ENVIRON

5 August 2009 Our Ref: AS120637

Landcom Green Square Town Centre Project Office
Attn: Mike Williams
100 Joynton Ave
Zetland NSW 2017

Dear Mike

Re: INTERIM ADVICE LETTER NO. 1 – GREEN SQUARE REMEDIATION ACTION PLAN

1 Introduction

As a NSW-EPA accredited Contaminated Sites Auditor, I have prepared this letter in relation to the Remedial Action Plans prepared for the subject site. This initial review has been undertaken to provide an independent review of the suitability and appropriateness of a plan of remediation for the above site.

This interim letter is based on a review of the documents listed below and observations made on site visits.

Details of the audit are:

Requested by:	Mike Williams on behalf of Landcom
Request/Commencement date:	26 February 2007
Auditor:	Graeme Nyland
Accreditation No.:	9808

This interim advice letter has been prepared based on the following:

- 'Desktop Investigation Green Square Residential Development Waverley Woollahra Process Plant [Incinerator] 355 Botany Road, Zetland. Property Reference (14)', dated November 2003 by Environmental Monitoring Services (EMS).
- 'Summary of Preliminary Site Investigation Reports. Green Square Development Area', dated July 2005 by EMS.
- 'Additional Site Investigation, NSW Police Services 77 Portman St, Zetland, NSW', dated March 2006 by EMS.
- 'Additional Environmental Site Assessment Bourke Street Council Depot Site 956-960 Bourke Street, Zetland, NSW', dated 18 September 2007 by HLA-Envirosciences Pty Limited (HLA).

- 'Remedial Action Plan City of Sydney Council Depot 956-960 Bourke Street, Zetland, NSW', dated 26 September 2007 by HLA. (**Bourke Street Council Depot RAP**)
- 'Additional Environmental Site Assessment Former Waterloo Incinerator Site 355 Botany Road, Zetland, NSW', dated 9 October 2007 by HLA.
- 'Soil and Groundwater Management Plan – Stage 1 Earthworks Former Waterloo Incinerator Site, 355 Botany Road, Zetland, NSW', dated 10 October 2007 by HLA
- 'Additional Environmental Site Assessment NSW Police Service Site, 377-497 Botany Road, Zetland, NSW', dated 11 October 2007 by HLA.
- 'Final Remedial Action Plan NSW Police Service Site, 377-497 Botany Road, Zetland, NSW', dated 13 December 2007 by HLA (**Police Site RAP)**
- 'Soil and Groundwater Management Plan – Stage 1 Earthworks Former Waterloo Incinerator Site. 355 Botany Road, Zetland, NSW', dated 24 August 2007 (**SGMP**)
- 'Stage 1 Earthworks – Site Condition Report, Former Waterloo Incinerator Facility 355 Botany Road, Zetland, NSW', dated 20 May 2009 by AECOM (formerly HLA) (**Site Condition Report**).
- Letter Re: 'Proposed Remediation Strategy Initial Sites Offering Green Square Town Centre', dated 9 July 2009 by Douglas Partners Pty Ltd (Douglas).

Contamination issues identified included the presence of a former landfill that occupies a former quarry, the presence of underground fuel storage tanks, and the presence of contaminants within the fill material. A plan for remediation (and some further investigation) is provided in the RAP prepared for each of the Police Site and the Bourke Street Council Depot. In addition, following a review of the documentation, Douglas (2009) provide recommendations for revision of some of the broader remedial strategies.

There have previously been a number of investigations over the Incinerator site. In 2003, 'Summary Site Audit Report, Waverley Woollahra Process Plant' GN46 was prepared by the current Auditor, which concluded that the site was suitable for commercial/industrial use and residential use with minimal opportunities for soil access. This conclusion was subject to preparation and implementation of a soil and groundwater management plan that addressed the materials found and inherent uncertainties of the landfill contents.

Following further investigations by HLA a SGMP was developed and implemented during the Stage 1 works (demolition of the infrastructure and regrading) as reported in the AECOM Site Condition Report.

A number of other investigations were undertaken including hazardous building assessments, due diligence investigations and intrusive investigations that were superseded by work undertaken by HLA. The results of the EMS investigation undertaken at the Police Site have been considered (Section 8) to be still relevant.

2 Site Details

2.1 Location

The subject of this audit is comprised of three properties as follows:

Property Name	Lot No. and DP	Address
Bourke Street Council Depot	Lot 10 DP 874704	956-996 Bourke Street
Incinerator Site	Portion Y DP 413956	355 Botany Road
Police Site	Lot 1 DP 628547	377-497 Botany Road

Local Government: City of Sydney

Zoning: 11(a) Green Square Town Centre and 11 (b) Green Square Town Centre Public Domain

Site Area: approximately 5.2 ha

2.2 Site Condition and Adjacent Uses

The site is located within a predominantly commercial/industrial area with some residential land uses. Warehouses are located to the west of the site while the underground Green Square Station is located to the north-west. Residential properties are located east of the site in Portman Lane and to the south at Hansard Street. Commercial uses are located east of Joynton Avenue.

The nearest surface water receptor is Alexandra Canal located approximately 1.5 km to the west.

The 'Incinerator Site' is disused and has remained vacant since the Incinerator was demolished. The site has a general fall to the west.

In 2007 the 'Police Site' was described in the HLA report as a NSW Police Service facility. It is not known whether the site is still operational. The site has a general fall to the west.

The current 'Bourke Street Council Depot' is an unused site with buildings including workshops and garages still in place. The site has a general fall to the south west and north west which is consistent with the surrounding topography.

2.3 Proposed Development

The site is to be developed as the Green Square Town Centre which will include residential, commercial and retail buildings, associated roads and plazas. It is understood that the plazas are likely to be built above underground car parks.

3 Site History

The broad history of quarrying and land filling under sections of the Bourke Street Council Depot, the Process Plant (the Incinerator) and the Police Site and Council Land is summarised in Table 3.1. Tables 3.2-3.4 are summaries of each individual site history.

Table 3.1: Chronological Site History - Quarrying and Landfilling

Dates	Activities
1823-1911	Private ownership, part of Process Plant within Waterloo Dam
1911-1923	Brickworks, including a clay/shale quarry, buildings and kilns
1923-pre 1951	Quarry filled during this period, landfill. Anecdotal evidence suggests that materials obtained from road works in the area in the 1930s were used to fill the quarry. The Consultant notes that tars used in road construction at this time included those sourced from gasworks.
1951-1965	Storage of equipment
1966-2008	Council owned, Process Plant operating between 1973 and 1997 and remained essentially unused until 2008.

Table 3.2: Chronological Site History - Incinerator Site

Dates	Activities
<1951	Quarrying activities occurred at the site
1951-1970	Landfilling activities
1986-1997	The Site was redeveloped into a municipal waste incinerator facility. Site decommissioned in 1997.
1997 - 2009	The decommissioned incinerator facility was demolished between December 2007 and April 2008.

Table 3.3: Chronological Site History – Bourke Street Council Depot

Dates	Activities
1880's – early 1900's	The site was primarily used for residential use.
Early 1900's – 1951	Quarrying activities occurred at the site
1951-1970	Landfilling activities
1986	Council Depot, used for storage, workshops, garaging, offices, etc.
2001	Removal of USTs from the centre of the site.
2007/2009	The site was decommissioned.

Table 3.4: Chronological Site History - Police Site	
Dates	**Activities**
1930's	Quarrying activities occurred at the site
<1951	Landfilling activities
1951 – 1970	Commercial uses (three warehouses and concrete hard standing). The western portion of the site contained factory buildings with two associated furnaces. The eastern section of the site consisted of 3 warehouses.
1970	Two warehouses were demolished and two new buildings were erected within the eastern part of the site.
Late 1970's	The brick factory buildings located in the western area of the site were demolished.
> 1986	Redeveloped into a NSW Police Service Facility including vehicle fuelling.
2009	Site closed

Known USTs were identified in the east of the Police Site. EMS indicate that there is the potential that a UST may also remain in the centre of the western half of the Police Site.

The site history is reasonably well known, particularly with respect to the extent of quarrying and landfilling, although there are inherent uncertainties in the contents of the landfill. Uncertainties with the Incinerator Site have largely been addressed during demolition activities. Any contamination other than landfill related to the Bourke Street Council depot is likely to be related to specific recent activities, such as workshops or fuel tanks. The history of the Police Site is less well known, with uncertainties related to the site use prior to development as a Police facility.

4 Contaminants Of Concern

Based on a review of the site history and current site conditions the Auditor has outlined the potential contaminants (Table 4.1).

Table 4.1: Contaminants of Potential Concern		
Area	**Activity**	**Contaminants of concern**
Landfilled areas	Landfilling to refill quarry and filling in general Landfilling with putrescible materials	Unknown, could include heavy metals, TPH, VOCs including BTEX, SVOCs including PAHs and phenols, asbestos Landfill gas, especially methane
Unsealed areas - unsealed during or prior to operation of the Process Plant	Atmospheric deposition and runoff from sealed surfaces, surface spills of fuels and lubricants, spraying of herbicides or pesticides	Metals, petroleum hydrocarbons, OCPs, possibly dioxins/furans, phenols
Workshops , USTs	Spills of fuel, lubricants, degreasers	Hydrocarbons, solvents

Table 4.1: Contaminants of Potential Concern		
Area	**Activity**	**Contaminants of concern**
Boiler Room	Lagging on pipes	Friable Asbestos
Police Site	Unknown historical activities	Unknown, could include heavy metals, TPH, VOCs including BTEX, SVOCs including PAHs and phenols, asbestos

The analyte lists used in the investigations generally covered the range of contaminants of concern, although the VOCs and SVOCs analysed were restricted to only the most common contaminants.

5 Stratigraphy And Hydrogeology

5.1 Stratigraphy

Most of the site contained a quarry which was backfilled with material generally logged as gravely sand, and described in different locations as containing ash, wood, brick, clinker, rubber, tin, slag, tiles, and rubble. The depth of the backfilled quarry is 11-14.5m over the central and eastern part of the Incinerator, and approximately 7-8m over most of the western part of the site.

The only potentially putrescible material noted on logs was “wood”, noted in about half the bore logs, most of which were on the northern side of the Incinerator. No descriptions or volume estimates were provided, but “wood” is not noted as a major component in any location.

At its deepest part, the fill overlies sandstone. Outside the quarry (mainly outside the site boundaries) and where the quarry was shallower than 14.5m, the natural soil profile is sand to a few metres depth, overlying residual clay developed on shale. The shale probably overlies sandstone and laminite at about 15m depth. Sandstone extends to at least 37 m depth.

5.2 Hydrogeology

Groundwater occurs in fill and sands at a depth between about 2.4 and 8.5 m below ground surface. The groundwater flow direction is to the north-west, appearing to be channelled towards a low point in the residual clay. There did not appear to be noticeable mounding of groundwater within the backfilled quarry when the incinerator was in place. The Consultant notes that groundwater flow in the vicinity of the Incinerator appears to converge on site and may be due to the influence of the modified bedrock profile in the former quarry or the presence of a previously in-filled watercourse. The flow direction data is not conclusive.

Groundwater in the Botany Sands aquifer has been widely used historically, and it is reported that there are approximately 50 registered bores within 2km. The Auditor notes that the site is located within Zone 2 of the Botany Groundwater Management Zone where

groundwater use is banned for domestic uses. The nearest groundwater receptor is likely to be Alexandra Canal to the south west of the site.

In the Auditor's opinion, the subsurface conditions are generally well characterised.

6 Evaluation of Quality Assurance and Quality Control

The Auditor has assessed the overall quality of the data by review of the information presented in the HLA reports, supplemented by field observations. Data quality of earlier reports was assessed in the previous SAR.

The Auditor's assessment follows in Tables 6.1 and 6.2.

Table 6.1: QA/QC – Sampling and Analysis Methodology Assessment

Sampling and Analysis Plan and Sampling Methodology	Auditor Comments
Sampling Pattern, Density and Locations	The overall sample density, locations and patterns are considered adequate given the site history and given further investigations and remedial works are proposed (see Section 10).
Sample Depths	The depths are considered adequate to target the landfill and fill materials and potential point source impacts from USTs.
Well construction	Screen depths and lengths and the well construction materials are considered adequate to characterise the overall groundwater characteristics.
Sample Collection Method	An SPT was used with the augers and groundwater samples were collected using a low-flow pump. These methods are considered to be adequate.
Decontamination Procedures	The sampling equipment and decontamination procedures employed are considered to be sufficient to limit cross-contamination.
Sample handling and containers	Samples were placed into preserved and prepared jars and chilled during storage and transport to the laboratory. Metals were field filtered.
Chain of Custody	Completed chain of custody forms were provided in the report.
Detailed description of field screening protocols including calibration	Field screening for odours, visual indications and volatiles (PID in ziplock bags) is considered to be adequate.
Sampling Logs	Soils logs provided adequate details i.e. sample depth, PID readings and lithology.

Table 6.2: QA/QC – Field and Lab Quality Assurance and Quality Control	
Field and Lab QA/QC	**Auditor Comments**
Field quality control samples	Field quality control samples were undertaken.
Field quality control results	Field quality control samples results indicate that the data is appropriate for use in the assessment.
NATA registered laboratory and NATA endorsed methods	The laboratory certificates provided by ALS and LabMark are NATA stamped.
Analytical methods and holding times	Laboratory methods are indicated on the laboratory certificates. They are typically in-house methods.
Practical Quantitation Limits (PQLs)	The PQLs are considered to be sufficiently low to assess risk
Laboratory quality control samples	Laboratory quality control samples were included.
Laboratory quality control results	The laboratory quality control samples results indicate that the data is appropriate for use in the assessment.
Data Quality Objectives and Data Evaluation (completeness, comparability, representativeness, precision, accuracy)	HLA set DQOs and undertook Data Validation to conclude that 'the overall quality of the analytical data produced is acceptably reliable for the purpose of the Stage 2 ESA'.

In considering the data as a whole the Auditor concludes that the data is likely to be reliable and useable for the purpose of this audit, and is representative of the overall site conditions. It is noted that further investigations and management are proposed.

7 Proposed Environmental Quality Criteria

It is understood that the proposed development is for medium to high density residential uses which may also include plazas and landscaped areas. To put the results in context, the soil data has been assessed in reference to the Soil Investigation Levels for Urban Redevelopment Sites in NSW (SIL Column 3 – 'recreational open space') in DEC (2006) "Guidelines for the NSW Site Auditor Scheme".

It is understood that bulk earthworks will be undertaken with plazas to be located over basement car parking. While it is anticipated that landscaping materials would be imported to the site, if site materials are used as a planting medium then consideration of the provisional phytotoxicity based investigation levels in DEC (2006) will be required. It is noted that some of the metals exceed these PPILs in site soils.

The Auditor has assessed the groundwater investigation data in reference to ANZECC (2000) "Australian and New Zealand Guidelines for Fresh and Marine Water Quality" for marine waters.

There are no national or DEC endorsed guidelines for asbestos in soil relating to human health. DEC (2006) state that Auditors must exercise their professional judgement when assessing whether a site is suitable for a specific use. The DEC states that the position of the Health Department is that there should be no asbestos in surface soil.

As the NSW EPA do not provide guidelines for the assessment of dioxins and furans in soils, guidelines used by HLA as a screening criteria include:

- New Zealand - Soil Acceptance Criteria published by New Zealand Health and Environmental Guidelines for Selected Timber Treatment Chemicals (Ministry for the Environment and Ministry, 1997)
- Germany – National Dioxins Program (2001-2004) study undertaken by the Australian Department of Environment and Heritage in Australia (ADEH) found no Australian guidelines level for dioxin in soil. Reference was made to German remediation requirements for residential (1000 pg/g) and industrial (10000 pg/g) areas.

Action levels in NSW EPA (1996) “Environmental Guidelines: Solid Waste Landfills” (methane concentrations) for methane at the surface (12500ppm (i.e. 25% of LEL)) and in the subsurface (500ppm (i.e. 1% of LEL)) have been considered. It is recognised that any building construction above a landfill also requires consideration of risks from vapour inhalation.

Imported materials would be been assessed in relation to attributes expected of virgin excavated natural material (VENM) and excavated natural material (ENM) as defined under the POEO Regulation (2005).

8 Evaluation of Soil and Gas Results

8.1 Soil Analytical Results

There were three separate investigations carried out on the three properties incorporating the Green Square Site by HLA (Bourke Street Council Depot, the Former NSW Police Site and the Incinerator Site). Investigation locations are shown on Attachments 1-3.

The Bourke Street Council Depot Site scope of works included drilling 17 boreholes, converting five boreholes into monitoring wells. The NSW Police Site investigation included the drilling of 14 boreholes and converting three of these boreholes into monitoring wells and sampling three previous wells. Previous investigations by EMS have also been considered. The Incinerator Site investigation incorporated drilling 13 boreholes and converting five into monitoring wells. Below in Tables 8.1, 8.2 and 8.3 is a summary of the soil investigation results.

Table 8.1: Bourke Street Council Depot Soil Analytical Results – Summary Table (mg/kg)

Analyte	n	Detections	Maximum	n > EPA (1994)	n > SIL Column 3 (DEC 2006)
Asbestos	4	0	0	NA	NA
Arsenic	46	44	39	NA	0
Cadmium	46	34	6.7	NA	0
Total Chromium	46	46	180	NA	0
Copper	46	46	1440	NA	0
Lead	46	46	5480	NA	**7**
Nickel	46	44	150	NA	0
Zinc	46	46	6130	NA	0
Mercury (inorganic)	46	34	1.9	NA	0
Total Phenols	6	2	47.2	NA	0
PCBs	33	0	ND	NA	0
OCP (add other OCPs to list if they exceed PQLs)	11	0	ND	NA	0
TPH (C6-C9)	46	2	260	**2**	NA
TPH (C10-C36)	46	25	6810	**10**	NA
Benzene	46	3	0.4	0	NA
Toluene	46	0	ND	0	NA
Ethyl benzene	46	0	ND	0	NA
Xylene	46	0	ND	0	NA
Total PAHs	33	21	462.9	NA	**13**
Benzo(a)Pyrene	33	19	40	NA	**16**

n number of samples
- No criteria available/used

All exceedances including TPH, PAH and lead across the Bourke Street Council Depot were located within the former landfill area. There were four boreholes (BH4, BH5, BH6, BH7) drilled to the north-east out of the former landfill footprint. All of the results returned results below the land use criteria, with only minor detections of PAH's and TPH's.

Table 8.2: Police Site Soil Analytical Results – Summary Table (mg/kg)

Analyte	n	Detections	Maximum	n > EPA (1994)	n > SIL Column 3 (DEC 2006)
Asbestos	64	**9**	NA	NA	NA

Table 8.2: Police Site Soil Analytical Results – Summary Table (mg/kg)

Analyte	n	Detections	Maximum	n > EPA (1994)	n > SIL Column 3 (DEC 2006)
Arsenic	48	30	34	NA	0
Cadmium	48	15	7.8	NA	0
Total Chromium	48	44	25	NA	0
Copper	48	47	450	NA	0
Lead	49	49	1770	NA	**2**
Nickel	48	40	38	NA	0
Zinc	48	46	9980	NA	0
Mercury (inorganic)	48	31	17	NA	0
Total Phenols	7	0	ND	NA	0
PCBs	15	1	3.4	NA	0
4,4-DDE	18	2	0.5	NA	0
DDD	18	2	0.78	NA	0
DDT	18	2	3.5	NA	0
DDT+DDE+DDD	18	2	4.78	NA	0
Hexachlorobezene	18	2	7.1	NA	NG
TPH (C6-C9)	39	0	ND	0	NA
TPH (C10-C36)	39	7	420	0	NA
BTEX	39	0	ND	0	NA
Total PAHs	47	26	64	NA	**1**
Benzo(a)Pyrene	47	20	4.6	NA	**3**

n number of samples
\- No criteria available/used
NG No Guidelines

All results above the criteria were found within the footprint of the former landfill site, except for four locations. Two locations (AS04 and AS06) contained asbestos at 0.2m and 0.6m respectively and two locations (BH3 and BH8) contained organochlorine pesticides both at a depth of 0.2-0.4mbgl.

Where there were suspected UST's (near BH15 and AS03), no TPH and BTEX concentrations were detected. Where there is known UST storage, TPH was detected in small concentrations in AS07, which is located down slope of the UST's.

Table 8.3: Incinerator Site Soil Analytical Results – Summary Table (mg/kg)					
Analyte	**n**	**Detections**	**Maximum**	**n > EPA (1994)**	**n > SIL Column 3 (DEC 2006)**
Asbestos	16	**4**	NA	NA	NA
Arsenic	23	23	17	NA	0
Cadmium	26	23	2.6	NA	0
Total Chromium	26	26	23	NA	0
Copper	26	26	250	NA	0
Lead	26	26	3980	NA	**3**
Nickel	26	25	160	NA	0
Zinc	26	26	160	NA	0
Mercury (inorganic)	26	23	0.77	NA	0
Total Cyanide	33	0	ND	NA	0
Total Phenols	13	2	2.7	NA	0
PCBs	11	0	ND	NA	0
OCP (add other OCPs to list if they exceed PQLs)	13	0	ND	NA	0
TPH (C6-C9)	26	0	ND	0	NA
TPH (C10-C36)	26	14	2670	**4**	NA
BTEX	26	0	ND	0	NA
Total PAHs	26	20	274.2	NA	**6**
Benzo(a)Pyrene	26	17	16	NA	**8**

n number of samples
- No criteria available/used

The entire area of the 'Incinerator Site' is covered by the footprint of the former quarry and landfill. There were exceedances in lead, TPH, PAH's and asbestos at a variety of depths, likely to be associated with the previous landfill activities.

8.2 Landfill – Soil

The landfill contains mainly non-putrescible material with minimal volatile components. Contaminants within the landfill include relatively low concentrations of polycyclic aromatic hydrocarbons (PAHs), and random occurrences of petroleum hydrocarbons (TPH) and lead. Consistent with a non-putrescible landfill, pieces of asbestos containing material have also been found.

The former quarry and landfill extend across the Bourke Street Council Depot. TPH was reported in a larger proportion of samples from landfill materials at this site. The Auditor notes that it is likely that the former activities undertaken at the depot may have led to some

of these impacts to soil. Elevated TPH concentrations were reported in the vicinity of the former USTs and in association with a thin layer of gravel fill under the bitumen surface that had reported very strong tar/naphthalene odour (TPH C10-C36 at 6230 mg/kg at 0.1-0.3m).

There were only 2 detections of TPH C_6-C_9 (maximum 260mg/kg at 11.2-11.6mbgl). These were detected at the Bourke Street Council Depot in the vicinity of the UST's (which are understood to have been removed). There were no detections of BTEX in soil samples, but there were elevated PID readings recorded in the field.

Shallow landfill material reported elevated concentrations of benzo(a)pyrene (maximum of 40 mg/kg) and PAHs (maximum of 463 mg/kg) in association with elevated TPH concentrations and a tar/naphthalene odour (Bourke Street Council Depot).

OCPs were not detected in any landfill area and arsenic and mercury were only detected at low concentrations within the surface.

Asbestos detected within the landfill material, over the three sites, appears to be randomly distributed. The greatest depth of detection was at 10mbgl (BH4 of the Incinerator Site). The shallowest depth of detection for asbestos was 3mbgl in BH1, which additionally detected asbestos at 9mbgl.

Remedial works to address the presence of the landfill materials and further investigations following removal of the pavements and buildings will be undertaken as documented in Section 10.

Given the historical land filling activities, a Soil and Groundwater Management Plan (SGMP) was implemented during demolition of the infrastructure and regrading at the Incinerator Site.

Based on visual inspection during the works, AECOM (previously HLA) segregated excavated material (from the former landfill) into stockpiles and selected samples for analysis of PAHs, metals, and asbestos. The results were consistent with the previous results. No analyses were conducted for TPH, but visual inspection and PID screening did not indicate significant TPH concentrations. This is consistent with previous investigations in which significant TPH at this site was only found in a low number of investigation locations that were mainly outside the area of Incinerator excavation.

AECOM reinstated the stockpiled material into the excavation. The Auditor is satisfied that the screening processes conducted were appropriate, and did not reveal material that would be unsuitable for backfilling.

The final surveyed ground level is approximately 17 m AHD which is shown on the survey plan provided by HLA. The depths over the bunker range from 16.5 to 17.5 m AHD. AECOM state that the stockpiles were placed mostly at 14.5 m AHD however materials with a higher percentage of ash were placed at up to 15.7 m AHD. A survey of the final placement depth of the stockpiles was not provided. Stockpiles that met the criteria were used to bring the levels up to 17 m AHD.

The minimum depth of cover in the western section of the bunker could be 0.8 m (16.5 - 15.7 m AHD) which is less than the proposed depth of > 2 m BGS. The stockpile register notes that the final placement would be greater than 3 m BGL. The SGMP has been updated to ensure that the final depths will be consistent with those proposed in the report. The long term environmental management plan will ultimately document the conditions at the completion of development.

AECOM recommended that a SGMP be prepared to address the management of impacted soil and groundwater during the proposed development works. The Auditor agrees that an EMP in line with the requirements of the RAP and the SGMP prepared for Stage 1 of the Incinerator site would need to be implemented.

8.3 Landfill – Gas

Methane measured over the Incinerator Site was reported at low concentrations. The Auditor (GN 46) concluded that the overall results indicated that gas concentrations are low and off-site migration of landfill gas is minimal. No further works are proposed to address landfill gas.

8.4 Non-Landfill

A number of other potential impacts were targeted for sampling and analysis from activities undertaken since landfilling and in areas outside of the quarry area.

8.4.1 Fill Material

Shallow filling has also occurred to facilitate previous development (southern half of Police Site). Fill in the Police Site consists of silt, ash and blue metal to deeper fill containing ash, furnace slag, crushed tile and concrete fragments and the presence of asbestos as analysed in the laboratory (not visible in the field). TPH was also encountered in two samples to the west of the site in black oily materials and at the surface (reported in reports prepared prior in 2002 and 1999). OCP's were also detected in this area. DDT, DDE, DDD and hexachlorobenzene were detected marginally above the PQLs and below the trigger values. Given the presence of ash, there may be a risk of elevated PAHs.

Remedial works proposed include excavation, further inspections following removal of pavements and buildings and further investigations in areas of uncertainty i.e. detections of asbestos, elevated TPH and OCP detections.

8.4.2 Unsealed Areas

The site extends approximately 250 m from the former Incinerator. Samples have been collected from the Incinerator, Bourke Street Council Depot and Police Site for dioxin analysis. Only two of 66 samples from the Incinerator marginally exceeded the reference values (dioxins), the depths of which are not clear. All other detections within the surface and sub-surface soils are below the criteria.

Dioxins and furans were detected throughout the soil profile at various concentrations in surface and near surface soils at the Incinerator Site. Considering the low mobility of dioxins in the environment, the Auditor considers that fill materials, rather than atmospheric deposition, are the most likely source of the dioxin and furan contaminants. Considering the

results, it is in the Auditors opinion that there is unlikely to be significant dioxin contamination within the fill materials. No further assessment is considered necessary.

8.4.3 Underground Storage Tanks (USTs)

It is understood that USTs located within the Bourke Street Council Depot have been removed. Some minor TPH contamination was detected in the vicinity. The removal of the USTs will be confirmed following removal of the pavement slabs (Section 10).

USTs are known to be located at the eastern end of the Police Site. EMS also indicate that a UST may be located in the centre of the western half. Only minor TPH concentrations were detected in association with known UST locations.

Remedial works are proposed to remove the USTs and undertake further investigations in the vicinity of the suspected USTs (Section 10).

8.4.4 Unassessed Areas

A number of buildings, concrete and asphalt surfaces remained during the investigations which limited access for drilling and visual observations of materials below the slabs and paving.

No intrusive investigations were undertaken in the workshop building at the Bourke Street Council Depot and buildings on Police Site. Demolition of the incinerator has been undertaken and the materials encountered have been consistent with those located in the vicinity.

Visual validation following removal of the slabs and buildings is proposed (Section 10) to confirm that the materials are similar to those encountered in surrounding investigations.

8.4.5 Site Characterisation Conclusion

The Auditor considers that soils have been characterised sufficiently such that a plan of remediation can be prepared. The plan of remediation needs to address the following:

- Ensure limited access to landfill materials which are associated with elevated concentrations of PAHs and random occurrences of TPH and lead. Other contaminants such as asbestos may also be encountered.
- Confirm that the materials exposed following removal of the pavements and bulk earthworks are similar to those encountered during the investigations.
- Determine the extent of impact to soil and the potential sources at the Police Site outside of the former landfill footprint and have a contingency for remediation or management if required.

9 Evaluation of Groundwater Analytical Results

Overall groundwater results were obtained by sampling at the Incinerator, Police Site and the Bourke Street Council Depot that are located over the landfill. The results obtained were similar to each other in magnitude and confirmed the earlier investigations at the Incinerator

Site that concluded that shallow groundwater at the Incinerator Site had been well characterised for the potential contaminants although not fully characterised for potential beneficial uses such as irrigation. The results are summarised in Table 9.1.

Table 9.1: Evaluation of Groundwater Analytical Results – Summary Table (μg/L)

Analyte	n	HLA Investigations 2007			
		Detections	Maximum	n >ANZECC Marine (2000)	Auditor Comments
Arsenic	20	15	12	4	Slightly elevated concentrations were detected in the Bourke Street Council Depot in four of the five wells
Cadmium	20	1	0.04	0	
Total Chromium	20	2	1	0	
Copper	20	5	0.002	0	Concentrations were only marginally above the PQL.
Lead	20	8	10	1	The exceedance occurred at the southern boundary of Bourke Street Council Depot
Nickel	20	20	6	0	
Zinc	20	20	21	2	The two exceedances of the trigger value occurred at the northern boundary of the Bourke Street Council Depot
Mercury (inorganic)	20	7	0.2	3	Marginal exceedences occurred at the western boundary of the in Bourke Street Council Depot
Ammonia-Nitrogen	19	19	35.1	0	
Cyanide	5	0	ND	0	
TPH (C6-C9)	14	0	ND	NG	
TPH (C10-C36)	19	11	2150	NG	TPH detections widespread throughout landfill.
Benzene	20	0	ND	0	No detections reported.
Toluene	20	0	ND	0	No detections reported.
Ethylbenzene	20	0	ND	0	No detections reported.
Xylene	20	2	7	0	Minor concentrations were detected above PQL.

NG – No Guideline

ND – Not detected above the PQLs

A summary of the results follows:

- Ammonia, commonly associated with putrescible waste in landfills, was detected in all wells within the landfill and up and down gradient of the landfill. However, the concentrations are relatively low for landfill leachate commensurate with the low amount of putrescible waste noted on borelogs. The consultants indicate that concentrations of ammonia detected may have been derived from a nitrate source up-gradient of the landfill with some potential for ammonia to be generated from the landfill waste.
- A number of contaminants, such as iron, manganese, zinc, nickel and cyanide were detected at elevated levels up-gradient of the landfill. A number of contaminants, such as zinc and lead that were detected at marginally elevated levels within the soil were only detected at relatively low concentrations within the groundwater. Bourke Street Council Depot groundwater contained higher concentrations of metals in comparison to the other sites.

Metals that were reported above the ANZECC (2000) trigger values for aquatic organisms in marine environments were arsenic, lead, mercury and zinc. All other metals analysed for (Cd, Cr, Cu and Ni) were detected below the trigger values.

The potential sources of groundwater impacts will be further assessed during remedial works for the larger Green Square development. Volatile contaminants were not detected in groundwater. Groundwater is located below the depth to which trenches and services would normally be excavated.

The results obtained were similar in magnitude and confirmed the earlier investigations at the Incinerator that concluded that shallow groundwater at the Incinerator had been well characterised for the potential contaminants although not fully characterised for potential beneficial uses such as irrigation.

HLA consider that ammonia in groundwater does not pose a significant risk to future users of the sites or the environment. Douglas agree that proactive remediation is not warranted. Management of groundwater during the proposed development works is discussed in Section 10. The Auditor considers that groundwater has been sufficiently characterised to allow development works to proceed.

10 Evaluation of Proposed Remediation

10.1 Works required

Following the investigation works it was identified by HLA that remedial works would be required to ensure that the three sites can be made suitable for the proposed uses. The following reports have been prepared outlining the proposed remedial and management works:

- Remedial plans were prepared for the Bourke Street Council Depot and Police Site (HLA RAP). The HLA RAP was prepared prior to detailed knowledge of the proposed development and is not reliant on the bulk earthworks for site remediation (Tables 10.1 to 10.3).

- A Soil and Groundwater Management Plan (SGMP) was prepared and implemented during Stage 1 earthworks at the Incinerator Site. Stage 1 earthworks included the demolition of the incinerator and other structures and regrading (Section 10.3).
- Following implementation of the SGMP, a Site Condition Report was prepared for the Incinerator recommending that a SGMP be prepared for Stage 2 of site redevelopment (Table 10.1),
- A revision of some of the broader remedial strategies was undertaken Douglas (2009) (discussed in Tables 10.1 to 10.3).

The works required are discussed in Table 10.1.

Table 10.1: Extent of Remediation Works

Element	Extent of Remediation Required (identified by HLA)	Proposed Works (RAP unless otherwise indicated)
Landfill Materials	Landfill materials were found to have some elevated concentrations of lead, TPH C10-C36 and PAHs, and contain asbestos. The extent of the quarry and subsequent landfill are outlined on the site plans.	Remedial works: Capping of the landfill materials. Implementation of a long term EMP. **HLA RAP** - 1 m of non-impacted material beneath future basement and road areas. A marker layer was not discussed. VENM in underground service corridors. Implementation of a long term EMP. **Douglas** – 0.5 m or a permanent concrete floor slab. The base of the cap would 'typically' be marked with a visible marker layer. It is not clear whether permanent concrete pavement rather than the concrete floor of the proposed buildings is also proposed as a barrier to landfill materials without the 0.5 m of capping. The Auditor notes that pavements not under buildings should include a minimum 0.5 m of clean subgrade. Services would be over excavated by 0.5 m and a marker layer placed over the trench. Validation of the thickness of the capping/trench materials and appropriate management measures commensurate with the reduced cap thickness will be required to ensure that this strategy is adequate (discussed in Table 10.2 and 10.3). **Incinerator Site Condition Report**: AECOM (2008) recommend that a SGMP be prepared to address the management of soil and groundwater during the proposed development works. The Auditor notes that a SGMP should be implemented at all sites.

Table 10.1: Extent of Remediation Works

Element	Extent of Remediation Required (identified by HLA)	Proposed Works (RAP unless otherwise indicated)
Shallow asbestos impacted soil (**Police Site**)	Six locations under pavements (outside the landfill area) to a shallow depth. **Douglas** note that asbestos contamination in fill material is typically sporadic The Auditor notes that four of these locations are within the landfill. The other two detections are located on either side of the landfill.	Remedial works: Targeted excavation and off-site disposal of shallow asbestos impacted soil. Further investigations: Delineation works (in addition to validation sampling). No further details provided. Remedial actions that may be required following further investigations are not discussed by HLA. **Douglas** note that the total removal of all asbestos contamination filling would not be practical. An alternative remedial or management approach was not provided. The Auditor notes that a conceptual model of the source of the impact and the likely extent should be formulated and verified and remedial/management works undertaken where necessary.
TPH Hotspots (**Police Site)**	TPH impact at two 'hotspots' to the west and south of the site. HLA note that the impact is estimated to be due to oil spills. The Auditor notes that particularly elevated TPH concentrations were noted at 2 m depth bgl. The source and extent of odours and TPH has not been determined.	Remedial works: Excavation and off-site disposal or landfarming of the two hotspots. Further investigations: Test pitting in the vicinity of one of these locations (BH10) to ensure there is not a source of TPH (i.e. tank/piping). The Auditor notes that the potential source identified by HLA is tanks (earlier in the report it was oil spills). Further investigations should aim to formulate and verify a conceptual model of the potential impacts. The Auditor notes that as 'hotspots' are being excavated there is a risk that the extent of contamination may extend further than expected. Remedial actions that may be required following further investigations are not discussed by HLA.
Deep Fill (**Police Site**)	Deep fill to at least 6 m depth at BH3. HLA estimate that the area is limited in extent.	Further investigations: Test pits in the vicinity following removal of the concrete slabs to determine the extent of fill. Remedial actions that may be required following further investigations are not discussed by HLA.

Table 10.1: Extent of Remediation Works

Element	Extent of Remediation Required (identified by HLA)	Proposed Works (RAP unless otherwise indicated)
Other Unknowns Beneath Buildings and Pavements (**Police Site and Bourke Street Council Depot)**	All pavements, buildings and structures will be removed. **Bourke Street Council Depot**: HLA note that there are potential impacts beneath buildings associated with historic depot operations (workshop pits) or pre-construction pesticide application.	Further investigations: Inspections and sampling and analysis following the removal of the buildings and slabs. No further details are provided. Validation works are discussed in Table 10.2. Remedial actions that may be required following further investigations are not discussed by HLA.
USTs **(Police Site and Bourke Street Council Depot**)	**Police Site**: Three disused USTs, associated piping/bowsers and potentially impacted backfill sands. These are located in the east of the site. **Bourke Street Council Depot**: Localised TPH impacts associated with the former fuel storage area. It is understood that USTs have been removed however this has not been confirmed and some pipelines may have been retained. EMS (2003) considered that an additional UST may remain on-site. HLA ENSR did not observe any visual evidence of an existing UST at the site, other than the bowser. A WorkCover search was not undertaken by HLA	Remedial Works: USTs at the Police Site (and if encountered at the Bourke Street Council Depot) would be removed in accordance with the required regulations. Excavation and off-site disposal to landfill or landfarming of contaminated soil from UST areas. The existing bowser and in-situ pipework at **Bourke Street Council Depot** are to be excavated and disposed off-site. Further investigations: During removal of concrete slabs in this area, investigations would be undertaken to assess whether any other USTs are present. Test pits/trenches in the area are proposed. Remedial actions if found are discussed above.
Bulk Earthworks	Bulk earthworks for basement car parks and some of the road areas. The extent of the proposed basement car parks is not discussed.	**HLA RAP**: Removal of the landfill materials would be 'a waste management exercise' with materials either used in land-forming or disposed off-site. **Douglas** note that segregation and adequate validation would enable re-use of materials including as capping. While Douglas note that comprehensive segregation would be difficult, selective segregation of targeted soil pockets could be effective. The Auditor notes that the suitability of this option will depend on the validation works undertaken.

The Auditor notes that the extent of remediation required for areas of concern (other than the landfill) has not been established. Targeting hotspots, USTs, etc is essentially the starting point for the proposed remedial and investigation works. Given that more investigations are proposed, staged reporting will be required prior to bulk excavations to ensure that the conceptual models and proposed actions are adequate.

The proposed validation works are discussed in Table 10.2.

Table 10.2: Proposed Validation Works

Element	Validation Works Proposed	Auditors Opinion
Capping of Landfill Materials	No specific validation works are proposed.	A survey of the base and top of cap would be required to confirm the final capping depth. Adequate validation of any materials used in the root zones and other areas of potential access during landscaping activities (including the landscaped road verge) would be required. Validation requirements for imported materials, including topsoil, are discussed below. The requirements for an EMP are discussed in Table 10.3.
Excavations - shallow asbestos impacted soil (Police Site) - TPH hotspots (Police Site) - USTs (Bourke Street Depot and Police Site)	Inspections of the excavation for pieces of asbestos, stained soil, etc At least one sample per wall and one per base (10 m by 10 m) with the final density dependent on surface area. Samples would be submitted for the relevant contaminants of concern (COC). USTs: One sampler per line of the piping and bowsers. Hydrocarbons: Samples submitted to the laboratory for analysis would be determined based on PID results and field observations. Landfarm: 1 per 25 m^3 (TPH, BTEX and lead) Douglas propose to further validate the removal of the USTs by excavating test pits 'stepped out' from the excavation.	Sample selection should be based on the depth of estimated impact i.e. wall samples for the USTs should be at the depth of the former base of the USTs. The Auditor notes that while the validation sampling approach may be appropriate for point sources such as USTs, it may not be for diffuse/random occurrences such as asbestos. The HLA RAP indicates that excavation will also be undertaken for bulk earthworks for basements. It is not clear whether sampling is proposed. Visual validation of the fill materials should be undertaken during bulk earthworks. This may be undertaken in accordance with a SGMP as undertaken at the Incinerator Site.
Other Unknowns Beneath Buildings and Pavements	Collection of samples beneath sumps/piping or other potential contaminant source following building demolition. **HLA RAP (Police Site)** notes that this will include OCP testing and visual inspection of contamination such as asbestos or oil staining. The need for further remedial works will be assessed following these validation works.	The Auditor notes that the inspections will need to consider odours, staining, inconsistent fill materials, indicators of contamination, etc. Sampling and analysis should be commensurate with the observations made. OCPs were identified as a potential issue at both sites and soils should be tested accordingly.

Table 10.2: Proposed Validation Works		
Element	**Validation Works Proposed**	**Auditors Opinion**
Bulk Earthworks	Material for reuse, including landfarmed material, to be tested at 1 per 25 m^3 for COC. Imported material to be sampled at 1 per 100 m^3 for metals, petroleum hydrocarbons, PAHs, pesticides and PCBs. VENM would be validated in accordance with the EPA (1995) Sampling Design Guidelines. Material for off-site disposal would be subject to the waste classification process outlined in the HLA RAP. This includes sampling of a maximum stockpile volume of 5000 m^3 at a density of 1 per 250 m^3 (dependent on observations). Some pre-treatment may be required. HLA RAP refers to DEC (2004) waste guidelines. These have since been superseded. **Incinerator**: AECOM (May 2009) note that the material would need to be classified in accordance with the DECC (2008) Waste Guidelines: Classifying Wastes prior to off-site disposal. (These have since been updated as July 2009).	The Auditor notes that the sample density should be commensurate with the documentation provided. Materials imported to the site should be indicated i.e. backfill sands, gravels, etc. Any topsoil material will need to be validated as suitable for use with regard to potential contaminants. The Auditor notes that imported materials should be demonstrated to be in accordance with the POEO Act where used as engineered fill or in earthworks, or adequately validated topsoil. The Auditor notes that waste should be classified in accordance with the POEO Act. The Auditor notes that OH&S procedures will be required during potential segregation works and land forming works. This is likely to be addressed in the Asbestos Management Plan (AMP) which is a requirement of the HLA RAP. The AMP essentially aims to prevent the formation of dust.

10.2 Evaluation of the HLA RAP

The Auditor has assessed the HLA RAP by comparison with the checklist included in 'Guidelines for Consultants Reporting on Contaminated Sites' as follows in Table 10.3.

Table 10.3: Evaluation of Remedial Action Plan	
Remedial Action Plan	**Comments**
Remedial Goal	The goal of the HLA RAP is to undertake remedial works to render the site suitable for the proposed medium to high density residential land use. Given that it is understood that the plazas will be paved and located over basement car parking the Auditor considers this goal to be appropriate.

Table 10.3: Evaluation of Remedial Action Plan	
Remedial Action Plan	**Comments**
Discussion of the extent of remediation required.	Remediation required for each area was discussed within the RAP (See Table 10.1 above)
Remedial Options	A generic discussion on the hierarchy of remedial options was provided. HLA indicated that the following options were considered: - excavation and landfarming of hydrocarbon impacted soil - excavation and off-site disposal of asbestos impacted soil and other impacted soil - on-site containment of residual landfill materials beneath roads and future basements The options, including potential advantages and disadvantages, were not discussed in detail in the HLA RAP. The Auditor notes that given the proposed bulk earthworks to facilitate development that the options were limited and have been adequately considered. A combination was adopted as the preferred options.
Selected Preferred Option	The preferred options were discussed within the RAP (refer Table 10.1). The main rationale for capping was that it was not economically feasible, or necessary, to remove all landfill materials and that the cap could be managed by an EMP. The Auditor considers this to be adequate.
Proposed Validation Testing	Refer to Table 10.2.
Interim Site Management Plan (before remediation)	Not discussed. The sites are currently fenced to prevent access.
Site Management Plan and Contingency Plans to Respond to Site Incidents.	A plan for site management during the remedial works and contingency plans to respond to site incidents were provided.
Contingency Plan if Selected Remedial Strategy Fails	Not discussed. Contingency plans should be considered and detailed with the results of further investigations prior to implementation of the RAP at the Police Site and the Bourke Street Council Depot.
Remediation Schedule and Hours of Operation	The hours of operation were detailed and signs will be displayed throughout the duration of the works. It is understood that works will commence in 2010.
Licence and Approvals	The HLA RAP noted that the works were Category 2 under SEPP 55 and that the USTs would be removed in accordance with the appropriate regulations and requirements for disposal of liquids and tank destruction. All waste material will be classified in accordance with the POEO Act with tracking of the transport and disposal of the waste.
Contacts/ Community Relations	Contacts not provided but will be displayed on signs located adjacent to the site access throughout the remediation program.

Table 10.3: Evaluation of Remedial Action Plan

Remedial Action Plan	Comments
Staged Progress Reporting	It is understood that the sequence of works is proposed as follows: • Removal of pavements, buildings and floor slabs • Further inspections and investigations that may lead to further testing and additional remedial works • Remedial works in accordance with the HLA RAP and as amended by Douglas • **Police Site RAP**: Staged reporting following each stage of remediation works and earthworks documenting investigation, remedial and validation results. Given that further inspections, delineation and targeted investigations are proposed (and the proposed remedial/contingency actions following on from the investigations are not proposed), the Auditor agrees that staged reporting is required. The results and any additional proposed remedial works should be submitted to the Auditor prior to additional remedial works or earthworks. • **Bourke Street Council Depot RAP**: HLA RAP indicates that a Site Condition Report rather than a validation report be prepared at the completion of remediation and earthworks. The Report would document investigation, remedial and validation results. Further investigation works include determining whether USTs are still present on the site and inspections following removal of the concrete slabs (particularly around the former workshop sumps). The Auditor considers that a validation report should be prepared following the investigations and remedial works prior to earthworks. • Preparation of a SGMP (Incinerator only) to be implemented during the proposed development works. The Auditor notes that depending on the results of investigations and remedial works, implementation should be considered for all of the sites.
Long term site management plan	The remedial plans outline some broad minimum requirements of the EMP. These requirements were based on a cap of 1m over the landfill materials. Given the reduced cap thickness, the management of minor services, particularly underneath the building, will need to ensure the protection of human health. More details on how the reduced cap thickness would be managed and who would be responsible should be provided prior to development.

The HLA RAP provides a conceptual overview of the proposed investigations and remediation processes that should be followed, while providing limited details in some areas. Because of lack of access in the still-operational sites, the RAP requires further inspections and testing in a number of areas. The Auditor considers that the processes outlined should result in the site being made suitable for the proposed uses.

11 Conclusions and Recommendations

In the Auditor's opinion, the measures outlined in the conceptual HLA Remedial Action Plans as revised by Douglas are practical and the sites can be made suitable for the proposed development if the site is remediated in accordance with those Plans. The Auditor considers that the following steps are required prior to ultimate certification of suitability with a Site Audit Statement:

1 Further Investigation

- Beneath buildings and pavements on the Bourke Street Council Depot and Police Site after they are demolished. Observations must be recorded with follow up investigations where indicated by field conditions.
- To assess the extent of contamination on the Police Site.

2 Development of Remediation Processes

- Detailed design of capping required to provide a separation layer between landfill material and site users.
- Detailed design of capping/separation for below ground features such as services including beneath buildings.
- Preliminary development of long term management plan detailing management measures related to each capping.
- Revision of remediation action plan to address any contamination found in the further investigations.

3 Implementation of Remediation

- Implementation of capping measures.
- Removal of underground fuel storage tanks and any related contamination.
- Completion of remediation in accordance with remediation action plan and any revisions.

4 Validation

– Adequate validation of remedial works including the thickness and location of the cap, nature and extent of asbestos outside of capped areas and the base of the UST excavations.

– Demonstration that imported material particularly topsoil is suitable for use.

5 Management Plan

– Preparation of long term management plan, documenting the as-constructed conditions, management required and responsibilities

– Acceptance of the management plan by relevant stakeholders.

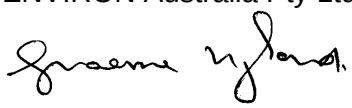
It is noted that development of the site can be staged, and that separate Site Audit Statements can be prepared for different parts of the site.

* * *

Consistent with Department of Environment and Climate Change (DECC and formerly NSW EPA) requirement for staged "signoff" of sites that are the subject of progressive assessment, remediation and validation, I advise that:

- This advice letter does not constitute a Site Audit Report or Site Audit Statement.
- At the completion of the remediation and validation I will provide a Site Audit Statement and supporting documentation.
- This interim advice will be documented in the Site Audit Report.

Yours faithfully
ENVIRON Australia Pty Ltd



Graeme Nyland
Accredited Auditor 9808

Attachment 1: Police Site
Attachment 2: Incinerator Site
Attachment 3: Bourke Street Council Depot

Attachment 1: Police Site

PROJECT-FILE NAME S4075802
DATE 27 July 2007
DRAWN TO
APPROVED

- Police site investigation area
- Approximate extent of former quarry (subject to change)
- UST Area
- Local groundwater flow direction
- Borehole/groundwater monitoring well location (HLA ENSR)
- Borehole location (HLA ENSR)
- Surface sample location (HLA ENSR)
- AD Envirotech Groundwater monitoring well location (1999)
- AD Envirotech borehole location (1999)
- EMS Borehole location (2002)
- EMS Borehole location (2006)
- EMS Groundwater monitoring well location (2006)
- *14.75* Groundwater elevation (mAHD)

Site Sampling Location Plan
Landcom
Additional Environmental Site Assessment - NSW Police Service Site
Green Square Town Centre
Waterloo, NSW

HLA

FIGURE
3

Attachment 2: Incinerator Site

PROJECT-FILE NAME S4075801
DATE 2 October 2007
DRAWN TO
APPROVED

- Incinerator site investigation area
- Cross-section transect (Refer to Figures 10 & 11)
- Approximate extent of former quarry
- Borehole/groundwater monitoring well sample location
- Groundwater monitoring well sample location (Coffey 2002)
- Groundwater monitoring well (EMS 2006)
- Borehole sample location
- Surface sample location

N

0 50m

Site Sampling Location Plan
Landcom
Additional Environmental Site Assessment - Waterloo Incinerator Site
Green Square Town Centre
Waterloo, NSW

HLA

FIGURE
3

Attachment 3: Bourke Street Council Depot

PROJECT-FILE NAME S4075803
DATE 18 April 2007
DRAWN TO
APPROVED

Council depot site investigation area
Approximate extent of former quarry
Borehole/groundwater monitoring well sample location
Borehole sample location
Dioxin sample location

N

0 35m

Site Sampling Location Plan
Landcom
Additional Environmental Site Assessment - Bourke Street Council Depot
Green Square Town Centre
Waterloo, NSW

HLA

FIGURE
3