu	Ni	Pb	Zn	Hg
LOR		1	1	1	1	1	1	1	0.1
IP2	0-0.3	2	<1	5	20	25	6	16	<0.1
IP4	0-0.5	2	<1	5	16	23	6	20	<0.1
IP13	0-0.3	5	<1	8	26	29	7	18	<0.1
IP15	0-0.2	15	<1	19	47	18	516	670	<0.1
DUP1	IP15 0-0.2	17	<1	18	48	18	484	621	<0.1
IP16	0-0.4	4	<1	7	38	12	15	24	<0.1
IP17	0-0.2	5	<1	15	17	47	27	91	<0.1
IP18	0-0.1	4	<1	9	41	7	49	85	<0.1
IP18	0.1-0.3	6	<1	12	14	88	5	36	<0.1
IP19	0.5-1.2	11	<1	32	259	54	388	1320	0.1
IP20	0-1.5	37	<1	29	214	7	253	2810	<0.1
IP21	0-1.5	5	<1	14	8	23	16	111	<0.1
IP21	1.5-1.8	11	2	11	55	41	24	346	<0.1
IP21	1.9	2	<1	17	6	1	8	5	<0.1
IP22	0-0.1	14	<1	13	65	13	130	159	0.2
IP23	0-0.2	4	nd	5	21	29	6	39	nd
IP24	0-0.3	6	nd	8	171	39	12	59	nd
IP26	0-0.9	4	nd	17	41	13	54	183	nd
IP28	0-0.1	4	nd	40	34	30	161	267	0.5
IP29	0-0.3	4	nd	19	21	12	53	133	0.6
Assessment Criteria		*500*	*100*	*500*	*5000*	*3000*	*1500*	*35000*	*75*

Notes: ***LOR** = Laboratory reporting limit;*
***m.b.g.l.** = metres below ground level;*
***nd** - not detected ie. below laboratory detection limits; and*
***Total Cr** = trivalent chromium Cr(III) and hexavalent chromium Cr (VI); and*
shading indicates exceedance of criteria.

Table 4.3 SUMMARY OF ANALYTICAL RESULTS FOR INORGANICS IN SOILS (in mg/kg) *(contd.)*

Sample No	Sample Depth (m.b.g.l.)	As	Cd	Total Cr	Cr (III)	Cr (VI)	Cu	Ni	Pb	Zn	Hg
LOR		1	1	1	1	1	1	1	1	1	0.1
IP31	0-0.3	2	nd	37			43	24	4	40	nd
IP32	0-0.1	19	nd	16			39	23	118	161	0.1
IP33	0-0.1	16	nd	20			68	34	39	153	nd
IP33	0.1-0.7	14	nd	16			50	54	33	132	1.2
IP34	0-0.3	4	nd	13			29	41	10	22	nd
IP34	0.4	2	nd	42			6	6	71	5	nd
IP35	0-0.3	4	nd	26			41	28	8	32	nd
IP37	0-0.1	3	nd	24			24	16	82	109	nd
IP40	0-2.5	3	nd	23			44	34	489	223	2.5
IP42	0-1.0	2	nd	28			2	3	9	8	nd
IP44	0-0.2	4	nd	5			8	11	13	39	nd
DUP4	IP44 0-0.2	3	nd	3			8	12	5	12	nd
IP45	0.3-2.5	3	nd	16			17	23	36	97	nd
IP46	1-1.5	16	2	-	5100	nd	850	48	220	724	2.2
DUP5	IP46 1-1.5	12	1	-	3800	-	715	45	181	545	1.9
IP46	2.5-3.0	1	nd	43			6	4	13	6	nd
IP47	0-0.1	8	1	26			199	29	191	1310	0.1
Assessment Criteria		*500*	*100*	*500*	$6x10^5$	*500*	*5000*	*3000*	*1500*	*35000*	*75*

Notes: ***LOR** = Laboratory reporting limit;*
***m.b.g.l.** = metres below ground level;*
***nd** - not detected ie. below laboratory detection limits;*
shading indicates exceedance of criteria;
***Cr(III)** = trivalent chromium;*
***Cr (VI)** = hexavalent chromium; and*
***Total Cr** = trivalent chromium Cr(III) and hexavalent chromium Cr (VI).*

4.2 QUALITY CONTROL

A total of forty five (45) soil samples and five (5) duplicate soil samples were submitted for laboratory analysis. Duplicate analysis was conducted on the analytes in a ratio of 1:10. The QA/QC report is provided in *Appendix E*.

Analytical data reported by ALS was judged to have suitable accuracy and precision for the purposes of this investigation. The data assessment examined laboratory results, COC documentation, and laboratory QA/QC. The following comments can be viewed as an overall summary of the quality of the analytical component for this project.

- Sample integrity and container requirements were documented as acceptable;
- Holding time compliance was documented as acceptable;
- Matrix spike (MS) results and laboratory control sample (LCS) percentage recovery (%R) values for soil samples, indicated sample accuracy ranged between 34.5%R and 133%R, varying outside the expected control limits of 70% to 130%R, for some SVOC compounds (refer to non-conforming results in *Table 3* of the QA/QC report in *Appendix E*). However the accuracy of the results is considered acceptable, on the basis that these compounds were not detected above the laboratory detection limit. Variations outside the expected control limits for SVOC compounds can be attributed to poor extraction efficiency, using the required adopted USEPA extraction method;
- Laboratory surrogate recovery (%R) values indicated that laboratory accuracy was within the expected range of 70% to 130%R, except for some phenolic compounds, where a low %R of 52%R was recorded. Variations outside the expected control limits for these compounds is attributed to poor extraction efficiency for phenols and surrogates, using the required adopted USEPA extraction method;
- Laboratory duplicate precision was within the expected range of 0 to 50% RPD, except for zinc (Zn) in IP2 (0m to 0.3m), where the RPD was 90%. The variation outside the expected control limit is attributed to the result being reported close to the laboratory detection limit, and/or sample heterogeneity;
- Field duplicate sample precision was within the expected range of 0% to 50%RPD, except for samples analysed from:

    1. IP44 (0 to0.2m) and Dup4 for Zn (106%); and
    2. IP46 (1 to1.5m) and Dup5 for Cd (67%), Phenanthrene (77%,) Fluoranthene (94%), Pyrene (94%), Chrysene (57%) and Benzo(b)fluoranthene (53%).

The variation outside the expected control limit is attributed to the result being reported close to the laboratory detection limit, and/or sample heterogeneity All laboratory QA/QC method blanks were found to be acceptable; and

- The data set variability was assessed as being acceptable.

In summary, the ALS QA/QC data for the documented soil samples were assessed to be of sufficient quality to be considered acceptable to comply with the ERM quality protocols. As such, the analytical data, QA/QC data and field duplicate results are free of systematic and method bias.

4.3 EXTENT AND DISTRIBUTION OF IMPACT TO SOILS

TPH in the $C_{10} - C_{36}$ hydrocarbon group was above the DIL criteria of 5000mg/kg only in the sample of silty sand fill, collected from inspection pit IP46 (1.0m to 1.5m), located in the 'Ash Disposal Area'. The same lithological unit was noted in inspection pits IP44 and IP45. Although a sample of this unit was not submitted for analysis from inspection pit IP44, TPH concentrations were not detected in the sample of this unit analysed from IP45 (0.3-2.5m). The results suggest that localised 'hot spots' of organic impact are located within the silty sand layer, rather than the entire fill unit.

The lateral distribution of the silty sand fill unit covers an area of approximately 50 square metres, within the fenced area of the 'Ash Disposal Area', adjacent to the eastern boundary of Lot 223. The thickness of this horizon is approximately 2.0 metres.

TPH in the $C_{10} - C_{36}$ hydrocarbon group was not detected in sample of residual clay collected from inspection pit IP46 (2.5m to 3.0m). As such the vertical extent of impact in the vicinity of inspection pit IP46, appears confined to the silty sand fill overlying the residual clay.

Chapter *5*

CONCLUSIONS

Based on the results of the Phase I and Phase II Assessments at the site, ERM concludes the following:

- the site (Lot 221 and Lot 223) is in an area zoned for industrial landuse and occupies an area of approximately 10.5 hectares;
- the geology below the site comprises clayey silt alluvium/colluvium to approximately 0.9 metres below ground level, underlain by silty clay residual soil to a depth of approximately 2.0 metres below ground level. The bedrock is siltstone/sandstone of the Lochinvar Formation;
- areas of ash fill to approximately 0.4 metres below ground level, were noted in most inspection pits excavated across the site. A unit of silty sand fill approximately 2.0m thick, was encountered in a 50 square metres area in the 'Ash Disposal Area', located adjacent to the eastern boundary of Lot 223;
- groundwater was not encountered during the assessment, although seepage water was noted at the upper contact of the residual soil in some of the inspection pits excavated;
- information supplied by the DLWC indicated that there are no registered bores within a 2 kilometre radius of the site. The closest bore (GW027289) is located approximately 2.1 kilometres to the north west of the site;
- a thirty three (33) metre deep water bore is located within the adjoining Lot 211. The measured static water level in the fractured rock aquifer was 12.5 metres below ground level. High concentrations of chloride, iron, and total dissolved solids have rendered the groundwater from this bore not suitable for use as raw drinking water, irrigation water, livestock watering and in the textile manufacturing process. The chemical characteristics of the groundwater in the Lot 211 bore is likely to be the consistent on a regional basis, and the groundwater below this site should have similar characteristics;
- fifty six (56) inspection pits were excavated across the site at locations of potential impact identified during the ERM (March 2001) *Phase I Audit*, as well outside these areas to assess the nature of fill material and the presence of potential 'burial pits' in the vacant areas across the site;

- PCBs, VOCs and SVOCs in the soils were either below the site investigation criteria or below the laboratory detection limits;
- although PAHs and benzo [a] pyrene were detected in most of the ash fill samples analysed, concentrations were below the site investigation criteria;
- BTEX compounds were not detected in any of the samples analysed;
- TPH in the C_6-C_9 hydrocarbon group was not detected in any of the samples analysed;
- TPH in the C_{10}-C_{36} hydrocarbon group was detected above the sensitive land use criteria of 1000mg/kg in the samples collected from IP19 (0.5-1.2m), IP20 (0-1.5m), and IP46 (1-1.5m);
- TPH in the C_{10}-C_{36} hydrocarbon group was detected above the DIL criteria of 5000 mg/kg used as a screening tool, in the sample of silty sand fill of inspection pit IP46 (1.0m to 1.5m). At all other sampling locations, TPH concentrations were either not detected, or were below the DIL criteria.
- of the selected inorganics analysed (As, Cd, Cr, Cu, Ni, Pb, Zn and Hg), concentrations detected in all samples were below the site assessment criteria;
- a sample of the same silty sand fill found in inspection IP46, was analysed from inspection pit P45 (0.3m to 2.5m). The results indicated that TPH in the $C_{10} - C_{36}$ hydrocarbon group was not detected. The results suggest that localised 'hot spots' of organic impact are located within the silty sand layer, rather than the entire fill unit.

On the basis of the investigations, ERM concludes that the identified areas of potential impact on Lot 221 and Lot 223 have been investigated and that the site is suitable for industrial landuse, with the exception of the fenced 'Ash Disposal Area' on Lot 223. ERM recommends that the lateral extent, of what appears to be a localised 'pocket' of TPH impacted fill within this area, should be delineated to assess whether the impact is localised in the vicinity of inspection pit IP46.

ERM does not consider that the impacted silty sand fill unit has the potential to cause significant risk of harm to human health and/or the environment for the following reasons:

- the material is within the fenced off 'Ash Disposal Area', where assess to this area is via a locked gate;
- the fill unit is covered by approximately 0.3 metres of ash fill which is not impacted. As such, there is limited potential for personnel to gain exposure to the impacted material, as long as the fill unit remains undisturbed;

- odour/aesthetics are not considered an issue as long as the fill remains undisturbed;
- impact has not occurred to the residual clay horizon below the silty sand fill in IP46; and is vertically confined to localised 'hotpots' of impact within the fill; and
- the underlying low permeability residual clay horizon will retard vertical migration of potentially impacted seepage water to the fractured rock aquifer at approximately 12.0 metres below ground level. The current classification of the groundwater indicated that the water quality is poor and not suitable for drinking water irrigation water, livestock watering, or for the textile industry, with respect to one of the following: chloride, total hardness, total dissolved solids or iron.

ERM considers that a sufficient number of inspection pits have been excavated outside areas of identified potential impact, to assess the potential presence of significantly sized 'burial pits' containing textile and/or munitions waste, within the vacant areas of the site.

Finally the southern boundary of Lot 223 extends for approximately 20 metres to the south of the security fence. This boundary is not fenced and future site owners should ensure that a fence is erected along this boundary, to prevent potential dumping of material across this boundary.

REFERENCES

National Environment Protection (Assessment of Site Contamination) Measure (1999);

NSW EPA (1994) *Guidelines for Assessing Service Station Site;*

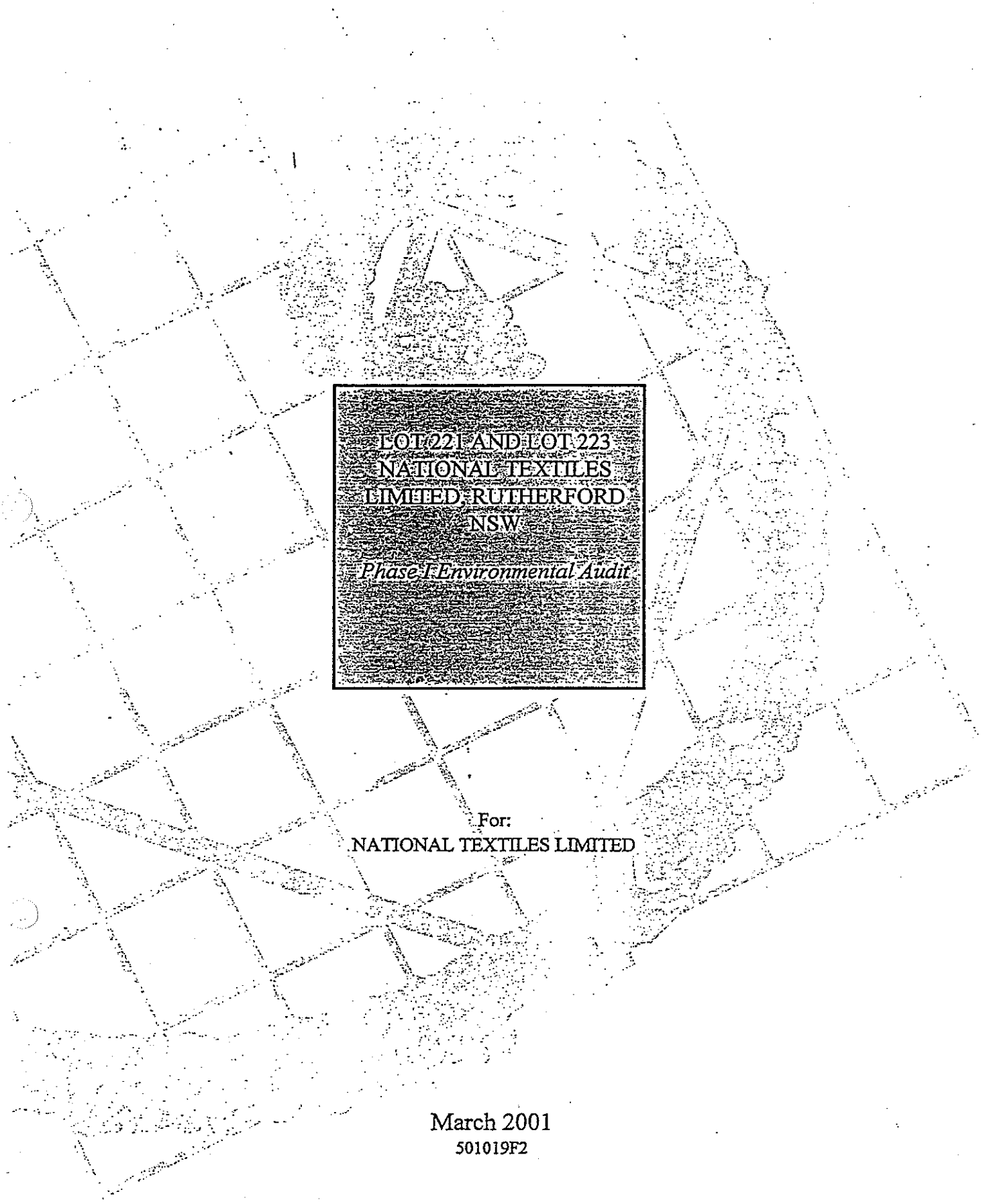
NSW EPA, (1997) Guidelines for Consultants Reporting on Contaminated Sites; and

NSW EPA (1995) *Sampling Design Guidelines.*

APPENDICES

Appendix A

ERM (MARCH 2001) PHASE I AUDIT REPORT



LOT 221 AND LOT 223 NATIONAL TEXTILES LIMITED RUTHERFORD NSW

Phase I Environmental Audit

For:
NATIONAL TEXTILES LIMITED

March 2001
501019F2

Report No. 501019

This report has been prepared in accordance with the scope of services described in the contract or agreement between Environmental Resources Management Australia Pty Ltd ACN 002 773 248 (ERM) and the Client. The report relies upon data, surveys, measurements and results taken at or under the particular times and conditions specified herein. Any findings, conclusions or recommendations only apply to the aforementioned circumstances and no greater reliance should be assumed or drawn by the Client. Furthermore, the report has been prepared solely for use by the Client and ERM accepts no responsibility for its use by other parties.

Approved by:	David Bone
Position:	Project Director
Signed:	
Date:	*1 March, 2001*

Environmental Resources Management Australia Pty Ltd Quality System

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- Facility management stated that there are no current UST's on lot 221 or 223, and that only one is known from the munitions factory operations at the site, but was never used as part of the textiles operations.
- Currently there are numerous drums still located around the dye house on lot 223. These drums, with residual chemicals, are stored in designated bunded drum storage areas, fitted with blind sumps.
- Some of these storage areas exhibit staining and corrosion from spills over many years of use.
- Facility management stated that no complaints have been received from site neighbours.
- The site has a number of areas of potential asbestos containing materials. A sample of sheeting from the old laboratory was positively identified as containing chrysotile asbestos. Areas include the roof of the dye house; inside and on the roof of the old boiler house; carpenters shed and workshop; the old laboratory; and on pipework as insulation.
- There are eight active electricity transformers and one inactive transformer on lots 221 and 223. At least three potential PCB containing capacitors are stored in the old laboratory and workshop on lot 223. The transformers are all located on concrete slabs, with the some sections of the slabs showing visible signs of staining below the transformers.
- There are a number of halon gas fire extinguishers stored in the old boiler house on lot 223. There was no disposal program identified by management for these ozone-depleting substances.

Potential environmental issues include the following:

- The old and new boilers contain potential asbestos materials. The age of the building and the poor condition of the old boiler house, may present a safety hazard for site personnel;
- Insulation materials such as that observed around pipework should be examined to determine if it contains asbestos, should the pipework require removal;
- If buildings are to be demolished, an asbestos survey should be conducted to identify the presence and condition of potential asbestos containing materials, and to provide recommendations on demolition methods and disposal options available;
- The integrity of underground pipework should be checked, as it carried wastewater which may have leaked into the soil material; and
- Given the past use of the site as a munitions factory and the long industrial history of the site dating from 1943, an intrusive Phase II investigation, in the target areas indicated in the report, is recommended. The intrusive investigation will determine whether the soils and or groundwater below the site, has been impacted by either onsite or offsite activities, to levels above the industrial land use criteria.

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1 INTRODUCTION

1.1 PURPOSE AND SCOPE

Environmental Resources Management Australia (ERM) was commissioned by *National Textiles Limited* (NTL) to undertake a Phase I environmental due diligence audit of the abandoned Rutherford textiles facility, located off the New England Highway, Rutherford New South Wales.

The scope of work for this assessment was:

- to identify any potential environmental liabilities from the previous and current operations at the site and adjoining areas
- to design a Phase II sampling program to satisfy the NSW EPA guidelines

1.2 APPROACH

A review of available environmental documentation, database searches and visual inspection of the site and site boundaries was undertaken by ERM audit specialists, Mr David Bone and Mr Chris Hadlow on the 2nd and 7th of February 2001. The following site representatives were interviewed during the site visit:

- *Mr Rodney Unterheiner, site engineer, a former employee of NTL, now employed by BRUCK P\L;*
- *Mr Derek Hodge of NTL;*
- *Mr Darcy McElwee, surveyor; and*
- *Mr Andrew Cant, real estate agent.*

As the site is not operational, no other employees were interviewed and no operational processes could be observed.

The report format is as follows:

Section Two provides details concerning the site location, layout, operations and history.

Section Three provides details of the site environmental setting (geology, hydrogeology and surface water resources) and site sensitivity.

Section Four presents the factual findings and observations of the assessment.

1.3 LIMITATIONS

The information contained in this report has been obtained from site management, divisional management and from observations made by the auditors during a brief site visit and a review of historical information. Due to time constraints, where it has not been possible to verify all information supplied, ERM has relied on information provided by site and divisional management.

Where historical searches and other data reviews have been carried out, ERM cannot confirm that the information obtained is complete.

Nothing contained in this report shall be construed as a warranty or affirmation by ERM that the site and property described in the report are suitable collateral for any loan or that acquisition of such property by any lender through foreclosure proceedings or otherwise will pose no risk of potential environmental liability on the part of such lender.

2 SITE BACKGROUND DESCRIPTION

2.1 SITE LOCATION

Topographical and historic parish maps of the area, indicate that the site is located off the New England Highway at Rutherford, at grid reference 6379625 359325 (AMG), see *Figure 1*. The site is located on a flat area to the west of the town of Rutherford approximately 2.5 kilometres to the south-west of the Hunter River, and 1.2 kilometres to the west of Stony Creek. This small tributary drains to Swamp Creek to the south of Maitland, which is approximately 3.8 kilometres to the east of the NTL site.

Access to the site is gained from a private roadway off the New England Highway or via gates along the western side of Lot 223 which fronts Kyle Street. The general area surrounding the NTL site is comprised of light industrial properties including warehouses, printers cardboard recycling, transport companies and metal fabrication workshops.

Site neighbours are of a light industrial nature, with residential properties located at Rutherford approximately two kilometres to the north-east. Information relating to neighbours is provided in *Table 1*.

Table 1 ***Site Neighbours***

Land use	Location	Distance from property
LOT 221		
Clothing print shop	east	100m east of lot 221
Vacant warehouses	North-west, north-east	Adjoining lot 221
Plant and equipment auction site	North-west	100m north-west of lot 221
Concrete batch plant	North-west	50m north west of lot 221
Storage area for plant and equipment awaiting sale	west	Adjoining lot 221
Vacant building (Lot 223)	south	Adjoining lot 221
LOT 223		
Haxton Haulage	south and east (Lot 101)	Adjoining lot 223
Visy recycling	east	Adjoining lot 223
Mechanical workshops	South and west	Adjoining lot 223
Vacant land	North west and south west	Adjoining lot 223
Vacant building (Lot 221)	north	Adjoining lot 223
FORMER NTL COMPLEX		
Oil reprocessing plant	south	400m south
Rutherford aerodrome	North-west	1.25 kilometres north-west
Main northern Railway	south	1.5 kilometres
Old Rutherford landfill site	North-east	1.1 kilometres
Rutherford residential area	North-east	2 kilometres
Rutherford industrial area	east	2 kilometres

SOURCE: LAND INFORMATION CENTRE RUN 6 CESSNOCK

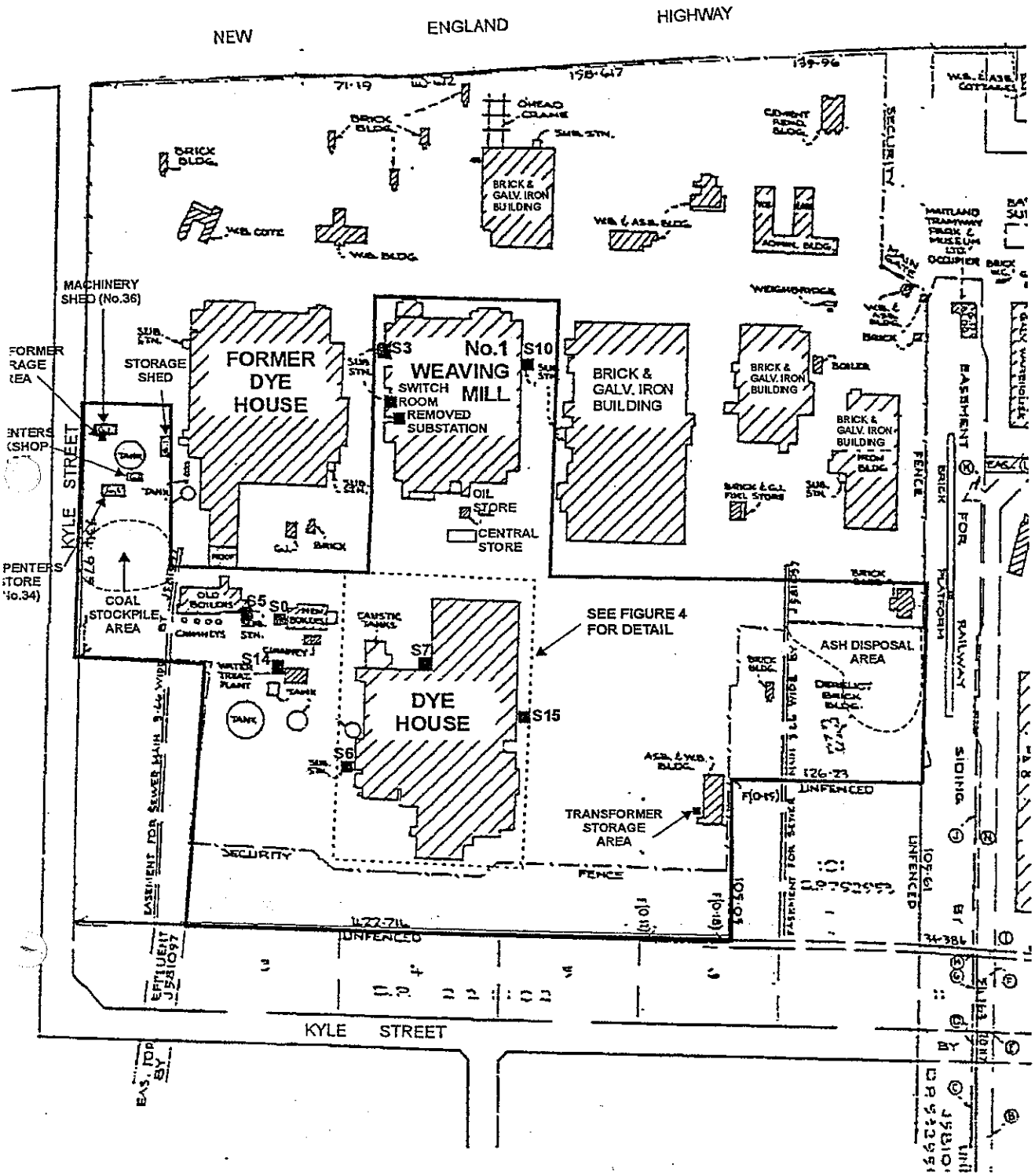
3010151/Locality.cdr

ERM

Figure 1 LOCALITY

N

0 500m



■ S15 TRANSFORMER SUBSTATION LOCATION

▭ APPROXIMATE BOUNDARY OF SURVEY AREA

SOURCE: McELWEE ASSOCIATES

Figure 2 SITE LAYOUT CURRENT - 1991-2001

N

0 100m

The site has been disused as a textile manufacturing site since 1997 and the buildings on the site are mostly unoccupied and empty. Some buildings on adjoining lots are being used as warehouses or storage areas and some remain unsold and are vacant. The machinery in the main dye house building is being dismantled and removed from the site currently. This is expected to continue until about July 2001.

2.2 SITE LAYOUT AND CURRENT OPERATIONS

The site is currently owned by COLERAND P/L which has owned the site since 1995. Current operations on the NTL site on adjoining lots include warehousing, screen printing, transport depots, concrete batch plants and steel fabrication workshops. The subject buildings on Lots 221 and 223 of DP 990651 are vacant. Equipment and residual textile material is in the process of being removed from the site. When this has been completed, the subject buildings will be completely vacant.

The total subject area is approximately 12.8 hectares of which approximately 30 percent comprise buildings or structures. The facility employs less than 10 full time staff during the decommissioning phase.

The current layout of the site is shown in *Figure 2,* and can be described as follows.

2.2.1 Lot 221

Located on the northern part of the complex, this building (labelled as building number 1) is a brick and galvanised iron structure of approximately 11 000 m^2. There are also two other steel shed structures to the rear, or south of the main building on this lot. As the operations at the site have ceased, all buildings are vacant, with some weaving and spinning machinery not yet sold and still in place in main building. There are two active transformers, one on the east and one on the west of the building and one former transformer area on the western side of the building.

Buildings occupy approximately 90 percent of this lot.

2.2.2 Lot 223

This building is located on a large block of approximately 11 hectares and containing one main building of approximately 18 000 m^2 and nine other buildings including an old boiler house, workshops for mechanics and carpenters, new boiler house, possible air raid shelters, disused effluent tanks and storage buildings.

There are six transformers located around the outside of the boiler houses and main building. Machinery is currently being removed from this building and is expected to be completed by July 2001.

Buildings occupy approximately 30 percent of this lot.

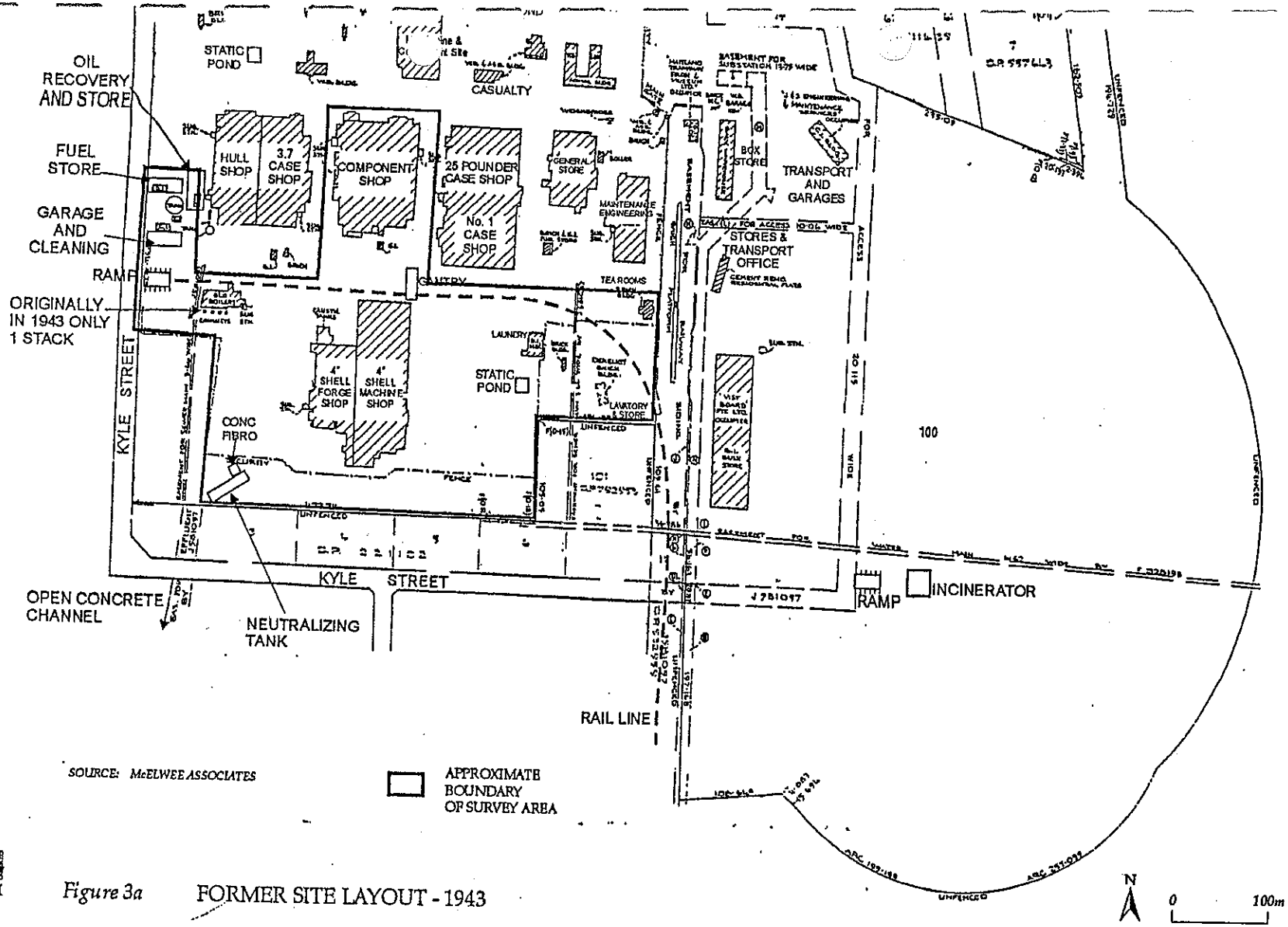


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Figure 3a FORMER SITE LAYOUT - 1943

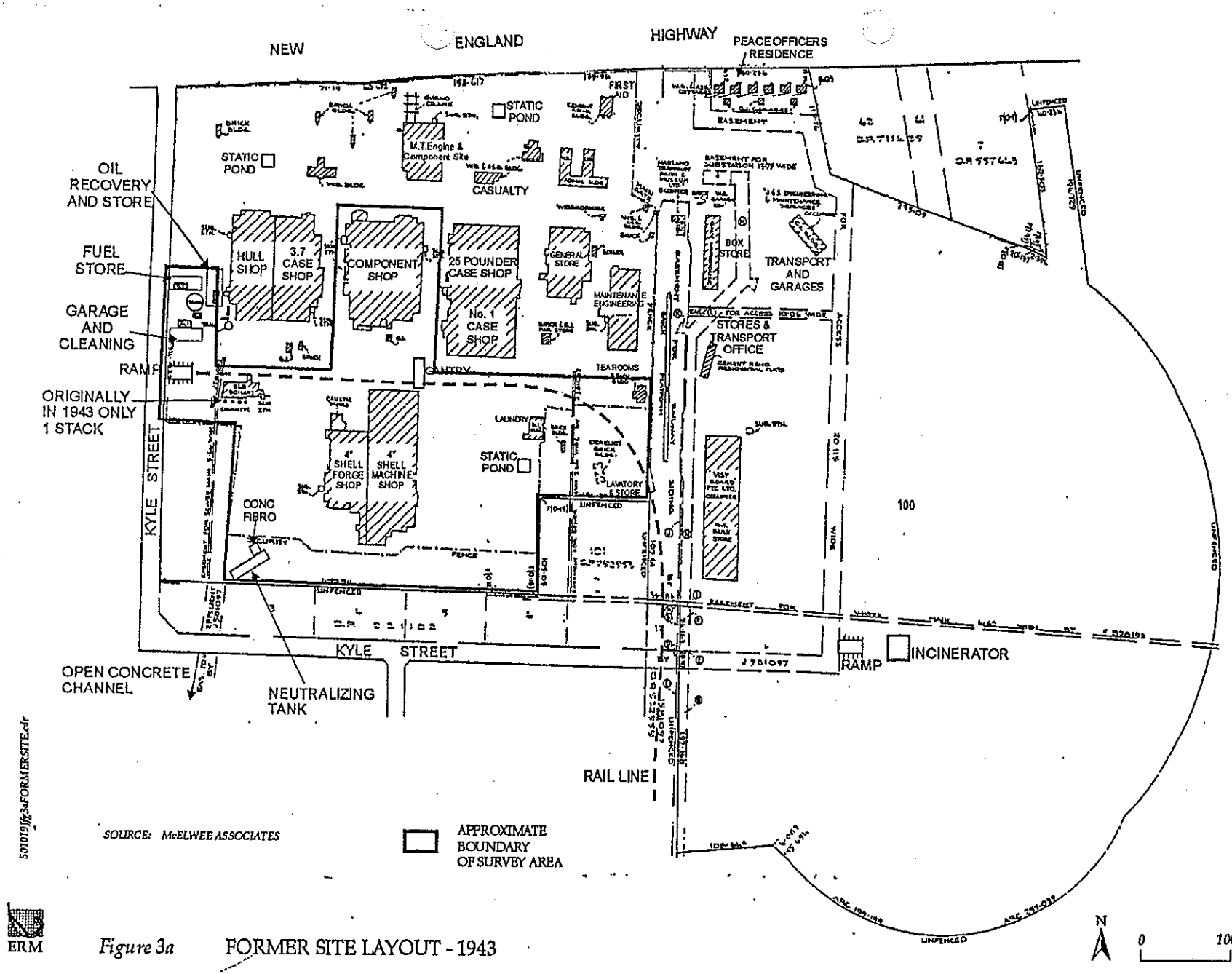

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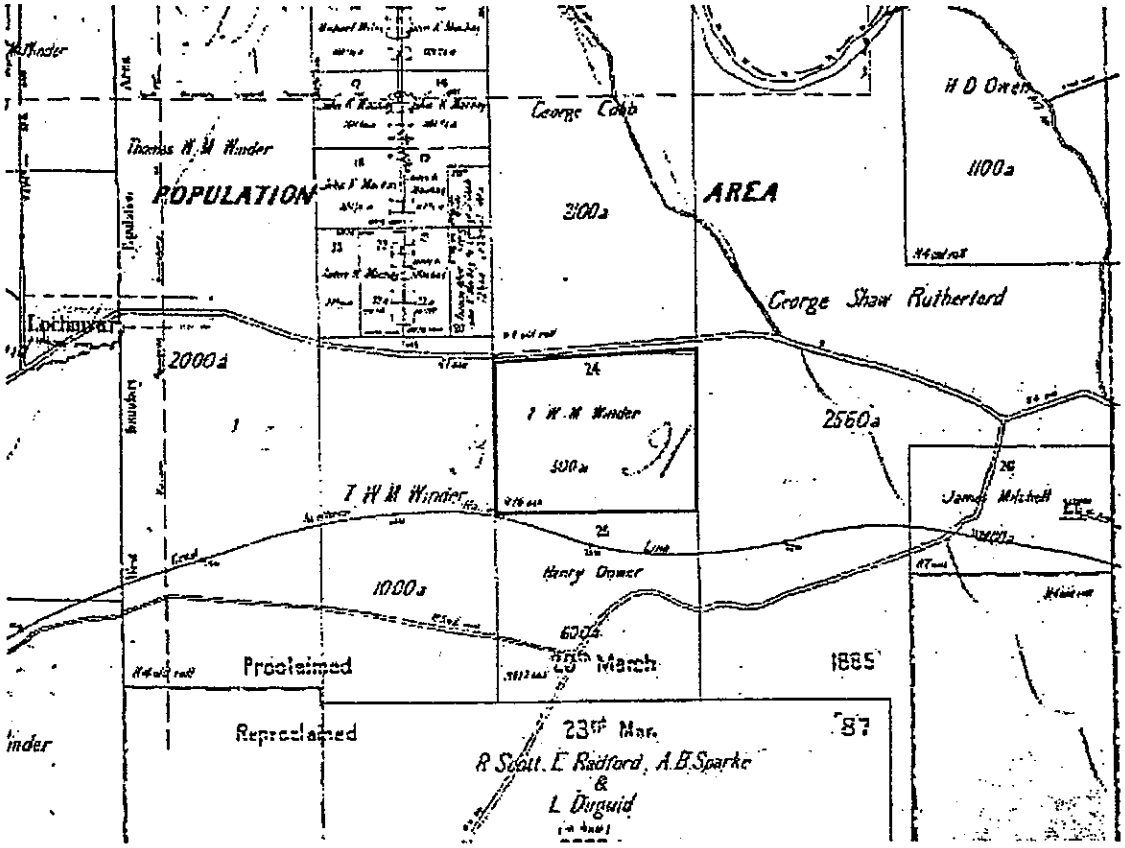
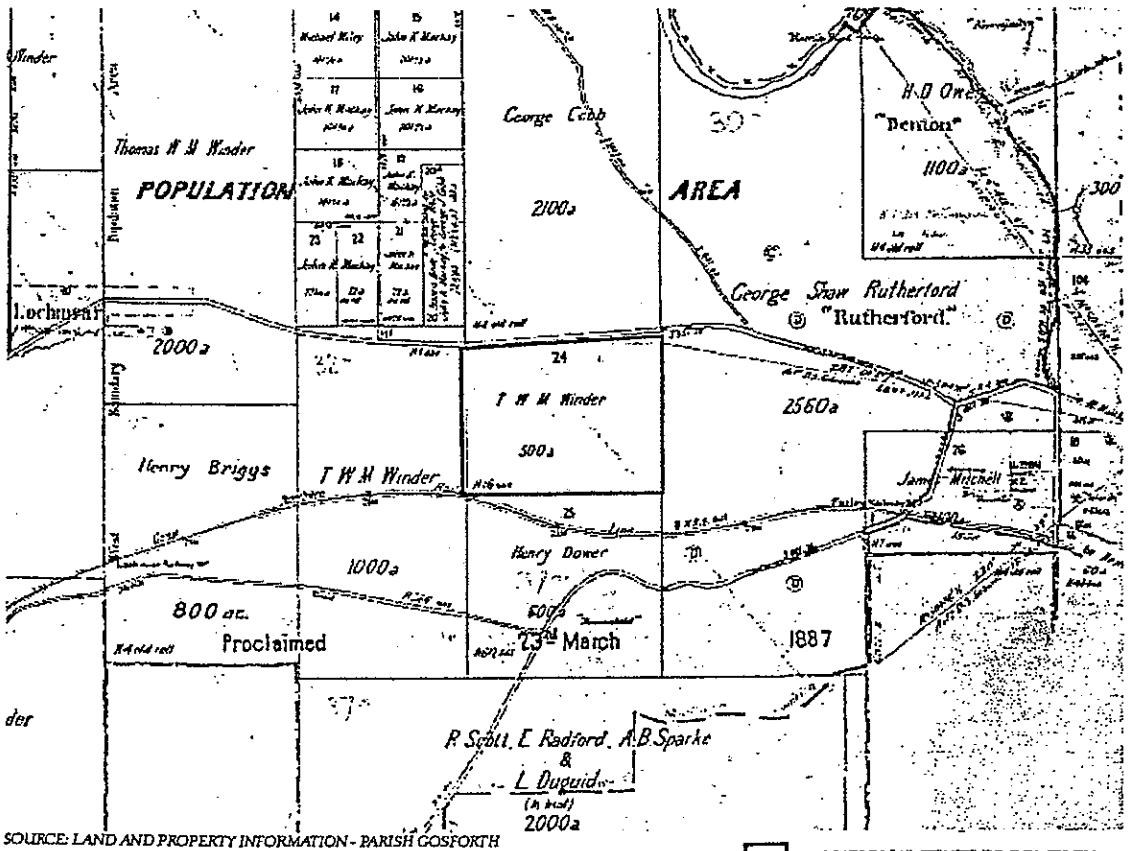
Figure 3a FORMER SITE LAYOUT - 1943

1885 Gosforth Parish Map.



1891 Gosforth Parish Map.

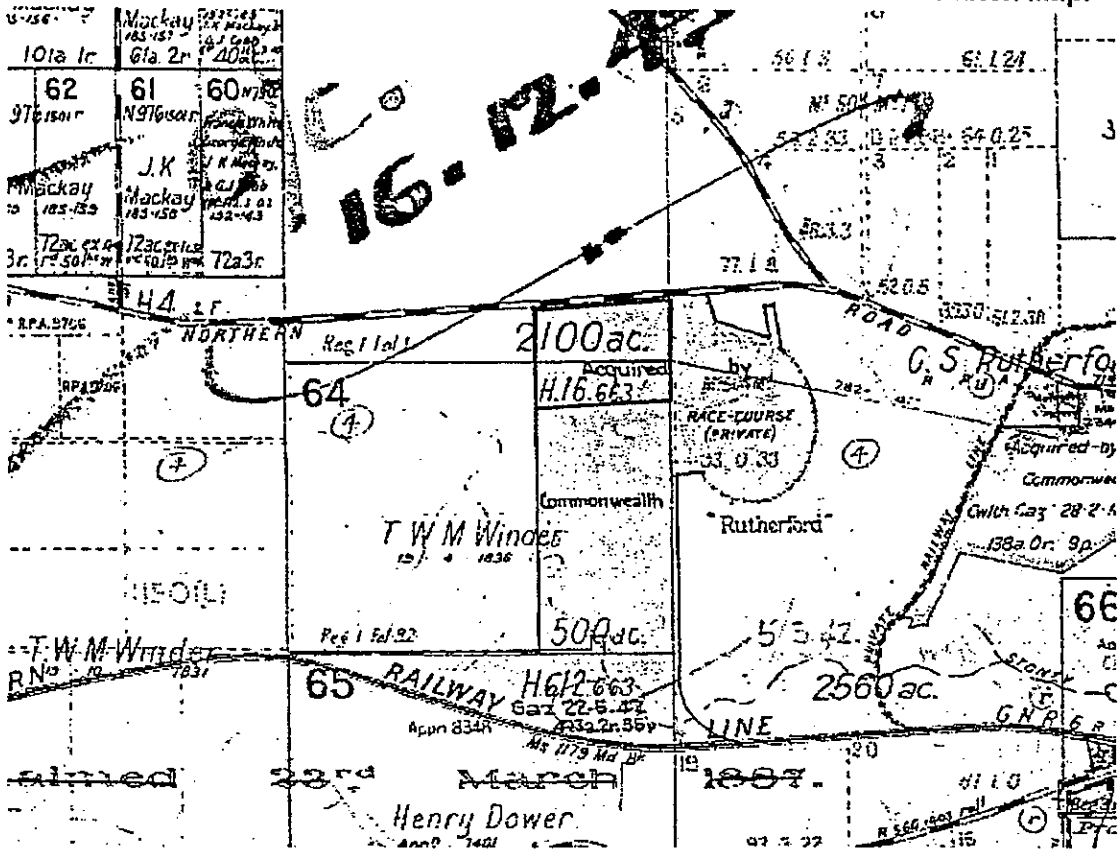


SOURCE: LAND AND PROPERTY INFORMATION - PARISH GOSFORTH

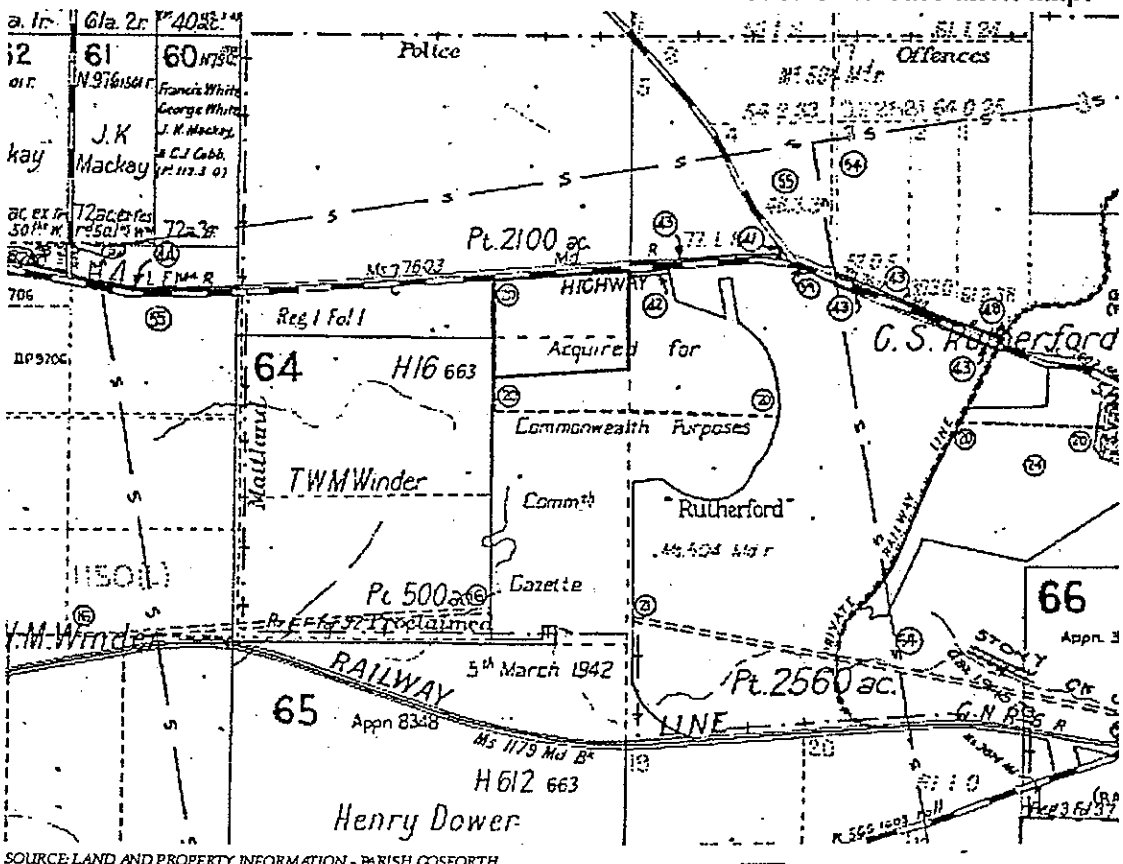
NATIONAL TEXTILES COMPLEX

Figure 3b GOSFORTH PARISH MAPS

1927 Gosforth Parish Map.



1943 Gosforth Parish Map.



SOURCE: LAND AND PROPERTY INFORMATION - PARISH GOSFORTH

NATIONAL TEXTILES COMPLEX

5010195/3/parishmaps2.cdr

ERM

Figure 3c GOSFORTH PARISH MAPS

Aerial photography of the site from 1974 and 1994 were also reviewed and showed that few changes had occurred on the subject sites during this time. Notable changes included:

- the building of the new boiler house between 1974 and 1991;
- removal of trees on the south-western portion of lot 223 and the adjoining western property;
- placement of unknown materials in the southern portion of lot 223, which appeared as a mound, not previously there in 1974; and
- removal of the laundry building in the north-east of lot 223.

Surrounding landuse changed significantly in the years between 1974 and 1994 with large scale development of industrial sites occurring to the south-west and south of the NTL site. The disused landfill site located to the north-east of the site was also closed during this period.

3 *ENVIRONMENTAL SETTING*

3.1 GEOLOGICAL AND HYDROGEOLOGICAL SETTING

The Newcastle 1: 100 000 *Newcastle Coalfield Regional Geology*, geological map indicated that the site is underlain by basalt, siltstone and sandstone of the early Permian, Lochinvar Formation of the Dalwood Group. Information supplied by Mr Rodney Unterheiner indicated that during construction of the effluent tank dam, red clays were observed to the depth of the dam construction. Red clays are typical of residual soils derived from weathering of underlying siltstone bedrock. More importantly, these clays are generally of very low permeability and any potential surface contamination is unlikely to penetrate this horizon, and access the fractured rock aquifer below the site. As such, where potential contamination occurs, it is likely to be vertically confined to above the clay horizon.

The closest alluvial aquifer occurs along the banks of the Hunter River, approximately 2.3km to the north east of the site. Potential impact to Hunter River alluvial aquifer, by past activities carried out at the site, is highly unlikely.

A groundwater bore data search was conducted with the Department Land and Water Conservation (DLWC). The information supplied indicated that there are no registered bores within a two kilometre radius of the site. The closest bore (GW027289) is located approximately 2.1 kilometres to the north west of the site. The work summary sheets and plan showing the location of this bore is given in *Appendix B*. Few details relating to this bore are provided and the information provided indicates that the bore depth is 5.5 metres below ground level and within loamy clay soils. This data suggests that this bore is not a water supply bore.

3.2 SURFACE WATER RESOURCES – SENSITIVITY AND VULNERABILITY

The nearest surface watercourse is Stony Creek, 1.3 kilometres to the south and east of the site. Drainage channels are located on lot 223 in the south-west, which discharge water into an ephemeral tributary of Stony Creek, some 300 metres to the

south-west of Lot 223. Another drainage channel occurred near the garage and workshop area in the north-west of Lot 223 and drained northwards to the New England Highway road drain which in turn connects to the northern arm of an ephemeral tributary of Stony Creek, approximately one kilometre to the east of the site. This drain is no longer present and no evidence of its former location could be found.

The Hunter River is located 2.3 kilometres to the north-east of the site and flows in an easterly direction.

All potentially contaminated wastewater generated from previous activities carried out at the site, was disposed of to sewer. All surface water drainage on site eventually drains into Stony Creek. Given that all former drum storage areas are bunded and all open drains within these bunds, outside the factory area, are connected to the sewer, ERM considers surface water vulnerability to be low, although the sensitivity is moderate.

4 *FINDINGS AND OBSERVATIONS*

4.1 AIR EMISSIONS

There are no significant air emissions currently generated from Lots 221 or 223 as there are no operational activities at the site. Boiler houses at the site were reportedly used to provide steam to the buildings, which was used in the textile and yarn manufacturing process. Electricity is provided to the site via the main substation located to the north-east of the NTL site.

There is no open burning of wastes carried out on site as part of the decommissioning works and no evidence of any open burning was observed on these lots at the time of the site visit.

4.2 WATER MANAGEMENT

4.2.1 Water Supply and Use

Water is supplied to the site by *Hunter Water Corporation* and is was used for domestic, sanitary and process related purposes. The supply is metered and charges apply on a user pays basis for the volume used. No data was available as to the former water consumption of the site. Management did not report any problems relating to the supply of water to the site in the past, or currently. The supply is now only used for potable and sanitary uses at Lots 221 and 223.

Facility management stated that there are no additional sources of water supply to the site. There are no on site groundwater abstraction wells and surface water abstraction is reportedly not carried out. No evidence of water abstractions from ground or surface water sources was observed from these lots by ERM. An effluent water treatment tank and lined holding dam is located on Lot 223 in the south-west. This tank and dam are connected to the sewer and previously discharged water containing

dye residues and other process waters. Following the factory closing, the system has reportedly not been used. No plans of the utility connections were available for review by ERM. Power was still connected to the effluent pumps and tank area at the time of inspection.

Water is currently used only for domestic and sanitary purposes. As previously mentioned, there is unknown volumes of water in the main effluent tank, holding dam and old effluent tanks located adjacent to the garage and workshop area on Lot 223.

4.2.2 Wastewater Discharges

Wastewater discharges from the site currently comprise stormwater runoff from roofs and areas of hardstanding, and sanitary wastewater (sewage). There are currently no process wastewater discharges from the Lots 221 and 223. The site engineer reported that all grated effluent pits on the site are connected to the effluent tank and holding pond and were discharged to the sewer. Stormwater drainage from the areas outside of the security fence, but still on Lot 223, discharges into wetland areas located in the south-eastern corner of Lot 223 and also off site on Lot 101.

Sanitary wastewater (sewage) is directed to the sewer and pumped to the sewage treatment works. Blind sumps are periodically pumped out and were reportedly disposed of into the sewer with the other wastewaters from the manufacturing process. Areas fitted with blind sumps are shown on *Figure 4* and include external drum storage areas, internal dye storage and mixing areas and external transformer installations. There is reportedly no current arrangement for the disposal of material from these sumps and many which were visible contained unknown liquid.

Figure 4 also shows the open grate areas, which were observed by ERM during the site audit. These were all reportedly connected to the sewer.

4.3 WASTE MANAGEMENT

Currently no waste is generated on either Lots 221 or 223. No disposal of wastes currently occurs on either lot. During decommissioning materials such as scrap steel, aluminium, building materials and partly full drums of raw materials used in the textile manufacture process are still stored on Lots 221 and 223. These are being sold or removed from the site by the current management. The site management has provided large bins for this purpose, which are reportedly collected by a licensed contractors for off site disposal. No hazardous wastes are currently generated on the site. No documentation for the waste contractor was viewed by ERM.

The scrap steel storage area is located on the old coal stockpile area in the west of Lot 223. Material observed stored here consisted of railings, 3 x10,000 litre (approx.) stainless steel storage tanks, several empty 205 steel and plastic drums, plate steel and stairways removed from buildings at the NTL complex.

In the past, wastes which have been generated and disposed of on the site, include:

- Ash material from coal fired boilers (from 1943 to approximately 1991), disposed of in eastern section of Lot 223. Some of this material was reportedly taken

offsite by a landscape contractor. This practice ceased with the closure of the site and the subdivision into several lots;

- Effluent overflows from the tank in the north-west of Lot 223, from the original dying processes reportedly undertaken on the current Lot 221, were disposed of via a channel to the New England Highway road drain. This occurred when effluent levels were in excess of the holding capacity of the original tank. This occurred prior to the construction of the main effluent tank in the 1980's;
- Static ponds were shown in the original 1943 drawings. These ponds appeared to be located to capture runoff from paved surfaces around the NTL complex. The ponds are not in existence today and the site engineer was not aware of any ponds that had been filled in the past 20 years. At least one pond was located on Lot 223 (see *Figure 3a);*
- An incinerator was also shown on the 1943 plans, this is 450 metres to the south-east of Lot 223 and was unknown to the site engineer and therefore must have been removed prior to approximately 1980;
- Old electrical equipment reportedly containing PCB oils and drums reportedly containing PCB contaminated clothing are stored on the floor of the old laboratory building. These units are not bunded or contained in any way and the floorboards beneath them appear stained. Two other units were observed in the workshop area also stored on the floor with no secondary containment. Staining of boards beneath units may also have occurred from oils and lubricants stored in the same areas. Neither storage has any labelling to suggest that PCB's are located there and the old laboratory building is not secure, with the units easily viewed through the large holes in the asbestos sheet walls.

No documentation relating to the disposal or licensing of waste contractors was available at the site.

4.4 MATERIALS HANDLING AND STORAGE

4.4.1 Bulk Storage

As the site is not operating, no active bulk storage tanks are reportedly located on either Lots 221 or 223. A number of bulk tanks are still located around the main dye house on Lot 223, some were observed to contain product however most have been emptied and it was reported that all are to be removed as part of the decommissioning program. The location of all tanks is shown on *Figure 4.* All bulk storage tanks are stainless steel and are in bunded areas. Bunds generally appeared in good condition with the caustic soda tanks bund containing considerable amounts of water and spilt product.

The effluent tanks which were used to collect all process related wastewaters and some sump drainage from internal storage and mixing areas are not bunded in any way. The condition of the tanks appeared good with no external cracks visible. The integrity of the tank bases and connecting underground pipework is unknown.

Materials stored in bulk AST's on the site were:

- Caustic soda (3 x approx. 6000 litre stainless steel tanks in bunded area outside dye building on northern side);
- Caustic soda (3 x approx. 2000 litre stainless steel tanks inside dye building on northern side);

- Hydrogen peroxide (1 x approx. 3000 litre stainless steel tank in bund on southern side of dye building);
- Hot water tank (1 x approx. 5000 litre steel tank on south side of dye building)
- Effluent tank (1 x approx. 20,000 litre concrete tank, unbunded, to west of dye building);
- Flocculant tank (1 x approx. 10,000 litre steel tank adjacent to effluent tank, unbunded); and
- Effluent tank disused (1x approx 10,000 litre brick and concrete tank adjacent to garage and workshop area, unbunded and partially full from rainwater).

The effluent pond which was unfinished due to the closure of the site has been lined with plastic but material excavated from it remains on site. The location of the dam is in the area where the original neutralising tank was on Lot 223 and the fill may contain some contaminated heavy metal material from the munition factory process wastewaters which were disposed of in this area.

Facility management stated that there are no current UST's on Lots 221 or 223, and that only one is known from the former operations at the site. This is a concrete and brick tank located to the west of the carpenters workshop and store on Lot 223. This tank was never used as part of the NTL operations and was reportedly linked to the former munitions factory, however no use for the tank was known.

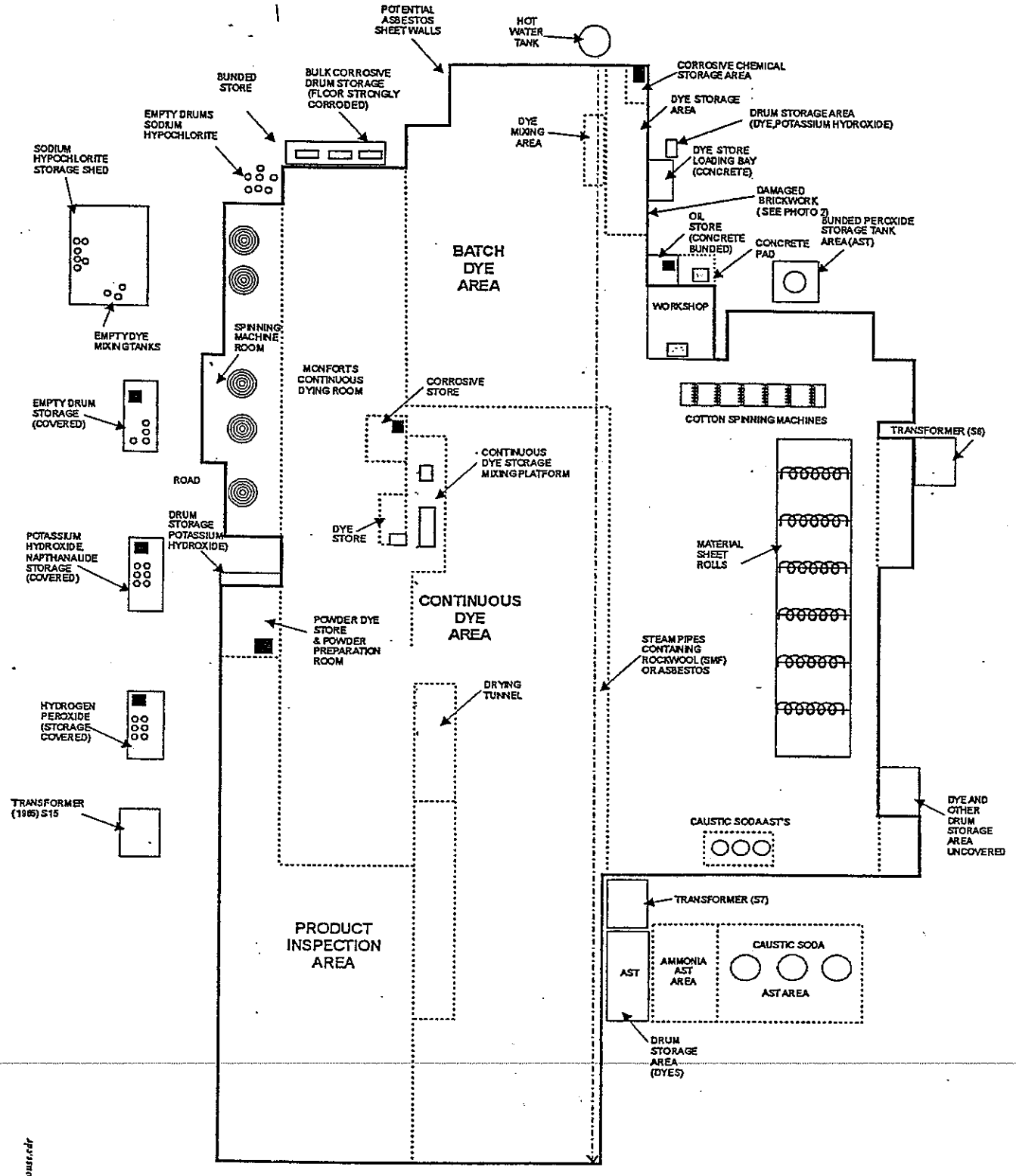
A UST exists adjacent to Lot 223, this is a fuel UST located beneath the fuel bowser pumps on Lot 222 and is located adjacent to Lot 223 on the northern side.

4.4.2 Drummed Storage

Drum storage is carried out on site and management stated that as the site is no longer operational, the excess chemicals stored are to be sold or removed from the site as part of the decommissioning process. Currently there are numerous drums still located in the areas marked on *Figure 4*, predominantly these are around the dye house on Lot 223. All drums with residual chemicals are stored in designated drum storage areas with bunds and blind sumps see *Figure 4*. Empty drums are also located in these areas, as well as throughout the buildings and in the scrap steel storage area on Lot 223. All drums observed are in good condition with lids fitted, labels attached and appropriately segregated.

Materials observed stored in drums on the site were:

- Sodium hypochlorite, stored in 205 litre steel drums in covered areas to the south and east of the dye building, inside the dye building in dye storage areas, corrosive store and dye mixing areas. These areas were bunded but staining and corrosion of the concrete was evident in most locations;
- Hydrochloric acid, stored in industrial 1,000 litre plastic bins in covered and bunded areas to the south of the dye building. The bunded area here is corroded and crumbling;
- Potassium hydroxide, stored in steel 205 litre drums to the south and east of the dye building. The bunded area shows signs of spills to the blind sump but the bund appears in good condition;
- Napthanalide, stored in plastic 25 litre carboys on a palate. The palate had fallen over during the first day of the site inspection but no leaks could be seen. The fallen materials had been restacked by the time of the second inspection;



301019/fig4dyehouse.cdr

ERM

Figure 4 DYE BUILDING LAYOUT

- Textile dyes of unknown compounds were stored in 100 litre (approx.) steel drums at several places in and around the perimeter of the dye building. All were in bunded areas however in the dye mixing area, dye store loading bay and the dye store, the floor was badly stained, cracked and corroded from large ($10m^2$) spills which had occurred over many years. The floor is stained with blue and red pigments in these areas. The brick work on the outside of the western wall, below floor level at the dye store loading bay and mixing area;
- Powder dyes were stored in 50 and 100 litre steel drums in the powder dye storage area. There was staining of the floor in this area, with the waste going to a small blind sump;
- Sodium Hydrosulphite is stored in 205 litre steel drums on the floor of the Dye House. This is used in the dying process and several drums were noted in the storage area, and mixing areas; and
- Hydrogen Peroxide is stored in 100 litre steel drums in a covered outdoor storage area. The area has a concrete floor and a blind sump, no spills were noted in this area.

Typically, "empty" drums which are stored on site have contained strong alkali's or acids and dye material. These are generally stored in the designated drum storage areas around the dye house as shown on *Figure 4*. Some empty drums are also stored in the corrosive store and dye preparation areas. These drums were regularly collected by a contractor after being washed and the labels removed, this practice ceased with the closure of the plant and has caused a larger than normal number of drums to be stored in the designated areas.

4.5 COMPLAINTS AND PUBLIC RELATIONS

Facility management stated that no complaints have been received from site neighbours. The nearest residential properties to the site are located at Rutherford which is approximately two kilometres away.

4.7 OTHER ENVIRONMENTAL ISSUES

4.7.1 Asbestos

Facility management reported that an asbestos survey has not been carried out at the site. During the site visit potential asbestos cement sheeting was observed on all roofed areas of the dye building, guttering and some downpipes around the southern side of the dye house and much of the southern walls, see *Figure 4*. The weaving shed has iron roof and walls. In addition, potential asbestos cement sheeting was noted as wall cladding and false ceilings inside both buildings. Materials which could be inspected such as walls and some internal linings were in good condition and not friable.

The old laboratory building has asbestos cement walls, roof, and internal linings. Samples taken of this material were identified as containing chrysotile asbestos, see laboratory report in *Appendix C*, this material is in a friable condition.

The old boiler house has a sign on the main door identifying the area as being an asbestos dust hazard. The roof and most walls, guttering and downpipes of this building are asbestos cement sheeting and pipe lagging and boiler brick materials may

also contain asbestos materials. The boiler house is in a poor condition with materials observed in a friable condition.

The carpenters' workshop and store buildings on Lot 223 all have asbestos cement roofs, false ceilings and wall linings. The roofing materials appeared to be in fair condition but shows signs of cracking. The internal ceilings and wall linings, where fitted, are all painted but exhibit many cracks and are considered to be in fair condition and non-friable.

The roofing materials on the dye house were not able to be closely viewed but generally appeared to be in good condition with some areas painted. The walls on the southern side of the dye house were in good condition and have been painted, which has assisted in keeping the material from becoming friable. Areas which were damaged have been replaced with galvanised iron material and are typically in good structural condition, although certain areas of sheeting were broken and require replacement.

In their current condition potential asbestos cement materials in the dye house, carpenters shed and store are not considered by ERM to pose a significant health risk to employees. Asbestos cement should be removed when damaged and the asbestos fibres exposed. It is considered good practice to monitor the condition of such materials and remove and replace them as and when appropriate.

Some exposed sections of pipe work in the dye house and the old boiler house may have potential asbestos containing insulation material. No samples of this material could be gathered as the pipes are high up along the walls of the structures and the old boiler house stairways and platforms are unstable and cannot be safely accessed.

Exposed lagging was in poor condition in the old boiler house and was considered to be in fair condition in the dye house where it was visible. Pipes are located throughout the buildings and were used to supply steam to dying, drying and pressing equipment. The large amount of pipework on the site increases the risk of exposure to asbestos products and synthetic mineral fibres which may be present in the lagging material. It is ERM's understanding from site management that the pipework will be cut from the machines and remain on the site.

4.7.2 Polychlorinated Biphenyls – PCB's

There are eight active transformers, one inactive transformer and at least three pieces of redundant PCB containing electrical equipment on Lots 221 and 223. Only transformers which are located on the subject properties were examined, many other large transformers are located at the NTL complex, around other buildings and in the main switchyard to the east of Lot 221.

Compliance plates visible on transformers adjacent to the dye house on Lot 223 showed that the units were of 1965 vintage. Many units' compliance plates could not be read through the fences. All active and inactive units were located on concrete slabs inside security compounds. Thick grass buildup around security fences prevented full examination of the surface for evidence of spills.

otential contaminants associated with materials used in the munitions manufacturing process include the following:

Dinitrotoluene (DNT), Trinitrotoluene (TNT), urea, metals (specifically lead (Pb)), acetone, nitric acid, ammonia nitrate, pentachlorophenol, ammonia, sulphuric acid, nitroglycerine, calcium cyanamide, ethylene glycol, methanol, adipate, dibutyl pthalate, and sodium hydroxide.

lany of these compounds are not listed as the EPA's priority contaminants and iteria for allowable concentrations in soils are not in any of the published guidelines. Criteria for metals, semi volatile organic compounds (SVOC's) which clude pentachlorophenol, dibutyl pthalate, and DNT are provided. Potential ontaminants associated with the dying and textile manufacturing process include, amongst others, solvents such as toluene, metals, and sulphates.

reas of potential impact on Lot 223, adjacent to the western boundary, include:

- areas of drummed storage;
- machinery works shed;
- effluent disposal tanks; and
- coal stockpile area.

Other areas of potential impact identified, on Lots 221 and 223, include:

- A total of eleven (11) areas of either transformer use or storage;
- Ash disposal areas adjacent to the eastern boundary of lot 223 and the old boiler;
- Oil and dye storage areas; and
- Stockpiled drum areas adjacent to southern boundary.

reas of potential impact to the site from off site activities, include:

- The fuel storage area from Lot 204 near the north eastern corner of the site; and
- The drum storage area of Haxton Haulage, adjacent to the south eastern corner of Lot 223.

otential contaminants associated with above areas include total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAH,s), metals, and olychlorinated biphenyls (PCB's).

These areas require an intrusive Phase II Assessment to determine whether impact by otential contaminants has occurred to the soils and/or groundwater (if any), in oncentrations above the industrial/commercial landuse criteria, outlined in the NSW EPA (1998) *Contaminated sites - Guidelines for NSW Site Auditors Scheme*,. Our roposed methodology will be to use the 'Judgemental' Sampling pattern, outlined in ie NSW EPA (1995) *Sampling Design Guidelines,* given that a detailed site history of potentially contaminated areas across the sites, has been identified in this report.

Potential contaminants associated with materials used in the munitions manufacturing process include the following:

- Dinitrotoluene (DNT), Trinitrotoluene (TNT), urea, metals (specifically lead (Pb)), acetone, nitric acid, ammonia nitrate, pentachlorophenol, ammonia, sulphuric acid, nitroglycerine, calcium cyanamide, ethylene glycol, methanol, adipate, dibutyl pthalate, and sodium hydroxide.

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Areas of potential impact on Lot 223, adjacent to the western boundary, include:

- areas of drummed storage;
- a machinery works shed;
- effluent disposal tanks; and
- coal stockpile area.

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5 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the Phase 1 environmental audit of Lots 221 and 223, ERM concludes the following:

Areas of potential environmental issues include:

- The old and new boilers contain potential asbestos materials. The age of the building and the poor condition of the old boiler house may present a safety hazard for site personnel;
- Insulation materials such as that observed around pipework should be examined to determine if it contains asbestos should pipework be required to be removed;
- If buildings are to be demolished, an asbestos survey should be conducted to identify the presence and condition of potential asbestos containing materials and to provide recommendations on removal methods and disposal options available;
- Disused transformers and electrical equipment are installed around the main buildings on lots 223 and 221 and also stored in the old laboratory and workshop area. This equipment could potentially contain PCB oils; and
- The integrity of underground pipework should be checked as it carried wastewater which may have leaked into the soil material.

Given the past use of the site as a munitions factory and the long industrial history of the site dating from 1943, an intrusive Phase II investigation is recommended to determine if the site soils and groundwater (if any), has been impacted by onsite or offsite activities.