



PRELIMINARY SITE INVESTIGATION
NEW FARM POWERHOUSE SITE

*Brisbane City Council
Scientific Services Branch*

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1.0 INTRODUCTION

In March of 1993, Scientific Services Branch of the Brisbane City Council was commissioned to undertake a stage 1, Preliminary Site Investigation to determine the extent of contamination at the site known as "The New Farm Powerhouse".

The site is located at the tip of the New Farm peninsula. The area investigated comprises the former Powerhouse, associated buildings and approximately 2.9 hectares of adjoining land. The site borders New Farm Park to the south-west, the Colonial Sugar Refinery (CSR) to the north-west, and the Brisbane River to the north-east.

The New Farm Powerhouse site investigation is being carried out as part of the urban renewal program for the inner north-eastern suburbs of Brisbane by the Brisbane City Council. The urban renewal program is investigating the feasibility of the potential for reuse of the Powerhouse building and its surrounds for a range of purposes. These include:

- 1) Adaptation for arts/cultural use
- 2) Adaptation for sports/recreation use
- 3) Adaptation for housing
- 4) Open space adaptation

Appendix 3 figures 18, 19, 20 and 21 show the proposed redevelopment schemes described above.

All sampling, data reduction, interpretation and report presentation has been undertaken by the Brisbane City Council, Scientific Services Branch. Chemical analysis was undertaken by Australian Laboratory Services Limited (ALS, Brisbane), Safety in Mines Testing and Research Station (Simtars, Brisbane) and the Institute of Environmental Health and Forensic Services (New Zealand).

2.0 EXECUTIVE SUMMARY

The site forming the study area was located at the tip of the New Farm peninsula, Lamington Street, New Farm and comprises the powerhouse itself, associated buildings, and open space. The site borders New Farm Park to the south-west, the CSR refinery to the north-west, and the Brisbane River to the north-east. It covers a total area of 2.5959 hectares. Figure 1, in appendix 1, depicts the site location.

The sampling plan developed for the New Farm powerhouse site had two distinct functional components. A triangular grid pattern of boreholes with 50 m spacing over the open space, and judgemental sampling of areas around the existing buildings on site.

The results of the preliminary site investigation indicated that there was no evidence of any significant levels of contamination which would restrict the development of the site for the end uses proposed by the Brisbane City Council. However, if significant excavation was to be carried out on site, as part of a redevelopment plan, further site investigation may be necessary.

Contamination at the site was primarily physical. Large amounts of imported soils, mixed in some cases with building rubble were found. Chemical contamination by phenols, polynuclear aromatic hydrocarbons, petroleum hydrocarbons, heavy metals, PCB's and dioxins was not significant across the site. No evidence of significant asbestos contamination was found during the preliminary site investigation.

Appendix 1, figure 3 contains illustrations of the remaining stores buildings at the site. The stores were once connected by a timber framed walkway to the powerhouse buildings, but this was removed when the boilerhouse was demolished. These buildings were used as stores for powerhouse needs during its operating period.

The buildings are apparently sound, and are currently occupied by the Electrical Services Section of the Brisbane City Council, Corporate Services Division.

Council rehabilitation plans support the retention and refurbishment of these buildings as they form an integral part of the original powerhouse complex.

This study did not examine these buildings as they are currently occupied by the Electrical Services Section of the Brisbane City Council, the area around these buildings is fully sealed by concreting, and historical records show that they have been only used for storage of equipment.

3.2 The Offices and Workshops

These buildings were constructed in the 1940's to provide additional space for the powerhouse operations. They have been fully renovated and are currently occupied for office use, by the Electrical Services Section of the Brisbane City Council. Appendix 1, figures 2 and 3 show the location of these buildings. The office workshop area of the site is viewed as non-essential to the redevelopment of the site.

3.3 The Boilerhouse

The boilerhouse structure was demolished in May 1984. Rubble from the demolition was placed in the basement section of the building and the debris covered with dirt to make a smooth surface. As the original boilerhouse

basement is above ground level the north-eastern and north-western sides of the basement are exposed.

The large steel doors on the north-eastern side and a smaller standard door on the north-western side of the basement are in place, but have not been sealed. These doors are buckling under the pressure of the rubble inside the building and are starting to open to the environment. Appendix 2 contains photographs of these breaches in the basement "seals".

The surface of the demolished structure is approximately 2-3 metres above ground level at the same height as the ground floor of the remaining powerhouse buildings. As the debris has been covered with compacted soil, a smooth dirt surface slopes westward towards New Farm Park and the natural ground level.

The top area of the old boilerhouse is currently being used to store bark chips and mulch for New Farm Park.

3.4 Open Space

A large portion of the site is open space. It lies to the north of the powerhouse complex along the curve of the river and adjacent to the CSR grounds and has always been open and undeveloped (Allom *et.al.* 1993).

Considerable amounts of fill were imported to the open area following closure of the powerhouse, and its surface height is up to 5 metres above natural ground level. A retaining wall, varying from four to six metres in height, at the edge of the open area faces south, along the extension of Lamington Street towards the powerhouse. A further four to six metre embankment of fill slopes towards the Brisbane river.

The open space is completely grassed with a some established larger vegetation such as Poinciana and Acacia along the river bank, and various other tree species such as Mangos, Figs, Eucalypts and Callistemans dotted around the open space. Figure 4 in appendix 1 shows the existing vegetation.

A former coal handling wharf in a poor state of repair, survives on the north-eastern side of the open space. This wharf is still being used commercially by a barge operator. The upper most southern section of the open space area is being used as a car parking facility by Brisbane City Council staff.

The north-west corner of the open space is being used as an additional storage area for large piles of mulch and bark chips for New Farm park.

3.5 The Transformers

The transformers were originally located on the western boundary of the powerhouse site, behind the carpenter's shop. Appendix 1, Figure 2 shows the former location of the transformer housings. These have been removed from the site. Mesh fencing encircles the former location of the transformers. All that remains is the concrete foundations for these structures. Gravel covers the concrete base.

3.6 Coal Stockpiling Areas

Several former coal stockpiling areas are illustrated in figure 5, appendix 1. A gypsum store for CSR has been constructed over the northern most area illustrated. The stockpiling area adjacent to the powerhouse has been covered with concrete. The area in the remaining open space has been covered with fill.

4.0 SITE HISTORY

Prior to the construction of the powerhouse the property is thought to have supported a racecourse for the Moreton Bay Racing Club in 1846, and grazing/park activities from the 1880's to the 1920's. The Colonial Sugar Refinery (CSR) purchased land adjacent to the New Farm powerhouse site in 1885, and established a sugar refinery in 1893.

The land on the New Farm peninsula, which the powerhouse now occupies, was partially resumed from private owners and New Farm park and combined with unoccupied allotments by the Brisbane City Council in 1926. Brisbane City Council records show that "Small Creek" meandered from the north-west corner of the property before entering the Brisbane River from the south-east corner. Figure 6, appendix 1 shows the location of this creek. The main powerhouse buildings, the boilerhouse and the stores, were built over this creek which then cut through the southern corner of the open space at the site. As there is no evidence of this water course today, it can be assumed that it was drained and filled during the construction of the powerhouse foundations in the 1920's.

Construction of the first stage of the New Farm powerhouse by the Brisbane City Council, commenced under the supervision of Mr. R.R.Ogg, the designer of the buildings, in 1926. The turbine room and boiler house were in the first phase developed, and operation of the powerhouse began in 1928. The Architects and Builders Journal of Queensland, May 1928, detailed the construction of the powerhouse and stated, " The workmanship through out is of the best, and reflects great credit on those concerned". The turbine room and switch house were expanded in 1934, the boiler house and staff accommodation in 1936, and further extensions to the boiler house were completed in 1940.

Coal was originally transported by rail to the boilers, via an extension from Lamington street of the existing rail services to the CSR refinery. During the 1950's a coal handling wharf on the Brisbane river was constructed. Coal was then shipped to the powerhouse and stockpiled adjacent to the river and behind the boiler house. Figure 5, appendix 1 shows the location of all former coal stockpiling areas.

In 1963 operation of the powerhouse and surrounding land was passed over to the Southern Electric Authority, and in 1967 from the Southern Electric Authority to the State Electricity Commission of Queensland (now SEQEB).

The powerhouse was decommissioned by SEQEB in 1968. Under the original terms of contract between SEQEB, the Southern Electric Authority and the Brisbane City Council, Clause 39 (5) provided for the repurchase of the powerhouse and associated buildings by the Brisbane City Council. Negotiations began in 1973 between SEQEB and the Brisbane City Council for the repurchase of the powerhouse and associated buildings only, by the council. The council approved the transaction and repurchased these buildings in 1973. The remainder of the site, e.g. the majority of the unimproved land, remained under SEQEB control. SEQEB maintained two substations and a works depot at the remainder of the site under their control.

Contracts for the removal of plant and ancillary structures from the powerhouse buildings were issued by the Brisbane City Council in 1976. Items to be removed included the Boilers, Turbo Alternators, Pumps, Coal Handling Facilities, Smoke Stacks and Reactors. Conditions of the contract encompassed the cleaning of the entire site by the contractors and removal of all waste and scrap to be disposed of in accordance with Brisbane City Council regulations.

A Sydney firm was granted the contract for the removal of plant machinery in July 1977. This contract included the removal of asbestos from the powerhouse buildings. Although government regulations regarding asbestos handling and

removal were not as stringent in the 1970's as in the 1990's, the SEQEB manager who was on site at this time, recalled that management and staff responsible for removing the asbestos material were aware of the dangers of the material and rigorous procedures were employed to remove all residues from the site. There appears to be no assessment documentation of the relative success or failure of this clean-up. The powerhouse buildings were then recommended for use as storage facilities by the council.

After decommissioning of the powerhouse, parts of the site continued as a works depot for SEQEB. Large amounts of material, consisting of concrete, soil, and general fill were imported to the open space of the site by SEQEB during the 1980's. The SEQEB manager of the site at this time, recalled that the material originated from SEQEB cable excavations from around the city. Imported materials were primarily soil and building rubble from excavation activities. There is no documentation about these earth moving activities. These activities resulted in an increase of the ground level, up to 4.5m above natural height, in some areas around the powerhouse.

In the early 1980's the old boilerhouse building was deemed to be unsafe by the Brisbane City Council, and tenders for its demolition were called. The contract was granted to Denviel Demolitions Pty. Ltd. in 1984. The contractors were required to undertake the demolition, in-fill construction, and cleaning of the boilerhouse building. All walls of the boilerhouse, excepting the common wall with the turbine bay, and the boilerhouse ground floor slab were demolished. Fill material was then placed in the basement section of the building. The contract specified that this material was to be clean broken masonry reduced to single brick size. Asbestos residues were not specifically mentioned in the contract. Council staff were then responsible for the top-soiling and turfing of this area. All demolished debris and materials, except for the demolished masonry used for filling, were removed from the site.

In 1989 land exchanges occurred between SEQEB and the Brisbane City Council. These land dealings between QEC, SEQEB and the Brisbane City Council were gazetted in January 1990, and the ownership of the majority of the site which had been under SEQEB management, was transferred to the Brisbane City Council.

The old store building is currently being used as council stores and offices, and parts of the powerhouse land are used for stockpiling compost and bark chips for New Farm park operations. The New Farm Powerhouse site is now targeted for restoration as part of the urban renewal program of the Brisbane City Council.

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5.0 INITIAL SITE INSPECTION REPORT

An initial site inspection was carried out by officers of Scientific Services Branch, Brisbane City Council. This inspection was carried out by Felicity Boevink, Ken Giess, and Allan Kleinschmidt of the Scientific Services Branch of the Brisbane City Council in April 1993.

Observations made during this inspection are included in section 3.0 Site Location and Description.

Points of interest noted during this inspection were that:

- . The area around the buildings was sealed by concreting.
- . All buildings except for the powerhouse itself were renovated and contained modern office and store facilities.
- . There appeared to be no evidence of vegetation affected by underlying contamination in the open space.
- . The transformers have been removed. A concrete base covered by gravel remains.
- . The basement of the boilerhouse was open to the environment through breaches in the original entrance ways.
- . There was a small area of exposed coal fines along the embankment which runs next to the south-west wall of the powerhouse facing New Farm Park.
- . Large mounds of compost and bark chips are stored for New Farm park activities on the levelled basement area of the boilerhouse and in the north-west corner of the open space.
- . There are no visible areas of coal where it was formerly stockpiled for powerhouse operation.

6.0 SAMPLING PLAN

The sampling plan developed for the New Farm powerhouse site had two distinct functional components. A triangular grid pattern of boreholes over the open space area, and judgemental sampling based on site history of areas around the existing buildings on site.

6.1 Sample Locations

Historical records indicated that the area of open space contained large amounts of imported fill. Boreholes in a triangular grid pattern, with 50 m spacing between each bore, was judged to be the most effective method for developing a profile for this area. Bores were drilled to the natural ground level in all cases. Samples were collected from each discrete layer, in each bore, by auguring. The borelogs provide a detailed description of the layers of fill over the open space area. Appendix 4 contains details of the sample locations, sample depths and bore logs.

Two bores based on estimates made from consulting historical records were drilled in an attempt to find any discharge of water through the site to the Brisbane River from "Small Creek". Appendix 4 contains the details of these bores.

Judgemental sampling targeted the boilerhouse rubble, drains, transformers, and areas of exposed ash adjacent to the powerhouse building. Bores were drilled to the concrete basement of the boilerhouse and composite samples taken by auger of the rubble. Drain sediments were sampled by lowering a sample container to grab samples from the deep drains, and surface drain samples were collected with a sampling trowel. Some gravel was collected from the sites of the transformers. Samples of the exposed ash were collected by surface

sampling with a sampling trowel to a depth of 150mm. Appendix 4 contains the detailed locations of these sampling points.

6.2 Analysis parameters

The New Farm Powerhouse site had the potential to be contaminated from a wide range of substances originating from construction, operation and maintenance activities.

Likely contaminants are :

. **Asbestos** - Used in lagging and coating activities through out the powerhouse. Land and structures surrounding areas where asbestos coatings have been used may be contaminated by overspray. The removal of plant and ancillary structures in the 1970's was likely to have removed the bulk of the asbestos material, however the potential for contamination of buildings, surrounding soils and drains by dusts remained possible. The demolition materials in the basement of the boiler house was expected to contain high quantities of asbestos fibres.

. **Coal and Coal Fines** - The structures, and land adjacent to, coal handling or storage facilities are most likely to be contaminated by coal and coal leachates. Under normal rainfall conditions coal produces a highly acidic, metal-rich leachate. Sulphur complexes and heavy metal precipitates often result after contact with the more alkaline surface soils and waters. The complex organic structure of coals leaches a complex mixture of aliphatic and aromatic hydrocarbons, including a wide variety of polynuclear aromatic hydrocarbons. Phenolic and other oxygen-containing organic compounds also leach from coal piles. Leachates generally have high conductivities and concentrations of suspended materials.

. **Petroleum Hydrocarbons** - Resulting from general operation and maintenance practices, spillages of lubricating oils and greases as well as a variety of other

petroleum products are likely to have occurred. Centralised around plant and other mechanical equipment, and possibly storehouses, these contaminants, though biodegradable may still be present.

. **Polychlorinated Biphenyls** - Used for cooling oils in transformers these compounds are highly persistent and toxic contaminants. PCB's may be present near former transformer and storage sites.

. **Ash** - Partially combusted materials and ash from coal firing, boiler ash and flue dust fallout may be distributed across the entire site as well as concentrated in the regions built-up with imported fill. Ash typically contains high concentrations of polycyclic aromatic hydrocarbons, phenols, halogenated hydrocarbons, and other aliphatic and aromatic compounds as well as dioxins, furans, cyanide, metal and sulfur compounds.

6.3 Sample collection protocol

Samples for analysis were collected in the appropriately solvent or acid washed container in all cases.

Samples for metals analysis were collected in acid washed, glass bottles or plastic bags manufactured for soil sampling.

Samples for organics analysis were collected in solvent washed glass bottles with solvent washed teflon cap-liners.

Samples for asbestos analysis were collected in plastic bags manufactured for soil sampling.

Samples for dioxin analysis were collected in glass bottles with teflon cap liners. The bottles were washed with phosphate free detergent, rinsed with water, methanol, acetone, hexane, and methylene chloride.

The sampling auger and drill bits were steamed cleaned before drilling each bore. The sampling trowel was cleaned by rinsing with distilled water and acetone before the collection of each new sample.

6.4 Bore Logs

Bore logs were kept for all bores drilled on the site, by David Stewart of the Geotechnical section of the Brisbane City Council. These revealed the stratification of fill that had been placed over the open space and the nature of the rubble in the boilerhouse basement.

6.4.1 Bores in the open space

The natural ground level of the open space sloped gradually downwards from its north western boundary (Alluvial soils approximately 0.6 m under the existing surface) to the southern corner (Alluvial soils approximately 5.8 m under the existing surface), at the edge of the Brisbane River. The depth and variety of fill changed with the alluvial depth of the open space land. More fill had been placed in a variety of layers over the southern and south-eastern corners of the open space than in the northern and western corners of the open space. The fill which was characterised at the site was mainly sand, gravel and clay mixes that had been placed over the natural topsoil. There were also layers of coal dust and ash over this area. The complete borelogs are contained in appendix 4.

Bores 6,7,8,9,10 and Creek1 had the greatest depth to alluvial soils (3.2 to 5.8 m). They were exclusively located in the southern half of the open space area. The majority of fill was placed over this portion of the open space area. There were a variety of layers of sandy, gravelly, clayey mixes with some building rubble detected in the bores. Ash and coal dust layers in these bores were located at depths of 2.9 to 5.1 m. The bore profiles for this area correspond with recollections of the SEQEB manager of the site at the time, that the

majority of fill imported to the site was soil and building materials from SEQEB cable excavations from around Brisbane.

Bores 4 and 5 were located on the edge of the drop in the alluvial soil level. Alluvial soils were located 2.2 and 2.1 m under the imported fill. The profiles of these two bores were very similar. An ash layer was detected just below the surface at a depth of 0.2 to 0.9 m, and a second layer of ash, coal, and coal dust was found at a depth of 1.3 to 2.2 m. Layers of sandy clay and sandy gravel fill were also found in these bores. No building rubble was detected in these bores.

Bores 1A, 1B, 2 and 3 were drilled in the northern section of the open space area. Alluvial soils were found 1 m below the surface. Little fill was imported to this area. A layer of ash was detected immediately below the surface in bores 1A, 2 and 3. This layer appeared to be the only imported material over the northern portion of the open space area.

6.5 The Boilerhouse

Two bores were drilled through the rubble in the boilerhouse basement. These bores contained building rubble, cobbles and timber over a concrete floor 3.95 m under the surface. A sandy gravel surface had been compacted over this building rubble.

7.0 CHEMICAL ANALYSES

Samples were submitted to Australian Laboratory Services Limited (ALS, Brisbane), Safety in Mines Testing and Research Station (Simtars, Brisbane) and the Institute of Environmental Health and Forensic Services (New Zealand).

Australian Laboratory Services Limited performed analyses for polynuclear aromatic hydrocarbons, phenols, total petroleum hydrocarbon, sulfur, cyanide and selected metals. ALS is a NATA registered laboratory. Quality control spikes and replicate samples were analysed by ALS.

All samples for metals analysis were prepared in accordance with USEPA Method 3051 (microwave digestion for metals). Analysis was carried out by inductively coupled plasma atomic emission spectroscopy (ICPAES) or cold vapour atomic absorption spectroscopy (CVAAS) as appropriate.

Samples for polynuclear aromatic hydrocarbons and phenols were extracted by ultrasonication, and analysed by gas chromatography - mass spectrometry. Samples for total petroleum hydrocarbons were extracted by ultrasonication, and analysed by gas chromatography - mass spectrometry (GCMS) and gas chromatography - Flame Ionisation Detector (GCFID).

SIMTARS carried out asbestos testing. Tests were carried out using polarising light microscopy techniques. Samples were sent to the Electron Microscope Centre at the Queensland University of Technology for confirmation of results.

The Institute of Environmental Health and Forensic Services, New Zealand, conducted testing for dioxins in the submitted samples. A travel blank, the samples and quality control samples were all processed by the Institute of

Environmental Health and Forensic Services. The Institute is registered by the Testing Laboratory Registration Council of New Zealand (NATA equivalent).

7.1 Heavy Metal Contamination

Samples from the boilerhouse fill, and bores 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 were analysed for levels of heavy metal concentration. The analytes selected were arsenic, cadmium, cobalt, chromium, copper, manganese, nickel, lead, zinc, and mercury. Samples were selected from all levels of fill in the bores, including the surface soils, ash layers, imported soils and building materials.

All levels of analytes in these samples were below the thresholds for environmental investigation as specified by A Guide to the Contaminated Land Act 1991 (Chemical Hazards and Emergency Unit (Chem. Unit), 1992) except for those samples listed in Table I. The original analytical reports are contained in Appendix 5.

Samples with heavy metal concentration above threshold levels for environmental investigation were in layers of subsurface, imported fill in all cases. The soil/building rubble matrix 2.0 m below the surface in borehole 10, and 2.5-3.0m below the surface in borehole 6 contained levels of copper above the threshold environmental investigation level. The ash layer 1.0 m below the surface in bore 3 contained levels of manganese above the threshold environmental investigation level. The surface material across the site did not appear to be contaminated with heavy metals.

The results of the preliminary site investigation indicated that there is no evidence of any significant metal contamination across the site. As the site was filled with large amounts of imported material from construction activities, isolated pockets of contamination could exist.

Table I
Metal Concentration At The Powerhouse Site

Sample	Analyte	Concentration mg/kg	Environmental Threshold mg/kg (Chem. Unit, 1992)
Borehole #3 1.0 - 1.5m Ash layer	Manganese	854	500
Borehole #10 2.0 -2.5m Gravelly sand and building rubble	Copper	98	60
Borehole #6 2.5 -3.0m Sandy gravelly clay	Copper	68	60

7.2 Organic Contamination

Samples from boreholes 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 were analysed for levels of concentration of possible organic contaminants. The analytes selected were polynuclear aromatic hydrocarbons, phenols and petroleum hydrocarbons. Samples were selected from all levels of fill in the bores, including the surface soils, ash layers, imported soils and building materials.

All levels of analytes in these samples were below the thresholds for environmental investigation as specified by A Guide to the Contaminated Land Act 1991 (Chem. Unit, 1992) except for those samples listed in Table II. The original analytical reports are contained in Appendix 5.

Petroleum hydrocarbons were detected in the surface soil of borehole 1B. The bore was adjacent to the old coal-handling wharf now used by a commercial barge operator. This contamination was likely to have been caused by fuelling operations or spillages associated with wharf activities.

Table II
Organic contaminants at the site

Sample	Analyte	Concentration mg/kg	Threshold level for health based investigation mg/kg (Chem. Unit, 1992)
Bore #1 0 - 0.25m Surface soil	Total petroleum hydrocarbon	1540	_____
Bore #3 0 - 0.25m Surface soil	PAH	23.6	20
Bore #5 2.0 - 2.5 m Alluvial soils	PAH	20.0	20

Polynuclear aromatic hydrocarbons are generated by the combustion of fossil fuels. High levels of these contaminants were expected at the powerhouse site. PAH's were detected in the surface soils of bores 3,4 and 9, the alluvial soil of borehole 5 and in the ash layers of bores 6 and 8. Levels of PAH's at borehole 3 exceed threshold limits for a health based investigation. Despite the levels detected at borehole 3, PAH levels did not appear to be excessive in the surface soils across the site. Sub-surface levels of PAH's did not appear to pose a health or environmental risk in relation to future use of the site.

There does not appear to be any significant contamination by phenols or petroleum hydrocarbons at the New Farm powerhouse site.

7.3 Asbestos Contamination

Samples from the Boilerhouse rubble and the northern and southern sections of the open space, and drain sediments were tested for asbestos contamination by polarising light microscopy and scanning electron microscopy. The original analytical reports are contained in Appendix 5.

The results for the asbestos testing for these samples are shown in Table III. Results for the drain sediment sample were still outstanding at the time that this report was completed.

Table III
Asbestos Concentrations At The New Farm Powerhouse

Sample	Results by Polarising Light Microscopy	Results by Scanning Electron Microscopy
Boilerhouse #1	Organic Fibre < 1% Particulate Matter > 99% No asbestos detected	No asbestos detected
Boilerhouse #2	Organic Fibre < 1% Particulate Matter > 99% No asbestos detected	No asbestos detected
Bore #3	Particulate matter 100 % No asbestos detected	Some crocidolite fibre in a subsample, no asbestos in the remainder of the sample

Sample	Results by Polarising Light Microscopy	Results by Scanning Electron Microscopy
Bore #7	Particulate matter 100 % No asbestos detected	No asbestos detected

The scanning electron microscopy report for borehole 3 detected some crocidolite fibres in the sample. These results when compared with results by polarising light microscopy indicated that the bulk of the sample did not contain asbestos.

There does not appear to be wide spread asbestos contamination at the New Farm Powerhouse site.

7.4 Dioxin Contamination

A composite sample from the open space area, a sample of the exposed ash along the embankment which runs next to the south-west wall of the powerhouse facing New Farm Park, and a travel blank were sent to the Institute of Environmental Health and Forensic Services, New Zealand.

Results for these samples are presented in Table IV. The original sample reports are contained in appendix 5.

Table IV
Dioxin contamination at the site

Sample	Dioxin Concentration pg g^{-1} Total toxic equivalents
Blank	0.21
Exposed ash	33.4
Composite cleared area	260

The principle environmental sources of dioxins are suspected to be of industrial origin. Sources of dioxins include incineration processes, motor vehicles, residential burning, and forest fires. Dioxin contamination at the site may have been generated by the coal firing processes used for power generation. Travis *et.al.* (1989) reported average dioxin concentrations of 1405 pg g^{-1} for urban sites in the United States of America with a previously known source of contamination, and 1819 pg g^{-1} for Canadian urban soils. Berry *et.al.* (1993) concluded that dioxins are common by-products of human society and are widely dispersed in the ambient environment.

The concentration of dioxin over the open space area was greater than that found in the exposed ash along the embankment which runs next to the south-west wall of the powerhouse facing New Farm Park.

7.5 Sulphur And Cyanide Contamination

Samples from bores 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 were analysed for levels of sulphate and cyanide concentration. Samples were selected from all levels of fill in the bores, including the surface soils, ash layers, imported soils and building materials.

All levels of analytes in these samples were below the thresholds for environmental investigation as specified by A Guide to the Contaminated Land Act 1991 (Chem. Unit, 1992) except for those sample 1B. The original analytical reports are contained in Appendix 5.

Sulphur levels of 8700 mg/kg as sulphate, were measured in the sample of borehole 1B. This exceeds the threshold environmental investigation level of 2000 mg/kg for sulphates.

There appeared to be no extensive sulphate or cyanide contamination across the site.

7.6 PCB Contamination

Samples collected from the former transformer sites were found to be unsuitable for analysis. As this area was fully concreted, it was concluded that any possible PCB contamination would be localised. If redevelopment plans include the disturbance or use of this area of the site, further investigation of possible PCB contamination may be necessary.

8.0 SUMMARY OF RESULTS

The results for each borehole are summarised in the following tables. All results are in mg/kg unless otherwise indicated.

Table V
Boreholes 1 - 4

Analyte	Borehole 1B 0.0 - 0.25 m	Borehole 2 1.5 - 2.0 m	Borehole 3 0.0 - 0.25 m	Borehole 3 1.0 - 1.5 m
% Moisture	11.1	15.1	8.5	13.2
% Sulphur	0.29	0.01	0.05	0.05
Arsenic	4	5	10	3
Cadmium	<1	<1	<1	<1
Cobalt	6	11	4	13
Chromium	6	24	13	22
Copper	21	15	13	13
Manganese	124	391	172	854
Nickel	6	15	8	16
Lead	19	25	25	12
Zinc	43	52	48	42
Mercury	<0.1	0.1	<0.1	0.1
Cyanide	0.2	0.1	0.1	<0.1
Phenol	<0.67	<0.67	<0.67	<0.67

Analyte	Borehole 1B 0.0 - 0.25 m	Borehole 2 1.5 - 2.0 m	Borehole 3 0.0 - 0.25 m	Borehole 3 1.0 - 1.5 m
PAH	<0.67	<0.67	NA	23.63
Petroleum Hydrocarbon	1540	<100	NA	<100

Table VI
Boreholes 4 - 7

Analyte	Borehole 4 0.5 - 1.5 m	Borehole 5 2.0 - 2.5 m	Borehole 6 2.5 - 3.0 m	Borehole 7 0.0 - 0.25m
% Moisture	14.9	16.9	17.6	10.8
% Sulphur	0.11	0.01	0.04	0.01
Arsenic	4	3	5	8
Cadmium	<1	<1	<1	<1
Cobalt	8	8	5	8
Chromium	15	22	20	7
Copper	21	11	68	22
Manganese	189	242	206	424
Nickel	9	14	11	13
Lead	31	7	109	50
Zinc	56	33	170	88
Mercury	0.1	0.1	0.4	0.4
Cyanide	0.1	<0.1	0.1	<0.1

Analyte	Borehole 4 0.5 - 1.5 m	Borehole 5 2.0 - 2.5 m	Borehole 6 2.5 - 3.0 m	Borehole 7 0.0 - 0.25m
Phenol	<0.67	<0.67	<0.67	<0.67
PAH	10.88	20.04	1.45	<0.67
Petroleum Hydrocarbon	<100	<100	<100	<100

Table VII
Boreholes 8 - 10

Analyte	Borehole 8 3.0 - 3.5 m	Borehole 9 0.0 - 0.25m	Borehole 10 2.0 - 2.5m
% Moisture	12.7	12.3	7.2
% Sulphur	0.05	0.03	0.07
Arsenic	6	2	10
Cadmium	<1	<1	<1
Cobalt	5	1	6
Chromium	31	11	20
Copper	54	11	98
Manganese	97	53	189
Nickel	11	3	9
Lead	71	84	139
Zinc	75	111	119
Mercury	0.2	<0.1	0.3

Analyte	Borehole 8 3.0 - 3.5 m	Borehole 9 0.0 - 0.25m	Borehole 10 2.0 - 2.5m
Cyanide	0.2	0.1	<0.1
Phenol	<0.67	<0.67	<0.67
PAH	12.28	<0.67	<0.67
Petroleum Hydrocarbon	<100	<100	<100

Table VIII
Boreholes on boilerhouse

Analyte	Borehole Boilerhouse #1	Borehole Boilerhouse #2
% Moisture	9.8	12.9
% Sulphur	0.05	0.08
Arsenic	10	5
Cadmium	<1	<1
Cobalt	4	2
Chromium	14	5
Copper	27	13
Manganese	183	90
Nickel	9	7
Lead	119	61
Zinc	109	51

Analyte	Borehole Boilerhouse #1	Borehole Boilerhouse #2
Mercury	0.1	0.2
Cyanide	0.4	0.1
Asbestos	None detected	None detected

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9.0 CONCLUSION

Based on the findings of the preliminary site investigation, there is no evidence of any significant level of contaminants which would restrict a proposed end-use of the site for the following purposes :

- 1) Adaptation for arts/cultural use
- 2) Adaptation for sports/recreation use
- 3) Adaptation for housing
- 4) Open space adaptation

If the proposed end-use of the New Farm Powerhouse site is for residential housing, or if significant excavation operations are proposed, it would be necessary to conduct a more detailed investigation targeting those areas which exceed threshold levels of contamination for environmental investigation as determined by Chem. Unit (1992).

It will be necessary to instigate discussions with the Department of Environment and Heritage (Qld.), Contaminated Land Unit in regard to the following:

- . The proposed development of the site
- . Results of the preliminary site investigation
- . The need for further site assessment

10.0 References

Allom Lovell Marquis-Kyle (1992) *New Farm Powerhouse Assessment : A Study for the Urban Renewal Task Force Brisbane City Council* (unpublished)

Anderson M., Bertsch P., et.al., (1991) *Interactions of Acidic Metal-Rich Coal Pile Runoff with a Subsoil*, *Enviro.Sci.Technol.*, Vol.25, No.12.

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Berry R., Luthe C., Voss R., (1993) *Ubiquitous Nature of Dioxins*, *Enviro.Sci.Technol.*, Vol.27, No.6.

Buser H. (1991) *Polychlorodibenzothiophenes, the Sulfur Analogues of the Polychlorodibenzofurans Identified in Incineration Samples*, *Enviro.Sci.Technol.*, Vol.25, No.9.

Chemical Hazards and Emergency Unit (1992) *A Guide to the Contaminated Land Act 1991*, Queensland Government Printers, Brisbane.

Fendinger N., Radway J., et.al., (1989) *Characterisation of Organic Matter Leached from Coal by Simulated Rainfall*, *Enviro.Sci.Technol.*, Vol.23, No.2.

Travis C., Hattermer-Frey H., Sildergeld E., (1989) *Dioxin, Dioxin Everywhere*, *Enviro.Sci.Technol.*, Vol.23, No.9.

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APPENDIX 1
Site Details

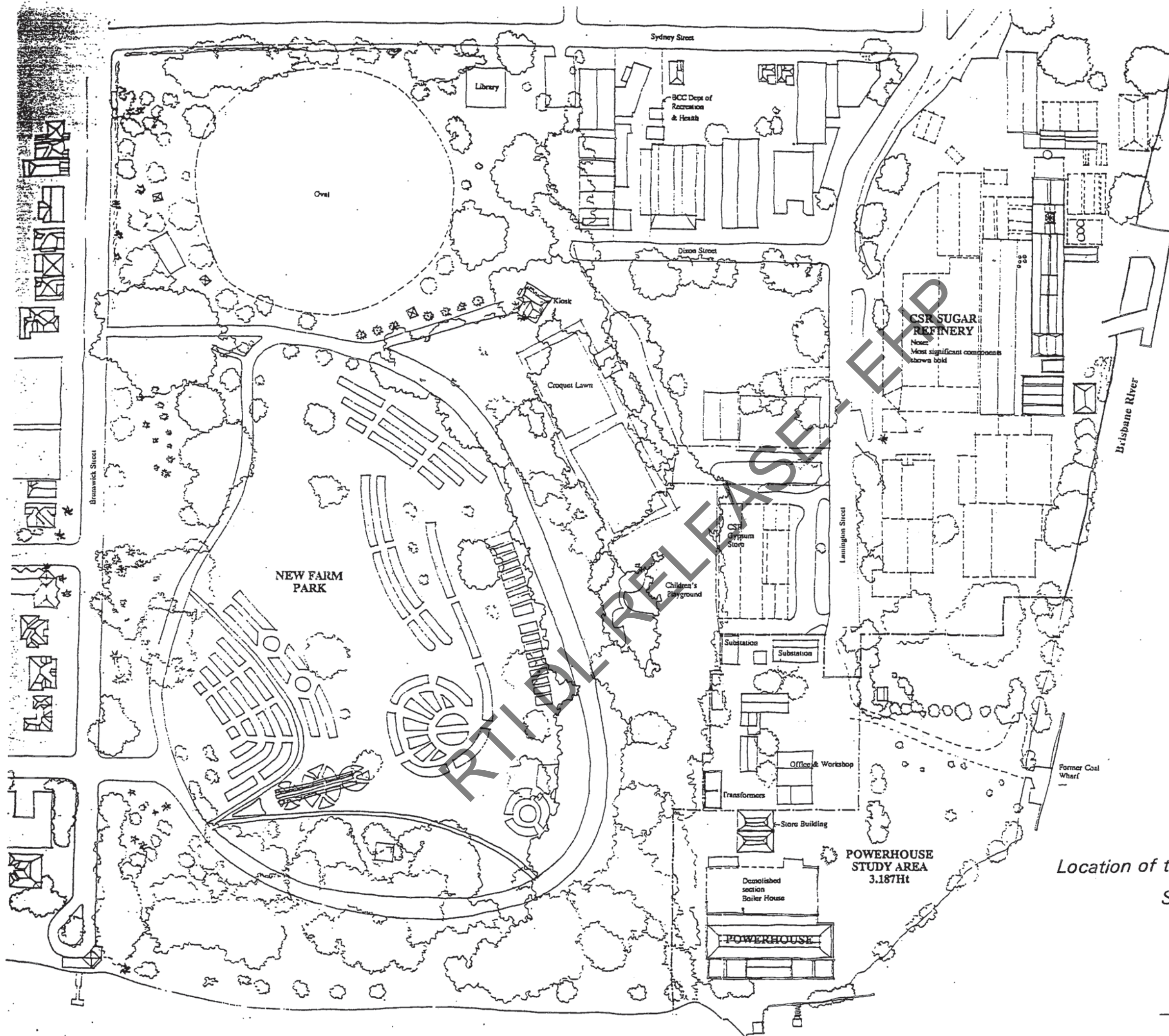
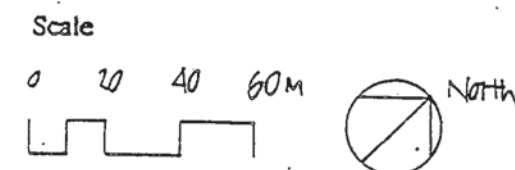
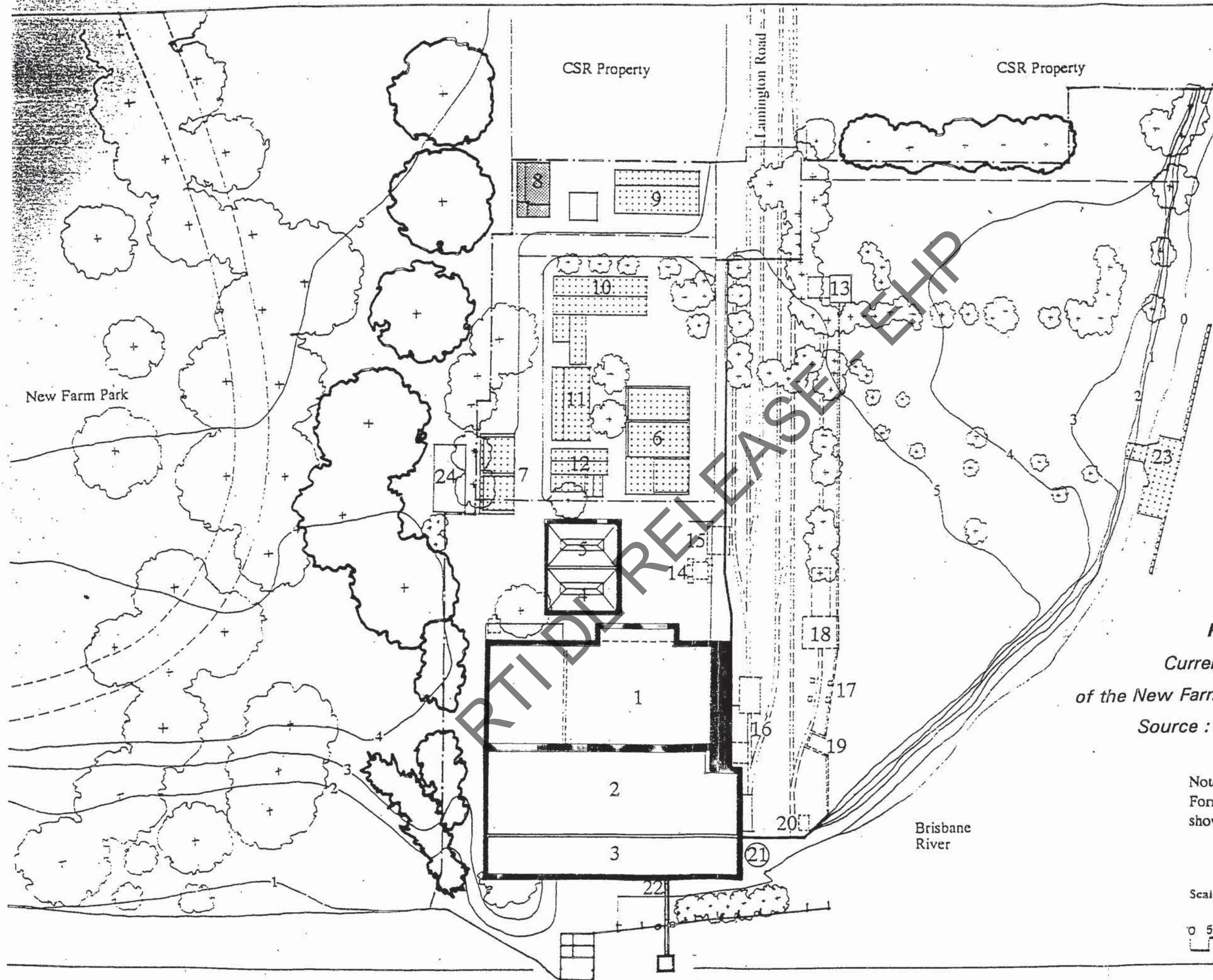


FIGURE 1

Location of the New Farm Powerhouse study area

Source : Allom et.al., 1992

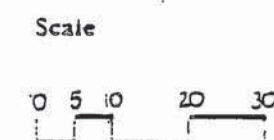
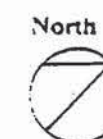


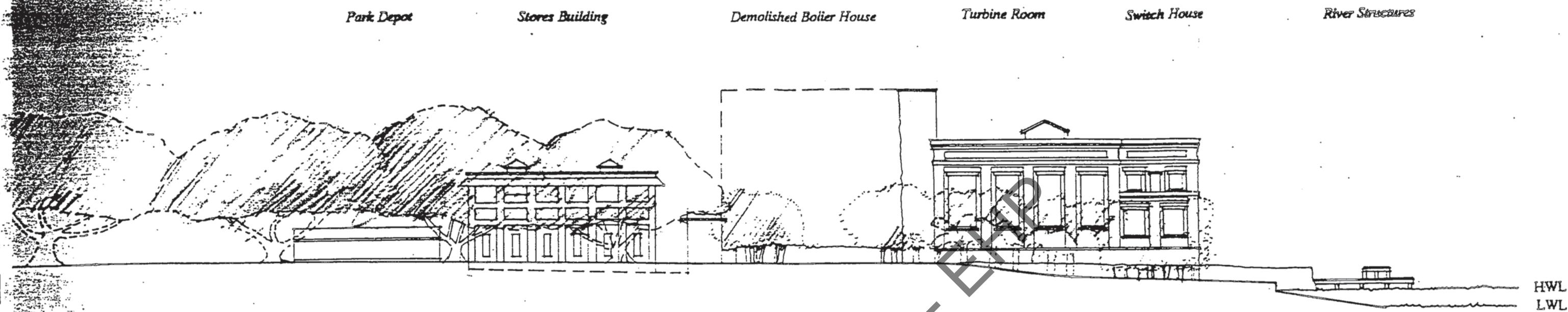


- Legend**
- 1 Boiler House
 - 2 Turbine Room
 - 3 Switch House
 - 4 Store & Office
 - 5 Store
 - 6 Office and Workshop
 - 7 Transformers
 - 8 Substation
 - 9 Substation
 - 10 QEC Archive
 - 11 Joinery Shop
 - 12 Carpenter's Shop
 - 13 Recreation Shed
 - 14 Crane
 - 15 Ash Bunker
 - 16 Coal Receiving and Conveying sheds
 - 17 Coal Grab Crane
 - 18 Coal Receiving Shed
 - 19 Coal Unloading Pit
 - 20 Winch
 - 21 Filter
 - 22 Pump
 - 23 Coal Wharf
 - 24 Park Depot

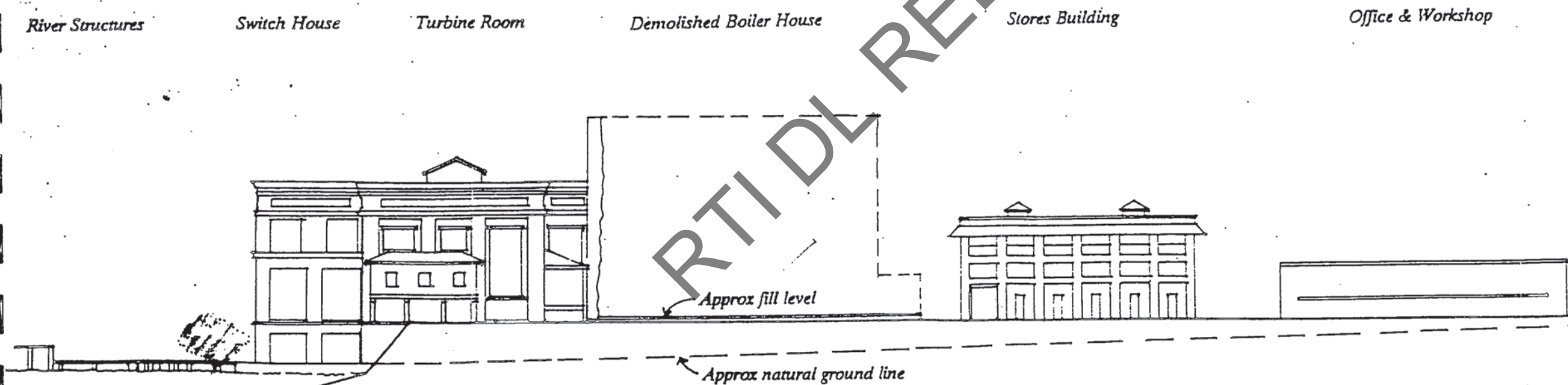
FIGURE 2
 Current site features
 of the New Farm Powerhouse study area
 Source : Allom et.al., 1992

Note:
 Former components
 shown dashed





Section from New Farm Park



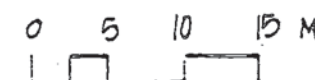
Section towards New Farm Park

FIGURE 3

Building details at the
New Farm Powerhouse study area

Source : Allom et.al., 1992

Scale



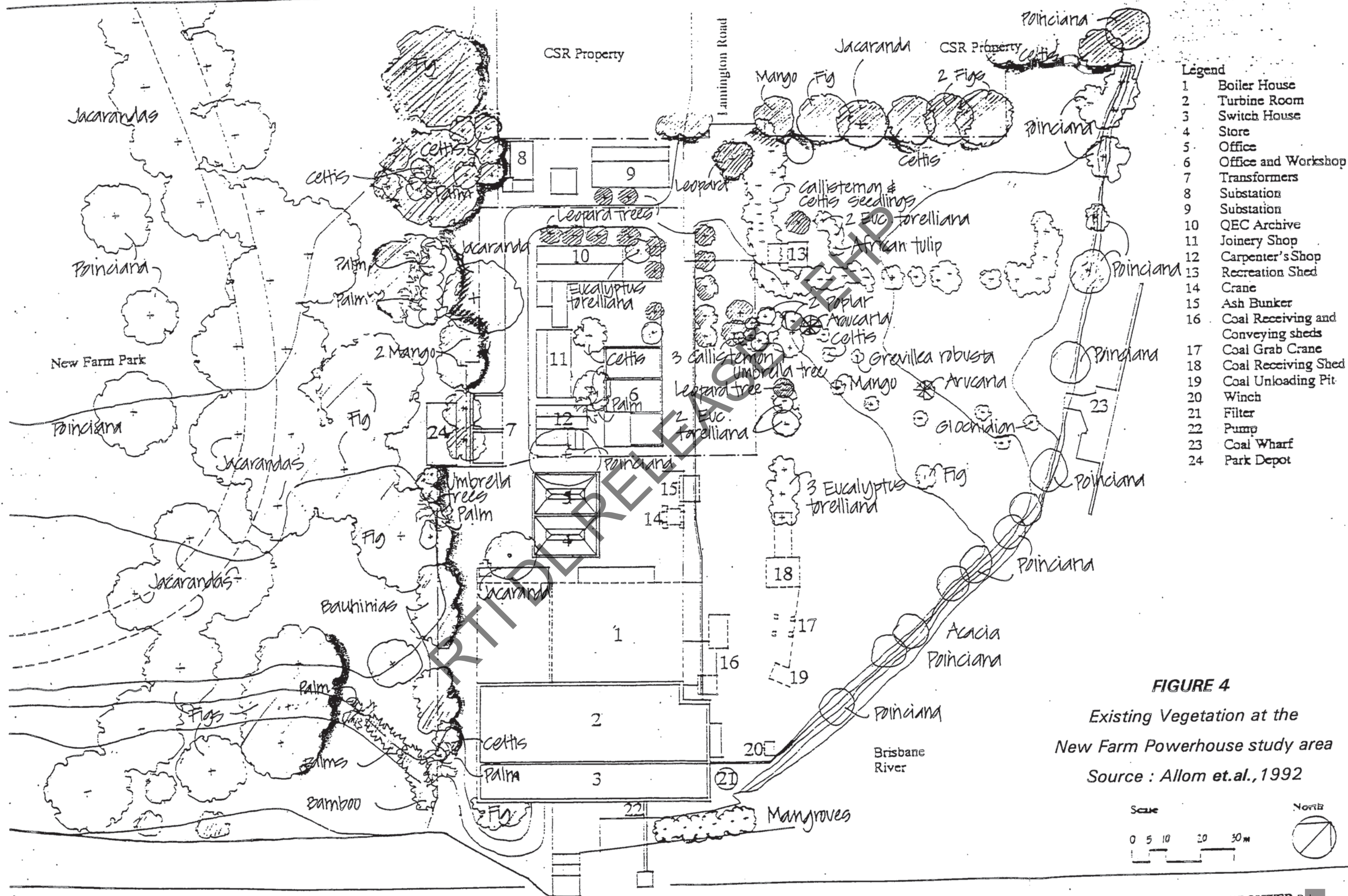


FIGURE 4
Existing Vegetation at the
New Farm Powerhouse study area
Source : Allom et.al., 1992

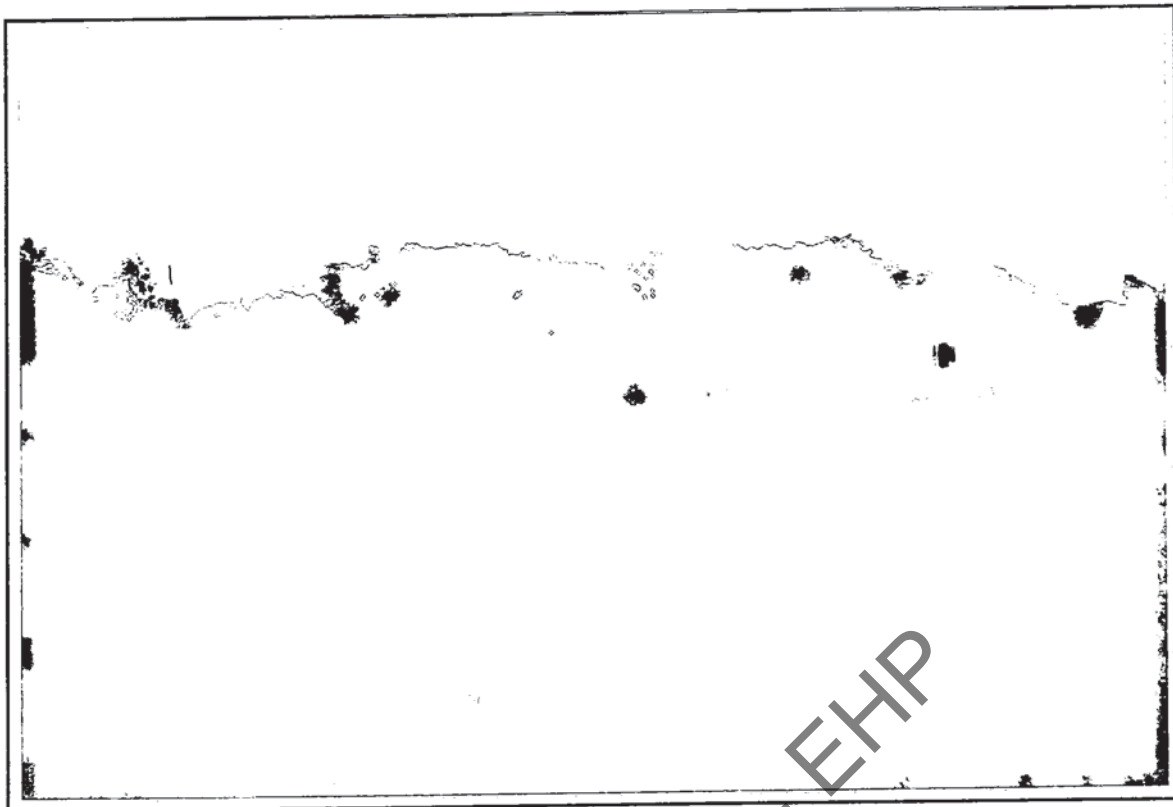


FIGURE 7 Open space facing north-west boundary

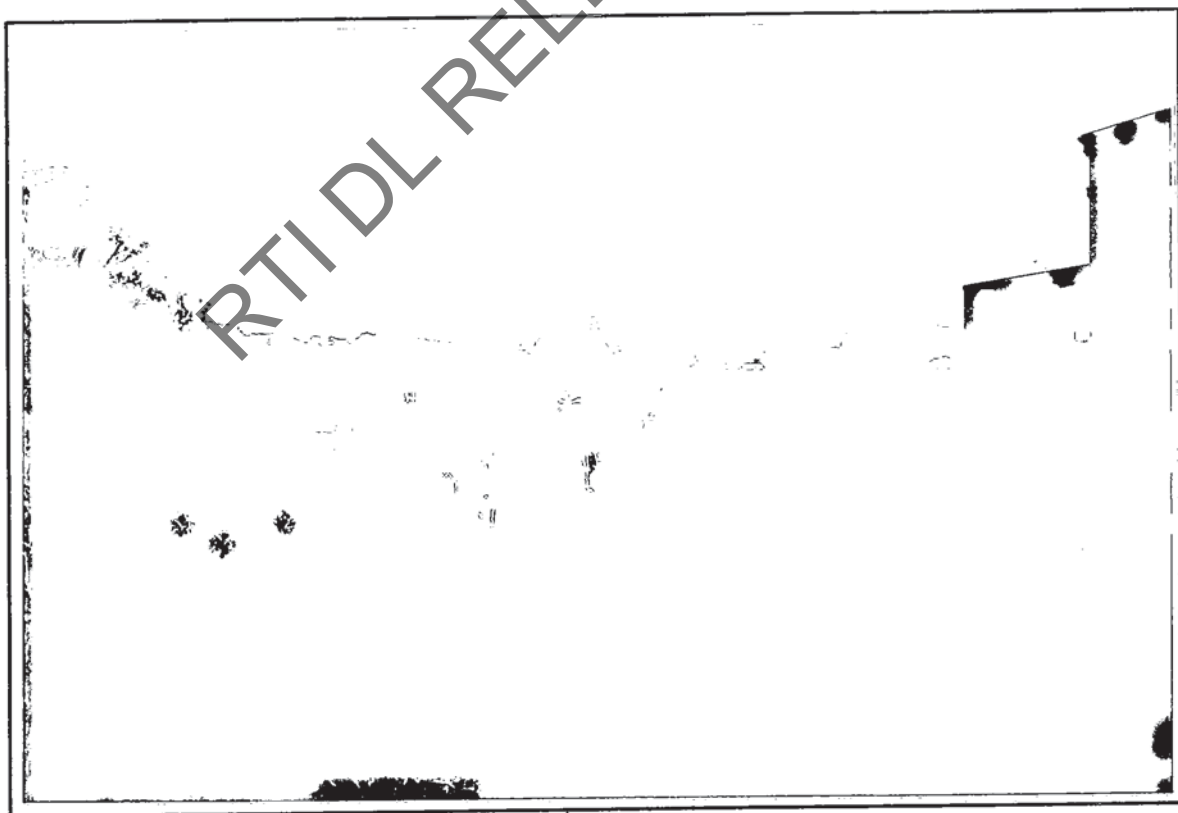


FIGURE 8 Open space facing south-east boundary

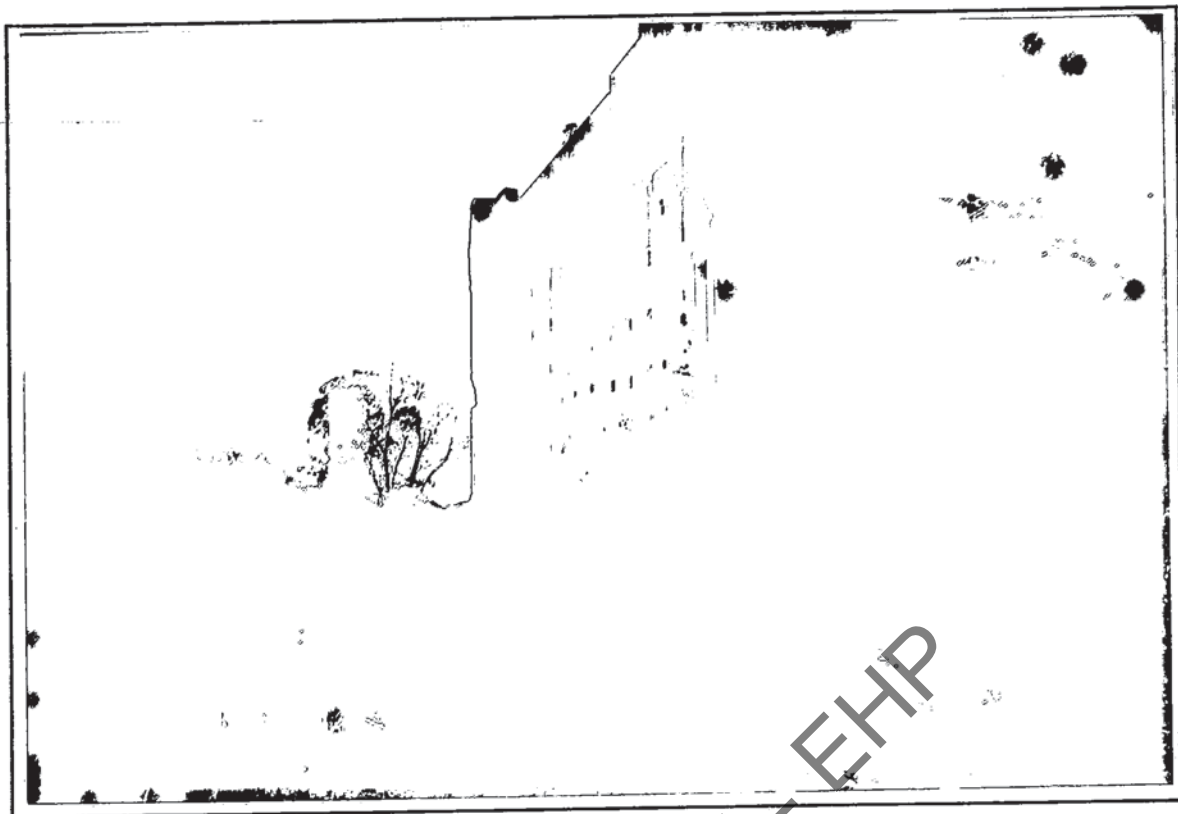


FIGURE 9 Surface of the demolished boilerhouse

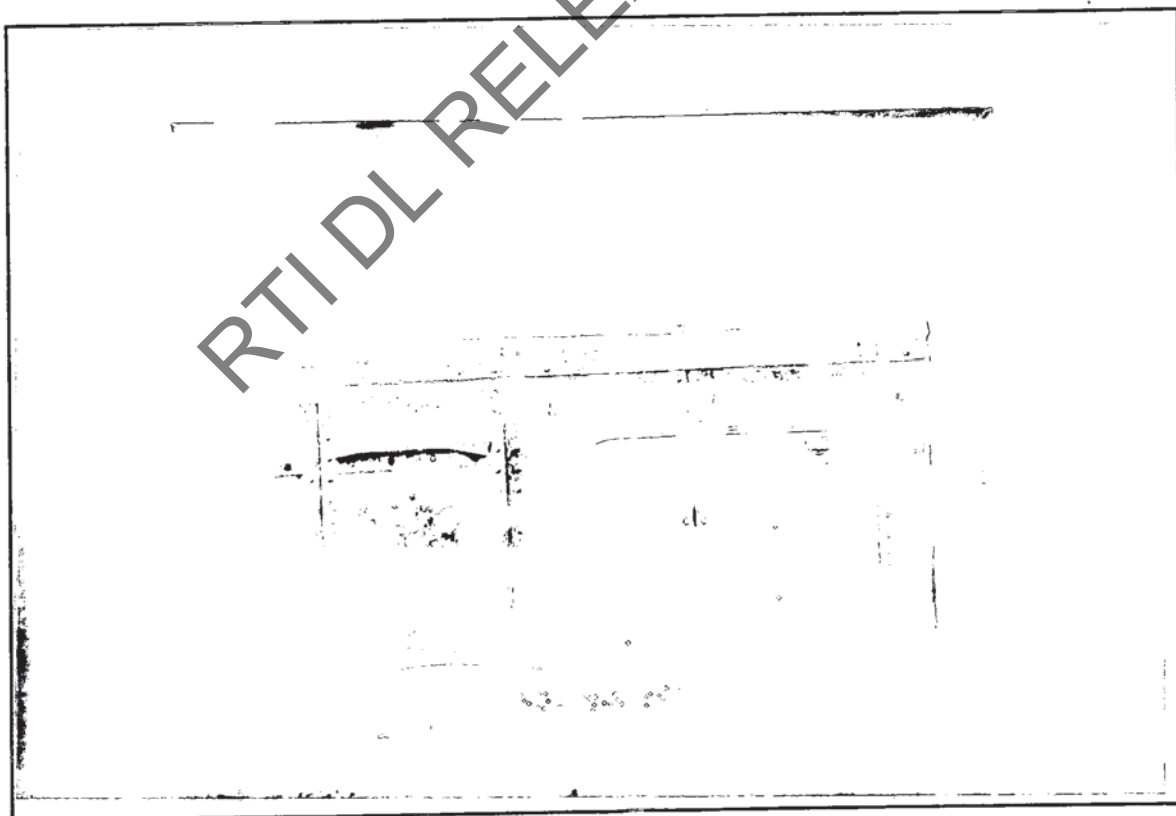


FIGURE 10 Open doorway to boilerhouse basement

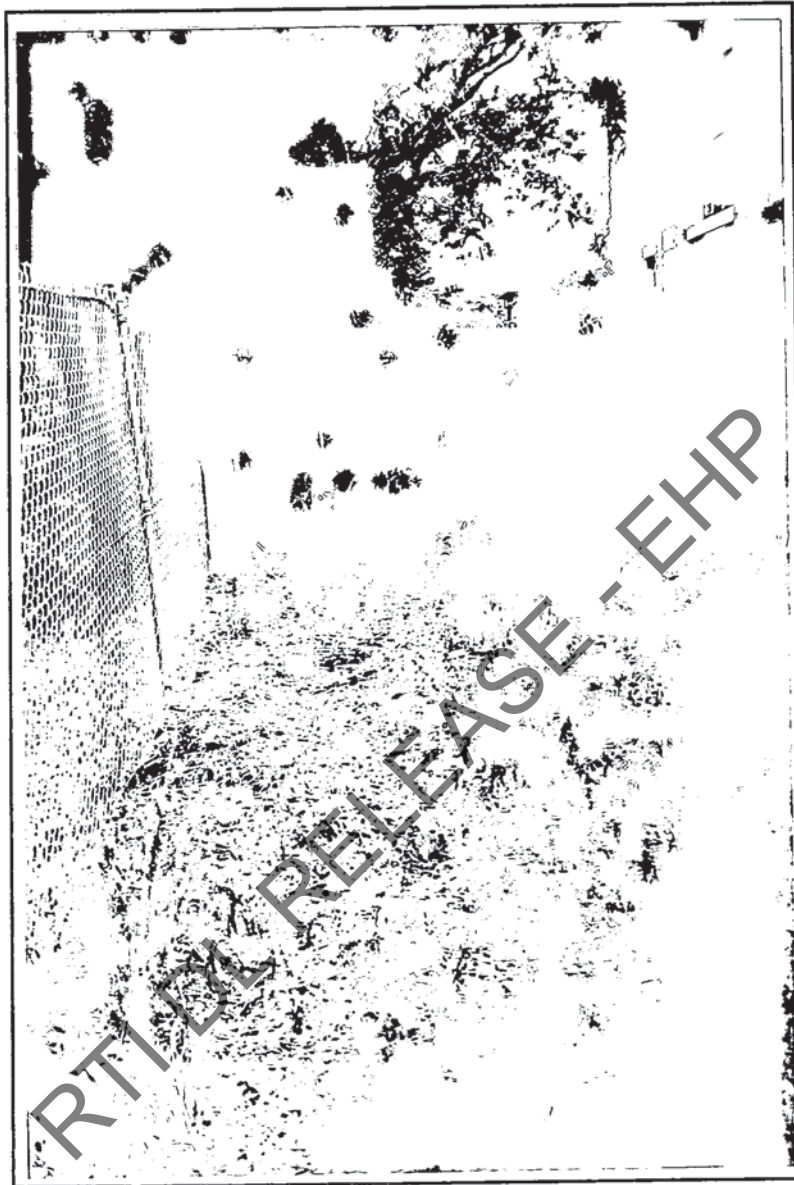


FIGURE 11 Embankment from the powerhouse to New Farm Park

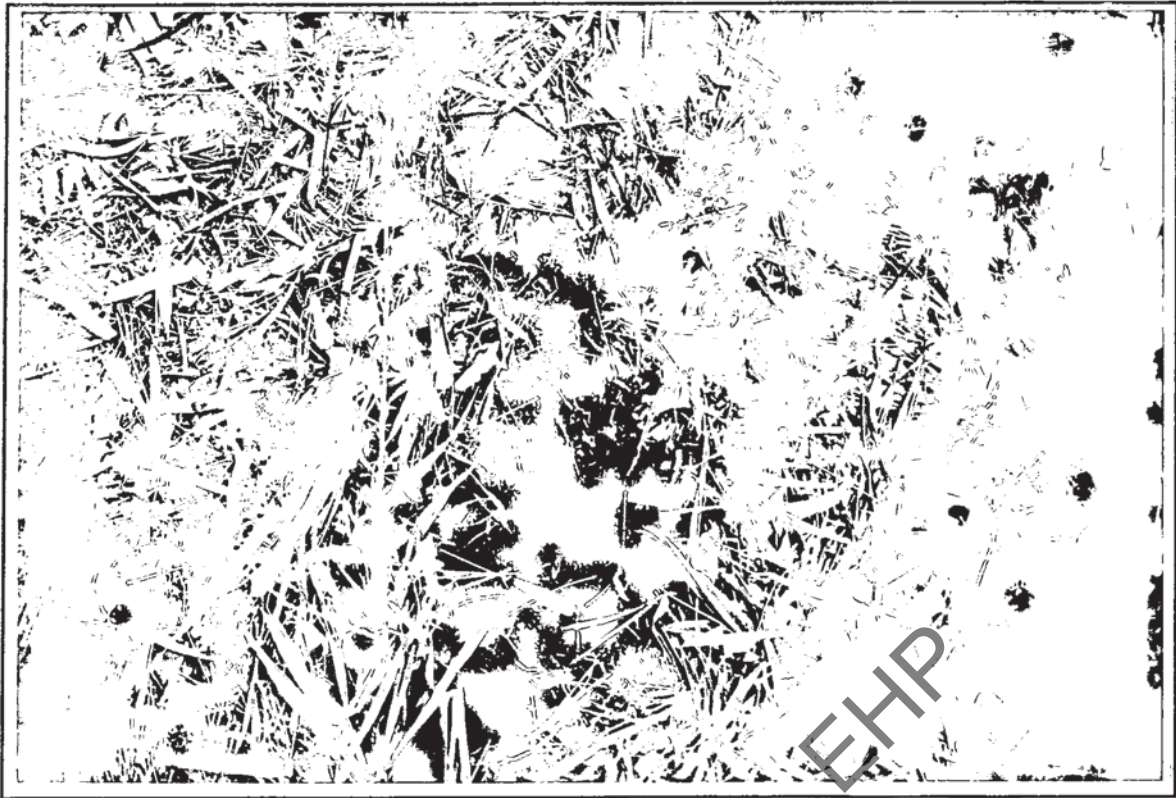


FIGURE 12 *Ash on the surface of the embankment*

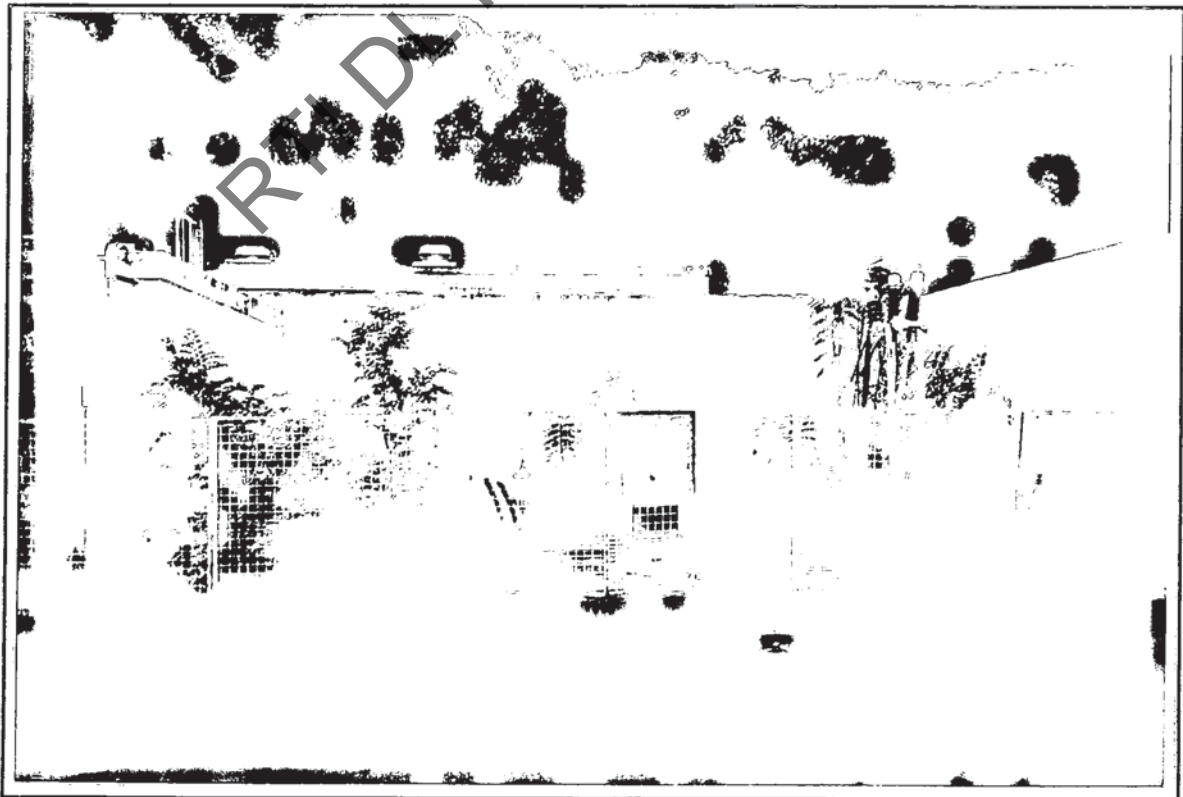


FIGURE 13 *Former transformer housing*

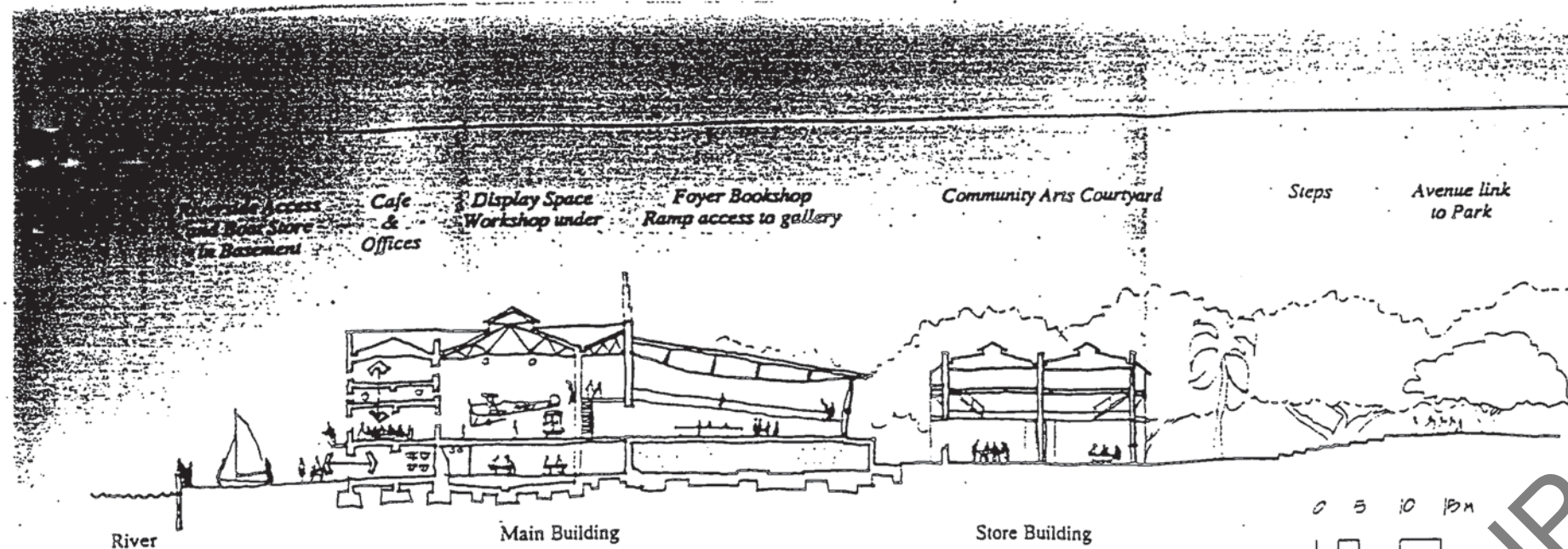
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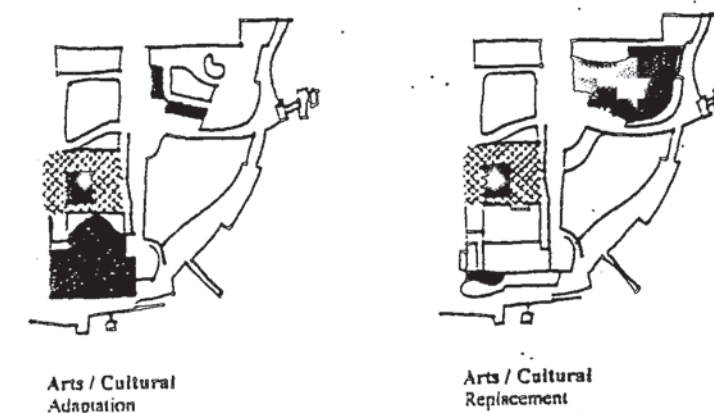
RTI DL RELEASE - EHP

RTI DL RELEASE - EHP

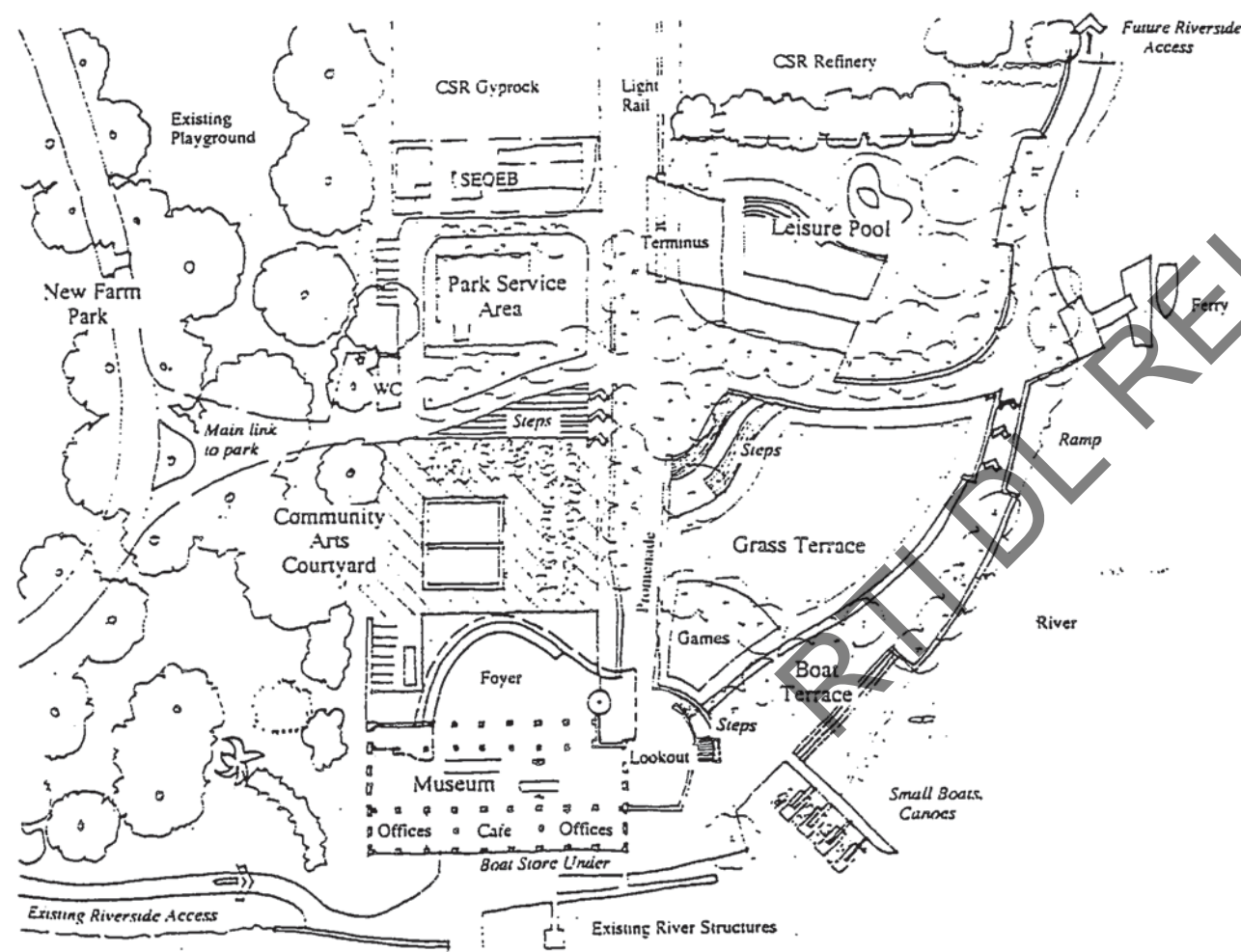
APPENDIX 3
Proposed Redevelopment Schemes



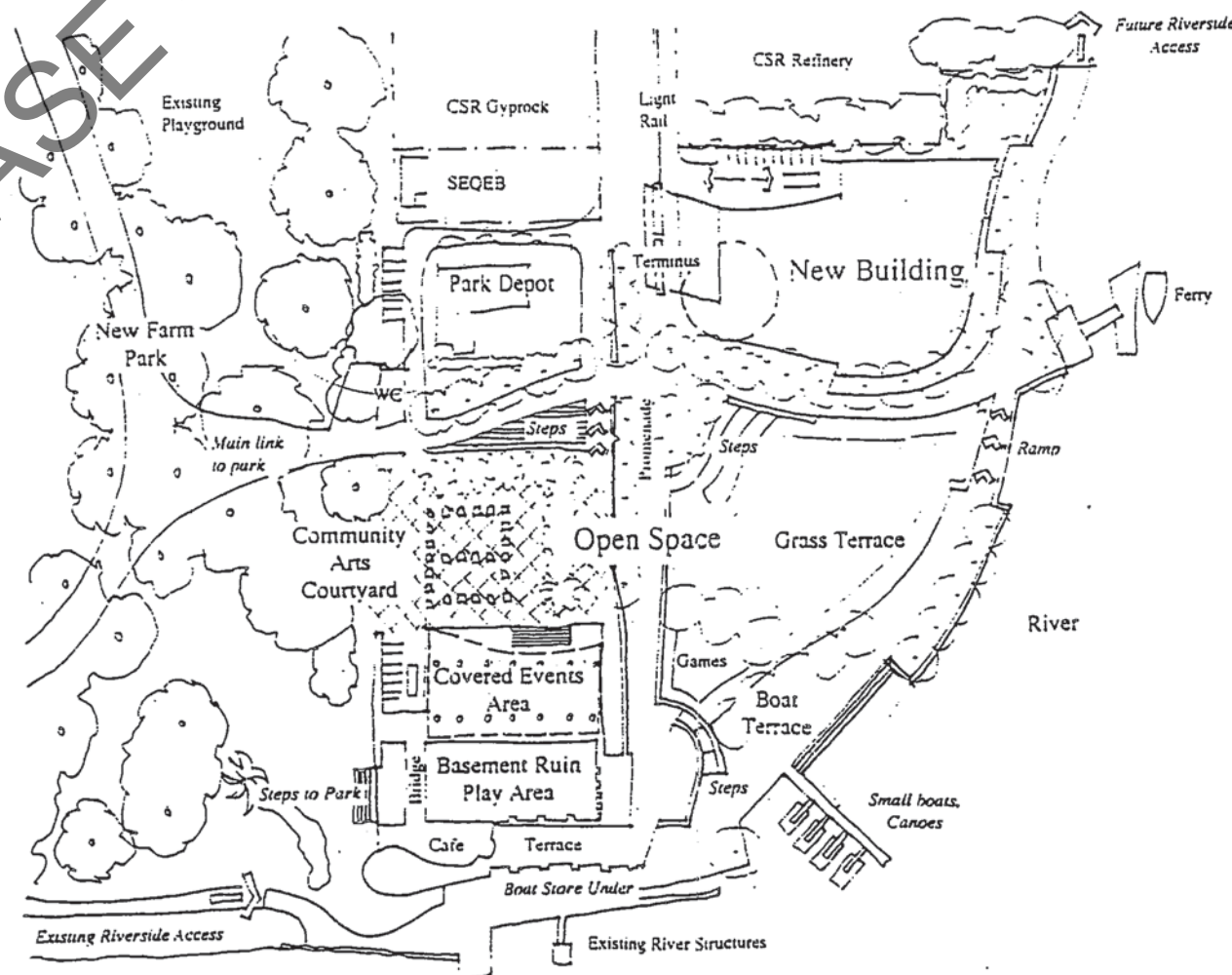
Schematic Site Section - Adaptation



Key Diagram



Schematic Site Plan - Adaptation

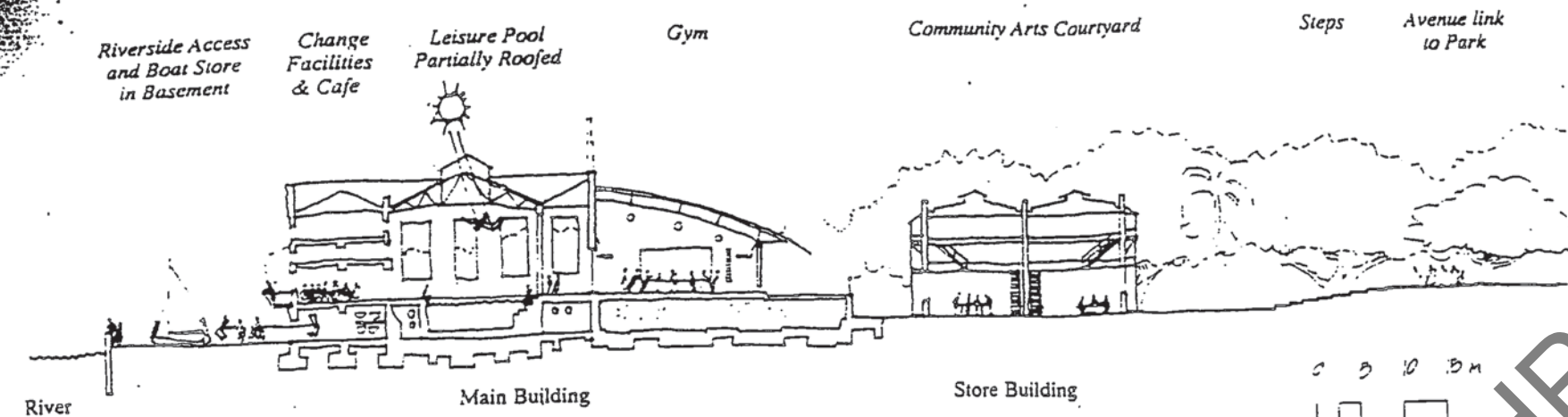


Schematic Site Plan - Replacement

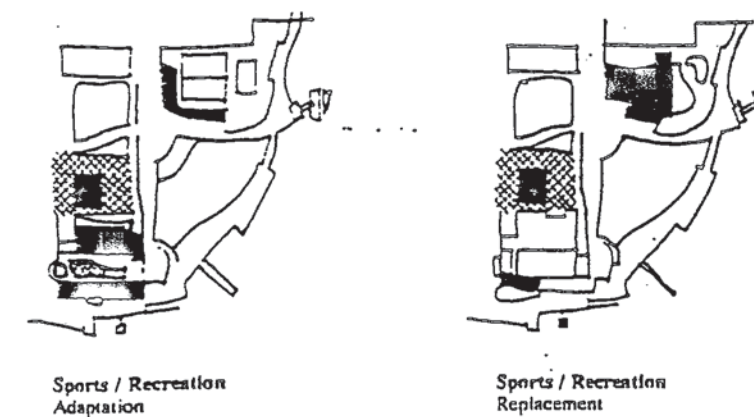
FIGURE 18

Site Redevelopment Arts/Cultural Option

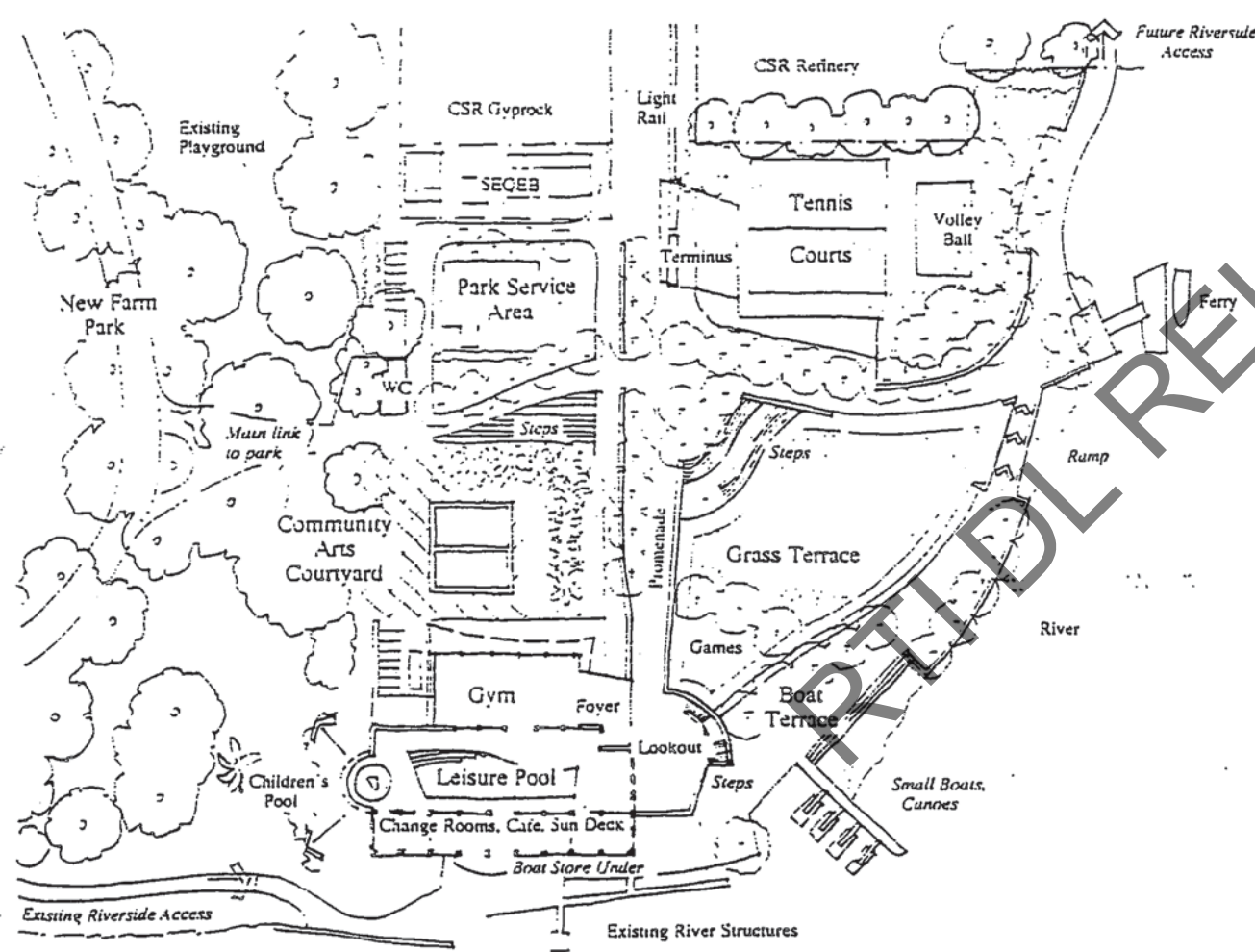
Source: Allom et.al.(1992)



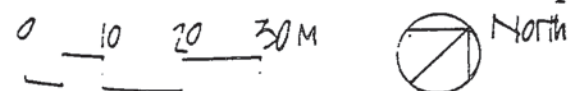
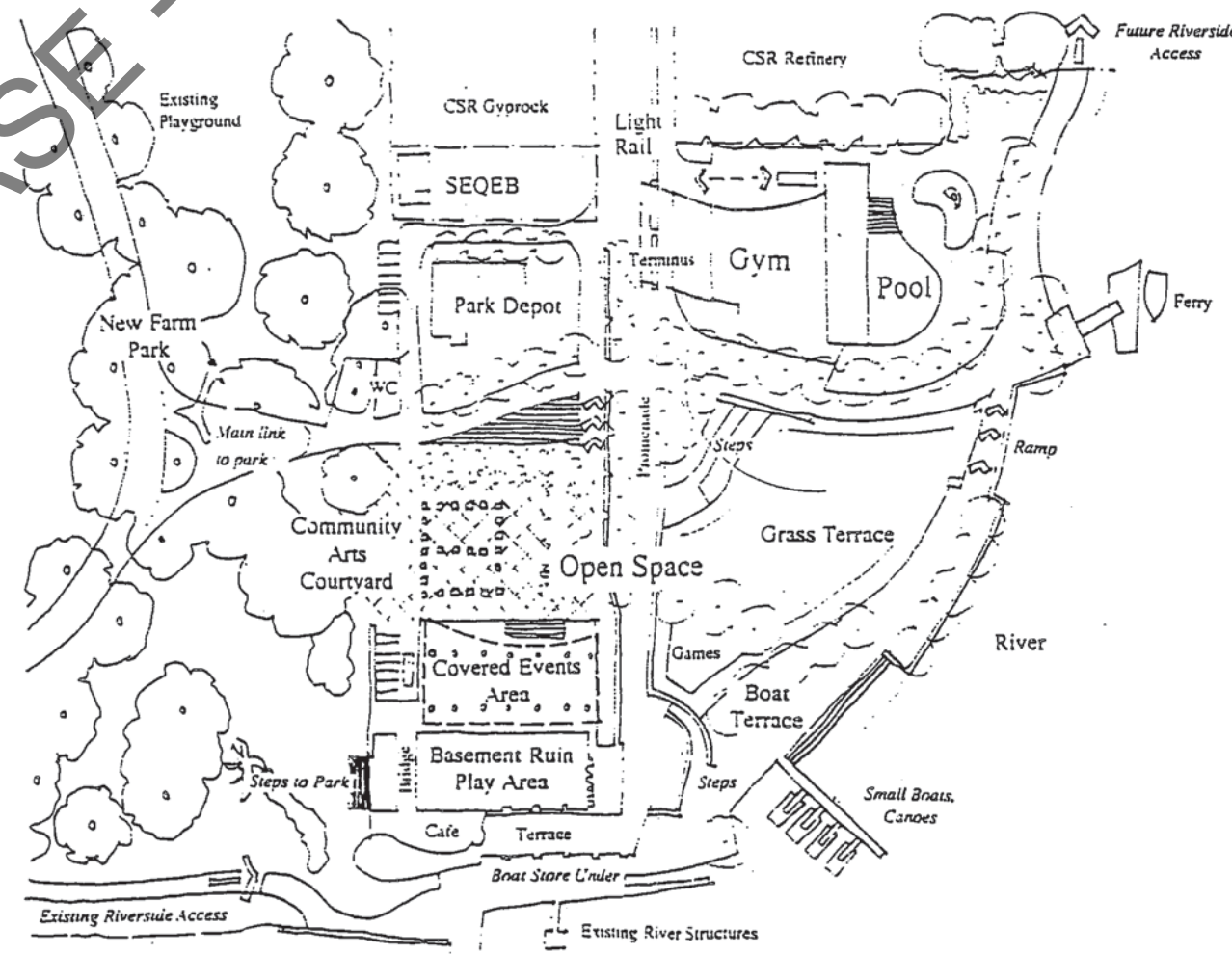
Schematic Site Section - Adaptation



Key Diagram



Schematic Site Plan - Adaptation



Schematic Site Plan - Replacement

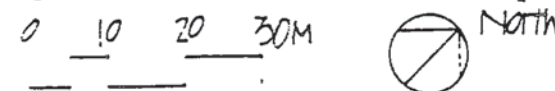


FIGURE 19

Site Redevelopment Sports/Recreational Option

Source: Allom et.al.(1992)

Release

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APPENDIX 4

Sample Locations and Borelogs

Sample Name	Description
Bore #4 0.0 - 0.25 m	Open space, sandy gravel, fill
Bore #4 0.5 - 1.0 m	Open space, ash, fill
Bore #5 0.0 - 0.25 m	Open space, gravelly sandy clay, topsoil
Bore #5 2.0 - 2.5 m	Open space, ash, coal, coal dust, fill
Bore #6 0.0 - 0.25 m	Open space, sandy gravelly clay, fill
Bore #6 0.25 - 1.5 m	Open space, gravelly sand, rubble, fill
Bore #6 2.5 - 3.0 m	Open space, sandy gravelly clay, ash, fill
Bore #7 0.0 - 0.25 m	Open space, Sandy gravelly clay, topsoil
Bore #7 1.0 - 1.5 m	Open space, gravelly sand, rubble, fill
Bore #7 2.5 - 3.0 m	Open space, gravelly sand, ash, fill
Bore #8 0.0 - 0.25 m	Open space, silty gravelly sand, fill
Bore #8 3.0 - 3.5 m	Open space, silty gravelly sand, ash rubble, fill
Bore #9 0.0 - 0.25 m	Open space, sandy clay, topsoil
Bore #9 3.5 - 4.0 m	Open space, sandy gravelly clay, rubble, ash, fill
Bore #10 0.0 - 0.25 m	Open space, gravelly sand, fill
Bore #10 2.0 - 2.5 m	Open space, gravelly sand, rubble, fill

Sample Name	Description
Bore #10 5.5 - 6.0 m	Open space, sandy clayey gravel, ash, fill

RTI DL RELEASE - EHP

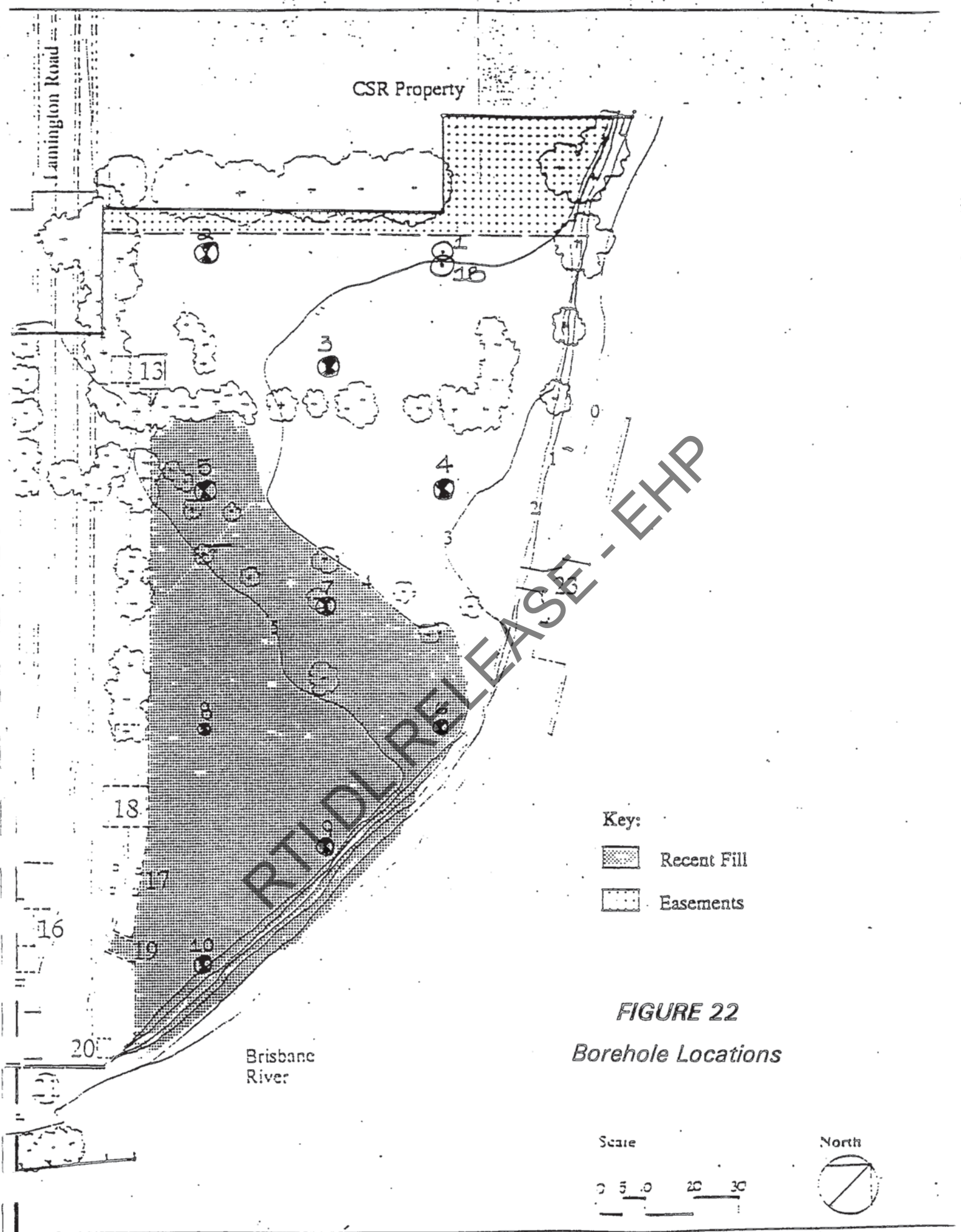


FIGURE 22
Borehole Locations

Allom Lovell Marquis-Kyle
Architects



GEOTECHNICAL SERVICES

REPORT OF BOREHOLE 1B

CLIENT: DSSR

BOREHOLE LOCATION: SEE FIG 1

SHEET: 1 OF 1

PROJECT: CONTAMINATED LAND
ASSESSMENT - NEWFARM POWER
STATION

ELEVATION:

DRILL RIG: DB1000

JOB NUMBER: SSKW80

DATUM: AHD

LOGGED: DS

DATE
STARTED: 16/3/92

INCLINATION: VERTICAL

CHECKED:

DEPTH (m)	INFERRED STRATIGRAPHY	DEPTH (m)	FIELD SAMPLING AND TESTING	WATER LEVEL	DRILL METHOD
		FL			
		0.2			augor
1.0	silty CLAY, some sand and gravel, high plasticity, dark brown, sand fine to coarse, gravel fine, angular, soft to firm, moist, organics present (grass roots and fibres) (TOPSOIL)	0.6			
	gravelly SAND, brown, sand fine to coarse, gravel fine, angular, loose to medium dense, dry (ash and Tuff fragments present in matrix) (FILL)	1.5			
2.0	silty clayey SAND, low plasticity, orange-brown, sand fine to medium, loose to medium dense, moist (ALLUVIUM)				
3.0	END OF BOREHOLE				
4.0					
5.0					
6.0					



GEO TECHNICAL SERVICES

REPORT OF BOREHOLE 2

CLIENT: DSSR

PROJECT: CONTAMINATED LAND
ASSESSMENT - NEWFARM POWER
STATION

JOB NUMBER: SSKW60

DATE
STARTED: 16-3-92

BOREHOLE LOCATION: SEE FIG 1

ELEVATION:

DATUM: AHD

INCLINATION: VERTICAL

SHEET: 1 OF 1

DRILL RIG: DB1000

LOGGED: DS

CHECKED:

DEPTH (m)	INFERRED STRATIGRAPHY	DEPTH (m)	FIELD SAMPLING AND TESTING	WATER LEVEL	DRILL METHOD
		EL			
	0.1 silty SAND, brown, sand fine, loose, dry, (TOPSOIL)				sugar
1.0	0.9 ASH, COAL and COAL DUST, black, ash and coal, fine to coarse, angular, loose dry (FILL)				
	1.5 sandy CLAY/clayey SAND, orange-brown, low to medium plasticity, sand fine to medium, stiff/medium dense, dry (ALLUVIUM)				
2.0	END OF BOREHOLE				
3.0					
4.0					
5.0					
6.0					



GEOTECHNICAL SERVICES

REPORT OF BOREHOLE: 3

CLIENT: DSSR

BOREHOLE LOCATION: SEE FIG. 1

SHEET: 1 OF 1

PROJECT: CONTAMINATED LAND
ASSESSMENT: NEWFARM POWER
STATION

ELEVATION:

DRILL RIG: DB1000

JOB NUMBER: SSKW60

DATUM: AHD

LOGGED: DS

DATE
STARTED: 16/3/92

INCLINATION: VERTICAL

CHECKED:

DEPTH (m)	INFERRED STRATIGRAPHY	DEPTH (m)	FIELD SAMPLING AND TESTING	WATER LEVEL	DRILL METHOD
		EL			
1.0	sandy GRAVEL, brown, sand fine to medium gravel fine to medium, angular, loose, dry (FILL)	Sch4p4(6) Personal information			auger
	ASH, black, fine to medium, subangular, loose, dry (FILL)	Sch4p4(6) Personal information			
2.0	sandy CLAY, orange-brown, low to medium plasticity, sand fine to medium, firm, dry, moist (ALLUVIUM)				
	trace of fine gravel, subangular				
3.0	END OF BOREHOLE	2.5			
4.0					
5.0					



GEOTECHNICAL SERVICES

REPORT OF BOREHOLE: 4

CLIENT: DSSR

BOREHOLE LOCATION: SEE FIG 1

SHEET: 1 OF 1

PROJECT: CONTAMINATED LAND
ASSESSMENT - NEWFARM POWER
STATION

ELEVATION:

DRILL RIG: DB1000

JOB NUMBER: S6KW60

DATUM: AHD

LOGGED: DS

DATE
STARTED: 16/3/92

INCLINATION: VERTICAL

CHECKED:

DEPTH (m)	INFERRED STRATIGRAPHY	DEPTH (m)	FIELD SAMPLING AND TESTING	WATER LEVEL	DRILL METHOD
		EL			
					auger
	sandy GRAVEL, brown, sand fine to medium, gravel fine to medium, angular, loose, dry (FILL)	0.6			
	ASH, black, fine to medium, angular, loose (FILL)	0.9			
1.0					
	sandy CLAY, some sand and gravel, high plasticity, dark brown, sand fine to coarse, gravel fine, angular, firm moist (FILL)	1.3			
2.0					
	ASH, COAL and COAL DUST, ash and coal fine to coarse, angular, loose, dry (FILL)	2.2			
	sandy CLAY, low to high plasticity, green-grey, sand fine, firm, moist (ALLUVIUM)	2.5			
3.0					
	END OF BOREHOLE				
4.0					
5.0					
6.0					



GEOTECHNICAL SERVICES

REPORT OF BOREHOLE: 5

CLIENT: D96R

PROJECT: CONTAMINATED LAND
ASSESSMENT - NEWFARM POWER
STATION

JOB NUMBER: SSKW60

DATE
STARTED: 16/3/92

BOREHOLE LOCATION: SEE FIG 1

ELEVATION:

DATUM: AHD

INCLINATION: VERTICAL

SHEET: 1 OF 1

DRILL RIG: DB1000

LOGGED: DS

CHECKED:

DEPTH (m)	INFERRED STRATIGRAPHY	DEPTH (m)	FIELD SAMPLING AND TESTING	WATER LEVEL	DRILL METHOD
		EL			
		0.2			auger
	gravelly sandy CLAY, low plasticity, mottled grey, orange and brown, sand fine to coarse, gravel fine, angular firm, moist (TOPSOIL)	0.8			
1.0	ASH, black, fine to coarse, subangular, loose (FILL)				
	gravelly SAND, brown, sand fine to coarse, gravel fine, angular, loose, dry (FILL)				
2.0	ASH, COAL and COAL DUST, ash and coal fine to coarse, angular, loose, dry (FILL)	1.9 2.1			
	sandy CLAY/clayey SAND, low plasticity, orange-brown, sand fine to medium, firm/medium dense, moist (ALLUVIUM)	3.0			
	END OF BOREHOLE				
4.0					
5.0					
6.0					



GEOTECHNICAL SERVICES

REPORT OF BOREHOLE: 6

CLIENT: DSSR

BOREHOLE LOCATION: SEE FIG 1

SHEET: 1 OF 1

PROJECT: CONTAMINATED LAND
ASSESSMENT - NEWFARM POWER
STATION

ELEVATION:

DRILL RIG: DB1000

JOB NUMBER: 56KW60

DATUM: AHD

LOGGED BY:

DATE
STARTED: 16/3/92

INCLINATION: VERTICAL

CHECKED:

DEPTH (m)	INFERRED STRATIGRAPHY	DEPTH (m) EL	FIELD SAMPLING AND TESTING	WATER LEVEL	DRILL METHOD
0.4	sandy gravelly CLAY, high plasticity, organics present (grass roots and fibres), mottled grey, orange and brown, sand fine, gravel fine to coarse, angular, firm, moist (FILL)	0.4			auger
1.0	gravelly SAND, some silt, brown, sand fine to medium, gravel fine to coarse, angular, (Tuff fragments and broken bricks), loose, dry (FILL)				
2.0	zones of building rubble				
2.5		2.5			
3.0	sandy gravelly CLAY, high plasticity, yellow-brown and brown, sand fine to coarse, gravel fine to coarse, angular, moist (FILL)	3.0			
3.3	ASH, black, fine to medium, subangular, loose (FILL)	3.3			
3.8		3.8			
4.0	gravelly SAND, some silt, brown, sand fine to medium, gravel fine to coarse, angular, loose, dry (FILL)				
4.5	sandy CLAY, medium to high plasticity, green-grey, sand fine to medium, soft to firm, moist (ALLUVIUM)	4.5			
5.0	END OF BOREHOLE				
6.0					



GEOTECHNICAL SERVICES

REPORT OF BOREHOLE 7

CLIENT: D59R

PROJECT: CONTAMINATED LAND
ASSESSMENT - NEWFARM POWER
STATION

JOB NUMBER: 59KW60

DATE
STARTED: 16/3/92

BOREHOLE LOCATION: SEE FIG 1

ELEVATION:

DATUM: AHD

INCLINATION: VERTICAL

SHEET: 1 OF 1

DRILL RIG: DB1000

LOGGED: DS

CHECKED:

DEPTH (m)	INFERRED STRATIGRAPHY	DEPTH (m)	FIELD SAMPLING AND TESTING	WATER LEVEL	DRILL METHOD
		EL.			
1.0	sch4p4(6) Personal information silty gravelly CLAY, high plasticity, organics present (grass roots and fibres), mottled orange, grey and brown, gravel fine to coarse, angular, firm, moist (TOPSOIL)				auger
2.0	gravelly SAND, brown, sand fine to coarse, gravel fine to coarse, angular, loose to medium dense, dry (FILL) some cobbles and boulders in matrix some bands of high plasticity clay				
3.0	ASH, black, fine to coarse, subangular, loose, dry (FILL)	2.7			
4.0	sandy CLAY, medium plasticity, grey and black, sand fine to medium, firm, moist (ALLUVIUM)	3.3			
5.0	END OF BOREHOLE	4.0			
6.0					



GEO TECHNICAL SERVICES

REPORT OF BOREHOLE: 8

CLIENT: DSSR

PROJECT: CONTAMINATED LAND
ASSESSMENT - NEWFARM POWER
STATION

JOB NUMBER: SSKWB0

DATE
STARTED: 10/3/92

BOREHOLE LOCATION: SEE FIG 1

ELEVATION:

DATUM: AHD

INCLINATION: VERTICAL

SHEET: 1 OF 1

DRILL RIG: DB1000

LOGGED: DS

CHECKED:

DEPTH (m)	INFERRED STRATIGRAPHY	DEPTH (m)	FIELD SAMPLING AND TESTING	WATER LEVEL	DRILL METHOD
		EL			
1.0	silty gravelly SAND, light brown, sand fine, gravel fine to medium, angular, loose to medium dense, organics present (grass roots and fibres), dry (FILL)				auger
	void				
2.0					
3.0	building rubble (cobbles and boulders) throughout matrix				
	ASH, black, fine to coarse, subangular, loose (FILL)	3.7			
4.0	sandy CLAY, low plasticity, brown with orange speckles, sand fine to medium, firm, moist (FILL)	4.4			
5.0	gravelly SAND, brown, sand fine to coarse, gravel fine to coarse, angular, loose, dry (FILL)				
	silty CLAY, some sand, high plasticity, grey-brown, sand fine, soft, moist (ALLUVIUM)	5.8			
6.0	END OF BOREHOLE	6.0			



GEOTECHNICAL SERVICES

REPORT OF BOREHOLE: 9

CLIENT: D99R

BOREHOLE LOCATION: SEE FIG. 1

SHEET: 1 OF 1

PROJECT: CONTAMINATED LAND
ASSESSMENT - NEWFARM POWER
STATION

ELEVATION:

DRILL RIG: DBT000

JOB NUMBER: 66RW00

DATUM: AHD

LOGGED: DS

DATE
STARTED: 16/3/92

INCLINATION: VERTICAL

CHECKED:

DEPTH (m)	INFERRED STRATIGRAPHY	DEPTH (m)	FIELD SAMPLING AND TESTING	WATER LEVEL	DRILL METHOD
		EL			
	sandy CLAY, low plasticity, mottled orange, white and brown, organics present (grass roots and fibres), sand fine to coarse, firm, moist (TOPSOIL)	sch4p4(6) Personal information			auger
1.0	silty gravelly SAND, brown, sand fine, gravel fine to medium, angular (FILL)				
2.0	building rubble and rock fragments in fill (cobble size)	2.3			
3.0	silty gravelly CLAY, some sand, low plasticity, brown, sand fine to medium, gravel fine to coarse, firm, moist (FILL)				
	building rubble (cobble size)	3.7			
4.0	ASH, black, fine to medium, subangular, loose (FILL)	4.4			
5.0	sandy CLAY, medium to high plasticity, green-grey, sand fine to medium, soft to firm, moist (ALLUVIUM)	5.0			
	END OF BOREHOLE				



GEO TECHNICAL SERVICES

REPORT OF BOREHOLE: 10

CLIENT: DSSR

PROJECT: CONTAMINATED LAND
ASSESSMENT - NEWFARM POWER
STATION

JOB NUMBER: S&KW60

DATE
STARTED: 16-3-92

BOREHOLE LOCATION: SEE FIG 1

ELEVATION:

DATUM AND

INCLINATION: VERTICAL

SHEET: 1 OF 2

DRILL RIG: DB1000

LOGGED: DS

CHECKED:

DEPTH (m)	INFERRED STRATIGRAPHY	DEPTH (m)	FIELD SAMPLING AND TESTING	WATER LEVEL	DRILL METHOD
		EL			
1.0	gravelly SAND, brown, sand fine to coarse, gravel fine to coarse, angular, loose, dry (FILL)				auger
2.0	building rubble throughout matrix				
3.0					
4.0		4.0			
	steel plate	4.3			
5.0	ASH, black, fine to coarse, subangular, loose (FILL)				
		5.1			
	sandy clayey GRAVEL, grey and black, ash present in matrix, sand fine to coarse, gravel fine to coarse,	5.8		5.3	
6.0	ORTHOBLASTIC, loose, saturated (FILL)			1200	

sch4p4(6) Personal information



GEOTECHNICAL SERVICES

REPORT OF BOREHOLE: 10

CLIENT: D89R

BOREHOLE LOCATION: SEE FIG 1

SHEET: 2 OF 2

PROJECT: CONTAMINATED LAND
ASSESSMENT - NEWFARM POWER
STATION

ELEVATION

DRILL RIG: DB1000

JOB NUMBER: S6RW00

DATUM: AHD

LOGGED: DS

DATE

INCLINATION: VERTICAL

CHECKED:

STARTED: 16:3:92

DEPTH (m)	INFERRED STRATIGRAPHY	DEPTH (m)	FIELD SAMPLING AND TESTING	WATER LEVEL	DRILL METHOD
		EL			
		6.1			sugar
	sandy CLAY, medium to high plasticity, green-grey, sand fine to medium, soft to firm, moist (ALLUVIUM)	6.5			
7.0	clayey SAND, grey, sand fine to coarse, loose, saturated (ALLUVIUM)				
	END OF BOREHOLE				
8.0					
9.0					
NOTE: standpipe installed in borehole; screen placed between 5.05m and 6.05m; bentonite plug above 5.05m.					



GEOTECHNICAL SERVICES

REPORT OF BOREHOLE CREEK 1

CLIENT: DSSR

BOREHOLE LOCATION: SEE FIG 1

SHEET: 1 OF 1

PROJECT: CONTAMINATED LAND
ASSESSMENT - NEWFARM POWER
STATION

ELEVATION:

DRILL RIG: DB1000

JOB NUMBER: 95KW50

DATUM: AHD

LOGGED: DS

DATE
STARTED: 16/3/92

INCLINATION: VERTICAL

CHECKED:

DEPTH (m)	INFERRED STRATIGRAPHY	DEPTH (m)	FIELD SAMPLING AND TESTING	WATER LEVEL	DRILL METHOD
		EL			
					auger
	silty gravelly CLAY, high plasticity, trace of sand, mottled brown, orange and yellow, sand fine, gravel fine, angular, firm, moist (TOPSOIL)	0.4			
1.0	gravelly sandy CLAY, high plasticity, brown, sand fine to coarse, gravel fine to medium, angular, firm, dry (FILL)				
2.0		2.3			
3.0	gravelly SAND, white and brown, sand fine to coarse, gravel fine to coarse, angular, loose, dry (FILL) building rubble and cobbles in matrix				3.3 V-bit refusal
4.0		4.2			
5.0	ASH, black, fine to medium, subangular, loose, dry (FILL)	5.0		5.0	
	sandy CLAY, medium plasticity, green- grey, sand fine to medium, firm, saturated (ALLUVIUM)	5.5		10:30	
6.0	END OF BOREHOLE				
NOTE: standpipe installed in borehole; screen 4.5m - 5.5m; bentonite plug above 4.5m.					



GEOTECHNICAL SERVICES

REPORT OF BOREHOLE: CREEK 2

CLIENT: DSSR

BOREHOLE LOCATION: SEE FIG 1

SHEET: 1 OF 1

PROJECT: CONTAMINATED LAND
ASSESSMENT - NEWFARM POWER
STATION

ELEVATION:

DRILL RIG: DB1000

JOB NUMBER: S6KW60

DATUM: AHD

LOGGED: DS

DATE
STARTED: 16/3/92

INCLINATION: VERTICAL

CHECKED:

DEPTH (m)	INFERRED STRATIGRAPHY	DEPTH (m)	FIELD SAMPLING AND TESTING	WATER LEVEL	DRILL METHOD
		EL			
					euger
1.0	sandy gravelly CLAY, high plasticity, mottled orange and brown, sand fine, gravel fine, angular, organics present (grass roots and fibres), firm, moist (TOPSOIL)	0.4			
2.0	gravelly SAND, brown, sand fine to coarse, gravel fine to coarse, angular, medium dense, dry (FILL)				
	cobbles in matrix	2.4			
3.0	ASH, black, fine to medium, subangular, loose, dry (FILL)	2.9			
	sandy CLAY, medium plasticity, mottled brown and orange, sand fine, firm, moist (ALLUVIUM)	3.5			
4.0	END OF BOREHOLE				
5.0					
6.0					



GEOTECHNICAL SERVICES

REPORT OF BOREHOLE: BOILER HOUSE 1

CLIENT: DSSR

BOREHOLE LOCATION: SEE FIG 1

SHEET: 1 OF 1

PROJECT: CONTAMINATED LAND
ASSESSMENT: NEWFARM POWER
STATION

ELEVATION:

DRILL RIG: DB1000

JOB NUMBER: SSKW80

DATUM: AHD

LOGGED: DS

DATE
STARTED: 18/3/92

INCLINATION: VERTICAL

CHECKED:

DEPTH (m)	INFERRED STRATIGRAPHY	DEPTH (m)	FIELD SAMPLING AND TESTING	WATER LEVEL	DRILL METHOD
		EL			
1.0	sandy GRAVEL, some clay, brown and white, sand fine to coarse, gravel fine to coarse, angular, loose, dry (FILL)				auger
2.0	building rubble, cobbles and timber throughout matrix				
3.0					
4.0	Refuse on basement floor	3.95			
5.0	END OF BOREHOLE				
6.0					

RTI DL RELEASE - EHP

Appendix 5
Analytical Reports

Brisbane City Council

Scientific Services

Industrial Waste Section

Sample Analysis Request

Date: 6 APRIL 1993

To: Institute of Environmental Health
and Forensic Sciences
Attn: John Taucher

Phone: (07) 875 8623
Internat: 61 7 875 8623
Fax: (07) 875 8646
Internat: 61 7 875 8646

From: Alan Kleinschmidt
Supervising Scientist Hazardous Chemicals

Sample Type	Identification	Analysis Required
Soil	New Farm Powerhouse	
	#2054/1 Comp. Cleared Area	Dioxins
	#2054/2 Exposed Ash	Dioxins
	#2054/3 Blank	Dioxins

Comments:

Report To: Brisbane City Council
Scientific Services Branch
Donaldson Rd
Rocklea QLD 4106
Attn: A Kleinschmidt

Order No: To be advised

Signature: [Redacted] sch4p4(6) Personal information

BRISBANE CITY COUNCIL
SCIENTIFIC SERVICES BRANCH
CHAIN OF CUSTODY RECORD

LOCATION: *New Farm Power House*

DATE: *Submitted 2/4/93*

SAMPLES: sch4p4(6) Personal information

PERSON RESPONSIBLE FOR SAMPLES: sch4p4(6) Personal information

PHONE: *875 8623*

Item No.	Sample No.	Number & Size of Containers	Description	Transfer No Check					
				1	2	3	4	5	6
1	2058/2	1 - 250 mL	Bore 2 1.5 - 2.0 m PAH, Phenols						
2	2059/1	1 - 250 mL	Bore 3 0 - 0.25 m PAH, Phenols						
3	2060/2	1 - 250 mL	Bore 4 0.5 - 1.0 m PAH, Phenols						
4	2061/2	1 - 250 mL	Bore 5 2.0 - 2.5 m PAH, Phenols						
5	2062/3	1 - 250 mL	Bore 6 2.5 - 3.0 m PAH, Phenols						
6	2063/1	1 - 250 mL	Bore 7 0 - 0.25 m PAH, Phenols, TPH						

Transfer No.	Item No.	Transfers Relinquished By	Accepted By	Date	Time
1		sch4p4(6) Personal information		2/4/93	157
2				"	"
3				"	"
4				"	"
5				"	"
6				"	"

ALS - Organics

BRISBANE CITY COUNCIL
SCIENTIFIC SERVICES BRANCH
CHAIN OF CUSTODY RECORD

LOCATION: *New Farm Power House*

DATE: *Submitted 2/4/93*

SAMPLES: *sch4p4(6) Personal information*

PERSON RESPONSIBLE FOR SAMPLES: *sch4p4(6) Personal information*

PHONE: *875 8623*

Item No.	Sample No.	Number & Size of Containers	Description	Transfer No Check					
				1	2	3	4	5	6
1	<i>2064/2</i>	<i>1 - 250 mL</i>	<i>Bore 8 3.0-3.5 m PAHs, Phenols</i>						
2	<i>2068/1</i>	<i>1 - 250 mL</i>	<i>Bore 9 0.0-0.25 m PAHs, Phenols, TPH</i>						
3	<i>2069/10</i>	<i>1 - 250 mL</i>	<i>Bore 10 2-2.5 m PAH, Phenols</i>						
4									
5									
6									

Transfer No.	Item No.	Transfers Relinquished By	Accepted By	Date	Time
1		<i>sch4p4(6) Personal information</i>		<i>2/4/93</i>	<i>1.57</i>
2				<i>"</i>	<i>"</i>
3				<i>"</i>	<i>"</i>
4					
5					
6					

ALS - Organics

BRISBANE CITY COUNCIL

SCIENTIFIC SERVICES BRANCH

CHAIN OF CUSTODY RECORD

LOCATION: New Farm Power Station

DATE: 27/4/93

SAMPLES: sch4p4(6) Personal information

PERSON RESPONSIBLE FOR SAMPLES: sch4p4(6) Personal information

PHONE: 875 8623

Item No.	Sample No.	Number & Size of Containers	Description	Transfer No Check					
				1	2	3	4	5	6
1	2056/1	1 (Glass)	Bore 1 0-250 Organics	✓					
2	2056/1	1 (Plastic)	Bore 1 0-250 Metals/Inorganics	✓					
3									
4									
5									
6									

Transfer No.	Item No.	Transfers Relinquished By	Accepted By	Date	Time
1	1/2	sch4p4(6) Personal information		28/4	1035
2					
3					
4					
5					
6					

BRISBANE CITY COUNCIL
SCIENTIFIC SERVICES BRANCH
CHAIN OF CUSTODY RECORD

LOCATION: *New Farm Power House*

DATE: *Submitted 2/4/93*

SAMPLES: sch4p4(6) Personal information

PERSON RESPONSIBLE FOR SAMPLES: sch4p4(6) Personal information

PHONE: *875 8623*

Item No.	Sample No.	Number & Size of Containers	Description	Transfer No Check					
				1	2	3	4	5	6
1	<i>2055/1</i>	<i>1 - bag</i>	<i>Boiler House No 1</i>						
2	<i>2055/2</i>	<i>1 - bag</i>	<i>Boiler House No. 2</i>						
3	<i>2058/2</i>	<i>1 - bag</i>	<i>Bore 2 1.5 - 2.0 m</i>						
4	<i>2059/2</i>	<i>1 - bag</i>	<i>Bore 3 1.0 - 1.5 m</i>						
5	<i>2059/1</i>	<i>1 - bag</i>	<i>Bore 3 0 - 0.25 m</i>						
6	<i>2060/2</i>	<i>1 - bag</i>	<i>Bore 4 0.5 - 1.0 m</i>						
Transfer No.	Item No.	Transfers Relinquished By	Accepted By	Date		Time			
1		sch4p4(6) Personal information		<i>2/4/93</i>		<i>1.57</i>			
2				<i>"</i>		<i>"</i>			
3				<i>"</i>		<i>"</i>			
4				<i>"</i>		<i>"</i>			
5				<i>"</i>		<i>"</i>			
6				<i>"</i>		<i>"</i>			

ALS - 3050 Metals, CN, S

BRISBANE CITY COUNCIL
SCIENTIFIC SERVICES BRANCH
CHAIN OF CUSTODY RECORD

LOCATION: *New Farm Power House*

DATE: *Submitted 2/4/93*

SAMPLES: sch4p4(6) Personal information

PERSON RESPONSIBLE FOR SAMPLES: sch4p4(6) Personal information

PHONE: *8758623*

Item No.	Sample No.	Number & Size of Containers	Description	Transfer No Check					
				1	2	3	4	5	6
1	<i>2061/2</i>	<i>1 - bag</i>	<i>Bore 5 2.0 - 2.5 m</i>						
2	<i>2062/3</i> ^{AK}	<i>1 - bag</i>	<i>Bore 6 2.5 - 3.0 m</i>						
3	<i>2063/1</i>	<i>1 - bag</i>	<i>Bore 7 0 - 0.25 m</i>						
4	<i>2064/2</i>	<i>1 - bag</i>	<i>Bore 8 3.0 - 3.5 m</i>						
5	<i>2068/1</i>	<i>1 - bag</i>	<i>Bore 9 0 - 0.25 m</i>						
6	<i>2069/1</i>	<i>1 - bag</i>	<i>Bore 10 2.0 - 2.5 m</i>						

Transfer No.	Item No.	Transfers Relinquished By	Accepted By	Date	Time
1		sch4p4(6) Personal information		<i>2/4/93</i>	<i>1.57</i>
2				<i>"</i>	<i>"</i>
3				<i>"</i>	<i>(1</i>
4				<i>"</i>	<i>(1</i>
5				<i>"</i>	<i>"</i>
6				<i>"</i>	<i>"</i>

ALS - 3050 Metab, CN, S



ANALYTICAL REPORT

BRISBANE CITY COUNCIL
SCIENTIFIC SERVICES BRANCH
DONALDSON ROAD
ROCKLEA QLD

4106

ATTENTION
MR A KLEINSCHMIDT
ORDER-NO

SAMPLE-TYPE
SOIL

Page 1 of 1

ENVIRONMENTAL

Batch-no: 5022

Sub-batch: 0

No. samples: 1

Received: 28/04/93

Completed: 20/05/93

Method	Analysis description	Units	LOD	#2056/1	
				0-250	
EA-055	Moisture Content (dried @ 103°C)	%	0.1	11.1	
ED-042T	Sulphur - Total	%	0.01	0.29	
EG-005T	Arsenic - Total	mg/kg	1	4	
EG-005T	Cadmium - Total	mg/kg	1	<1	
EG-005T	Cobalt - Total	mg/kg	1	6	
EG-005T	Chromium - Total	mg/kg	1	6	
EG-005T	Copper - Total	mg/kg	1	21	
EG-005T	Manganese - Total	mg/kg	1	24	
EG-005T	Nickel - Total	mg/kg	1	6	
EG-005T	Lead - Total	mg/kg	1	19	
EG-005T	Zinc - Total	mg/kg	1	43	
EG-035T	Mercury - Total	mg/kg	0.1	<0.1	
EK-026	Total Cyanide	mg/kg	0.1	0.2	

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No. 025

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SAMPLES ANALYSED AS RECEIVED

Samples as received digested by USEPA method 3051 prior to the determination of metals. Results reported on a dry weight basis.

Samples dried and pulverized prior to Leco S analysis.

sch4p4(6) Personal information

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Page 74



ANALYTICAL REPORT

Page 1 of 1

BRISBANE CITY COUNCIL
SCIENTIFIC SERVICES BRANCH
DONALDSON ROAD
ROCKLEA QLD

4106

ATTENTION

MR A KLEINSCHMIDT

ORDER-NO

SAMPLE-TYPE
QUALITY CONTROL

ENVIRONMENTAL

Batch-no: 5022

Sub-batch: 0

No. samples: 1

Received: 28/04/93

Completed: 20/05/93

Method	Analysis description	Units	LOD	#2056/1 %SPK REC	#2056/1 CHK
EA-055	Moisture Content (dried @ 103°C)	%	0.1	----	11.1
ED-042T	Sulphur - Total	%	0.01	----	0.29
EG-005T	Arsenic - Total	mg/kg	1	89	4
EG-005T	Cadmium - Total	mg/kg	1	86	<1
EG-005T	Cobalt - Total	mg/kg	1	96	5
EG-005T	Chromium - Total	mg/kg	1	95	4
EG-005T	Copper - Total	mg/kg	1	102	22
EG-005T	Manganese - Total	mg/kg	1	94	137
EG-005T	Nickel - Total	mg/kg	1	97	4
EG-005T	Lead - Total	mg/kg	1	84	20
EG-005T	Zinc - Total	mg/kg	1	96	42
EG-035T	Mercury - Total	mg/kg	0.1	100	<0.1
EK-026	Total Cyanide	mg/kg	0.1	----	0.2



No. 025

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SAMPLES ANALYSED AS RECEIVED

Samples as received digested by USEPA method 3051 prior to the determination of metals. Results reported on a dry weight basis.

Samples dried and pulverized prior to Leco S analysis.

sch4p4(6) Personal information

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ANALYTICAL REPORT

BRISBANE CITY COUNCIL
SCIENTIFIC SERVICES BRANCH
DONALDSON ROAD
ROCKLEA QLD

4106

ATTENTION

MR A KLEINSCHMIDT

ORDER-NO

SAMPLE-TYPE
QUALITY CONTROL

Page 1 of 2

ENVIRONMENTAL

Batch-no: 4859
Sub-batch: 0
No. samples: 12
Received: 05/04/93
Completed: 21/04/93

Method	Analysis description	Units	LOD	2055/1 BH1 %SPK REC	2064/2 B8 CHK	2059/2 B3 CHK
EA-055	Moisture Content (dried @ 103°C)	%	0.1	----	11.0	13.2
ED-042T	Sulphur - Total	%	0.01	----	0.05	----
EG-005T	Arsenic - Total	mg/kg	1	77	7	----
EG-005T	Cadmium - Total	mg/kg	1	74	<1	----
EG-005T	Cobalt - Total	mg/kg	1	83	4	----
EG-005T	Chromium - Total	mg/kg	1	85	35	----
EG-005T	Copper - Total	mg/kg	1	80	56	----
EG-005T	Manganese - Total	mg/kg	1	75	94	820
EG-005T	Nickel - Total	mg/kg	1	84	10	----
EG-005T	Lead - Total	mg/kg	1	78	71	----
EG-005T	Zinc - Total	mg/kg	1	82	69	----
EG-035T	Mercury - Total	mg/kg	0.1	100	0.2	----
EK-026	Total Cyanide	mg/kg	0.1	----	----	----

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SAMPLES ANALYSED AS RECEIVED

Samples as received digested by USEPA method 3051 prior to the
determination of metals. Results reported on a dry weight basis.

Samples dried and pulverized prior to Total S analysis.

sch4p4(6) Personal information

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ANALYTICAL REPORT

BRISBANE CITY COUNCIL
SCIENTIFIC SERVICES BRANCH
DONALDSON ROAD
ROCKLEA QLD 4106
ATTENTION
MR A KLEINSCHMIDT
ORDER-NO
SAMPLE-TYPE
SOIL

Page 1 of 4

ENVIRONMENTAL
Batch-no: 4859
Sub-batch: 0
No. samples: 12
Received: 05/04/93
Completed: 21/04/93

Method	Analysis description	Units	LOD	2055/1 B. House #1	2055/2 B. House #2	2058/2 B2 1.5-2.0m
EA-055	Moisture Content (dried @ 103°C)	%	0.1	9.8	12.9	15.1
ED-042T	Sulphur - Total	%	0.01	0.05	0.08	0.01
EG-005T	Arsenic - Total	mg/kg	1	10	5	5
EG-005T	Cadmium - Total	mg/kg	1	<1	<1	<1
EG-005T	Cobalt - Total	mg/kg	1	4	2	11
EG-005T	Chromium - Total	mg/kg	1	14	5	24
EG-005T	Copper - Total	mg/kg	1	27	13	15
EG-005T	Manganese - Total	mg/kg	1	183	90	391
EG-005T	Nickel - Total	mg/kg	1	9	7	15
EG-005T	Lead - Total	mg/kg	1	119	61	25
EG-005T	Zinc - Total	mg/kg	1	109	51	52
EG-035T	Mercury - Total	mg/kg	0.1	0.1	0.2	0.1
EK-026	Total Cyanide	mg/kg	0.1	0.4	0.1	0.1

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health and safety of the community.

SAMPLES ANALYSED AS RECEIVED

Samples as received digested by USEPA method 3051 prior to the
determination of metals. Results reported on a dry weight basis.
Samples dried and pulverized prior to Total S analysis.

sch4p4(6) Personal information

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ANALYTICAL REPORT

BRISBANE CITY COUNCIL
SCIENTIFIC SERVICES BRANCH
DONALDSON ROAD
ROCKLEA QLD 4106

Page 2 of 4

ATTENTION
MR A KLEINSCHMIDT
ORDER-NO

SAMPLE-TYPE
SOIL

ENVIRONMENTAL
Batch-no: 4859
Sub-batch: 0
No. samples: 12
Received: 05/04/93
Completed: 21/04/93

Method	Analysis description	Units	LOD	2059/2 B3 1.0-1.5m	2059/1 B3 0.0-0.25m	2060/2 B4 0.5-1.0m
EA-055	Moisture Content (dried @ 103°C)	%	0.1	13.2	8.5	14.9
ED-042T	Sulphur - Total	%	0.01	0.05	0.05	0.11
EG-005T	Arsenic - Total	mg/kg	1	3	10	4
EG-005T	Cadmium - Total	mg/kg	1	<1	<1	<1
EG-005T	Cobalt - Total	mg/kg	1	13	4	8
EG-005T	Chromium - Total	mg/kg	1	22	13	15
EG-005T	Copper - Total	mg/kg	1	13	13	21
EG-005T	Manganese - Total	mg/kg	1	854	172	189
EG-005T	Nickel - Total	mg/kg	1	16	8	9
EG-005T	Lead - Total	mg/kg	1	12	25	31
EG-005T	Zinc - Total	mg/kg	1	42	48	56
EG-035T	Mercury - Total	mg/kg	0.1	0.1	<0.1	0.1
EK-026	Total Cyanide	mg/kg	0.1	<0.1	0.1	0.1

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SAMPLES ANALYSED AS RECEIVED

sch4p4(6) Personal information

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RTI 13-106

Collection 16

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ANALYTICAL REPORT

BRISBANE CITY COUNCIL
SCIENTIFIC SERVICES BRANCH
DONALDSON ROAD
ROCKLEA QLD 4106

Page 3 of 4

ATTENTION
MR A KLEINSCHMIDT
ORDER-NO

SAMPLE-TYPE
SOIL

ENVIRONMENTAL
Batch-no: 4859
Sub-batch: 0
No. samples: 12
Received: 05/04/93
Completed: 21/04/93

Method	Analysis description	Units	LOD	2061/2 B5 2.0-2.5m	2063/2 B6 2.5-3.0m	2063/1 B7 0-0.25m
EA-055	Moisture Content (dried @ 103°C)	%	0.1	16.9	17.6	10.8
ED-042T	Sulphur - Total	%	0.01	0.01	0.04	0.01
EG-005T	Arsenic - Total	mg/kg	1	3	5	8
EG-005T	Cadmium - Total	mg/kg	1	<1	<1	<1
EG-005T	Cobalt - Total	mg/kg	1	8	5	8
EG-005T	Chromium - Total	mg/kg	1	22	20	7
EG-005T	Copper - Total	mg/kg	1	11	68	22
EG-005T	Manganese - Total	mg/kg	1	242	206	424
EG-005T	Nickel - Total	mg/kg	1	14	11	13
EG-005T	Lead - Total	mg/kg	1	7	109	50
EG-005T	Zinc - Total	mg/kg	1	33	170	88
EG-035T	Mercury - Total	mg/kg	0.1	0.1	0.4	0.4
EK-026	Total Cyanide	mg/kg	0.1	<0.1	<0.1	<0.1

SAMPLES ANALYSED AS RECEIVED

sch4p4(6) Personal information

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ANALYTICAL REPORT

BRISBANE CITY COUNCIL
SCIENTIFIC SERVICES BRANCH
DONALDSON ROAD
ROCKLEA QLD 4106

Page 4 of 4

ENVIRONMENTAL

Batch-no: 4859

Sub-batch: 0

No. samples: 12

Received: 05/04/93

Completed: 21/04/93

ATTENTION

MR A KLEINSCHMIDT

ORDER-NO

SAMPLE-TYPE
SOIL

Method	Analysis description	Units	LOD	2064/2 BB 3.0-3.5m	2068/1 B9 0-0.25m	2069/1 B10 2.0-2.5m
EA-055	Moisture Content (dried @ 103°C)	%	0.1	12.7	12.3	7.2
ED-042T	Sulphur - Total	%	0.01	0.05	0.03	0.07
EG-005T	Arsenic - Total	mg/kg	1	6	2	10
EG-005T	Cadmium - Total	mg/kg	1	<1	<1	<1
EG-005T	Cobalt - Total	mg/kg	1	5	1	6
EG-005T	Chromium - Total	mg/kg	1	31	11	20
EG-005T	Copper - Total	mg/kg	1	54	11	98
EG-005T	Manganese - Total	mg/kg	1	97	53	189
EG-005T	Nickel - Total	mg/kg	1	11	3	9
EG-005T	Lead - Total	mg/kg	1	71	84	139
EG-005T	Zinc - Total	mg/kg	1	75	111	119
EG-035T	Mercury - Total	mg/kg	0.1	0.2	<0.1	0.3
EK-026	Total Cyanide	mg/kg	0.1	0.2	0.1	<0.1

RTI DL RELEASE - EHP



This report is certified by the National
Laboratory Services Pty Ltd. The
information contained herein is based on
the analysis of the sample as received. This
report shall not be used for any other purpose.

SAMPLES ANALYSED AS RECEIVED

sch4p4(6) Personal information

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RTI 13-106

Collection 16

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ANALYTICAL REPORT

BATCH NUMBER: EN5022
CLIENT: Brisbane City Council
ADDRESS: Scientific Services Branch
Donaldson Road
Rocklea Q 4106
CONTACT: A. Kleinschmidt
CLIENT ORDER No.: N/A
DATE RECEIVED: 28/4/93
DATE COMPLETED: 4/5/93
SAMPLE TYPE: Soil
ANALYSIS REQUESTED: Polynuclear Aromatic Hydrocarbons (PAH) - 1
Phenols - 1
Total Petroleum Hydrocarbon (TPH) by Fractions - 1
METHOD OF ANALYSIS:
PAH ALS Method Code: EP-075A
Extraction: Solids - Ultrasonication
Liquids - Separatory Funnel
Analysis: GC/MS
Phenols ALS Method Code: EP-075B
Extraction: Solids - Ultrasonication
Liquids - Separatory Funnel
Analysis: GC/MS
TPH ALS Method Code: EP-071
Extraction: Volatiles - Purge & Trap
Semivolatiles - Ultrasonication
Analysis: Volatiles - GCMS
Semivolatiles - GCFID

Signed: sch4p4(6) Personal information

Joanne Boden
Senior Organic Chemist



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ANALYTICAL RESULTS SHEET

ALS EA-055 : MOISTURE CONTENT

BATCH No: EN5022
ANALYST: M. Burcham

MATRIX: Soil
UNITS: %

Lab I.D.	-1					
Client I.D.	#2056/1 BORE 1 0-250					
Moisture %	11.1					

RTI DL RELEASE - EHP

ANALYTICAL RESULTS SHEET

ALS EP-075A : Phenols

Batch No.: EN5022
QC Lot No. : BNAS028
Analyst : L. Nitschinsk

Matrix : Soil
Units : mg/kg

Target Compounds	Lab I.D.	-1				
	Client I.D.	#2056/1 BORE 1				
	LOR	0-250				
Phenol	0.67	< LOR				
2-Chlorophenol	0.67	< LOR				
2-Methylphenol	0.67	< LOR				
4-Methylphenol	0.67	< LOR				
2-Nitrophenol	0.67	< LOR				
2,4-Dimethylphenol	0.67	< LOR				
2,4-Dichlorophenol	0.67	< LOR				
2,6-Dimethylphenol	0.67	< LOR				
4-Chloro-3-methylphenol	0.67	< LOR				
2,4,6-Trichlorophenol	0.67	< LOR				
2,4,5-Trichlorophenol	0.67	< LOR				

COMMENTS :

- 1) LOR is the Level of Reporting.
- 2) All results are reported on an as received basis.

BATCH QUALITY CONTROL

ALS EP-075A : Phenols

Matrix :
QC Lot No. :

Soil
BNAS028

Analyst : L. Nitschinsk

Target Compounds	Blank Conc mg/kg	Spike Results							Control Limits	
		Spike Conc mg/kg	SCS Conc mg/kg	DCS Conc mg/kg	Average Recovery		RPD		Recovery Low - High	RPD %
					%	*	%	*		
Phenol	<LOR	1.67	1.22	1.17	72		4		17 - 100	35
2-Chlorophenol	<LOR	1.67	1.18	1.12	69		6		36 - 120	35
2-Methylphenol	<LOR	1.67	1.23	1.14	71		7		50 - 150	35
4-Methylphenol	<LOR	1.67	1.20	1.08	68		10		50 - 150	35
2-Nitrophenol	<LOR	1.67	1.04	0.98	60		5		45 - 167	35
2,4-Dimethylphenol	<LOR	1.67	1.06	0.77	55		32		42 - 109	35
2,4-Dichlorophenol	<LOR	1.67	1.15	1.09	67		5		52 - 122	35
2,6-Dichlorophenol	<LOR	1.67	1.52	1.41	88		7		50 - 150	35
4-Chloro-3-methylphenol	<LOR	1.67	1.26	1.17	73		8		41 - 128	35
2,4,6-Trichlorophenol	<LOR	1.67	1.30	1.12	73		15		52 - 129	35
2,4,5-Trichlorophenol	<LOR	1.67	1.66	1.55	96		7		50 - 150	35

COMMENTS :

- 1) The control limits are based on the U.S. E.P.A. SW846 criteria for method 8270.
- 2) An asterisk (*) indicates that a recovery or RPD falls outside of the advisory control limits.

BATCH QUALITY CONTROL

ALS EP-075B : Polynuclear Aromatic Hydrocarbons (PAH)

Matrix :

Soil

Analyst : L. Nitschinsk

QC Lot No. :

BNAS028

Target Compounds	Blank Conc mg/kg	Spike Results						Control Limits	
		Spike Conc mg/kg	SCS Conc mg/kg	DCS Conc mg/kg	Average Recovery		RPD		Recovery Low - High
					%	*	%	*	
Naphthalene	<LOR	1.67	1.19	1.14	70		5		36 - 120
2-Methylnaphthalene	<LOR	1.67	1.22	1.16	71		5		50 - 150
2-Chloronaphthalene	<LOR	1.67	1.24	1.15	72		8		50 - 150
Acenaphthylene	<LOR	1.67	1.17	1.11	68		5		54 - 126
Acenaphthene	<LOR	1.67	1.18	1.16	70		2		60 - 132
Fluorene	<LOR	1.67	1.22	1.17	71	*	4		72 - 108
Phenanthrene	<LOR	1.67	1.23	1.18	72		4		65 - 109
Anthracene	<LOR	1.67	1.15	1.13	68		2		43 - 118
Fluoranthrene	<LOR	1.67	1.22	1.18	72		4		43 - 121
Pyrene	<LOR	1.67	1.22	1.18	72		3		70 - 100
2-Acetylaminofluorene	<LOR	1.67	0.87	0.87	52		0		50 - 150
Benz(a)anthracene	<LOR	1.67	1.18	1.13	69		4		42 - 133
Chrysene	<LOR	1.67	1.20	1.23	73		3		44 - 140
Benzo(b)fluoranthene & Benzo(k)fluoranthene	<LOR	3.34	2.36	2.52	73		7		5 - 146
7,12-Dimethylbenz(a)anthren	<LOR	1.67	1.06	1.05	63		1		50 - 150
Benzo(a)pyrene	<LOR	1.67	1.05	1.03	62		3		32 - 148
3-Methylcholanthrene	<LOR	1.67	1.21	1.20	72		1		50 - 150
Indeno(1,2,3-cd)pyrene	<LOR	1.67	1.36	1.36	81		0		10 - 151
Dibenz(a,h)anthracene	<LOR	1.67	1.45	1.39	85		4		10 - 200
Benzo(g,h,i)perylene	<LOR	1.67	1.51	1.49	90		2		10 - 195

COMMENTS :

- 1) The control limits are based on the U.S. E.P.A. SW846 criteria for method 8270.
- 2) An asterisk (*) indicates that a recovery or RPD falls outside of the advisory control limits.

ANALYTICAL RESULTS SHEET

ALS EP-071 : Total Petroleum Hydrocarbons by Fractions

BATCH No.: EN5022
ANALYST: L. Baker

MATRIX: Soil
UNITS: mg/kg

COMPOUND	Lab I.D.	-1					
	Client I.D.	#2056/1 BORE 1					
	LOR	0-250					
C5 - C9	2	<LOR					
C10 - C14	50	140					
C15 - C28	100	1000					
C29 - C36	100	400					

COMMENTS:

1. Results are reported on an as received basis
2. LOR : Level Of Reporting

BATCH QUALITY CONTROL - TPH

ALS EP-071 : Total Petroleum Hydrocarbons by Fractions

MATRIX: Soil

ANALYST: L. Baker
SPIKING STD: n-Alkane

Volatile Components *

COMPOUND	Level Of Reporting (LOR)	Blank conc	SOIL SPIKE RESULTS					CONTROL LIMITS		
			Spike Conc.	SCS conc	DCS conc	Av. Rec.	RPD	Recovery (%)		RPD
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	%	Low	High	%
QC Lot No.: VOCS084										
Applicable to Samples EN5022 -1										
C6-C9	2	<LOR	40.00	39.00	40.50	99	4	70	130	20
C10	50	<LOR	10.00	10.10	9.90	100	2	70	130	20

Semivolatile Components

COMPOUND	Level Of Reporting (LOR)	Blank conc mg/kg	SOIL SPIKE RESULTS					CONTROL LIMITS		
	mg/kg		Spike Conc. mg/kg	SCS conc mg/kg	DCS conc mg/kg	Av. Rec. %	RPD %	Recovery (%)		RPD
								Low	High	%
QC Lot No.: TPHT043										
Applicable to Samples EN5022-1										
C11-C14	50	<LOR	500	383	409	79	7	70	130	20
C15-C28	100	<LOR	260	203	216	81	6	70	130	20
C29-C36	100	<LOR	N/A	N/A	N/A	N/A	N/A	70	130	20

* Surrogate standards are added to every QC spike and sample to monitor method performance.



ANALYTICAL REPORT

BATCH NUMBER: EN4858
CLIENT: Brisbane City Council
ADDRESS: Scientific Services Branch
Donaldson Rd
Rocklea Q 4106
CONTACT: Alan Kleinschmidt
CLIENT ORDER No.: N/A
DATE RECEIVED: 2/4/93
DATE COMPLETED: 15/4/93
SAMPLE TYPE: Soil
ANALYSIS REQUESTED: Polynuclear Aromatic Hydrocarbons (PAH) - 9
Phenols - 9
Total Petroleum Hydrocarbon (TPH) by Fractions - 2
Moistures - 9
METHOD OF ANALYSIS:
PAH **ALS Method Code:** EP-075
Extraction: Solids - Ultrasonication
Liquids - Separatory Funnel
Analysis: GC/MS
Phenols **ALS Method Code:** EP-075
Extraction: Solids - Ultrasonication
Liquids - Separatory Funnel
Analysis: GC/MS
TPH **ALS Method Code:** EP-071
Extraction: Volatiles - Purge & Trap
Semivolatiles - Ultrasonication
Analysis: Volatiles - GCMS
Semivolatiles - GCFID
Moistures **ALS Method Code:** EP-055



No. 025

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sch4p4(6) Personal information
Signed.....

Joanne Boden
Senior Organic Chemist

ANALYTICAL RESULTS SHEET

ALS EA-055 : MOISTURE CONTENT

BATCH No: EN4858
ANALYST: L. Baker

MATRIX: Soil
UNITS: %

Lab I.D.	-1	-2	-3	-4	-5	-6
Client I.D.	2058/2 BORE 2	2059/1 BORE 3	2060/2 BORE 4	2061/2 BORE 5	2062/3 BORE 6	2063/1 BORE 7
Moisture %	13.6	10.1	10.5	16.7	16.8	13.2

Lab I.D.	-7	-8	-9			
Client I.D.	2064/2 BORE 8	2068/1 BORE 9	2069/10 BORE 10			
Moisture %	15.1	15.0	8.3			

ANALYTICAL RESULTS SHEET

ALS EA-055 : MOISTURE CONTENT

BATCH No: EN4858
ANALYST: L. Baker

MATRIX: Soil
UNITS: %

Lab I.D.	-1	-2	-3	-4	-5	-6
Client I.D.	2058/2 BORE 2	2059/1 BORE 3	2060/2 BORE 4	2061/2 BORE 5	2062/3 BORE 6	2063/1 BORE 7
Moisture %	13.6	10.1	10.5	16.7	16.8	13.2

Lab I.D.	-7	-8	-9			
Client I.D.	2064/2 BORE 8	2068/1 BORE 9	2069/10 BORE 10			
Moisture %	15.1	15.0	8.3			

ANALYTICAL RESULTS SHEET

ALS EP-075A : Phenols

Batch No.: EN4858
 QC Lot No. : BNAS027
 Analyst : L. Nitschinsk

Matrix : Soil
 Units : mg/kg

Target Compounds	Lab I.D.	-1	-2	-3	-4	-5
	Client I.D.	2058/2	2059/1	2060/2	2061/2	2062/3
	LOR	Bore 2	Bore 3	Bore 4	Bore 5	Bore 6
Phenol	0.67	< LOR	< LOR	< LOR	< LOR	< LOR
2-Chlorophenol	0.67	< LOR	< LOR	< LOR	< LOR	< LOR
2-Methylphenol	0.67	< LOR	< LOR	< LOR	< LOR	< LOR
4-Methylphenol	0.67	< LOR	< LOR	< LOR	< LOR	< LOR
2-Nitrophenol	0.67	< LOR	< LOR	< LOR	< LOR	< LOR
2,4-Dimethylphenol	0.67	< LOR	< LOR	< LOR	< LOR	< LOR
2,4-Dichlorophenol	0.67	< LOR	< LOR	< LOR	< LOR	< LOR
2,6-Dimethylphenol	0.67	< LOR	< LOR	< LOR	< LOR	< LOR
4-Chloro-3-methylphenol	0.67	< LOR	< LOR	< LOR	< LOR	< LOR
2,4,6-Trichlorophenol	0.67	< LOR	< LOR	< LOR	< LOR	< LOR
2,4,5-Trichlorophenol	0.67	< LOR	< LOR	< LOR	< LOR	< LOR

COMMENTS :

- 1) LOR is the Level of Reporting.
- 2) All results are reported on an as received basis.

ANALYTICAL RESULTS CONTINUED

ALS EP-075A : Phenols

Batch No.: EN4858
 QC Lot No. : BNAS027
 Analyst : L. Nitschinsk

Matrix : Soil
 Units : mg/kg

Target Compounds	Lab I.D.	-6	-7	-8	-9	
	Client I.D.	2063/1	2064/2	2068/1	2069/10	
	LOR	Bore 7	Bore 8	Bore 9	Bore 10	
Phenol	0.67	< LOR	< LOR	< LOR	< LOR	
2-Chlorophenol	0.67	< LOR	< LOR	< LOR	< LOR	
2-Methylphenol	0.67	< LOR	< LOR	< LOR	< LOR	
4-Methylphenol	0.67	< LOR	< LOR	< LOR	< LOR	
2-Nitrophenol	0.67	< LOR	< LOR	< LOR	< LOR	
2,4-Dimethylphenol	0.67	< LOR	< LOR	< LOR	< LOR	
2,4-Dichlorophenol	0.67	< LOR	< LOR	< LOR	< LOR	
2,6-Dimethylphenol	0.67	< LOR	< LOR	< LOR	< LOR	
4-Chloro-3-methylphenol	0.67	< LOR	< LOR	< LOR	< LOR	
2,4,6-Trichlorophenol	0.67	< LOR	< LOR	< LOR	< LOR	
2,4,5-Trichlorophenol	0.67	< LOR	< LOR	< LOR	< LOR	

ANALYTICAL RESULTS SHEET

aromatic Hydrocarbons (PAH)

Matrix : Soil

Units : mg/kg

Batch No.: FMA

QC Lot No.

Analyst : L.

Targ. Compou.			-3	-4	-5
		11	2060/2 Bore 4	2061/2 Bore 5	2062/3 Bore 6
Naphthalene			< LOR	< LOR	< LOR
2-Methylnaphthalene			< LOR	< LOR	< LOR
2-Chloronaphthalene			< LOR	< LOR	< LOR
Acenaphthylene			< LOR	< LOR	< LOR
Acenaphthene	0.67	< LOR	< LOR	< LOR	< LOR
Fluorene	0.67	< LOR	< LOR	< LOR	< LOR
Phenanthrene	0.67	< LOR	1.4	1.2	3.6
Anthracene	0.67	< LOR	0.73	< LOR	1.0
Fluoranthrene	0.67	< LOR	4.7	2.1	4.3
Pyrene	0.67	< LOR	4.4	1.8	3.5
4-Acetylaminofluorene	1.3	< LOR	< LOR	< LOR	< LOR
Benz(a)anthracene	0.67	< LOR	1.9	0.96	1.3
Chrysene	0.67	< LOR	1.9	1.4	1.2
Benzo(b)fluoranthene and Benzo(k)fluoranthene	1.3	< LOR	3.6	2.0	2.1
p-Dimethylbenz(a)anthracene	0.67	< LOR	< LOR	< LOR	< LOR
Benzo(a)pyrene	0.67	< LOR	1.9	0.68	1.1
3-Methylcholanthrene	0.67	< LOR	< LOR	< LOR	< LOR
Indeno(1,2,3-cd)pyrene	0.67	< LOR	1.7	0.74	1.0
Dibenz(a,h)anthracene	1.3	< LOR	< LOR	< LOR	< LOR
Benzo(g,h,i)perylene	0.67	< LOR	1.4	< LOR	0.94

COMMENTS :

- 1) LOR is the Level of Reporting.
- 2) All results are reported on an as received basis.

Release

ANALYTICAL RESULTS CONTINUED

ALS EP-075B : Polynuclear Aromatic Hydrocarbons (PAH)

Batch No.: EN4858
 QC Lot No. : BNAS027
 Analyst : L. Nitschinsk

Matrix : Soil
 Units : mg/kg

Target Compounds	Lab I.D.	-6	-7	-8	-9	
	Client I.D.	2063/1	2064/2	2068/1	2069/10	
	LOR	Bore 7	Bore 8	Bore 9	Bore 10	
Naphthalene	0.67	< LOR	< LOR	< LOR	< LOR	
2-Methylnaphthalene	0.67	< LOR	< LOR	< LOR	< LOR	
2-Chloronaphthalene	0.67	< LOR	< LOR	< LOR	< LOR	
Acenaphthylene	0.67	< LOR	< LOR	< LOR	< LOR	
Acenaphthene	0.67	< LOR	< LOR	< LOR	< LOR	
Fluorene	0.67	< LOR	< LOR	< LOR	< LOR	
Phenanthrene	0.67	< LOR	1.6	< LOR	< LOR	
Anthracene	0.67	< LOR	< LOR	< LOR	< LOR	
Fluoranthrene	0.67	< LOR	2.6	0.69	< LOR	
Pyrene	0.67	< LOR	2.3	0.72	< LOR	
4-Acetylaminofluorene	1.3	< LOR	< LOR	< LOR	< LOR	
Benz(a)anthracene	0.67	< LOR	0.96	< LOR	< LOR	
Chrysene	0.67	< LOR	0.88	< LOR	< LOR	
Benzo(b)fluoranthene and Benzo(k)fluoranthene	1.3	< LOR	1.5	< LOR	< LOR	
p-Dimethylbenz(a)anthracene	0.67	< LOR	< LOR	< LOR	< LOR	
Benzo(a)pyrene	0.67	< LOR	0.93	< LOR	< LOR	
3-Methylcholanthrene	0.67	< LOR	< LOR	< LOR	< LOR	
Indeno(1,2,3-cd)pyrene	0.67	< LOR	0.79	< LOR	< LOR	
Dibenz(a,h)anthracene	1.3	< LOR	< LOR	< LOR	< LOR	
Benzo(g,h,i)perylene	0.67	< LOR	0.72	< LOR	< LOR	

BATCH QUALITY CONTROL

ALS EP-075B : Polynuclear Aromatic Hydrocarbons (PAH)

Matrix :

QC Lot No. :

Soil

BNAS027

Analyst : L. Nitschinsk

Target Compounds	Blank Conc mg/kg	Spike Results							Control Limits	
		Spike Conc mg/kg	SCS Conc mg/kg	DCS Conc mg/kg	Average Recovery		RPD		Recovery Low - High	RPD %
					%	*	%	*		
Naphthalene	<LOR	1.67	1.26	1.28	76		2		36 - 120	35
2-Methylnaphthalene	<LOR	1.67	1.28	1.27	76		0		50 - 150	35
2-Chloronaphthalene	<LOR	1.67	1.24	1.27	75		2		50 - 150	35
Acenaphthylene	<LOR	1.67	1.27	1.27	76		0		54 - 126	35
Acenaphthene	<LOR	1.67	1.28	1.26	76		2		60 - 132	35
Fluorene	<LOR	1.67	1.28	1.27	76		1		72 - 108	35
Phenanthrene	<LOR	1.67	1.29	1.30	77		1		65 - 109	35
Anthracene	<LOR	1.67	1.23	1.21	73		2		43 - 118	35
Fluoranthrene	<LOR	1.67	1.29	1.29	77		0		43 - 121	35
Pyrene	<LOR	1.67	1.29	1.29	77		0		70 - 100	35
2-Acetylaminofluorene	<LOR	1.67	1.31	1.30	78		1		50 - 150	35
Benz(a)anthracene	<LOR	1.67	1.27	1.27	76		0		42 - 133	35
Chrysene	<LOR	1.67	1.29	1.29	77		0		44 - 140	35
Benzo(b)fluoranthene & Benzo(k)fluoranthene	<LOR	3.34	2.70	2.71	81		0		5 - 146	35
7,12-Dimethylbenz(a)anthren	<LOR	1.67	1.13	1.16	68		3		50 - 150	35
Benzo(a)pyrene	<LOR	1.67	1.17	1.16	70		0		32 - 148	35
3-Methylcholanthrene	<LOR	1.67	1.26	1.23	75		2		50 - 150	35
Indeno(1,2,3-cd)pyrene	<LOR	1.67	1.36	1.36	81		0		10 - 151	35
Dibenz(a,h)anthracene	<LOR	1.67	1.37	1.34	81		2		10 - 200	35
Benzo(g,h,i)perylene	<LOR	1.67	1.37	1.35	82		2		10 - 195	35

COMMENTS :

- 1) The control limits are based on the U.S. E.P.A. SW846 criteria for method 8270.
- 2) An asterisk (*) indicates that a recovery or RPD falls outside of the advisory control limits.

ANALYTICAL RESULTS SHEET

ALS EP-071 : Total Petroleum Hydrocarbons by Fractions

BATCH No.: EN4858
ANALYST: L. BakerMATRIX: Soil
UNITS: mg/kg

COMPOUND	Lab I.D.	-6	-8				
	Client I.D.	2063/1 BORE 7	2068/1 BORE 9				
	LOR						
C5 - C9	2	<LOR	<LOR				
C10 - C14	50	<LOR	<LOR				
C15 - C28	100	<LOR	<LOR				
C29 - C36	100	<LOR	<LOR				

COMMENTS:

1. Results are reported on an as received basis
2. LOR : Level Of Reporting

BATCH QUALITY CONTROL - TPH

ALS EP-071 : Total Petroleum Hydrocarbons by Fractions

MATRIX: Soil

ANALYST: L. Baker
SPIKING STD: n-Alkane

Volatile Components *

COMPOUND	Level Of Reporting (LOR)	Blank conc mg/kg	SOIL SPIKE RESULTS					CONTROL LIMITS		
			Spike Conc.	SCS conc	DCS conc	Av. Rec.	RPD	Recovery (%)		RPD
	mg/kg		mg/kg	mg/kg	mg/kg	%	%	Low	High	%
QC Lot No.: VOCS079										
Applicable to Samples EN4858 -6, -8										
C6-C9	2	<LOR	40.00	38.40	39.60	98	3	70	130	20
C10	50	<LOR	10.00	9.40	9.20	93	2	70	130	20

Semivolatile Components

COMPOUND	Level Of Reporting (LOR)	Blank conc mg/kg	SOIL SPIKE RESULTS					CONTROL LIMITS		
			Spike Conc.	SCS conc	DCS conc	Av. Rec.	RPD	Recovery (%)		RPD
	mg/kg		mg/kg	mg/kg	mg/kg	%	%	Low	High	%
QC Lot No.: TPHE057										
Applicable to Samples EN4858 -6, -8										
C11-C14	50	<LOR	500	490	451	94	8	70	130	20
C15-C28	100	<LOR	260	255	243	96	5	70	130	20
C29-C36	100	<LOR	N/A	N/A	N/A	N/A	N/A	70	130	20

* Surrogate standards are added to every QC spike and sample to monitor method performance.

DEPARTMENT OF RESOURCE INDUSTRIES

REDBANK TESTING & CALIBRATION LABORATORY

REPORT NO.: L-1582-92/93

Four soil samples were submitted to the Queensland University of Technology School of Geology to be tested for asbestos fibre content using Scanning Electron Microscopy.

The soil samples are identified as in Table 1.

TABLE 1

BCC Identification	SIMTARS Laboratory Number	QUT Sample Identification
2055/1 Boilerhouse #1	9136-92L	SIM # 13/93
2055/2 Boilerhouse #2	9137-92L	SIM # 14/93
2059/2 Bore 3 1.0 - 1.5	9138-92L	SIM # 15/93
2063/2 Bore 7 1.0 - 1.5	9139-92L	SIM # 16/93

The report from QUT is attached. The samples were not pulverised by SIMTARS, nor was asbestos added to the samples, as indicated in the Introduction of the QUT report.

Results for three of four samples (9136-92L, 9137-92L and 9139-92L) are as per SIMTARS' original report, L-1186-92/93, with no asbestos detected in the samples.

In sample 9138-92L SEM analysis revealed fibrous material consistent with crocidolite asbestos. This sample had been analysed by optical microscopy and no asbestos material was detected. This indicates that the crocidolite fibre detected in the subsample taken for SEM analysis is not representative of the entire sample and in all probability represents an isolated pocket of material in that subsample. That is, the bulk of the sample should not contain any asbestos material.

TESTED BY:

sch4p4(6) Personal information

CHECKED BY:

DATE: 13 July 1993

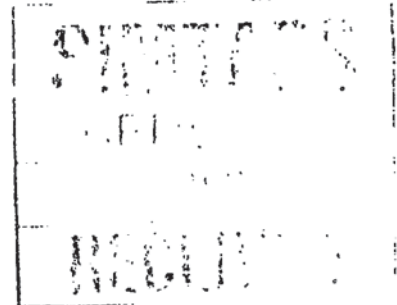
DATE: 13 July 1993

PAGE: 2 OF 2



Prepared for

Mr Stuart Bell
SIMTARS
PO Box 467
Goodna Qld 4301



Prepared by

W Kwle cien
School of Geology
Queensland University of Technology
GPO Box 2434
Brisbane Qld 4001

Report on

Analysis of soil samples for asbestos fibre identification.
17th May 1993

The material contained within this report may not be quoted other than in full. Extracts may be used only with the express prior written approval of QUT.

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Queensland University of Technology

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Brisbane Q 4001
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Phone: (07) 864 2111
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Fax: (07) 864 3998

Kedron Park
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Kedron Q 4031
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Zillmere Q 4034
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Central Administration
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Release

1.0 Introduction

Four soil samples were received from your organization and it was requested they be tested for asbestos fibre content. It was advised asbestos had been added to the samples prior to pulverisation. The QUT sample identification numbers given are as follows.

SIM # 13/93	(9136)
SIM # 14/93	(9137)
SIM # 15/93	(9138)
SIM # 16/93	(9139)

(Your Ref: O/No.....)

1.1 Results: SIM # 13/93 (9136)

Optical analysis of the soil sample did not reveal the presence of any material with the morphological characteristics of asbestiform mineral fibres. Although some ultra-small elongated birefringent particles were observed floating in the immersion oil definitive optical properties were beyond the resolution of the optical microscope.

SEM analysis at magnifications of X-1000 indicated the presence of a number of elongated particles (aspect ratio greater than 3:1) but no elongated linear cleavage was observed. At higher magnifications (x-4000) it was evident these elongated particles were platy minerals in a vertical position. Energy dispersive x-ray analysis of a number of these elongated particles indicated a composition of potassium iron aluminium silicate, not the chemical composition of any asbestiform mineral fibres. Refer to SEM photograph 6647, 6648 and the corresponding x-ray spectral analysis.

No elongated minerals with the morphological characteristics or chemical composition of any asbestiform mineral fibres could be identified using Scanning Electron Microscopy at the above magnifications.

1.2 Results: SIM # 14/93 (9137)

This sample was similar to the above sample. No minerals with the morphological characteristics or chemical composition of any asbestiform mineral fibres could be identified using optical microscopy and Scanning Electron Microscopy at magnifications of up to x6000. Energy dispersive x-ray analysis of a number of elongated particles indicated a composition of potassium iron aluminium silicate, similar to the above sample. Refer to SEM photograph 0485 (mag x500) 0486 (mag x3000), and the corresponding x-ray spectral analysis.

1.3 Results: SIM # 15/93 (9138)

The bulk of this sample was similar to the above two samples, however some asbestos mineral fibres were found using the SEM. A number of these fibres were relatively long (up to 120 microns). SEM photograph 6652 shows one of the largest fibres present. Energy dispersive x-ray analysis indicates a composition of sodium magnesium iron aluminium silicate, most comparable to the composition of Crocidolite ($\text{Na}_2\text{Fe}_5\text{Si}_8\text{O}_{22}(\text{OH})_2$). No other types of asbestos fibre were found. No ultra fine fibres could be seen disseminated throughout the sample. Refer to SEM photograph 6652 and the corresponding x-ray spectral analysis.

1.4 Results: SIM # 16/93 (9139)

This sample was similar to the first two samples (9136 and 9137). No minerals with the morphological characteristics or chemical composition of any asbestiform mineral fibres could be identified using optical microscopy and Scanning Electron Microscopy at magnifications of up to x6500. Pulverisation may have destroyed the morphological characteristics of the fibres or may have camouflaged the fibres by fine dust particles.

1.5 Analytical Method

- (i) Polarized Light Microscopy
- (ii) Scanning Electron Microscopy with energy dispersive x-ray spectral analysis. Semi quantitative analysis has also been included.

Should you require any additional information regarding the analysis please do not hesitate to contact me.

Yours faithfully,

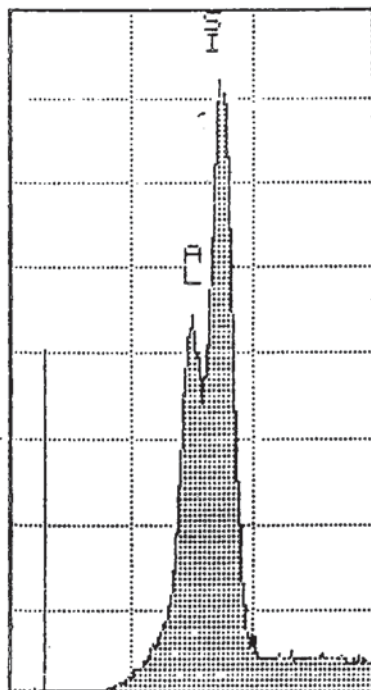
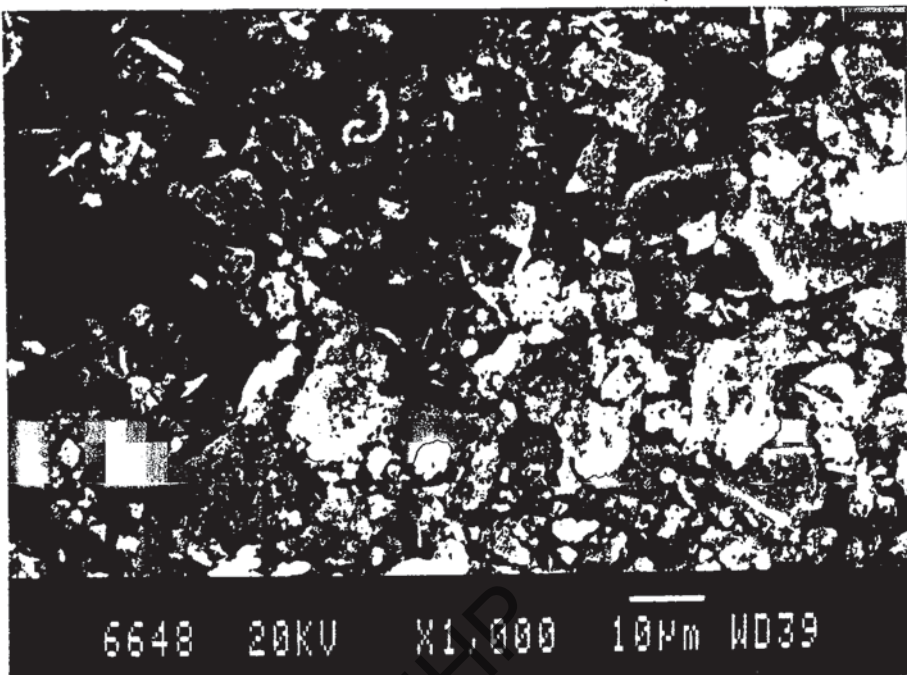
sch4p4(6) Personal information

W Kwiecien
Technologist, Geochemistry.

SQ: SETUP DEFINITIONS

*
0,0 ERROR-WD32765
*
*

ANALYTICAL ELECTRON
Cursor: 0.000keV =

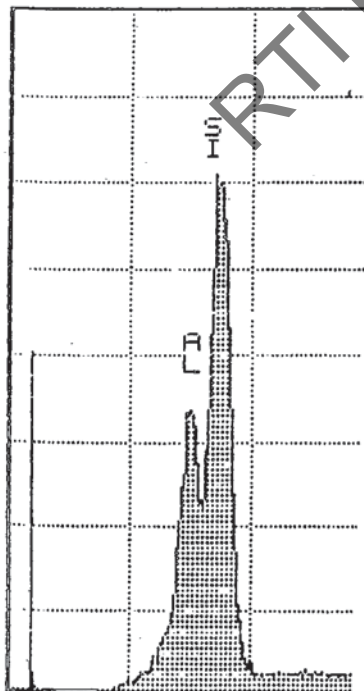
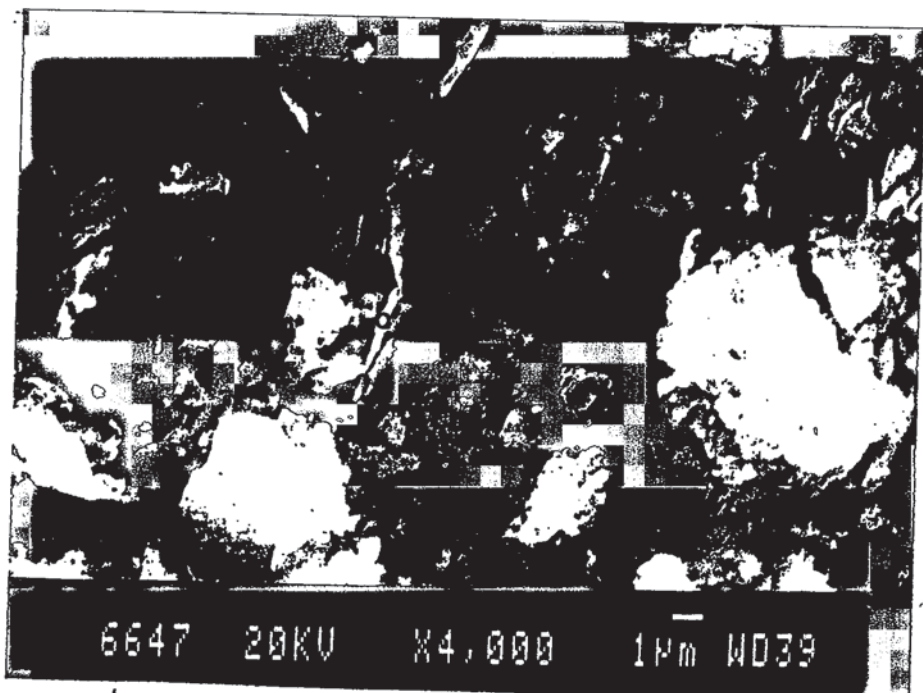


Sim. # 13/93 9136

0.000 C- 5
60 9136 K-FELDSPAR

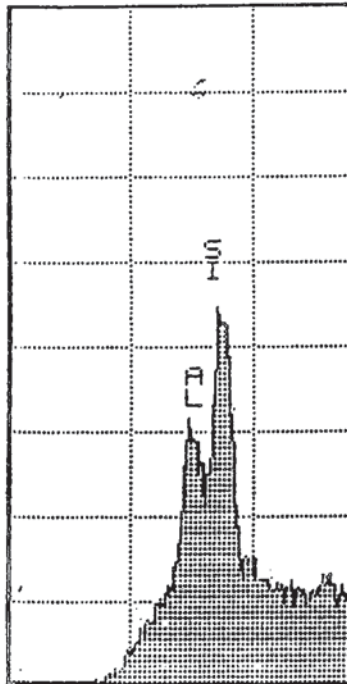
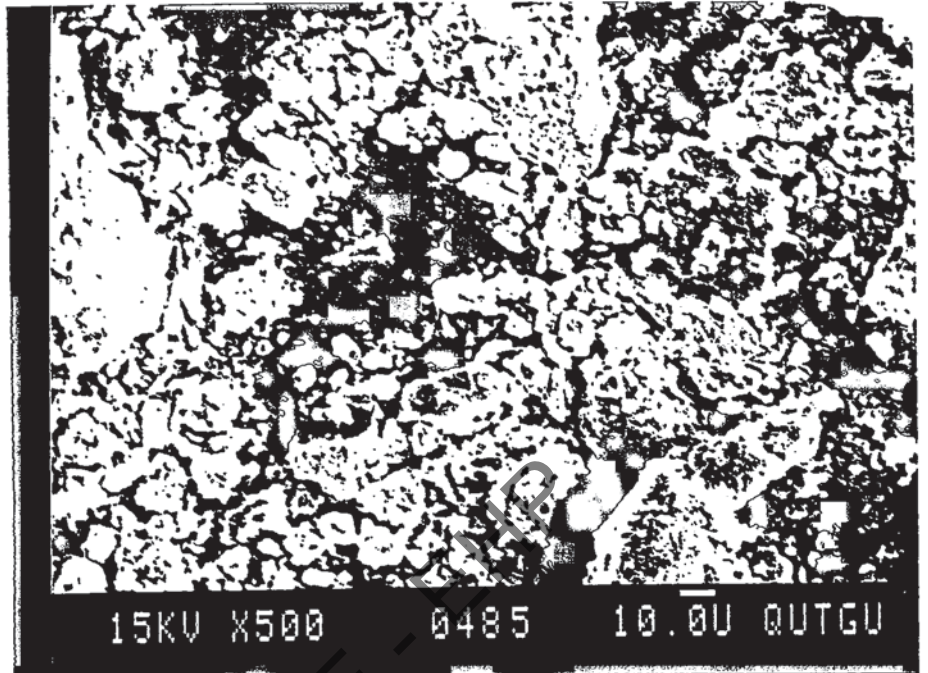
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ANALYTICAL ELECTRON MICROSCOPY FACILITY WED 07-MAY-93 20:25
Cursor: 0.000keV = 0 ROI (0) 0.000:20.140



0.000 B- 5
60 9136 K-FELDSPAR
Sim # 13/93 9136

ANALYTICAL ELECTRON
Cursor: 0.010keV :



15KV X500 0485 10.00 OUTGU

SIM # 14/93

9137
E

0.000

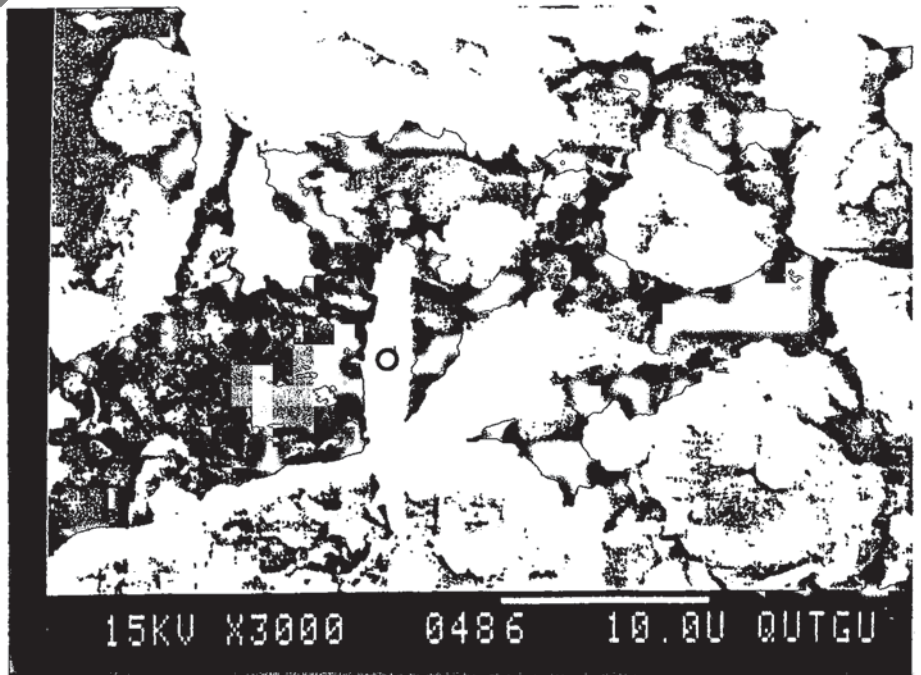
VFS = 512

10.240

60

SIM 9137

RTI DL RELEASE



15KV X3000 0486 10.00 OUTGU

SIM 14/93 (9137)

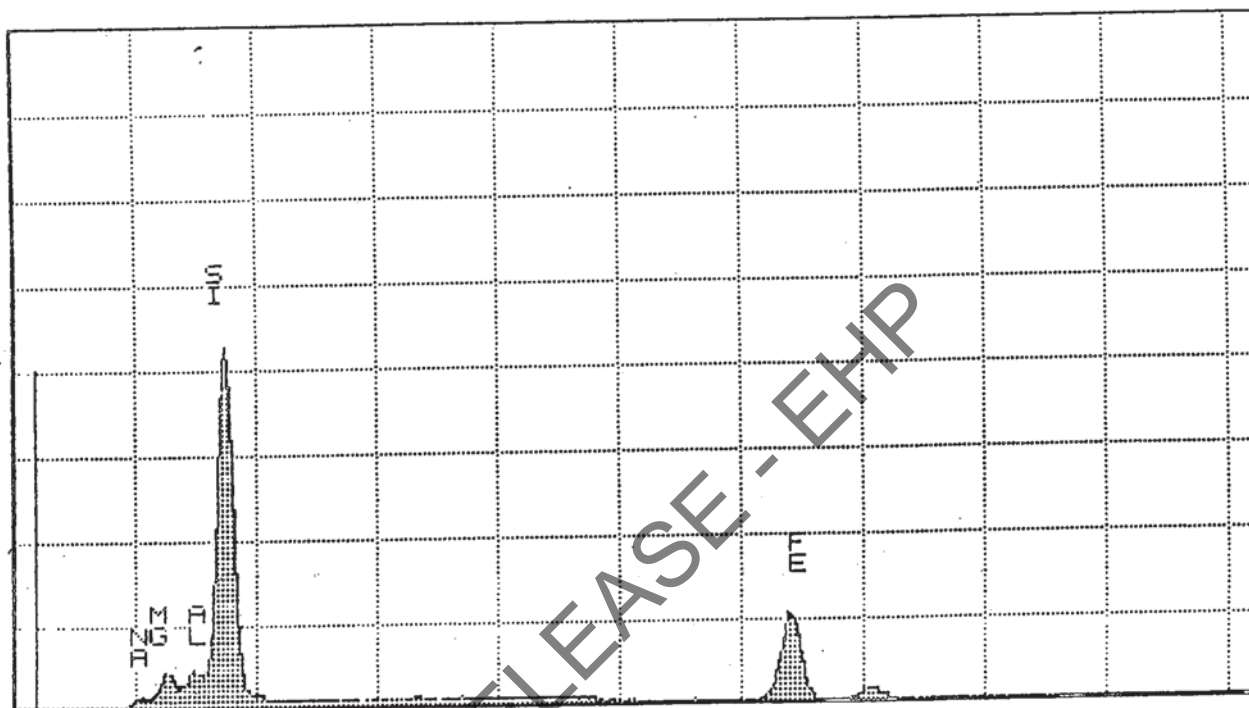
ANALYTICAL ELECTRON MICROSCOPY FACILITY

WED 07-MAY-93 21:19

Cursor: 0.000keV = 0

ROI

(0) 0.000:20.140



0.000

B- 5

VFS = 8192 10.240

60

SIM 9138

SIM 15/93 (9138)

SQ: SETUP DEFINITIONS

SQ: QUANTIFY

SIM 9138

Standardless Analysis

20.0 KV 40.0 Degrees

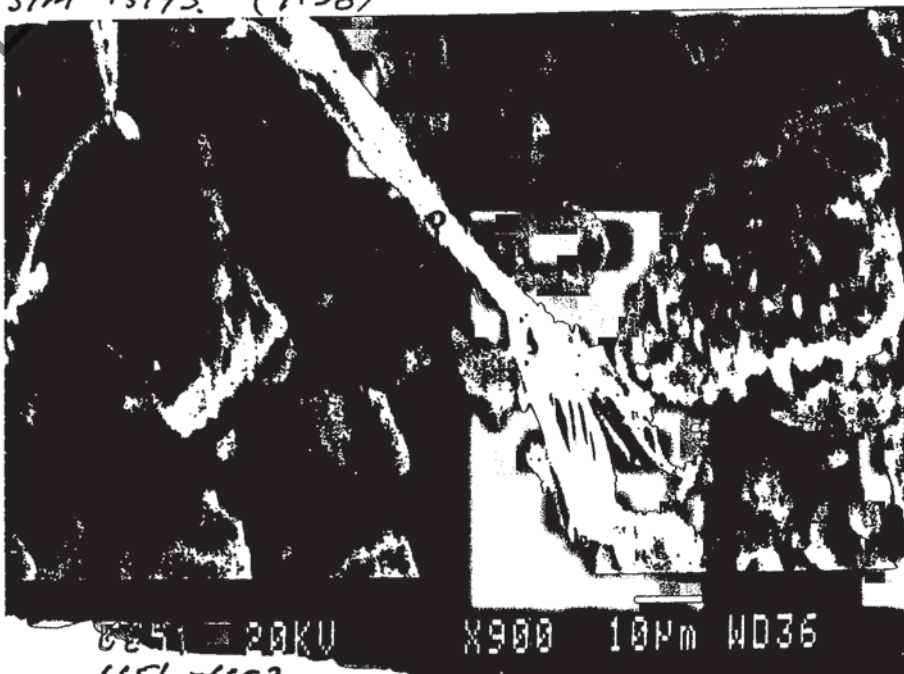
Chi-sqd = 1.91

Element	Rel. K-rat
Si-K	0.47680 +/- 0.0
Mg-K	0.04466 +/- 0.0
Fe-K	0.40717 +/- 0.0
Al-K	0.02637 +/- 0.0
Na-K	0.04499 +/- 0.0

ZAF Correction 20.00 kv

No. of Iterations = 6

Element	K-ratio	Z
Si-K	0.188	1.001
Mg-K	0.018	0.999
Fe-K	0.160	1.126
Al-K	0.010	1.029
Na-K	0.018	1.025
O-K	0.215	0.955



6651-20KV

6651-6652

X900 10µm WD36

Cloisidolite Psbestos

FeO	23.18
Al2O3	3.60
Na2O	6.98
Total	100.00%



Sim # 16/73 (9/37) . Not Asbestos

RTI DL RELEASE

DEPARTMENT OF RESOURCE INDUSTRIES
REDBANK TESTING & CALIBRATION LABORATORY

FIBRE IDENTIFICATION REPORT

REPORT NO.: L-1186-92/93
LABORATORY NO.: 9136-92L
CLIENT: BRISBANE CITY COUNCIL
DATE RECEIVED: 2 April 1993
DATE SAMPLED: NOT SPECIFIED

SAMPLE IDENTIFICATION:

2055/1 BOILERHOUSE #1

REMARKS/COMMENTS:

Major = >50%; Minor = 2 - 50%; Trace = <2%.
The sample was analysed using polarising light microscopic techniques.

SQIL SAMPLE

RESULTS:

The sample consisted of:-

Organic Fibre - Trace (<1%)
Particulate Matter - Major (>99%)

No Asbestos Detected in this Sample.

sch4p4(6) Personal information

TESTING OFFICER:

CHECKED:

sch4p4(6) Personal information

DATE: 19 April 1993

DATE: 19 April 1993

PAGE: 2 OF 5

DEPARTMENT OF RESOURCE INDUSTRIES
REDBANK TESTING & CALIBRATION LABORATORY

FIBRE IDENTIFICATION REPORT

REPORT NO.: L-1186-92/93
LABORATORY NO.: 9137-92L
CLIENT: BRISBANE CITY COUNCIL
DATE RECEIVED: 2 April 1993
DATE SAMPLED: NOT SPECIFIED

SAMPLE IDENTIFICATION:

2055/2 BOILERHOUSE #2

REMARKS/COMMENTS:

Major = >50%; Minor = 2 - 50%; Trace = <2%.
The sample was analysed using polarising light microscopic techniques.

SOIL SAMPLE

RESULTS:

The sample consisted of:-

Organic Fibre - Trace (<1%)
Particulate Matter - Major (>99%)

No Asbestos Detected in this Sample.

TESTING OFFICER:

[REDACTED] sch4p4(6) Personal information

CHECKED:

[REDACTED] sch4p4(6) Personal information

DATE: 19 April 1993

DATE: 19 April 1993

PAGE: 3 OF 5

DEPARTMENT OF RESOURCE INDUSTRIES
REDBANK TESTING & CALIBRATION LABORATORY

FIBRE IDENTIFICATION REPORT

REPORT NO.: L-1186-92/93
LABORATORY NO.: 9138-92L
CLIENT: BRISBANE CITY COUNCIL
DATE RECEIVED: 2 April 1993
DATE SAMPLED: NOT SPECIFIED

SAMPLE IDENTIFICATION:

2059/2 BORE 3 1.0 - 1.5

REMARKS/COMMENTS:

Major = >50%; Minor = 2 - 50%; Trace = <2%.
The sample was analysed using polarising light microscopic techniques.

SOIL SAMPLE

RESULTS:

The sample consisted of:-

Particulate Matter - Total of Sample

No Asbestos Detected in this Sample.

TESTING OFFICER:

sch4p4(6) Personal information

CHECKED:

sch4p4(6) Personal information

DATE: 19 April 1993

DATE: 19 April 1993

PAGE: 4 OF 5

DEPARTMENT OF RESOURCE INDUSTRIES
REDBANK TESTING & CALIBRATION LABORATORY

FIBRE IDENTIFICATION REPORT

REPORT NO.: L-1186-92/93
LABORATORY NO.: 9139-92L
CLIENT: BRISBANE CITY COUNCIL
DATE RECEIVED: 2 April 1993
DATE SAMPLED: NOT SPECIFIED

SAMPLE IDENTIFICATION:

2063/2 BORE 7 1.0 - 1.5

REMARKS/COMMENTS:

Major = >50%; Minor = 2 - 50%; Trace = <2%.
The sample was analysed using polarising light microscopic techniques.

SOIL SAMPLE

RESULTS:

The sample consisted of:-

Organic Fibre - Trace (<1%)
Particulate Matter - Major (>99%)

No Asbestos Detected in this Sample.

TESTING OFFICER:

sch4p4(6) Personal information

CHECKED: sch4p4(6) Personal information

DATE: 19 April 1993

DATE: 19 April 1993

PAGE: 5 OF 5



INSTITUTE OF ENVIRONMENTAL HEALTH & FORENSIC SCIENCES

Providers of Research, Analytical & Consultancy Services

CERTIFICATE OF ANALYSIS

Date: 15 June 1993

Laboratory reference:

G200/1

Client:

Brisbane City Council
Scientific Services Branch
Donaldson Road
Rocklea QLD 4106
AUSTRALIA

Attention: Mr Alan Kleinschmidt

Sample:

#2054/1 Comp cleared area

Date received:

8 April 1993

Method: The sample was spiked with $^{13}\text{C}_{12}$ labelled internal standards, extracted with organic solvents and purified with chemical treatment and solid phase chromatographic techniques. Measurement was performed using high resolution capillary chromatography and high resolution electron impact mass spectrometry. Full details are available on request.

CDD = chlorodibenzo-p-dioxin
CDF = chlorodibenzofuran
T = tetra
Pe = penta
Hx = hexa
Hp = hepta
O = octa
TEF = toxic equivalent factor (NATO basis)
TE = toxic equivalent.
 pg g^{-1} = picograms-per-gram

Page 1 of 2

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Wellington Science Centre
Gracefield Road, PO Box 30-547, Lower Hutt, New Zealand.
Telephone (04) 570 1555, Facsimile (04) 560 4500.

Collection 16

Page 110

RESULTS

Laboratory Reference: G200/1

Date: 15 June 1993

Sample: #2054/1 Comp cleared area

Congeners	Level† (pg g ⁻¹)	TEF	TE level (pg g ⁻¹)
2378 TCDF	1.05	0.1	0.105
Non 2378 TCDF	30.3	0	0
2378 TCDD	0.318	1	0.318
Non 2378 TCDD	34.7	0	0
12378 PeCDF	1.66	0.05	0.083
23478 PeCDF	1.97	0.5	0.984
Non 2378 PeCDF	40.4	0	0
12378 PeCDD	2.40	0.5	1.20
Non 2378 PeCDD	52.0	0	0
123478 HxCDF	46.2	0.1	4.62
123678 HxCDF	30.8	0.1	3.08
234678 HxCDF	13.0	0.1	1.30
123789 HxCDF	4	0.1	0.2
Non 2378 HxCDF	2350	0	0
123478 HxCDD	5.19	0.1	0.519
123678 HxCDD	200	0.1	20.0
123789 HxCDD	24.6	0.1	2.46
Non 2378 HxCDD	502	0	0
1234678 HpCDF	4140	0.01	41.4
1234789 HpCDF	218	0.01	2.18
Non 2378 HpCDF	12300	0	0
1234678 HpCDD	5940	0.01	59.4
Non 2378 HpCDD	4760	0	0
OCDF	28800	0.001	28.8
OCDD	93100	0.001	93.1

< = Less than limit of detection (0.5 of value used in calculating TE)

† Results calculated on a dry weight basis

Total toxic equivalents:

260 pg g⁻¹ (NATO basis)

sch4p4(6) Personal information

sch4p4(6) Personal information

S J Buckland
Environmental Group

J A Taucher
Environmental Group

TELOIRC

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Page 2 of 2



INSTITUTE OF ENVIRONMENTAL HEALTH & FORENSIC SCIENCES

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CERTIFICATE OF ANALYSIS

Date: 15 June 1993

Laboratory reference:

G200/2

Client:

Brisbane City Council
Scientific Services Branch
Donaldson Road
Rocklea QLD 4106
AUSTRALIA

Attention: Mr Alan Kleinschmidt

Sample:

#2054/2 Exposed ash

Date received:

8 April 1993

Method: The sample was spiked with $^{13}\text{C}_{12}$ labelled internal standards, extracted with organic solvents and purified with chemical treatment and solid phase chromatographic techniques. Measurement was performed using high resolution capillary chromatography and high resolution electron impact mass spectrometry. Full details are available on request.

CDD = chlorodibenzo-p-dioxin
CDF = chlorodibenzofuran
T = tetra
Pe = penta
Hx = hexa
Hp = hepta
O = octa
TEF = toxic equivalent factor (NATO basis)
TE = toxic equivalent.
pg g⁻¹ = picograms-per-gram

Page 1 of 2

sch4p4(6) Personal information

sch4p4(6) Personal information


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RTI 15-106

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Gracefield Road, PO Box 30-547, Lower Hutt, New Zealand.
Telephone (04) 570 1555, Facsimile (04) 569 4500.
Collection 16

Page 112

RESULTS

Laboratory Reference: G200/2

Date: 15 June 1993

Sample: #2054/2 Exposed ash

Congeners	Level† (pg g ⁻¹)	TEF	TE level (pg g ⁻¹)
2378 TCDF	1.71	0.1	0.171
Non 2378 TCDF	21.1	0	0
2378 TCDD	0.2	1	0.1
Non 2378 TCDD	40.0	0	0
12378 PeCDF	1.24	0.05	0.0620
23478 PeCDF	1.18	0.5	0.589
Non 2378 PeCDF	18.8	0	0
12378 PeCDD	1.28	0.5	0.640
Non 2378 PeCDD	19.5	0	0
123478 HxCDF	3.00	0.1	0.300
123678 HxCDF	103	0.1	10.3
234678 HxCDF	1.10	0.1	0.110
123789 HxCDF	3.44	0.1	0.344
Non 2378 HxCDF	24.1	0	0
123478 HxCDD	1.29	0.1	0.129
123678 HxCDD	63.4	0.1	6.34
123789 HxCDD	64.5	0.1	6.45
Non 2378 HxCDD	77.7	0	0
1234678 HpCDF	24.6	0.01	0.246
1234789 HpCDF	2.93	0.01	0.0293
Non 2378 HpCDF	28.7	0	0
1234678 HpCDD	172	0.01	1.72
Non 2378 HpCDD	237	0	0
OCDF	36.0	0.001	0.0360
OCDD	5800	0.001	5.80

< = Less than limit of detection (0.5 of value used in calculating TE)

† Results calculated on a dry weight basis

Total toxic equivalents:

33.4 pg g⁻¹ (NATO basis)

sch4p4(6) Personal information

sch4p4(6) Personal information

S J Buckland
Environmental Group

J A Taucher
Environmental Group

TELOIRC

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INSTITUTE OF ENVIRONMENTAL HEALTH & FORENSIC SCIENCES

Providers of Research, Analytical & Consultancy Services

CERTIFICATE OF ANALYSIS

Date: 15 June 1993

Laboratory reference:

G200/3

Client:

Brisbane City Council
Scientific Services Branch
Donaldson Road
Rocklea QLD 4106
AUSTRALIA

Attention: Mr Alan Kleinschmidt

Sample:

#2054/3 Blank

Date received:

8 April 1993

Method: The sample was spiked with $^{13}\text{C}_{12}$ labelled internal standards, extracted with organic solvents and purified with chemical treatment and solid phase chromatographic techniques. Measurement was performed using high resolution capillary chromatography and high resolution electron impact mass spectrometry. Full details are available on request.

CDD = chlorodibenzo-p-dioxin
CDF = chlorodibenzofuran
T = tetra
Pe = penta
Hx = hexa
Hp = hepta
O = octa
TEF = toxic equivalent factor (NATO basis)
TE = toxic equivalent.
 pg g^{-1} = picograms-per-gram

Page 1 of 2

sch4p4(6) Personal information

sch4p4(6) Personal information



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NECAL Laboratory,
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Collection 16

Page 114

RESULTS

Laboratory Reference: G200/3

Date: 15 June 1993

Sample: #2054/3 Blank

Congeners		Level† (pg g ⁻¹)	TEF	TE level (pg g ⁻¹)
2378 TCDF	<	0.08	0.1	0.004
Non 2378 TCDF	<	0.5	0	0
2378 TCDD	<	0.08	1	0.04
Non 2378 TCDD	<	0.1	0	0
12378 PeCDF	<	0.2	0.05	0.005
23478 PeCDF	<	0.2	0.5	0.05
Non 2378 PeCDF	<	1	0	0
12378 PeCDD	<	0.03	0.5	0.0075
Non 2378 PeCDD	<	0.07	0	0
123478 HxCDF	<	0.9	0.1	0.045
123678 HxCDF	<	0.4	0.1	0.02
234678 HxCDF	<	0.2	0.1	0.01
123789 HxCDF	<	0.2	0.1	0.01
Non 2378 HxCDF	<	2	0	0
123478 HxCDD	<	0.03	0.1	0.0015
123678 HxCDD	<	0.03	0.1	0.0015
123789 HxCDD	<	0.03	0.1	0.0015
Non 2378 HxCDD	<	0.1	0	0
1234678 HpCDF	<	2	0.01	0.01
1234789 HpCDF	<	0.5	0.01	0.0025
Non 2378 HpCDF	<	0.8	0	0
1234678 HpCDD	<	0.4	0.01	0.002
Non 2378 HpCDD	<	0.3	0	0
OCDF	<	2	0.001	0.001
OCDD	<	2	0.001	0.001

< = Less than limit of detection (0.5 of value used in calculating TE)

† Reported on the basis of the dry weight of sample used for the analysis of G200/1 and 2.

Total toxic equivalents:

0.21 pg g⁻¹ (NATO Basis)

sch4p4(6) Personal information

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