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REPORT
on
TARGETED PHASE 2 CONTAMINATION ASSESSMENT

INDUSTRIAL PORTION
HOXTON PARK AIRPORT
WEST HOXTON

Prepared for
MIRVAC PROJECTS PTY LTD
AND WOOLWORTHS LIMITED

Project 71500 – Revision 1
February 2010

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EXECUTIVE SUMMARY

This report details the methodology and results of a Targeted Phase 2 Contamination Assessment undertaken by Douglas Partners Pty Ltd (DP), at the “southern part” of the former Hoxton Park Airport, referred to hereinafter as “the Site”, as shown in Drawing 1, Appendix A. The investigation was limited to the portion of the former airport site that is the subject of the commercial/industrial redevelopment proposal of the Mirvac Projects Pty Limited (Mirvac). The investigation was commissioned by Mr Stuart Penklis of Mirvac.

The investigation was undertaken in conjunction with a geotechnical investigation, which is reported separately (DP project 71500.01).

The assessment consists of a review of the available previous reports conducted on various parts of the site, the drilling of test bores and the sampling and analysis of representative soil and groundwater samples.

Test Bores generally indicated that the site was underlain by shallow filling or topsoil, clay and siltstone. Soil analytical results were generally low and well within the adopted site assessment criteria.

Groundwater results were also typically low or below the laboratory detection limits. Whilst there were some elevated heavy phenols and PAH results were detected no signs of petroleum hydrocarbon or fuel related contamination were noted.

It is noted that the current assessment was undertaken to assess the “broad scale” and overall contamination status of the site. Given the general consistency of the investigation findings and the analytical results (in both the current and previous investigations), it is considered that the potential for contamination risk at the site is low. In particular, based on the soil groundwater assessment findings, no signs of unacceptable or wide spread impacts were noted.

On the basis of the current investigation findings, whilst noting the “low sensitivity” of the proposed commercial/industrial land use, *no issues of unacceptable environmental concern that warrant remediation action were noted, and the site is considered compatible with the proposed development and may proceed from a contamination management standpoint.*

Whilst, as in all cases of investigation, there may be potential for presence of relatively localised sources/issues at various areas of the site, for example in the footprints of the current structures, and in areas of past activities (e.g. demolition of old buildings, use of filling of unknown origin, may result in isolated impacts such as pockets of asbestos contamination), it is envisaged that such impacts would be minor and localised in nature, and can be managed in a straightforward manner during the construction of the proposed development.

In this regard it is recommended that in order to ensure adequate management of possible localised contamination issues, the construction works should proceed under a Construction Environmental Management Plan (CEMP) to be prepared by an environmental consultant and implemented. The plan will provide detailed provisions on the following:

(a) Requirements and procedures to be adopted prior to and during demolition works to ensure that the works are conducted in a safe and appropriate manner in accordance with the legislative requirements, and that any hazardous material (such as asbestos) will be removed in a controlled manner by a qualified and appropriately licensed contractor without contaminating the substrate.

(b) As a good due diligence practice, following demolition and removal of the existing site structures/infrastructure and prior to the commencement of construction works, ie when the site become more accessible, the site should be inspected/checked by a qualified environmental consultant to verify the current investigation findings. The inspection/check should focus on previously concealed areas or areas of possible concern such as the former building footprints, and also on areas of potential concern eg hangars and areas of the former fuel tanks.

(c) Development of “Unexpected Finds Protocols” to provide clear guidance to site workers for the management of unexpected findings during the site development process.

Based on the available information, in the unlikely event that unexpected contamination issues are uncovered during the post-demolition site validation, these can be handled, assessed and managed in a straightforward manner in accordance with the Unexpected Finds Protocols and the relevant provisions of the CEMP.

GLOSSARY

ANZECC	Australian and New Zealand Environment and Conservation Council
AS	Australian Standard
AST	Above ground Storage Tank
BTEX	Benzene, Toluene, Ethyl Benzene and Xylenes
C10-C36	long to medium chain hydrocarbons
C6-C9	short chain hydrocarbons
COC	chain of custody
D.P.	Deposited Plan
DP	Douglas Partners
DQI	data quality indicator
DQO	data quality objective
EPA	Environmental Protection Authority
GIL	groundwater investigation level
HIL	human health based investigation level
NATA	National Association of Testing Authorities
NEPM	National Environment Protection Measure
NSW DECC	New South Wales Department of Environment and Climate Change
OCP	organochlorine pesticides
OPP	organophosphate pesticides
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
PID	photoionisation detector
PPIL	phytotoxicity based investigation level
ppm	parts per million
PQL	practical quantification limit
PRG	primary remediation goal
Pty Ltd	Propriety Limited
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
RPD	relative percentage difference
SAC	site acceptance criteria
SAQP	sampling analysis and quality plan
SMF	synthetic mineral fibres
TCLP	toxicity characteristic leaching procedure
TOPIC	total photoionisable compounds
TPH	total petroleum hydrocarbons
UCL	upper confidence limit
USEPA	United States Environmental Protection Agency
UST	underground storage tank
VOC	volatile organic compounds

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1. INTRODUCTION

This report details the methodology and results of a Targeted Phase 2 Contamination Assessment undertaken by Douglas Partners Pty Ltd (DP), at the "southern part" of the former Hoxton Park Airport, referred to hereinafter as "the Site", as shown in Drawing 1, Appendix A. The investigation was limited to the portion of the former airport site that is the subject of the industrial redevelopment proposal of the Mirvac Projects Pty Limited (Mirvac). The investigation was commissioned by Mr Stuart Penklis of Mirvac.

The investigation was undertaken in conjunction with a geotechnical investigation, which is reported separately (DP project 71500.01).

The assessment consists of a review of the available previous reports conducted on various parts of the site, the drilling of test bores and the sampling and analysis of representative soil and groundwater samples.

2. PROPOSED DEVELOPMENT AND OBJECTIVES

2.1 Proposed Development

It is understood that at this stage that the proposed development will consist of the construction of two new distribution centres with associated infrastructure, as shown in Drawing 5, Appendix A. The proposed redevelopment would also include the construction of supporting roadways and on grade staff car parking. It is understood that the redevelopment would likely require the site levels to be raised in the order of 2 m to raise the level above the flood levels. At this stage the proposed development is only at the concept stage and therefore the final design may vary to some extent although the overall character and land use is not expected to alter significantly from the concept designs.

It is noted that the distribution centres will be occupied and utilised by Woolworths.

2.2 Objectives of Investigation

The objectives of the current investigation are as follows:

- To assess the potential for soil contamination at the site and the likely nature and extent of the contamination encountered;
- To assess the potential for groundwater contamination at the site and the likely nature and extent of the contamination encountered;
- To determine if the site is suitable for the proposed development (as detailed in Section 2.1); and
- To assess the need for general remedial works (if required) to render the site suitable for the proposed development.

3. SCOPE OF WORKS

The scope of works and methodology adopted is generally in accordance with DP's proposal dated 17 November 2009 and accepted by Mirvac Group.

The Phase 1 Environmental Site Assessment prepared by Parsons Brinckerhoff (PB) has been provided by the vendor (along with other reports), which has generally included the most essential historical information regarding the site. In this light, the scope of the current Targeted Phase 2 Contamination Assessment has allowed for a site historical information review based on the information provided in the PB report.

The scope of the current investigation comprises the following:

- Review of previous investigation reports provided by the client.
- Conduct a general site inspection with a view to identify discernible signs/sources of contamination that were not previously reported by PB, and to establish the locations of the intrusive sampling points.
- A precautionary electronic scan of drilling locations and a review of 'dial before you dig' service plans prior to drilling.
- Ground penetrating radar survey of area/s of suspected or former underground storage tanks (USTs).
- Levelling of groundwater wells and geotechnical test bores.
- Conduct intrusive investigation, from 39 environmental test bores drilled over the site using two bobcat drilling rigs. Collect soil samples from the bores at broadly regular intervals, starting from the near surface horizon. The actual sampling depth was adjusted in accordance with site observations.
- Based on noted conditions of the samples, onsite observations made at each sampling location, the nature of potential contamination sources in the vicinity of the sampling points and the soil profiles noted, 54 soil samples (plus 6 replicate QA/QC samples including at least 5% interlaboratory and 5% intralaboratory duplicates) were selected to the NATA accredited laboratories for chemical analysis for various combinations of a suite of potential contaminants including heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), total petroleum hydrocarbons (TPH), monocyclic aromatic hydrocarbons

(BTEX – benzene, toluene, ethyl benzene and xylenes), polycyclic aromatic hydrocarbons (PAH), organochlorine pesticides (OCP), polychlorinated byphenyls (PCBs), total phenolics and asbestos.

- Convert nine of the bores into groundwater monitoring wells for subsequent groundwater sampling and analysis. The groundwater wells were extended to depths of about one meter below the perceived groundwater table (based on site observations) or to a maximum depth of 10 m. Groundwater samples were also collected from two functional existing groundwater wells installed in the vicinity of the UST by others.
- After well development, and allowing appropriate time lapse for the groundwater recharge into the wells, collect representative groundwater samples (plus one intralaboratory duplicate) from the wells following well purging using low flow technique and/or bore dedicated bailers (where water volumes were low), and upon noted attainment of equilibrium for all field parameters (these are standard procedures are to ensure the representativeness of the groundwater samples).
- Deliver all collected groundwater samples to the NATA accredited laboratories for chemical analysis of a suite of contaminants of concern (TPH, BTEX, PAH, phenols and heavy metals).
- Screening of all groundwater wells with a GA2000 landfill gas metre to identify discernible signs of potential presence of odorous or landfill gases.
- Review and assess the analytical data in the light of the known information of the site.
- Prepare a brief factual letter report on contamination investigation findings, with comments on the identified issues of contamination concern, the likely nature and extent of the issues (or the uncertainties noted), with an evaluation of the likely potential for environmental risks associated with the site, and a preliminary opinion on the likely suitability of the site, from a contamination standpoint, for the proposed commercial/industrial development.
- Prepare a Final Targeted Phase 2 Contamination Assessment (this report).

4. SITE DESCRIPTION

4.1 Site Identification

The Hoxton Park Airport is situated within the Liverpool Local Government Area. The former airport is located off Cowpasture Road, West Hoxton, NSW 2171. The entire airport covers approximately 81.6 ha. The current assessment covers the southern portion of the West Hoxton Airport, with a land area of approximately 40 ha. The site is identified as part of Lot 400 in DP 1141990.The general extent of the investigation area (the site) is presented in Drawing 1 attached.

4.2 Site Description

At the time of the investigation, the site is in a state of disuse. The site comprises:

- Entrance road, taxiway and runway, all sealed with asphalt pavement;
- Aircraft hangar buildings and office buildings;
- A former service station containing former diesel and unleaded petroleum underground storage tanks (UST) and an aboveground LPG tank. It is understood (based on a Tankpit Characterisation Report by ENSR, see later section) that the USTs have been decommissioned removed and;
- A mobile phone tower.

Two landfill areas were reported by PB to be located on the “northern reaches” of the greater airport site. These areas were noted to be located beyond the site boundary of the current investigation site.

It is noted that the site is secured by a two metre high barbed wire fence. The portion of the site located to the east of the runway, ie the riparian zone along the Hinchinbrook Creek alignment, was fenced off and hence inaccessible to intrusive assessment. The area, nevertheless, comprised heavily vegetated land and was not intended to be developed.

The surrounding landuses include:

- To the north, the northern portion of the Hoxton Park Airport, followed by a new residential development with parks, sports grounds and reservoirs. Cecil Hills High School is located approximately 500 m north of the airport.
- To the east, Hinchinbrook Creek, then Cowpasture Road. Highly developed residential land use with parks and sports grounds lie immediately to the east of Cowpasture Road. A service station (operated as a 7-Eleven store/service station) is located offsite, adjacent to the south eastern corner of the site (103 Cowpasture Road, West Hoxton).
- To the south, Cowpasture Road, then residential development with parks and sports ground.
- To the west, the M7 motorway, with agricultural land further to the west. The southern Hoxton Park Aerodrome Release Area is located to the west of the site.

Of the above-mentioned nearby landuses, the one with the highest potential for causing impacts on the site is the service station located to the south east. Given the noted topography and geographical setting, it is envisaged that the general gradient of groundwater (and hence the direction of groundwater migration) would be in a north easterly to easterly direction, towards Hinchinbrook Creek. In this light, the potential for contamination impacts from this service station on the Site is envisaged to be relatively low. One groundwater well was installed near the section of site boundary to the north of the service station to assessment the potential impacts from the service station.

Selected photos of the site are presented in Appendix B.

5. REGIONAL GEOLOGY, TOPOGRAPHY AND HYDROGEOLOGY

Following is a description of the regional geology, topography and hydrogeology.

Reference to the Penrith 1:100 000 Geological Series Sheet (Drawing 6, Appendix A) indicates that the site is underlain by Tertiary fluvial deposits comprising medium grained sand, clay and silt. The site is close to a geological boundary with Bringelly Shale which typically comprises shale, carbonaceous claystone, laminite, fine to medium grained lithic sandstone.

The elevation of the site is approximately 40 m AHD and the local relief is less then 10 m (Drawing 7, Appendix A). The site slopes gently to the east towards Hinchinbrook Creek. A number of stormwater drains had also been constructed to drain water from the western side of the site under the runway to discharge points close to Hinchinbrook Creek. Based on the measured groundwater levels the local direction of groundwater flow would appear to be to the east.

The measured groundwater levels (relative to AHD) are presented in groundwater level contour drawing in Drawing 10, Appendix A. The drawing shows that the direction of groundwater flow is generally to the south to south east to Hinchinbrook creek.

A search of the Department of Water and Energy (now the function has been incorporated into Department of Environment, Climate Change and Water, DECCW) groundwater bore database was conducted as part of the PB 2006 assessment. There were no registered bores within a 1.5 km radius of the site. Based on field parameters for electrical conductivity (EC) of groundwater collected during the DP investigation the EC ranged from 1 ms/cm to 25 ms/cm indicating that groundwater was moderately to highly saline.

According to the Soil Landscapes of the Sydney 1:100,000 (Drawing 8, Appendix A) Sheet the majority of the site is mapped as the South Creek, alluvial soil landscape. This soil landscape is typical of landscape such as floodplains, valley flats and drainage depressions. The soils are very often deep sediments over bedrock including red and yellow podzolics, grey clays and yellow solodic soils. They typically exhibit an erosion hazard and can be subject to frequent flooding.

The north-western corner of the site is mapped as being part of the Blacktown soil group. Soils of the Blacktown group are typically found in landscapes characterised by gently undulating slopes and rises on Wianamatta group shales and Hawkesbury Shales with local relief of up to 30 m and slopes usually less then 5%. Broad rounded crests and ridges with gently inclined slopes, cleared woodlands and tall open forest are also characteristic of this group.

The soils of the Blacktown Group are typically shallow to moderately deep (<100 cm) red brown and brown podzolic soils on crests and upper slopes (and well drained areas) and deep (150 - 200 cm) yellow podzolic and soloth soils on lower slopes and areas of poor drainage. These soils typically are moderately reactive, are highly plastic, have low fertility and have poor soil drainage.

According to the Department of Environment, Climate Change and Water, 1:25,000 Acid Sulphate Soils Risk Mapping there is no known or suspected occurrence of acid sulphate soils at the site (despite the close proximity to Hinchinbrook Creek). It is also noted that acid sulphate soils are not typically present above 5 m AHD and the site is at approximately 40 m AHD, and therefore would be considered highly unlikely to be present. Therefore, based on the available mapping (and the conditions encountered in the test bores), it is considered that further acid sulphate soils assessment is not required.

According to the Salinity Potential in Western Sydney (2002) Map (Drawing 9, Appendix A) (NSW Department of Infrastructure, Planning and Natural Resources) the site has a moderate to high salinity potential. Areas of high salinity potential are typically found along the eastern side of the site in proximity to Hinchinbrook Creek.

6. REVIEW OF PREVIOUS REPORTS

A number of previous investigations have been provided by the client for review. These earlier investigations include:

a. Parsons Brinckerhoff (PB), Phase 1 Environmental Site Assessment – Hoxton Park Airport, Off Cowpasture Road, West Hoxton, NSW 2171 (prepared for Hoxton Park Airport (HAPL) Freehold, reference 2113007A PR_3243 Rev B) (PB 2006);

b. ENSR Australia Pty Ltd (ENSR), Tank Pit Characterisation – Hoxton Park Airport, McIver Avenue, Hoxton Park NSW 2171 (ENSR 2009);

c. SMEC Australia Pty Limited (SMEC), Fenced (Part of Lot 3-7) and Stockpile Areas in Hoxton Park Airport, Off Cowpasture Road, West Hoxton, NSW 2171 – Validation Report for Abigroup Contractor Pty Limited (SMEC 2007);

d. David Lane Associates (DLA), Asbestos Clearance Certification Documentation – Hoxton Park Airport, Cowpasture Road, West Hoxton NSW (DLA 2007);

e. Environ Australia Pty Ltd (Environ), Site Audit Statement and Site Audit Report – ALJV Hoxton Park Airport (the audit covers part Lots 3-7 of Lot 22 DP 1042996 (Environ 2008).

Of the above reports the PB 2006 Phase 1 (walk over) Environmental Site Assessment report (item a) presents the findings of a preliminary contamination assessment which covers the entire airport including the site. The ENSR report (item b), focuses on the findings of the validation assessment of the tank pit created as a result of the removal of an underground storage tank (UST) from the BP refuelling facility in the airport. Items c to e refer to the assessment reports undertaken as part of a site audit conducted by Mr Graeme Nyland of Environ on the removal and validation of asbestos contaminated soil found in three localised areas in the general airport area. The results are summarised in the following sub sections.

6.1 PB 2006

The PB report covers the entire 81.6 ha land parcel of the Hoxton Park Airport. The assessment is a "desktop" assessment without intrusive sampling.

Based on the information provided in the PB report, a number of previous investigations have been conducted by other consultants including:

- URS conducted an environmental site assessment (ESA) in 2000 (Note: a geotechnical investigation was also conducted by URS in 2005 and was provided by the client. The findings were not directly relevant to the current assessment); and
- OTEK conducted a groundwater monitoring event (GME) at the 7-Eleven service station located at 103 Cowpasture Road (located offsite) in 2005.

Whilst the URS 2000 and OTEK 2005 reports were not provided for DP's review, a summary of the relevant findings of these investigations was provided in the PB report, and was reviewed and summarized in Sections 6.2 and 6.3 based on the information provided by PB.

The major findings of these earlier assessments are summarized as follows:

6.2 URS 2000 Report

The URS 2000 report indicated that there were 16 tenants at Hoxton Park Airport that carried out a range of aviation related (e.g. fuel sales, pilot training and aircraft maintenance) and non-aviation related activities (e.g. Green Valley Sand and Cement sales yard and a 7-Eleven Service Station (offsite, located at 103 Cowpasture Road, West Hoxton, see above). URS considered that these activities have a potential for moderate or significant environmental risk to the site.

Given that most buildings were less than 20 years old, URS considered that the potential for impacts due to polychlorinated biphenyls (PCBs) materials on the site would be low.

URS also identified two landfills in the northern portion of the airport (to the north of the runway). These landfills were therefore located outside the current site boundary.

The URS 2005 assessment is a geotechnical investigation. The findings are not directly relevant to the Limited Phase 2 Assessment. It is noted from PB's summary that:

Rock characteristics "being shallow depth to weathered rock and presence of competent shale at depth".

"Underlying groundwater is present on the site", although the depth to groundwater was not reported.

6.3 OTEK 2005 Report

OTEK conducted a round of groundwater monitoring in October 2005. The assessment focused on the 7-Eleven service station located at 103 Cowpasture Road, West Hoxton. The assessment involved the collection and analysis of groundwater samples collected from 6 groundwater wells.

Petroleum hydrocarbons were not detected in any of the soil samples. Whilst elevated lead levels were recorded in five of the six groundwater monitoring wells, OTEK considered that the elevated lead concentrations were likely to be due to the high silt content of the samples. OTEK concluded that “the groundwater beneath the 7-Eleven service station does not currently present a risk to human health and/or the environment”.

6.4 Findings of PB 2006

PB reviewed the above-mentioned reports in their assessment, along with other historical information on the site including, inter alia, aerial photographs, historical land titles, council records and dangerous goods records.

In summary, the site has been used as an airport and aviation related business before 1951 (a landing strip was noted in the 1951 aerial photograph). An area of land disturbance was noted to be located in the northern section of the airport and was confirmed by the HPAL representative to be the two landfill identified in the earlier reports. These landfills are located within the larger airport site, but outside of the proposed distribution centre development site (the Site).

In 2005, the land parallel to the Westlink M7 was cleared in the western portion of the site. A small M7 construction compound was located in the southern section of the cleared area. [Note: DP noted a stockpile of fill material placed outside the boundary fence of the site, near the site entrance.]

Main Findings of PB are summarised as follows:

According to the PB report, a number of potential sources of contamination were identified including:

- The (then) current Underground Storage Tanks (USTs) and Previous USTs (which have now all been removed);
- Previous above ground storage tanks (ASTs);

- Northern Landfills (A and B) [Note: these are located to the north of the runway and beyond the boundary of the current development site];
- Use of lead based paints possibly used on buildings and hangers and runway construction materials;
- Spills from fuelling of aircraft across site;
- Corrosion of metal building components and possible asbestos building materials;
- Paint storage;
- Pesticide use to control weeds;
- Construction compound associated with the M7 and batching plant.

Overall PB considered that "the site to be in good condition with no visible evidence of gross or widespread contamination that would restrict any areas from the land uses proposed following completion of the appropriate phase 2 investigations.

Further investigation of potentially impacted areas would include Phase 2 sampling and analysis, with the goal to confirm the existence of any potential contamination and the extent if encountered." Based on our observations (and subsequent findings), and noting that the landfills are located offsite, at a substantial distance from the northern site boundary, DP tends to concur with the assessment.

PB suggested that the scope of the Phase 2 investigation should be developed in accordance with the recognized NSW EPA (endorsed) Guidelines for Assessing Contaminated Land, National Environmental Protection Measures, and State Environmental Planning Policy 55 (Management of Contaminated Land). Further investigation scoping should also be developed with the range of proposed land uses in mind. This approach is generally supported by DP, whilst noting that the DECCW guidelines allow assessments to be undertaken in various stages.

PB also recommended that "should the site be rezoned for redevelopment…all existing infrastructure on site, such as underground tanks, hangars, etc will be removed and validation required, in accordance with EPA guidelines. Furthermore, any area found to be contaminated through further investigation will be subject to remediation and validation works, again as per

EPA guidelines." DP concurs with the recommendation, noting that all airport related infrastructure will be removed. In particular, that the underground tanks have been removed and validated by ENSR.

6.5 ENSR 2009

ENSR undertook a tank pit characterisation and a groundwater monitoring event (GME) in the vicinity of the area associated with the underground storage tank (UST) infrastructure located in the central western portion of the site (Location see Drawing 4, Appendix A).

ENSR reviewed a number of previous reports (not available for review) and noted that:

- The UST was installed in 1986-1987 to replace two smaller tanks. Anecdotal information suggested that one of the two former tanks was leaking;
- The replacement UST has a capacity of 43 000 litre, and contain Avgas for light aeroplanes;
- In February 1994, fuel losses in the existing UST were noted. Two tank integrity tests were conducted in 1994, with conflicting results – the first test showing a tank failure whereas no failure was detected in the second test;
- In 1994, concentrations of TPH (C_6-C_9) at 543 parts per million (ppm, or mg/kg) in soil were detected at 1 m depth at one of the various test locations. Total BTEX was reported at 2.7 ppm in the same sample. The vertical extent of the impact was not determined;
- ENSR reported that Petroleum hydrocarbon contamination was not detected in the clayey natural sediments (sic) in 1994;
- In 2008, petroleum hydrocarbon impact was detected in soil at the "offsite" location at BH103, at around 4 m depth (Note: it appears that ENSR referred to the UST pit as the site, as the offsite location is still within the vicinity of the UST and hence well within the current investigation area). The location was adjacent to the pump area and downgradient to the UST. Petroleum hydrocarbons were not detected in other soil samples;
- In 2008, petroleum hydrocarbon impact was not detected in groundwater samples collected from three groundwater monitoring wells (MW1, MW102 and MW103) placed close to the UST area; and

- Based on the available analytical results obtained in 2008, ENSR considered that the backfill material around the UST was reported to be suitable for disposal to a licensed landfill as "General Solid Waste".

At the time of the 2009 tank pit characterization and GME, ENSR reported that the UST has been removed by Dermont Fuelling Systems. The removed UST was noted to be in good condition with no observable cracks. Approximately 300 L of water was pumped out from the tank pit excavation by the contractor. No sheen or odours were noted by ENSR.

Discoloration and hydrocarbon odours were noted in the soils in the former bowser/fuel line excavation. The noted impacted soils were chased out and removed. In summary about 80 m^3 of soil was removed from the tank pit excavation. About 40 m^3 of the excavated soil was validated and found to be not impacted and not odorous. These were returned to the tank pit. It is noted that two samples were collected from the spoil excavated from the tank pit. From ENSR's discussions, it appeared that the contaminant levels in these two "tankpit excavation spoil samples were low" (as the only sample with reported elevated levels of TPH and benzo(a)pyrene was SP5 which was collected from the bowser/fuel line area (all material from the bowser/fuel line was disposed offsite – see below).

About 30 m^3 of soil was excavated from the bowser/fuel line excavation, all of which were removed.

It was reported that approximately 40 m^3 of imported recycled concrete and road base were placed in the excavation. It is noted that ENSR did not test for asbestos. Levels of chemical contaminants in the imported fill were found to be acceptable.

Validation soil samples were collected from the UST excavation as well as from the excavation associated with the UST infrastructure including the bowser/fuel line. Contaminant levels in all validation samples analysed were low and all were below the site assessment criteria (with most of the organic contaminants below detection). It is, however, noted that not all samples collected were analysed.

Concentrations of the contaminants of concern were below the laboratory limits of reporting (LOR) in all three groundwater samples.

Based on the analytical results and field observations, ENSR considered that "the tank pit excavation and associated bowser/fuel line excavation areas are suitable for future urban development, including continued aviation and/or commercial/industrial usage.

DP generally agreed with ENSR's assessment, but noted that there were data gaps in their validation sampling plan (some samples not analysed without adequate justifications). Also the imported fill material used to backfill the tank pit excavation comprised recycled concrete and road base material, instead of VENM. It is recognized that recycled concrete may be cross contaminated with asbestos containing material. In this regard, ENSR has not tested for asbestos. Having said this, the potential area of backfill is only limited in extent (within the tank pit excavation), and the health impacts associated with the backfill material is envisaged to be minimal, and can be managed in a simple and straightforward manner.

6.6 SMEC 2007, DLA 2007 and Environ 2008

The SMEC 2007 and DLA 2007 reports were conducted following the detection of filling containing asbestos at three identified locations at the site (referred to as the Fenced Area (located beyond the current site fence). It is further understood that the fill material was previously stored in an area known as the Stockpile Area, located approximately 700 m to the south of the Fenced Area (adjacent to the south western tip of the site). Both reports were reviewed, as part of a non-statutory site audit by Mr Graeme Nyland of Environ.

Based on the site plan provided in the three reports, it appears likely that the area of concern is located outside the proposed distribution centre site boundary. However, it is possible that part of the area of asbestos impact was within the current site (as the actual extent of the Stockpile Area was not clearly defined). Given the uncertainty, the above reports were reviewed and the results briefly summarized.

In general, the two area of concern were validated in several rounds of systematic inspection and validation sampling, undertaken initially by SMEC, then by DLA. The initial remediation and validation works by SMEC involved the excavation of 2658 tonnes of fill materials from the site followed by the collection and analysis of validation samples. Asbestos was detected in 23 of the 63 samples collected from the Fenced Area, but only two samples collected from the Stockpile Area. SMEC adopted the asbestos assessment criteria of 0.01% proposed by Australian Contaminated Land Consultants Association (ACLCA) and considered that the remediation has been satisfactorily completed. The auditor noted that the ACLCA proposed criterion was not endorsed by EPA, and considered that further validation would be required.

The subsequent phase of validation assessment was conducted by DLA. The methodology involved the scraping of surface soils, systematic visual inspection and "hen picking" of asbestos debris found, followed by clearance inspection and validation sampling.

Upon review of the reports provided, the site auditor noted that:

- The surface soils remaining on the site [note: the audit area] are natural clays and fill material has been removed from the site;
- The asbestos identified at the site has been removed and that there is a low possibility of encountering further asbestos at the site.

He then stated in his conclusion that:

(a) SMEC considered that the contaminants at the site "were below site criteria", however, the criterion adopted by SMEC was not endorsed by NSW EPA.

(b) DLA considered that the site "can now be accessed without risk to human health or the environment. Every effort has been made to ensure no asbestos contaminated material remain on site".

(c) The auditor considered that the site is suitable for commercial/industrial use.

Upon reviewing the available information, DP concurs with the auditor's opinion, but note that, due to the typical random nature of asbestos contamination in soil, no unequivocal statement can be made on the absence of asbestos in the soil.

Having said this, DP noted that the both asbestos impacted areas were subject to several rounds of systematic validation by SMEC and DLA, and we understand that the fill material has been removed from the area of concern. In this regard, whilst the potential presence of isolated fragments cannot be ruled out (as in the case of any sites), the potential health impacts due to asbestos contamination associated with the site is assessed to be low.

As a related comment, it should be noted the potential presence of asbestos in other areas of the site, in particular the "developed area of the airport" (i.e. where buildings are/were present), could not be discounted. Having said this, no signs of widespread asbestos contamination, or significant pockets asbestos debris, were noted at the current investigation site, suggesting that the potential for extensive asbestos contamination is low. Isolated fragments/debris can be effectively managed and removed during development works, and would not affect the outcome of the assessment.

7. SUMMARY OF SITE HISTORY INFORMATION

Following is a summary of the site history outlined in the PB report. The site history assessment was limited to a review of the URS 2000 and OTEK 2005 reports and additional information including historical aerial photographs (for the years 1950, 1961, 1970, 1978, 1986, 1994, 2002 and 2005), historical title deeds (dating back to 1890 from Land and Property Information NSW), Liverpool Council Records, WorkCover records on underground fuel storage and client supplied information.

The findings of the site history search are summarised in Table 1, below.

Table 1 - Site History Information

Source	Findings
Aerial Photographs	• Site used for airport and aviation related businesses from 1951 to present • During 1960's further taxiways and hangers constructed • Appears to be some formalisation of water courses in 1970's. The northern portion disturbed – possible landfill • Additional hangers/buildings built in the 1980s • Site largely unchanged since 1980s
Historical title deeds	• Site previously subdivided through time and had several owners between 1893 and 1974 including graziers, farmers, sawmill owners and other private land owners • By 1951 the majority of the was owned by the commonwealth of Australia • By 2002 the entire site was owned by the commonwealth
Liverpool Council Records	There were no significant issues identified in the council records (149 certificates)
WorkCover records	WorkCover records indicated that there were 6 storage depots at the site • Depot 1 and 2 – Class C1 65,000 L aboveground diesel storage tank (installed June 2003) • Depot 3 – Class C2 5,000 L aboveground engine oil tank (installed June 2003) • Depot 4 – Class C2 5,000L aboveground transmission oil tank (installed June 2003) • Depot 5 – Class C2 5,000L aboveground waste oil tank (installed June 2003) • Depot 6 – Class 2 40 m^3 cylinder store (acetylene gas Class 2.1 20 m^3 and oxygen Class 2.2 20 m^3, installed June 2003)
Client supplied Information	Based on the URS (2000) report a 45,000 L Avgas underground storage tank was present at the site at the time of the PB 2006 report installed in 1988 to replace 2 USTs at the same location. The UST was later removed in 2009 and validated by ENSR.

In addition DP reviewed a report on Preliminary Hoxton Park Airport Limited (HPAL) Preliminary Draft Environmental Strategy (the strategy was not subsequently adopted). The strategy indicated that the airport was first developed in the early years of World War II. After the war it was leased to Hardy Rubber Company for use as a tyre test track. Plans were made to convert it into a speedway but lobbying from aviation bodies saw it revert back into an airport.

8. POTENTIAL CONTAMINANTS

Based on the past site use (airport), it is generally considered that there is a low to moderate potential for contamination at the site. Having said this, the previous assessment suggests that the potential for broad scale contamination would be low throughout the majority of the site.

Based on the site history and previous investigations it is considered that the main potential sources of contamination at the site, as identified in the earlier assessments, were:

- Previous avgas USTs that were located at the site;
- Previous diesel, engine oil, waste oil and transmission oil above ground storage tanks;
- Fuel spillage from aircraft;
- Possible lead based paints in building and hangers and runway construction materials;
- Corrosion of metal building and possible asbestos containing materials;
- Paint storage;
- Other issues related to the general use of the site as an airport;
- Use of pesticides to control weeds; and
- The northern landfills [Note: these are located to the north of the runway and beyond the boundary of the current development site].

In view of the above identified (potential) sources, the current investigation was designed to assess a wide range of contaminants, with some bores located as to specifically target the above listed areas of potential concern and others located to provide general site coverage. The range of potential contaminants in soil that were targeted included:

- The priority heavy metals arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc;
- Polycyclic Aromatic Hydrocarbons (PAH);
- Total Recoverable Hydrocarbons (TRH);
- Monocyclic aromatic hydrocarbons - benzene, toluene, ethyl benzene and xylenes (BTEX);
- Organochlorine pesticides (OCP);

- Organophosphate pesticides (OPP);
- Total Phenols;
- Polychlorinated biphenyls (PCB); and
- Asbestos.

The contaminants targeted in groundwater included:

- The priority heavy metals arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc;
- Polycyclic Aromatic Hydrocarbons (PAH);
- Total Recoverable Hydrocarbons (TRH);
- Monocyclic aromatic hydrocarbons - benzene, toluene, ethyl benzene and xylenes (BTEX);
- Total Phenols.

In addition the groundwater wells were screened with a GA2000 landfill gas meter in the field for signs of potential landfill gas migration from the northern landfills (as sources of potential odour) for:

- Methane;
- Carbon dioxide;
- Oxygen; and
- Hydrogen sulphide.

9. FIELD WORK

9.1 Data Quality Objectives

The data quality objectives (DQO) of the Limited Phase 2 Contamination Assessment have been developed to define the type and quality of the data to achieve the project objectives and were based broadly in accordance with the seven step data quality objective process, as defined in Australian Standard (AS) *Guide to the Sampling and Investigation of Potentially*

Contaminated Soil Part 1: Non-volatile and Semi-volatile Compounds (AS 4482.1 – 2005). The DQO process is outlined in the AS and defined by:

- Stating the Problem;
- Identifying the Decision;
- Identifying Inputs to the Decision;
- Defining the Boundary of the Assessment;
- Developing a Decision Rule;
- Specifying Acceptable Limits on Decision Errors; and
- Optimising the Design for Obtaining Data.

Detailed discussions of the 7 step DQO process is provided in Appendix F and are summarised in Table 2, below.

Table 2 – Data Quality Indicators

Data Quality Objective	Report Section where addressed
State the Problem	S1 Introduction S2 Proposed development and Objectives S4 Site Description
Identify the Decision	S11 Site Acceptance Criteria S13 Discussion of Results S14 Conclusions and Recommendations
Identify Inputs into the Decision	S4 Site Description S5 Regional Geology S6 Previous Reports S7 Site History S8 Potential Contaminants S10 Site Assessment Criteria S11 Results of Assessment S12 Discussion of Results
Define the Boundary of the Assessment	S4 Site Description, Appendix A
Develop a Decision Rule	S10 Site Assessment Criteria
Specify Acceptable Limits on Decision Errors	Appendix G
Optimise the Design for Obtaining Data	S9 Fieldwork

9.2 Sample Rationale

According to the NSW EPA's publication Contaminated Sites: *Sample Design Guidelines* (1997), a minimum of 55 sampling locations placed on a grid basis are required for site characterisation of a five hectare site, particularly if only limited information is available for the site. No guidance is provided for sites larger than five hectares. Such sites are usually sub-divided into smaller areas for more effective sampling. As a general guide, many site auditors (and consultants) have adopted a sampling density of 11 locations per hectare (derived from 55 locations for 5 ha) for the "full characterisation" of a site, although typically a reduced density may also be justified for large sites. On this basis to "fully characterise" a 40 ha site with limited site information, a "theoretical" total of 440 test locations would be required.

Noting, however, that the site has been subject to a number of previous assessments, such that useful site information has been made available, with appropriately defined areas/issues of environmental concern. Moreover, the objective of the current assessment is to obtain a general assessment of the contamination status of the site, whilst recognising that the site will be redeveloped for "less sensitive" commercial/industrial use. On this basis, it is considered that instead of systematic sampling, a Targeted Phase 2 Assessment is appropriate. The scope of the assessment has been devised on the basis of site specific information, focusing on identified areas of concern (mainly focused on the main activity area of the airport (e.g. control tower, maintenance and refuelling facilities) but also covering other areas of the site. The current assessment also includes an assessment of groundwater quality over the site so as to provide an evaluation of the nature and extent of groundwater impacts associated with the site.

Therefore a total of 39 test bores were drilled across the site, with 9 bores converted into groundwater wells. In addition to pre-existing groundwater wells in the vicinity of the BP refuelling area were also utilised. The sampling locations are shown on Drawings 1 to 4, Appendix A.

9.3 Sampling Procedures

9.3.1 Soil Sampling

All sample locations were cleared for services and pipes using Dial-before-you-dig information and an electro-magnetic sweep by an accredited service locater. For the purpose of contamination assessment the fieldwork comprised the drilling of 39 bore holes, were drilled with a bobcat mounted drilling rig.

All Environmental sampling will be performed according to standard operating procedures outlined in the DP *Field Procedures Manual*. All sampling data will be recorded on DP chain of custody sheets. The general soil sampling procedure will comprise:

- Collection of soil samples from auger returns at regular intervals or as determined based on field observations;
- decontamination of all sampling equipment using a 3% solution of phosphate free detergent (Decon 90) and distilled water prior to collecting each sample;
- transfer of samples into laboratory-prepared glass jars and bottles/vials, and capping immediately with teflon lined lids;
- replicate samples of every sample will be placed in sealed plastic bags for volatiles screening in the field using a photoionisation detector (PID);
- collection of 10% replicate samples (5% inter-laboratory replicates and 5% intra-laboratory replicates) for QA/QC purposes. In addition laboratory prepared trip spikes and blanks will be taken into the field unopened to as additional QA/QC samples;
- labelling of sample containers with individual and unique identification, including project number, sample location and sample depth; and
- placement of the sample jars and replicate sample bags into a cooled, insulated and sealed container for transport to the laboratory.

NATA accredited laboratories will be employed to conduct the sample analysis. The laboratories are required to carry out routine in-house QC procedures.

A photoionisation detector (PID) was used to screen the headspace gases of the replicate samples placed in the sealed zip-lock bag. The PID provides an indication of the likely presence of volatile organic compounds in the soil. The PID had a 10.6eV lamp and was calibrated with isobutylene gas at 97 ppm prior to commencement of each day's field work.

9.3.2 Piezometer Installation and Groundwater Sampling Methods

The piezometer was constructed using 50 mm diameter acid washed class 18 PVC casing and machine slotted well screen. Joints were screw threaded, thereby avoiding the use of glues and solvents which may contaminate the groundwater. The piezometer was completed with a gravel pack extending to 0.1 m above the well screen and a bentonite plug of at least 0.2 m thickness and backfilled with drill returns to the surface. The piezometer was finished with a gatic cover on the ground surface.

Subsequent to installation, the well elevations were surveyed, the groundwater level in the well and the pre-existing wells and DP wells was measured and then the wells developed by removing a minimum of 3 bore volumes of water (or until all standing water was removed), using a disposable bailer.

The wells were allowed to recharge over a period of 24 hours and groundwater levels re-measured. The wells were then micro-purged until field parameters (pH, temperature, dissolved oxygen, conductivity and turbidity) stabilised, and samples were collected using a peristaltic pump or a bore dedicated bailer if the water volumes in the piezometer were inadequate.

Samples were placed with minimum of disturbance and aeration into appropriately preserved bottles. For heavy metal analysis the relevant sample fraction was filtered using a sterilized 0.45 μm filter. The sample pump and all non disposable sampling equipment was decontaminated between samples via a "triple rinse" procedure i.e. a rinse of all particulates in tap water followed a decontamination using a 3% Decon 90 solution and a final rinse in deionised water.

Sample handling and transport was as set out below:

- Sample containers, supplied by the laboratory (listed below), labelled with individual and unique identification, including project number and sample number;
  - BTEX, C_6-C_9 and VOCs – 2 x 40 ml HCl preserved glass vial;
  - C10-C36 – glass 500 ml;
  - PAH – glass 1000 ml;
  - Phenols – 250 ml H_2SO_4 preserved plastic;
  - Heavy metals and hardness – filtered, 50 ml HNO_3 preserved plastic; and
  - pH – 20 ml plastic or glass.
- Collection of 5% intra-laboratory replicate samples for QA/QC purposes;
- Samples were placed in insulated coolers and maintained at a temperature of approximately 4°C until transported to the analytical laboratory, and
- Chain of custody documentation was maintained at all times and countersigned by the receiving laboratory on transfer of samples.

All samples were dispatched to a NATA accredited laboratory for analysis.

Groundwater wells were also screened for potential landfill gases using a GA2000.

9.4 Analytical Rationale

The analytical scheme (Table 3) was designed to assess the potential for contamination which may have arisen from current and past use of the site. A total of forty one selected soil samples (including six QA/QC replicates), were analysed for various combinations of the contaminants of concern. In addition, ten groundwater samples (including one QA/QC replicate) were also analysed as shown in Table 4.

Table 3 – Analytical Scheme for Soil Samples

Sample ID	TPH	BTEX	PAH	OCP	PCB	Heavy Metals	Asbestos	Phenol
GW1/0.1-0.3	✓	✓	✓	✓	✓	✓	✓	-
GW1/3.8-4.0	✓	✓	✓	-	-	-	-	-
GW2/0.1-0.3	✓	✓	✓	✓	✓	✓	✓	-
GW2/2.8-3.0	✓	✓	✓	-	-	-	-	-
GW3/0.4-0.5	✓	✓	✓	-	-	✓	✓	✓
GW3/3.5	✓	✓	✓	-	-	-	-	-
GW4/0.3-0.5	✓	✓	✓	-	-	✓	✓	-
GW4/2.8-3.0	✓	✓	✓	-	-	-	-	-
GW5/0.1-0.3	✓	✓	✓	✓	✓	✓	✓	✓
GW6/0-0.1	✓	✓	✓	✓	✓	✓	✓	-
GW7/0.4-0.5	✓	✓	✓	✓	✓	✓	✓	-
GW7/0.9-1.0	✓	✓	✓	-	-	✓	-	-
GW8/0.3-0.5	✓	✓	✓	✓	✓	✓	✓	✓
GW9/0.1-0.3	✓	✓	✓	✓	✓	✓	✓	-
GW9/2.8-3.0	✓	✓	✓	-	-	-	-	-
BH1/0.1-0.3	✓	✓	✓	✓	✓	✓	✓	✓
BH2/0.3-0.5	✓	✓	-	✓	✓	✓	✓	✓
BH3/0.1-0.3	✓	✓	✓	✓	✓	✓	✓	-
BH3/0.3-0.5	✓	✓	✓	-	-	-	-	-
BH4/0.3-0.5	✓	✓	✓	✓	✓	✓	✓	-
BH5/0.3-0.5	✓	✓	✓	✓	✓	✓	✓	-
BH6/0.1-0.3	✓	✓	✓	✓	✓	✓	✓	-
BH7/0-0.1	✓	✓	✓	✓	✓	✓	✓	✓
BH8/1.3-1.5	✓	✓	✓	-	-	✓	✓	-
BH9/0.4-0.5	✓	✓	✓	-	-	✓	-	-
BH10/0.4-0.5	✓	✓	✓	-	-	✓	✓	-
BH11/0.1-0.3	✓	✓	✓	-	-	-	-	-
BH12/0.1-0.3	✓	✓	✓	✓	✓	✓	✓	-
BH13/0.1-0.2	✓	✓	✓	✓	✓	✓	✓	-
BH14/0.3-0.5	✓	✓	✓	-	-	-	-	-
BH14/2.8-3.0	✓	✓	✓	-	-	-	-	-
BH15/0.1-0.3	✓	✓	✓	-	-	✓	✓	✓
BH15/3.5-3.6	✓	✓	✓	-	-	✓	✓	✓
BH16/0.1-0.3	✓	✓	✓	✓	✓	✓	✓	✓
BH17/0.1-0.3	✓	✓	-	✓	✓	✓	✓	-
BH18/0.4-0.5	✓	✓	✓	-	-	✓	✓	-
BH19/0-0.1	✓	✓	✓	✓	✓	✓	-	✓

Sample ID	TPH	BTEX	PAH	OCP	PCB	Heavy Metals	Asbestos	Phenol
BH20/0.4-0.5	✓	✓	✓	✓	✓	✓	-	✓
BH21/0.4-0.5	✓	✓	✓	✓	✓	✓	✓	-
BH21/2.4-2.5	✓	✓	✓	-	-	-	-	-
BH22/0-0.1	✓	✓	✓	-	-	✓	-	-
BH23/0-0.1	✓	✓	✓	✓	✓	✓	✓	✓
BH24/0-0.1	✓	✓	✓	✓	✓	✓	-	-
BH24/0.4-0.5	✓	✓	✓	-	-	✓	-	-
BH25/0.3-0.5	✓	✓	✓	✓	✓	✓	✓	-
BH26/0.4-0.5	✓	✓	✓	-	-	✓	-	-
BH27/0.1-0.2	✓	✓	✓	✓	✓	✓	✓	✓
BH27/1.4-1.5	✓	✓	✓	-	-	✓	-	-
BH28/0.3-0.5	✓	✓	✓	✓	✓	✓	✓	✓
BH28/2.8-3.0	✓	✓	✓	-	-	✓	-	✓
B1/0.4-0.5	✓	✓	✓	✓	-	✓	✓	-
B2/0.4-0.5	✓	✓	✓	✓	-	✓	✓	-
Fuel Tank/0.9-1	✓	✓	✓	-	-	✓	-	-
Fuel Tank/0-0.1	✓	✓	✓	-	-	✓	-	-
BD1/261109	-	-	✓	-	-	✓	-	-
BD1/271109	-	-	✓	-	-	✓	-	-
BD2/261109	-	-	✓	-	-	✓	-	-
BD3/271109	-	-	✓	-	✓	✓	-	-
BD4/271109	-	-	✓	-	✓	✓	-	-
BD3261109	-	-	✓	-	✓	✓	-	-

Table 4 – Analytical Scheme for Groundwater Samples

Sample ID (Location)	Heavy Metals	TPH/ BTEX	PAH	Phenols	OPP	pH	Hardness
GW2	✓	✓	✓	✓	✓	✓	✓
GW3	✓	✓	✓	✓	✓	✓	✓
GW4	✓	✓	✓	✓	✓	✓	✓
GW5	✓	✓	✓	✓	✓	✓	✓
GW6	✓	✓	✓	✓	✓	✓	✓
GW7	✓	✓	✓	✓	✓	✓	✓
GW8	✓	✓	✓	✓	✓	✓	✓
GW9	✓	✓	✓	✓	✓	✓	✓
OW1	✓	✓	✓	✓	✓	✓	✓
OW2	✓	✓	✓	✓	✓	✓	✓
BD1 041209	✓	✓	✓	✓	✓	✓	✓

10. SITE ASSESSMENT CRITERIA

10.1 Soils

The current assessment has been undertaken with reference to the policies, guidelines and plans relevant to site contamination assessment, as endorsed by the Department of Environment, Climate Change and Water (DECCW), as well as the relevant requirements listed by the Director General in his letter entitled “Mirvac Industrial Park, Hoxton Park – Director General’s Requirements”.

In particular, the DECCW’s standard, health risk based site assessment settings are defined in the *Guidelines for the NSW Site Auditor Scheme,* 2nd edition, 2006, Appendix I and it includes health based assessment criteria for the following land uses:

- Residential with accessible soil and use of home grown produce. Includes child-care centres, primary schools, pre-schools, town houses and villas (HIL Column 1);
- Residential with minimal access to soil such as high rise apartments and flats (HIL Column 2);
- Parks, recreational open space or [playing fields and including secondary schools (HIL Column 3);
- Commercial or industrial use (HIL Column 4).

In addition, the DECCW also sets provisional phytotoxicity-based investigation levels (PPIL, Column 5) for the protection of plants in the appropriate setting (residential with gardens, areas outside of the building footprint of apartments and flats and open space). DECCW, however, recognised that the PPILs have significant limitations (DECCW 2006). The guidelines should therefore be used for screening purposes only. PPIL exceedances do not, by themselves imply presence of unacceptable impacts on plants, unless there is accompanying evidence of actual phytotoxicity risk.

With regards to the site, it is understood that at the time that this investigation was commenced, the redevelopment plan included two distribution centres with associated infrastructure.

In view of the intended land use and the known redevelopment plans, the site redevelopment plan is considered to be commercial/industrial in nature. Therefore the site will be assessed against the guidelines as set out below.

- Commercial or industrial land use (HIL Column 4).

PPIL will be used as a screening reference for assessing the impacts on plants in landscaped areas and lawns (applicable to the top 0.5 m of the landscaped and lawn areas). Exceedances of the PPIL will not trigger remedial action, unless accompanying evidence of actual phytotoxicity impacts is noted.

Appendix II of the *Guidelines for the NSW Site Auditor Scheme* and the NSW EPA publication *Guidelines for Assessing Service Station Sites* 1994 provides the health-based investigation levels (HIL) for these settings and, together with the PPIL (as a screening criteria), these form the site acceptance criteria (SAC) for the assessment of the site which the soil analytical results have been compared to. The adopted site assessment criteria are shown in Table 5, below.

A contaminant concentration in soil/filling material is considered to be significant if:

i) The concentration of the contaminant is more than 2.5 times the site assessment criteria (SAC). Any location more than 2.5 times the SAC is classified as a 'hotspot', requiring further assessment/ management.

ii) For a data of like material, with respect to the health-based criteria, the calculated 95% Upper Confidence Limit of average concentrations (excluding any 'hotspot' concentrations) exceeds the SAC [Note: statistical analysis is not applicable to PPIL].

iii) The standard deviation of the results is greater than 50% of the health-based investigation levels (HIL).

Note that the statistical analysis would only apply to HILs.

Table 5 – Site Assessment Criteria for Soil/ Filling

Contaminant	Adopted Criteria (SAC)		Source
TPH			NSW EPA[1] Contaminated Sites *Guidelines for Assessing Service Station Sites* (1994) threshold concentrations for sensitive land use-soils. Currently there are no other comprehensive EPA endorsed investigation levels for petroleum hydrocarbons.
$C_6 - C_9$	65 mg/kg		
$C_{10} - C_{36}$	1000 mg/kg		
BTEX			
Benzene	1 mg/kg		
Toluene	1.4 mg/kg		
Ethylbenzene	3.1 mg/kg		
Xylene	14 mg/kg		
Metals	**HIL-Column 4**	**PPIL**	NSW DEC Contaminated Sites *Guidelines for the NSW Site Auditor Scheme* (2006), 2nd Edition, Soil Investigation Levels for Urban Redevelopment Sites in NSW Heath-based investigation levels for commercial or industrial site (HIL4) Provisional phytotoxicity-based investigation levels These guidelines are also consistent with the National Environment Protection Measure (NEPM), *Assessment of Site Contamination, Schedule B (1)*
Arsenic (total)	500 mg/kg	20 mg/kg	
Cadmium	100 mg/kg	3 mg/kg	
Chromium	60%	400 mg/kg	
Copper	5000 mg/kg	100 mg/kg	
Lead	1500 mg/kg	600 mg/kg	
Mercury	75 mg/kg	1 mg/kg	
Nickel	3000 mg/kg	60 mg/kg	
Zinc	35000 mg/kg	200 mg/kg	
Total Phenols	42500 mg/kg	-	
PAH			
Total	100 mg/kg	-	
Benzo(a)Pyrene	5 mg/kg	-	
PCB	50 mg/kg	-	
OCP			
aldrin + dieldrin	50	-	
chlordane	200	-	
DDT (including DDD, DDE, DDT)	1000	-	
Heptachlor	50	-	
Asbestos	No asbestos found in soil		No current NSW EPA endorsed guideline levels were available

Providing that the 95% Upper Confidence Limit (UCL) of average concentrations is within the SAC (health-based), and no concentrations of the contaminants are at hotspot level, minor exceedances of the SAC may be considered to pose an insignificant human health risk under the proposed land-use.

[1] NSW EPA and NSW DEC is now part of the NSW Department of Environment and Climate Change (DECC).

10.2 Groundwater

The levels of contaminants in groundwater will be assessed against Groundwater Investigation Levels (GILs) adopted from applicable guidelines, specifically, the ANZECC (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. The ANZECC 2000 Guidelines and their source documents are detailed in Table 6. Guidelines for fresh waters will be adopted.

Table 6 – Groundwater Investigation Levels (GIL)

Contaminant	Adopted Criteria (GIL) [µg/L]	Source
TPH $C_6 - C_9$ $>C_9$	 150 µg/L 600 µg/L	At this stage, there are no high reliability guideline value for TPH* in ANZECC 2000 or endorsed by NSW EPA. For reference purposes, DP has referred to other available Australian guidelines for TPH viz. Airport (Environment Protection) Regulations (1997), Schedule 2 Water Pollution Accepted Limits: Table 1.03 – Accepted limits of contamination. It should be noted however that these have not been endorsed by EPA and are used as 'screening levels' only.
BTEX Benzene Toluene Ethylbenzene Xylene	 950 µg/L 180 µg/L 80 µg/L 550 µg/L	*ANZECC (2000) low to moderate reliability trigger levels, Australian Water Quality Guidelines for the protection of 95% of fresh water species*
PAH Total Benzo(a)Pyrene Naphthalene Anthracene Phenanthrene Fluoranthene	 Not Specified 0.2 µg/L[a] 16 µg/L 0.4 µg/L[a] 2.0 µg/L[a] 1.4 µg/L[a]	*ANZECC (2000) Australian Water Quality Guidelines for the protection of 95% of fresh water species* a. low reliability trigger value *ANZECC (2000)*
Metals[1] Arsenic (V) Cadmium Chromium (VI) Copper Lead Mercury Nickel Zinc	 13µg/L 0.2 µg/L 1.0 µg/L 1.4 µg/L 3.4 µg/L 0.06 µg/L 11 µg/L 8 µg/L	*ANZECC (2000) Australian Water Quality Guidelines for the protection of 95% of fresh water species*
Phenols	320 µg/L	*ANZECC (2000) Australian Water Quality Guidelines for the protection of 95% of fresh water species*

Notes:

1. Metals GILs in results tables are adjusted for hardness of 100 mg $CaCO_3$/L

a For PAHs, in cases where no high reliability ANZECC trigger values are provided, the low reliability trigger values and the PQLs have been used as screening levels, along with a review of the recorded PAH levels in the soil samples. Similarly for some OCPs, PCBs and OPP, low reliability screening levels have been adopted

* Other than a low reliability trigger value of 7µg/L, which is not routinely achievable by NATA accredited laboratories

In addition, other relevant reference documents, including, inter alia, SEPP 55, Remediation of Land, National Environment Protection (Assessment of Site Contamination) Measures 1999, relevant ANZECC and ARMCANZ guidelines and other relevant DECCW endorsed guidelines on soil and groundwater contamination were referenced, as appropriate.

11. RESULTS OF INVESTIGATION

11.1 Field Observations

11.1.1 Soils

Details of the sub-surface conditions encountered during the course of the investigation are included in the Test Bore Report Sheets (Appendix C). The bore locations are shown on Drawings 1 to 4, Appendix A. The soils were generally free of obvious signs of chemical contamination such as odours or staining. The ground conditions encountered at the bores at the site were relatively consistent and are summarised as follows:

FILLING: grey and brown silty clay and shale filling was encountered up to depths between 0.3 m and 0.9 m. This material was underlain by

SILTY CLAY: Stiff to very stiff brown silty clay to depths between 3.5 m to 7.0 m; underlain by

GRAVELLY CLAY: very stiff brown gravelly clay in Bores GW2A, GW3A, GW4A, GW6, GW7, GW8, 20, 21 and 22 to depths between 6.8 m to 8.4 m; underlain by

SILTSTONE: extremely low to very low strength shale/siltstone.

11.1.2 Total Photoionisable Compounds (TOPIC) Results

The replicate soil samples collected in plastic bags were allowed to equilibrate under ambient temperatures before screening for Total Photoionisable Compounds (TOPIC) using a calibrated Photoionisation Detector (PID). Results of sample screening are shown in the Test Bore Reports in Appendix D. All PID readings were low and well below the adopted trigger level of 50 ppm and were consistent with background levels.

11.1.3 Groundwater

The condition of the groundwater was generally in the neutral pH range and a number of the bores had a relatively high turbidity and silt content. The Electrical conductivity results were typical of moderately to highly saline groundwater, particularly near the Blacktown soil landscape group. The groundwater field parameters are presented in Table 7.

Measured groundwater levels are indicating that groundwater generally flows to the south to south-east towards Hinchinbrook Creek.

Table 7 – Groundwater Field Parameters

Bore ID	Surface Level (m AHD)	Water Depth (m)	Water Level (m AHD)	Oxygen (ppm)	Conductivity (mS/cm)	pH	Turbidity (NTU)	Temperature (^oC)
OW1	42.0	4.3	37.7	0.07	0	6.4	666	25.0
OW2	42.1	3.54	38.56	0.17	18.0	6.5	>1000	25.3
GW1	43.3	Dry						
GW2	40.1	2.2	38.1	0.43	9.74	6.6	331	20.9
GW3	42.0	3.3	38.7	0.38	24.8	6.2	>1000	24.0
GW4	43.8	4.15	39.65	0.11	19.42	6.5	>1000	22.6
GW5	44.9	4.3	40.6	0.19	20.85	6.5	>1000	21.0
GW6	40.0	2.3	37.7	0.27	13.64	6.2	720	20.6
GW7	41.6	1.6	40	0.2	0.33	5.7	160	21.6
GW8	43.8	3.1	40.7	0.2	8.99	7.0	>1000	20.4
GW9	38.4	2.6	36.3	Not enough sample for collect field parameters				

11.1.4 Landfill Gas Results

The concentration of common landfill gases were measured in the field using a GA2000 in the groundwater wells to determine if potential odorous landfill gases were present in the soils at the site from the two landfill areas in the northern part of the airport. The results are summarised in Table 8.

Table 8 – Landfill Gas Results

Bore ID	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Balance (%)	Hydrogen Sulphide (ppm)	Carbon Monoxide (ppm)
OW1	0	3.2	15.6	81.2	0	0
OW2	0	3.4	15.5	81.1	0	0
GW1	0	4.5	13.6	81.9	0	0
GW2	0	4.6	16	79.6	0	0
GW3	0	2.7	17.0	80.3	0	0
GW4	0.1	1.7	19.6	78.5	0	0
GW5	0	8.5	6.5	85.2	0	0
GW6	0	0	20	80	0	0
GW7	0	0	19.6	20.4	0	0
GW8	0	2.8	18.8	78.4	0	0
GW9	0	0.4	19.9	79.7	0	0

Based on the results there does not appear to be any migration of potential odourous landfill gas at the site.

11.2 Laboratory Results

The results of laboratory analysis of the soil and groundwater samples are summarised in Tables 9 and 10, with NATA Reports provided in Appendix E.

Table 9 - Soil Results

	TPH				BTEX					PAH				Heavy Metals								Asbestos		
Sample	C_6 - C_9	C_{10} - C_{14}	C_{15} - C_{28}	C_{29} - C_{36}	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-Xylene	B(a)P[2]	Total [3]	Total OCP[3]	Total PCB	Arsenic	Cadmium	Chromium[1]	Copper	Lead	Mercury	Nickel	Zinc	Asbestos ID in soil	Trace Analysis	Phenol
GW1/0.1-0.3	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	<0.1	<0.1	7	<0.5	20	12	19	<0.1	8	12	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	-
GW1/3.8-4.0	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-
GW2/0.1-0.3	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	<0.1	<0.1	9	<0.5	22	8	30	<0.1	10	16	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	-
GW2/2.8-3.0	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-
GW3/0.4-0.5	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	-	-	6	<0.5	20	14	17	<0.1	6	10	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	<5
BD1/261109[4]	-	-	-	-	-	-	-	-	-	<0.05	<0.1	-	-	6	<0.5	18	12	13	<0.1	6	10	-	-	-
GW3/3.5	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-
GW4/0.3-0.5	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	-	-	6	<0.5	18	9	17	<0.1	7	10	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	-
GW4/2.8-3.0	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-
GW5/0.1-0.3	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	<0.1	<0.1	7	<0.5	23	23	28	<0.1	20	56	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	<5
GW6/0-0.1	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	3.4	38.2	<0.1	<0.1	8	<0.5	25	5	22	<0.1	2	10	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	-
GW7/0.4-0.5	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	0.08	0.68	<0.1	<0.1	6	<0.5	16	10	17	<0.1	4	11	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	-
GW7/0.9-1.0	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	0.07	0.77	-	-	6	<0.5	16	20	15	<0.1	9	24	-	-	-
GW8/0.3-0.5	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	<0.1	<0.1	7	<0.5	16	11	22	<0.1	8	15	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	<5
BD2/261109[4]	-	-	-	-	-	-	-	-	-	<0.05	<0.1	-	-	6	<0.5	14	9	19	<0.1	6	12	-	-	-
GW9/0.1-0.3	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	0.3	3.9	<0.1	<0.1	4	<0.5	12	13	21	<0.1	9	26	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	-
GW9/2.8-3.0	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-
BD3261109[9]	-	-	-	-	-	-	-	-	-	<0.5	<0.5	-		6	<0.1	12	18	14	0.05	11	35	-	-	-
BH1/0.1-0.3	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	<0.1	<0.1	7	<0.5	16	19	18	<0.1	9	28	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	<5
BD3/271109[9]	-	-	-	-	-	-	-	-	-	<0.5	<0.5	-		7	<0.1	16	15	20	0.11	8	25	-	-	-
BH2/0.3-0.5	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	-	-	<0.1	<0.1	4	<0.5	10	16	12	<0.1	4	15	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	<5
BH3/0.1-0.3	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	<0.1	<0.1	6	<0.5	32	21	19	<0.1	22	29	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	-
BH3/0.3-0.5	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-
BH4/0.3-0.5	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	<0.1	<0.1	6	<0.5	13	13	19	<0.1	9	17	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	-
BH5/0.3-0.5	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	<0.1	<0.1	5	<0.5	14	12	15	<0.1	6	14			-
BH6/0.1-0.3	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	<0.1	<0.1	5	<0.5	18	21	15	<0.1	11	20	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	-
BD4/271109[9]	-	-	-	-	-	-	-	-	-	<0.5	<0.5	-		5	<0.1	15	18	14	0.08	9	19	-	-	-
BH7/0-0.1	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	<0.1	<0.1	5	<0.5	14	11	17	<0.1	7	15	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	<5
BH8/1.3-1.5	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	0.07	0.77	-	-	5	<0.5	13	20	15	<0.1	9	27			-
BH9/0.4-0.5	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	0.2	-	-	5	<0.5	17	28	20	<0.1	14	31	-	-	-
BH10/0.4-0.5	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	0.3	-	-	6	<0.5	24	17	15	<0.1	8	19	No asbestos	Respirable	-

	TPH				BTEX					PAH				Heavy Metals								Asbestos		
Sample	C_6 - C_9	C_{10} - C_{14}	C_{15} - C_{28}	C_{29} - C_{36}	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-Xylene	B(a)P[2]	Total [3]	**Total OCP[3]**	**Total PCB**	Arsenic	Cadmium	Chromium[1]	Copper	Lead	Mercury	Nickel	Zinc	Asbestos ID in soil	**Trace Analysis**	**Phenol**
																						found at reporting limit of 0.1g/kg	fibres not detected	
BH11/0.1-0.3	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	0.1	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-
BH12/0.1-0.3	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	0.7	6.2	<0.1	<0.1	7	<0.5	20	13	21	<0.1	11	12	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	-
BH13/0.1-0.2	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	2.8	42.1	<0.1	<0.1	11	<0.5	29	8	24	<0.1	6	11	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	-
BH14/0.3-0.5	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-
BH14/2.8-3.0	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-
BH15/0.1-0.3	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	0.08	0.68	-	-	8	<0.5	27	8	37	<0.1	6	32			<5
BD1/271109[4]	-	-	-	-	-	-	-	-	-	0.05	0.45	-	-	8	<0.5	24	7	34	<0.1	5	24	-	-	-
BH15/3.5-3.6	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	-	-	4	<0.5	12	19	11	<0.1	14	46			<5
BH16/0.1-0.3	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	<0.1	<0.1	10	<0.5	23	6	26	<0.1	4	8	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	<5
BH17/0.1-0.3	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	-	-	<0.1	<0.1	12	<0.5	27	9	33	<0.1	7	22	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	-
BH18/0.4-0.5	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	1.6	20.5	-	-	6	<0.5	16	19	17	<0.1	12	28	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	-
BH19/0-0.1	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	0.08	0.78	<0.1	<0.1	8	<0.5	19	7	25	<0.1	6	10	-	-	<5
BH20/0.4-0.5	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	<0.1	<0.1	6	<0.5	17	11	12	<0.1	4	10	-	-	<5
BH21/0.4-0.5	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	<0.1	<0.1	6	<0.5	19	12	15	<0.1	7	16	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	-
BH21/2.4-2.5	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	0.6	7.1	-	-	-	-	-	-	-	-	-	-	-	-	-
BH22/0-0.1	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	0.3	-	-	6	<0.5	16	18	15	<0.1	7	23	-	-	-
BH23/0-0.1	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	0.07	0.67	<0.1	<0.1	5	<0.5	13	14	20	<0.1	9	26	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	<5
BH24/0-0.1	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	<0.1	<0.1	7	<0.5	19	16	20	<0.1	8	25	-	-	-
BH24/0.4-0.5	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	-	-	13	<0.5	26	30	30	<0.1	13	47	-	-	-
BH25/0.3-0.5	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	<0.1	<0.1	5	<0.5	15	12	12	<0.1	6	11	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	-
BH26/0.4-0.5	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	0.3	-	-	5	<0.5	25	29	20	<0.1	30	48	-	-	-
BH27/0.1-0.2	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	0.2	1.9	<0.1	<0.1	5	<0.5	19	3	13	<0.1	3	6	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	<5
BH27/1.4-1.5	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	0.1	1.4	-	-	5	<0.5	25	4	16	<0.1	5	10	-	-	-
BH28/0.3-0.5	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	0.1	1.3	<0.1	<0.1	6	<0.5	20	8	21	<0.1	5	9	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	<5
BH28/2.8-3.0	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	-	-	6	<0.5	15	13	14	<0.1	5	18	-	-	<5
B1/0.4-0.5	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	<0.1	-	10	<0.5	26	14	23	0.1	5	13	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	-
B2/0.4-0.5	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	<0.1	-	6	<0.5	19	30	13	<0.1	12	22	No asbestos found at reporting limit of 0.1g/kg	Respirable fibres not detected	-
Fuel Tank/0.9-1	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	-	-	7	<0.5	14	24	18	<0.1	10	37	-	-	-
Fuel Tank/0-0.1	<25	<50	<100	<100	<0.5	<0.5	<1	<2	<1	<0.05	<0.1	-	-	5	<0.5	12	9	17	<0.1	4	13	-	-	-
Guidelines																								
Commercial[6]	65[7]	1000 [7]			1 [7]	1.4 [7]	3.1 [7]	14 [7]		5	100	50/250/1000/50[5]	50	100	20	600000	1000	300	15	600	7000	Nil detected	Nil Detected	42500
PPIL[8]	-	-			-	-	-	-		-	-	-	-	20	3	400	100	600	1	60	200	-	-	-

Notes:

1	All Chromium are assumed to exist in the stable Cr(III) oxidation state, as Cr(VI) is too reactive and unstable under the normal environment
2	benzo(a)pyrene
3	where results less than practical quantitative limit (PQL), quoted as less than PQL for most individual compounds
4	Intralaboratory Duplicate of sample listed above
5	OCP SACs given in order Aldrin+Dieldrin/Chlordane/ DDD+DDE+DDT/Heptachlor
6	NSW DECC Contaminated Sites *Guidelines for the NSW Site Auditor Scheme* 2nd edition (2006) Soil Investigation Levels for Urban Redevelopment Sites in NSW Heath-based investigation levels for Commercial and Industrial sites (HIL Column 4).
7	NSW EPA Contaminated Sites *Guidelines for Assessing Service Station Sites* (1994)
8	NSW DECC Contaminated Sites *Guidelines for the NSW Site Auditor Scheme* 2nd edition (2006) Provisional Phytotoxicity Based Investigation Levels (PPIL)
9	Interlaboratory Duplicate
-	not analysed
BOLD	Exceeds SAC
Red	Hotspot Concentration
green	exceeds PPIL

Table 10 - Groundwater Results

	TPH		BTEX				PAH							Phenols	Heavy Metals								
Sample ID	C6-C9	C10-C36	Benzene	Toluene	Ethyl benzene	Xylenes	Total[5]	Benzo(a)Pyrene	Naphthalene	Anthracene	Phenanthrene	Fluoranthene	Pyrene	Total	As	Cd	Ch	Cu	Pb	Hg	Ni	Zn	Hardness
GW2	<10	<250	<1	<1	<1	<3	<1	<1	<1	<1	<1	<1	<1	<50	<1	<0.1	<1	<1	<1	<0.1	3	14	620
GW3	<10	<250	<1	<1	<1	<3	5.4	<1	<1	<1	2.4	1.6	1.4	<50	<1	<0.1	<1	<1	<1	<0.1	6	32	2700
GW4	<10	<250	<1	<1	<1	<3	<1	<1	<1	<1	<1	<1	<1	<50	<1	0.2	<1	<1	<1	<0.1	11	17	1300
GW5	<10	<250	<1	<1	<1	<3	<1	<1	<1	<1	<1	<1	<1	370	<1	<0.1	<1	<1	<1	<0.1	<1	5	2800
GW6	<10	<250	<1	<1	<1	<3	<1	<1	<1	<1	<1	<1	<1	<50	<1	<0.1	<1	<1	<1	<0.1	18	16	1300
GW7	<10	<250	<1	<1	<1	<3	<1	<1	<1	<1	<1	<1	<1	<50	<1	<0.1	<1	<1	<1	<0.1	3	13	28
GW8	<10	<250	<1	<1	<1	<3	<1	<1	<1	<1	<1	<1	<1	<50	<1	<0.1	<1	6	<1	<0.1	2	12	620
GW9	<10	<250	<1	<1	<1	<3	<1	<1	<1	<1	<1	<1	<1	<50	<1	<0.1	<1	3	<1	<0.1	8	20	840
OW1	<10	<250	<1	<1	<1	<3	<1	<1	<1	<1	<1	<1	<1	<50	<1	<0.1	<1	7	<1	<0.1	3	10	810
OW2	<10	<250	<1	<1	<1	<3	<1	<1	<1	<1	<1	<1	<1	470	<1	<0.1	<1	<1	<1	<0.1	2	1	1700
BD1 041209[3]	<10	<250	<1	<1	<1	<3	<1	<1	<1	<1	<1	<1	<1	<50	<1	0.2	<1	<1	<1	<0.1	2	<1	1700
Guidelines																							
ANZECC	150	600	950	180	80	550	Not Specified	0.2	16	0.4	2	1.4	-	320	13	0.2	1	1.4	3.4	0.06	11	8	-
HMTV[4]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	8.4	12.6	90.8	-	99	72	-

Notes:

1 *ANZECC (2000) low to moderate reliability trigger levels, Australian Water Quality Guidelines for the protection of 95% of fresh water species*
2 Airport (Environment Protection) Regulations (1997), Schedule 2 Water Pollution Accepted Limits: Table 1.03 – Accepted limits of contamination.
3 Intralaboratory Duplicate
4 Hardness modified trigger value for extremely hard waters (hardness 400)
5 Given as sum of PQL of all analytes in list where all analytes below PQL
Shading Exceeds GIL

12. DISCUSSION OF RESULTS

Based on the available site history in the previous investigations, it is understood that site was grazing/rural land prior to being developed as an airport towards the end of the Second World War. The site was later leased as a tyre test track before reverting to an airport.

A number of potential sources of contamination at the site were identified including (now removed) USTs and ASTs as well as general aviation practices and maintenance. It is noted that while these uses/activities may have a moderately high potential for contamination, given the generally low permeability of the underlying soil, the extent of contamination, if present, may be localised. In particular, the USTs have been removed and the area validated.

The conditions encountered in the test bores typically consisted of shallow topsoil or filling underlain by silty clay to depths of up 3.5 to 7.0 m. The silty clay was typically underlain by gravely clay to depths of up to 6.8 to 8.4 m underlain by siltstone. There were no signs of contamination in the test bores such as chemical odours and/or staining or signs of significant building rubble (commonly associated with asbestos).

12.1 Contaminants in Soil

Soil samples were analysed for a variety of commonly occurring contaminants including heavy metals, TPH, BTEX, PAH, OCP, PCB, phenols, and asbestos.

12.1.1 Heavy Metals

Soil samples were analysed for the priority heavy metals (i.e. arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc. The concentration of all heavy metals was within the HIL (health based investigation levels for commercial site use) for all samples tested. In addition all results for heavy metals were within the PPIL and there were no signs of phytotoxic stress.

12.1.2 TPH, BTEX

Soil Samples were tested for total petroleum hydrocarbons (TPH) and monocyclic aromatic hydrocarbons, BTEX (benzene, toluene, ethyl benzene and xylenes. The concentration of TPH and BTEX in all soil samples tested was below the laboratory detection limits and hence well within the adopted SAC. It is also noted that there were no signs of hydrocarbon contamination in the test bores such as elevated PID readings, odours or staining, including those located near the former BP refuelling station (i.e. Test Bore GW3, BH13 and BH15).

12.1.3 PAH

Soil samples were analysed for PAH. Generally speaking the concentration of PAH was below the laboratory detection limits. Trace levels of PAH were detected in a few of the samples, however the concentrations were within the adopted HIL for commercial site use.

It is noted that if the site were to be redeveloped for a more sensitive land use than is currently proposed, such as residential with accessible soils, that some of the trace level PAH levels detected may warrant further investigation and assessment.

12.1.4 OCP and PCB

Soil samples were analysed for OCP, and PCB. The concentration of OCP and PCB was below the laboratory detection limits and therefore with the site SAC in all samples.

12.1.5 Phenols

The results of soil samples analysed for phenols were all below the laboratory detection limits and therefore well within the adopted assessment criteria. On this basis, it is considered that the site soils are not impacted by phenols.

12.2 Asbestos

Surficial soil samples were analysed for asbestos. There were no signs of asbestos in the test bores such as building rubble or fibro cement sheeting. No asbestos fragments of asbestos fibres were detected in the laboratory analysis.

Due to the typical random nature of asbestos contamination in soil, however, no unequivocal statement can be made on the absence of asbestos in the soil.

Having said this, as no signs of widespread asbestos contamination, or significant pockets asbestos debris, were noted at the site. In this regard, whilst the potential presence of isolated fragments cannot be ruled out (as in the case of any sites), the potential health impacts due to asbestos contamination associated with the site is assessed to be low. Isolated fragments/debris may be present, eg in the footprints of the buildings from demolition of previous buildings or deterioration of the existing buildings, but can be effectively managed and removed during development works or managed via encapsulation, and would not affect the outcome of the assessment.

12.3 Potential Odour Sources

During the investigation DP did not observe any obvious sources of odour, it is noted however that odours of "natural cause" may be periodically generated by the creek during/after periods of flood or from the M7 Motorway during periods of high traffic volumes, however any such impacts would be expected to be minor and short term in nature.

In addition DP conducted a preliminary screening exercise using a GA2000 to measure landfill gas levels in the groundwater monitoring wells. The results indicated that there were no discernible signs of landfill gas concentrations in the wells and that it is unlikely that significant concentrations of odour causing landfill gas are likely to migrate from the two areas of landfill within the airport. It is noted however, that if these offsite landfill areas are subsequently excavated during site redevelopment works, it is possible that a temporary odour issue may be created.

12.4 Groundwater Results

Shallow groundwater was typically encountered in monitoring wells between 1.6 m and 4.3 m below ground level with the inferred direction of flow generally being towards the east (Hinchinbrook Creek). Groundwater field parameters indicate that groundwater is moderately to highly saline with the highest salinities typically in the western and northern sides of the site. The groundwater was also in the hard range, typical of saline conditions.

Groundwater samples were analysed for TPH, BTEX, PAH, phenols, heavy metals, hardness and pH.

The concentrations of heavy metals were at trace levels or below laboratory detection limits and well within the GIL or the hardness modified trigger values. TRH and BTEX concentrations were below the laboratory detection limits and therefore well within the adopted GIL.

It is noted however that there were some marginally elevated levels of phenanthrene, fluroranthene and pyrene (three species of polycyclic aromatic hydrocarbons, PAH), all of which were detected in the groundwater sample collected from GW3 (located near the former UST), and two exceedances of total phenolics (detected in wells GW3 and OW2). It is noted however that in the replicate sample of OW2 (BD1 o41209) the concentration of phenols was below the laboratory detection limits.

A review of the analytical results of sample GW3 and GW5 was undertaken. It was noted that no signs of petroleum hydrocarbon or fuel related contamination were noted in both samples (as well as others). In particular, no detectable TPH or BTEX, or lighter PAHs such as naphthalene (which may be present in fuel) were noted in these two samples (and other samples).

On this basis, it is possible that marginally elevated PAH species (phenanthrene, fluroranthene and pyrene) in GW3 and total phenolics (in both GW3 and OW2) may not be caused by fuel release, although this cannot be verified without further testing. In any case, given the absence of signs of contamination (including petroleum hydrocarbon contamination) in the groundwater samples collected from nearby and down-gradient wells, and, in fact, no signs of TPH and BTEX in all other wells, the results indicated no signs of unacceptable or extensive contamination impacts on the groundwater.

It is also noted that OW1 and OW2 were installed by ENSR during the tank pit characterisation, identified in the ENSR report as MW103 and MW102 respectively. Water samples were analysed for TPH, BTEX, PAH and lead during the ENSR investigation. The concentrations of the above analytes were below the detection limits in both monitoring wells

13. CONCLUSIONS AND RECOMMENDATIONS

The scope of work for the current assessment comprised a site walkover inspection, review of previous reports, soil and groundwater sampling and analysis. A review of historical information indicated that the site has been used as an airport since the end of the Second World War.

Test Bores generally indicated that the site was underlain by shallow filling or topsoil, clay and siltstone. Soil analytical results were generally low and within the adopted site assessment criteria.

Groundwater results were also typically low or below the laboratory detection limits. Whilst there were some elevated heavy phenols and PAH results were detected no signs of petroleum hydrocarbon or fuel related contamination were noted.

It is noted that the current assessment was undertaken to assess the “broad scale” and overall contamination status of the site. Given the general consistency of the investigation findings and the analytical results (in both the current and previous investigations), it is considered that the potential for contamination at the site is low. In particular, based on the soil groundwater assessment findings, no signs of unacceptable or wide spread impacts were noted.
On the basis of the current investigation findings, whilst noting the “low sensitivity” of the proposed commercial/industrial land use,

On the basis of the current investigation findings, whilst noting the “low sensitivity” of the proposed commercial/industrial land use, *no issues of unacceptable environmental concern that warrant remediation action were noted, and the site is considered compatible with the proposed development and may proceed from a contamination management standpoint.*

Whilst, as in all cases of investigation, there may be potential for presence of relatively localised sources/issues at various areas of the site, for example in the footprints of the current structures, and in areas of past activities (e.g. demolition of old buildings, use of filling of unknown origin, may result in isolated impacts such as pockets of asbestos contamination), it is envisaged that such impacts would be minor and localised in nature, and can be managed in a straightforward manner during the construction of the proposed development.

In this regard it is recommended that in order to ensure adequate management of possible localised contamination issues, the construction works should proceed under a Construction Environmental Management Plan (CEMP) to be prepared by an environmental consultant and implemented. The plan will provide detailed provisions on the following:

(a) Requirements and procedures to be adopted prior to and during demolition works to ensure that the works are conducted in a safe and appropriate manner in accordance with the legislative requirements, and that any hazardous material (such as asbestos) will be removed in a controlled manner by a qualified and appropriately licensed contractor without contaminating the substrate.

(b) As a good due diligence practice, following demolition and removal of the existing site structures/infrastructure and prior to the commencement of construction works, ie when the site become more accessible, the site should be inspected/checked by a qualified environmental consultant to verify the current investigation findings. The inspection/check should focus on previously concealed areas or areas of possible concern such as the former building footprints, and also on areas of potential concern eg hangars and areas of the former fuel tanks.

(c) Development of "Unexpected Finds Protocols" to provide clear guidance to site workers for the management of unexpected findings during the site development process.

Based on the available information, in the unlikely event that unexpected contamination issues are uncovered during the post-demolition site validation, these can be handled, assessed and managed in a straightforward manner in accordance with the Unexpected Finds Protocols and the relevant provisions of the CEMP.

14. LIMITATIONS OF THIS REPORT

The scope of the site assessment activities undertaken by DP were detailed in the proposal dated 17 November 2009 and accepted by Mirvac Projects Pty Ltd.

DP's assessment is necessarily based upon and the previous reports provided by the client which have been taken in good faith, the result of a limited site investigation for and the restricted programme of surface and subsurface sampling, screening and chemical testing which was set out in the proposal. DP cannot provide unqualified warranties with regards to site contamination nor does DP assume any liability for site conditions not observed or accessible during the time of the investigations.

Despite all reasonable care and diligence, the ground conditions encountered and concentrations of contaminants measured may not be representative of conditions between the locations sampled and investigated. In addition, site characteristics may change over time due to activities such as spillages of contaminating substances. These changes may occur subsequent to DP's investigations and assessment.

This report, its associated documentation and the information herein have been prepared solely for the use of Mirvac Projects Pty Ltd and Woolworths Limited. Any reliance assumed by third parties on this report shall be at such parties' own risk.

DOUGLAS PARTNERS PTY LTD

Reviewed by:

Kurt Plamback
Environmental Scientist

Ronnie Tong
Principal

APPENDIX A
Site Drawings

Legend

BH1 — Bore Hole Location

GW5A — Groundwater Well Location

Site Boundary

Douglas Partners Geotechnics • Environment • Groundwater	CLIENT: Mirvac Projects		TITLE:	**Location of Test Bores**	Project No: 71500
	DRAWN BY: KDP	SCALE: NTS	OFFICE: Sydney	**Limited Phase 2 Contamination Assessment**	Drawing No: 1
	APPROVED BY		DATE: 17.12.2009	**Hoxton Park Airport**	Revision: A

N

Site North

Legend

Bore Hole Location (BH1)

Groundwater Well Location (GW5A)

Site Boundary

Douglas Partners Geotechnics · Environment · Groundwater	CLIENT: Mirvac Projects		TITLE:	**Location of Test Bores - Site North**	Project No: 71500
	DRAWN BY: KDP	SCALE: NTS	OFFICE: Sydney	**Limited Phase 2 Contamination Assessment**	Drawing No: 2
	APPROVED BY		DATE: 17.12.2009	**Hoxton Park Airport**	Revision: A

N

Site South

Adjacent Service Station

Legend

BH1	Bore Hole Location
GW5A	Groundwater Well Location
(blue line)	Site Boundary

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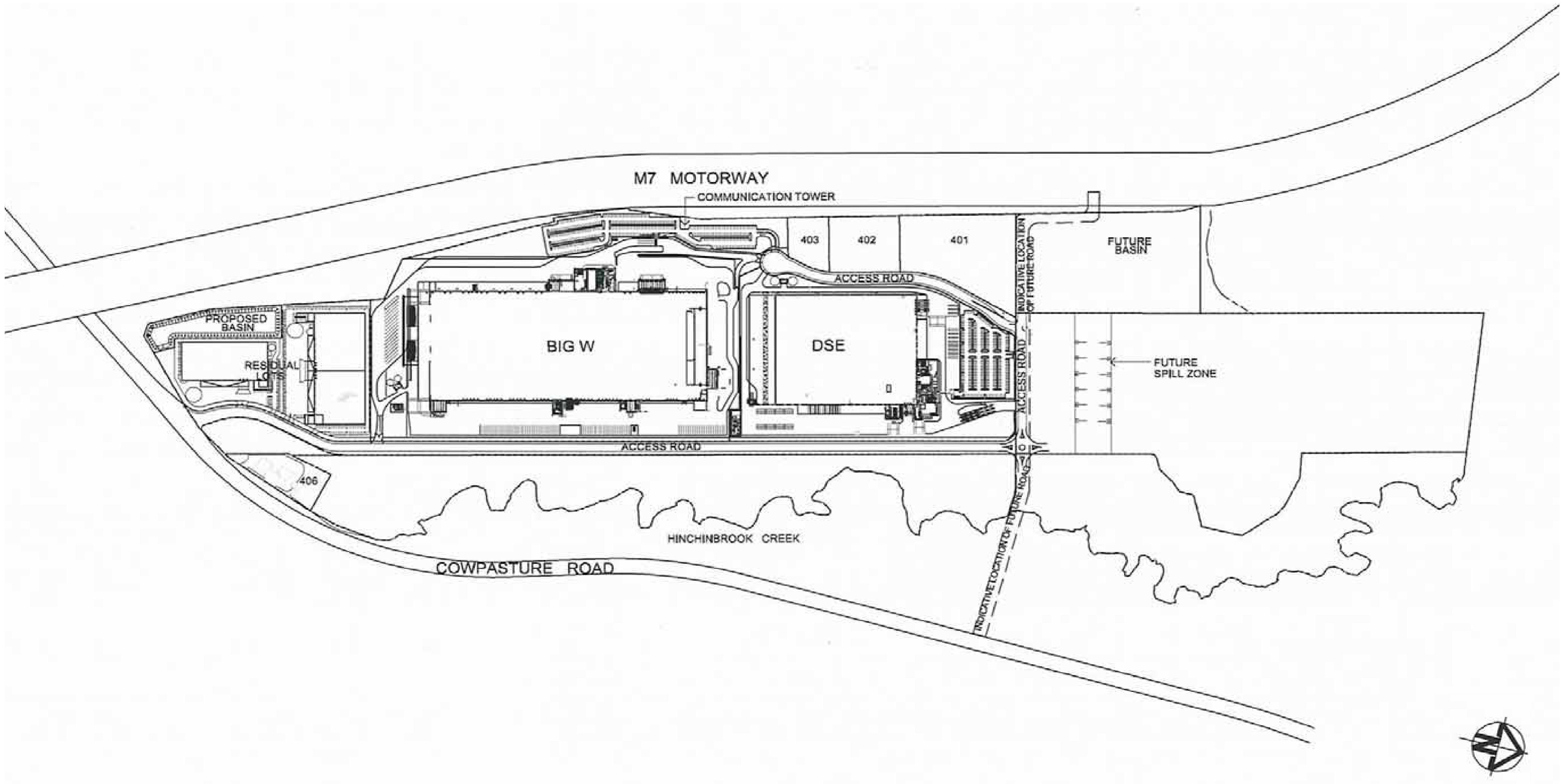
CLIENT: Mirvac Projects			TITLE: **Location of Test Bores - Site South**	Project No: 71500
DRAWN BY: KDP	SCALE: NTS	OFFICE: Sydney	**Limited Phase 2 Contamination Assessment**	Drawing No: 3
APPROVED BY		DATE: 17.12.2009	**Hoxton Park Airport**	Revision: A

N →

Legend

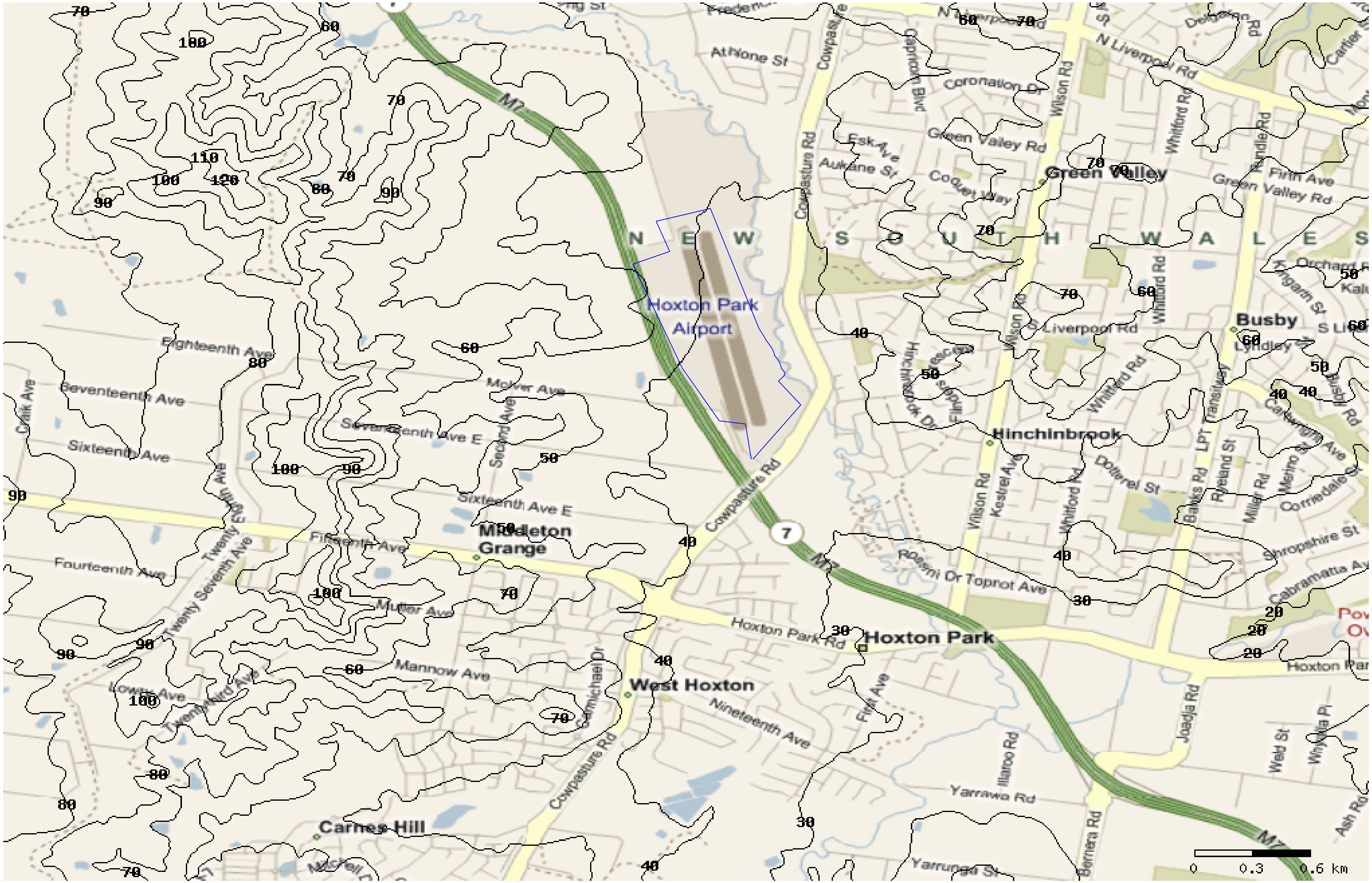
- BH1 — Bore Hole Location
- GW5A — Groundwater Well Location
- Site Boundary
- Previous Well

Douglas Partners — Geotechnics · Environment · Groundwater	CLIENT: Mirvac Projects			TITLE: Location of Test Bores - Vacinity of UST	Project No: 71500
	DRAWN BY: KDP	SCALE: NTS	OFFICE: Sydney	Limited Phase 2 Contamination Assessment	Drawing No: 4
	APPROVED BY		DATE: 17.12.2009	Hoxton Park Airport	Revision: A



Douglas Partners Geotechnics · Environment · Groundwater	CLIENT: Mirvac Projects			TITLE:	Concept Plan	Project No: 71500
	DRAWN BY: KDP	SCALE: NTS	OFFICE: Sydney		Limited Phase 2 Contamination Assessment	Drawing No: 5
	APPROVED BY		DATE: 8.2.2010		Hoxton Park Airport	Revision: A

Douglas Partners Geotechnics • Environment • Groundwater	CLIENT: Mirvac Projects			TITLE:	Geology Map	Project No:	71500
	DRAWN BY: KDP	SCALE: NTS	OFFICE: Sydney		Limited Phase 2 Contamination Assessment	Drawing No:	6
	APPROVED BY		DATE: 17.12.2009		Hoxton Park Airport	Revision:	A



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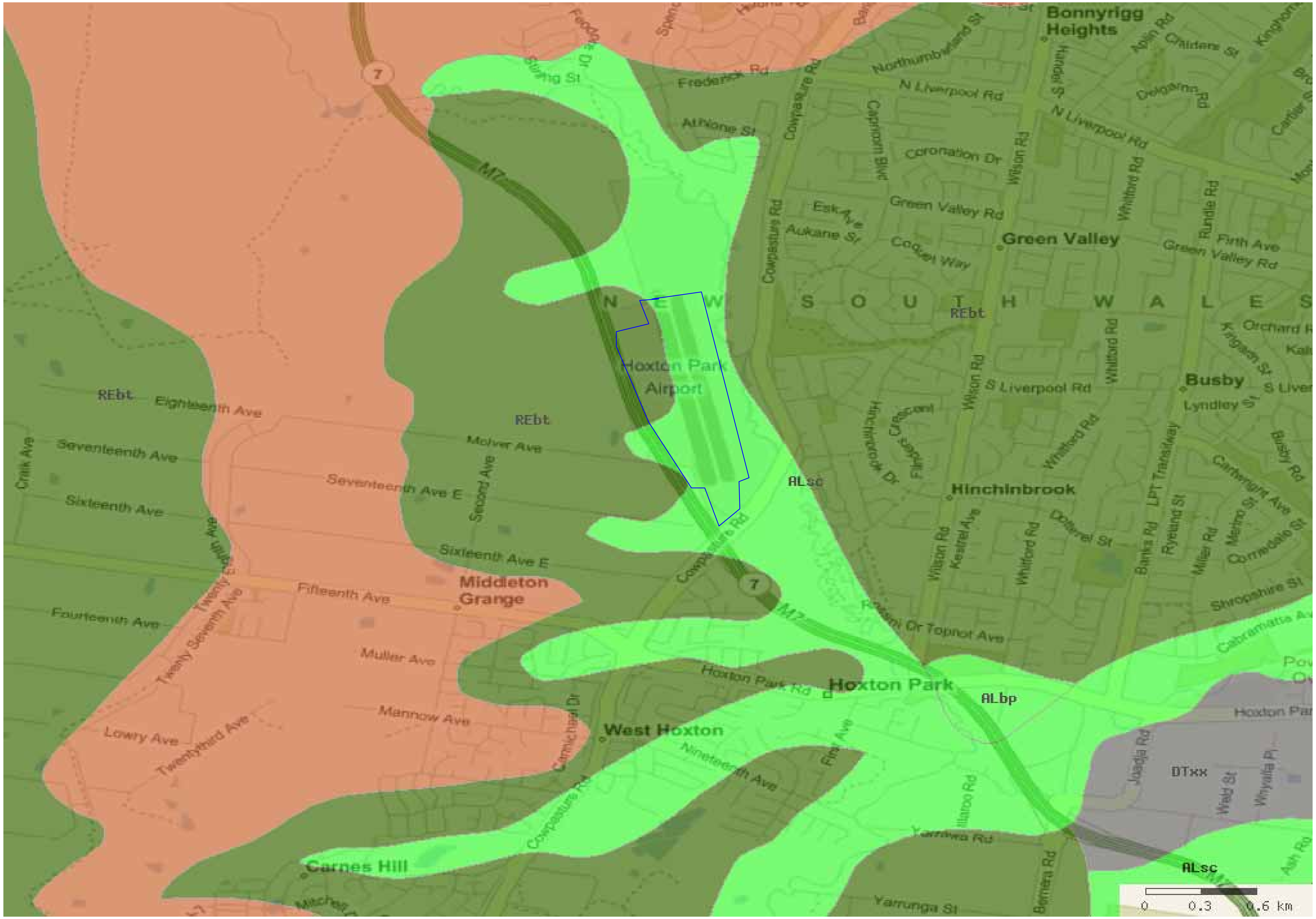
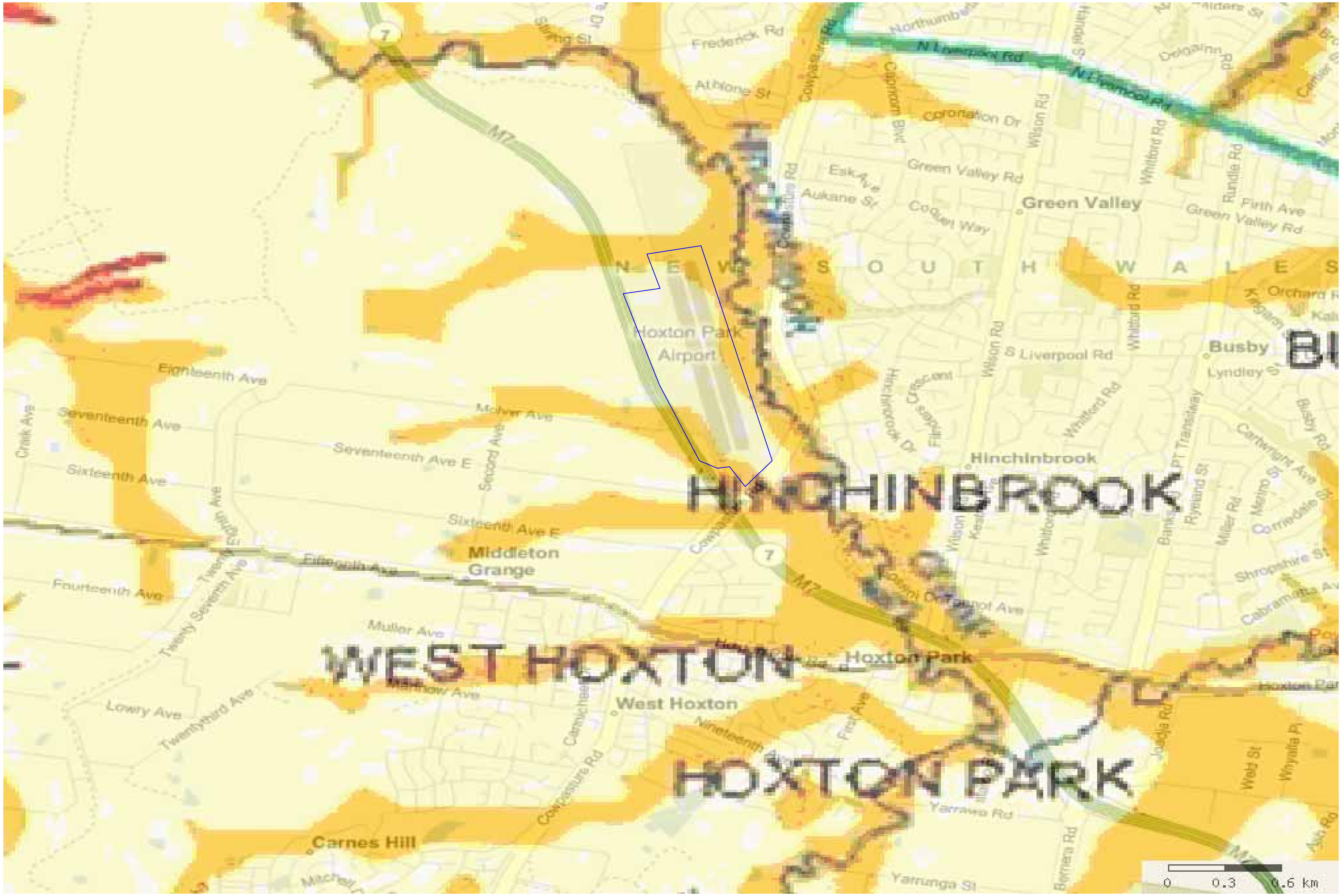
CLIENT: Mirvac Projects			TITLE: Site Topographic Map	Project No: 71500
DRAWN BY: KDP	SCALE: NTS	OFFICE: Sydney	Limited Phase 2 Contamination Assessment	Drawing No: 7
APPROVED BY		DATE: 17.12.2009	Hoxton Park Airport	Revision: A



Douglas Partners Geotechnics • Environment • Groundwater	CLIENT: Mirvac Projects			TITLE:	Soil Landscape Mape	Project No: 71500
	DRAWN BY: KDP	SCALE: NTS	OFFICE: Sydney		Limited Phase 2 Contamination Assessment	Drawing No: 8
	APPROVED BY		DATE: 17.12.2009		Hoxton Park Airport	Revision: A



Douglas Partners Geotechnics • Environment • Groundwater	CLIENT: Mirvac Projects			TITLE:	**Salinity Map**	Project No: 71500
	DRAWN BY: KDP	SCALE: NTS	OFFICE: Sydney		**Limited Phase 2 Contamination Assessment**	Drawing No: 9
	APPROVED BY		DATE: 17.12.2009		**Hoxton Park Airport**	Revision: A

Douglas Partners *Geotechnics • Environment • Groundwater*	CLIENT: Mirvac Projects			TITLE:	**Groundwater Levels (AHD)**	Project No: 71500
	DRAWN BY: KDP	SCALE: NTS	OFFICE: Sydney		**Limited Phase 2 Contamination Assessment**	Drawing No: 10
	APPROVED BY		DATE: 17.12.2009		**Hoxton Park Airport**	Revision: A

APPENDIX B
Site Photographs

Photo 1: Former Runway looking South

Photo 2: Site from northern side of runway looking south

Limited Phase 2 Contamination Assessment Hoxton Park Airport Hoxton Park	Project 71500	January 2009	Plate 1

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Photo 3: Location of former UST/BP refueling area

Photo 4: Location of former UST/BP refueling area

Limited Phase 2 Contamination Assessment Hoxton Park Airport Hoxton Park	Project 71500	January 2009	Plate 2

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Photo 5: Recycled concrete backfill in former UST pit

Photo 6: Service Station outside south east boundary of site

Limited Phase 2 Contamination Assessment Hoxton Park Airport Hoxton Park	Project 71500	January 2009	Plate 3

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Photo 7: Former office

Photo 8: Former hangers, worksheds and offices

Limited Phase 2 Contamination Assessment Hoxton Park Airport Hoxton Park	Project 71500	January 2009	Plate 4

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Photo 9: Former Helicopter Hanger

Photo 10: Drainage Trench in running north to south in southern half in between runway and taxiwa

Limited Phase 2 Contamination Assessment Hoxton Park Airport Hoxton Park	Project 71500	January 2009	Plate 5

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Photo 11: Drainage Trench in south west corner of site

Photo 12: Drainage trench near former helicopter bay

Limited Phase 2 Contamination Assessment Hoxton Park Airport Hoxton Park	Project 71500	January 2009	Plate 6

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Photo 13: Stormwater rentention basin outside south western side of site

Photo 14: Soil Stockpiles ouside site boundary (western side)

Limited Phase 2 Contamination Assessment Hoxton Park Airport Hoxton Park	Project 71500	January 2009	Plate 7

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Photo 15: Soil Stockpiles ouside site boundary (western side)

Limited Phase 2 Contamination Assessment **Hoxton Park Airport** **Hoxton Park**	**Project** **71500**	**January** **2009**	**Plate** **8**