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Report

Preliminary Geotechnical and Contamination Review, Ingleburn Defence Site

for

Defence Estate Organisation

DAMES & MOORE
Ref: 12343-063-070
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Department of Defence
Sydney Property Disposal Unit
Level 8
307 Pitt Street
Sydney NSW 2000

Attention: Ms Kathryn Shields

Dear Kathryn

REPORT

Preliminary Geotechnical and Contamination Review, Ingleburn Defence Site

We are pleased to submit the Stage 1 final report. The report has been finalised based on comments received from Defence and the Environmental Auditor, Tony Scott, on the Draft reports dated 13 July, 1998 and 24 September 1998.

Should you have any questions or comments on any aspect of the project, please do not hesitate to contact me.

Yours sincerely
DAMES & MOORE

Graeme Nyland
Principal

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EXECUTIVE SUMMARY

A preliminary geotechnical and contamination assessment has been conducted at the Defence site at Ingleburn. The 308 Ha site has been occupied by Defence since 1939 and has primarily been used as an infantry training camp. Since that time, a number of unoccupied buildings at the site have been removed.

The objective of the preliminary assessment was to identify major constraints to development and to provide a sound basis for planning of detailed investigations.

The site is gently undulating. It contains clay soils over shallow shale bedrock. The clay soils tend to shrink and swell, otherwise foundation conditions are good. The clay soils also tend to limit the potential for movement of contaminants. Groundwater is present within the shale at a depth of at least 5m over most of the site and the permeability of the formation is low. This restricts the potential for significant groundwater contamination.

Historical activities on the site have been investigated by contacting the units known to have been stationed at Ingleburn at some time, review of air photographs taken since 1947 and interviews with military and defence personnel. The historical information obtained does not indicate any major deficiencies and has been adequate to identify potential contamination sources.

Preliminary sampling of surface water and sediments in drainage channels has been conducted to provide an indication of possible contaminants on the site. The analytical results indicated elevated concentrations of some heavy metals which can be further investigated during the detailed investigations.

An investigation programme has been developed for the potential areas of contamination identified during this preliminary investigation. The areas, which are indicated on Figure 4 of the report, are:

- ***Waste Dumps.*** *Two areas have been identified, one containing known waste and one suspected dumping area of unknown size. These areas are not known to contain hazardous materials but require characterisation to assess any impacts on developments;*
- ***Grenade Ranges.*** *Two grenade ranges have been identified, one of which was abandoned in the 1940s and one which was abandoned in the late 1960s. Each of these areas may have unexploded ordnance. It is anticipated that they will be able to be cleared and will not provide a major constraint on development.*
- ***Small Arms Range.*** *The range is likely to have heavy metal contamination in shallow soils. Metals such as lead could require remediation prior to development.*
- ***Underground Storage Tanks.*** *There were about 20 underground storage tanks on the site, nearly all of which are now disused but most are still in place. All of these UST's will need to be removed prior to development. The extent of any contamination is likely to be limited by the low permeability clay soils. Any remediation required can be conducted in association with the tank removal.*
- ***Maintenance Compounds.*** *There are eight maintenance compounds which have potential for probably localised and minor hydrocarbon contamination.*
- ***Building Areas.*** *There is potential for heavy metals contamination, principally lead from paint, around the former building locations.*

Other potential areas of localised contamination include any areas where there was pesticide or herbicide spraying, transformer areas, a "poisons shed", and areas of indiscriminate dumping.

While some remediation can be expected to be required, no major constraints on development have been identified.

REPORT
Preliminary Geotechnical and Contamination Review, Ingleburn Defence Site
for
Defence Estate Organisation

1. INTRODUCTION

This report summarises the works conducted by Dames & Moore in association with the preliminary geotechnical and environmental review of the Ingleburn Defence (Military Camp) site, Ingleburn NSW (**Figure 1**). The works were conducted in accordance with our proposal number 98-055 of 11 March 1988 under Department of Defence Tender number SPDU 6/98 (the "Brief").

Ingleburn is a large site, occupying approximately 308 ha, which has been primarily occupied by units of the Australian Army. Approximately 50 Defence houses have been leased out to non-Defence uses in recent years. The site is located within two local government areas. No previous contamination investigations have been conducted.

The work described herein involves a preliminary environmental and geotechnical characterisation of the site in preparation for future disposal. An EPA accredited independent Auditor has been engaged to review the work undertaken on this assignment. Sign off by an Auditor is required to assist in the disposal process. Investigations have been divided into stages with the current work covering the preliminary assessment and historical review of the site in preparation for more detailed investigations which will be conducted in the future.

The site has been used since 1939 as a training and embarkation camp. Training activities have included basic fitness training, weapons and transport operation, officer training and conscript basic training. Most of the training activities would not give rise to ground or water contamination. The locations of activities which could give rise to contamination have been assessed during this review and will be targeted for investigation during Stage 2.

2. OBJECTIVES & SCOPE OF WORK

The primary objective of Stage 1 was to provide a sound basis for planning the detailed investigations to be conducted under Stage 2. The requirements are clearly set out in the Scope of Work defined in the Brief and include:

- Identification, collection and review of existing data and historical information on the site from Defence and other government agencies;
- Detailed inspections of the site;
- Preparation and distribution of a detailed questionnaire regarding site usage to military units which had been identified as having occupied sections of the site at some time in the past;
- Where possible personal or telephone interviews with current and former site personnel concerning past site activities;
- Preliminary sampling of sediments, surface water and/or groundwater;
- Preparation of the Stage 2 work plan based on the information collected;
- Liaison with the Environmental Auditor; and
- Preparation of a report summarising the findings of the review.

3. SITE DESCRIPTION

The site is located southwest of Sydney near the town of Ingleburn (see **Figure 1**), occupying approximately 308 ha within the local government areas of Campbelltown (south of Campbelltown Road) and Liverpool.

3.1 SITE SETTING

The general topography of the region is of gently undulating crests and ridges. The site is located on one of these crests, with the overall slope of the land falling towards the east

The area surrounding the site is mainly low density residential to the north and north-west and hobby farms to the south and south-west. The South Western Freeway marks the site boundary to the east and south-east (**Figure 2**). Several roads including Campbelltown Road running east west and Zouch Road and McDonald Road running north south provide access to the site

3.2 HYDROLOGY

There are several creeks running through the site with a general trend of flow towards the north and east. At the time of the fieldwork, most of the creeks were found to be flowing and the north-eastern section of the site was found to be heavily waterlogged. On the basis of discussions with site personnel, however, it is understood that permanent surface water is limited to the three dams south of Campbelltown Road and the outlet dams from the sewage treatment works to the northeast.

Enquiries with regard to surface water quality were made to the NSW Department of Land & Water Conservation, however they do not have any data for sampling points in close proximity to the site.

3.3 REGIONAL GEOLOGY

The Penrith 1:100,000 series Geological Sheet indicates that this area is located on the Bringelly Shale of the Wianamatta Group. The Wianamatta Group is the uppermost unit of the Permo-Triasic

sequence in the Sydney Basin. The Bringelly Shale formation consists of shale, carbonaceous claystone, laminate, fine to medium grained lithic sandstone, rare coal and tuff.

From the soils map of the Penrith area, the soils at the site can be generally described as moderately deep (50 – 150 cm) and hard-setting. The acid sulphate soil (ASS) map for the Liverpool area does not indicate the occurrences of ASS in the vicinity of the site.

3.4 HYDROGEOLOGY

A regional groundwater system occurs within the shales, with principal flow paths within fissures and joint planes within the bedrock, complicated by the intrusion of sandstone layers. The Assessment of Pollution risk map for NSW indicates that there is a low potential for groundwater movement. The groundwater would be expected to be somewhat saline and typically hard.

Enquiries to the NSW Department of Land & Water Conservation indicate the presence of three registered groundwater bores within a radius of 4.5 km of the centre of the site. Details of these bores are as follows:

Reference Number	Location	Depth	Use	Notes
GW031197	Immediately south of the Great South Western Freeway, approximately 0.5 km south west of the site.	1.8 m	Irrigation	Hand dug well with timber casing
GW058753 and GW058754	Approximately 3 km west of the site	191.4 m and 173.7 m	Irrigation	Standing water level indicated to be approximately 91 m below ground level. Water salinity reported as poor. Yield reported as 0.32 l/s

4. SITE OPERATIONS AND HISTORY

The historical review has largely been based on recollections and anecdotes related to Dames & Moore by former Army personnel who were based on the site at some time in the past. Historical information obtained by Godden Mackay Heritage Consultants has also been reviewed. Although all of the units which we know were stationed at the site have been contacted and we have be able to interview personnel whose site knowledge spans almost the entire occupied period, the available data cannot be considered to provide a completely comprehensive commentary on the site history. It is believed, however, that the data provides a good understanding of the general site practices and the major issues of potential environmental concern and that there is a high degree of confidence that all major historical activities that could cause contamination have been addressed. A list of the units and groups interviewed in the course of the historical review is presented in **Appendix A** to this report. **Figure 2** to this report is a site plan indicating the principal current and historical site features. The figure indicates the Blocks that the site has been broken into by Defence for reference purposes.

4.1 CURRENT SITE OPERATIONS

In recent years, Defence units have progressively vacated the site. At the time of this assessment, the site was partially occupied by 4/3 Royal New South Wales Regiment (RNSWR), located in "Block G" (south of Campbelltown Road), and by 2 Training Group located in "Block F" (north of Campbelltown Road). Two residential areas, "Bardia Village" and "Ingleburn Village" are currently leased out to predominantly non-military families. A small sewage treatment plant owned by Defence is present in the northeastern section of the site. The remainder of the property is currently vacant and the majority of the buildings that were present during its operational period have been demolished. Many of the vacant areas have been subject to illegal fly tipping.

4.2 SUMMARY OF AVAILABLE HISTORICAL DOCUMENTATION

Prior to the Ingleburn site being acquired by the army, the Ingleburn area was mainly rural, with dairy-farming as the main industry. However, it is likely that most of the site was not used for this purpose as there were still large areas of dense timber when the army built Ingleburn Camp during World War II (W.W.II) for the purpose of training infantry. The construction of an embarkation camp begun on 8 October 1939, and soon after, a total of 133 buildings had been erected. Although

the camp was primarily an infantry camp, other units such as artillery, engineers, transport, signals, anti-aircraft artillery, medical, services, works and ordnance were present in some form at the site.

Post W.W.II and pre Korean War, parts of the site were leased to local farmers. The site was used extensively during the Korean War (1951-54) as a major training centre after the reintroduction of National Service. The section of the site west of Zouch Road was acquired in 1951, as well as a further 229 ha to the north of the site (subsequently sold and therefore not included in the current study). Sporting ovals, vehicle parks, and larger buildings had been developed by 1959.

Block J is understood to have formerly housed a barracks complex that was demolished in the 1950's.

The Military Police occupied Blocks L and O during the 1970's. Operations on the site diminished following the abolition of National Service in 1972 but the majority of the facility remained active to some extent until the 1990's. Blocks D, E and F (the Bardia Barracks area) have been the headquarters of the Army Second Training Group since 1973.

In 1980 the "Married Quarters" (Ingleburn Village and Block H) were transferred to the Defence Housing Authority. In 1990, the 93 ha camp directly north of the site and north of Bardia Barracks was sold to the NSW Department of Housing.

Blocks I, K, L, M, N, and O were vacated and demolished between 1995 and 1997. Blocks A and B are vacant. Blocks D, F, G and H are still occupied, either by military units or by civilian tenants.

Other site features include a disused small arms range close to the southern site margin and two former grenade ranges, one in the south eastern corner of the main site and one in the area to the west of Zouch Road.

On the basis of the information received to date, it is understood that the principal units stationed at Ingleburn were as follows:

- The School of Infantry
- 1/19 Royal New South Wales Regiment
- 2/17 Royal New South Wales Regiment
- 1/15 Royal New South Wales Regiment

- 4/3 Royal New South Wales Regiment
- 65th Infantry Battalion of the 1st Royal Australian Regiment
- 15th National Service Battalion
- 5th Brigade Admin. Support Battalion (BASB)
- The 23rd Field Regiment (10 Field Battery)
- The 812 Medium Regiment
- 1 Combat Support Services Battalion
- 1 Field Hospital
- The Army Malaria Research Unit
- The 8th Signal Regiment
- 1 Joint Support Unit (1 Signal Regiment)
- The Military Police

It is believed that a large number of other units performing similar activities were stationed at the site for short periods, particularly during the Korean and Vietnam conflicts.

4.3 AERIAL PHOTOGRAPH REVIEW

A review of the historical photographs held by the Air Photograph section of the Department of Land & Water Conservation was conducted as part of this assessment. The results of this review can be summarised as follows:

1947 Air Photograph (see Appendix A): The overall site layout is consistent with the present day site with a number of the present day features in evidence. Large barracks buildings are present in Blocks F, G, H, I, J, and L. Construction appears to have been according to a standard plan with parallel rows of what appear to be accommodation huts flanking a central open area. Blocks M and N (the hospital area) in the centre of the site is fully developed. Workshop buildings have been constructed in the southern portion of Block K. The grenade range and small arms range in the southern portion of the site are in evidence. There is no indication of development of the sections of land to the east of Block F, to the east of the Hospital, to the south of Blocks H and I or to the west of Zouch Road. The sewage farm and associated dams are not present.

The surrounding area appears to be either occupied by bush or in agricultural use.

1961 Air Photograph: The majority of the major site features which are present today are present in the 1961 photograph. The barracks buildings in Block J have been removed and the area appears to be unused. Each of the other barracks complexes has acquired an additional collection of buildings, probably mess halls, within the former open areas flanked by the accommodation huts. The housing development in Block B has been constructed and the sewage plant is in evidence along with its associated dams.

1970 Air Photograph (see Appendix A): The features present on the 1970 photograph are consistent with those on the 1961 photograph. The overall building density has increased somewhat, however no major new structures have appeared. Preparations for the construction of the South Western Freeway are evident along the southern perimeter of the site. Other surrounding land uses remain predominantly agricultural.

1982 Air Photograph: Block H is under redevelopment with new housing and the former barracks buildings have been removed. A large new building is evident, the vehicle maintenance compound associated with Block L. The new freeway on the southern site margin is operational.

1994 Air Photograph: The site exhibits very little change from the 1982 photograph. The small arms and grenade ranges on the southern section of the site appear to be disused and overgrown. The property immediately to the west of Block F has been developed and exhibits evidence of mixed use including light industry, accommodation and farming.

5. SITE REVIEW

5.1 INTRODUCTION

This section describes the findings of the review conducted to identify areas of potential soil or groundwater contamination. The review process involved the completion of a programme of interviews with site personnel (both present and past), the distribution of a questionnaire to regiments formerly stationed at the site, discussions with Department of Defence personnel with detailed site knowledge, and a site inspection.

On the basis of the review, the following facilities and operations were identified as having the potential for environmental impact:

- Unidentified buried wastes and buried objects across the main site area;
- Unexploded Ordnance (UXO);
- The small arms range to the south of K Block;
- Maintenance compounds, fuel stores and workshops (including the various underground storage tanks around the site);
- Transformers & switchgear around the site;
- The "Poisons Shed" south of Block I;
- The margins around the current and former site buildings which might have been impacted by leaded paint flakes;
- The Nursery/ground maintenance compound;
- Site area road margins, fencelines, parade grounds and ovals; and
- Fly tipped material around the site.

The following sections will address each of these issues. The principal areas of interest are indicated on **Figure 4** of this report.

5.2 WASTE DISPOSAL AREAS

On the whole, the interviewees questioned during the review indicated only minor burial of wastes on the site. On the basis of the review, it is understood that waste disposal was conducted by the following methods:

- Incineration - Each barracks and mess is believed to have had at least one incinerator. No information is currently available regarding the disposal of ash and other incinerator residues;
- Recycling - Some wastes, particularly those generated by the mess kitchens, are understood to have been removed from the site by local farmers for use a animal feed. This practice continued until at least the mid 1960's;
- Offsite Disposal - We have been informed that off-site disposal by external contractors has been the main disposal methodology adopted on the base since at least the early 1970's;
- Landfilling - On the basis of information from one interviewee, it is believed that some burial of waste was conducted in the area to the north of Block F. The precise nature of the material buried in this area is not known but it is believed to have consisted primarily of general refuse from the nearby barracks. On the basis of our field observations it is believed that waste materials have also been deposited in the area immediately to the east of the sewage treatment plant. Experience on previous defence site suggests that localised burial of waste would probably have been conducted at locations around the site on an ad-hoc basis. Such burial is particularly likely to have occurred in raised and graded areas such as the ovals, parade grounds and some of the transport compounds.

5.3 UNEXPLODED ORDNANCE

Review of the records held by the Department of Defence, the site interview programme and our site inspection suggests that only two areas have the potential for the presence of quantities of unexploded ordnance (UXO) as a result of mainstream site activities. Both of these areas are understood to have been used historically for grenade training and the potential exists for unexploded grenades to be present. On the basis of the information currently available it is likely that UXO issues on the remainder of the site would be limited to isolated imported artefacts. The recorded occurrence of such items on the site is as follows:

Location	UXO Description
Sewage Plant	One three inch high explosive shell, without fuse
2 Training Group, Ingleburn	One five pound projectile, solid shot

Given the site history and the rare occurrence of isolated UXO to date, the presence of items of ordnance on the main body of the site is not considered to represent a substantial issue in terms of the objectives of this investigation.

5.4 SMALL ARMS RANGE

One former small arms range is present within the current site boundary. This range, located close to the southern site boundary, comprises a covered firing point and a stop butt at a range of 25 metres. Visual inspection, discussions with former site personnel and enquiries by Alpha Geosciences indicate that the range was only used for calibres of up to 0.303". On the basis of the armaments used on the range and its age, it is unlikely that UXO capable of presenting a hazard to personnel would be present in the area. Contamination issues would be principally associated with metals such as lead, copper and tin which are commonly used in small arms ammunition. Contamination by these materials would be expected to be widely spread over the entire range area.

5.5 MAINTENANCE COMPOUNDS, FUEL STORES & WORKSHOPS

The site has housed a number of workshops, maintenance compounds and fuel stores during its operational life. The most significant of these facilities are as follows:

Location	Approximate Area (Ha)
K block Vehicle Area	0.52
K Block Workshops	0.58
I Block Transport Compound	0.29
L Block Transport Compound	0.26
J Block Transport Compound	0.78
F Block Transport Compound	0.39
Former F Block Fuel Store	0.13
Former Fuel Store Adjacent to Block B	0.19

Given the nature of the activities undertaken in these areas, it is considered that each of them would have the potential to exhibit some soil and groundwater impact by materials such as petroleum hydrocarbons, solvents and metals.

It is believed that up to 20 underground fuel storage tanks (USTs) are present on the site. These tanks were historically used for storage of diesel and petroleum sprit for motor transport or fuel oil for facilities such as boilers or backup generators. In general, the tanks used for diesel or petroleum spirit would be expected to be the largest and to have had the greatest throughput of fuel. It is understood that only two of the tanks on the site, those located within the transport compound in Block G, were operational at the time of our assessment.

The UST locations are indicated on **Figure 4** and the number of tanks in each area is as follows:

Block B	2 tanks (petrol point)
Block D	1 tank (boiler fuel)
Block F	3 thanks (2 at petrol point, 1 boiler fuel)
Block G	5 tanks (4 in transport compound, 1 boiler fuel)
Block I	1 tank (boiler fuel)
Block K	3 tanks (1 boiler fuel, 2 at petrol point)
Block L	3 tanks (2 at petrol point, 1 boiler)
Block N	2 tanks (standby generator and boiler fuel)

5.6 TRANSFORMERS

The site was equipped with an extensive network of electrical substations and transformers which, it is understood, were owned and serviced by Defence. Discussions with Defence personnel have indicated that the transformers had been well maintained and serviced on a regular basis. It is also believed that polychlorinated biphenyl (PCB) containing transformer oils would have been removed and replaced during the late 1970's. Some potential may exist, however, for localised soil impact in the vicinity of the transformers as a result of past spillages of oil.

5.7 POISONS SHED

Discussions with Defence personnel have indicated that a small temporary building located immediately between Blocks H and I may have been used for the storage of some form of noxious substance. Subsequent discussions with former site personnel have failed to provide any further information in relation to the building or its historical usage. When Dames & Moore personnel inspected the building in the course of the fieldwork, it was found to exhibit a strong and unpleasant chemical odour. It is anticipated that this area will be subject to additional investigations to identify potential contaminants.

5.8 SITE BUILDING MARGINS

On the basis of past experience and discussions with Defence personnel, it is considered likely that leaded paint was used on site buildings from their time of construction until the early 1980's. It is therefore possible that localised soil contamination by lead may have occurred in the immediate vicinity of the buildings as a result of paint stripping, flaking and/or demolition works. We understand that plastic sheeting was laid down around the buildings during some phases of the recent demolition works in an attempt to limit the potential for the distribution of leaded paint. On the basis of our conversations with Defence personnel it is understood that the former I and J Block areas have the potential for soil impact by leaded paint particles.

5.9 SITE MARGINS, ROADWAYS AND CLEARED AREAS

On the basis of past experience, it is considered that materials such as herbicides and pesticides may have been used along road margins, fence-lines and on cleared areas such as the ovals or the parade grounds. The use of such materials may have resulted in localised soil impact.

The former ground maintenance area adjacent to McDonald Road would potentially exhibit a similar range of contaminants.

5.10 FLY TIPPED AREAS

Localised fly tipping is evident across a large proportion of the site. The bushland area in the northeastern corner of the site and the disused area bounded by Campelltown Road, McDonald Road and the South Western Freeway, appear to have been subject to the most extensive tipping. The tipped wastes appear to be mainly comprised of general refuse and to have a relatively low potential for soil or groundwater impact. In some locations asbestos cement wastes were observed to be present.

6. FIELD INVESTIGATIONS

6.1 INTRODUCTION

This section describes the findings of the field investigations undertaken at the Ingleburn Military Base. An account of the field procedures applied in this project can be found in **Appendix B**.

6.2 SUBSURFACE CONDITIONS

6.2.1 General

The intrusive works undertaken at the site in the course of this investigation comprised the excavation of ten test pits (TP1-TP10), the drilling of four boreholes and installation of monitoring wells. **Figure 3** shows the location of these investigation points. Details of the subsurface conditions are provided on the test pit and borehole logs, included in **Appendix C**.

The materials encountered in the course of the investigations typically included:

- Fill;
- Natural soil; and
- Natural rock (shale with thin sandstone horizons).

The occurrence and characteristics of each of these materials is described in more detail in the following sections.

6.2.2 Fill

Shallow fill layers were encountered in all four of the boreholes and in a number of the test pits. In general the fill materials were found to be comprised of reworked soil and gravel, however, in one location (TP4) a substantial quantity of waste material was found to be present in the top 1.2m. The waste materials excavated included pieces of timber, plastic bottles, plastic sheeting, and general refuse. Field screening and observations of these materials did not indicate the presence of substantial quantities of materials that would be expected to generate contaminated leachates. Standard Penetration Test (SPT) results for the fill materials indicate that they should be classified as being soft to firm.

6.2.3 Soils

A clayey sand or sandy clay topsoil layer was typically found to be present in unfilled areas from the ground surface to a depth of approximately 0.2m.

Red/orange/brown low to medium plasticity clay was typically encountered beneath the topsoil and fill layers to a depth of between 0.6m and 1.2m below ground surface. This was underlain by white/grey low to medium plasticity clay which was found to be present from approximately 0.6m to between 1.2m and 3m below ground level. The clay was found to be deepest in the north-eastern corner of the site where it extended to a depth of at least 3 m below ground level.

On the basis of the results of the SPT tests conducted during the drilling operations, the clays would typically be considered to be stiff to very stiff and occasionally hard.

6.2.4 Bedrock

Shale bedrock was encountered in each borehole and in the majority of the test pits. This material was found to comprise a top surface of grey/white to orange/brown weathered low plasticity clayey shale overlying dry, powdery, friable shale. The formation was encountered immediately beneath the surficial clays at a minimum depth of approximately 1.2m below ground level. Occasional layers of hard white sandstone, ironstone and sandy shale were found to be present within the shale formation at each of the borehole locations.

6.3 HYDROGEOLOGY

Perched water was found to be present locally within the shallow fill materials and topsoil. The clays beneath these materials were moist but did not exhibit the presence of substantial quantities of groundwater.

Groundwater was encountered within the shale formation in three of the four boreholes. The groundwater levels within the wells were found to stabilise at depths of between 5.1 and 8.5 metres, in each case at a level above that which it was encountered during the drilling programme. Field measurements of the standing groundwater surface (**Table 1**) indicate that the regional groundwater

flow within the main part of the site is towards the east, following the local topography. The wells recharged slowly, an observation consistent with the expected low permeability of the formation.

6.4 CONTAMINATION INDICATORS

Ten sediment and three surface water samples were collected from the locations as indicated in **Figure 2** and were submitted to MGT Laboratories in Melbourne and AMDEL Laboratories in Sydney for analysis for a range of potential contaminants. Copies of the analytical test certificates for the samples are presented in **Appendix D** to this report.

The sampling locations were chosen on the basis of the observed drainage pattern on the site and the distribution of the main site activities. Where possible, the samples were taken from locations which would be expected to be representative of the sedimentation or surface runoff associated with particular site areas or activities. The scope of the analytical programme was determined on the basis of our initial understanding of the site activities and potential contaminants.

The pH and electrical conductivity (EC) of the surface water, measured on the field indicated the water to be slightly acidic and fresh to brackish (**Table 2**). It is considered likely that these characteristics are representative of natural site conditions.

The results of the laboratory analyses indicated that the following analytes were not present at detectable concentrations in any of the sediment or surface water samples:

- Explosive Organic compounds;
- Total Fractional Petroleum Hydrocarbons (TPH);
- Petroleum Aromatics (BTEX);
- Phenolic Compounds;
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Chlorinated Hydrocarbons; and
- OC/OP Pesticides.

The analytical results for the target metals in sediment and surfacewater samples are summarised in **Tables 3 and 4** respectively and discussed below.

The target metals (lead, copper, zinc, nickel, chromium, arsenic and cadmium) were generally found to be present at concentrations below the corresponding the Australian & New Zealand Guidelines for the Assessment of Contaminated Sites (ANZECC/NHMRC 1992) Environmental Investigation values in the sediment samples. The exception to this generalisation was a concentration of zinc in sample SED-08 which marginally exceeded the guideline values. Several metals were, however, found to be present in concentrations greater than would be expected given the apparent site background levels, as follows:

- Cadmium was found to be present at detectable concentrations in two of the ten samples, SED-08 and SED-09. Both of these samples were collected in streams on the northern margin of the site.

- Lead, nickel and zinc were each found to be present in one sample at concentrations in excess of two standard deviations above the mean concentration detected in the samples from the site. The elevated lead, nickel and zinc concentrations were recorded in samples SED-02, SED-09 and SED-08 respectively. Presence of the analytes at concentrations which exceed the site average to this extent suggests that the observed concentrations are not representative of the natural conditions. The recorded concentration of zinc in sample SED-08, 210mg/kg, also marginally exceeded the 200 mg/kg ANZECC/NHMRC value quoted for environmental investigations.

- Mercury was found to be present at a concentration in excess of the laboratory detection limit in one of the ten samples, SED-04. It is considered unlikely that the detected concentration of mercury would be the result of natural processes on the site.

Asbestos was not detected in any of the sediment samples.

The metal concentrations detected in the surface water samples were all found to be below the ANZECC freshwater quality criteria, with the exception of copper and zinc. The copper and zinc concentration detected were very consistent throughout the three samples. On the basis of the similarity of the detected concentrations and the wide distribution of the three sample points around the site, it is considered likely that these elevated copper and zinc levels reflect natural local conditions.

6.5 QUALITY ASSURANCE/QUALITY CONTROL

The results of a blind interlaboratory duplicate sample submitted to Amdel Laboratories in Sydney were generally in accordance with the findings of the primary laboratory (MGT).

7. DISCUSSION

7.1 GEOTECHNICAL ISSUES

The investigations conducted to date indicate the presence of stiff clays overlying shale over the majority of the site. On the basis of the observed clay properties, it is considered likely that simple foundations on the clay would be suitable for light structures such as one story houses. Structures requiring higher load bearing capacities, for example multi-storey dwellings or water towers, would require deeper foundations resting on the bedrock.

Typically, clays developed on the Bringelly Shale such as those present on the Ingleburn site are expansive and would exhibit a tendency to heave or crack depending on their moisture content. The natural slopes in the area are generally not steep enough to cause slope instability except possibly for some of the steeper slopes in the south west corner of the site.

Where present, the fill materials on the site are unlikely to exhibit mechanical properties which would be suitable for the construction of any form of foundations. As such, it is likely that construction in areas where substantial fill volumes are present would require the removal or relocation of the fill materials.

7.2 ENVIRONMENTAL ISSUES

The preliminary investigation has identified a number of areas with the potential to have contamination of the soil or groundwater as a result of their historical usage. The main areas are illustrated in **Figure 4** of this report. In addition to the source areas illustrated, it is considered that the following areas may have the potential for localised soil or groundwater impact:

- The sites of active and abandoned electrical transformers which may have contained PCBs;
- The areas immediately adjacent to current or historic buildings which may have been painted with lead based paints;
- The site margins, fencelines, parade grounds, ovals and roadways where herbicides may have been used to suppress the growth of vegetation; and
- A number of areas around the site which have been subjected to illegal fly tipping of waste materials.

Although a wide range of contaminants have the potential to be present, the principal contaminants of concern for the site are considered to be petroleum hydrocarbons due to their widespread use and storage on the site. It is believed that up to twenty underground fuel storage tanks remain on the site. The products stored in these tanks would have included fuel oils for boilers, petroleum spirit and diesel fuel.

The clay soils would substantially reduce the potential for surface spillages to migrate to the underlying shale formation. Similarly the potential for lateral migration of contaminants would be limited by the low permeability of the formation.

The findings of the initial surface water and sediment-sampling programme do not indicate impact by any of the target organic analytes or asbestos. Individual sediment samples were found to exhibit concentrations of cadmium, lead, nickel, zinc and mercury which suggest impact from man made sources. The detected concentrations may be indicative of upstream sources for metallic contaminants.

The metallic analytes zinc and copper were found to be present in the surface water samples at concentrations that exceed the ANZECC/NHMRC guidelines for the protection of fresh water aquatic ecosystems. The concentrations recorded for these two analytes were found to be very consistent although the samples were collected from widely dispersed streams, which were fed by different catchment areas. It is therefore believed that the observed concentrations reflect natural conditions in the local surface water. Additional testing of the surface water at intervals over a longer period may be appropriate to confirm this hypothesis.

8. CONCLUSIONS AND RECOMMENDATIONS

The programme of fieldwork, document review and interviews conducted in the course of this assessment has provided sufficient information to allow the development of a detailed appreciation of potential geotechnical and contamination issues on the site.

Table 5 provides a range of recommendations for further (Stage 2) works for the characterisation of environmental and UXO impacts on the site. It is anticipated that these works would be conducted in a phased manner with the results of the initial phases being used in the scoping of subsequent works. Some elements of the recommended works may prove to be unnecessary on the basis of the initial phases of investigation. It is anticipated that a detailed Work Plan including quality control measures will be prepared prior to commencement of the Stage 2 works.

In terms of the geotechnical properties, the site soils and bedrock are suitable for the construction of a wide range of structures using simple foundations. Additional building or structure specific geotechnical investigations would, however, be recommended to support final foundation designs for heavily loaded structures and for structures on the steeper slopes. The probable expansive nature of the clays should also be taken into account in the development of building designs. In particular attention should be given to stormwater control and potential differential settlement for any structures which are to be founded on the clays.

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Limitations, **Tables 1 to 5**, **Figures 1 to 4** and **Appendices A to D** are attached and complete this report.

Respectfully submitted
DAMES & MOORE

Rory Nagle
Senior Engineer

LIMITATIONS OF REPORT

We have prepared this report for the use of the **Defence Estate Organisation** in accordance with generally accepted consulting practice. No other warranty, expressed or implied, is made as to the professional advice included in this report. This report has not been prepared for the use by parties other than the client, the owner and their respective consulting advisors. It may not contain sufficient information for purposes of other parties or for other uses.

It is recommended that any plans and specifications prepared by others and relating to the content of this report or amendments to the original plans and specifications be reviewed by Dames & Moore to verify that the intent of our recommendations is properly reflected in the design.

Whilst to the best of our knowledge information contained in this report is accurate at the date of issue, subsurface conditions, including groundwater levels and contaminant concentrations, can change in a limited time. This should be borne in mind if the report is used after a protracted delay.

There are always some variations in subsurface conditions across a site which cannot be fully defined by investigation. Hence it is unlikely that the measurements and values obtained from the limited sampling and testing during the preliminary investigation will represent the extremes of conditions which exist within the site.

TABLE 1
GROUNDWATER MONITORING DATA

Well Number	Depth to Water (m)	Approximate Groundwater Elevation (mAHD)
BH1	Dry	-
BH2	5.13	71
BH3	8.51	46
BH4	6.72	43

TABLE 2
SURFACE WATER MONITORING DATA

Sample Location	Sample Identification	pH	Electrical Conductivity (µS/cm)
North-eastern site margin	SW-01	6.10	539.0
Upstream Dam South of Block N	SW-02	6.08	165.7
North-western Site Margin	SW-03	6.23	1103.0

TABLE 3
SUMMARY OF ANALYSES
FOR METALS IN SEDIMENT SAMPLES

Sample Identification	METALLIC ANALYTE CONCENTRATION (mg/Kg)							
	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
SED-01	4.6	<0.5	12	17	13	<0.1	5.2	34
SED-01D (Intralaboratory Duplicate of SED-01)	4.6	<0.5	11	18	13	<0.1	5.5	34
SED-02	5.6	<0.5	13	22	*47*	<0.1	6.5	71
SED-03	15	<0.5	15	23	14	<0.1	5	34
SED-04	5.6	<0.5	17	50	25	*0.78*	7	73
SED-05	11	<0.5	20	25	17	<0.1	<5	43
SED-06	12	<0.5	20	23	15	<0.1	<5	40
SED-07	6.6	<0.5	20	21	13	<0.1	6	29
SED-08	9	0.9	28	40	31	<0.1	7.8	*210*
SED-09	14	*1.2*	25	45	33	<0.1	*12*	95
SED-10	8.5	<0.5	20	28	24	<0.1	7.2	55
ANZECC/NHMRC Investigation Guidelines[1]	20	3	50	60	300	1	60	200
Maximum Concentration	15	1.2	28	50	47	0.78	12	210
Mean	8.77	0.40	18.27	28.36	22.27	0.12	6.11	65.27
Standard Deviation of Sample Concentrations	3.76	0.33	5.33	11.32	11.05	0.22	2.61	52.36
Mean plus two times the Standard Deviations	16.29	1.06	28.93	51.00	44.37	0.56	11.33	169.99

Notes: [1] Australian & New Zealand Guidelines for Assessment of Contaminated sites (January 1992)

Italicised sample concentrations fall outside of 2 standard deviations of the mean concentration

In cases were a compound was not detected, means and standard deviations have been calculated using a value equal to half of the detection limit.

Statistically, 95% of a normally distributed population would be expected to fall within 2 standard deviations of the mean of the population.

TABLE 4
SUMMARY OF ANALYSES
FOR METALS IN SURFACE WATER SAMPLES

Sample Identification	METALLIC ANALYTE CONCENTRATION (mg/l)							
	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
SW-01	<0.001	<0.001	<0.001	0.029	0.001	<0.0002	0.001	0.089
SW-01D (Intralaboratory Duplicate of SW-01)	<0.001	<0.001	<0.001	0.031	0.001	<0.0002	<0.001	0.085
SW-02	<0.001	<0.001	<0.001	0.02	0.001	<0.0002	0.001	0.092
SW-12 (Interlaboratory Duplicate of SW-02)	0.003	0.0002	0.001	0.001	0.001	Not Analysed	0.001	0.044
SW-03	0.002	<0.001	0.002	0.028	<0.001	<0.0002	<0.001	0.083
ANZECC Guidelines[1]	0.05	0.002	0.01	0.002-0.005	0.001-0.005	0.0001	0.015	0.005-0.05

Notes: 1 Australian & New Zealand Environment & Conservation Council Water Quality Guidelines for Protection of Fresh Water Aquatic Ecosystems (1982)

TABLE 5
SUMMARY OF PROPOSED PHASE II INVESTIGATIONS

Target Areas	No of Areas	Contaminants Of Concern	Investigative Approach	Estimated Number of Sampling Points
Unidentified Buried Waste and Buried Objects	Site-Wide	• Possible wide range of organics and inorganics	• Detailed visual inspection and recording of site observations; • Test pit investigation and judgmental soil sample collection on a 100 m grid across the site; • Analysis will be judgmental.	320 (approx. 130 samples for analysis)
Grenade Ranges	2	• UXO • Explosive Organics • Metals	• Clearing of vegetation, including the removal of low tree branches, on each area • Visual search of each suspected UXO area; • Shallow metal detector search of the whole of each suspected UXO area; • Quality control surveying of 10% of the area ; • Provision of a qualified Ordnance Technician to evaluate any ordnance discovered during the investigation • Removal and disposal of any UXO • Shallow soil sampling in areas where UXO or shrapnel fragments are most common (up to 2 samples per location, one at surface and one at the top of the clay). If no evidence of explosive ordnance is detected, at least 5 selected samples will be collected in each area for validation purposes; • Analysis of samples for metals and explosive organics.	Allow for a total of 20 samples
Small Arms Range	1	• Metals	• Excavation of five test pits into the stop-butt area to characterise the contamination • Sieving of samples of stop-butt material to determine metal content • Excavation of ten shallow test pits into the range area • Detailed logging of soil and collection of representative soil samples at two depths; • Completion of a programme of laboratory analyses focusing on metals, in particular lead, copper, tin, silver and mercury.	30

TABLE 5 (continued)
SUMMARY OF PROPOSED PHASE II INVESTIGATIONS

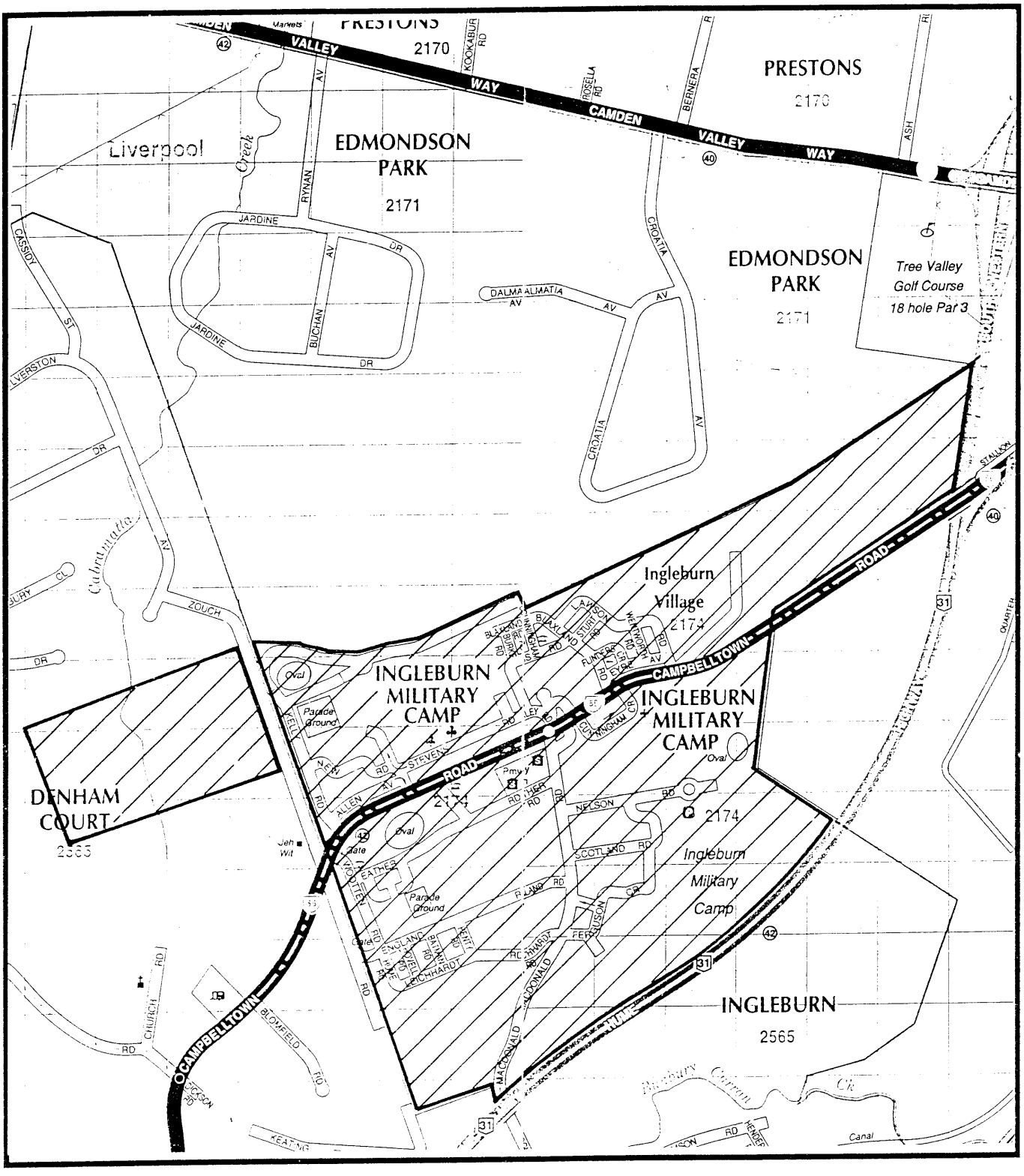
Target Areas	No of Areas	Contaminants Of Concern	Investigative Approach	Estimated Number of Sampling Points
Underground Storage Tanks	20	• Petroleum Hydrocarbons • BTEX • Metals	• Physical inspection of sites to locate USTs • General Screening by magnetometer • Removal & disposal of USTs, associated services and contaminated soil from each area; • Validation sampling of soils from excavation surfaces • Backfilling with soil/clean fill • Analysis of up to five soil samples from each tank pit excavation (one from base and one from each wall) in accordance with NSW EPA recommendations. • Ex-situ bioremediation of contaminated soils.	100
Maintenance Compounds & Large POL Stores	8	• Petroleum Hydrocarbons • BTEX • Metals • Degreasing Agents • Waste Disposal	• General Screening using geophysical methods to identify anomalies • Excavation of test pits to investigate any anomalies and to provide a general characterisation of the area; • Detailed logging and field screening of soil and collection of representative soil samples; • Analysis of samples for TPH/BTEX, Chlorinated Solvents, Metals	average of 8 test pits per area
Transformers & Switchgear	Approx. 10	• PCBs • Petroleum Hydrocarbons	• Surface or shallow soil sampling in close proximity to the transformers/switchgear • Submission of up to two samples for analysis for PCBs and TPH	Allow an average of 2 sample locations per area
Poisons Shed	1	• Unknown	• Collection of up to five soil or swab samples from within or immediately around the shed; • Analysis for unknown semivolatile compounds and unknown volatile compounds.	5
Filled Area East of Sewage Works	1	• Putrescible Matter • Possible wide range of organics & inorganics	• Excavation of up to 10 shallow test pits to provide a general characterisation of the area. • Detailed logging of soil/fill and collection of representative fill and/or soil samples; • Analysis of samples for TPH/BTEX, metals, ammonia and asbestos, organics.	10

TABLE 5 (continued)
SUMMARY OF PROPOSED PHASE II INVESTIGATIONS

Target Areas	No of Areas	Contaminants Of Concern	Investigative Approach	Estimated Number of Sampling Points
Suspected Waste Burial Area Close To The North Western Site Margin	1	• Putrescible Matter • Possible wide range of organics & inorganics	• Geophysical survey by magnetometer on a ten metre line spacing; • Test pit investigation and soil sampling of major anomalies • Analysis of samples for TPH/BTEX, metals, ammonia and asbestos, organics	Assume 20 test pits
Nursery/Ground Maintenance Compound	1	• Pesticides • Herbicides • Metals	• Collection of representative soil samples from up to seven locations. Two samples to be collected at each location, one close to the surface and one from approximately 500 mm depth. • Analysis of samples for TPH/BTEX, metals, pesticides & herbicides.	7
Building Margins	Not Defined	• Lead • Zinc • Pesticides • Herbicides	• Collection (in accordance with sampling guidelines) of representative surface soil samples from up to 30 locations around existing and demolished buildings; • Analysis of samples for metals.	30
Site area road margins, fencelines, parade grounds and ovals	Not Defined	• Pesticides • Herbicides • Metals	• Collection of representative soil samples from up to 45 locations. Samples to be collected from within 100 mm of the ground surface; • Analysis of samples for Herbicides, pesticides and metals	Allow 50 samples
Site Groundwater	Not Defined	• Metals • Petroleum Hydrocarbons • Solvents	• Purging and sampling of existing groundwater wells. New wells will only be required in the event of substantial soil contamination being present; • Assume 10 new wells to be constructed, developed and samples in areas of substantial soil contamination. • Analysis of samples from existing wells for metals, TPH/BTEX and volatile organic compounds • Analysis of samples from all new wells for metals and TPH/BTEX. Assume analysis of four samples from the new wells for the Full Analytical Suite[1]	13

TABLE 5 (continued)
SUMMARY OF PROPOSED PHASE II INVESTIGATIONS

Target Areas	No of Areas	Contaminants Of Concern	Investigative Approach	Estimated Number of Sampling Points
Fly Tipped Material	Not Defined	• Putrescible Matter • Possible wide range of organics & inorganics	• Detailed walk over survey of site • Mapping of waste distribution • Collection of 20 waste samples • Analysis of all samples for metals and TPH/BTEX • Analysis of five samples for the full analytical suite[1] and TCLP[2] for metals/petroleum hydrocarbons	20
QA/QC of Laboratory Programme			• 5% Interlaboratory and 5% Intralaboratory duplicates for soil samples • 10% Interlaboratory duplicates, 10% Intralaboratory duplicates for groundwater samples • Rinsate blanks and trip blanks for groundwater samples	



SOURCE: GREGORY'S SYDNEY STREET DIRECTORY, 60th EDITION

DEPARTMENT OF DEFENCE GEOTECHNICAL & ENVIRONMENTAL REVIEW INGLEBURN DEFENCE SITE	SITE LOCATION MAP

DCM GROUP DAMES & MOORE PTY LTD A DAMES & MOORE COMPANY	FILE: DOD-A4.DWG DATE: 13/7/98 REVISION: 0	12343-063-070	FIGURE 1

ZOUCH ROAD

SUSPECTED GRENADE RANGE

BARDIA BARRACKS

BLOCK F

BLOCK D

BLOCK E

CAMPBELTOWN

BLOCK B

INGLEBURN VILLAGE

BLOCK A

ROAD

SEWERAGE TREATMENT PLANT

DAMS

TO LIVERPOOL

FORMER HOSPITAL

BLOCK M

BLOCK N

DAMS

BLOCK J

BLOCK L

BLOCK O

FORMER MALARIA RESEARCH UNIT

GROUND MAINTENANCE AREA

BLOCK G

ROAD

BLOCK H

BLOCK I

BLOCK K

BARDIA VILLAGE

FREEWAY

GRENADE RANGE

TO CAMPBELTOWN

McDONALD

DAM

WESTERN

SMALL ARMS RANGE

SOUTH

0 200 400m

APPROX. SCALE

LEGEND

SURFACE WATER

SITE BOUNDARY

DEPARTMENT OF DEFENCE
GEOTECHNICAL & ENVIRONMENTAL REVIEW
INGLEBURN DEFENCE SITE

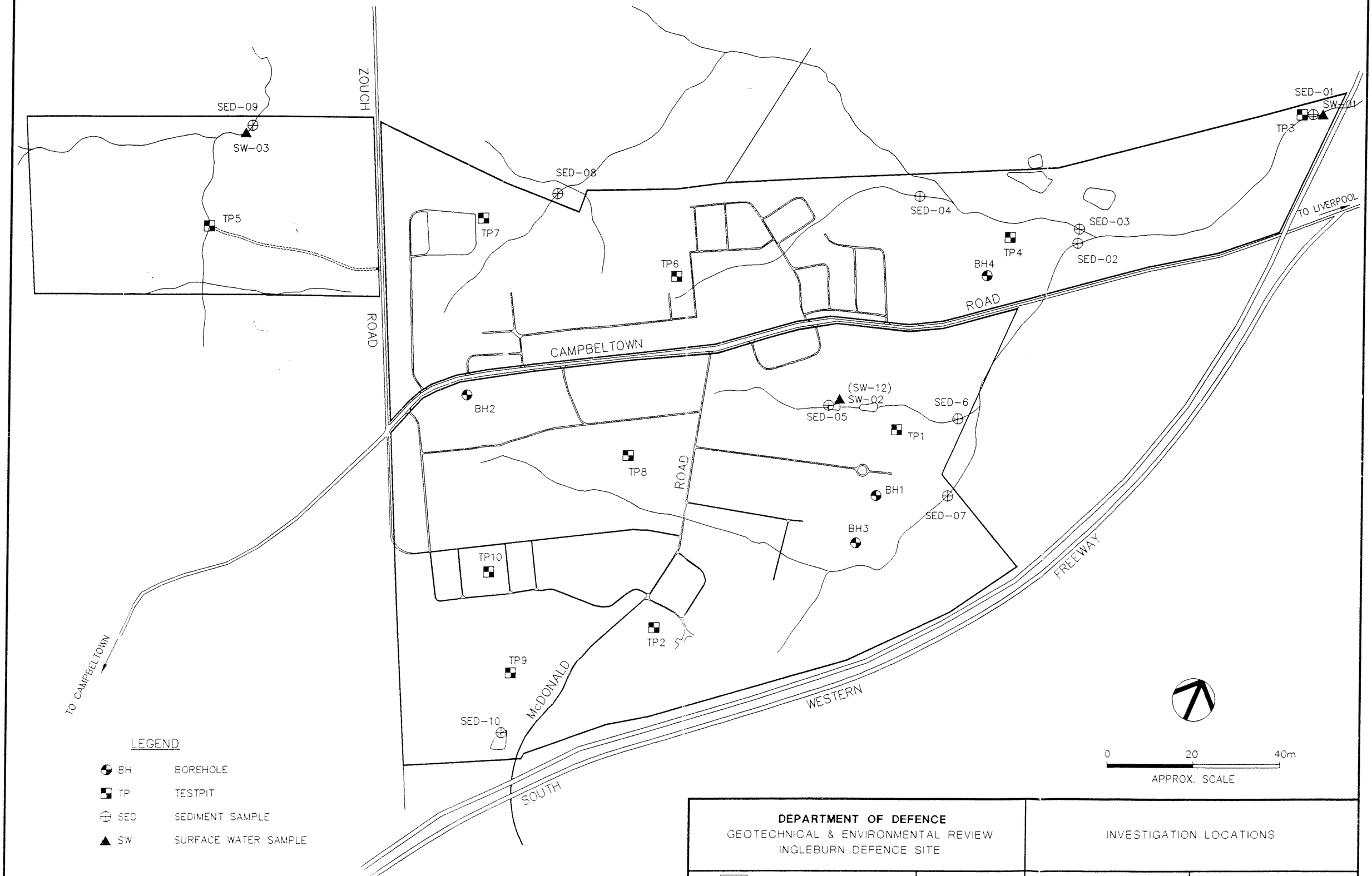
SITE PLAN

DAMES & MOORE pty LTD
A DAMES & MOORE COMPANY

FILE: DOD-PLAN.DWG
DATE: 14/7/98
REVISION: 0

12343-063-070

FIGURE 2



DEPARTMENT OF DEFENCE
GEOTECHNICAL & ENVIRONMENTAL REVIEW
INGLEBURN DEFENCE SITE

INVESTIGATION LOCATIONS

DCM GROUP DAMES & MOORE Pty LTD
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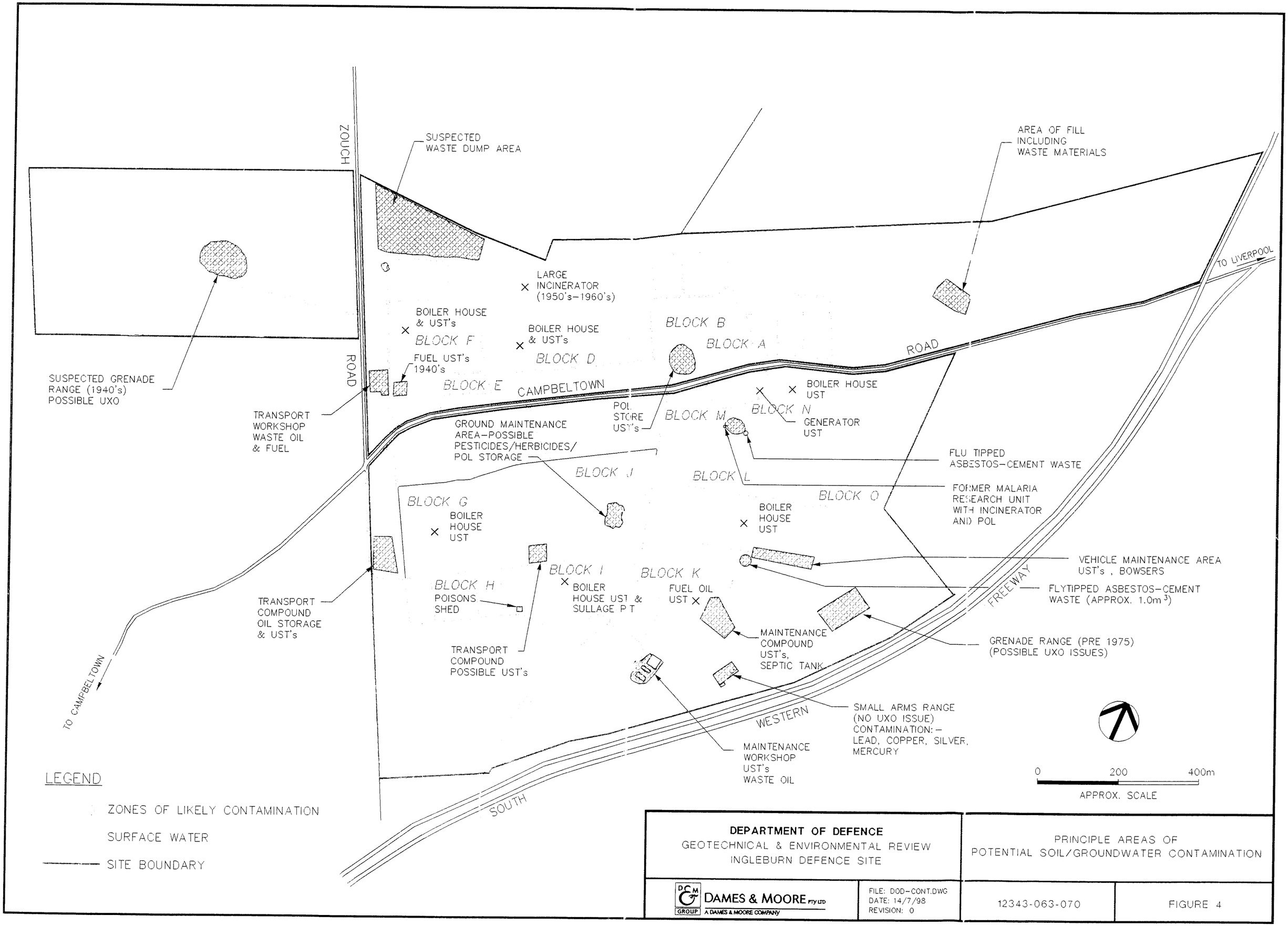
FILE: DOD-SAMP.DWG
DATE: 14/7/98
REVISION: 0

12343-063-070

FIGURE 3



DEPARTMENT OF DEFENCE
GEOTECHNICAL & ENVIRONMENTAL REVIEW
INGLEBURN DEFENCE SITE

PRINCIPLE AREAS OF POTENTIAL SOIL/GROUNDWATER CONTAMINATION

DAMES & MOORE PTY LTD
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FILE: DOD–CONT.DWG
DATE: 14/7/98
REVISION: 0

12343-063-070

FIGURE 4

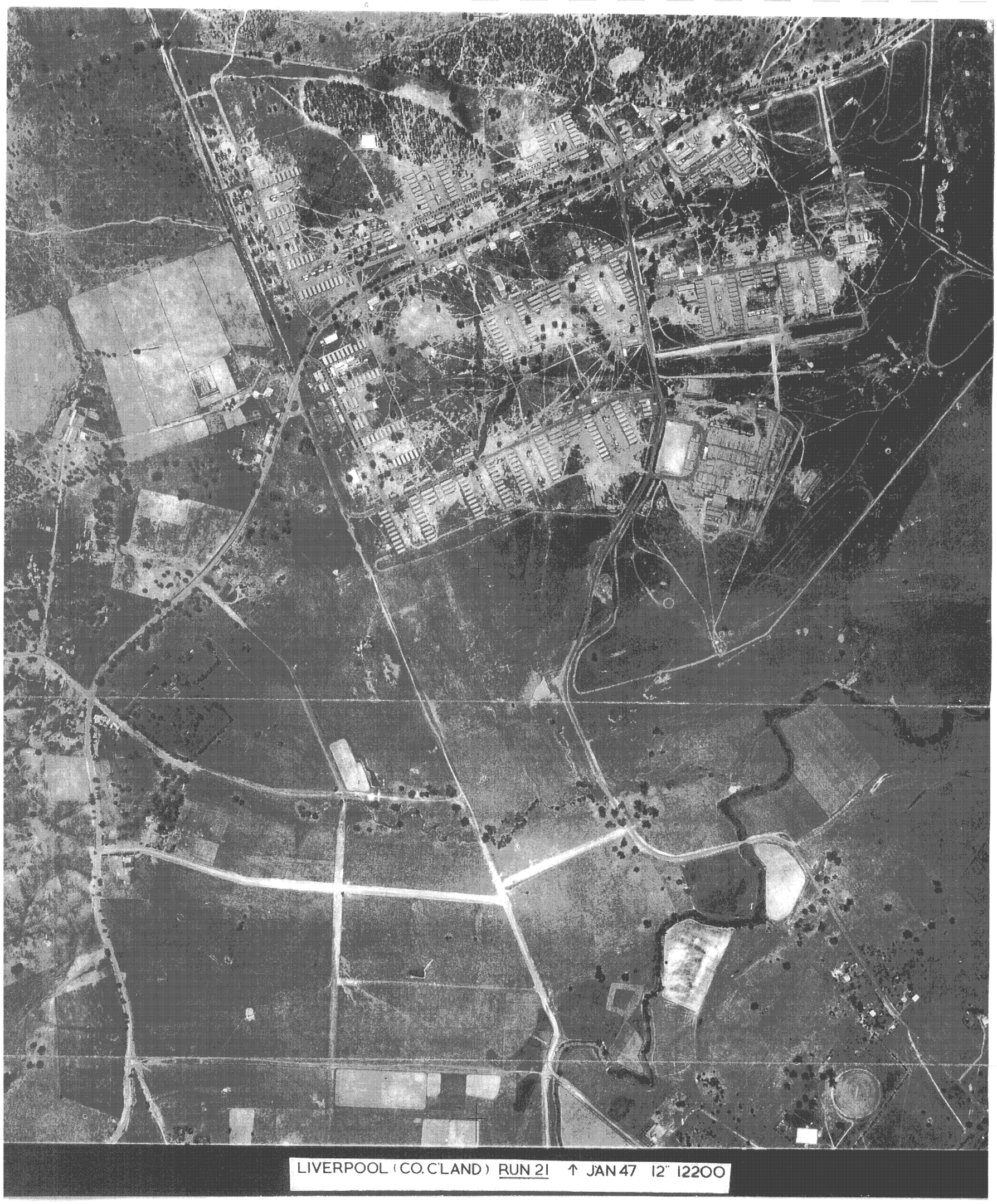
Appendix A

Information Sources

List of Information Contacts & Interviewees

Unit	Questionnaire	Telephone Interview	Personal Interview
• 1/19 RNSWR, Bravo Co.	X		
• BASB (Brigade Admin. Support Battalion)	X	X	
• 23 Field Regiment	X	X	
• 812 Medium Regiment	X		
• 1 Combat Support Services Battalion	X		
• Army Malaria Research Unit	X	X	
• 8 Signal Regiment			
• School of Infantry	X	X	
• 1/15 RNSWR		X	
• 4/3 RNSWR			X
• 2 Training Battalion			X
• The Army Museum Society, Victoria Barracks, Sydney			X
• Military Police - Holdsworthy	X	X	
• Military Librarian - Holdsworthy		X	X
• Historian at Victoria Barracks		X	
• Command Architect - CAD Manager		X	
• United Photo & Graphic Services P/L (AUSLIG)		X	

Note: All returned questionnaires that indicated detailed site knowledge were followed up with telephone interviews. In many cases, however, the units were unable to provide any substantial assistance.



LIVERPOOL (CO. C'LAND) RUN 21 ↑ JAN 47 12" 12200


7/7/70
UAg 1001 152,37

Appendix B

Field Methodology

APPENDIX B
FIELD METHODOLOGY

1. OVERVIEW

The programme comprised 4 boreholes, 10 test pits, 3 surface water samples and ten sediment samples collected from selected locations across the site. Sample locations are shown in **Figure 3**. The boreholes were extended to groundwater, occurring at depth in the shale. To be cost effective, basic geotechnical testing (Standard Penetration Tests) were conducted in the bores and the bores/testpits were logged geotechnically in accordance with the Unified Soil Classification System (USCS). The boreholes were equipped as groundwater monitoring wells. Soil samples were screened for organic vapours in the field but no samples were taken for chemical laboratory analysis.

2. INVESTIGATION LOCATIONS

Prior to the commencement of intrusive investigations (borehole drilling or test pitting) at any location, a specialist subcontractor cleared the proposed work area with respect to underground services.

3. TEST PITS

Test pits were constructed to a maximum depth of 3m below ground level using a backhoe excavator operated under the direction of a qualified engineer. Grab samples were collected from the walls or base of a test pit or from the bucket of the backhoe. Samples were collected from the centre of the excavator bucket, as this soil was less likely to have come into direct contact with the bucket. Samples from the walls of the test pits were taken from a freshly exposed surface after scraping back any soil which may have been cross-contaminated by the action of the backhoe bucket.

The soil and sediment sampling procedure was as follows:

1. A test pit log and Sampling Record Form was prepared.
2. Equipment was laid out on plastic sheeting adjacent to sampling location;
3. It was ensured that all sampling equipment had been decontaminated before use at each new location.
4. Vegetation, leaves, debris and other surface material not designated for sampling was removed from the vicinity of the sample location.

5. The sampling excavation was conducted to the required sampling depth.

6. The sample was recovered over required sampling interval with the backhoe bucket or directly using a stainless steel trowel.

7. For test pit samples, ambient temperature headspace testing was conducted on the sample using a portable photoionsation detector.

10. A lithological log was prepared for all test pits.

11. A Sampling Record Form was completed.

12. All items which had made contact with the sample were either discarded or decontaminate before proceeding to the next sampling location.

4. BOREHOLES

The borehole drilling programme was completed using a combination of solid stem augers with a blade bit and, down hole air hammer drilling to groundwater. All works were completed under the direction of a qualified engineer. Standard penetration testing (SPT) was undertaken at regular half metre to one-metre intervals above the rock surface, or until refusal was reached. The boreholes were logged in accordance with the provisions of the Unified Soil Classification System (USCS).

5. WELL CONSTRUCTION

The groundwater wells were constructed using 50mm ID UPC "Aquascreen", with 400µm slots every 10mm to approximately 1m above the depth at which water was encountered during drilling. The remainder of the well was backfilled with washed and graded 2mm sand over the screened interval and above this with bentonite pellets. The top of each well was sealed with cement and finished with a road-box.

Where possible wells were constructed in a manner that allowed the determination of the elevation of the phreatic surface associated with the regional shallow groundwater body rather than any local perched water.

Detailed construction of each monitoring well can be found in the borehole logs in **Appendix A**.

6. SEDIMENT SAMPLE COLLECTION

10 sediment samples were collected and analysed, at the locations shown approximately on **Figure 3**.

The sampling procedure when collecting sediment samples was as follows:

1. Prepare a Sampling Record Form.

2. Ensure all equipment to be used for sampling was decontaminated.

3. Remove surface debris and other surface material not designated for sampling from the vicinity of the sample location.

4. Push sediment sampler 1m (or to refusal) into the sediment by hand.

5. Use vacuum to withdraw the tube and sample with minimum disturbance and place end caps on the tube.

6. Carefully extrude the sample into a stainless steel tray;

13. If appropriate, collect a sample for ambient temperature headspace.

14. Collect required sub-samples of core and place in appropriate sample containers. Samples for each sample point were collected in order of most volatile to least volatile parameters. The preferred collection order was as follows:

- Volatile organics such as BTEX, chlorinated solvents and short chain total petroleum hydrocarbons;
- Semivolatile organic compounds such as polycyclic aromatic hydrocarbons, phenols and explosive hydrocarbons;
- Pesticides;
- Long chain total petroleum hydrocarbons
- Metals and Asbestos;

10. Immediately cover the sample jars with the Teflon lined jar lid provided.

11. Lithologically log all samples and borings.

12. Label the jars and store in a cocled esky.

13. Complete a Chain of Custody documentation and Sample Record Forms.

15. All items which contacted the sample were either discarded or decontaminated before proceeding to the next sampling location.

7. SURFACE WATER SAMPLE COLLECTION

3 surface water samples were collected at the locations shown approximately on **Figure 3**.

Stream samples were collected as far from the bank as possible, by wading into the stream.

Dam samples were taken as far from the bank as practicable.

Grab samples were collected using a hand-held plastic scoop or bottle, depending on the depth of water. Volatile organic sample containers were filled directly from the source by dipping the sample container directly into the liquid. Care was taken to minimise aeration of the water during sampling.

Where possible, both stream and dam water grab samples were taken at a depth of about 30cm, plunging the sampling device (bottle) beneath the surface to avoid sampling of the surface film.

The following procedures were generally followed in the collection of surface water samples:

1. Prepare field record sheets and record relevant data in field logbook.

2. Lay out equipment on plastic sheeting adjacent to sampling location to prevent direct contact with the ground surface

3. Measure and record water depth and time of measurement, if appropriate.

4. Collect sample by appropriate method.

5. Measure pH, conductivity, and temperature.

6. Samples for each sample point were collected in order of most volatile to least volatile parameters. The preferred collection order was as follows:
   - Volatile organics such as BTEX, chlorinated solvents and short chain total petroleum hydrocarbons;
   - Semivolatile organic compounds such as polycyclic aromatic hydrocarbons, phenols and explosive hydrocarbons;
   - Pesticides;
   - Long chain total petroleum hydrocarbons
   - Dissolved metals;

7. Filter and/or preserve the sample as appropriate.

8. Label sample bottle with appropriate labels

9. Place the properly labelled sample bottle in an appropriate carrying container on ice.

10. All items which contacted the sample were either discarded or decontaminated before proceeding to the next sampling location. This included items such as sampling equipment, gloves, and beakers.

11. Complete chain of custody documents and sampling record forms.

8. FIELD DECONTAMINATION PROCEDURE

Equipment that typically required decontamination included: hand augers; composite trays; push and drive samplers eg SPT split spoon sampler; trowels; bailers; drill rods; PVC casing etc. Equipment decontaminated by others (eg drillers) was checked to ensure that it had been cleaned to an acceptable standard before use.

Decontamination was undertaken by detergent wash and water rinse using the following equipment:

- Laboratory (phosphate-free) detergent or DECON-90;
- Tap water and deionised water;
- Buckets or tubs (sufficient for size of equipment to be cleaned);
- Stiff brushes for cleaning.

All sampling equipment will be decontaminated before use, between each sample, and at the completion of the sampling programme. The following procedures were followed for decontamination of sampling equipment:

1. Buckets or tubs used for decontamination were cleaned with tap water and detergent and rinsed with tap water before sampling commenced.
2. The first bucket was filled with tap water and phosphate free detergent.
3. A second bucket was filled with tap water.
4. All equipment was cleaned thoroughly in detergent water and then rinsed in tap water.
5. Equipment was dried with disposable towels.
7. Equipment was then rinsed by thoroughly spraying with distilled water and allowed to air dry.
8. Water and detergent solution was changed after each sampling site.

Equipment that could not be thoroughly decontaminated using the detergent wash and water rinse was not used for further sampling. Any equipment that could not be decontaminated to the satisfaction of the sampling team was discarded and replaced.

9. SAMPLE HANDLING, PRESERVATION, STORAGE AND SHIPMENT

Immediately after sealing and labelling, the samples were placed in a refrigerator or "esky". The esky was provided with sufficient ice or ice bricks to keep the water samples at a temperature of at most 4 degrees Celsius.

Temporary storage of all samples collected during the fieldwork was undertaken in accordance with the following protocol:

1. Placement of the sample inside a cooled esky.
2. Transfer of samples to a fridge at the end of each day to await shipment to the laboratory. Samples were not be placed in the freezer section of the fridge.

Water sample preservation was carried out in general accordance with the protocols set out in the Standards Association requirements for "Selection of Containers and Preservation of Water Samples For Chemical and Microbiological Analysis" in AS 2031.1 and 2031.2-1986. Water samples for metals analysis were filtered in the field prior to acidification.

The esky was cooled by using ice bricks or similar. When ice was used to cool eskies the sample containers were not placed directly in contact with the ice, as it may result in freezing of the sample which could affect the integrity of the sample, or could cause cracking of the glass sample jars and loss of the sample.

At the completion of each sampling event, samples for analysis were forwarded to the testing laboratory as soon as possible.

Samples to be sent for analysis were placed in a cooled esky for preservation during the shipment to the testing laboratory. The esky was sealed and packaged by the field staff prior to shipment, and labeled to indicate that the contents were fragile. All containers were shipped and delivered to the laboratory via a public courier company.

All shipment containers were sealed and clearly addressed to the selected laboratory representative responsible for the project. Samples were delivered to the laboratory so that the requested analyses could be performed within the specified allowable holding time.

A Chain of Custody (CoC) Form accompanied the shipment of samples to the testing laboratory. The form was prepared and signed by the Dames & Moore field supervisor sending the sample. Authorised laboratory personnel acknowledged receipt of shipment by signing and dating the form and returning a copy to the Dames & Moore Project Manager.

10. SURVEY

Sampling locations were approximately located relative to the Australian datum by use of a hand held Global Positioning System receiver.

11. MONITORING

Monitoring for volatile organic compounds (VOC's) was conducted during all excavations using a Microtip Photoionisation Detector (PID) using a 10.6eV lamp.

Appendix C

Borehole and Testpit Logs

PROJECT: DEFENCE FORCE – INGLEBURN	TEST PIT: TP1	SHEET 1 of 1
Surface elevation: –	Test Pit location: 33°58'61"	
Date: 13/5/98 Logged by: A.B.	Excavation method: Backhoe Checked by: –	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	FIELD MONITORING	SAMPLE INTERVALS
(FILL): sandy clay; brown; low plasticity; moist; sand fine grained; roots	0.0		CL	mc < pl	
CLAY: red/ orange, some grey, medium plasticity; moist; trace roots; no odour.	0.5		CL	mc < pl	
	1.0				
CLAY: grey; some orange; dry–moist; medium plasticity; no odour.	1.5		CL	mc < pl	
SHALE: grey/orange; extremely weathered; dry; dry–moist; medium plasticity; no odour.				mc < pl	
TEST PIT TERMINATED AT 1.9m. TARGET DEPTH					

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TEST PIT LOG

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PROJECT: DEFENCE FORCE – INGLEBURN	TEST PIT: TP2	SHEET 1 of 1
Surface elevation: –	Test Pit location: 33°59'01"; 150°51'62"	
Date: 13/5/98 Logged by: A.B.	Excavation method: Backhoe Checked by: –	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	FIELD MONITORING	SAMPLE INTERVALS
(FILL): clayey sand; brown/yellow; fine; moist; some gravel; roots	0.0		SC		
CLAY: brown/orange; medium plasticity; moist soft; trace roots.	0.5		CL	mc < pl	
SHALE: grey/white; medium plasticity; dry; highly weathered	1.0		CL	mc < pl	
SHALE: pink/yellow; moderately weathered.	1.5				
TEST PIT TERMINATED AT 1.8m. TARGET DEPTH					

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TEST PIT LOG

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PROJECT: DEFENCE FORCE – INGLEBURN	TEST PIT: TP3	SHEET 1 of 2
Surface elevation: –	Test Pit location: 33°57'89"S; 150°52'37"E	
Date: 13/5/98 Logged by: A.B.	Excavation method: Backhoe Checked by: –	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	FIELD MONITORING	SAMPLE INTERVALS
CLAYEY SAND: brown; fine grained; moist; trace roots.	0.0		SC		
SANDY CLAY: brown low plasticity; moist; roots; becoming grey.	0.5		CL	mc < pl	
CLAY: yellow & white mottled; medium plasticity moist; soft; no odour.	1.0			mc < pl	
	1.5				

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PROJECT: DEFENCE FORCE – INGLEBURN	TEST PIT: TP3	SHEET 2 of 2
Surface elevation: –	Test Pit location: 33°57'89"S; 150°52'37"E	
Date: 13/5/98 Logged by: A.B.	Excavation method: Backhoe Checked by: –	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	FIELD MONITORING	SAMPLE INTERVALS
water seeping into TP; becoming hard; some ironstone.	2.0 2.5				
TEST PIT TERMINATED AT 2.95m.	3.0 3.5				

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PROJECT: DEFENCE FORCE – INGLEBURN	TEST PIT: TP4	SHEET 1 of 1
Surface elevation: –	Test Pit location: 33°58'25"S; 150°51'91"E	
Date: 13/5/98 Logged by: A.B.	Excavation method: Backhoe Checked by: –	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	FIELD MONITORING	SAMPLE INTERVALS
(FILL): sandy clay; medium plasticity; moist; soft; pieces of wood; plastic; garbage; bottles; hose piping water in hole	0.0 0.5 1.0		CL	mc < pl	
CLAY: white trace red; medium plasticity; moist–wet; some ironstone.	1.5		CL	mc > pl	
TEST PIT TERMINATED AT 1.85m					

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PROJECT: DEFENCE FORCE – INGLEBURN	TEST PIT: TP5	SHEET 1 of 1
Surface elevation: –	Test Pit location: 33°58'5€"S, 150°50'57"E	
Date: 13/5/98 Logged by: A.B.	Excavation method: Backhoe Checked by: –	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	FIELD MONITORING	SAMPLE INTERVALS
CLAY: yellow/brown; medium plasticity; moist; soft; no odour.	0.0 0.5 1.0		CL	mc = pl	
SHALY CLAY: orange/brown; medium plasticity; moist; hard; some ironstone; layering bands.	1.5		LL	mc < pl	
SHALE: brown/red; moderate weathered; some ironstone. TEST PIT TERMINATED AT 1.95m					

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PROJECT: DEFENCE FORCE – INGLEBURN	TEST PIT: TP6	SHEET 1 of 1
Surface elevation: –	Test Pit location: 33°58'52"S, 150°51'30"E	
Date: 13/5/98 Logged by: A.B.	Excavation method: Backhoe Checked by: –	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	FIELD MONITORING	SAMPLE INTERVALS
CLAYEY SAND: brown; fine; moist; clay medium plasticity soft; roots.	0.0		SC		
CLAY: red; medium plasticity; dry–moist; stiff; no odour.	0.5			mc < pl	
CLAY: grey/white; low plasticity; dry.			CL	mc < pl	
SHALE: brown/red; moderate weathered; some ironstone bands hard.	1.5				
TEST PIT TERMINATED AT 1.8m					

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PROJECT: DEFENCE FORCE – INGLEBURN	TEST PIT: TP7	SHEET 1 of 1
Surface elevation: –	Test Pit location: 33°58'41"S, 150°51'27"E	
Date: 13/5/98 Logged by: A.B.	Excavation method: Backhoe Checked by: –	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	FIELD MONITORING	SAMPLE INTERVALS
CLAYEY SAND: brown; fine grained; moist.	0.0		SC		
CLAY: red; medium plasticity; moist; stiff; no odour.	0.5		CL	mc < pl	
CLAY: yellow; medium plasticity; dry moist; very stiff no odour.	1.0			mc < pl	
SHALE: brown/red; moderate weathered; some ironstone bands hard.					
SANDSTONE: yellow; fine grained; highly weathered; dry.					
TEST PIT TERMINATED AT 1.45m. REFUSAL	1.5				

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PROJECT: DEFENCE FORCE – INGLEBURN	TEST PIT: TP8	SHEET 1 of 1
Surface elevation: –	Test Pit location: 33°58'81"S, 150°51'26"E	
Date: 13/5/98 Logged by: A.B.	Excavation method: Backhoe Checked by: –	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	FIELD MONITORING	SAMPLE INTERVALS
CLAY: brown; low plasticity; moist; very soft; no odour.	0.0		CL	mc < pl	
	0.5				
CLAY: grey/white with red; medium plasticity; very moist; very soft, no odour; some ironstone; H_2O in test pit.				mc > pl	
	1.0				
becoming dry and hard	1.5				
SHALY CLAY: grey some red; low plasticity; dry; stiff.				mc < pl	
TEST PIT TERMINATED AT 2.0m.					

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PROJECT: DEFENCE FORCE – INGLEBURN	TEST PIT: TP9	SHEET 1 of 1
Surface elevation: –	Test Pit location:	
Date: 13/5/98 Logged by: A.B.	Excavation method: Backhoe Checked by: –	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	FIELD MONITORING	SAMPLE INTERVALS
CLAYEY SAND: brown; fine grained; moist; roots; no odour.	0.0		SC	TP PID = 0	
CLAY: red/brown; medium plasticity; dry–moist; stiff; no odour; trace roots.	0.5		CL	mc < pl	
CLAY: yellow/white; medium plasticity; dry; friable; some sand very fine grained; no odour.	1.0			mc < pl	
SHALY CLAY: grey/white; dry; very stiff; no odour.					
SHALE: yellow/white; slightly weathered; very hard; no odour.					
TEST PIT TERMINATED AT 1.2m. REFUSAL.	1.5				

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PROJECT: DEFENCE FORCE – INGLEBURN	TEST PIT: TP10	SHEET 1 of 2
Surface elevation: –	Test Pit location: HORSE PADDOCK	
Date: 13/5/98 Logged by: A.B.	Excavation method: Backhoe Checked by: –	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	FIELD MONITORING	SAMPLE INTERVALS
GRASS COVER SANDY CLAY: dark brown; medium moist; vary soft; roots; no odour; (top soil)	0.0		SC	TP PID = 0 mc < pl	
CLAY: grey/brown; medium plasticity; moist; soft; some grvel(max dia.5mm); trace sand; trace roots; no odour.	0.5		CL	mc < pl	
CLAY: yellow/brown; medium plasticity; moist; vary soft; trace roots; no odour.	1.0			mc < pl	
trace ironstone	1.5				

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PROJECT: DEFENCE FORCE – INGLEBURN	TEST PIT: TP10	SHEET 2 of 2
Surface elevation: –	Test Pit location: HORSE PADDOCK	
Date: 13/5/98	Excavation method: Backhoe	
Logged by: A.B.	Checked by: –	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	FIELD MONITORING	SAMPLE INTERVALS
	2.0				
SHALY GRAVELLY CLAY: red/yellow/brown; low plasticity; dry–moist.				TP PID = 0	
	2.5				
SANDSTONE: red/yellow; dry; vary fine; moderately weathered; dry.					
extremly weathered shale; gravel consists of ironstone(<15mm dia); no odour.				mc < pl	
	3.0				
SHALE: red/yellow/brown; dry; moderately weathered; ironstone bonds.					
TEST PIT TERMINATED AT 3.1m					
	3.5				

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PROJECT: DEFENCE FORCES – INGLEBURN	BOREHOLE: BH1	SHEET 1 of 3
Surface elevation: –	Borehole location: 33°58'64",150°51'73"	
Date: 4/5/98	Drill type: P160	
Logged by: A.B. Checked by: –	Drilling method: Auger	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	WELL CONSTRUCTION	FIELD MONITORING	SAMPLE INTERVALS
CLAY: brown; low plasticity; dry to most; moisture content< plastic limit; stiff to firm; no odour	0.0		CL		SPT 2,3,4 N=7	
					SPT 5,7,16 N=23	
CLAY: grey with some brown; low plasticity; dry; moisture content<plastic limit; stiff; no odour	1.0					
: some grey & brown layering					SPT 3,13,11 N=24	
SHALE: grey; extremely weathered; very dry; some siltstone			ML		SPT 21 (refusal after 130mm)	
: some brown/orange clay	2.0					
	3.0					
: dark grey	4.0					

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PROJECT: DEFENCE FORCES – INGLEBURN	BOREHOLE: BH1	SHEET 2 of 3
Surface elevation: –	Borehole location: 33°58'64",150°51'73"	
Date: 4/5/98	Drill type: P160	
Logged by: A.B. Checked by: –	Drilling method: Auger	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	WELL CONSTRUCTION	FIELD MONITORING	SAMPLE INTERVALS
SHALE: grey; extremely weathered; very dry; some siltsone	4.0		ML			
: very hard to auger	5.0					
: trace ironstone	6.0					
: becoming harder	7.0					
: dark grey						

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PROJECT: DEFENCE FORCES – INGLEBURN	BOREHOLE: BH1	SHEET 3 of 3
Surface elevation: –	Borehole location: 33°58'64",150°51'73"	
Date: 4/5/98	Drill type: P160	
Logged by: A.B. Checked by: –	Drilling method: Auger	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	WELL CONSTRUCTION	FIELD MONITORING	SAMPLE INTERVALS
SANDSTONE: white	8.0		SST			
BOREHOLE TERMINATED AT 9.0m AUGER REFUSAL. WELL INSTALLED.	9.0 10.0 11.0					

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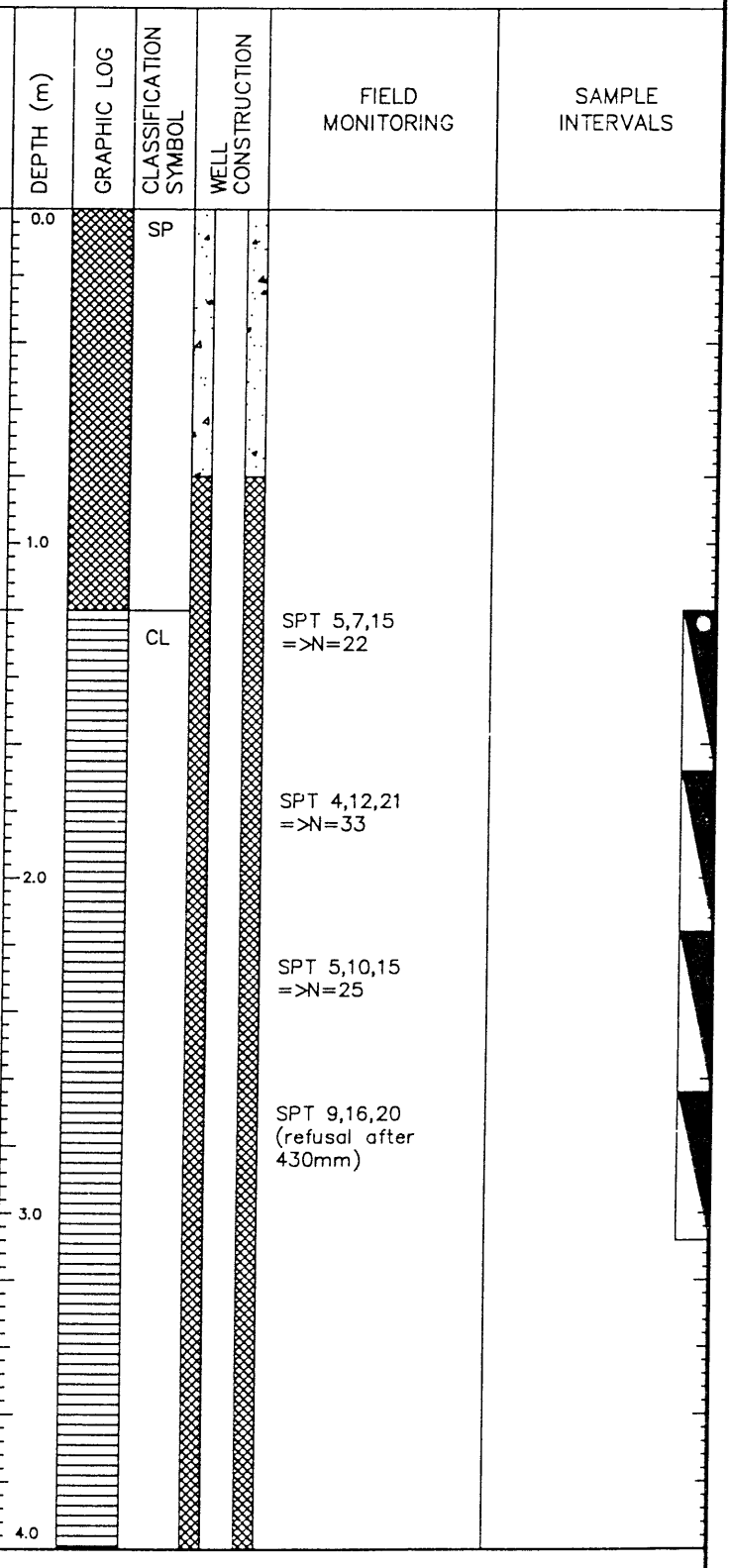
PROJECT: DEFENCE FORCES – INGLEBURN	BOREHOLE: BH2	SHEET 1 of 3
Surface elevation: –	Borehole location: 33°58'74",150°51'08"	
Date: 4/5/98	Drill type: P160	
Logged by: A.B. Checked by: –	Drilling method: Auger	



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PROJECT: DEFENCE FORCES – INGLEBURN	BOREHOLE: BH2	SHEET 2 of 3
Surface elevation: –	Borehole location: 33°58'74",150°51'08"	
Date: 4/5/98	Drill type: P160	
Logged by: A.B. Checked by: –	Drilling method: Auger	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	WELL CONSTRUCTION	FIELD MONITORING	SAMPLE INTERVALS
	4.0		CL			
SHALE: grey/brown; medium plasticity; extremely weathered; very dry; some ironstone; no odour			ML			
	5.0					
	6.0					
: black; no ironstone; trace coal	7.0					
: grey/brown; no ironstone						

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PROJECT: DEFENCE FORCES – INGLEBURN	BOREHOLE: BH2	SHEET 3 of 3
Surface elevation: –	Borehole location: 33°58'74",150°51'08"	
Date: 4/5/98	Drill type: P160	
Logged by: A.B. Checked by: –	Drilling method: Auger	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	WELL CONSTRUCTION	FIELD MONITORING	SAMPLE INTERVALS
SHALE: grey/brown; no ironstone	8.0		SST			
: some moisture; very soft	9.0					
: moist; very hard	10.0					
: moist; very hard; moisture content<plastic limit	11.0					Steam off auger
: very wet						
BOREHOLE TERMINATED AT 12.0m. TARGET DEPTH. WELL INSTALLED.						

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PROJECT: DEFENCE FORCES – INGLEBURN	BOREHOLE: BH3	SHEET 1 of 3
Surface elevation: –	Borehole location: 33°58'74",150°51'08"	
Date: 5/5/98	Drill type: P160	
Logged by: A.B. Checked by: –	Drilling method: Auger	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	WELL CONSTRUCTION	FIELD MONITORING	SAMPLE INTERVALS
FILL (SANDY CLAY): brown; low plasticity; dry; moisture content<plastic limit; firm to stiff; sand fine grained; some gravel (max dia 10mm); no odour	0.0		CL		SPT 4,7,6 =>N=13	
	1.0				SPT 2,1,2 =>N=3	
					SPT 2,2,3 =>N=5	
CLAY: brown, some red; medium plasticity; moist; moisture content<plastic limit; stiff; no odour	2.0		CL		SPT 2,5,6 N=11	
					SPT 2,4,6 N=10	
CLAYEY SANDSTONE: yellow/white; fine grained; extremely weathered; clay medium plasticity; dry; moisture content< plastic limit; no odour	3.0		CL		SPT 12,15 (refusal after 210mm)	
: laminated with ironstone	4.0					

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PROJECT: DEFENCE FORCES – INGLEBURN	BOREHOLE: BH3	SHEET 2 of 3
Surface elevation: –	Borehole location: 33°58'74",150°51'08"	
Date: 5/5/98	Drill type: P160	
Logged by: A.B. Checked by: –	Drilling method: Auger	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	WELL CONSTRUCTION	FIELD MONITORING	SAMPLE INTERVALS
	4.0		CL			
CLAY: brown/grey; medium plasticity; moisture content< plastic limit; stiff; trace sand	5.0		CL			
SHALE: grey/brown; medium plasticity; very dry; extremely weathered; some ironstone; no odour	5.0		CL			
	7.0					

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PROJECT: DEFENCE FORCES – INGLEBURN	BOREHOLE: BH3	SHEET 3 of 3
Surface elevation: –	Borehole location: 33°58'74",150°51'08"	
Date: 5/5/98	Drill type: P160	
Logged by: A.B. Checked by: –	Drilling method: Auger	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	WELL CONSTRUCTION	FIELD MONITORING	SAMPLE INTERVALS
SHALE: grey/brown; medium plasticity; very dry; extremely weathered; some ironstone; no odour	8.0		SST			
	9.0					
: becoming harder; less weathered	10.0					
	11.0					
BOREHOLE TERMINATED AT 12.0m. TARGET DEPTH. WELL INSTALLED.						

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PROJECT: DEFENCE FORCES – INGLEBURN	BOREHOLE: BH4	SHEET 1 of 6
Surface elevation: –	Borehole location: 33°58'31",150°51'92"	
Date: 15/5/98	Drill type: P160	
Logged by: A.B. Checked by: –	Drilling method: Auger	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	WELL CONSTRUCTION	FIELD MONITORING	SAMPLE INTERVALS
CLAYEY SAND: brown; fine; very dry; some ironstone	0.0		CL			
CLAY: red/orange/grey; low plasticity; very dry; moisture content<plastic limit; very stiff; some ironstone	1.0				SPT 18,3 (refusal after 225mm) SPT 5,16 (refusal after 300mm)	
SHALE: grey; very dry; extremely weathered; trace ironstone	2.0		CL			
: dark grey	3.0					
	4.0					

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PROJECT: DEFENCE FORCES – INGLEBURN	BOREHOLE: BH4	SHEET 2 of 6
Surface elevation: –	Borehole location: 33°58'31",150°51'92"	
Date: 15/5/98 Logged by: A.B. Checked by: –	Drill type: P160 Drilling method: Auger	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	WELL CONSTRUCTION	FIELD MONITORING	SAMPLE INTERVALS
: becoming very hard; some sand	4.0 5.0		CL			
SANDSTONE: white; very fine, very dry; moderately weathered; very hard			SST			
SANDY SHALE: white/grey; low plasticity; very dry; moisture content<plastic limit; slightly weathered; very fine sand	6.0 7.0		CL			

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PROJECT: DEFENCE FORCES – INGLEBURN	BOREHOLE: BH4	SHEET 3 of 6
Surface elevation: –	Borehole location: 33°58'31",150°51'92"	
Date: 15/5/98	Drill type: P160	
Logged by: A.B. Checked by: –	Drilling method: Auger	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	WELL CONSTRUCTION	FIELD MONITORING	SAMPLE INTERVALS
	8.0		SST			
	9.0					
SHALY SANDSTONE: grey; fine; distinct shale laminations embedded in sandstone; very dry	10.0					
	11.0					

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PROJECT: DEFENCE FORCES – INGLEBURN	BOREHOLE: BH4	SHEET 4 of 6
Surface elevation: –	Borehole location: 33°58'31",150°51'92"	
Date: 15/5/98	Drill type: P160	
Logged by: A.B. Checked by: –	Drilling method: Auger	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	WELL CONSTRUCTION	FIELD MONITORING	SAMPLE INTERVALS
SHALY SANDSTONE: grey; fine; distinct shale laminations embedded in sandstone; very dry	12.0 13.0 14.0 15.0			Backfill Bentonite Seal 50mm PVC Well Sand Screen (40um)		

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PROJECT: DEFENCE FORCES – INGLEBURN	BOREHOLE: BH4	SHEET 5 of 6
Surface elevation: –	Borehole location: 33°58'31",150°51'92"	
Date: 15/5/98	Drill type: P160	
Logged by: A.B. Checked by: –	Drilling method: Auger	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	WELL CONSTRUCTION	FIELD MONITORING	SAMPLE INTERVALS
SHALY SANDSTONE: grey; fine; distinct shale laminations embedded in sandstone; very dry	16.0					
SHALE: grey; low plasticity; very dry; moisture content< plastic limit; slightly weathered	17.0					
: water sprayed out	18.0					
	19.0					

DEPARTMENT OF DEFENCE
INGLEBURN GEOTECHNICAL STUDY
CONTAMINATION ASSESSMENT
INGLEBURN DEFENCE SITE

WELL CONSTRUCTION LOG

DCM GROUP DAMES & MOORE pty ltd
A DAMES & MOORE COMPANY

12343–063–070

REVISION 0

PROJECT: DEFENCE FORCES – INGLEBURN	BOREHOLE: BH4	SHEET 6 of 6
Surface elevation: –	Borehole location: 33°58'31",150°51'92"	
Date: 15/5/98	Drill type: P160	
Logged by: A.B. Checked by: –	Drilling method: Auger	

SOIL DESCRIPTION	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	WELL CONSTRUCTION	FIELD MONITORING	SAMPLE INTERVALS
SHALE: grey; low plasticity; very dry; moisture content< plastic limit; slightly weathered	20.0					
	21.0					
BOREHOLE TERMINATED AT 21.5m. TARGET DEPTH.	22.0					
	23.0					

DEPARTMENT OF DEFENCE
INGLEBURN GEOTECHNICAL STUDY
CONTAMINATION ASSESSMENT
INGLEBURN DEFENCE SITE

WELL CONSTRUCTION LOG

DCM GROUP DAMES & MOORE pty ltd
A DAMES & MOORE COMPANY

12343-063-070

REVISION 0

Appendix D

Laboratory Test Certificates

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amdel

INDUSTRIAL AND ENVIRONMENTAL SERVICES DIVISION
Trading as Australian Analytical Laboratories Pty Ltd
ACN 001 491 667

Correspondence to:
PO BOX 514
HORNSBY NSW 2077

5 Kelray Place
ASQUITH NSW 2077
Telephone: (02) 9482 1922
Facsimile: (02) 9482 1734

FACSIMILE TRANSMISSION

SIT-95-1946
25-5-98

MH

TO: Mr Mike Hayter

COMPANY: Dames & Moore

FAX: (02) 9955 7324 **DATE:** 22/05/98

FROM: ~~INNEKEH~~ Richard Coghlan

Please advise if you do not receive all pages or if any are unclear.

AMDEL REFERENCE: 8E00795

YOUR ORDER No.: SYD-00293

YOUR PROJECT CODE: 12343-063-071/INGLEBURN

[ ] This fax contains final results (partial report only)

[✓] This fax contains final results (complete report). A signed endorsed Report, with associated QA/QC, will be posted within 2 days.

[ ] This job has been e-mailed to you today.

[✓] Note, I will clarify why surrogate was not reported for OC Pesticides on Monday

Regards,

R. Coghlan

amdel

Job Number : 8E00795
Client : Dames & Moore
Reference : SYD-00293

	Lab No	E46389				
	Sample Id	SW12				
Analyte	PQL					
E0220 TPH in Water (µg/L)						
Total C6-C36	**440**	nd				
C6-C9 Fraction	**20**	nd				
C10-C14 Fraction	**40**	nd				
C15-C28 Fraction	**200**	nd				
C29-C36 Fraction	**200**	nd				
E0010 BTEX (P&T) in Water (µg/L)						
Benzene	**0.5**	nd				
Toluene	**1**	nd				
Ethylbenzene	**1**	nd				
Total Xylenes	**3**	nd				

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = Not Detected (< PQL)
-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified
Leachates : mg/L (ppm) in leachate

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amdel

Job Number : 8E00795
Client : Dames & Moore
Reference : SYD-00293

Analyte	PQL	Sample Id: SW12
	Lab No:	E46389
E0050 Explosive Compounds in Water (µg/L)		
RDX	**20**	nd
2.4.6-TNT	**20**	nd
2.6-Dinitrotoluene	**20**	nd
2.4-Dinitrotoluene	**20**	nd
4-MNT	**20**	nd
E4870 Dissolved Metals in Waters		
Lead	**0.001**	0.001
Copper	**0.001**	0.001
Zinc	**0.002**	0.044
Nickel	**0.001**	0.001
Chromium	**0.001**	0.001
Arsenic	**0.001**	0.003
Cadmium	**0.0001**	0.0002
E49501 Total Recoverable Mercury in Water		
Mercury	**0.00005**	nd

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Waters : mg/L (ppm) unless otherwise specified
Leachates : mg/L (ppm) in leachate

amdel

Job Number : 8E00795
Client : Dames & Moore
Reference : SYD-00293

	Lab No	E46389				
	Sample Id	SW12				
Analyte	PQL					
E0080 OC Pesticides in Water (µg/L)						
HCB	1	nd				
a-BHC	1	nd				
g-BHC	1	nd				
Heptachlor	1	nd				
Aldrin	1	nd				
b-BHC	1	nd				
d-BHC	1	nd				
Oxychlordane	1	nd				
Heptachlor epoxide	1	nd				
Endosulfan 1	1	nd				
Chlordane-Trans	1	nd				
Chlordane-Cis	1	nd				
trans-Nonachlor	1	nd				
DDE	1	nd				
Dieldrin	1	nd				
Endrin	1	nd				
DDD	1	nd				
Endosulfan 2	1	nd				
DDT	1	nd				
Endosulfan sulfate	1	nd				
Methoxychlor	1	nd				
2.4.5.6-tetrachloro-m-xylene-SURROGATE	1	*				

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Waters : mg/L (ppm) unless otherwise specified
Leachates : mg/L (ppm) in leachate

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Job Number : 8E00795
Client : Dames & Moore
Reference : SYD-00293

	Lab No	E46389				
	Sample Id	SW12				
Analyte	PQL					
E0090 OP Pesticides in Water (µg/L)						
Dichlorvos	**10**	nd				
Mevinphos	**10**	nd				
Ethoprop	**10**	nd				
Phorate	**10**	nd				
Demeton-s-methyl	**10**	nd				
Diazinon	**10**	nd				
Disulfoton	**10**	nd				
Ronnel	**10**	nd				
Chlorpyrifos methyl	**10**	nd				
Chlorpyrifos	**10**	nd				
Merphos	**10**	nd				
Parathion methyl	**10**	nd				
Fenthion	**10**	nd				
Malathion	**10**	nd				
Fenitrothion	**10**	nd				
Prothiofos	**10**	nd				
Stirophos	**10**	nd				
Ethion	**10**	nd				
Bolstar	**10**	nd				
Fensulfothion	**10**	nd				
Azinphos methyl	**10**	nd				
Coumaphos	**10**	nd				
	1	88%				

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Waters : mg/L (ppm) unless otherwise specified
Leachates : mg/L (ppm) in leachate

amdel

Job Number : 8E00795
Client : Dames & Moore
Reference : SYD-00293

Analyte	Lab No	E46389				
	Sample Id	SW12				
	PQL					
E0180 Semivolatile Organic Compunds (µg/L)						
Phenol	10	nd				
Aniline	100	nd				
Bis(2-chloroethyl) ether	10	nd				
2-Chlorophenol	10	nd				
1.3-Dichlorobenzene	10	nd				
1.4-Dichlorobenzene	10	nd				
1.2-Dichlorobenzene	10	nd				
Benzyl Alcohol	10	nd				
2-Methylphenol	10	nd				
N-Nitrosodi-n-propylamine	10	nd				
Bis(2-Chloroisopropyl) ether	10	nd				
4-Methylphenol	10	nd				
3-Methylphenol	10	nd				
Hexachloroethane	10	nd				
Nitrobenzene	10	nd				
Isophorone	10	nd				
2-Nitrophenol	10	nd				
2.4-Dimethylphenol	10	nd				
Bis(2-chloroethoxy) methane	10	nd				
Benzoic acid	100	nd				
2.4-Dichlorophenol	10	nd				
1.2.4-Trichlorobenzene	10	nd				
Naphthalene	10	nd				
4-Chloroaniline	10	nd				

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Leachates : mg/L (ppm) in leachate

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Job Number : 8E00795
Client : Dames & Moore
Reference : SYD-00293

Analyte	Lab No	E46389				
	Sample Id	SW12				
	PQL					
Hexachlorobutadiene	10	nd				
4-Chloro-3-methylphenol	10	nd				
2-Methylnaphthalene	10	nd				
Hexachlorocyclopentadiene	10	nd				
2.4.6-Trichlorophenol	10	nd				
2.4.5-Trichlorophenol	10	nd				
2-Chloronaphthalene	10	nd				
2-Nitroaniline	10	nd				
Dimethyl phthalate	10	nd				
2.6-Dinitrotoluene	10	nd				
Acenaphthylene	10	nd				
3-Nitroaniline	10	nd				
Acenaphthene	10	nd				
2.4-Dinitrophenol	10	nd				
4-Nitrophenol	10	nd				
Dibenzofuran	10	nd				
Diethyl phthalate	10	nd				
Fluorene	10	nd				
4-Chlorophenyl phenyl ether	10	nd				
4-Nitroaniline	10	nd				
4.6-Dinitro-2-methylphenol	10	nd				
Azobenzene	100	nd				
N-Nitrosodiphenylamine	100	nd				
a-BHC	10	nd				
4-Bromophenyl phenyl ether	10	nd				

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Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified
Leachates : mg/L (ppm) in leachate

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Job Number : 8E00795
Client : Dames & Moore
Reference : SYD-00293

Analyte	Lab No	E46389				
	Sample Id	SW12				
	PQL					
Hexachlorobenzene	**10**	nd				
b-BHC	**10**	nd				
Pentachlorophenol	**10**	nd				
g-BHC	**10**	nd				
Phenanthrene	**10**	nd				
Anthracene	**10**	nd				
d-BHC	**10**	nd				
Heptachlor	**10**	nd				
Di-n-butyl phthalate	**10**	nd				
Aldrin	**10**	nd				
Heptachlor epoxide	**10**	nd				
Fluoranthene	**10**	nd				
Pyrene	**10**	nd				
Endosulfan 1	**10**	nd				
4.4-DDE	**10**	nd				
Dieldrin	**10**	nd				
Endrin	**10**	nd				
Endosulfan 2	**10**	nd				
4.4-DDD	**10**	nd				
Endrin aldehyde	**10**	nd				
Butyl benzyl phthalate	**10**	nd				
Endosulfan sulfate	**10**	nd				
4.4-DDT	**10**	nd				
3.3-Dichlorobenzidine	**100**	nd				
Benz(a)anthracene	**10**	nd				

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-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified
Leachates : mg/L (ppm) in leachate

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Job Number : 8E00795
Client : Dames & Moore
Reference : SYD-00293

Analyte	Lab No	E46389				
	Sample Id	SW12				
	PQL					
Chrysene	**10**	nd				
Bis(2-ethylhexyl) phthalate	**10**	nd				
Di-n-octylphthalate	**10**	nd				
Benzo(b)fluoranthene	**10**	nd				
Benzo(k)fluoranthene	**10**	nd				
Benzo(a)pyrene	**10**	nd				
Indeno(1.2.3-cd)pyrene	**10**	nd				
Dibenz(a.h)anthracene	**10**	nd				
Benzo(g.h.i)perylene	**10**	nd				
2-Fluorophenol-SURROGATE		105%				
Phenol-D5-SURROGATE		80%				
Nitrobenzene-D5-SURROGATE		120%				
2-Fluorobiphenyl-SURROGATE		100%				
2.4.6-Tribromophenol-SURROGATE		115%				
p-Terphenyl-D14-SURROGATE		120%				

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Leachates : mg/L (ppm) in leachate

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Job Number : 8E00795
Client : Dames & Moore
Reference : SYD-00293

Analyte	Lab No / Sample Id / PQL	E46389 / SW12				
E0140 Phenols By GC/MS In Water (µg/L)						
Phenol	5	nd				
2-Chlorophenol	5	nd				
2-Methylphenol	5	nd				
3-Methylphenol & 4-Methylpheno	5	nd				
2-Nitrophenol	5	nd				
2.4-Dimethylphenol	5	nd				
2.4-Dichlorophenol	5	nd				
2.6-Dichlorophenol	5	nd				
4-Chloro-3-methylphenol	5	nd				
2.4.5-Trichlorophenol	5	nd				
2.4.6-Trichlorophenol	5	nd				
2.4-Dinitrophenol	20	nd				
4-Nitrophenol	10	nd				
2.3.4.6-Tetrachlorophenol	10	nd				
4.6-Dinitro-2-methylphenol	20	nd				
Pentachlorophenol	10	nd				
4.6-Dinitro-2-sec-butylphenol	20	nd				
2-Fluorophenol-SURROGATE		105%				
Phenol-D6-SURROGATE		80%				
2.4.6-Tribromophenol-SURROGATE		115%				

PQL = Practical Quantitation Limit
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-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified
Leachates : mg/L (ppm) in leachate

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Job Number : 8E00795
Client : Dames & Moore
Reference : SYD-00293

Analyte	Lab No	E46389				
	Sample Id	SW12				
	PQL					
E0270 VHCs (P&T) in Water (µg/L)						
Vinyl chloride	1	nd				
Chloroethane	1	nd				
Trichlorofluoromethane	1	nd				
1.1-Dichloroethene	1	nd				
Methylene chloride	1	nd				
trans-1.2-Dichloroethene	1	nd				
1.1-Dichloroethane	1	nd				
cis-1.2-Dichloroethene	1	nd				
Chloroform	1	nd				
1.1.1-Trichloroethane	1	nd				
Carbon tetrachloride	1	nd				
1.2-Dichloroethane	1	nd				
Trichloroethene	1	nd				
1.2-Dichloropropane	1	nd				
Bromodichloromethane	1	nd				
trans-1.3-Dichloropropylene	1	nd				
cis-1.3-Dichloropropylene	1	nd				
1.1.2-Trichloroethane	1	nd				
Tetrachloroethene	1	nd				
Dibromochloromethane	1	nd				
Chlorobenzene	1	nd				
Bromoform	1	nd				
1.1.2.2-Tetrachloroethane	1	nd				
1.3-Dichlorobenzene	1	nd				

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = Not Detected (<PQL)
-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified
Leachates : mg/L (ppm) in leachate

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Job Number : 8E00795
Client : Dames & Moore
Reference : SYD-00293

Analyte	Lab No / Sample Id / PQL	E46389 / SW12 /				
1.4-Dichlorobenzene	1	nd				
1.2-Dichlorobenzene	1	nd				
Pentafluorobenzene-SURROGATE	1	103%				

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
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Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified
Leachates : mg/L (ppm) in leachate

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Job Number : 8E00795
Client : Dames & Moore
Reference : SYD-00293

Analyte	Lab No	E46389				
	Sample Id	SW12				
	PQL					
E0190 Chlorinated Hydrocarbons (µg/L)						
1.3-Dichlorobenzene	20	nd				
1.4-Dichlorobenzene	40	nd				
1.2-Dichlorobenzene	20	nd				
Hexachloroethane	1	nd				
1.2.3-Trichlorobenzene	4	nd				
1.2.4-Trichlorobenzene	4	nd				
1.3.5-Trichlorobenzene	2	nd				
1.2.3.5- & 1.2.4.5-TCB	4	nd				
1.2.3.4-Tetrachlorobenzene	2	nd				
Hexachlorocyclopentadiene	2	nd				
Hexachlorobutadiene	1	nd				
Pentachlorobenzene	1	nd				
Hexachlorobenzene	1	nd				

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-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified
Leachates : mg/L (ppm) in leachate

mgt Environmental Consulting Pty. Ltd.
3 Kingston Town Close, Oakleigh, Victoria, 3166, Australia
Postal Address: P.O. Box 276, Oakleigh, Victoria, 3166, Australia
Telephone: (03) 9564 7055
Fax: (03) 9564 7190

MGT ANALYSIS REPORT 125581

CLIENT :- Dames & Moore
41 McLaren St
North Sydney
New South Wales 2060

SITE :- INGLEBURN 12343

DATE RECEIVED :- 06/05/98

DATE REPORTED :- 14/05/98

QA/QC DETAILS :- The QA/QC for these samples is detailed in this report no : 125581
A total of 40 duplicate, 31 matrix spike % recovery and 20 method blank analyses or sets of analyses were carried out on this batch of samples.
All QA/QC results for duplicates, matrix spike % recoveries, method blanks and known QC standards were within the set acceptable criteria.

FINAL REPORT :- The results in this report supersede any previously corresponded results.

Michael Wright
Laboratory Manager

mgt Environmental Consulting Pty. Ltd.

3 Kingston Town Close, Oakleigh, Victoria, 3166, Australia
Postal Address: P.O. Box 276, Oakleigh, Victoria, 3166, Australia
Telephone: (03) 9564 7055
Fax: (03) 9564 7190

Dames & Moore
41 McLaren St
North Sydney
New South Wales 2060
Site : INGLEBURN 12343

CHLORINATED HYDROCARBONS US EPA SW486 METHOD 8270C AND 8260B

Sample	SW01	SW01 Dup	Spike % Recov	SED-01	SED-02	SED-03
Lab. No.	MY0897	MY0897D		MY0898	MY0899	MY0900
Benzyl Chloride	<0.001	<0.001	83%	<0.1	<0.1	<0.1
2-Chloronaphalene	<0.001	<0.001	91%	<0.1	<0.1	<0.1
1,2 Dichlorobenzene	<0.001	<0.001	89%	<0.1	<0.1	<0.1
1,3 Dichlorobenzene	<0.001	<0.001	92%	<0.1	<0.1	<0.1
1,4 Dichlorobenzene	<0.001	<0.001	94%	<0.1	<0.1	<0.1
Hexachlorobenzene	<0.001	<0.001	87%	<0.1	<0.1	<0.1
Hexachlorobutadiene	<0.001	<0.001	83%	<0.1	<0.1	<0.1
Hexachlorocyclopentadiene	<0.001	<0.001	91%	<0.1	<0.1	<0.1
Hexachloroethane	<0.001	<0.001	86%	<0.1	<0.1	<0.1
1,2,3 Trichlorobenzene	<0.001	<0.001	82%	<0.1	<0.1	<0.1
1,2,4 Trichlorobenzene	<0.001	<0.001	84%	<0.1	<0.1	<0.1
1,3,5 Trichlorobenzene	<0.001	<0.001	85%	<0.1	<0.1	<0.1
1,2,3,4 Tetrachlorobenzene	<0.001	<0.001		<0.1	<0.1	<0.1
1,2,4,5 Tetrachlorobenzene	<0.001	<0.001		<0.1	<0.1	<0.1
1,2,3,5 Tetrachlorobenzene	<0.001	<0.001		<0.1	<0.1	<0.1

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

Date received 06/05/98 Date Reported 14/05/98

mgt Environmental Consulting Pty. Ltd.

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Dames & Moore
41 McLaren St
North Sydney
New South Wales 2060
Site : INGLEBURN 12343

CHLORINATED HYDROCARBONS US EPA SW486 METHOD 8270C AND 8260B

Sample	SED-04	SED-04 Dup	Spike % Recov	SW02	SED-05	SED-06
Lab. No.	MY0901	MY0901D		MY0902	MY0903	MY0904
Benzyl Chloride	<0.1	<0.1	89%	<0.001	<0.1	<0.1
2-Chloronaphalene	<0.1	<0.1	96%	<0.001	<0.1	<0.1
1,2 Dichlorobenzene	<0.1	<0.1	94%	<0.001	<0.1	<0.1
1,3 Dichlorobenzene	<0.1	<0.1	98%	<0.001	<0.1	<0.1
1,4 Dichlorobenzene	<0.1	<0.1	101%	<0.001	<0.1	<0.1
Hexachlorobenzene	<0.1	<0.1	97%	<0.001	<0.1	<0.1
Hexachlorobutadiene	<0.1	<0.1	94%	<0.001	<0.1	<0.1
Hexachlorocyclopentadiene	<0.1	<0.1	92%	<0.001	<0.1	<0.1
Hexachloroethane	<0.1	<0.1	89%	<0.001	<0.1	<0.1
1,2,3 Trichlorobenzene	<0.1	<0.1	96%	<0.001	<0.1	<0.1
1,2,4 Trichlorobenzene	<0.1	<0.1	91%	<0.001	<0.1	<0.1
1,3,5 Trichlorobenzene	<0.1	<0.1	94%	<0.001	<0.1	<0.1
1,2,3,4 Tetrachlorobenzene	<0.1	<0.1		<0.001	<0.1	<0.1
1,2,4,5 Tetrachlorobenzene	<0.1	<0.1		<0.001	<0.1	<0.1
1,2,3,5 Tetrachlorobenzene	<0.1	<0.1		<0.001	<0.1	<0.1

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

Date received 06/05/98 Date Reported 14/05/98

mgt Environmental Consulting Pty. Ltd.

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Dames & Moore
41 McLaren St
North Sydney
New South Wales 2060
Site : INGLEBURN 12343

CHLORINATED HYDROCARBONS US EPA SW486 METHOD 8270C AND 8260B

Sample	SED-07	SED-08	SW03	SED-09	SED-10	Method Blank
Lab. No.	MY0905	MY0906	MY0907	MY0908	MY0909	
Benzyl Chloride	<0.1	<0.1	<0.001	<0.1	<0.1	<0.001
2-Chloronaphalene	<0.1	<0.1	<0.001	<0.1	<0.1	<0.001
1,2 Dichlorobenzene	<0.1	<0.1	<0.001	<0.1	<0.1	<0.001
1,3 Dichlorobenzene	<0.1	<0.1	<0.001	<0.1	<0.1	<0.001
1,4 Dichlorobenzene	<0.1	<0.1	<0.001	<0.1	<0.1	<0.001
Hexachlorobenzene	<0.1	<0.1	<0.001	<0.1	<0.1	<0.001
Hexachlorobutadiene	<0.1	<0.1	<0.001	<0.1	<0.1	<0.001
Hexachlorocyclopentadiene	<0.1	<0.1	<0.001	<0.1	<0.1	<0.001
Hexachloroethane	<0.1	<0.1	<0.001	<0.1	<0.1	<0.001
1,2,3 Trichlorobenzene	<0.1	<0.1	<0.001	<0.1	<0.1	<0.001
1,2,4 Trichlorobenzene	<0.1	<0.1	<0.001	<0.1	<0.1	<0.001
1,3,5 Trichlorobenzene	<0.1	<0.1	<0.001	<0.1	<0.1	<0.001
1,2,3,4 Tetrachlorobenzene	<0.1	<0.1	<0.001	<0.1	<0.1	<0.001
1,2,4,5 Tetrachlorobenzene	<0.1	<0.1	<0.001	<0.1	<0.1	<0.001
1,2,3,5 Tetrachlorobenzene	<0.1	<0.1	<0.001	<0.1	<0.1	<0.001

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

Date received 06/05/98 Date Reported 14/05/98

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Dames & Moore
41 McLaren St
North Sydney
New South Wales 2060
Site : INGLEBURN 12343

CHLORINATED HYDROCARBONS US EPA SW486 METHOD 8270C AND 8260B

Sample	SW01	SW01 Dup	Spike % Recov	SED-01	SED-02	SED-03
Lab. No.	MY0897	MY0897D		MY0898	MY0899	MY0900
α-Hexachlorocyclohexane (α-BHC)	<0.001	<0.001	91%	<0.1	<0.1	<0.1
ß-Hexachlorocyclohexane (ß-BHC)	<0.001	<0.001	87%	<0.1	<0.1	<0.1
g-Hexachlorocyclohexane (g-BHC)	<0.001	<0.001	93%	<0.1	<0.1	<0.1
d-Hexachlorocyclohexane (d-BHC)	<0.001	<0.001	89%	<0.1	<0.1	<0.1

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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CHLORINATED HYDROCARBONS US EPA SW486 METHOD 8270C AND 8260B

Sample	SED-04	SED-04 Dup	Spike % Recov	SW02	SED-05	SED-06
Lab. No.	MY0901	MY0901D		MY0902	MY0903	MY0904
α-Hexachlorocyclohexane (α-BHC)	<0.1	<0.1	95%	<0.001	<0.1	<0.1
ß-Hexachlorocyclohexane (ß-BHC)	<0.1	<0.1	92%	<0.001	<0.1	<0.1
g-Hexachlorocyclohexane (g-BHC)	<0.1	<0.1	87%	<0.001	<0.1	<0.1
d-Hexachlorocyclohexane (d-BHC)	<0.1	<0.1	94%	<0.001	<0.1	<0.1

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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CHLORINATED HYDROCARBONS US EPA SW486 METHOD 8270C AND 8260B

Sample	SED-07	SED-08	SW03	SED-09	SED-10	Method Blank
Lab. No.	MY0905	MY0906	MY0907	MY0908	MY0909	
α-Hexachlorocyclohexane (α-BHC)	<0.1	<0.1	<0.001	<0.1	<0.1	<0.001
ß-Hexachlorocyclohexane (ß-BHC)	<0.1	<0.1	<0.001	<0.1	<0.1	<0.001
g-Hexachlorocyclohexane (g-BHC)	<0.1	<0.1	<0.001	<0.1	<0.1	<0.001
d-Hexachlorocyclohexane (d-BHC)	<0.1	<0.1	<0.001	<0.1	<0.1	<0.001

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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EXPLOSIVES HPLC METHOD MGT200A

Sample	SW01	SW01 Dup	SED-01	SED-01 Dup	SED-02	SED-03
Lab. No.	MY0897	MY0897D	MY0898	MY0898D	MY0899	MY0900
RDX	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
1,3,5 TNB	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
1,3 DNB	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
2,4,6 TNT	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
2,4 DNT	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
2,6 DNT	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
2 MNT	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
3 MNT	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
4 MNT	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
Tetryl	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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EXPLOSIVES HPLC METHOD MGT200A

Sample	SED-04	SW02	SED-05	SED-06	SED-07	SED-08
Lab. No.	MY0901	MY0902	MY0903	MY0904	MY0905	MY0906
RDX	<0.1	<0.001	<0.1	<0.1	<0.1	<0.1
1,3,5 TNB	<0.1	<0.001	<0.1	<0.1	<0.1	<0.1
1,3 DNB	<0.1	<0.001	<0.1	<0.1	<0.1	<0.1
2,4,6 TNT	<0.1	<0.001	<0.1	<0.1	<0.1	<0.1
2,4 DNT	<0.1	<0.001	<0.1	<0.1	<0.1	<0.1
2,6 DNT	<0.1	<0.001	<0.1	<0.1	<0.1	<0.1
2 MNT	<0.1	<0.001	<0.1	<0.1	<0.1	<0.1
3 MNT	<0.1	<0.001	<0.1	<0.1	<0.1	<0.1
4 MNT	<0.1	<0.001	<0.1	<0.1	<0.1	<0.1
Tetryl	<0.1	<0.001	<0.1	<0.1	<0.1	<0.1

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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EXPLOSIVES HPLC METHOD MGT200A

Sample	SW03	SED-09	SED-10	Method Blank	Spike % Recov	
Lab. No.	MY0907	MY0908	MY0909			
RDX	<0.001	<0.1	<0.1	<0.001	93%	
1,3,5 TNB	<0.001	<0.1	<0.1	<0.001	89%	
1,3 DNB	<0.001	<0.1	<0.1	<0.001		
2,4,6 TNT	<0.001	<0.1	<0.1	<0.001	97%	
2,4 DNT	<0.001	<0.1	<0.1	<0.001	85%	
2,6 DNT	<0.001	<0.1	<0.1	<0.001	89%	
2 MNT	<0.001	<0.1	<0.1	<0.001	92%	
3 MNT	<0.001	<0.1	<0.1	<0.001	93%	
4 MNT	<0.001	<0.1	<0.1	<0.001	97%	
Tetryl	<0.001	<0.1	<0.1	<0.001	84%	

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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HALOGENATED VOLATILE ORGANICS US EPA SW846 METHODS 8260B

Sample	SW01	SW01 Dup	SED-01	SED-02	SED-03	SED-04
Lab. No.	MY0897	MY0897D	MY0898	MY0899	MY0900	MY0901
Benzyl Chloride	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
Carbon Tetrachloride	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
Chlorodibromomethane	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
Chloroethane	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
2-Chloroethyl vinyl ether	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
Chloromethane	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
1,2 Dichlorobenzene	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
1,3 Dichlorobenzene	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
1,4 Dichlorobenzene	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
Dichlorodifluromethane	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
1,1 Dichloroethane	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
1,2 Dichloroethane	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
1,1 Dichloroethylene	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
trans-1,2 Dichloroethane	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
1,2 Dichloropropane	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
cis-1,3 Dichloropropene	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
trans-1,3 Dichloropropene	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
Hexachlorobutadiene	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
Hexachloroethane	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
Dichloromethane	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
1,1,1,2 Tetrachloroethane	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01

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New South Wales 2060
Site : INGLEBURN 12343

HALOGENATED VOLATILE ORGANICS US EPA SW846 METHODS 8260B

Sample	SW01	SW01 Dup	SED-01	SED-02	SED-03	SED-04
Lab. No.	MY0897	MY0897D	MY0898	MY0899	MY0900	MY0901
1,1,2,2 Tetrachloroethane	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
Tetrachloroethylene	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
1,1,1 Trichloroethane	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
1,1,2 Trichloroethane	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
Trichloroethylene	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
Trichlorofluoromethane	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
1,2,3 Trichloropropane	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01
Vinyl Chloride	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01

Results in ppm (soils mg/kg dry, waters mg/l).

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HALOGENATED VOLATILE ORGANICS US EPA SW846 METHODS 8260B

Sample	SW02	SED-05	SED-06	SED-07	SED-08	SW03
Lab. No.	MY0902	MY0903	MY0904	MY0905	MY0906	MY0907
Benzyl Chloride	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
Carbon Tetrachloride	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
Chlorobenzene	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
Chlorodibromomethane	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
Chloroethane	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
2-Chloroethyl vinyl ether	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
Chloromethane	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
1,2 Dichlorobenzene	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
1,3 Dichlorobenzene	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
1,4 Dichlorobenzene	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
Dichlorodifluromethane	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
1,1 Dichloroethane	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
1,2 Dichloroethane	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
1,1 Dichloroethylene	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
trans-1,2 Dichloroethane	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
1,2 Dichloropropane	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
cis-1,3 Dichloropropene	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
trans-1,3 Dichloropropene	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
Hexachlorobutadiene	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
Hexachloroethane	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
Dichloromethane	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
1,1,1,2 Tetrachloroethane	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001

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HALOGENATED VOLATILE ORGANICS US EPA SW846 METHODS 8260B

Sample	SW02	SED-05	SED-06	SED-07	SED-08	SW03
Lab. No.	MY0902	MY0903	MY0904	MY0905	MY0906	MY0907
1,1,2,2 Tetrachloroethane	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
Tetrachloroethylene	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
1,1,1 Trichloroethane	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
1,1,2 Trichloroethane	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
Trichloroethylene	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
Trichlorofluoromethane	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
1,2,3 Trichloropropane	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
Vinyl Chloride	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001

Results in ppm (soils mg/kg dry, waters mg/l).

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HALOGENATED VOLATILE ORGANICS US EPA SW846 METHODS 8260B

Sample	SED-09	SED-10	SED-10 Dup	Method Blank	Spike % Recov	
Lab. No.	MY0908	MY0909	MY0909D			
Benzyl Chloride	<0.01	<0.01	<0.01	<0.001	93%	
Carbon Tetrachloride	<0.01	<0.01	<0.01	<0.001	87%	
Chlorobenzene	<0.01	<0.01	<0.01	<0.001	96%	
Chlorodibromomethane	<0.01	<0.01	<0.01	<0.001	92%	
Chloroethane	<0.01	<0.01	<0.01	<0.001	84%	
2-Chloroethyl vinyl ether	<0.01	<0.01	<0.01	<0.001	82%	
Chloromethane	<0.01	<0.01	<0.01	<0.001	93%	
1,2 Dichlorobenzene	<0.01	<0.01	<0.01	<0.001	87%	
1,3 Dichlorobenzene	<0.01	<0.01	<0.01	<0.001	92%	
1,4 Dichlorobenzene	<0.01	<0.01	<0.01	<0.001	84%	
Dichlorodifluromethane	<0.01	<0.01	<0.01	<0.001	96%	
1,1 Dichloroethane	<0.01	<0.01	<0.01	<0.001	87%	
1,2 Dichloroethane	<0.01	<0.01	<0.01	<0.001	92%	
1,1 Dichloroethylene	<0.01	<0.01	<0.01	<0.001	85%	
trans-1,2 Dichloroethane	<0.01	<0.01	<0.01	<0.001	96%	
1,2 Dichloropropane	<0.01	<0.01	<0.01	<0.001	92%	
cis-1,3 Dichloropropene	<0.01	<0.01	<0.01	<0.001	87%	
trans-1,3 Dichloropropene	<0.01	<0.01	<0.01	<0.001	90%	
Hexachlorobutadiene	<0.01	<0.01	<0.01	<0.001	84%	
Hexachloroethane	<0.01	<0.01	<0.01	<0.001	82%	
Dichloromethane	<0.01	<0.01	<0.01	<0.001	96%	
1,1,1,2 Tetrachloroethane	<0.01	<0.01	<0.01	<0.001	101%	

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HALOGENATED VOLATILE ORGANICS US EPA SW846 METHODS 8260B

Sample	SED-09	SED-10	SED-10 Dup	Method Blank	Spike % Recov	
Lab. No.	MY0908	MYC909	MY0909D			
1,1,2,2 Tetrachloroethane	<0.01	<0.01	<0.01	<0.001	103%	
Tetrachloroethylene	<0.01	<0.01	<0.01	<0.001	89%	
1,1,1 Trichloroethane	<0.01	<0.01	<0.01	<0.001	91%	
1,1,2 Trichloroethane	<0.01	<0.01	<0.01	<0.001	87%	
Trichloroethylene	<0.01	<0.01	<0.01	<0.001	85%	
Trichlorofluoromethane	<0.01	<0.01	<0.01	<0.001	81%	
1,2,3 Trichloropropane	<0.01	<0.01	<0.01	<0.001	89%	
Vinyl Chloride	<0.01	<0.01	<0.01	<0.001	80%	

Results in ppm (soils mg/kg dry, waters mg/l).

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Dames & Moore
41 McLaren St
North Sydney
New South Wales 2060
Site : INGLEBURN 12343

HEAVY METALS VIC EPA PUB.139 METHODS 13&16(Hg) US EPA SW846 METHOD 6010B,ICP

Sample	SW01	SW01 Dup	Spike % Recov	SED-01	SED-01 Dup	Spike % Recov
Lab. No.	MY0897	MY0897D		MY0898	MY0898D	
Arsenic	<0.001	<0.001	88%	4.6	4.6	95%
Cadmium	<0.001	<0.001	87%	<0.5	<0.5	86%
Chromium	<0.001	<0.001	92%	12	11	89%
Copper	0.029	0.031	94%	17	18	90%
Lead	0.001	0.001	89%	13	13	92%
Mercury	<0.0002	<0.0002	89%	<0.1	<0.1	92%
Nickel	0.001	<0.001	91%	5.2	5.5	89%
Zinc	0.089	0.085	97%	34	34	95%

Extraction with (1+3) HNO3 & HCl. Results in ppm (soils mg/kg dry, waters mg/l).

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HEAVY METALS VIC EPA PUB.139 METHODS 13&16(Hg) US EPA SW846 METHOD 6010B,ICP

Sample	SED-02	SED-03	SED-04	SW02	SED-05	SED-06
Lab. No.	MY0899	MY0900	MY0901	MY0902	MY0903	MY0904
Arsenic	5.6	15	5.6	<0.001	11	12
Cadmium	<0.5	<0.5	<0.5	<0.001	<0.5	<0.5
Chromium	13	15	17	<0.001	20	20
Copper	22	23	50	0.020	25	23
Lead	47	14	25	<0.001	17	15
Mercury	<0.1	<0.1	0.78	<0.0002	<0.1	<0.1
Nickel	6.5	5.0	7.0	0.001	<5	<5
Zinc	71	34	73	0.092	43	40

Extraction with (1+3) HNO3 & HCl. Results in ppm (soils mg/kg dry, waters mg/l).

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HEAVY METALS VIC EPA PUB.139 METHODS 13&16(Hg) US EPA SW846 METHOD 6010B,ICP

Sample	SED-07	SED-08	SW03	SED-09	SED-10	Method Blank
Lab. No.	MY0905	MY0906	MY0907	MY0908	MY0909	
Arsenic	6.6	9.0	0.002	14	8.5	<0.001
Cadmium	<0.5	0.9	<0.001	1.2	<0.5	<0.001
Chromium	20	28	0.002	25	20	<0.001
Copper	21	40	0.028	45	28	<0.001
Lead	13	31	<0.001	33	24	<0.001
Mercury	<0.1	<0.1	<0.0002	<0.1	<0.1	<0.0002
Nickel	6.0	7.8	<0.001	12	7.2	<0.001
Zinc	29	210	0.083	95	55	<0.001

Extraction with (1+3) HNO3 & HCl. Results in ppm (soils mg/kg dry, waters mg/l).

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MAH's AROMATIC VOLATILE ORGANICS US EPA SW846 METHODS 8020&5030,8260B

Sample	SW01	SED-01	SED-02	SED-03	SED-04	SW02
Lab. No.	MY0897	MY0898	MY0899	MY0900	MY0901	MY0902
Benzene	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
Toluene	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
Ethyl Benzene	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
Xylenes	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001

Results in ppm (soils mg/kg dry, waters mg/l).

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MAH's AROMATIC VOLATILE ORGANICS US EPA SW846 METHODS 8020&5030,8260B

Sample	SED-05	SED-06	SED-06 Dup	Spike % Recov	SED-07	SED-08
Lab. No.	MY0903	MY0904	MY0904D		MY0905	MY0906
Benzene	<0.01	<0.01	<0.01	94%	<0.01	<0.01
Toluene	<0.01	<0.01	<0.01	87%	<0.01	<0.01
Ethyl Benzene	<0.01	<0.01	<0.01	102%	<0.01	<0.01
Xylenes	<0.01	<0.01	<0.01	98%	<0.01	<0.01

Results in ppm (soils mg/kg dry, waters mg/l).

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MAH's AROMATIC VOLATILE ORGANICS US EPA SW846 METHODS 8020&5030,8260B

Sample	SW03	SW03 Dup	Spike % Recov	SED-09	SED-10	Method Blank
Lab. No.	MY0907	MY0907D		MY0908	MY0909	
Benzene	<0.001	<0.001	87%	<0.01	<0.01	<0.001
Toluene	<0.001	<0.001	96%	<0.01	<0.01	<0.001
Ethyl Benzene	<0.001	<0.001	90%	<0.01	<0.01	<0.001
Xylenes	<0.001	<0.001	89%	<0.01	<0.01	<0.001

Results in ppm (soils mg/kg dry, waters mg/l).

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ORGANOCHLORINE PESTICIDES US EPA SW846 METHOD 8080

Sample	SW01	SED-01	SED-02	SED-02 Dup	SED-03	SED-04
Lab. No.	MY0897	MY0898	MY0899	MY0899D	MY0900	MY0901
Aldrin	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.01
α-BHC	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.01
ß-BHC	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.01
σ-BHC	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.01
Lindane	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.01
Chlordane	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
4,4'-DDD	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.01
4,4'-DDE	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.01
4,4'-DDT	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan I	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan II	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan sulphate	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor epoxide	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.01

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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ORGANOCHLORINE PESTICIDES US EPA SW846 METHOD 8080

Sample	SW02	SED-05	SED-06	SED-07	SED-08	SW03
Lab. No.	MY0902	MY0903	MY0904	MY0905	MY0906	MY0907
Aldrin	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.00002
α-BHC	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.00002
ß-BHC	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.00002
σ-BHC	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.00002
Lindane	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.00002
Chlordane	<0.001	<0.1	<0.1	<0.1	<0.1	<0.001
4,4'-DDD	<0.00002	<0.01	<0.01	<0.01	0.03	<0.00002
4,4'-DDE	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.00002
4,4'-DDT	<0.00002	<0.01	<0.01	<0.01	0.01	<0.00002
Dieldrin	<0.00002	<0.01	<0.01	<0.01	0.17	<0.00002
Endosulfan I	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.00002
Endosulfan II	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.00002
Endosulfan sulphate	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.00002
Endrin	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.00002
Heptachlor	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.00002
Heptachlor epoxide	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.00002

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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Site : INGLEBURN 12343

ORGANOCHLORINE PESTICIDES US EPA SW846 METHOD 8080

Sample	SW03 Dup	SED-09	SED-10	Method Blank	Spike % Recov	
Lab. No.	MY0907D	MY0908	MY0909			
Aldrin	<0.00002	<0.01	<0.01	<0.00002	94%	
α-BHC	<0.00002	<0.01	<0.01	<0.00002	87%	
ß-BHC	<0.00002	<0.01	<0.01	<0.00002	96%	
σ-BHC	<0.00002	<0.01	<0.01	<0.00002	94%	
Lindane	<0.00002	<0.01	<0.01	<0.00002	89%	
Chlordane	<0.001	<0.1	<0.1	<0.001		
4,4'-DDD	<0.00002	<0.01	<0.01	<0.00002	95%	
4,4'-DDE	<0.00002	<0.01	<0.01	<0.00002	97%	
4,4'-DDT	<0.00002	<0.01	<0.01	<0.00002	92%	
Dieldrin	<0.00002	<0.01	<0.01	<0.00002	89%	
Endosulfan I	<0.00002	<0.01	<0.01	<0.00002	96%	
Endosulfan II	<0.00002	<0.01	<0.01	<0.00002	92%	
Endosulfan sulphate	<0.00002	<0.01	<0.01	<0.00002	91%	
Endrin	<0.00002	<0.01	<0.01	<0.00002	88%	
Heptachlor	<0.00002	<0.01	<0.01	<0.00002	93%	
Heptachlor epoxide	<0.00002	<0.01	<0.01	<0.00002	96%	

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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ORGANOCHLORINE PESTICIDES US EPA SW846 METHOD 8080

Sample	SW01	SED-01	SED-02	SED-02 Dup	SED-03	SED-04
Lab. No.	MY0897	MY0898	MY0899	MY0899D	MY0900	MY0901
Methoxychlor	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.01
Toxophene	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin aldehyde	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.01

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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ORGANOCHLORINE PESTICIDES US EPA SW846 METHOD 8080

Sample	SW02	SED-05	SED-06	SED-07	SED-08	SW03
Lab. No.	MY0902	MY0903	MY0904	MY0905	MY0906	MY0907
Methoxychlor	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.00002
Toxophene	<0.001	<0.1	<0.1	<0.1	<0.1	<0.001
Endrin aldehyde	<0.00002	<0.01	<0.01	<0.01	<0.01	<0.00002

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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ORGANOCHLORINE PESTICIDES US EPA SW846 METHOD 8080

Sample	SW03 Dup	SED-09	SED-10	Method Blank	Spike % Recov	
Lab. No.	MY0907D	MY0908	MY0909			
Methoxychlor	<0.00002	<0.01	<0.01	<0.00002	84%	
Toxophene	<0.001	<0.1	<0.1	<0.001		
Endrin aldehyde	<0.00002	<0.01	<0.01	<0.00002	95%	

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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ORGANOPHOSPHORUS PESTICIDES US EPA SW846 METHOD 8140

Sample	SW01	SED-01	SED-02	SED-02 Dup	SED-03	SED-04
Lab. No.	MY0897	MY0898	MY0899	MY0899D	MY0900	MY0901
Azinphos Methyl	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
Bolstar	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
Coumaphos	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
Demeton-O	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
Demeton-S	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
Disulfoton	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
Ethoprop	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
Fensulfothion	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
Fenthion	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
Merphos	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
Mevinphos	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion Methyl	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
Phorate	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
Tokuthion	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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ORGANOPHOSPHORUS PESTICIDES US EPA SW846 METHOD 8140

Sample	SW02	SW02 Dup	SED-05	SED-06	SED-07	SED-08
Lab. No.	MY0902	MY0902D	MY0903	MY0904	MY0905	MY0906
Azinphos Methyl	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
Bolstar	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
Coumaphos	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
Demeton-O	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
Demeton-S	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
Diazinon	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
Dichlorvos	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
Disulfoton	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
Ethoprop	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
Fensulfothion	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
Fenthion	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
Merphos	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
Mevinphos	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
Parathion Methyl	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
Phorate	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
Ronnel	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
Tokuthion	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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Sample	SW03	SED-09	SED-10	Method Blank	Spike % Recov	
Lab. No.	MY0907	MY0908	MY0909			
Azinphos Methyl	<0.001	<0.1	<0.1	<0.001	88%	
Bolstar	<0.001	<0.1	<0.1	<0.001	92%	
Chlorpyrifos	<0.001	<0.1	<0.1	<0.001	89%	
Coumaphos	<0.001	<0.1	<0.1	<0.001	95%	
Demeton-O	<0.001	<0.1	<0.1	<0.001	96%	
Demeton-S	<0.001	<0.1	<0.1	<0.001	90%	
Diazinon	<0.001	<0.1	<0.1	<0.001	87%	
Dichlorvos	<0.001	<0.1	<0.1	<0.001	89%	
Disulfoton	<0.001	<0.1	<0.1	<0.001	96%	
Ethoprop	<0.001	<0.1	<0.1	<0.001	94%	
Fensulfothion	<0.001	<0.1	<0.1	<0.001	89%	
Fenthion	<0.001	<0.1	<0.1	<0.001	95%	
Merphos	<0.001	<0.1	<0.1	<0.001	92%	
Mevinphos	<0.001	<0.1	<0.1	<0.001	91%	
Parathion Methyl	<0.001	<0.1	<0.1	<0.001	84%	
Phorate	<0.001	<0.1	<0.1	<0.001	89%	
Ronnel	<0.001	<0.1	<0.1	<0.001	96%	
Tokuthion	<0.001	<0.1	<0.1	<0.001	93%	

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

Date received 06/05/98 Date Reported 14/05/98

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Dames & Moore
41 McLaren St
North Sydney
New South Wales 2060
Site : INGLEBURN 12343

ORGANOPHOSPHORUS PESTICIDES US EPA SW846 METHOD 8140

Sample	SW01	SED-01	SED-02	SED-02 Dup	SED-03	SED-04
Lab. No.	MY0897	MY0898	MY0899	MY0899D	MY0900	MY0901
Naled	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
Trichloronate	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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ORGANOPHOSPHORUS PESTICIDES US EPA SW846 METHOD 8140

Sample	SW02	SW02 Dup	SED-05	SED-06	SED-07	SED-08
Lab. No.	MY0902	MY0902D	MY0903	MY0904	MY0905	MY0906
Naled	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
Trichloronate	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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Site : INGLEBURN 12343

ORGANOPHOSPHORUS PESTICIDES US EPA SW846 METHOD 8140

Sample	SW03	SED-09	SED-10	Method Blank	Spike % Recov	
Lab. No.	MY0907	MY0908	MY0909			
Naled	<0.001	<0.1	<0.1	<0.001	98%	
Trichloronate	<0.001	<0.1	<0.1	<0.001	89%	

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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Site : INGLEBURN 12343

POLYNUCLEAR AROMATIC HYDROCARBONS US EPA SW846 METHOD 8310(HPLC) & 8270(GC/MS).

Sample	SW01	SED-01	SED-02	SED-03	SED-04	SW02
Lab. No.	MY0897	MY0898	MY0899	MY0900	MY0901	MY0902
Naphthalene	<0.0001	<0.1	<0.1	<0.1	<0.1	<0.0001
Acenaphthylene	<0.0001	<0.1	<0.1	<0.1	<0.1	<0.0001
Acenaphthene	<0.0001	<0.1	<0.1	<0.1	<0.1	<0.0001
Fluorene	<0.0001	<0.1	<0.1	<0.1	<0.1	<0.0001
Phenanthrene	<0.0001	<0.1	<0.1	<0.1	<0.1	<0.0001
Anthracene	<0.0001	<0.1	<0.1	<0.1	<0.1	<0.0001
Fluoranthrene	<0.0001	<0.1	<0.1	<0.1	<0.1	<0.0001
Pyrene	<0.0001	<0.1	<0.1	<0.1	<0.1	<0.0001
Benzo(a)anthracene	<0.0001	<0.1	<0.1	<0.1	<0.1	<0.0001
Chrysene	<0.0001	<0.1	<0.1	<0.1	<0.1	<0.0001
Benzo(b)fluoranthene	<0.0001	<0.1	<0.1	<0.1	<0.1	<0.0001
Benzo(k)fluoranthene	<0.0001	<0.1	<0.1	<0.1	<0.1	<0.0001
Benzo(a)pyrene	<0.0001	<0.1	<0.1	<0.1	<0.1	<0.0001
Dibenzo(a,h)anthracene	<0.0001	<0.1	<0.1	<0.1	<0.1	<0.0001
Benzo(g,h,i)perylene	<0.0001	<0.1	<0.1	<0.1	<0.1	<0.0001
Indeno(1,2,3-cd)pyrene	<0.0001	<0.1	<0.1	<0.1	<0.1	<0.0001

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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POLYNUCLEAR AROMATIC HYDROCARBONS US EPA SW846 METHOD 8310(HPLC) & 8270(GC/MS).

Sample	SED-05	SED-06	SED-07	SED-08	SW03	SW03 Dup
Lab. No.	MY0903	MY0904	MY0905	MY0906	MY0907	MY0907D
Naphthalene	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.0001
Acenaphthylene	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.0001
Acenaphthene	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.0001
Fluorene	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.0001
Phenanthrene	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.0001
Anthracene	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.0001
Fluoranthrene	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.0001
Pyrene	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.0001
Benzo(a)anthracene	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.0001
Chrysene	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.0001
Benzo(b)fluoranthene	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.0001
Benzo(k)fluoranthene	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.0001
Benzo(a)pyrene	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.0001
Dibenzo(a,h)anthracene	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.0001
Benzo(g,h,i)perylene	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.0001
Indeno(1,2,3-cd)pyrene	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.0001

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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POLYNUCLEAR AROMATIC HYDROCARBONS US EPA SW846 METHOD 8310(HPLC) & 8270(GC/MS).

Sample	SED-09	SED-10	SED-10 Dup	Method Blank	Spike % Recov	
Lab. No.	MY0908	MY0909	MY0909D			
Naphthalene	<0.1	<0.1	<0.1	<0.0001	93%	
Acenaphthylene	<0.1	<0.1	<0.1	<0.0001	87%	
Acenaphthene	<0.1	<0.1	<0.1	<0.0001	96%	
Fluorene	<0.1	<0.1	<0.1	<0.0001	102%	
Phenanthrene	<0.1	<0.1	<0.1	<0.0001	98%	
Anthracene	<0.1	<0.1	<0.1	<0.0001	92%	
Fluoranthrene	<0.1	<0.1	<0.1	<0.0001	97%	
Pyrene	<0.1	<0.1	<0.1	<0.0001	101%	
Benzo(a)anthracene	<0.1	<0.1	<0.1	<0.0001	89%	
Chrysene	<0.1	<0.1	<0.1	<0.0001	96%	
Benzo(b)fluoranthene	<0.1	<0.1	<0.1	<0.0001	91%	
Benzo(k)fluoranthene	<0.1	<0.1	<0.1	<0.0001	94%	
Benzo(a)pyrene	<0.1	<0.1	<0.1	<0.0001	89%	
Dibenzo(a,h)anthracene	<0.1	<0.1	<0.1	<0.0001	86%	
Benzo(g,h,i)perylene	<0.1	<0.1	<0.1	<0.0001	84%	
Indeno(1,2,3-cd)pyrene	<0.1	<0.1	<0.1	<0.0001	86%	

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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PHENOLS & CRESOLS - HPLC- JRNL. CHROM 464(1989) 405-410, GC- US EPA SW846 8040

Sample	SW01	SED-01	SED-01 Dup	SED-02	SED-03	SED-04
Lab. No.	MY0897	MY0898	MY0898D	MY0899	MY0900	MY0901
Phenol	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methyl Phenol (o-Cresol)	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
3-Methyl Phenol (m-Cresol)	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
4-Methyl Phenol (p-Cresol)	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
2,4 Dimethylphenol	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
2 Chlorophenol	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
2,4 Dichlorophenol	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
2,6 Dichlorophenol	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,5 Trichlorophenol	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,6 Trichlorophenol	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
2,3,4,5 Tetrachlorophenol	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
2,3,4,6 Tetrachlorophenol	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
2,3,5,6 Tetrachlorophenol	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
Pentachlorophenol	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
2-Nitrophenol	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
4-Nitrophenol	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
2,4 Dinitrophenol	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloro-3-Methyl Phenol	<0.001	<0.1	<0.1	<0.1	<0.1	<0.1

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

Date received 06/05/98 Date Reported 14/05/98

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North Sydney
New South Wales 2060
Site : INGLEBURN 12343

PHENOLS & CRESOLS - HPLC- JRNL. CHROM 464(1989) 405-410, GC- US EPA SW846 8040

Sample	SW02	SW02 Dup	SED-05	SED-06	SED-07	SED-08
Lab. No.	MY0902	MY0902D	MY0903	MY0904	MY0905	MY0906
Phenol	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
2-Methyl Phenol (o-Cresol)	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
3-Methyl Phenol (m-Cresol)	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
4-Methyl Phenol (p-Cresol)	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
2,4 Dimethylphenol	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
2 Chlorophenol	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
2,4 Dichlorophenol	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
2,6 Dichlorophenol	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
2,4,5 Trichlorophenol	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
2,4,6 Trichlorophenol	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
2,3,4,5 Tetrachlorophenol	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
2,3,4,6 Tetrachlorophenol	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
2,3,5,6 Tetrachlorophenol	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
Pentachlorophenol	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
2-Nitrophenol	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
4-Nitrophenol	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
2,4 Dinitrophenol	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1
4-Chloro-3-Methyl Phenol	<0.001	<0.001	<0.1	<0.1	<0.1	<0.1

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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PHENOLS & CRESOLS - HPLC- JRNL. CHROM 464(1989) 405-410, GC- US EPA SW846 8040

Sample	SW03	SED-09	SED-10	Method Blank	Spike % Recov	
Lab. No.	MY0907	MY0908	MY0909			
Phenol	<0.001	<0.1	<0.1	<0.001	96%	
2-Methyl Phenol (o-Cresol)	<0.001	<0.1	<0.1	<0.001		
3-Methyl Phenol (m-Cresol)	<0.001	<0.1	<0.1	<0.001		
4-Methyl Phenol (p-Cresol)	<0.001	<0.1	<0.1	<0.001		
2,4 Dimethylphenol	<0.001	<0.1	<0.1	<0.001	85%	
2 Chlorophenol	<0.001	<0.1	<0.1	<0.001		
2,4 Dichlorophenol	<0.001	<0.1	<0.1	<0.001	86%	
2,6 Dichlorophenol	<0.001	<0.1	<0.1	<0.001	84%	
2,4,5 Trichlorophenol	<0.001	<0.1	<0.1	<0.001		
2,4,6 Trichlorophenol	<0.001	<0.1	<0.1	<0.001		
2,3,4,5 Tetrachlorophenol	<0.001	<0.1	<0.1	<0.001		
2,3,4,6 Tetrachlorophenol	<0.001	<0.1	<0.1	<0.001		
2,3,5,6 Tetrachlorophenol	<0.001	<0.1	<0.1	<0.001		
Pentachlorophenol	<0.001	<0.1	<0.1	<0.001	102%	
2-Nitrophenol	<0.001	<0.1	<0.1	<0.001		
4-Nitrophenol	<0.001	<0.1	<0.1	<0.001		
2,4 Dinitrophenol	<0.001	<0.1	<0.1	<0.001	89%	
4-Chloro-3-Methyl Phenol	<0.001	<0.1	<0.1	<0.001		

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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TOTAL RECOVERABLE HYDROCARBONS (GC) MGT METHOD 100A-GC

Sample	SW01	SED-01	SED-02	SED-02 Dup	SED-03	SED-04
Lab. No.	MY0897	MY0898	MY0899	MY0899D	MY0900	MY0901
T.R.H. C_6 -C_9 Fraction by GC	<0.01	<5	<5	<5	<5	<5
T.R.H. C_{10}-C_{14} Fraction by GC	<0.05	<20	<20	<20	<20	<20
T.R.H. C_{15}-C_{28} Fraction by GC	<0.1	<50	<50	<50	<50	<50
T.R.H. C_{29}-C_{36} Fraction by GC	<0.1	<50	<50	<50	<50	<50

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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TOTAL RECOVERABLE HYDROCARBONS (GC) MGT METHOD 100A-GC

Sample	SW02	SW02 Dup	SED-05	SED-06	SED-07	SED-08
Lab. No.	MY0902	MY0902D	MY0903	MY0904	MY0905	MY0906
T.R.H. C_6 -C_9 Fraction by GC	<0.01	<0.01	<5	<5	<5	<5
T.R.H. C_{10}-C_{14} Fraction by GC	<0.05	<0.05	<20	<20	<20	<20
T.R.H. C_{15}-C_{28} Fraction by GC	<0.1	<0.1	<50	<50	<50	<50
T.R.H. C_{29}-C_{36} Fraction by GC	<0.1	<0.1	<50	<50	<50	<50

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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TOTAL RECOVERABLE HYDROCARBONS (GC) MGT METHOD 100A-GC

Sample	SW03	SED-09	SED-10	Method Blank	Spike % Recov	
Lab. No.	MY0907	MY0908	MY0909			
T.R.H. C_6 -C_9 Fraction by GC	<0.01	<5	<5	<0.01		
T.R.H. C_{10}-C_{14} Fraction by GC	<0.05	<20	<20	<0.05	98%	
T.R.H. C_{15}-C_{28} Fraction by GC	<0.1	<50	<50	<0.1		
T.R.H. C_{29}-C_{36} Fraction by GC	<0.1	<50	<50	<0.1		

Results in ppm (soils mg/kg dry, waters mg/l). Extraction MGT 300A soils, USEPA 3510 waters.

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CRITERIA USED TO ASSESS QUALITY CONTROL RESULTS

VALIDITY AND RELIABILITY OF TEST RESULTS

The continuing validity and reliability of results is accomplished by monitoring a number of factors:

1. Analysis of duplicates. Duplicates run at a minimum of 5 %
2. Recovery of known additions. Spikes run at a minimum of 5 % with each batch of samples.
3. Analysis of reagent blanks run with each batch of samples.

1. Analysis of Duplicates

Duplicates are analysed as a matter of course and the data analysed by means of a range chart type system. The range for each duplicate pair is determined and 'normalised' by dividing by the average of the duplicate results.
Once enough data has been gathered control data for each method can be developed. The mean range (R) is determined as:

$$R = \frac{(\Sigma R_i)}{n}$$

where n = number of observations
and R_i = normalised range

and the variance (square of the standard deviation) is determined as:

$$s_r^2 = \frac{(\Sigma R_i^2 - nR^2)}{n - 1}$$

The control criteria thus become:

Average range	R
Warning Limit	$R + 2s_r$
Control Limit	$R + 3s_r$

The normalised range for each duplicate pair is calculated and compared with the above criteria. (This can be achieved either graphically or by visual comparison of the data.)
Since the limits are based on 95 % and 90 % confidence levels respectively , the following actions are taken, based on these statistical parameters:

Control Limit

If one measurement exceeds the C.L. repeat the analysis. If the repeat is within the C.L. continue analyses . If it exceeds the C.L. discontinue analyses and correct the problem.

Warning Limit

If two out of three successive points exceed the W.L. analyse another sample. If the next point is less than the W.L. continue analyses, if the next point exceeds the W.L. discontinue analyses and correct the problem.

***Particular care needs to be taken with some soil samples with regard to sample homogeneity, especially with regard to 'organics' analyses. Statistical analysis may indicate a problem exists when in fact the problem is really only sample homogeneity.

2. Recovery of known additions.

The recovery of known additions is used to verify the absence of matrix effects and absence of interferences. Recovery from standards is used to verify method performance. Recovery data is compared against acceptance criteria published in Standards Methods for Examination of Water and Waste water, or appropriate U.S. EPA Methods.

If recoveries fall outside acceptance criteria, analyses should be discontinued and the problem rectified.

3.0 Analysis of Reagent Blanks

Reagent blanks are used to monitor purity of reagents and the overall procedural blank. Reagent blanks are run as a matter of course with each batch for analysis. Unusual or out of the 'norm' results for blanks are investigated and corrective action taken before analysis of any batch is completed.

G. Black.

CHAIN OF CUSTODY RECORD DM-FORM-43

RECEIVING LAB: MGT

COC NO: 44-98-156

SHEET 1 OF 2

D&M JOB NO.: 12343-063-070 SITE: INGLEBURN

SAMPLER: R.N PROJECT MANAGER: M. HAYTER

TURNAROUND TIME: FINAL REPORT BY:

REPORT FORMAT: HARD: ☐ FAX: ☐ DISK: ☐ BULLETIN BOARD: ☐

ANALYSIS REQUIRED

TO BE ANALYSED AS PER QUOTATION

SAMPLE DATA				CONTAINER DATA		COMMENTS
SAMPLE ID	MATRIX	DATE	TIME	(1)TYPE & (2) PRES.	NO.	
SW01	Water	1/5/98	11.30	GB, PB(A), V	11	
SED-01	Soil	"	"	J(N)	2	
SED-02	"	"	12.30	J(N)	2	
SED-03	"	"	1.10	"	2	
SED-04	"	"	1.40		2	
SW02	Water	"	2.25	GB, PB(A), V	11	
SED-05	Soil	"	2.45	J(N)	2	
SED-06	"	"	3.20	J(N)	2	
SED-07	"	"	3.40	J(N)	2	
SED-08	"	4/5/98	2.30	J(N)	2	

RELINQUISHED BY (signature)		RECEIVED BY (signature)	
NAME: R. [illegible]	DATE: 5.5.98	NAME:	DATE:
OF:	TIME: 17.00	OF:	TIME: 6/5
NAME:	DATE:	NAME:	DATE:
OF:	TIME:	OF:	TIME:
NAME:	DATE:	NAME:	DATE:
OF:	TIME:	OF:	TIME:

LABORATORY NOTES:

(1) TYPE CODES: J = jar; GB = glass bottle; PB = plastic bottle; V = glass vials; SS = stainless steel rings.

(2) PRESERVATIVE CODES: A = acid washed solvent rinsed; C = caustic (NaOH); E = EDTA; N = nitric acid; H = hydrochloric acid; S = sulphuric acid; Z = zinc acetate; U = untreated.

QUOTE NO:

LAB REFERENCE NO:

ADDITIONAL QC REQUIREMENTS: Y N

SPECIAL DETECTION LIMITS: Y N

DCM GROUP
DAMES & MOORE PTY LTD
A DAMES & MOORE COMPANY
PHONE (02) 9955 7772
FAX (02) 9955 7324
Level 1, 41 McLaren St
NORTH SYDNEY NSW 2060

FOR LAB USE	SHIPMENT
Custody Seal on Cooler Intact: Y N	Transport Company Name:
Cooler Temperature: _____ deg. C	Consignment Note No.:

WHITE & PINK COPIES - Accompany Samples YELLOW COPY - Project General File

PLEASE SIGN AND FAX TO DAMES & MOORE UPON RECEIPT

CHAIN OF CUSTODY RECORD DM-FORM-43

RECEIVING LAB: MGT

COC NO: 44-98-156

SHEET 2 OF 2

D&M JOB NO.: 12343-063.040 SITE: INGLEBURN

SAMPLER: R N PROJECT MANAGER: M. HAYTER

TURNAROUND TIME: FINAL REPORT BY:

REPORT FORMAT: HARD: ☑ FAX: ☐ DISK: ☐ BULLETIN BOARD: ☐

SAMPLE DATA				CONTAINER DATA		ANALYSIS REQUIRED
SAMPLE ID	MATRIX	DATE	TIME	(1)TYPE & (2) PRES.	NO.	TO BE ANALYSED AS PER QUOTATION
SW-03	water	4/5/98	4.25	GB, PB(A), V	VI	
SED-09	soil	"	4.30	J (N)	2	
SED-10	"	"	5.30	J (N)	2	
SW12 HOLD						

COMMENTS

RELINQUISHED BY (signature)		RECEIVED BY (signature)	
NAME: R. HAYTER OF:	DATE: 5.5.98 TIME: 17.00	NAME: OF: MGT	DATE: TIME: 6/5
NAME: OF:	DATE: TIME:	NAME: OF:	DATE: TIME:
NAME: OF:	DATE: TIME:	NAME: OF:	DATE: TIME:

LABORATORY NOTES:

(1) TYPE CODES: J = jar; GB = glass bottle; PB = plastic bottle; V = glass vials; SS = stainless steel rings.

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QUOTE NO:

LAB REFERENCE NO:

ADDITIONAL QC REQUIREMENTS: Y N

SPECIAL DETECTION LIMITS: Y N

DCM GROUP
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Cooler Temperature: deg. C	Consignment Note No.:

WHITE & PINK COPIES - Accompany Samples YELLOW COPY - Project General File

PLEASE SIGN AND FAX TO DAMES & MOORE UPON RECEIPT

E.S.P. LABORATORIES

A.C.N. 067 499 389
A division of Enviro-net Australia Pty. Ltd.

Environment and Safety Professionals

8 Hall Street
Newport
Victoria 3015

Telephone: (03) 9398 0277
Facsimile: (03) 9398 0351

DATE: 14TH MAY, 1998

ESP JOB NUMBER: 6545

NAME: MGT ENVIRONMENTAL CONSULTING PTY LTD

ADDRESS: P.O BOX 276
OAKLEIGH, VIC. 3166

SAMPLED FROM: AS SUPPLIED

SAMPLED BY: AS SUPPLIED RECEIVED ON: 7TH MAY, 1998

TEST METHOD: Qualitative identification of asbestos types in bulk samples by polarised light microscopy, including dispersion staining using ESP in-house Method No. 2.

LAB. NO.	SAMPLE DESCRIPTION	RESULT
E54812	MY898 - SOIL	NO ASBESTOS DETECTED
E54813	MY899 - SOIL	NO ASBESTOS DETECTED
E54814	MY900 - SOIL	NO ASBESTOS DETECTED
E54815	MY901 - SOIL	NO ASBESTOS DETECTED
E54816	MY903 - SOIL	NO ASBESTOS DETECTED
E54817	MY904 - SOIL	NO ASBESTOS DETECTED
E54818	MY905 - SOIL	NO ASBESTOS DETECTED
E54819	MY906 - SOIL	NO ASBESTOS DETECTED
E54820	MY908 - SOIL	NO ASBESTOS DETECTED
E54821	MY909 - SOIL	NO ASBESTOS DETECTED

Samples analysed on a as-received basis.
Asbestos content of samples is performed by visual examination and is an approximation only.

INTERPRETATION

TRACE: <1% CONTENT BY VOLUME
MINOR: 1-20% CONTENT BY VOLUME
MAJOR: >20% CONTENT BY VOLUME

M. A. Smith
Approved Identifier

ESP Laboratories
A division of Enviro-Net Australia Pty Ltd
NATA Reg. No. 3110

Environment and Safety Professionals
8 Hall Street, Newport, Victoria, 3015
Telephone: (03) 9398 0277
Facsimile: (03) 9398 0351

FACSIMILE TRANSMISSION

TO (COMPANY): MGT

ATTENTION: Lisa Fernando

FAX NUMBER: 95647190

COPIES TO: (1)_____ (2)_____

(3)_____ (4)_____

FROM: M. Spruth Phone:(03) 9398 0277 Fax:(03) 9398 0351

DATE: 14/5/98 TIME: 8:55 PAGES: 2 (including this page)

RE: Soil analysis Results

Please find attached results
Your job No: 12343

Regards

Gayle.

PP.

M. Spruth.

E. & O. E.