



Mirvac Projects Pty Ltd
Ecological Risk Assessment

2 Locomotive Street
Eveleigh NSW

8 December 2015
51142-102217/ Rev B
JBS&G

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Abbreviations

Term	Definition
ACM	Asbestos Containing Material
AEC	Area of Environmental Concern
AF/FA	Asbestos Fines / Fibrous Asbestos
AHD	Australian Height Datum
As	Arsenic
ASLP	Australian Standard Leaching. Procedure
ASS	Acid Sulphate Soils
AST	Aboveground Storage Tank
AST	Australian Technology Park
BaP	Benzo (a) Pyrene
bgl	Below Ground Level
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
BSA	Botany Sands Aquifer
BSB	Botany Sand Beds
CBA	Commonwealth Bank of Australia
Cd	Cadmium
CEC	Cation Exchange Capacity
COPC	Contaminant of Potential Concern
CoS	City of Sydney
Cr	Chromium
CSM	Conceptual Site Model
Cu	Copper
DA	Development Application
DO	Dissolved Oxygen
DQI	Data Quality Indicator
DQO	Data Quality Objectives
DP	Deposited Plan
DPI Water	NSW Department of Primary Industry - Water
EC	Electrical Conductivity
EMP	Environmental Management Plan
EPA	NSW Environment Protection Authority
ERA	Ecological Risk Assessment
ESL	Ecological Screening Level
GMA	Groundwater Management Area
Ha	Hectare
Hg	Mercury

Term	Definition
HIL	Health-based Investigation Level
HSL	Health Screening Level
HSP	Remediation Occupational Health and Safety Plan
JBS&G	JBS&G Australia Pty Ltd
LOR	Limit of Reporting
LNAPL	Light Non-Aqueous Phase Liquid
MAH	Monocyclic Aromatic Hydrocarbon
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
Ni	Nickel
OEH	NSW office of Environment and Heritage
OCP	Organochlorine Pesticides
OPP	Organophosphorus Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
Pb	Lead
PCB	Polychlorinated Biphenyls
PID	Photo-ionisation Detector
PIL	Phytotoxicity Based Investigation Level
QA/QC	Quality Assurance/Quality Control
RAP	Remedial Action Plan
REMP	Remediation Environmental Management Plan
RPD	Relative Percentage Difference
SAS	Site Audit Statement
SAR	Site Audit Report
SCS	Significantly Contaminated Site
SWA	Safe Work Australia
SSDA	State Significant Development Application
TCLP	Toxicity Characteristic Leaching Procedure
TOC	Total Organic Carbon (% w/w)
TRH	Total Recoverable Hydrocarbons
TPH	Total Petroleum Hydrocarbons
UST	Underground Storage Tank
VENM	Virgin Excavation Natural Material (as defined in POEO Act)
VOC	Volatile Organic Compound
Zn	Zinc

Executive Summary

JBS&G Australia Pty Ltd (JBS&G) was engaged by Mirvac Projects Pty Limited (Mircvac, the client) to complete an ecological risk assessment for the proposed redevelopment of the former commercial / industrial sites located at 2 Locomotive Street, Eveleigh, NSW (the site). The site is proposed to be redeveloped for mixed uses including commercial, retail, community and childcare. Completion of the redevelopment program will require significant cut and fill works across the Site. Materials generated by excavation works are to be re-used as fill materials to minimise waste materials generated by the Site works and reduce demand for external sources of fill. Portions of the site are required to support flora and fauna consistent with proposed use as recreational areas.

A number of environmental assessments have identified environmentally impacted material across the Site. The ecological risk assessment has considered a range of potential ecological exposures to site impact present in soils, groundwater and potentially occurring in the future as leachates from site soils. On-site and off-site ecological exposures have been assessed. A sensitivity analysis has been undertaken of the risk assessment process adopted and the conclusions and recommendations have been found to be suitably conservative to be applied to the site.

Consistent with the limitations provided as **Section 10**, it has been found that the re-use of fill materials on the site is not likely to pose a potential ecological risk consistent with the following recommendations:

- (Imported) growing media are used in accessible areas of the site where potential plantings are proposed to occur;
- A minimum depth of 0.5 m of growing media should be adopted in areas of grasses / shrubs;
- A minimum depth of 1.5 m, not exceeding 2 m, is appropriate for areas of the site where larger trees are proposed to be planted;
- Growing media should have levels of constituents consistent with ecological protection criteria for 'urban residential and public open space' as provided to NEPC (2013), and levels of Aldrin, Dieldrin and polychlorinated biphenyls (PCBs) below laboratory detection limits;
- Fill materials on site are not suitable to be used as growing media, unless demonstrated as environmentally suitable;
- A significant extent of the natural soils on the site, generally at depths in proximity to the extent of the fill based soils, are further not suitable to be used as growing media, unless demonstrated otherwise. Where natural soils are proposed to be used on site as growing media they will require to be validate for heavy metals, TRH and PAHs;
- Natural soils on site (underlying fill materials) may be suitable to be used as growing media subject to validation of hydrocarbons meeting NEPC (2013) criteria; and
- Preliminary calculations undertaken to assess potential worst case levels of leachate generated from the reuse of site fill materials under a scenario of increased contact of the soils to leaching fluids (i.e. groundwater), and the potential impact to site groundwater and hydrogeologically down gradient potential receptors of groundwater, have indicated that it likely that these materials will not pose an unacceptable ecological risk. However, the calculations are considered likely to be grossly conservative consequent of theoretical estimates of potential leachabilities of the soil constituents.

It is recommended that a program of soil sampling is undertaken as targeted to fill materials and known areas of impacted natural materials that may be subject to on-site reuse under a scenario of increased leaching potential, for the purposes of generating site specific estimates of constituent

leachability. Calculations undertaken here to estimate potential future groundwater impacts should be revised on the basis of these site measured values. This should particularly target potential leachability of copper, zinc and semi-volatile TRH.

1. Introduction

1.1 Introduction and Background

JBS&G Australia Pty Ltd (JBS&G) was engaged by Mirvac Projects Pty Limited (Mircvac, the client) to complete an ecological risk assessment for the proposed redevelopment of a portion of the Australian Technology Park (ATP) (the site). This report supports a State Significant Development Application (SSDA) to be submitted to the Department of Planning and Environment pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979 (EP&A Act)*.

The ATP precinct, for which the site is part, comprises a 13.6 hectare (ha) parcel of land and is occupied by a number of modern high rise buildings, heritage industrial buildings, private roads and public domains, as shown in **Figures 1 and 2**. The Mirvac site, herein referred to as 'the site' is legally identified as Lots 8, 9, 12 in Deposited Plan (DP) 1136859, Part Lot 13 in DP 1136859, Part Lot 10 in DP 1136859 and Lot 505 in DP 1033739 and occupies an area of 11.6 ha. The site includes the Locomotive Workshop, public roads/domains (road reserves and pedestrian easements, recreational facilities and the eastern most extent of Lot 10 DP 1136859) and Developable Lots (Lots 8, 9 and 12). The footprints of existing ATP precinct structures (including the International Business Centre, National Innovation Centre, Traffic Management Centre (formally the RTA Building), Ambulance Service Building and Biomedical Building footprints) within Lot 13 in DP 113659 fall outside the site boundaries, as shown on **Figure 2**.

The ATP, including the site, has been subject to a number of environmental assessments have identified historical land uses comprising locomotive workshops, foundries, railway sidings and goods yards. The ATP, including the site, was used to manufacture components required for steam locomotive assembly and repair. Site activities were reported to have comprised brass, iron and steel founding, heavy engineering machining, blacksmith works, refuelling, cleaning, degreasing, including the use of solvents and paints.

Soil impact has been identified as associated with hot-spots of semi- and non-volatile petroleum hydrocarbons and polycyclic aromatic hydrocarbons (PAHs), and/or heavy metals as associated with fill materials historically used across the sites or resultant from historical site activities. Localised areas of asbestos impact have identified.

Mircvac has been announced by UrbanGrowth NSW Development Corporation (UGDC) as the successful party in securing ownership and redevelopment rights for the site for ongoing use as a campus style precinct catering for science and technology bases occupants. In addition, Mirvac propose to develop Developable Lots 8, 9 12 in DP 1136859 for commercial land use, with Lots 8 and 9 potentially including childcare facilities (or similar). Adaptive reuse of Locomotive Workshop is proposed for ongoing commercial land use excluding childcare facilities.

An ecological risk assessment has been identified as being required to determine the level of ecological risk posed by these materials. Ecological risk assessment (ERA) is required to determine the suitability of the environmentally impacted material to remain *in-situ*, or to be relocated to other sections of the site to facilitate the ecological sustainable development (ESD) objectives of the project. The ERA is to be based on the range of potential ecological receptors within the proposed development and associated with potentially sensitive ecological receptors in proximity of the site.

The ERA has been undertaken substantially in accordance with guidance provided in *National Environment Protection (Assessment of Site Contamination) Measure*, 2013, National Environment Protection Council (NEPC 2013) and the methodology outlined in *The Australian Methodology to Derive Ecological Investigation Levels in Contaminated Soils*, October 2009, Heemsbergen D, Warne M, McLaughlin M and Kookana R CSIRO (CSIRO, 2009). CSIRO (2009) is understood to have premised much of the ecological aspects of NEPC (2013). The findings of the risk assessment shall be used to determine future site management requirements for soils and groundwater within the current area

of the Site and to assess suitability of surplus materials to be used on the Site as fill materials (including growing medium).

1.2 Objectives

The objectives of the ERA are:

- To determine the ecological suitability of levels of a range of environmental constituents identified as being present in soils and groundwater across the Site;
- To establish environmental standards to assess the ecological suitability of surplus materials proposed to be used as fill materials to form the new proposed levels across the Site; and
- To establish a process / remedial framework for the re-use of site soils during site development activities to facilitate meeting the project's ecologically sustainable development objectives.

1.3 Previous Investigations

The ATP precinct, for which the site is part, has been the subject of over 100 contamination investigations over a period of 22 years. A site wide contamination assessment, consolidating and reviewing all previously reported environmental contamination data has been reviewed in this report, *Mirvac Project Pty Ltd, Australian Technology Park Detailed Site Assessment, 2 Locomotive Street, Eveleigh NSW*, 9 December 2015 (JBS&G 2015).

1.3.1 Summary of Known Fill/Soil Contamination Status

Fill materials were reported to occur across the entire site with minor exceptions, ranging from a skeletal fill soil profile to 7.6 m in depth. Fill materials within the site were noted to comprise gravelly sandy, silty sands, clayey sands, peat with inclusions of railway ballast, glass, ash, metal, ceramic, brick, slag, sedimentary clast and construction rubble.

Fill materials have been shown to contain elevated concentrations of heavy metals (principally copper, zinc and to a lesser extent lead), semi to non-volatile total petroleum hydrocarbons (TPHs)/total recoverable hydrocarbons (TRH), PAHs (including concentrations of carcinogenic PAH compounds as benzo(a)pyrene TEQ) and, in parts, asbestos.

Within the developable Lots (Lot 8, Lot 9 and Lot 12) the reported concentrations of the identified contaminants (where present) in the fill material typically exceed endorsed generic/site-derived ecological criteria and, in relatively few cases, exceed endorsed health-based criteria as adopted for proposed permissible land uses (Lots 8 and 9 – commercial with childcare use; Lot 12 – commercial use).

1.3.2 Summary of Known Groundwater Contamination Impact

As documented in JBS&G (2015) and SAS's prepared for various land parcels within the ATP precinct, groundwater has been assessed across the site and no groundwater remediation is considered to be required.

Identified historical groundwater contamination issues underlying the ATP precinct, incorporating but not necessary directly applicable to the site, include:

- Elevated concentrations of heavy metals (principally zinc and copper) in groundwater identified in various parts of site;
- Elevated zinc concentrations at BH508 within Lot 9, which may be related to overlying fill conditions;
- Light non-aqueous phase liquid (LNAPL) historically reported (in the 1990s) within the northern site extent (MW3 – Area 2) and GWP208A within Lot 10 (outside the site); and

- Dissolved phase concentrations of TRH in groundwater related to the presence of LNAPL and in localised areas likely associated with other TRH sources (e.g., former UST(s) and/or historical site activities).

As documented in JBS&G (2015), no known LNAPL sources have been reported during recent groundwater sampling events and TRH (and other organic COPC) concentrations have generally been below the laboratory limit of reporting (LOR) or only marginally exceeding the laboratory LOR.

The potential for affecting groundwater conditions, for example by increased contaminant leaching, needs to be considered in the redevelopment. This includes, but is not limited to, fill materials at BH508 (Lot 9) and within the top 1.5 m of fill materials within the central and central-northern portions of Lot 12 that have been identified as potentially containing leachable zinc and lead concentrations, respectively, which may require management if the exposure scenario changes with respect to future development of Developable Lots.

1.3.3 Summary of Known Soil Vapour Contamination Impact

Sub-slab vapour samples collected from underlying Bays 5 and 6 of the Locomotive Workshop have reported trichloroethylene (TCE) concentrations ranging between 0.0655 mg/m³ to 0.307 mg/m³. However, on the basis that ambient air quality sampling results were reported below the adopted assessment criterion, no current risk from sub-slab vapour conditions has been reported. Additional assessment of the nature and extent of volatile COPC in the subsurface underlying the Locomotive Workshop is required to support ongoing management under the environmental management plan (EMP) if the exposure scenario changes under the proposed adaptive reuse of the Locomotive Workshop or change to the EMP is necessary.

1.3.4 Hazardous Building Materials

Lead based paint has been identified within the Locomotive Workshop. Lead based paints are required to be removed from the Locomotive Workshop or documented in the Hazardous Materials Register prepared for the Locomotive Workshop and managed under an EMP.

1.4 Development Framework and Design

Introduction

This report supports a SSDA submitted to the Department of Planning and Environment pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Mirvac is seeking to secure approval for the urban regeneration of the Australian Technology Park (ATP), including the redevelopment of three car parking lots within ATP for the purposes of commercial, retail and community purposes, along with an extensive upgrade to the existing public domain within ATP. Building heights of 4, 7 and 9 storeys are proposed across the 3 development lots.

ATP has been continuously developed since its establishment in 1996, but has been underutilised as a technology and business precinct for quite some time. UrbanGrowth NSW Development Corporation (UGDC) has actively encouraged new development and employment opportunities at the Park for the past 15 years, and Mirvac intends to continue upon this and deliver upon the precinct's full potential, with the development of circa 107,400 m² for employment uses, which will facilitate the employment homes of an extra 10,000 staff everyday within ATP by development completion.

Background

Mirvac has been announced by UGDC as the successful party in securing ownership and redevelopment rights for the ATP precinct (the site), following an Expression of Interest (EOI) and an Invitation to Tender (ITT) process which commenced in 2014. Mirvac has also secured the Commonwealth Bank of Australia (CBA) as an anchor tenant for the development and intends to

immediately commence the urban regeneration of this precinct through the lodgement of this SSDA. CBA's commitment to the precinct is in the form of one of the largest commercial leasing pre-commitments in Australian history, occupying circa 95,000 square metres of commercial, retail, community and childcare NLA, which will house circa 10,000 technology focused staff by 2019 and 2020. Mirvac's redevelopment goes well beyond the development on the 3 development lots, as it includes the regeneration of the public domain within ATP, the addition of retail to activate the precinct and also the provision of community facilities such as a community centre, a gym and 2 x 90 child childcare facilities.

Site Description

The ATP precinct is strategically located approximately 5 km south of the Sydney central business district (CBD), 8 km north of Sydney airport and within 200 m of Redfern Railway Station. The ATP precinct, with an overall area of some 13.2 hectares, is located within the City of Sydney local government area (LGA), as shown in **Figure 1**.

Three key lots remain undeveloped within the ATP precinct and are presently used for at-grade worker and special event car parking. These sites are:

- Lot 8 in DP 1136859 – site area circa 1,937 m²;
- Lot 9 in DP 1136859 – site area circa 8,299 m²; and
- Lot 12 in DP 1136859 – site area circa 11,850 m².

The ATP site layout is shown in **Figure 2**.

In addition, the site contains the Locomotive Workshops which is a large heritage listed masonry and steel former railway building, which has undergone adaptive reuse in recent years for commercial purposes. The SSDA works boundary excludes the Locomotive Workshop. Future development associated with the adaptive re-use of the Locomotive Workshop will be the subject of separate future applications.

Overview of Proposed Development

The development application seeks approval for the following components of the development:

- Site preparation works, including demolition and clearance of the existing car parking areas/ancillary facilities and excavation;
- Construction and use of a 9 storey building within Lot 9 (Building 1), comprising of parking, retail, commercial and childcare uses;
- Construction and use of a 7 storey building within Lot 12 (Building 2) comprising of parking, retail and commercial uses;
- Construction and use of a 4 storey community building within Lot 8 (Community Building) comprising of gym, retail, community, commercial and childcare uses;
- Extensive landscaping and public domain improvements throughout the precinct for the benefit of the local community; and
- Extension and augmentation of physical infrastructure/utilities as required.

A more detailed and comprehensive description of the proposal is contained in the Environmental Impact Statement (EIS) prepared by JBA. Design Plans for Lots 8, 9 and 12 are provided in **Appendix A**.

Adaptive reuse and refurbishment of the Locomotive Workshop for commercial purposes is proposed in future development.

It is understood works are to be undertaken in a staged manner.

Planning Framework

State Environmental Planning Policy (SEPP) Major Development 2005 is the principal environmental planning instrument applying to the site. Schedule 3, Part 5 of the Major Development SEPP sets out the zoning, land use and development controls that apply to development on the site.

As the development has a capital investment value of more than \$10 million it is identified as State Significant Development under the State Environmental Planning Policy (State and Regional Development) 2011, with the Minister for Planning the consent authority for the project.

2. Summary Site Condition and Surrounding Environment

2.1 Site Identification

The site is a part of the ATP campus style precinct catering for science and technology based occupants, in a historical setting, comprising heritage renewal as well as modern state of the art facilities. The site is located approximately 5 km south of the Sydney CBD, 8 km north of Sydney airport and within 200 m of Redfern Railway Station. The site, with an overall area of some 11.6 hectares (ha), is located within the City of Sydney local government area (LGA).

The site is bound to the north by a railway easement, east by Garden and Cornwallis Streets, south by Henderson Road and to west by Alexander Street and a childcare facility.

The location of the site is shown in **Figure 1**, current layout is shown in **Figure 2**. Site details are summarised in **Table 2.1**.

Table 2.1: Summary Site Details

Project Site Lot/DP	Lots 8, 9, 12 in DP 1136859 Part Lot 13 in DP 1136859 Lot 505 in DP 1033739 Part Lot 10 in DP 1136859
Address	Australian Technology Park, 2 Locomotive Street, Eveleigh, NSW
Local Government Authority	City of Sydney Council
Site Zoning	SEPP Major Development 2005 under the City of Sydney Local Environment Plan 2012
Current Use	Lot 8 DP 1136859 – vacant land / car park Lot 9 DP 1136859 – vacant land / car park Lot 12 DP 1136859 – vacant land / car park Lot 13 DP 1136859 and Lot 505 DP 1033739 – campus style precinct comprising heritage renewal as well as modern state of the art facilities for science and technology based occupants (commercial land use). In addition areas of public open space comprising a roads, sports oval, tennis courts and picnic facilities (recreational land use) Lot 10 DP 1136859 – commercial land use
Proposed Use	Part Lot 10 DP 1136859, Part Lot 13 DP 1136859 and Lot 505 DP 1033739 – ongoing commercial/industrial (road and pedestrian easements) and recreational land uses Lot 8 DP 1136859 – commercial potentially including a child care centre Lot 9 DP 1136859 – commercial potentially including a child care centre Lot 12 DP 1136859 – commercial potentially Locomotive Workshop (part Lot 13 DP 1136859) –adaptive reuse for commercial land use
Geographical Co-ordinates	Approximate centre of site (GDA94- MGA56) Easting: 333169.991 Northing: 6247929.199
Area of the site	ATP: approximately 13.6 ha Site: approximately 11.6 ha

2.2 Current Site Condition

The site comprises an irregular shaped parcel of land accommodating Developable Lots and public domain areas of the ATP campus style precinct catering for science and technology based occupants, in a historical setting, comprising heritage renewal as well as modern state of the art facilities. The site is bound to the north by a railway easement, east by Garden and Cornwallis Streets, south by Henderson Road and to west by Alexander Street and a childcare facility.

The site is defined as part ATP precinct, comprising the public domain areas of the ATP precinct (roads, pedestrian easements and recreations facilities) including the pedestrian easement between Lots 10 and 12, the Locomotive Work Shop and Developable Lots (Lots 8, 9 and 12). Areas excluded from the site include the footprints of existing structures within Lot 13 (International Business Centre, National Innovation Centre, Traffic Management Centre, Ambulance Service Building and Biomedical Building) and land currently tenanted by Seven Network (Channel Seven – Lots 10 and 11 in DP 1136859) (but including the public domain easement between Lot 10 DP 1136859 and Lot 12 DP 1136859).

Excluding Developable Lots (Lots 8, 9 and 12), the site is occupied/surfaced by either or a combination of the following:

- Road Reserves - primarily surfaced with bituminous concrete, concrete pavements or ceramic pavers with landscaped areas (garden beds with mulch/topsoil ground cover),
- Pedestrian Easements - primarily surfaced with bituminous concrete, concrete pavements or ceramic pavers with landscaped areas (garden beds with mulch/top soil ground cover), and
- Areas of Open Public Space – public accessible parks comprising primarily areas surfaced with grass cover (Vice Chancellors Oval and lawn areas), tennis courts, barbeque picnic area and areas surfaced with bituminous concrete, concrete and/or ceramic pavements with landscaped areas (garden beds with mulch/top soil ground cover).

Developable Lots (Lots 8, 9 and 12) are largely level, surfaced with bituminous concrete pavements with minor areas of exposed soils (garden beds). Lot 12 is noted to comprise two tiers, an upper level flush with the Locomotive Street road frontage, and a low level flush with the Central Avenue road frontage. An earthen/concrete embankment retaining wall of approximately 1.5 m in height separates the two tiers.

Developable Lots are currently used as overflow car parking facilities and proposed to be developed to accommodate commercial land use, with Lots 8 and 9 potentially including childcare facilities or similar.

The Vice Chancellors Oval and recreational areas located within the southern site extent are surfaced with grass cover and also act as a flood detention basin.

The Eastern Suburbs/Illawarra Train Line Tunnel runs below ground parallel to Henderson Road along the southern site boundary.

2.3 Surrounding Land Uses

The surrounding land uses have been identified as comprising:

- North – The site is bound to the north by a railway easement and in turn mixed land use comprising heritage (Carriage Works) renewal (commercial land use - art centre, restaurant/bar and markets), residential allotments and the University of Sydney campus facilities;
- East – The site is bound to the east by Cornwalls and Garden Street, across which are mixed land uses comprising residential and commercial allotments. Several residential and commercial allotments bound the site to the south east (corner of Henderson Road and Garden Street);
- South – The site is bound to the south by Henderson Road, across which are mixed land uses comprising residential and commercial allotments. A child care facility (Alexandria Childcare Centre) bounds the site to the south west. The Eastern Suburbs/Illawarra Train Line Tunnel runs parallel to Henderson Road along the southern site boundary (**Figure 1**); and

- West – The site is bound to the north west by a railway easement and associated infrastructure (RailCorp Depot), Lots 10 and 11 in DP 1136859 comprising commercial land uses (Channel 7 Building) and a child care centre (Alexandria Childcare Centre) to the south west.

Several existing buildings within Lot 13 in DP 1136859 (International Business Centre, National Innovation Centre, Traffic Management Centre, Ambulance Service Building and Biomedical Building) and Lots 10 and 11 in DP 1136859 (Seven Network Building) line the site periphery, falling outside the subject site. As discussed above, the pedestrian easement between Lot 10 in DP1136859 and Lot 12 in DP 1136589 falls within the Site boundary.

2.4 General

No potentially significant ecological populations have been observed on or in close proximity of the site during the previous / historical site inspections and assessments.

2.5 Proposed Development

As discussed in **Section 1.4**, proposed development drawings are provided in **Appendix C** for Lots 8, 9 and 12. The development application seeks approval for the following components of the development:

- Site preparation works, including demolition and clearance of the existing car parking areas/ancillary facilities and excavation;
- Construction and use of a 9 storey building within Lot 9 (Building 1), comprising of parking, retail, commercial and childcare uses. Building 2 is proposed to have a basement structure for part of the two lower levels;
- Construction and use of a 7 storey building within Lot 12 (Building 2) comprising of parking, retail and commercial uses;
- Construction and use of a 4 storey community building within Lot 8 (Community Building) comprising of gym, retail, community, commercial and childcare uses;
- Extensive landscaping and public domain improvements throughout the precinct; and
- Extension and augmentation of physical infrastructure/utilities as required.

2.6 Topography

A review of the *1:25,000 Botany Bay Topographic Map* (9130-3-S) indicates that the site lies at an elevation of between approximately 10 m and 20 m above Australian Height Datum (AHD). The site is reported to slope gently to the south west.

The site is situated within an area of gently undulating rises associated with dune formations. In the vicinity of the site, regional ground levels fall gently toward the south generally toward Shea's Creek, located approximately 600 m to the south east of the site and Alexandra Canal located approximately 1.4 km to the south of the site.

2.7 Geology

Review of the Sydney Geological Map (Sheet 9130, 1983¹) has identified that the site is underlain by Middle Triassic aged Ashfield Shale (regionally) and in turn Hawkesbury Sandstone of the Wianamatta Group, and Quaternary sediments. The site is considered most likely to be present at the extent of the Botany Sand Beds (BSB).

¹ 1:100 000 Sydney Geological Map Sheet 9130 Edition 1, Department of Mineral Resources, Published 1983

Quaternary sediments, commonly referred to as the BSB is comprised of unconsolidated to semi-consolidated permeable sands. The sands are medium to fine grained quartz marine sands with minor shell fragments and podzols. The sand is interspersed with lenses of layers of peat, peaty sand, silt and clay, which become more common in the lower part of the sequence. The BSBs can be up to 30 m to 60 m thick and are underlain typically with Hawkesbury Sandstone.

Previous investigations, as discussed in **Section 1.3**, identified fill materials across the entire site with minor exceptions, ranging from a skeletal fill soil profile to 7.6 m in depth. In general, the vertical extent of fill is reported to be greatest within the northern site extent, adjacent the Locomotive Workshop. Fill materials are considered result from a combination of site activity (waste products) and importation of fill materials to establish site levels.

Fill materials were noted to comprise gravelly sandy, silty sands, clayey sands, peat with inclusions of railway ballast, glass, ash, slag, metal, ceramic, brick, sedimentary clast and construction rubble.

Natural Aeolian sands and/or silty clay soils and in turn shale/sandstone bedrock were encountered underlying fill materials.

2.8 Hydrology

The nearest surface water receptor is the Alexandra Canal, located approximately 1.4 km to the south of the site. Alexandra Canal flows into the Cooks River, located approximately 4.5 km to the south west of the site which discharges into Botany Bay approximately 6 km to the south west of the site.

Existing pavements occupy greater than approximately 85% of the site and as such, rainfall within the site is anticipated to generally be controlled by the current storm water system, draining toward the Henderson Road site boundary and then into the regional storm water system. It is understood that regional storm water flow occurs via below ground infrastructure to the Alexandra Canal.

In unsealed sections of the site, a portion of rainfall is expected to infiltrate the relatively permeable sandy fill soils, with the remainder of rainfall becoming surface water run off toward the site boundary and then the regional storm water system.

As discussed above, based on communications with the client, it is understood that site is highly engineered, and alterations to the site's topography and in turn hydrology are subject to development controls, with the Vice Chancellors Oval and recreational areas fronting Henderson Road used as a stormwater detention basin.

2.9 Hydrogeology

As discussed in **Section 2.6**, the site lies at the edge of the Botany Sand Beds (BSB) aquifer. Two main groundwater systems are anticipated to operate in the vicinity of the site and more broadly across the BSB aquifer:

- A deeper, confined groundwater system resident in the fractures/porous Hawkesbury Sandstone which form the basement of the Botany Basin aquifer; and
- A shallow unconfined to semi-confined aquifer system resident within the unconsolidated sediments of the Botany Sand Beds.

Groundwater seepage was noted at a number of sampling locations during historical investigation activities. Seepage water levels varied from 0.8 m to 5 m below ground level (bgl) over a period of 22 years.

At a regional level, groundwater flow within the shallow aquifer system is through primary porosity, where water flows between the grains of sediments. The inflows, outflows and storage of the Botany Sand Beds define the water balance. Recharge is predominantly through rainfall infiltration although some water is also imported into the basin from Sydney Water's reticulated mains supply.

Consistent with the historical extensive use of groundwater in the Botany Sands aquifer, a significant number of registered groundwater wells (predominantly downgradient of the site) have previously been identified in proximity of the site. A review of the Botany Groundwater Management Zones map (DNR 2009²) indicates that the site is partially located within, and downgradient areas are located within, Zone 2 of the Botany Sands Aquifer Embargo Area. The DNR indicate that the Embargo Area “*incorporates localities with known or suspected contamination from past industrial activity*”. Residents of properties situated within this zone are advised that groundwater use is now banned, especially for drinking water, watering gardens, washing windows and cars, bathing or to fill swimming pools. Industrial users are required to test the bore water at least annually and provide the results to the NSW Department of Primary Industry - Water (DPI) and the Office of Environment and Heritage (NSW OEH).

Previous assessments within the site have identified groundwater at depths of approximately 16.8 m AHD within the norther site extent falling to approximately 13.2 m AHD within the southern site extent.

Previous assessments inferred shallow groundwater within the fill material and unconsolidated alluvial sediments flows in a southerly direction. The Eastern Suburbs/Illawarra Train Line Tunnel along Henderson Road to potentially influence groundwater flow direction.

Regional groundwater movement in the deeper confined sandstone/shale bedrock underlying the site is expected to flow in a south westerly direction consistent with the topography to Botany Bay and the Shea’s Creek/Alexandra Canal system.

2.10 Meteorology

A review of the average climatic data for the nearest Bureau of Meteorology monitoring location (Sydney Airport) indicates the site is located within the following meteorological setting:

- Average minimum temperatures vary from 7.2° C in July to 19.1° C in February;
- Average maximum temperatures vary from 17° C in July to 26.5° C in January;
- The average annual rainfall is approximately 1083 mm with rainfall greater than 1 mm occurring on an average of 96 days per year; and
- Monthly rainfall varies from 60.2 mm in September to 122.8 mm in June with the wettest periods occurring on average in February, March and April.

² Botany Groundwater Management Zones map, www.water.nsw.gov.au/water-management/water-quality/groundwater/botany-sand-beds-aquifer/Botany-Sands-Aquifer/default.aspx NSW Department of Natural Resources (DNR 2009)

3. Conceptual Site Model

National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1) (NEPC 2013) identifies a conceptual site model (CSM) as a representation of site related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The development of a CSM is an essential part of all site assessments.

NEPC (2013) identified the essential elements of a CSM as including:

- Known and potential sources of contamination and contaminants of concern including the mechanism(s) of contamination;
- Potentially affected media (soil, sediment, groundwater, surface water, indoor and ambient air);
- Human and ecological receptors;
- Potential and complete exposure pathways; and
- Any potential preferential pathways for vapour migration (if potential for vapours identified).

3.1 Known and Potential Sources of Contamination

Based on the history review and field observations from the site, and from environmental assessments previously undertaken at the site general areas of environmental concern have been categorised and are presented in **Table 3.1**.

Table 3.1 Areas of Environmental Concern and Associated Contaminants of Potential Concern

Area of Environmental Concern (AEC)	Contaminants of Potential Concern (COPC)
Areas of the site that have been filled with material of unknown origin	Heavy metals – in particular copper, lead, nickel and zinc; PAHs – including Benzo(a)pyrene TEQ; TRH/TPH; and Isolated areas of asbestos impact, including fibrous asbestos.
Sub slab vapour contamination of the Locomotive Workshop	VOCs

3.2 Extent of Environmental Impact

Potentially contaminated media comprise:

- Fill materials;
- Underlying natural soils;
- Subsurface vapour underlying the Locomotive Workshop; and
- Groundwater

Fill Materials

The fill materials have been identified across the site and found to be heterogeneous (though broadly consistent across the site) comprising generally of gravelly sandy, silty sands, clayey sands, clay, peat with inclusions of railway ballast, glass, ash, metal, ceramic, brick, sedimentary clast, construction rubble, boiler ash and metallurgical slag gravel inclusions.

Detections of environmental impact have been noted in fill material across the site. Constituents identified in the fill material include:

- Carcinogenic PAH compounds (including benzo(a)pyrene TEQ);
- TRH/TPH;

- Heavy metals (primarily copper, nickel, lead and zinc); and
- Asbestos, as identified in the form of asbestos fines in exceedance of ecological-based assessment criteria and at relatively few locations adopted health- based criteria.

As noted by the Site Auditor (JBS&G 2015), concentrations exceeded the adopted human health criteria in only a small number of samples of fill materials and no significant amounts of volatile contaminants were detected. With the exception of asbestos, no clear distribution of contaminants within fill has been identified.

Natural Soils

Underlying natural soils have generally been found to be free of significant levels of impact, with the exception of several samples with elevated TRH/TPH, PAH and heavy metals within the inferred top 0.2 m of the natural soil profile.

Although the risk of acid sulfate soils (ASS)/ potential acid sulfate soils (PASS) has been considered low, previous investigations have reported uncertainty in the potential for ASS/PASS within natural soils.

Soil Vapour

Sub-slab vapours beneath a portion of the Locomotive Workshop have been identified to contain TCE concentrations exceeding commercial/industrial land used criteria. However, ambient air sampling has reported ambient air TCE and other volatile COPC concentrations within the Locomotive Workshop to be less than adopted assessment criteria. While it has been reported there is no current risk associated with TCE in sub-slab vapour to site users subject to implementation of the EMP, the nature and extent of volatile COPCs underlying the Locomotive Workshop is not clearly defined.

Groundwater

Historically, groundwater has been found with a range of levels of heavy metals above adopted-criteria, TRH/TPH have been identified in proximity to historic petroleum storage and handling areas. Current, TRH/TPH concentrations are several orders of magnitude below those reported in 1993/1994.

3.3 Receptors

Potential ecological receptors of COPCs include:

- Flora species to be established on the site including shrubs, grasses and some proposed plantings of larger trees;
- Fauna species that will access the site, as typically restricted to species that typically occur within urban environments; and
- The marine water ecosystem of Alexandra Canal to the south-west of the site, considering the ultimate discharge of any flows through the lined channel of Alexandra Canal to Botany Bay.

3.4 Exposure Pathways

The ecological exposure pathways considered to be potentially complete include:

- Contaminant uptake by vegetation proposed to be established in areas of the site not occupied by building ground slabs. Root zones of plantings, typically grasses and shrubs are considered not to exceed 0.5m in depth, apart from larger trees which will not extend beyond a depth of 2 m consistent with the guidance for the depth of application of ecological investigation levels in NEPC (2013). Tree root zones will be controlled in practice by the construction of *in-situ* planter boxes, as advised by Mirvac to be formed by

‘shotcreting’ the extent of the planter, as consistent with project Horticulturist advice. Contaminant intake will occur through leachate / seepage water as generated from soils and available to plants;

- Direct contaminant exposure to fauna accessing the site. The vertical extent of fauna exposures is not anticipated to exceed the extent of root zones as associated with vegetation established in the areas of accessible soils on the site. Soil aeration as caused by root penetration is generally required for sub-surface fauna to similarly access soils; and
- Ecological receptors within Alexandra Canal to the south-west of the site, potentially exposed to leachate from fill materials migrating through seepage water / groundwater flows. It is noted that Alexandra Canal is a lined channel that is tidal along its length. The Canal discharges into Botany Bay.

It is anticipated that groundwater extraction will not occur over the area of the site. Therefore, this has not been considered as a complete exposure pathway. No accumulation of surface water, by drainage / rainfall control devices or otherwise, if proposed within the site area.

3.5 Potential Leaching of Environmental Impact

Impacted soils are present across the area of the site. These are generally present within fill materials as hot-spots. The current distribution of these materials in the unsaturated and saturated zones of the site is not found to be causing gross levels of groundwater impact, considering the proximity of the site to potential areas of beneficial re-use of groundwater. This indicates that the current leaching potential of these materials is minor.

The excavation and handling of soils during the development of the site associated with the relocation of fill materials in the unsaturated zone as required by the cut and fill works, may expose areas of environmental impact to future leaching processes. Additionally, fill materials from the site used to raise the surface of recreational/public domain areas may be subject to environmental impact. These scenarios of potential increased future leaching may have the consequence of increasing current levels of environmental constituents in groundwater.

3.6 Preferential Pathways

For the purpose of this assessment, preferential pathways have been identified as natural and/or manmade pathways that result in the preferential migration of COPCs as either liquids or gasses.

Man-made preferential pathways are present at the site are generally associated with slag and ash impacted fill materials. While assessments of infiltration were not undertaken it is considered that these fill materials will have a high permeability. This is anticipated to be maintained in a future site development scenario where the materials are re-worked as fill materials.

It is proposed that the finished levels of the site will be achieved by cut and fill, and wherever possible fill materials cut from the site are intended to be reused. The geological profile of the area of the redeveloped site will be substantially altered by these proposed filling works. As noted earlier, the geology formed by the filling and raising of the site profile, is also likely to be permeable, consistent with current *in-situ* conditions.

It is further noted that previous reports have identified that the rail tunnel in proximity of the site potentially has a localised influence on groundwater flow. This would indicate that backfill material associated with the rail tunnel potentially acts as a preferential pathway. Over the extent of the catchment being assessed, and the distance to the nearest identified potentially sensitive ecological receptor of groundwater, this is no considered significant.

4. Issue Identification

Issue identification is the first step of the risk assessment process.

4.1 Issue Identification

Issue identification determines whether risk assessment is useful, and establishes a context for the risk assessment by a process of identifying the concerns the risk assessment needs to address. Issue identification draws on all relevant lines of information.

Issue identification comprises several phases:

1. Identification of environmental health issues (or an individual issue) and determining whether there are hazards amenable to risk assessment. This will involve demarcating 'hazards' from 'issues' and may require environmental sampling;
2. Putting the hazards into their environmental health context (clarification and prioritising of problems and hazards);
3. Identification of potential interactions between agents; and
4. Stating clearly why risk assessment is needed and the scope and objectives of the risk assessment. This will involve identifying problems for which information is, or can be, available to undertake adequate risk assessments and problems which risk assessment cannot assist.

4.2 Identification of Environmental Hazards

Environmental health hazards may be caused by physical, chemical, biological or social factors in the environment. Physical factors include heat, cold, noise, mechanical hazards etc. Chemical factors include synthetic and naturally occurring substances. Biological factors include viruses, prions, bacteria, parasites and vermin.

The former commercial / industrial sites at Locomotive Street Eveleigh are the subject of this assessment. Environmental impact is currently present in isolated areas of the site, reported to be the result of historical placement of fill materials/historical site activities within the site boundaries.

The fill materials currently present underlying the site are impacted with elevated concentrations of heavy metals (including lead, nickel and zinc), petroleum hydrocarbons, PAHs and isolated areas of asbestos impact. Contaminant impacts on groundwater underlying the site are considered related to those identified for fill materials and have been assessed as only minor in nature.

Based on information provided by Mirvac, surplus materials from areas of the site to be cut or resultant of services/infrastructure upgrades are intended to be used as fill materials in other areas as part of the proposed redevelopment. The elevated concentrations of some substances identified in the fill, relative to levels in underlying natural soils, may present an environmental hazard following completion of the proposed redevelopment of the site.

4.3 Environmental Sampling and Analysis

Environmental sampling and analysis are a key factor in identifying the agents that may be present, their concentrations and distributions. Environmental sampling and analysis require to be targeted to address the identified potential environmental hazards.

Environmental sampling and analysis have been detailed in the previous investigations listed in **Section 1.3**. Within the area of the site, heavy metals, petroleum hydrocarbons, polycyclic aromatic hydrocarbons and asbestos have been identified in soils at levels exceeding NSW EPA published and/or endorsed investigation criteria.

4.4 Putting Hazards into their Environmental Health Context

Putting the hazards into their environmental context entails a consideration of:

- Whether the hazard has single or multiple sources;
- Whether the type of environmental impact affects multiple environmental media;
- How stakeholders perceive the problem including the consideration of different groups; and
- How do the hazards compare to other environmental hazards affecting the community.

The environmental hazards across the redeveloped site are generally restricted to the impacted fill, which may generate impact as it remains *in situ*, or may generate impacts subsequent to relocation on the site. The impacts from these materials from an ecological perspective, relate to leached contamination that may enter waterways, or contamination in soils used as growing media.

The risk assessment requires consideration of the redevelopment of the site as per the proposed development plan. Potential ecological receptors within the open waters of Alexandra Canal, potential flora to be used in the recreational areas of the site, and/or fauna that may access the site may ultimately be exposed to this impact.

As the environmental hazards present on the site are related to commonly occurring commercial / industrial contaminants, specifically lead and polycyclic hydrocarbons, that have a widespread occurrence of industrial sites / areas throughout Australia, it can be assumed that the environmental hazard does not pose a unique hazard to the community. However, the presence of these contaminants in uncontrolled locations, potentially accessed by sensitive populations, may serve to increase the exposure of the community and/or the environment to the environmental hazard.

4.5 Identification of Potential Interactions between Agents

There may be interactions between the physical, chemical, biological and social hazards that require identification and consideration as part of a risk assessment. There are several potential types of interactions between hazardous agents which include: additive effects; synergistic effects; potentiation effects and antagonistic effects.

4.6 Why is Risk Assessment Needed?

The occurrence of environmental hazards in a site sub-surface is unique for every site and location. Further, the particular populations exposed to an environmental hazard are unique for every occurrence of the environmental hazard. Regulatory authorities within NSW do not provide comprehensive guidance for the assessment of the range of contaminants identified within the proposed redeveloped site as an environmental hazard. The limited guidance available is considered unsuitable to be solely applied to the proposed redevelopment of the site.

The requirement, and method, for remediation/management for an environmental hazard needs to be determined. The extent of this potential requirement must be determined by the assessment of the presence of an environmental hazard; the degree of potential harm posed by the environmental hazard (in an isolated environment); and the likely exposure of the environment to the environmental hazard. Only through the assessment of all these factors can the true impact of the environmental hazard be assessed. The risk assessment process is designed to include all of these factors to determine a site specific requirement and associated acceptance criteria for a range of environmental constituents, which may be present in soils and/or seepage water and/or groundwater which will occur on the site.

4.7 Limitations and Uncertainties

Potential limitations and uncertainties that may occur in the risk assessment process include:

- Information gaps, e.g. effects of mixtures, low level and variable exposures over time, relative contribution of 'lifestyle' factors;
- Poor exposure information, e.g. complex mixtures of hazards with complex behaviours in the environment; limited knowledge about the actual or potential sub-population;
- Limitations of toxicological or epidemiological research, e.g. small populations and limited exposure information, multifactorial causes of many diseases on health impacts; 'background noise' affecting research into common diseases or symptoms; population heterogeneity;
- Complexity, e.g. large numbers of combinations of hazards, exposures and health states;
- Confidentiality of health and commercial information;
- Charged atmosphere of fear, antagonism and distrust; and
- Value conflicts.

The risk assessment requires a thorough sensitivity analysis subsequent to the provision of the risk outcomes. The sensitivity analysis will be required to take these matters into account, testing the outcome of the risk assessment of reasonable upper and lower bounds of each. Sensitivity analysis of all assumptions has been undertaken throughout the risk assessment. Risk assessment outcomes may require to be modified where sensitive parameters are observed to have large reasonable potential deviations.

5. Selection of Constituents of Potential Concern

Soil and groundwater data have been collected for the site as summarised in **Section 1.3**. A screening assessment is required to select COPCs to distinguish between chemical constituents which pose little or no risk to the environment and those constituents which may pose a risk. The screening assessment has been undertaken by a comparison of measured constituent concentrations with adopted screening criteria. Constituent concentrations across the whole of the site in soil and groundwater have been considered.

Where constituent concentrations in the soil or groundwater underlying the site do not exceed the screening criteria, it may be concluded with a high degree of confidence that those constituents do not pose a significant ecological risk.

5.1 Selection of Screening Criteria

Assessment criteria for sensitive land-uses are provided by regulatory authorities in Australia and internationally. Though these assessment criteria are not strictly applicable to the exposure scenarios and occurrence of site impact within the study area, they can be used to select constituents of potential concern (COPC's) requiring further assessment. The published assessment criteria used include soil and groundwater criteria for protection of ecological receptors as provided to *National Environment Protection (Assessment of Site Contamination) Measure (as amended)*, NEPC, 2013. For assessment of groundwater criteria, further reference has been made to *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, 2000, ANZECC/ARMCANZ (ANZECC/ARMCANZ 2000). Assessment of total recoverable hydrocarbons (TRH) in groundwater has considered the mineral oil Dutch Intervention Level as provided to *Annexes Circular on Target Values and Intervention Values for Soil Remediation*, 2000, Netherlands Ministry for Housing, Spatial Planning and the Environment (MHSPE 2000).

Several constituents are present where no local ecological screening criteria are available. In these cases, a review of international criteria has generally been undertaken and in most cases criteria as provided to US EPA Region 9 Risk-Based Screening Tables, website version, last updated June 2015 and/or *Supplemental Guidance to RAGS: Region 4 Bulletins, Ecological Risk Assessment*. Originally published: *EPA Region IV. 1995. Ecological Risk Assessment Bulletin No. 2: Ecological Screening Values*, Website version last updated 30 November 2001, U.S. Environmental Protection Agency Region 4, Waste Management Division and/or the US EPA Region 5 Ecological Screening Levels database, last updated in August 2003, has been adopted if available.

5.2 Assessment of Soil and Groundwater Data

Maximum levels of soil and groundwater impact have been summarised in **Tables 5.1 to 5.3**, respectively, with comparison to the selected screening criteria also included. The assessment has considered data for soils as occurring as fill based materials on the site and data for soils as occurring as natural soils underlying the fill material on the site, as per **Table 5.1** and **5.2** respectively. The review of soils has considered environmental data from the past 22 years presented in JBS&G (2015). The review of groundwater data has considered environmental data from 2014 onwards as presented in JBS&G (2015).

Table 5.1: Summary of Maximum Levels of Impact in Fill Based Soils and Screening Criteria (mg/kg)

Constituent	Maximum Concentration Reported	Source / Location	Screening Criteria	Source of Criteria
Arsenic	625	Lot 12, HLA 2001*, BH53/0.0-0.5	100	NEPC (2013), urban residential / public open space
Cadmium	21	Under roads, Jet1993*, BHAH5/0.0-0.1	1.6	US EPA Region 4 (2001)
Chromium	250	Under roads, DP2010*, BH611/2.0-2.5	190	NEPC (2013), low clay content, based on Cr(III)
Copper	27 000	Lot 12, DP2008*, BH606/0.9-1.0	190	NEPC (2013), CEC 10, pH 6.5, urban residential / public open space
Lead	12 000	Lot 12, DP2008*, BH605A/0.9-1.0	1 100	NEPC (2013), urban residential / public open space
Mercury	4.6	Lot 12, DP2009*, BHB4/0.0-0.2	0.1	US EPA Region 4 (2001)
Nickel	1 200	Lot 12, ES2014*, BH4/0.35-0.4	170	NEPC (2013), CEC 10, urban residential / public open space
Zinc	4 550	Lot 12, Jet1993*, BH52/1.5-2.0	400	NEPC (2013), CEC 10, pH 6.5, urban residential / public open space
Tin (Inorganic, Sn IV)	42	Lot 12, DP2008*, BH601/0.4-0.5	53	US EPA Region 4 (2001)
TRH C ₆ -C ₁₀	1 506	Under roads-Area 2, Jet1993*, BH47/0.5-1.0	180	NEPC (2013), coarse soils urban residential / public open space
TRH C ₁₀ -C ₁₆	1 000	Lot 9, ES2014b**, BH7/1.5-1.6	120	NEPC (2013), coarse soils urban residential / public open space
TRH C ₁₆ -C ₃₄	13 000	Lot 9, ES2014b**, BH7/1.5-1.6	300	NEPC (2013), coarse soils urban residential / public open space
TRH C ₃₄ -C ₄₀	1 700	Lot 9, ES2014b**, BH7/1.5-1.6	2 800	NEPC (2013), coarse soils urban residential / public open space
Acenaphthene	9.2	Lot 12, DP2008*, BH603/3.9-4.0	20	US EPA Region 4 (2001)
Acenaphthylene	48	Lot 9, ES2014b**, BH7/1.5-1.6	682	US EPA Region 5 (2003)
Anthracene	96	Lot 9, ES2014b**, BH7/1.5-1.6	0.1	US EPA Region 4 (2001). It is noted that US EPA Region 5 (2003) advised 1480 mg/kg
Benz(a)pyrene (TEQ)	220	Lot 9, ES2014b**, BH7/1.5-1.6	0.7	NEPC (2013), coarse soils urban residential / public open space, provided for benzo(a)pyrene only
Fluoranthene	430	Lot 9, ES2014b**, BH7/1.5-1.6	0.1	US EPA Region 4 (2001). It is noted that US EPA Region 5 (2003) advised 122 mg/kg
Fluorene	65	Lot 9, ES2014b**, BH7/1.5-1.6	30	US EPA Region 4 (2001)
Naphthalene	20.2	Under roads, Jet1993*, BH69/0.5-1.0	170	NEPC (2013), urban residential / public open space
Phenanthrene	510	Lot 9, ES2014b**, BH7/1.5-1.6	0.1	US EPA Region 4 (2001). It is noted that US EPA Region 5 (2003) advises 45.7 mg/kg

Constituent	Maximum Concentration Reported	Source / Location	Screening Criteria	Source of Criteria
Pyrene	420	Lot 9, ES2014b**, BH7/1.5-1.6	0.1	US EPA Region 4 (2001). It is noted that US EPA Region 5 (2003) advises 78.5 mg/kg
PAHs (Total)	2 400	Lot 9, ES2014b**, BH7/1.5-1.6	1	US EPA Region 4 (2001)
Benzene	0.2	Lot 12, ES 2014*, multiple samples	50	NEPC (2013), coarse soils urban residential / public open space
Aldrin	0.9	Lot 12, DP2008*, BH604/0.1-0.2	0.0025	US EPA Region 4 (2001)
Dieldrin	1.4	Lot 12, DP2008*, BH604/0.1-0.2	0.0005	US EPA Region 4 (2001)
DDD	0.1285	Lot 12, JET1993*, BH56/0.0-0.1	180	As based on DDT criteria
DDT	0.2	Lot 12, HLA2001*, multiple samples	180	NEPC (2013), urban residential / public open space
DDT+DDE+DDD	0.2261	Lot 12, JET1993*, BH56/0.0-0.1	180	As based on DDT criteria
Asbestos	Present	Multiple locations	-	No ecological criteria

Table 5.2: Summary of Maximum Levels of Impact in Natural Soils and Screening Criteria (mg/kg)

Constituent	Maximum Concentration Reported	Source / Location	Screening Criteria	Source of Criteria
Arsenic	30	Lot 9, ES2014*, BH8/2.0-2.1	100	NEPC (2013), urban residential / public open space
Cadmium	2	Recreational-Area 5, CMPS&F1994*, BH18B/2.0	1.6	US EPA Region 4 (2001)
Chromium	110	Under Roads-Area 4, DP2010*, BH611/3.5-4.0	190	NEPC (2013), low clay content, based on Cr(III)
Copper	6 600	Under Roads-Area 2, CMPS&F1994*, TP99/1.8-1.9	190	NEPC (2013), CEC 10, pH 6.5, urban residential / public open space
Lead	6 500	Under Roads-Area 2, CMPS&F1994*, TP99/1.8-1.9	1 100	NEPC (2013), urban residential / public open space
Mercury	0.6	Under Roads-Area 1, ES2010, BHGN/3.3-3.4	0.1	US EPA Region 4 (2001)
Nickel	56	Under Roads-Area 4, DP2010*, BH611/3.5-4.0	170	NEPC (2013), CEC 10, urban residential / public open space
Zinc	2 950	Under Roads-Area 2, CMPS&F1994*, TP99/1.8-1.9	400	NEPC (2013), CEC 10, pH 6.5, urban residential / public open space
TRH C ₆ -C ₁₀	20	Under Roads-Area 2, CMPS&F1994*, TP99/1.8-1.9	180	NEPC (2013), coarse soils urban residential / public open space
TRH C _{>10} -C ₁₆	3 289	Under Roads-Area 1, JET 1993*, BH48/4.5-5.0	120	NEPC (2013), coarse soils urban residential / public open space

Constituent	Maximum Concentration Reported	Source / Location	Screening Criteria	Source of Criteria
TRH C _{>16} -C ₃₄	16 000	Under Roads-Area 2, CMPS&F1994*, TP99/1.8-1.9	300	NEPC (2013), coarse soils urban residential / public open space
TRH C _{>34} -C ₄₀	140	Lot 9, ES2014*, BH10/3.0-3.1	2 800	NEPC (2013), coarse soils urban residential / public open space
Acenaphthene	2.9	Under Roads-Area 2, CMPS&F1994*, TP99/1.8-1.9	20	US EPA Region 4 (2001)
Acenaphthylene	12.6	Lot 9, HLA2001**, BH80/3.0-3.5	682	US EPA Region 5 (2003)
Anthracene	9.2	Lot 9, HLA2001**, BH80/3.0-3.5	0.1	US EPA Region 4 (2001). It is noted that US EPA Region 5 (2003) advised 1480 mg/kg
Benz(a)pyrene (TEQ)	12.5	Lot 9, HLA2001**, BH80/3.0-3.5	0.7	NEPC (2013), coarse soils urban residential / public open space, provided for benzo(a)pyrene only
Fluoranthene	26.3	Lot 9, HLA2001**, BH80/3.0-3.5	0.1	US EPA Region 4 (2001). It is noted that US EPA Region 5 (2003) advised 122 mg/kg
Fluorene	6	Lot 9, HLA2001**, BH80/3.0-3.5	30	US EPA Region 4 (2001)
Napthalene	10.2	Lot 9, HLA2001**, BH80/3.0-3.5	170	NEPC (2013), urban residential / public open space
Phenanthrene	33.6	Lot 9, HLA2001**, BH80/3.0-3.5	0.1	US EPA Region 4 (2001). It is noted that US EPA Region 5 (2003) advises 45.7 mg/kg
Pyrene	23.1	Lot 9, HLA2001**, BH80/3.0-3.5	0.1	US EPA Region 4 (2001). It is noted that US EPA Region 5 (2003) advises 78.5 mg/kg
PAHs (total)	170.7	Lot 9, HLA2001**, BH80/3.0-3.5	1	US EPA Region 4 (2001)
Benzene	0.2	Lot12, ES2014*, multiple samples	50	NEPC (2013), coarse soils urban residential / public open space
Ethylbenzene	1	Under Roads-Area 2, CMPS&F1994*, TP99/1.8-1.9	70	NEPC (2013), coarse soils urban residential / public open space
Xylenes	2	Under Roads-Area 2, CMPS&F1994*, TP99/1.8-1.9	105	NEPC (2013), coarse soils urban residential / public open space
DDD	1.262	Under Roads-Area 1, JET 1993*, BH48/4.5-5.0	180	As based on DDT criteria
DDT	0.9468	Under Roads-Area 1, JET 1993*, BH48/4.5-5.0	180	NEPC (2013), urban residential / public open space

Table 5.3: Summary of Maximum Levels of Impact in Groundwater and Screening Criteria (mg/L)

Constituent	Maximum Concentration Reported	Source/Location	Screening Criteria	Source of Criteria
Arsenic	0.02	Lot 9, ES2015b, MW508	0.0068	ANZECC/ARMCANZ (2000) sum of low reliability criteria provided for marine water for As(III) and As(V).
Cadmium	0.001	Area 1, ES2015b, MWAH1	0.0055	ANZECC/ARMCANZ (2000)
Chromium (total)	0.001	Multiple locations	0.01	ANZECC/ARMCANZ (2000)
Copper	0.01	Lot 12, ES2014d, MW301 & ES2014*, MW625	0.0013	ANZECC/ARMCANZ (2000)
Lead	0.001	Lot 9, ES2014d, MW507	0.0044	ANZECC/ARMCANZ (2000)
Mercury	0.00005	Lot 8, ES2014d, MW402	0.0004	ANZECC/ARMCANZ (2000)
Nickel	0.012	Area 1, ES2015b, MWAH1	0.07	ANZECC/ARMCANZ (2000)
Zinc	0.69	Lot 9, ES2014d, MW508	0.015	ANZECC/ARMCANZ (2000)
TRH >C ₁₀ -C ₁₆	0.15	Lot 12, ES2015b, MW625	0.6	MHSPE (2000), as based on criteria provided for mineral oil.
Acenaphthene	0.002	Lot 12, ES2014*, MW619		

5.3 Selection of Constituents of Potential Concern

Several constituents in the fill based, and natural, soils have exceeded the adopted ecological screening criteria. These constituents include arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, semi- and non-volatile petroleum hydrocarbon, anthracene, Benzo(a)pyrene TEQ, fluoranthene, fluorene, phenanthrene, pyrene, aldrin and dieldrin.

The maximum levels of arsenic, copper and zinc in groundwater have exceeded the ecological screening criteria. The levels of these constituents as reported in groundwater are generally consistent in monitoring wells across the site, and further consistent with levels would be anticipated in a typical urban catchment.

The potential for future pavement removal, increased infiltration and/or soil handling and relocation affecting groundwater conditions, for example by increased contaminant leaching, will need to be considered in any redevelopment proposal.

On this basis, COCPs for further ecological risk assessment have been selected principally from the fill based soils and include: heavy metals, TRH, PAHs and pesticides including aldrin and dieldrin. Each of the COCPs that could have potentially have been selected from review of groundwater data have been selected regardless from the review of the soil data. In undertaking ecological risk assessment for potential groundwater based impacts of these constituents, consideration will need to be given to current levels of these constituents in groundwater and potential future levels as may be caused by leaching of site soils, as discussed in **Section 1.3**.

6. Phytotoxicity Assessment

Substantial vegetation plantings are proposed with the open space / recreational areas within the proposed recreational / open space areas to be incorporated with the development. This includes a number of garden areas with a range of shrubs, and importantly a number of mature / large tree plantings. Soils which are defined as root zone soils, which are accessible to the root network of the proposed plantings, are required to be suitable from a phytotoxicity perspective to be used as root zone soils. Typical depths of exposures as relative to the vegetation type are summarised:

- To a typical depth of 0.3 m and a maximum of 0.5 m in lawn areas (i.e. grass plantings / small shrubs etc.); and
- To a typical depth of 1.5 m in the proximity of large tree plantings. NEPC (2013) indicates a maximum depth of 2 m, however the actual extent of accessible soils will be controlled on site by the construction of planter boxes in recreational areas.

Tree roots will not extend vertically beyond the defined growing zones, as controlled by engineered controls and fill materials underlying the root zone soils. The phytotoxicity assessment for soils applies to soils proposed to be used as 'root zone soils' within the open space / recreational areas of the development.

CSIRO (2009) provide a methodology for the assessment of ecological impacts to soils. It is reported in CSIRO (2009) that the methodology presented in the document is the basis of the revised ecological criteria provided in NEPC (2013). This is described in the following sections.

6.1 Level of Protection

The proposed recreational areas of the proposed development are classified as 'Urban residential and public open space' as per the definitions provided to CSIRO (2009). These are described as "...not pristine, rather extensively modified, but retaining important functions and species. These land-uses are expected to maintain plant growth of both introduced and native species". Microorganisms and soil invertebrates are nominated as requiring protection for these land-uses.

It is recommended in CSIRO (2009) that 80% of species and soil microbial processes are protected for this land-use, increasing to 85% for constituents that have a potential for biomagnification.

6.2 Exposure Pathways

The following exposure pathways are required to be addressed for the site soils, as per CSIRO (2009):

- Soil – organism (via ingestion, organisms include herbivores and soil dwellers);
- Soil – soil organism (passive absorption);
- Soil – soil organisms – soil predators including the potential for biomagnification for contaminants having biomagnification potential;
- Soil – plants;
- Soil – groundwater – surface water – aquatic organisms;
- Soil – groundwater – sediment – meiofauna;
- Soil – air – terrestrial species;
- Soil – plant – herbivores – carnivores for contaminants having biomagnification potential;
- Soil – soil organisms and/or soil predators – terrestrial predators for contaminants having biomagnification potential;

- Soil – groundwater – surface water – aquatic organisms – aquatic predators for contaminants having biomagnification potential.

Other potential exposure pathways are also identified in CSIRO (2009) that have not been considered appropriate for consideration for the site including: soil – surface water – aquatic organisms; and soil – groundwater – stygofauna.

The soil – surface water direct pathway has not been considered as the nearest surface water body is located a substantial distance from the site. No potentially complete exposure pathway has been identified. Potential impacts to surface water by groundwater migration have been identified and assessed. The groundwater – stygofauna exposure pathway has not been assessed. There is very limited data as to the occurrence and tolerance of environmental contaminants of stygofauna within the Botany Sands aquifer. However there is substantial data as to the environmental degraded nature of the Botany Sands aquifer in the proximity of Waterloo / Alexandria / Zetland region. This degradation is anticipated to impact potentially sensitive stygofauna populations that may have been present and would cause any specific assessment on the Mirvac site to be insignificant. Notwithstanding, groundwater quality has been assessed by comparison to a range of published criteria.

6.3 Constituent Data

A range of constituent data is identified in CSIRO (2009) as requiring to be assessed for the COPCs. This includes constituent half-life in the environment, Henry's Law constant, octanol-water partition coefficients and organic carbon-water coefficients.

This data are summarised in **Table 6.1** for each of the COPCs including constituents that co-occurred with constituents found to exceed ecological criteria.

CSIRO (2009) further nominates ecological considerations that are required in the assessment of each of the COPCs. These have been summarised in **Table 6.2**.

Table 6.1: Summary of Data for COPCs and Constituents Co-Occurring with COPCs

Constituent	Half-Life (days)	K _H	K _{OW} (L/kg)	K _{OC} (L/kg)	K _d (L/kg)	Reference / Comments
Arsenic	-	-	-	-	10 ^{1.462}	No half-life for elements
Cadmium	-	-	-	-	10 ^{-1.875}	No half-life for elements
Chromium	-	-	-	-	10 ^{6.255}	No half-life for elements
Copper	-	-	-	-	10 ^{1.544}	No half-life for elements
Lead	-	-	-	-	10 ^{2.954}	No half-life for elements
Mercury	-	0.467	10 ^{0.62}		10 ^{1.716}	No half-life for elements. RAIS database for other values
Nickel	-	-	-	-	10 ^{1.813}	No half-life for elements
Zinc	-	-	-	-	10 ^{1.792}	No half-life for elements
TRH C ₆ -C ₁₀ (ali)	-	73.6	10 ^{3.9}	132	-	No half-life data available. Other values from RAIS database.
TRH C ₆ -C ₁₀ (aro)	-	0.227	10 ^{2.13}	146	-	
TRH C ₁₀ -C ₁₆ (ali)	-	139	10 ^{5.65}	796	-	
TRH C ₁₀ -C ₁₆ (aro)	-	1.96*10 ⁻²	10 ^{3.58}	2010	-	

Constituent	Half-Life (days)	K _H	K _{OW} (L/kg)	K _{OC} (L/kg)	K _d (L/kg)	Reference / Comments
TRH C _{>16} -C ₃₄ (ali)	-	334	10 ^{6.1}	4820	-	
TRH C _{>16} -C ₃₄ (aro)	-	3.62*10 ⁻⁴	10 ^{5.16}	55 500	-	
Anthracene	570	2.27*10 ⁻³	10 ^{4.45}	16 400	-	
Benz(a)pyrene	570	1.87*10 ⁻⁵	10 ^{6.13}	587 000	-	
Fluoranthene	570	3.62*10 ⁻⁴	10 ^{5.16}	55 500	-	
Fluorene	570	3.93*10 ⁻³	10 ^{4.18}	9160	-	
Phenanthrene	570	1.73*10 ⁻³	10 ^{4.46}	16 700	-	
Pyrene	570	4.87*10 ⁻⁴	10 ^{4.88}	54 300	-	
Aldrin	1800	1.8*10 ⁻³	10 ^{6.5}	82 000	-	Half-life as per Montgomery 2007 and ATSDR public health statement.
Dieldrin	1800	4.09*10 ⁻⁴	10 ^{5.4}	20 100	-	

Note: K_H – Henry’s Law Constant; K_{OW} – octanol-water partition coefficient; K_{OC} – organic carbon partition coefficient; K_d – soil-water partition coefficient.

Table 6.2: Summary of Ecological Exposure Routes Requiring Consideration

Constituent	Primary Exposure Route	Secondary Exposure Route	Comments
Arsenic	Biomagnification	Direct toxicity	Known to biomagnify as per CSIRO (2009)
Cadmium	Biomagnification	Direct toxicity	Known to biomagnify as per CSIRO (2009)
Chromium	Biomagnification	Direct toxicity	Known to biomagnify as per CSIRO (2009)
Copper	Direct toxicity	-	Known to not biomagnify as per CSIRO (2009)
Lead	Biomagnification	Direct toxicity	Known to biomagnify as per CSIRO (2009)
Mercury	Biomagnification	Direct toxicity	Known to biomagnify as per CSIRO (2009)
Nickel	Biomagnification	Direct toxicity	Known to biomagnify as per CSIRO (2009)
Zinc	Direct toxicity	-	Known to not biomagnify as per CSIRO (2009)
TRH	Direct toxicity	Metabolites	
PAHs	Direct toxicity	Direct toxicity / Biomagnification	
Aldrin and Dieldrin	Biomagnification	Direct toxicity	

6.4 Protection of Plants and Soils

A substantial extent of the fill based soils present on the site are not considered suitable to be used as growing media due to the significant exceedances of the adopted screening criteria. Insufficient data is available on the proposed site use to attempt to derive criteria as specific to the proposed flora and fauna populations to access the site. On this basis, it is recommended that soils to be used as growing media on the site are validated to the appropriate ecological criteria provided to NEPC (2013). As per the discussion in **Section 5.3**, it is further recommended that detection limits are adopted for the assessment of Aldrin and Dieldrin in soils.

Exceedances of the ecological based screening criteria have also been identified for the underlying natural soils. However this was restricted to some heavy metals, semi- and non-volatile petroleum hydrocarbons and polycyclic aromatic hydrocarbons and was reported only in soils in close proximity of fill horizons. Impacted natural soils on the site in close proximity of fill horizons are potentially not appropriate to be used as growing media. However, deeper soils would be considered appropriate where levels of heavy metals, TRH and PAHs met NEPC (2013) ecological criteria.

6.5 Protection of Air for Terrestrial Species

Potential air impacts to terrestrial species would potentially occur from dusts generated from surface soils and vapours from impacted soils and/or groundwater. Surface soils, where present in uncovered areas of the site, will be restricted to areas of site growing zones. These soils will have met phytotoxicity based criteria. It is considered that the phytotoxicity based criteria will be protective of potential levels of airborne / fugitive dusts that are generated from these soils.

Areas of potential ecological exposure are restricted to outdoor areas. Any potential vapours that are generated from soils that occur in air overlying the site would be anticipated to be substantially dispersed by atmospheric dispersion processes. Notwithstanding, remediation is proposed in the risk assessment for hydrocarbon impacted soils that would be anticipated to generate the highest levels of vapours.

6.6 Surface Water and Groundwater Exposure Pathways

Potential surface water and groundwater exposure pathways have also been identified for the soils on the proposed Mirvac development Site in **Section 6.2**.

The soil – groundwater – surface water pathways are relevant to the potential leaching of fill materials soils as placed on the site in the future, as may be caused by the disaggregation and re-instatement of the soils.

Assessment is required of the leaching potential of the soils and the potential dilution of leachate prior to exposure to surface water receptors identified by the exposure route, to determine the potential ecological risk for these exposure pathways under the scenario that the exposure scenario of fill materials is changed as part of the development. The assessment of potential impacts to ecological receptors exposed to leachates from the site is summarised in **Section 7**.

It is considered that the NEPC (2013) ecological protection soil criteria as adopted for the root zone soils / growing media will not generate levels of leachate / seepage that will be potentially toxic to plants. Soils in accessible areas of the site will have required to have met these criteria. No further assessment is required of the leaching potential of these soils from a phytotoxicity perspective.

7. Protection of Surface Water Ecological Assessment

Groundwater is currently present under the site at a relatively shallow depth. Current groundwater data has reported levels of arsenic, copper and zinc that will potentially pose an ecological risk. Based on the review of soil data, elevated levels of arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, TRH, PAHs, aldrin and dieldrin are reported that will potentially exceed ecological criteria.

Leachate from impacted soils proposed to be relocated from current unsaturated horizons to likely saturated horizons to facilitate the proposed waste minimisation strategy to be adopted with the site development, will potentially impact groundwater. Leachate may be caused by disaggregation of the soils and/or the potential increased exposure of soils to leaching solutions (i.e. groundwater).

With both scenarios of current and potential future groundwater quality, there is a potential that where impacted groundwater migrates from the site that it may potentially adversely affect surface water quality at the nearest potential receptors of groundwater. This has been identified as Alexandra Canal hydrogeologically downgradient of the site.

An approach has been derived to assess potential impacts to groundwater consistent with the process presented in CSIRO (2009) and has comprised:

- An estimate of leaching potential of each constituent identified as a potential COPC in soils;
- An estimate of potential processes that may retard the migration of constituents through groundwater to surface water;
- An estimate of the potential dilution that may occur to groundwater constituents present underlying the site within the hydrogeologically downgradient extent of the Mirvac Project site within the catchment; and
- An estimate of potential dilutions that may occur within Alexandra Canal by potential mixing / tidal processes.

7.1 Leaching Potential of Soils

An estimate of the current leaching potential of the site soils can be obtained by the observation of the current groundwater data. Groundwater data available for the site indicates that potential constituents of concern, by comparison to ecological based groundwater screening criteria, are restricted to some heavy metals only.

However, it is proposed with the site development that soils, including fill based soils where several constituents have been identified as potential COPCs based on comparison to ecological based soils criteria, will be potentially relocated on the site. To this extent the soils will be disaggregated which will potentially cause an increase in the leaching potential, and it is further likely that the soils will be re-instated below the water table which will increase the potential contact of the soils to leaching fluids (i.e. groundwater). This strategy of the relocation of fill based soils within the site will allow waste minimisation / ESD objectives of the remedial works to be achieved.

The assessment of the leaching potential of soils has considered all constituents present in the fill based soils at levels that potentially pose an ecological risk. Preliminary leaching rates have been estimated from laboratory generated data for the fill based soils that represents a worse case of the potential processes that will be imposed upon site soils. Otherwise, consistent with the guidance in CSIRO (2009), theoretical leaching rates have been estimated. This is described for inorganic constituents (**Section 7.1.1**) and organic constituents (**Section 7.1.2**).

7.1.1 Inorganic Constituents

There is no data set available for an estimate of the leachability of heavy metals. Guidelines from CSIRO (2009) have been used to determine the potential movement of contaminants to ground and/or surface water. CSIRO (2009) determines the soil-water partition coefficient (K_d) has the key physicochemical property of inorganic contaminants and their leachability. K_d is a ratio of the concentration of a contaminant bound on soil to that dissolved in soil pore water at equilibrium and therefore is related to the aqueous solubility of the contaminant.

K_d values for inorganic site contaminants were provided in **Table 6.1**. The mobility of potential contaminants is defined by CSIRO (2009) as:

- $\log K_d < 3$ – high potential to leach.
- $\log K_d \geq 3$ – Low potential to leach.

For inorganics with a $\log K_d < 3$, leaching of contaminant should be addressed if there is a water source in the immediate vicinity. On the basis of the inorganic constituents identified in **Table 6.1**, this includes:

- Arsenic
- Cadmium
- Copper
- Lead
- Mercury
- Nickel
- Zinc

Leachate data is not available for these constituents, CSIRO (2009) instructs that the leachability of inorganic constituents can be estimated by:

$$EIL = C_w \cdot [(K_d + (\theta_w + \theta_a \cdot H') / \rho_b)]$$

where:

EIL – level of constituent in soil (mg/kg);

C_w – level of constituent in leachate (mg/l);

K_d – soil-water partition coefficient (L/kg);

θ_a – air filled porosity;

θ_w – water filled porosity;

H' – Henry's Law Constant (unitless);

ρ_b – soil bulk density (kg/l); and

Leachabilities have been estimated for the inorganic constituents as summarised in **Table 7.1**. In characterising the levels of impact present in the potentially leachable soils constituents data for fill materials has only been considered. The consideration of the site fill materials only is considered a conservative basis to estimate overall leachabilities from the site. Further it is noted that the Mirvac soil reuse strategy, to achieve the ESD and waste minimisation objective of the site, will principally the handling and relocation of fill based materials. While some elevated levels of impact have been recorded in some naturally occurring soils, these levels were typically consistent with those identified in the fill.

In undertaking this assessment, values of soil properties provided for sands in *CRCCARE Technical Report No. 10 Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater Part 1*:

Technical Development Document, 2011, Friebe and Nadebaum (CRCCARE 2011). This includes an air filled porosity of 0.257, a water filled porosity of 0.13, density of 1.625 g/cm³, and a level of organic carbon of 0.3%.

Table 7.1: Estimated Leachability of Potentially Mobile Organic Constituents

Constituent	Estimated Leachability (mg/L per mg/kg)	Average Concentration in Fill (mg/kg)	Estimated Leachate from Saturated Relocated Fill Materials (mg/L)	Marine Water Ecological Protection Criteria (mg/L)
Arsenic	0.0344	9.1	0.31	0.0068
Cadmium	0.0133	0.4	0.053	0.0007
Copper	0.0285	575.7	16.4	0.0013
Lead	0.0011	290.7	0.32	0.0044
Mercury	0.0192	0.17	0.0033	0.0001
Nickel	0.0154	16.6	0.26	0.007
Zinc	0.0161	226.8	3.7	0.015

On the basis of the comparison of the estimated leachabilities to the ecological protection criteria, arsenic, cadmium, copper, lead, mercury, nickel and zinc have been identified at potential levels that will exceed the ecological protection criteria (on the basis of estimated leachability data). On the basis of existing groundwater quality, arsenic, copper and zinc were identified at maximum levels on site that potentially exceed ecological protection criteria. Chromium has been found to be non-leachable from the site soils, and leachates have not been estimated.

Ecological protection criteria are not intended to be applied on the basis of laboratory estimated leachabilities. Instead, they require to be applied at the point of potential nearest ecological exposure, which by assessment of the site and surrounding area, would be Alexandra Canal substantially hydrogeologically downgradient of the site.

By comparison to the potential maximum level in groundwater on the site and the ecological protection criteria, the following dilutions / reductions are required between the laboratory estimated potential leachabilities of site constituents and the nearest ecological receptor:

- Arsenic – 46;
- Cadmium – 76;
- Copper – 12 615;
- Lead – 73;
- Mercury – 33;
- Nickel – 37; and
- Zinc – 247.

The potential reduction / dilution of constituents between the site and the nearest ecological receptor, and within the extent of the site only, has been assessed in **Sections 7.2 to 7.4**.

7.1.2 Organic Constituents

No leachability data is available for organic constituents on the site. On this basis, leachabilities of organic constituents has been required to be estimated through the use of guidelines in CSIRO (2009).

K_{OW} and K_{OC} values for site contaminants were provided in **Table 6.1**. The mobility of potential contaminants is defined by CSIRO (2009) as:

- $\text{Log } K_{OW} < 2$ / $\text{Log } K_{OC} < 2.4$ – mobile;
- $\text{Log } K_{OW} 2\text{--}2.7$ / $\text{Log } K_{OC} 2.4\text{--}3.05$ – medium mobility;
- $\text{Log } K_{OW} 2.7\text{--}3.7$ / $\text{Log } K_{OC} 3.05\text{--}3.95$ – low mobility; and
- $\text{Log } K_{OW} > 3.7$ / $\text{Log } K_{OC} > 3.95$ – immobile.

It is recommended in CSIRO (2009) that organic constituents with a large half-life (>45 days, summarised in **Table 6.1**) and a $\text{Log } K_{OC} < 4$ ($K_{OC} < 10,000$) or $\text{Log } K_{OW} < 4$ will be required to be assessed for contaminant leaching as protective of potential surface water receptors. On the basis of the organic constituents identified in **Table 6.1**, this includes:

- TRH C₆–C₁₀ (aliphatic and aromatic fractions) and TRH C₁₀–C₁₆ (aromatic fraction only);

Leachate data is not available for these constituents. CSIRO (2009) instructs that the leachability of an organic constituents can be estimated by:

$$\text{EIL} = C_w \cdot [(K_{OC} \cdot f_{OC}) + (\theta_w + \theta_a \cdot H') / \rho_b]$$

where: EIL – level of constituent in soil (mg/kg);

C_w – level of constituent in leachate (mg/l);

K_{OC} – organic carbon to water partition coefficient (L/kg);

f_{OC} – fraction of organic carbon (g/g)

θ_a – air filled porosity;

θ_w – water filled porosity;

H' – Henry's Law Constant (unitless);

ρ_b – soil bulk density (kg/l); and

Leachabilities have been estimated for each of the nominated constituents apart from TRH C₆–C₁₀ (aromatic constituents). Aromatic constituents of TRH C₆–C₁₀ have been assessed as per speciated constituents. The estimated leachabilities are summarised in **Table 7.2**.

In undertaking this assessment, values of soil properties provided for sands in *CRCCARE Technical Report No. 10 Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater Part 1: Technical Development Document*, 2011, Friebel and Nadebaum (CRCCARE 2011). This includes an air filled porosity of 0.257, a water filled porosity of 0.13, density of 1.625 g/cm³, and a level of organic carbon of 0.3%.

The average concentration of each constituent in the fill has also been estimated, as per the data in **Appendix A** and statistical analysis in **Appendix B**. Results are summarised in **Table 7.2**, with adopted ecological protection criteria and estimates of potential maximum level of constituents in future site leachate.

Table 7.2: Estimated Leachability of Potentially Mobile Organic Constituents

Constituent	Estimated Leachability (mg/L per mg/kg)	Average Concentration in Fill (mg/kg)	Estimated Leachate from Saturated Relocated Fill Materials (mg/L)	Marine Water Ecological Protection Criteria (mg/L)
TRH C ₆ -C ₁₀ (ali)	0.0825	5.512	0.45	0.6 ¹
TRH C ₁₀ -C ₁₆ (aro)	0.164	68.64	11.26	0.6 ¹

Note: 1. MHSPE (2000) mineral oil criteria

On the basis of the comparison of the estimated leachabilities to the ecological protection criteria, TRH C₆-C₁₀ is estimated to be below the ecological protection criteria. TRH C₁₀-C₁₆ has been identified at potential levels of theoretical leachability that will exceed the ecological protection criteria. This is consistent with the highly conservative theoretical estimates of potential leachability.

Ecological protection criteria are not intended to be applied on the site. Instead, they require to be applied at the point of potential nearest ecological exposure. By comparison to the potential maximum level in groundwater on the site and the ecological protection criteria, the following dilutions / reductions are required between the site and the nearest ecological receptor:

- TRH C₁₀-C₁₆ – 18.8;

The potential reduction / dilution of constituents within the extent of the site has been assessed in **Sections 7.2 to 7.4**.

7.2 Retardation of Constituents with Groundwater Flow

Attenuation processes will influence the concentration and distribution of solutes (including contaminants) in an aquifer. One of the processes which may attenuate contaminant concentrations is adsorption.

If a solute is reactive (i.e. capable of adsorption or desorption along a flow path), it will travel at a slower rate than the groundwater flow rate owing to adsorption. *Contaminant Hydrogeology*, 2001, Fetter (Fetter 2001) provides an equation in which the rate of solute movement in an aquifer can be estimated provided estimates of the dry bulk mass density of the transmitting medium, volumetric moisture content of the aquifer, and distribution coefficient for the solute in the aquifer can be ascertained or estimated. This equation is reproduced below.

$$v_c = v_x / [1 + (\rho_b / \theta) \times (K_d)]$$

where: v_c is the velocity of the solute front

v_x is the average linear velocity

ρ_b is the dry bulk density of the transmitting medium

θ is the volumetric moisture content of the transmitting medium

K_d is the distribution coefficient for the solute in the transmitting medium

The above equation also dictates that the velocity of the solute front is a function of the average linear velocity of groundwater flow. The average velocity of groundwater flow is directly proportional to the hydraulic conductivity, porosity, and hydraulic gradient in an aquifer as shown by the expression below.

$$v_x = (K \cdot i / \Phi_e)$$

where : v_x is the average linear (metres per day)

K is the hydraulic conductivity (metres per day)

i is the hydraulic gradient (dimensionless)

Φ_e is the effective porosity of the aquifer material

Combining the equations an expression for the velocity of the solute front is derived as follows.

$$v_c = (K \cdot i / \Phi_e) / [1 + (\rho_b / \theta) \times (K_d)]$$

The assessment undertaken here has not considered the hydraulic conductivity of the aquifer, hydraulic gradient or porosity. The assessment has considered, however, the potential for a reduction of the flow of the contaminants by sorption, by the estimation of the denominator in the relationship above. Fetter (2001) advises that this is effectively a measure of the dilution that occurs of a constituent within an aquifer by a function of the increased movement of water relative to dissolved levels of the constituent. This effectively causes a dilution in the level of the constituent within a quantity of groundwater that may discharge to an ecological receptor.

In undertaking this assessment, values of K_d for organic constituents have been estimated from the organic carbon coefficient (K_{oc}) to **Table 6.1** and the soil properties provided for sands in CRCCARE (2011). This includes a total porosity of 0.387, density of 1.625 g/cm³, and a level of organic carbon of 0.3%. The level of organic carbon of 0.3% is the lowest level that is commonly adopted for soils in a range of guidance documents. For example, the characterisation of Botany Sands in *Australian Oil Industry Environmental Guidelines for Petroleum Sites*, 1999, Australian Oil Industry Environmental Guidelines Working Group adopted a level of organic carbon of 0.3% for Botany Sands, and further reports the data for Botany Sands to be based on measured values specific to Botany Sands.

The total porosity has been adjusted by 95% to develop an estimate of effective porosity consistent with the guidance provided in *Bioscreen Natural Attenuation Decision Support System Users Manual*, August 1996, US EPA.

Values of k_d for inorganics have been obtained from values provided in the RAIS database. Estimations of the 'retardation' of each of the constituents is summarised in **Table 7.3** following.

Table 7.3: Estimated Retardation for Each Constituent

Constituent	Estimated Retardation Relative to Normal Groundwater Flow	Comments
Arsenic	129	RAIS K_d = 29. Effective porosity assumed 95% of total porosity. Other parameter as per CRCCARE (2011).
Cadmium	332	RAIS K_d = 75. Effective porosity assumed 95% of total porosity. Other parameter as per CRCCARE (2011).
Copper	156	RAIS K_d = 35. Effective porosity assumed 95% of total porosity. Other parameter as per CRCCARE (2011).
Lead	3980	RAIS K_d = 900. Effective porosity assumed 95% of total porosity. Other parameter as per CRCCARE (2011).
Mercury	231	RAIS K_d = 52. Effective porosity assumed 95% of total porosity. Other parameter as per CRCCARE (2011).
Nickel	288	RAIS K_d = 65. Effective porosity assumed 95% of total porosity. Other parameter as per CRCCARE (2011).
Zinc	275	RAIS K_d = 62. Effective porosity assumed 95% of total porosity. Other parameter as per CRCCARE (2011).
TRH C ₆₋₁₀ (ali)	2.7	Effective porosity assumed 95% of total porosity. Other parameter as per CRCCARE (2011).
TRH C ₁₀₋₁₆ (aro)	27.7	Effective porosity assumed 95% of total porosity. Other parameter as per CRCCARE (2011).

The anticipated retardation of each of the constituents, apart from copper, is found to be well above the required reduction in the levels of contaminants between the site and nearest potentially sensitive ecological receptor.

7.2.1 Reduced Migration Velocity of COPCs

Another way that the process of retardation may be assessed is by the consideration of reduced migration velocity of the constituents. As per *2010 Conceptual Site Model – Botany*, 31 January 2011, Golder Associates (Golder 2011) groundwater velocity in the Botany Sands Aquifer is anticipated to generally be 100 m/year. Velocities of inorganic constituents can be estimated on this basis and the retardation-factors as estimated for each. For example, the most potentially mobile of the inorganic constituents are arsenic and copper. These constituents would have estimated solute velocities in the aquifer of less than 1 m/year.

Observing the distance between the site and the nearest potentially sensitive receptor of groundwater, this indicates that there would be multiple generations of time before any constituent caused an increase in groundwater in proximity of the ecological receptor.

7.3 Dilution Attenuation Factor (DAF)

CSIRO (2009) notes that groundwater catchments most likely contain both contaminated and uncontaminated soils. Seepages from the uncontaminated soil horizons are found to dilute those from contaminated areas. Consequent of this, the pore water concentrations of constituents on the Site will not necessarily be equal to concentrations as may discharge into the nearest potentially sensitive ecological receptor of Alexandra Canal. A dilution attenuation factor (DAF) is recommended to be used to take this into account. The following equation is provided by CSIRO (2009):

$$\text{DAF} = 100 / \text{percent of contaminated soil in catchment.}$$

It is noted that in calculating a DAF the size of the whole catchment located at least within the area between the Site and the potentially sensitive ecological receptor should be taken into account. In areas which are likely to be free of significant environmental impact, such as residential areas of the upgradient extent of the catchment should also be considered.

The DAF calculated for the Site is provided in **Table 7.4** below. In relation to the Site the Alexandra Canal Catchment and sub catchments can be seen in **Figure 3**. Two estimates of the catchment area used in the DAF have been calculated as shown in **Figure 4**. This first is based on the catchment topographically down gradient of the site. This has been defined as:

- To the north by the topography of the surrounding area using approximate top of the ridge line between Newtown and the Redfern Railway station;
- To the east by the topography of the surrounding area using the approximate top of the ridge line between Kensington and Zetland;
- To the south by the extent of the Alexandra Canal; and
- To the west by the topography of the surrounding area using the top of the ridgeline along the Princes Highway through Newtown.

The second is based on a rectangular area the width of the site and the distance from the site to the closest point of the Alexandra Canal, identified as the 'calculable area'. The calculable area is considered the most conservative estimate and has been adopted in these calculations.

The total area of the Site has been assessed.

Table 7.4: CSIRO (2009) Method - Summary of DAF Calculations

Parameter	ATP Groundwater – catchment area	ATP Groundwater – calculable area
Total Area of Catchment (m ²) ¹	3 550 000 ¹	900 000 ²
Site Area (m ²)	116 000 ³	116 000 ³
Ratio of 'Contaminated Soil' Area to Total Catchment Area	0.0327	0.129
DAF	31	7.8

Notes 1 Catchment area is an estimate from topographic contours provided on the Department of Lands Six Viewer Website. Figure included as **Figure 4**.

2. Calculable area is the area the width of the site, extending from the site to the closest point of the Alexandra canal.

3. Contaminated soil assumed to the total area of the Site

A factor of 7.8 is calculated in **Table 7.4**. This is less than the DAF of 20 as recommended in several USEPA documents for assessing dilution and attenuation for leaching of impacted soils to groundwater, and discharge to surface water bodies. This demonstrates that the approach adopted is conservative.

7.4 Dilution of Constituents within Surface Water Body

Further dilution of constituents will occur within the receiving waters of Alexandra Canal. The canal is noted to be a lined channel hydrogeologically downgradient of the site. On this basis, ecological receptors are not able to readily access pore water. Instead pore water / groundwater needs to discharge through weep holes / cracks / fractures provided to the channel walls to occur in the surface water of the canal. Substantial dilutions would occur here as associated with the volume of the water in the canal as relative to the discharge from the groundwater from the site. And further by the tidal mixing that occurs within the channel. These potential dilutions would be estimated at orders of magnitude, and are substantially above the necessary reductions / dilutions to cause groundwater discharges from the site to occur with the canal at levels below the adopted ecological criteria.

7.5 Estimation of Reduction of Constituents within Groundwater within Extent of the Site

An estimation of reduction of constituent levels in the site can be made on the basis of:

- The constituent specific reductions in flow relative to groundwater by retardation as summarised in **Table 7.3** and specific to each constituent; and
- And the area based dilution by comparison of contaminated site area with area of the catchment, as estimated as a factor of 7.8 in **Section 7.3**.

On the basis of the estimated average concentrations of constituents in fill materials in **Table 7.1** and **7.2**, effective levels of groundwater constituents discharging from the site boundary are below the adopted ecological protection criteria for all constituents assessed apart from copper. The leaching relationship for this constituent was based on theoretical data, which has been found on several previous projects to significantly overstate potential leachabilities, and overstate by at least the less than order of magnitude that is predicted for these constituents.

Notwithstanding, the leachabilities for each of the constituents have been derived on the basis of potentially limited data sets. On this basis, risk based criteria have been derived for the protection of ecological receptors on the site. Potential leachabilities of fill materials to be re-stated below saturated horizons on the site will require to be assessed by comparison to the risk based criteria.

The estimates provided in this section are substantially based on theoretical estimates of the potential leaching from constituents in soils. These theoretical estimates are potentially orders of magnitude conservative and are causing overly conservative estimates of potential future

groundwater impact. It is recommended that a program of soil sampling is undertaken as targeted to fill materials and known areas of impacted natural materials, for the purposes of generating site specific estimates of constituent leachability should the exposure scenario of these materials change (e.g. relocated on the site and re-instated below the water table which will increase the potential contact of the soils to leaching fluids such as groundwater). Calculations undertaken here to estimate potential future groundwater impacts should be revised on the basis of these site measured values. This should particularly target potential leachability of copper, zinc and semi-volatile TRH.

8. Sensitivity Analysis

An assessment has been required to be undertaken of the sensitivity of the risk assessment outcomes. Risk assessment calculations can be observed to have been based on:

- Levels of COPCs as estimated by soil and groundwater sampling programs completed on the site and theoretical leachability data;
- Ecotoxicological parameters used to characterise COPCs;
- Physical properties used to characterise COPCs;
- Anticipated and assessed current and future land-uses;
- Ecological exposure parameters used to characterise future ecological exposures on the site and surrounding environment; and
- Equations and related relationships used to estimate levels of COPCs from reported levels in soils and groundwater to points of exposure.

Each of these is discussed further following.

8.1 Sampling Programs

Soil data used for the risk assessment have been obtained from sampling programs previously completed in the last 22 years. Soil data have been used in the assessment for the potential of ecological impacts to surface water. Where site data is not available, theoretical relationships have been used to estimate potential leachability of soils. Comparison of theoretical estimates to field data for constituents where field data is available indicates that theoretical estimates are highly conservative (i.e. the field data was typically non detect where the theoretical relationships estimated significant potential leachabilities).

Soil data is considered to be conservative as sample locations have generally been targeted to areas of likely impact. Further other assessments as made in addition to this assessment have made recommendations for the remediation of soil impact, which will cause the actual levels of soil impact to be reduced further below those adopted in this assessment. The reduction in levels of soil impact that would occur with these works has not been assessed in the ecological risk assessment.

It is further noted that the key recommendations of the ecological risk assessment are the adoption of either criteria derived from published ecological protection levels, or direct comparison to regulator published criteria. On this basis, the application of the findings of the risk assessment is not overtly sensitive to the data adopted in the characterisation of the site.

8.2 Toxicological Parameters

Ecotoxicological data where used in the risk assessment have been based on:

- Terrestrial soil criteria as provided by the EPA;
- Protection of marine water criteria as substantially based on ANZECC/ARMCANZ (2000) as supplemented by international sources where required.

These criteria have generally been derived from conservative sources. The terrestrial soil criteria are generally based on the lower of the published criteria provided to NEPC (2013). An assessment of conservatism of these criteria can be observed by the comparison of the background levels of COPCs in urban soils in the Sydney metropolitan region. For example, background levels of heavy metals in Sydney soils are reported in *Trace Element Concentrations in Soils from Rural and Urban Areas of Australia*, 1995, Olszowy H, Torr P, Imray P. An average background level of 230 mg/kg of zinc is reported, while the screening criteria adopted for zinc is relatively similar at 400 mg/kg.

Marine water criteria are found to be conservative, generally being based on ANZECC/ARMCANZ (2000) 95% protection levels. 99% protection levels have been adopted for constituents which potentially bioaccumulate. In addition, potential additive effects have been considered for the majority of the organic constituents, adding a further conservative factor to the calculations.

On this basis, it is considered that the ecotoxicological criteria adopted for the risk assessment are suitably conservative to allow confidence in the risk assessment findings.

8.3 Land-Use

The risk assessment outcomes are only valid for the assumed future land-use of the site. Potentially sensitive land-uses such as the use of open space / recreational areas for agricultural purposes associated with the production of edible produce have not been considered. The risk assessment would be required to be revised where the site ecological profile was to differ substantially from that described in the ERA.

8.4 Conclusion

There are several factors which may have caused the ecological risk estimates and associated criteria derived / adopted in this risk assessment to be underestimated. However, it is more than likely that any underestimation caused by the risk assessment process and limitations of available data and modelling techniques has been overcome by the use of conservative assumptions throughout the assessment.

It is concluded that the risk estimates provided are overestimates of actual ecological risk levels and can be used for future decision making for the site.

9. Conclusions and Recommendations

The ecological risk assessment has considered a range of potential ecological exposures to site impact present in soils, groundwater and potentially occurring in the future as leachates from site soils. On-site and off-site ecological exposures have been assessed. A sensitivity analysis has been undertaken of the risk assessment process adopted and the conclusions and recommendations have been found to be suitably conservative to be applied to the site.

Consistent with the limitations provided as **Section 10**, it has been found that the re-use of fill materials on the site is not likely to pose a potential ecological risk consistent with the following recommendations:

- (Imported) growing media are used in accessible areas of the site where potential plantings are proposed to occur;
- A minimum depth of 0.5 m of growing media should be adopted in areas of grasses / shrubs;
- A minimum depth of 1.5 m, not exceeding 2 m, is appropriate for areas of the site where larger trees are proposed to be planted;
- Growing media should have levels of constituents consistent with ecological protection criteria for 'urban residential and public open space' as provided to NEPC (2013), and levels of Aldrin, Dieldrin and polychlorinated biphenyls (PCBs) below laboratory detection limits;
- Fill materials on site are not suitable to be used as growing media, unless demonstrated environmentally suitable;
- A significant extent of the natural soils on the site, generally at depths in proximity to the extent of the fill based soils, are further not suitable to be used as growing media, unless demonstrated otherwise. Where natural soils are proposed to be used on site as growing media they will require to be validated for heavy metals, TRH and PAHs;
- Natural soils on site (underlying fill materials) may be suitable to be used as growing media subject to validation of hydrocarbons meeting NEPC (2013) criteria; and
- As documented in JBS&G (2015) and SAS's prepared for various land parcels within the ATP precinct, groundwater has been assessed across the site and no groundwater remediation is considered to be required. However, preliminary calculations undertaken to assess potential worst case levels of leachate generated from the reuse of site fill materials under a scenario of increased contact of the soils to leaching fluids (i.e. groundwater), and the potential impact to site groundwater and hydrogeologically downgradient potential receptors of groundwater, have indicated that it likely that these materials will not pose an unacceptable ecological risk. However, the calculations are considered likely to be grossly conservative consequent of theoretical estimates of potential leachabilities of the soil constituents.

It is recommended that a program of soil sampling is undertaken as targeted to fill materials and known areas of impacted natural materials that may be subject to on-site reuse under a scenario of increase leaching potential, for the purposes of generating site specific estimates of constituent leachability. Calculations undertaken here to estimate potential future groundwater impacts should be revised on the basis of these site measured values. This should particularly target potential leachability of copper, zinc and semi-volatile TRH.

10. Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS&G, and should not be relied upon by other parties, who should make their own enquires.

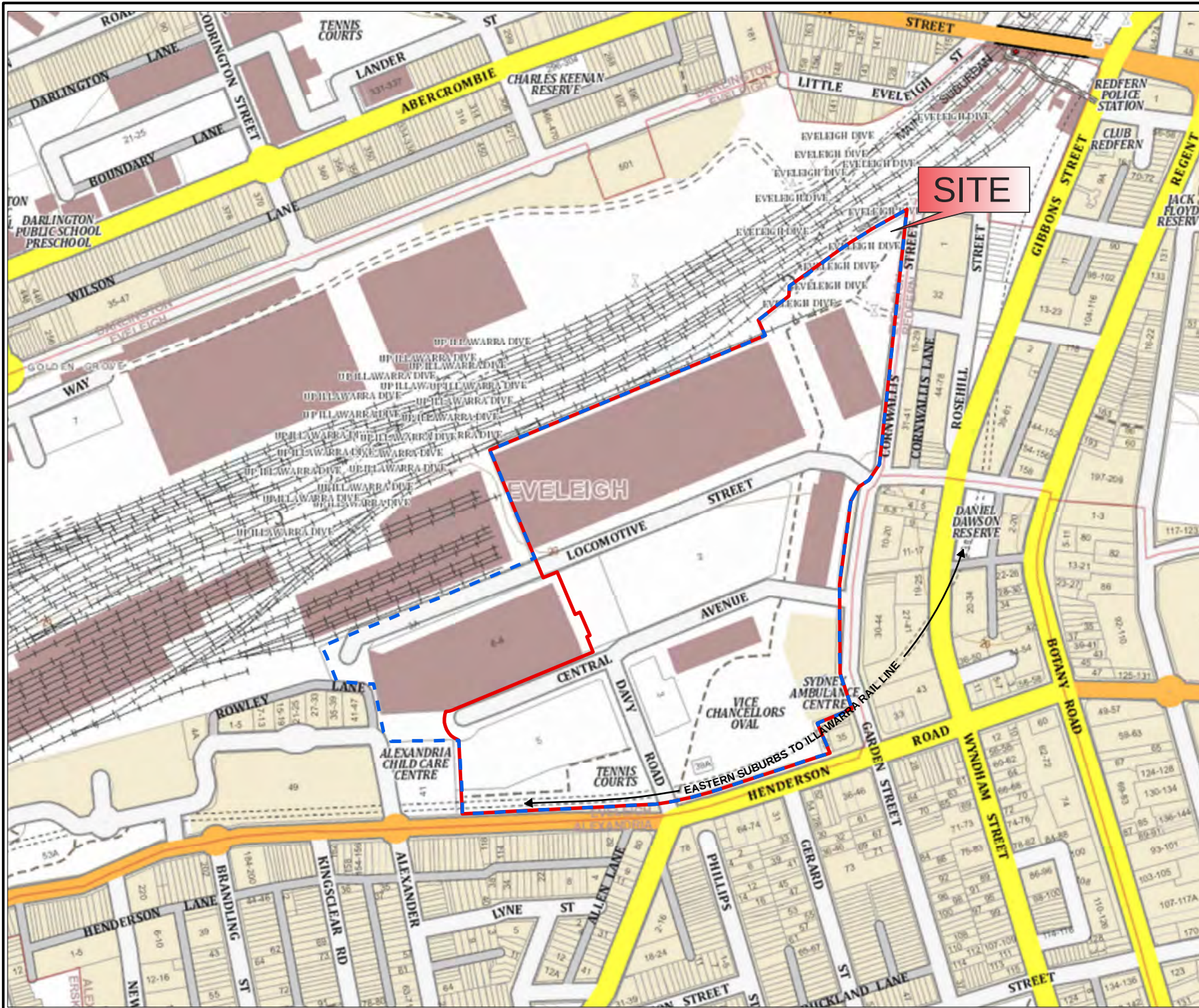
Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the report in the context of the additional information.

Figures



Legend:

- Approximate Boundary - ATP Site
- Approximate Boundary - "The Site"



Client: Mirvac

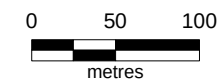
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Date: 23-Nov-2015

Drawn By: RF

Checked By: EH

Scale 1:4,500



Coor. Sys. GDA 1994 MGA Zone 56

**Australia Technology Park
Eveleigh, NSW**

SITE LOCATION

FIGURE 1:



Legend:

- Approximate Boundary - The Site
- Approximate Boundary - ATP Site
- Cadastral Boundaries
- Existing Building Footprint Excluded from "The Site"
- UST (Inferred Historical Location)



Client: Mirvac

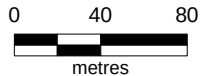
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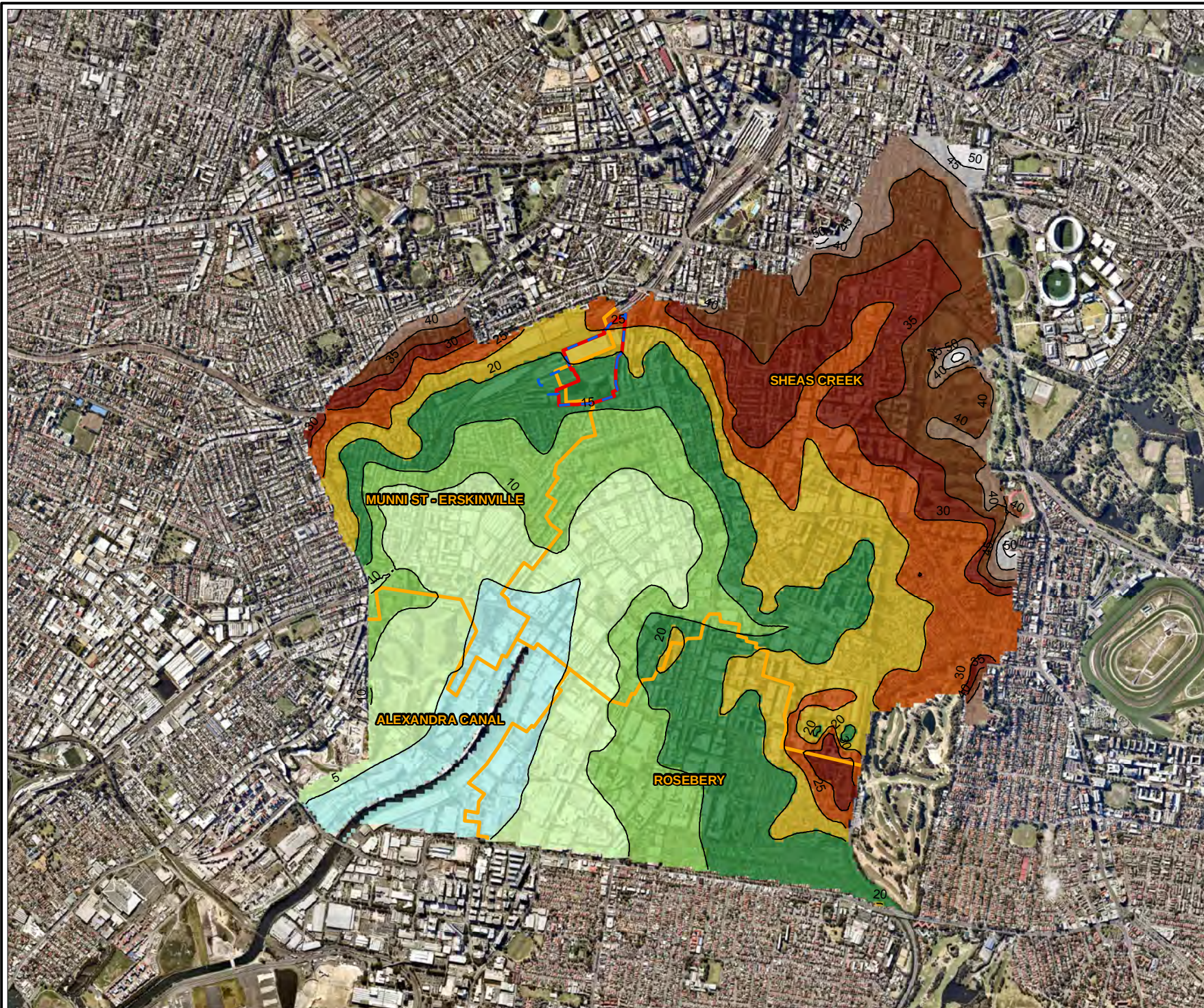


Coor. Sys. GDA 1994 MGA Zone 56

**Australia Technology Park
Eveleigh, NSW**

SITE LAYOUT

FIGURE 2:

**Legend:**

-  Approximate Boundary - ATP Site
 -  Approximate Boundary - The Site
 -  Alexandra Canal - Subcatchments
- Elevation (mAHD)**

-  2 - 5
-  5.01 - 10
-  10.01 - 15
-  15.01 - 20
-  20.01 - 25
-  25.01 - 30
-  30.01 - 35
-  35.01 - 40
-  40.01 - 45
-  45.01 - 50
-  50.01 - 55



Job No: 51142

Client: Mirvac

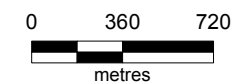
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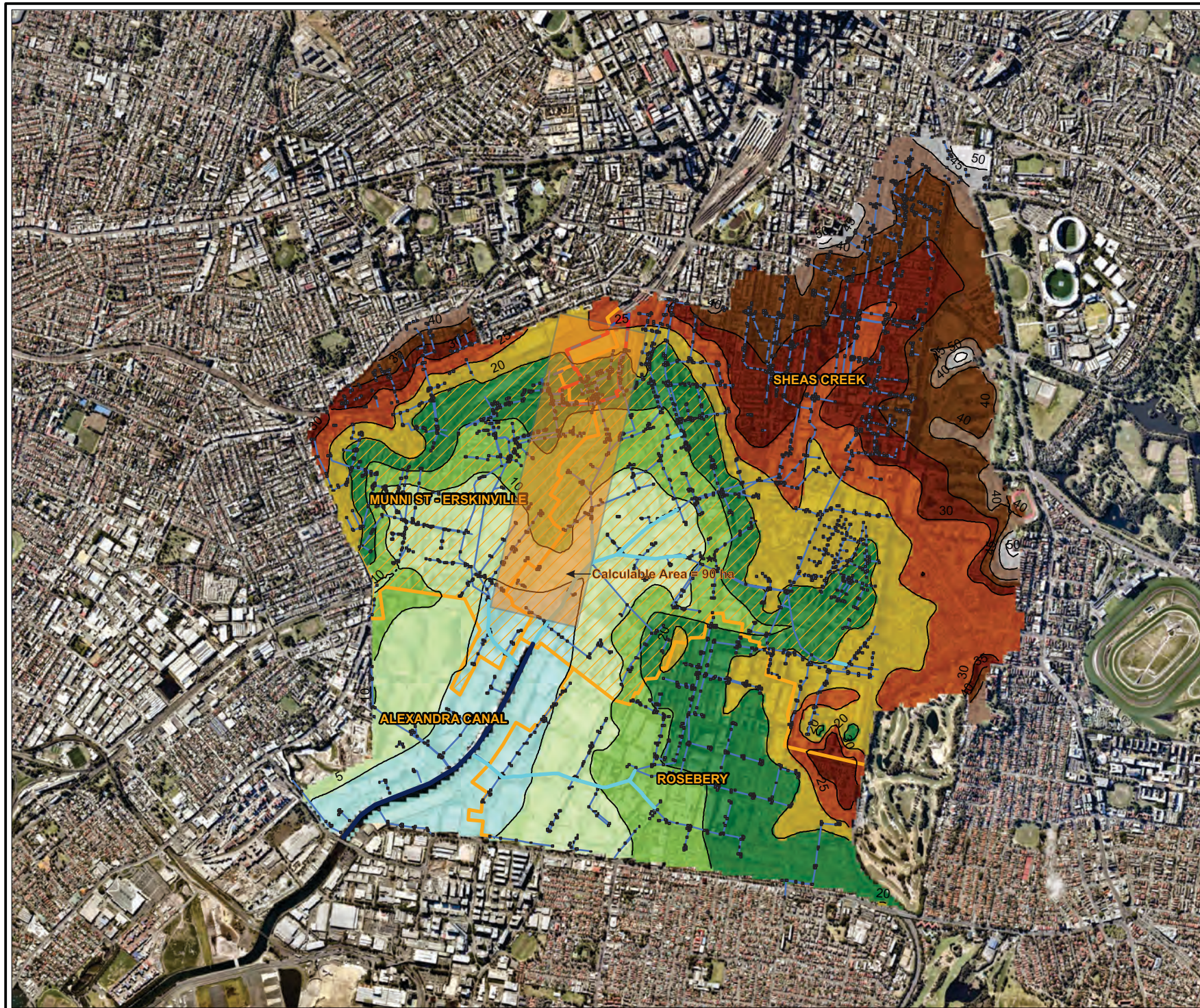


Coor. Sys. GDA 1994 MGA Zone 56

**Lachlan St,
Waterloo, NSW**

ALEXANDRA CANAL CATCHMENT

FIGURE 3:



- Legend:**
- Approximate Boundary - ATP Site
 - Approximate Boundary - The Site
 - Alexandra Canal - Subcatchments
 - Contributing Catchment
 - Elevation (mAHd)**
 - 2 - 5
 - 5.01 - 10
 - 10.01 - 15
 - 15.01 - 20
 - 20.01 - 25
 - 25.01 - 30
 - 30.01 - 35
 - 35.01 - 40
 - 40.01 - 45
 - 45.01 - 50
 - 50.01 - 55
 - Alexandra Canal
 - Open Channel
 - Surveyed Pipes
 - Surveyed Pits



Job No: 51142

Client: Mirvac

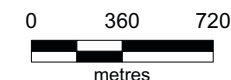
Version: R03 Rev A

Date: 19-Nov-2015

Drawn By: RF

Checked By: EH

Scale 1:30,000



Coor. Sys. GDA 1994 MGA Zone 56

**Lachlan St,
Waterloo, NSW**

CONTRIBUTING CATCHMENT

Sheas Creek Contributing Area = 210 ha
Munni St - Erskinville Contributing Area = 14 ha
Calculable Area - Site Based = 90 ha

FIGURE 4:

Appendix A Summary of Environmental Data

Field_ID	Depth	Date	Location	Matrix	Reference																																
BH12/0.1-0.2	0.1-0.2	22/03/2014	Lot 8	FILL	ES 2014a	Present	4	<0.4	10	9	22	<0.1	4	30		-	<50	<100	<100	<0.2	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1	<0.1	<0.1	<0.1	<0.3		
BH12/1.0-1.1	1-1.1	22/03/2014	Lot 8	FILL	ES 2014a	0	<4	<0.4	3	8	23	<0.1	2	21		-	<50	<100	<100	<0.2	<0.1	<0.1	<0.1	3	<0.1	0	<0.1	0	0	2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.3	
BH12/2.0-2.1	2-2.1	22/03/2014	Lot 8	FILL	ES 2014a	0	<4	<0.4	4	<1	2	<0.1	<1	2		-	<50	<100	<100	<0.2	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1	<0.1	<0.1	<0.1	<0.3		
BH13/0.2-0.3	0.2-0.3	22/03/2014	Lot 8	FILL	ES 2014a	0	<4	<0.4	7	4	11	<0.1	4	29		-	<50	<100	<100	<0.2	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1	<0.1	<0.1	<0.1	<0.3		
BH13/1.0-1.1	1-1.1	22/03/2014	Lot 8	FILL	ES 2014a	0	<4	<0.4	10	36	29	<0.1	4	51		-	<50	<100	<100	<0.2	<0.1	<0.1	0.40	1	3	0	2	0	2	3	17	<0.1	<0.1	<0.1	<0.1	<0.1	<0.3
BH13/2.0-2.1	2-2.1	22/03/2014	Lot 8	FILL	ES 2014a	0	<4	<0.4	12	40	39	<0.1	1	72		-	<50	<100	<100	<0.2	<0.1	<0.1	<0.1	0	<0.1	0	<0.1	0	0	0	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.3
BH13/3.0-3.1	3-3.1	22/03/2014	Lot 8	FILL	ES 2014a	0	10	<0.4	17	26	45	<0.1	1	15		-	<50	<100	<100	<0.2	<0.1	<0.1	0	0	<0.1	0	0	0	0	2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.3	
BH18/0.0-0.1	0-0.1	19/04/1993	Lot 8	FILL	Jet 1993*	-	<5	<0.5	9	11	20	-	-	38		<20	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	
BH18/0.5-1.0	0.5-1	19/04/1993	Lot 8	FILL	Jet 1993*	-	18	2	9	5210	2139	-	-	1353		<20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH18/1.0-1.5	1-1.5	19/04/1993	Lot 8	FILL	Jet 1993*	-	22	2	9	3660	2270	-	-	1343		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH18/1.5-2.0	1.5-2	19/04/1993	Lot 8	FILL	Jet 1993*	-	<5	<0.5	7	280	138	-	-	124		<20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH324/1.0-1.1	1-1.1	1/06/2005	Lot 8	FILL	DP 2005a	-	<3	<0.5	9	37	68	0	6	100		<20	-	-	-	<0.5	<0.1	0.20	0	2	<0.1	1	<0.1	1	2	10	-	-	-	-	-	-	
BH325/0.0-0.1	0-0.1	1/06/2005	Lot 8	FILL	DP 2005a	-	<3	<0.5	7	24	31	0	7	49		<20	-	-	-	<0.5	<0.1	<0.1	<0.1	0	<0.1	1	<0.1	0	0	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
BH326/0.2-0.3	0.2-0.3	1/06/2005	Lot 8	FILL	DP 2005a	0	<3	<0.5	16	40	20	<0.05	13	48		<20	-	-	-	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	
BH327/0.8-1.0	0.8-1	1/06/2005	Lot 8	FILL	DP 2005a	-	<3	<0.5	8	220	67	0	5	57		<20	-	-	-	-	<0.1	0.20	0	2	0	1	0	1	2	12	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
BH328/0.0-0.1	0-0.1	1/06/2005	Lot 8	FILL	DP 2005a	-	<3	1	19	61	9	<0.05	190	75		<20	-	-	-	<0.5	<0.1	<0.1	<0.1	0	<0.1	1	<0.1	<0.1	0	0	-	-	-	-	-	-	
BH401/0.3-0.5	0.3-0.5	23/11/2007	Lot 8	FILL	DP 2008a	-	<4	<1	7	9	20	<0.1	6	38		<25	-	-	-	<0.5	<0.1	<0.1	<0.1	0	<0.1	1	<0.1	0	0	-	<0.1	<0.1	-	<0.1	-	-	
BH401/0.5-0.6	0.5-0.6	23/11/2007	Lot 8	FILL	DP 2008a	-	5	<1	8	80	95	0	8	110		<25	-	-	-	<0.5	<0.1	<0.1	0	2	<0.1	1	<0.1	1	2	-	<0.1	<0.1	-	<0.1	-	-	
BH401/0.6-0.9	0.6-0.9	23/11/2007	Lot 8	FILL	DP 2008a	0	<4	<1	1	5	6	<0.1	<1	8		<25	-	-	-	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	-	-	
BH402/0.2-0.3	0.2-0.3	23/11/2007	Lot 8	FILL	DP 2008a	-	<4	<1	7	23	42	<0.1	10	43		<25	-	-	-	<0.5	<0.1	<0.1	<0.1	0	<0.1	1	<0.1	<0.1	0	-	<0.1	<0.1	-	<0.1	-	-	
BH402/0.5-0.6	0.5-0.6	23/11/2007	Lot 8	FILL	DP 2008a	-	<4	<1	5	71	110	<0.1	6	76		<25	-	-	-	<0.5	<0.1	<0.1	<0.1	0	<0.1	1	<0.1	0	0	-	<0.1	<0.1	-	<0.1	-	-	
BH402/0.8-1.0	0.8-1	23/11/2007	Lot 8	FILL	DP 2008a	0	<4	<1	6	3	4	<0.1	1	6		<25	-	-	-	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	-	-	
BH402/1.6-1.7	1.6-1.7	23/11/2007	Lot 8	FILL	DP 2008a	-	<4	<1	5	1	3	<0.1	<1	2		<25	-	-	-	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	-	-	
BH403/0.1-0.3	0.1-0.3	23/11/2007	Lot 8	FILL	DP 2008a	0	<4	<1	6	8	13	<0.1	4	25		<25	-	-	-	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	-	-	
BH403/0.3-0.5	0.3-0.5	23/11/2007	Lot 8	FILL	DP 2008a	-	<4	<1	8	6	19	<0.1	7	32		<25	-	-	-	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	-	-	
BH404/0.3-0.5	0.3-0.5	23/11/2007	Lot 8	FILL	DP 2008a	-	<4	<1	9	5	16	<0.1	4	31		<25	-	-	-	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	-	-	
BH404/0.5-1.0	0.5-1	23/11/2007	Lot 8	FILL	DP 2008a	0	<4	<1	8	59	130	<0.1	5	100		<25	-	-	-	<0.5	<0.1	0.90	1	6	0	1	0	4	7	-	<0.1	<0.1	-	<0.1	-	-	
BH404/1.3-1.5	1.3-1.5	23/11/2007	Lot 8	FILL	DP 2008a	-	<4	<1	8	3	2	<0.1	2	3		<25	-	-	-	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	-	-	
BH406/0.3-0.5	0.3-0.5	23/11/2007	Lot 8	FILL	DP 2008a	0	<4	<1	6	3	10	<0.1	6	34		<25	-	-	-	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	-	-	
BH406/0.5-1.0	0.5-1	23/11/2007	Lot 8	FILL	DP 2008a	-	<4	<1	6	9	52	<0.1	4	36		<25	-	-	-	<0.5	<0.1	<0.1	<0.1	0	<0.1	1	<0.1	0	0	-	<0.1	<0.1	-	<0.1	-	-	
BH406/1.0-1.1	1-1.1	23/11/2007	Lot 8	FILL	DP 2008a	-	<4	<1	4	<1	3	<0.1	1	1		<25	-	-	-	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	-	-	
BH65/0.0-0.2	0-0.2	3/01/2001	Lot 8	FILL	HLA 2001*	-	2	<1	4	6	15	0	2	21		<2	-	-	-	<0.2	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	
BH67/0.0-0.5	0-0.5	3/01/2001	Lot 8	FILL	HLA 2001*	-	3	<1	9	7	18	<0.1	4	33		-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	
BH68/0.6-0.7	0.6-0.7	3/01/2001	Lot 8	FILL	HLA 2001*	-	2	<1	13	19	65	<0.1	3	65		-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	
BH93/0.0-0.5	0-0.5	3/01/2001	Lot 8	FILL	HLA 2001*	-	3	<1	8	23	35	<0.1	3	44		<2	-	-	-	<0.2	-	-	-	-	-	0	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
BH97/0.0-0.2	0-0.2	3/01/2001	Lot 8	FILL	HLA 2001*	-	2	<1	5	50	27	<0.1	8	51		-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	
BH405/0.3-0.5	0.3-0.5	23/11/2007	Lot 8	FILL	DP 2008a	-	<4	<1	7	12	35	<0.1	5	34		<25	-	-	-	<0.5	<0.1	<0.1	<0.1	0	<0.1	1	<0.1	0	0	-	<0.1	<0.1	-	<0.1	-	-	
BH405/0.7-1.0	0.7-1	23/11/2007	Lot 8	FILL	DP 2008a	0	<4	<1	7	21	22	<0.1	5	46		<25	-	-	-	<0.5	<0.1	<0.1	<0.1	1	<0.1	1	<0.1	0	1	-	<0.1	<0.1	-	<0.1	-	-	
BH405/1.3-1.5	1.3-1.5	23/11/2007	Lot 8	FILL	DP 2008a	-	<4	<1	<1	4	11	0	<1	8		<25	-	-	-	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	-	-	
BH405/1.8-2.0	1.8-2	23/11/2007	Lot 8	FILL	DP 2008a	-	<4	<1	3	<1	3	<0.1	<1	12		<25	-	-	-	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	-	-	
BH1/0.0-0.1	0-0.1	19/04/1993	Lot 9	FILL	Jet 1993**	-	<5	<0.5	11	131	15	-	-	67		<20	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0032	-	-	-	-	-	-	
BH1/0.5-1.0	0.5-1	19/04/1993	Lot 9	FILL	Jet 1993**	-	<5	<0.5	11	20	31	-	-	38		0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH10/1.0-1.1																																					

Summary of Total Concentrations in Fill Soil Considered



Asbestos ID in Soil	Arsenic (Total)	Cadmium	Chromium (Total)	Copper	Lead	Mercury (Inorganic)	Nickel	Zinc	Tin (Inorganic, Sn IV)	C6-C10 Fraction	>C10-C16 Fraction	>C16-C34 Fraction	>C34-C40 Fraction	Benzene	Acenaphthene	Acenaphthylene	Anthracene	Fluoranthene	Fluorene	Carcinogenic PAHs as B(a)P TPE	Naphthalene	Phenanthrene	Pyrene	PAHs (Total)	Aldrin	Dieldrin	DDD	DDT	DDT+DDE+DDD (Sum of Total)
g/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg

Field_ID	Depth	Date	Location	Matrix	Reference																														
BH15/1.5-1.6	1.5-1.6	22/03/2001	Lot 9	FILL	ES 2014**	-	10	1	14	190	310	0	25	3	-	<50	330	<100	<0.2	0.10	<0.1	0	3	0	2	0	2	3	16	<0.1	<0.1	<0.1	<0.1	<0.3	
BH15/3.0-3.1	3-3.1	22/03/2001	Lot 9	FILL	ES 2014**	-	<4	<0.4	4	29	50	0	3	390	-	<50	<100	<100	<0.2	<0.1	0.10	0	1	<0.1	<0.5	<0.1	1	1	5	<0.1	<0.1	<0.1	<0.1	<0.3	
BH16/1.0-1.1	1-1.1	22/03/2001	Lot 9	FILL	ES 2014**	0	<4	<0.4	8	23	75	0	3	44	-	<50	<100	<100	<0.2	<0.1	<0.1	0	1	<0.1	1	<0.1	1	1	6	<0.1	<0.1	<0.1	<0.1	<0.3	
BH16/2.0-2.1	2-2.1	22/03/2001	Lot 9	FILL	ES 2014**	-	<4	<0.4	3	9	36	0	<1	51	-	<50	<100	<100	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1	<0.1	<0.1	<0.3	
BH23/0.0-0.1	0-0.1	19/04/1993	Lot 9	FILL	Jet 1993**	-	<5	<0.5	10	12	15	-	-	43	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH23/0.5-1.0	0.5-1	19/04/1993	Lot 9	FILL	Jet 1993**	-	<5	<0.5	8	33	85	-	-	137	0	-	-	-	-	-	-	0.30	1	2	0	2	0	1	-	12	-	-	-	-	-
BH23/1.5-2.0	1.5-2	19/04/1993	Lot 9	FILL	Jet 1993**	-	<5	<0.5	<2	5	14	-	-	19	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH24/0.0-0.1	0-0.1	19/04/1993	Lot 9	FILL	Jet 1993**	-	<5	<0.5	8	10	19	-	-	58	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH24/1.5-2.0	1.5-2	19/04/1993	Lot 9	FILL	Jet 1993**	-	10	2	103	148	954	-	-	890	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH25/0.0-0.1	0-0.1	19/04/1993	Lot 9	FILL	Jet 1993**	-	8	<0.5	9	22	24	-	-	72	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH26/0.0-0.1	0-0.1	19/04/1993	Lot 9	FILL	Jet 1993**	-	<5	<0.5	8	8	13	-	-	45	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH26/1.5-2.0	1.5-2	19/04/1993	Lot 9	FILL	Jet 1993**	-	7	1	20	147	471	-	-	592	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH501/1.4-1.5	1.4-1.5	16/01/2008	Lot 9	FILL	DP 2008**	-	4	<1	11	18	20	<0.1	6	38	<25	-	-	-	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	0	0	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1	<0.1	<0.1	
BH501/1.9-2.0	1.9-2	16/01/2008	Lot 9	FILL	DP 2008**	0	<4	<1	2	6	22	<0.1	1	100	<25	-	-	-	<0.5	<0.1	<0.1	<0.1	<0.1	1	<0.1	0	<0.1	0	1	3	<0.1	<0.1	<0.1	<0.1	
BH502/1.4-1.5	1.4-1.5	16/01/2008	Lot 9	FILL	DP 2008**	-	74	3	14	220	550	1	15	1200	<25	-	-	-	<0.5	0.40	2.10	3	17	2	10	1	13	17	95	<0.1	<0.1	<0.1	<0.1	<0.1	
BH502/1.9-2.0	1.9-2	16/01/2008	Lot 9	FILL	DP 2008**	0	34	2	11	91	300	1	9	620	<25	-	-	-	<0.5	<0.1	0.20	0	2	0	2	0	1	2	12	<0.1	<0.1	<0.1	<0.1	<0.1	
BH503/0.9-1.0	0.9-1	16/01/2008	Lot 9	FILL	DP 2008**	0	<4	<1	9	34	76	<0.1	19	100	<25	-	-	-	<0.5	<0.1	0.10	0	1	<0.1	1	<0.1	1	1	6	<0.1	<0.1	<0.1	<0.1	<0.1	
BH503/1.9-2.0	1.9-2	16/01/2008	Lot 9	FILL	DP 2008**	-	5	<1	9	76	63	1	3	64	<25	-	-	-	<0.5	<0.1	<0.1	0	1	<0.1	0	<0.1	0	1	3	<0.1	<0.1	<0.1	<0.1	<0.1	
BH504/0.4-0.5	0.4-0.5	16/01/2008	Lot 9	FILL	DP 2008**	0	<4	<1	5	8	13	<0.1	3	19	<25	-	-	-	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	0	<0.1	<0.1	0	2	<0.1	<0.1	<0.1	<0.1		
BH504/1.4-1.5	1.4-1.5	16/01/2008	Lot 9	FILL	DP 2008**	-	6	<1	10	20	61	<0.1	6	49	<25	-	-	-	<0.5	<0.1	<0.1	<0.1	0	<0.1	0	<0.1	0	0	2	<0.1	<0.1	<0.1	<0.1	<0.1	
BH505/0.5-0.6	0.5-0.6	16/01/2008	Lot 9	FILL	DP 2008**	-	8	<1	13	370	210	1	19	220	<25	-	-	-	<0.5	0.10	1.10	2	11	1	11	0	6	11	72	<0.1	<0.1	<0.1	<0.1	<0.1	
BH505/1.8-2.0	1.8-2	16/01/2008	Lot 9	FILL	DP 2008**	0	5	<1	18	3	54	<0.1	2	12	<25	-	-	-	<0.5	<0.1	0.20	0	2	<0.1	1	<0.1	1	2	9	<0.1	<0.1	<0.1	<0.1	<0.1	
BH506/0.4-0.5	0.4-0.5	16/01/2008	Lot 9	FILL	DP 2008**	-	5	<1	7	10	15	<0.1	9	47	<25	-	-	-	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	0	<0.1	<0.1	0	2	<0.1	<0.1	<0.1	<0.1		
BH506/1.9-2.0	1.9-2	16/01/2008	Lot 9	FILL	DP 2008**	0	<4	<1	9	36	390	<0.1	5	320	<25	-	-	-	<0.5	<0.1	0.20	0	3	<0.1	3	<0.1	1	3	20	<0.1	<0.1	<0.1	<0.1	<0.1	
BH507/0.9-1.0	0.9-1	16/01/2008	Lot 9	FILL	DP 2008**	-	<4	<1	6	220	110	<0.1	9	150	<25	-	-	-	<0.5	1.30	10.00	15	61	3	41	3	58	62	368	<0.1	<0.1	<0.1	<0.1	<0.1	
BH507/1.8-2.0	1.8-2	16/01/2008	Lot 9	FILL	DP 2008**	0	<4	<1	3	37	260	<0.1	3	160	<25	-	-	-	<0.5	<0.1	1.40	2	11	1	6	0	10	11	61	<0.1	<0.1	<0.1	<0.1	<0.1	
BH508/0.4-0.5	0.4-0.5	16/01/2008	Lot 9	FILL	DP 2008**	-	<4	<1	6	3	9	<0.1	2	16	<25	-	-	-	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1	<0.1	<0.1	
BH508/1.4-1.5	1.4-1.5	16/01/2008	Lot 9	FILL	DP 2008**	0	6	<1	11	47	130	<0.1	11	130	<25	-	-	-	<0.5	<0.1	0.50	1	4	0	3	<0.1	3	4	25	<0.1	<0.1	<0.1	<0.1	<0.1	
BH509/0.9-1.0	0.9-1	16/01/2008	Lot 9	FILL	DP 2008**	0	<4	<1	8	11	15	<0.1	7	47	<25	-	-	-	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	0	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1	<0.1	<0.1		
BH509/3.4-3.5	3.4-3.5	16/01/2008	Lot 9	FILL	DP 2008**	-	<4	<1	9	23	180	<0.1	4	78	<25	-	-	-	<0.5	<0.1	0.20	0	2	<0.1	1	<0.1	2	2	10	<0.1	<0.1	<0.1	<0.1	<0.1	
BH510/0.9-1.0	0.9-1	16/01/2008	Lot 9	FILL	DP 2008**	0	<4	<1	8	53	89	<0.1	5	77	<25	-	-	-	<0.5	1.80	11.00	12	39	7	23	12	49	40	249	<0.1	<0.1	<0.1	<0.1	<0.1	
BH510/1.4-1.5	1.4-1.5	16/01/2008	Lot 9	FILL	DP 2008**	-	<4	<1	1	2	7	<0.1	<1	7	<25	-	-	-	<0.5	<0.1	<0.1	0	1	<0											

Summary of Total Concentrations in Fill Soil Considered



Asbestos ID in Soil	Arsenic (Total)	Cadmium	Chromium (Total)	Copper	Lead	Mercury (Inorganic)	Nickel	Zinc	Tin (Inorganic, Sn IV)	C6-C10 Fraction	>C10-C16 Fraction	>C16-C34 Fraction	>C34-C40 Fraction	Benzene	Acenaphthene	Acenaphthylene	Anthracene	Fluoranthene	Fluorene	Carcinogenic PAHs as B(a)P TPE	Naphthalene	Phenanthrene	Pyrene	PAHs (Total)	Aldrin	Dieldrin	DDD	DDT	DDT+ DDE+DDD (Sum of Total)
g/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg

Field_ID	Depth	Date	Location	Matrix	Reference																														
BH78/0.0-0.5	0-0.5	3/01/2001	Lot 9	FILL	HLA 2001**	-	<1	<1	3	3	7	<0.1	1	9	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	6	-	-	-	-	-	
BH8/0.06-0.1	0.06-0.1	22/03/2001	Lot 9	FILL	ES 2014**	0	<4	<0.4	5	150	23	<0.1	6	42	-	140	2000	370	<0.2	2.00	7.30	14	45	4	37	2	44	47	310	-	-	-	-	-	
BH8/1.0-1.1	1-1.1	22/03/2001	Lot 9	FILL	ES 2014**	0	<4	1	4	150	23	<0.1	6	46	-	180	2400	550	<0.2	1.70	7.50	14	48	4	36	3	45	50	310	<0.1	<0.1	<0.1	<0.1	<0.3	
BH80/2.0-2.45	2-2.45	3/01/2001	Lot 9	FILL	HLA 2001**	-	4	<1	4	139	98	<0.1	2	114	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	8	-	-	-	-	-	
BH81/0.8-1.0	0.8-1	3/01/2001	Lot 9	FILL	HLA 2001**	-	12	4	20	223	1180	<0.1	18	2040	-	-	-	-	-	<0.5	<0.5	<0.5	2	<0.5	2	<0.5	1	2	15	-	-	-	-	-	
BH87/0.8-1.0	0.8-1	3/01/2001	Lot 9	FILL	HLA 2001**	-	3	<1	6	8	11	<0.1	6	45	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	7	-	-	-	-	-	
BH88/0.0-0.5	0-0.5	3/01/2001	Lot 9	FILL	HLA 2001**	-	2	<1	3	9	12	<0.1	3	34	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	8	-	-	-	-	-	
BH89/1.8-2.0	1.8-2	3/01/2001	Lot 9	FILL	HLA 2001**	-	1	<1	3	80	28	<0.1	3	46	-	-	-	-	-	<0.5	0.80	1	4	-	3	-	2	5	23	-	-	-	-	-	
BH9/0.5-0.6	0.5-0.6	22/03/2001	Lot 9	FILL	ES 2014b**	0	<4	<0.4	8	9	51	<0.1	4	5	-	<50	<100	<100	<0.2	<0.1	<0.1	<0.1	0	<0.1	<0.5	<0.1	<0.1	0	1	<0.1	<0.1	<0.1	<0.1	<0.3	
BH9/1.0-1.1	1-1.1	22/03/2001	Lot 9	FILL	ES 2014b**	0	5	1	8	78	110	<0.1	7	36	-	<50	460	120	<0.2	<0.1	1.20	1	8	0	9	1	4	10	59	<0.1	<0.1	<0.1	<0.1	<0.3	
BH90/1.8-2.0	1.8-2	3/01/2001	Lot 9	FILL	HLA 2001**	-	1	<1	7	16	182	0	3	54	<2	-	-	-	<0.2	<0.5	<0.5	1	5	<0.5	3	<0.5	4	4	25	<0.05	<0.05	<0.05	<0.2	<0.3	
BH99/0.8-1.0	0.8-1	3/01/2001	Lot 9	FILL	HLA 2001**	-	1	<1	5	5	23	<0.1	<1	19	<2	-	-	-	<0.2	<0.5	<0.5	<0.5	2	<0.5	1	<0.5	1	2	12	<0.05	<0.05	<0.05	<0.2	<0.3	
BH1/0.5-0.6	0.5-0.6	25/03/2014	Lot 12	FILL	ES 2014*	0	20	0	16	1800	270	0	25	210	-	-	<50	510	180	<0.2	<0.1	<0.1	0	1	<0.1	1	<0.1	1	1	5	<0.1	<0.1	<0.1	<0.1	<0.3
BH1/1.0-1.1	1-1.1	25/03/2014	Lot 12	FILL	ES 2014*	0	9	<0.4	8	260	43	<0.1	7	47	-	-	<50	<100	<100	<0.2	<0.1	<0.1	<0.1	0	<0.1	<0.172	<0.1	0	0	0	<0.1	<0.1	<0.1	<0.1	<0.3
BH1/2.0-2.1	2-2.1	25/03/2014	Lot 12	FILL	ES 2014*	0	9	<0.4	9	900	44	<0.1	4	33	-	-	<50	<100	<100	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1	<0.1	<0.1	<0.3
BH1/2.5-2.6	2.5-2.6	25/03/2014	Lot 12	FILL	ES 2014*	-	<4	<0.4	3	6	4	<0.1	<1	3	-	-	<50	<100	<100	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1	<0.1	<0.1	<0.3
BH1/3.0-3.1	3-3.1	25/03/2014	Lot 12	FILL	ES 2014*	0	7	<0.4	9	110	30	<0.1	3	24	-	-	<50	<100	<100	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1	<0.1	<0.1	<0.3
BH1/4.0-4.1	4-4.1	25/03/2014	Lot 12	FILL	ES 2014*	0	6	<0.4	8	81	24	<0.1	3	21	-	-	<50	<100	<100	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1	<0.1	<0.1	<0.3
BH1/4.5-4.6	4.5-4.6	25/03/2014	Lot 12	FILL	ES 2014*	-	<4	<0.4	8	6	14	<0.1	1	4	-	-	<50	<100	<100	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1	<0.1	<0.1	<0.3
BH1/5.0-5.1	5-5.1	25/03/2014	Lot 12	FILL	ES 2014*	0	<4	<0.4	8	39	21	<0.1	2	14	-	-	<50	<100	<100	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1	<0.1	<0.1	<0.3
BH14/0.4-0.5	0.4-0.5	9/04/2013	Lot 12	FILL	GETEX 2013*	0	<4	<0.4	7	45	40	<0.1	6	43	-	-	<50	<100	<100	<0.2	<0.1	<0.1	0	1	<0.1	0	<0.1	0	1	4	<0.1	<0.1	<0.1	<0.1	<0.3
BH143/1.0-1.1	1-1.1	30/03/2003	Lot 12	FILL	DP 2003*	-	<3	<0.5	11	3700	410	0	11	1100	-	<20	-	-	-	<0.5	-	-	-	-	2	-	-	-	2	-	-	-	-	-	
BH143/2.0-2.1	2-2.1	30/03/2003	Lot 12	FILL	DP 2003*	-	<3	<0.5	11	110	39	<0.05	2	53	-	<20	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	
BH143/3.0-3.1	3-3.1	30/03/2003	Lot 12	FILL	DP 2003*	-	<3	<0.5	6	690	160	0	11	150	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH143/4.0-4.1	4-4.1	30/03/2003	Lot 12	FILL	DP 2003*	-	<3	<0.5	8	160	66	<0.05	2	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH143/5.0-5.1	5-5.1	30/03/2003	Lot 12	FILL	DP 2003*	-	<3	<0.5	11	290	120	<0.05	4	44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH147B/0.5-0.6	0.5-0.6	30/03/2003	Lot 12	FILL	DP 2003*	-	9	3	22	1000	580	1	14	700	-	<20	-	-	-	<0.5	-	-	-	-	3	-	-	-	3	-	-	-	-	-	
BH147B/1.0-1.1	1-1.1	30/03/2003	Lot 12	FILL	DP 2003*	-	8	8	8	4700	1000	<0.05	16	2400	-	<20	-	-	-	<0.5	-	-	-	-	0	-	-	-	0	-	-	-	-	-	
BH147B/2.0-2.1	2-2.1	30/03/2003	Lot 12	FILL	DP 2003*	-	<3	<0.5	6	270	33	0	2	240	-	<20	-	-	-	<0.5	-	-	-	-	2	-	-	-	2	-	-	-	-	-	
BH149/0.0-0.5	0-0.5	30/03/2003	Lot 12	FILL	DP 2003*	-	<3	<0.5	10	140	100	0	8	100	-	<20	-	-	-	<0.5	-	-	-	-	5	-	-	-	5	-	-	-	-	-	
BH149/1.0-1.1	1-1.1	30/03/2003	Lot 12	FILL	DP 2003*	-	26	1	20	1800	1000	0	64	310	-	<20	-	-	-	<0.5	-	-	-	-	2	-	-	-	2	-	-	-	-	-	
BH149/2.0-2.1	2-2.1	30/03/2003	Lot 12	FILL	DP 2003*	-	<3	<0.5	2	2	3	<0.05	1	3																					

Field_ID	Depth	Date	Location	Matrix	Reference																															
BH4A/2.0-2.1	2-2.1	25/03/2014	Lot 12	FILL	ES 2014*	0	<4	1	8	44	29	<0.1	3	49	-	-	<50	<100	<100	0	<0.1	<0.1	<0.1	0	<0.1	0	<0.1	0	0	1	<0.1	<0.1	<0.1	<0.1	<0.3	
BH4A/3.0-3.1	3-3.1	25/03/2014	Lot 12	FILL	ES 2014*	0	<4	<0.4	<1	3	15	<0.1	<1	21	-	-	<50	<100	<100	0	<0.1	<0.1	0	1	<0.1	0	<0.1	1	1	4	<0.1	<0.1	<0.1	<0.1	<0.3	
BH4A/4.0-4.1	4-4.1	25/03/2014	Lot 12	FILL	ES 2014*	0	<4	<0.4	<1	<1	1	<0.1	<1	5	-	-	<50	<100	<100	0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1	<0.1	<0.1	<0.3	
BH5/0.1-0.2	0.1-0.2	25/03/2014	Lot 12	FILL	ES 2014*	0	<4	<0.4	15	160	110	<0.1	<1	96	-	-	<50	290	<100	0	<0.1	<0.1	<0.1	0	<0.1	<0.172	0	0	0	<1.55	<0.1	<0.1	<0.1	<0.1	<0.3	
BH5/2.0-2.1	2-2.1	25/03/2014	Lot 12	FILL	ES 2014*	0	<4	<0.4	12	23	23	0	<1	47	-	-	<50	<100	<100	0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	1	<0.1	<0.1	<0.1	<0.1	<0.3	
BH50/0.0-0.1	0-0.1	11/05/1993	Lot 12	FILL	Jet 1993*	-	15	<0.5	10	401	440	-	-	239	-	<2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH50/0.0-0.4	0-0.4	5/01/2001	Lot 12	FILL	HLA 2001*	-	4	<1	5	54	51	<0.1	5	65	-	<2	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1	-	<0.5	<0.5	<1.55	<0.05	<0.05	<0.05	0	<0.3
BH50/0.5-1.0	0.5-1	11/05/1993	Lot 12	FILL	Jet 1993*	-	14	<0.5	9	336	303	-	-	271	-	<2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH50/1.5-2.0	1.5-2	11/05/1993	Lot 12	FILL	Jet 1993*	-	8	<0.5	11	103	95	-	-	74	-	<2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH50/3.0-3.5	3-3.5	11/05/1993	Lot 12	FILL	Jet 1993*	-	<5	<0.5	9	58	31	-	-	35	-	<2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH50/4.5-5.0	4.5-5	11/05/1993	Lot 12	FILL	Jet 1993*	-	<5	<0.5	7	31	31	-	-	8	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH51/0.0-0.5	0-0.5	5/01/2001	Lot 12	FILL	HLA 2001*	-	12	<1	7	2340	342	0	12	207	-	<2	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1	-	<0.5	<0.5	2	-	-	-	-	-
BH51/2.8-3.0	2.8-3	5/01/2001	Lot 12	FILL	HLA 2001*	-	3	<1	8	12	8	<0.1	<1	3	-	<2	-	-	-	-	<0.2	1.80	1.90	16	51	4	22	-	47	47	235	<0.05	<0.05	<0.05	0	<0.3
BH51/3.0-3.45	3-3.45	5/01/2001	Lot 12	FILL	HLA 2001*	-	3	<1	9	7	18	<0.1	4	33	-	<2	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1	-	<0.5	<0.5	<1.55	-	-	-	-	-
BH52/0.0-0.1	0-0.1	11/05/1993	Lot 12	FILL	Jet 1993*	-	35	1	19	3800	3440	-	-	853	-	0	-	-	-	-	-	-	0.50	4	-	4	12	2	17	-	85	<0.0049	<0.0049	<0.0049	<0.0049	<0.0147
BH52/0.0-0.5	0-0.5	5/01/2001	Lot 12	FILL	HLA 2001*	-	4	<1	4	201	149	<0.1	4	69	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	1	<0.5	1	-	<0.5	1	2	<0.05	<0.05	<0.05	0	<0.3
BH52/0.5-1.0	0.5-1	11/05/1993	Lot 12	FILL	Jet 1993*	-	26	1	16	2160	2880	-	-	213	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH52/1.5-2.0	1.5-2	11/05/1993	Lot 12	FILL	Jet 1993*	-	407	7	18	1500	314	-	-	4550	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH52/3.0-3.5	3-3.5	11/05/1993	Lot 12	FILL	Jet 1993*	-	<5	<0.5	10	66	58	-	-	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH53/0.0-0.1	0-0.1	11/05/1993	Lot 12	FILL	Jet 1993*	-	29	2	14	2940	1040	-	-	645	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH53/0.0-0.5	0-0.5	5/01/2001	Lot 12	FILL	HLA 2001*	-	625	2	4	324	154	<0.1	28	180	-	<2	-	-	-	-	-	<0.5	<0.5	1	1	<0.5	1	-	1	1	3	<0.05	-	-	-	-
BH53/0.5-1.0	0.5-1	11/05/1993	Lot 12	FILL	Jet 1993*	-	87	<0.5	15	7340	737	-	-	440	-	<2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0049	<0.0049	<0.0049	<0.0049	<0.0147
BH53/1.5-2.0	1.5-2	11/05/1993	Lot 12	FILL	Jet 1993*	-	243	<0.5	34	104	1590	-	-	1560	-	<2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH53/3.0-3.5	3-3.5	11/05/1993	Lot 12	FILL	Jet 1993*	-	<5	<0.5	11	380	40	-	-	33	-	<2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH53/4.5-5.0	4.5-5	11/05/1993	Lot 12	FILL	Jet 1993*	-	5	<0.5	11	66	28	-	-	27	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH54/0.0-0.3	0-0.3	5/01/2001	Lot 12	FILL	HLA 2001*	-	2	<1	4	108	63	<0.1	8	54	-	<2	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1	-	<0.5	<0.5	<1.55	<0.05	<0.05	<0.05	0	<0.3
BH55/0.0-0.1	0-0.1	11/05/1993	Lot 12	FILL	Jet 1993*	-	27	1	43	1250	592	-	-	394	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH55/1.5-2.0	1.5-2	11/05/1993	Lot 12	FILL	Jet 1993*	-	<5	<0.5	6	233	98	-	-	101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH56/0.0-0.1	0-0.1	11/05/1993	Lot 12	FILL	Jet 1993*	-	<5	<0.5	12	116	49	-	-	34	-	<2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0048	<0.0048	0	0	0	
BH56/0.5-1.0	0.5-1	11/05/1993	Lot 12	FILL	Jet 1993*	-	<5	<0.5	10	76	84	-	-	33	-	<2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH56/0.8-0.9	0.8-0.9	5/01/2001	Lot 12	FILL	HLA 2001*	-	5	<1	8	467	2890	0	3	259	-	<2	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1	-	<0.5	<0.5	<1.55	<0.05	<0.05	<0.05	0	<0.3
BH56/1.5-2.0	1.5-2	11/05/1993	Lot 12	FILL	Jet 1993*	-	<5	<0.5	13	124	88	-	-	50	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH57/0.0-0.1	0-0.1	11/05/1993	Lot 12	FILL	Jet 1993*	-	<5	<0.5	15	69	48	-	-	73	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH57/1.5-2.0	1.5-2	11/05/1993	Lot 12	FILL	Jet 1993*	-	<5	<0.5	12	46	85	-	-	38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH59/1.0-1.45	1-1.45	5/01/2001	Lot 12	FILL	HLA 2001*	-	6	<1	4	1750	524	0	8	242	-	<2	-	-	-	-	-	<0.5	<0.5	1	4	<0.5	3	-	3	3	<1.55	<0.05	<0.05	<0.05	0	<0.3
BH59/2.0-2.45	2-2.45	5/01/2001	Lot 12	FILL	HLA 2001*	-	<1	<1	<1	73	22	<0.1	<1	10	-	<2	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1	-	<0.5	<0.5	<1.55	-	-	-	-	-
BH6/1.0-1.1	1-1.1	25/03/2014	Lot 12	FILL	ES 2014*	0	20	<0.4	7	260	530	0	<1	220	-	-	<50	<100	<100	0	<0.1	0.20	0	1	<0.1	1	<0.1	1	1	7	<0.1	<0.1	<0.1	<0.1	<0.3	
BH60/0.0-0.9	0-0.9	5/01/2001	Lot 12	FILL	HLA 2001*	-	-	-	-	-	-	-	-	-	-	<2	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1	-	<0.5	<0.5	<1.55	<0.05	-	-	-	-
BH60/0.17-0.5	0.17-0.5	5/01/2001	Lot 12	FILL	HLA 2001*	-	<1	<1	5	48	32	<0.1	1	29	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1	-	<0.5	<0.5	<1.55	-	-	-	-	-
BH600/0.1-0.2	0.1-0.2	6/08/2008	Lot 12	FILL	DP 2008*	0	<4	<0.5	15	60	41	<0.1	18	78	3	<25	-	-	-	<0.5	0.10	0.10	0	1	0	0	0	0	1	3	<0.1	<0.1	<0.1	<0.1	<0.3	
BH600/0.3-0.4	0.3-0.4	6/08/2008	Lot 12	FILL	DP 2008*	0	20	1	29	10000	180	0	25	670	-	<25	-	-	-	<0.5	0.10	0.10	0	0	0	0	0	0	0	0	-	-	-	-	-	
BH600/0.9-1.0	0.9-1	6/08/2008	Lot 12	FILL	DP 2008*	0	<4	<0.5	14	18	23	<0.1	4	10	-	<25	-	-	-	<0.5	0.10	0.10	0	0	0	0	0	0	0	<0.1	-	-	-	-	-	
BH601/0.4-0.5	0.4-0.5	6/08/2008	Lot 12	FILL	DP 2008*	0	5	<0.5	140	110	72	<0.1	81	230	42	<25	-	-	-	<0.5	0.10	0.10	0	0	0	0	0	0	0	2	<0.1	<0.1	<0.1	<0.1	<0.3	
BH601/0.9-1.0	0.9-1	6/08/2008	Lot 12	FILL	DP 2008*	0	<4	<0.5	35	260	260	<0.1	22	140	-	<25	-	-	-	<0.5	0.10	0.10	0	0	0	0	0	0	0	0	-	-	-	-	-	
BH601/1.9-2.0	1.9-2	6/08/2008	Lot 12	FILL	DP 2008*	-	<4	<0.5	17	48	53	<0.1	6	23	-	<25	-	-	-	<0.5	0.10	0.10	0	0	0	0	0	0	0	<0.1	-	-	-	-	-	
BH601/2.9-3.0	2.9-3	6/08/2008</																																		

Summary of Total Concentrations in Fill Soil Considered



Asbestos ID in Soil	Arsenic (Total)	Cadmium	Chromium (Total)	Copper	Lead	Mercury (Inorganic)	Nickel	Zinc	Tin (Inorganic, Sn IV)	C6-C10 Fraction	>C10-C16 Fraction	>C16-C34 Fraction	>C34-C40 Fraction	Benzene	Acenaphthene	Acenaphthylene	Anthracene	Fluoranthene	Fluorene	Carcinogenic PAHs as B(a)P TPE	Naphthalene	Phenanthrene	Pyrene	PAHs (Total)	Aldrin	Dieldrin	DDD	DDT	DDT+DDE+DDD (Sum of Total)
g/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg

Field_ID	Depth	Date	Location	Matrix	Reference																																	
BH603/0.4-0.5	0.4-0.5	6/08/2008	Lot 12	FILL	DP 2008*	0	7	<0.5	7	480	56	<0.1	6	38	-	<25	-	-	-	<0.5	0.10	0.10	0	0	0	1	0	0	1	4	<0.1	<0.1	<0.1	<0.1	<0.3			
BH603/0.9-1.0	0.9-1	6/08/2008	Lot 12	FILL	DP 2008*	0	10	<0.5	16	1400	68	<0.1	9	38	-	<25	-	-	-	<0.5	0.10	0.10	0	0	0	0	0	0	0	0	-	-	-	-	-			
BH603/1.9-2.0	1.9-2	6/08/2008	Lot 12	FILL	DP 2008*	-	<4	<0.5	10	19	17	<0.1	2	7	-	<25	-	-	-	<0.5	0.10	0.10	0	0	0	0	0	0	0	<0.1	-	-	-	-	-			
BH603/3.9-4.0	3.9-4	6/08/2008	Lot 12	FILL	DP 2008*	-	<4	<0.5	5	4	5	<0.1	2	3	-	<25	-	-	-	<0.5	9.20	0.10	3	3	4	0	3	7	2	33	-	-	-	-	-			
BH604/0.1-0.2	0.1-0.2	6/08/2008	Lot 12	FILL	DP 2008*	0	15	1	20	3400	5000	<0.1	21	440	-	<25	-	-	-	<0.5	0.60	0.20	4	10	1	8	1	11	11	69	1	1	<0.5	<0.5	<0.5			
BH604/0.9-1.0	0.9-1	6/08/2008	Lot 12	FILL	DP 2008*	0	4	<0.5	16	5400	1300	<0.1	5	36	-	<25	-	-	-	<0.5	0.10	0.10	0	0	0	0	0	0	0	<0.1	-	-	-	-	-			
BH604/1.9-2.0	1.9-2	6/08/2008	Lot 12	FILL	DP 2008*	-	<4	<0.5	13	140	560	<0.1	5	23	-	<25	-	-	-	<0.5	0.10	0.10	0	0	0	0	0	0	0	<0.1	-	-	-	-	-			
BH605A/0.9-1.0	0.9-1	6/08/2008	Lot 12	FILL	DP 2008*	0	32	2	36	5100	12000	<0.1	39	1600	-	<25	-	-	-	<0.5	0.10	0.20	0	2	0	2	1	2	3	17	-	-	-	-	-			
BH605A/1.9-2.0	1.9-2	6/08/2008	Lot 12	FILL	DP 2008*	-	<4	<0.5	19	160	820	<0.1	9	57	-	<25	-	-	-	<0.5	0.10	0.10	0	1	0	0	0	0	1	3	-	-	-	-	-			
BH606/0.1-0.2	0.1-0.2	6/08/2008	Lot 12	FILL	DP 2008*	0	<4	<0.5	9	100	95	<0.1	11	77	-	<25	-	-	-	<0.5	0.10	0.10	0	0	0	1	0	0	1	3	<0.1	<0.1	<0.1	<0.1	<0.3			
BH606/0.9-1.0	0.9-1	6/08/2008	Lot 12	FILL	DP 2008*	-	130	2	48	27000	290	<0.1	79	350	-	<25	-	-	-	<0.5	0.10	0.10	0	1	0	1	0	0	1	3	-	-	-	-	-			
BH606/1.9-2.0	1.9-2	6/08/2008	Lot 12	FILL	DP 2008*	-	9	<0.5	20	170	29	<0.1	8	90	-	<25	-	-	-	<0.5	0.10	0.10	0	0	0	0	0	0	0	<0.1	-	-	-	-	-			
BH606/2.9-3.0	2.9-3	6/08/2008	Lot 12	FILL	DP 2008*	-	7	<0.5	10	290	30	<0.1	7	110	-	<25	-	-	-	<0.5	0.10	0.10	0	0	0	0	0	0	0	<0.1	-	-	-	-	-			
BH607/0.1-0.2	0.1-0.2	6/08/2008	Lot 12	FILL	DP 2008*	0	<4	<0.5	16	46	25	<0.1	17	49	-	<25	-	-	-	<0.5	0.10	0.10	0	1	0	1	0	0	1	8	<0.1	<0.1	<0.1	<0.1	<0.3			
BH607/0.9-1.0	0.9-1	6/08/2008	Lot 12	FILL	DP 2008*	0	<4	<0.5	8	15	25	<0.1	2	7	-	<25	-	-	-	<0.5	0.10	0.10	0	0	0	0	0	0	0	<0.1	-	-	-	-	-			
BH607/2.9-3.0	2.9-3	6/08/2008	Lot 12	FILL	DP 2008*	-	5	<0.5	14	6	24	<0.1	2	2	-	<25	-	-	-	<0.5	0.10	0.10	0	0	0	0	0	0	0	<0.1	-	-	-	-	-			
BH608/0.1-0.2	0.1-0.2	6/08/2008	Lot 12	FILL	DP 2008*	0	<4	<0.5	12	70	170	<0.1	15	61	-	<25	-	-	-	<0.5	0.10	0.10	0	2	0	1	0	1	2	10	<0.1	<0.1	<0.1	<0.1	<0.3			
BH608/1.9-2.0	1.9-2	6/08/2008	Lot 12	FILL	DP 2008*	-	<4	<0.5	16	20	18	<0.1	7	16	-	<25	-	-	-	<0.5	0.10	0.10	0	0	0	0	0	0	0	<0.1	-	-	-	-	-			
BH608/2.9-3.0	2.9-3	6/08/2008	Lot 12	FILL	DP 2008*	-	<4	<0.5	8	17	23	<0.1	4	13	-	<25	-	-	-	<0.5	0.10	0.10	0	0	0	0	0	-	0	0	-	-	-	-	-			
BH609/0.1-0.2	0.1-0.2	6/08/2008	Lot 12	FILL	DP 2008*	-	5	<0.5	16	960	140	0	16	110	-	<25	-	-	-	<0.5	0.10	0.10	0	1	0	1	-	0	1	-	<0.1	<0.1	<0.1	<0.1	<0.3			
BH609/0.4-0.5	0.4-0.5	6/08/2008	Lot 12	FILL	DP 2008*	-	44	2	28	21000	370	0	58	300	-	<25	-	-	-	<0.5	0.10	0.10	0	0	0	0	-	0	0	-	<0.1	<0.1	<0.1	<0.1	<0.3			
BH609/0.9-1.0	0.9-1	6/08/2008	Lot 12	FILL	DP 2008*	-	<4	<0.5	4	28	5	<0.1	3	27	-	<25	-	-	-	<0.5	0.10	0.10	0	0	0	0	-	0	0	-	-	-	-	-				
BH61/0.6-0.8	0.6-0.8	5/01/2001	Lot 12	FILL	HLA 2001*	-	2	<0.1	34	97	182	<0.1	3	160	-	<2	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1	-	<0.5	<0.5	<1.55	<0.05	<0.05	<0.05	0	<0.3			
BH610/0.1-0.2	0.1-0.2	6/08/2008	Lot 12	FILL	DP 2008*	0	5	<0.5	11	96	53	<0.1	9	77	-	<25	-	-	-	<0.5	0.10	0.10	0	1	0	1	-	1	1	-	<0.1	<0.1	<0.1	<0.1	<0.3			
BH610/0.6-0.7	0.6-0.7	6/08/2008	Lot 12	FILL	DP 2008*	0	7	<0.5	19	7	18	<0.1	3	11	-	<25	-	-	-	<0.5	0.10	0.10	0	1	0	0	-	1	1	-	-	-	-	-	-			
BH610/0.9-1.0	0.9-1	6/08/2008	Lot 12	FILL	DP 2008*	-	<4	<0.5	8	31	22	<0.1	5	25	-	<25	-	-	-	<0.5	0.10	0.10	0	0	0	0	-	0	0	-	-	-	-	-	-			
BH611/0.1-0.2	0.1-0.2	6/08/2008	Lot 12	FILL	DP 2008*	0	4	<0.5	13	290	130	<0.1	9	200	-	<25	-	-	-	<0.5	0.10	0.10	0	1	0	1	-	1	1	-	<0.1	<0.1	<0.1	<0.1	<0.3			
BH611/0.9-1.0	0.9-1	6/08/2008	Lot 12	FILL	DP 2008*	-	9	1	80	620	120	<0.1	46	210	-	<25	-	-	-	<0.5	0.10	0.10	1	3	0	2	-	2	3	-	-	-	-	-	-			
BH612/0.1-0.2	0.1-0.2	6/08/2008	Lot 12	FILL	DP 2008*	0	6	<0.5	13	990	380	0	8	270	-	<25	-	-	-	<0.5	0.10	0.10	0	0	0	0	-	0	0	-	<0.1	<0.1	<0.1	<0.1	<0.3			
BH612/0.4-0.5	0.4-0.5	6/08/2008	Lot 12	FILL	DP 2008*	-	19	1	14	1800	490	0	18	250	-	<25	-	-	-	<0.5	0.10	0.10	1	2	0	2	-	2	3	-	<0.1	<0.1	<0.1	<0.1	<0.3			
BH612/0.9-1.0	0.9-1	6/08/2008	Lot 12	FILL	DP 2008*	-	19	1	11	1500	520	0	19	210	-	<25	-	-	-	<0.5	0.10	0.10	0	2	0	1	-	1	2	-	-	-	-	-	-			
BH612/2.9-3.0	2.9-3	6/08/2008	Lot 12	FILL	DP 2008*	-	17	1	11	2500	960	<0.1	37	180	-	<25	-	-	-	<0.5	0.10	0.10	0	0	0	0	-	0	0	-	-	-	-	-	-			
BH613/0.4-0.5	0.4-0.5	6/08/2008	Lot 12	FILL	DP 2008*																																	

Summary of Total Concentrations in Fill Soil Considered



Asbestos ID in Soil	g/kg
Arsenic (Total)	mg/kg
Cadmium	mg/kg
Chromium (Total)	mg/kg
Copper	mg/kg
Lead	mg/kg
Mercury (Inorganic)	mg/kg
Nickel	mg/kg
Zinc	mg/kg
Tin (Inorganic, Sn IV)	mg/kg
C6-C10 Fraction	mg/kg
>C10-C16 Fraction	mg/kg
>C16-C34 Fraction	mg/kg
>C34-C40 Fraction	mg/kg
Benzene	mg/kg
Acenaphthene	mg/kg
Acenaphthylene	mg/kg
Anthracene	mg/kg
Fluoranthene	mg/kg
Fluorene	mg/kg
Carcinogenic PAHs as B(a)P TPE	mg/kg
Naphthalene	mg/kg
Phenanthrene	mg/kg
Pyrene	mg/kg
PAHs (Total)	mg/kg
Aldrin	mg/kg
Dieldrin	mg/kg
DDD	mg/kg
DDT	mg/kg
DDT+DDE+DDD (Sum of Total)	mg/kg

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Summary of Total Concentrations in Fill Soil Considered



Asbestos ID in Soil	Arsenic (Total)	Cadmium	Chromium (Total)	Copper	Lead	Mercury (Inorganic)	Nickel	Zinc	Tin (Inorganic, Sn IV)	C6-C10 Fraction	>C10-C16 Fraction	>C16-C34 Fraction	>C34-C40 Fraction	Benzene	Acenaphthene	Acenaphthylene	Anthracene	Fluoranthene	Fluorene	Carcinogenic PAHs as B(a)P TPE	Naphthalene	Phenanthrene	Pyrene	PAHs (Total)	Aldrin	Dieldrin	DDD	DDT	DDT+DDE+DDD (Sum of Total)
g/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg

Field_ID	Depth	Date	Location	Matrix	Reference																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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Summary of Total Concentrations in Fill Soil Considered



Asbestos ID in Soil	g/kg
Arsenic (Total)	mg/kg
Cadmium	mg/kg
Chromium (Total)	mg/kg
Copper	mg/kg
Lead	mg/kg
Mercury (Inorganic)	mg/kg
Nickel	mg/kg
Zinc	mg/kg
Tin (Inorganic, Sn IV)	mg/kg
C6-C10 Fraction	mg/kg
>C10-C16 Fraction	mg/kg
>C16-C34 Fraction	mg/kg
>C34-C40 Fraction	mg/kg
Benzene	mg/kg
Acenaphthene	mg/kg
Acenaphthylene	mg/kg
Anthracene	mg/kg
Fluoranthene	mg/kg
Fluorene	mg/kg
Carcinogenic PAHs as B(a)P TPE	mg/kg
Naphthalene	mg/kg
Phenanthrene	mg/kg
Pyrene	mg/kg
PAHs (Total)	mg/kg
Aldrin	mg/kg
Dieldrin	mg/kg
DDD	mg/kg
DDT	mg/kg
DDT+DDE+DDD (Sum of Total)	mg/kg

[illegible]

[illegible]

Field_ID	Depth	Date	Location		Matrix	Reference																														
BH12/3.0-3.1	3-3.1	22/03/2014	Lot 8	NATURAL	ES 2014a	<4	<0.4	<1	<1	<1	<0.1	<1	5.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH12/4.0-4.1	4-4.1	22/03/2014	Lot 8	NATURAL	ES 2014a	<4	<0.4	<1	<1	<1	<0.1	<1	15.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH12/5.0-5.1	5-5.1	22/03/2014	Lot 8	NATURAL	ES 2014a	<4	<0.4	1.00	<1	<1	<0.1	<1	13.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH12/6.0-6.1	6-6.1	22/03/2014	Lot 8	NATURAL	ES 2014a	7.00	<0.4	18.00	<1	10.00	<0.1	9.00	14.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH12/7.0-7.1	7-7.1	22/03/2014	Lot 8	NATURAL	ES 2014a	20.00	0.40	28.00	<1	22.00	<0.1	<1	2.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH12/8.0-8.1	8-8.1	22/03/2014	Lot 8	NATURAL	ES 2014a	8.00	<0.4	8.00	<1	16.00	<0.1	<1	3.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH12/9.0-9.1	9-9.1	22/03/2014	Lot 8	NATURAL	ES 2014a	<4	<0.4	4.00	2.00	14.00	<0.1	<1	3.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH13/4.0-4.1	4-4.1	22/03/2014	Lot 8	NATURAL	ES 2014a	6.00	<0.4	10.00	26.00	35.00	<0.1	2.00	25.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	0.10	0.50	<0.1	0.20	0.20	0.40	0.40	2.60	<0.1	<0.1				
BH13/5.0-5.1	5-5.1	22/03/2014	Lot 8	NATURAL	ES 2014a	<4	<0.4	4.00	11.00	12.00	<0.1	<1	21.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	0.10	0.30	<0.1	0.17	<0.1	0.40	0.30	1.40	<0.1	<0.1				
BH13/6.0-6.1	6-6.1	22/03/2014	Lot 8	NATURAL	ES 2014a	9.00	<0.4	14.00	3.00	9.00	<0.1	8.00	12.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	0.20	<0.1	0.21	0.10	0.20	0.20	1.50	<0.1	<0.1				
BH13/7.0-7.1	7-7.1	22/03/2014	Lot 8	NATURAL	ES 2014a	5.00	<0.4	22.00	<1	14.00	<0.1	<1	2.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH13/8.0-8.1	8-8.1	22/03/2014	Lot 8	NATURAL	ES 2014a	4.00	<0.4	8.00	1.00	16.00	<0.1	<1	<1	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH13/9.0-9.1	9-9.1	22/03/2014	Lot 8	NATURAL	ES 2014a	<4	<0.4	3.00	1.00	26.00	<0.1	<1	<1	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH18/4.5-5.0	4.5-5	19/04/1993	Lot 8	NATURAL	Jet 1993*	<5	<0.5	2.00	4.00	<5	-	-	7.00	<20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
BH18/6.9-7.35	6.9-7.35	19/04/1993	Lot 8	NATURAL	Jet 1993*	6.00	<0.5	25.00	6.00	41.00	<0.1	-	19.00	<20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
BH325/3.5-4.0	3.5-4	1/06/2005	Lot 8	NATURAL	DP 2005a	<3	<0.5	5.00	2.00	2.00	<0.05	0.70	26.00	<20	<20	<50	-	<0.5	<0.5	<1.5	<0.1	<0.1	<0.1	<0.1	<0.1	0.70	<0.1	<0.1	<0.1	-	-	-				
BH326/1.3-1.5	1.3-1.5	1/06/2005	Lot 8	NATURAL	DP 2005a	<3	<0.5	0.60	1.00	3.00	<0.05	0.20	3.00	<20	<20	<50	-	<0.5	<0.5	<1.5	<0.1	<0.1	0.20	1.00	<0.1	0.70	<0.1	0.60	1.00	-	-	-				
BH327/1.8-2.0	1.8-2	1/06/2005	Lot 8	NATURAL	DP 2005a	<3	<0.5	0.70	3.00	8.00	<0.05	0.50	12.00	<20	<20	<50	-	<0.5	<0.5	<1.5	<0.1	<0.1	<0.1	0.10	<0.1	0.70	<0.1	<0.1	0.10	0.26	-	-				
BH401/2.3-2.5	2.3-2.5	23/11/2007	Lot 8	NATURAL	DP 2008a	<4	<1	2.50	<1	<1	<0.1	2.00	<1	<25	<50	<100	-	<0.5	<1	-	<0.1	<0.1	<0.1	<0.1	<0.1	0.70	<0.1	<0.1	<0.1	-	-	<0.1				
BH402/1.8-2.0	1.8-2	23/11/2007	Lot 8	NATURAL	DP 2008a	<4	<1	<1	<1	<1	<0.1	<1	<1	<25	<50	<100	-	<0.5	<1	-	<0.1	<0.1	<0.1	<0.1	<0.1	0.70	<0.1	<0.1	<0.1	-	-	<0.1				
BH403/1.8-2.0	1.8-2	23/11/2007	Lot 8	NATURAL	DP 2008a	<4	<1	3.40	1.20	3.50	<0.1	1.50	6.80	<25	<50	<100	-	<0.5	<1	-	<0.1	<0.1	<0.1	<0.1	<0.1	0.70	<0.1	<0.1	<0.1	-	-	<0.1				
BH406/2.3-2.5	2.3-2.5	23/11/2007	Lot 8	NATURAL	DP 2008a	<4	<1	3.30	3.00	1.10	<0.1	1.80	4.20	<25	<50	<100	-	<0.5	<1	-	<0.1	<0.1	<0.1	<0.1	<0.1	0.70	<0.1	<0.1	<0.1	-	-	<0.1				
BH65/1.0-1.5	1-1.5	3/01/2001	Lot 8	NATURAL	HLA 2001*	1.00	<1	1.00	10.00	85.00	<0.1	2.00	51.00	-	-	-	-	-	-	-	-	-	-	-	-	0.00	-	-	-	-	-	-				
BH93/1.0-1.4	1-1.4	3/01/2001	Lot 8	NATURAL	HLA 2001*	2.00	<1	2.00	27.00	69.00	<0.1	2.00	30.00	-	-	-	-	-	-	-	-	-	-	-	-	0.00	-	-	-	-	-	-				
BH1/1.5-2.0	1.5-2	19/04/1993	Lot 9	NATURAL	Jet 1993**	12.00	1.00	9.00	45.00	429.00	-	-	614.00	0.20	1.90	97.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
BH1/3.0-3.5	3-3.5	19/04/1993	Lot 9	NATURAL	Jet 1993**	<5	<0.5	8.00	17.00	17.00	-	-	17.00	<20	0.60	4.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
BH1/4.5-5.0	4.5-5	19/04/1993	Lot 9	NATURAL	Jet 1993**	<5	<0.5	<2	3.00	<5	-	-	4.00	<20	18.40	8.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
BH1/6.0-6.5	6-6.5	19/04/1993	Lot 9	NATURAL	Jet 1993**	<5	<0.5	25.00	9.00	25.00	-	-	6.00	<20	5.20	7.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
BH10/3.0-3.1	3-3.1	22/03/2001	Lot 9	NATURAL	ES 2014**	<4	<0.4	2.00	<1	2.00	<0.1	<1	490.00	-	-	-	140.00	<0.2	<1	<3	<0.1	<0.1	0.20	2.60	<0.1	4.00	<0.1	0.90	3.50	20.00	<0.1	<0.1				
BH10/4.0-4.1	4-4.1	22/03/2001	Lot 9	NATURAL	ES 2014**	<4	<0.4	<1	<1	1.00	<0.1	<1	160.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH10/5.0-5.1	5-5.1	22/03/2001	Lot 9	NATURAL	ES 2014**	<4	<0.4	2.00	3.00	4.00	<0.1	<1	21.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	0.10	<0.1	<0.5	<0.1	<0.1	0.20	0.38	<0.1	<0.1				
BH10/6.0-6.1	6-6.1	22/03/2001	Lot 9	NATURAL	ES 2014**	<4	<0.4	<1	<1	1.00	<0.1	<1	12.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH10/7.0-7.1	7-7.1	22/03/2001	Lot 9	NATURAL	ES 2014**	<4	<0.4	9.00	4.00	22.00	<0.1	5.00	<1	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH10/7.5-7.6	7.5-7.6	22/03/2001	Lot 9	NATURAL	ES 2014**	<4	<0.4	8.00	1.00	8.00	<0.1	3.00	10.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH10/8.0-8.1	8-8.1	22/03/2001	Lot 9	NATURAL	ES 2014**	6.00	<0.4	13.00	<1	14.00	<0.1	3.00	6.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH11/2.0-2.1	2-2.1	22/03/2001	Lot 9	NATURAL	ES 2014**	<4	0.50	<1	<1	4.00	<0.1	<1	50.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH11/3.0-3.1	3-3.1	22/03/2001	Lot 9	NATURAL	ES 2014**	<4	<0.4	8.00	5.00	33.00	<0.1	3.00	28.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	0.10	0.20	<0.1	<0.5	<0.1	0.10	0.20	0.76	<0.1	<0.1				
BH11/4.0-4.1	4-4.1	22/03/2001	Lot 9	NATURAL	ES 2014**	<4	<0.4	1.00	<1	2.00	<0.1	<1	110.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH11/5.0-5.1	5-5.1	22/03/2001	Lot 9	NATURAL	ES 2014**	<4	<0.4	<1	<1	1.00	<0.1	<1	11.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH11/6.0-6.1	6-6.1	22/03/2001	Lot 9	NATURAL	ES 2014**	<4	<0.4	<1	<1	2.00	<0.1	<1	7.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH11/7.0-7.1	7-7.1	22/03/2001	Lot 9	NATURAL	ES 2014**	<4	<0.4	1.00	<1	2.00	<0.1	<1	8.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<1.55	<0.1					

Field_ID	Depth	Date	Location Matrix		Reference																														
BH23/4.5-5.0	4.5-5	19/04/1993	Lot 9	NATURAL	Jet 1993**	<5	<0.5	<2	25.00	<5	-	-	9.00	0.00	1.00	14.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH23/6.0-6.5	6-6.5	19/04/1993	Lot 9	NATURAL	Jet 1993**	<5	<0.5	<2	3.00	<5	-	-	9.00	0.00	0.90	2.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH23/7.35-7.85	7.35-7.85	19/04/1993	Lot 9	NATURAL	Jet 1993**	<5	<0.5	9.00	6.00	17.00	-	-	12.00	0.00	1.40	1.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH24A/1.8-1.9	1.8-1.9	12/08/1994	Lot 9	NATURAL	CMPS&G 1994**	-	-	-	-	-	-	-	-	-	<50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	<0.01			
BH24A/2.5-2.6	2.5-2.6	12/08/1994	Lot 9	NATURAL	CMPS&G 1994**	-	-	-	-	-	-	-	-	-	<50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH26/3.0-3.5	3-3.5	19/04/1993	Lot 9	NATURAL	Jet 1993**	<5	<0.5	9.00	23.00	149.00	-	-	338.00	0.90	1.20	18.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH501/3.9-4.0	3.9-4	16/01/2008	Lot 9	NATURAL	DP 2008**	<4	<1	5.00	1.00	5.00	<0.1	1.00	1.30	<25	<50	<100	-	<0.5	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	0.20	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1			
BH505/3.9-4.0	3.9-4	16/01/2008	Lot 9	NATURAL	DP 2008**	<4	<1	10.00	28.00	140.00	<0.1	4.00	47.00	<25	<50	<100	-	<0.5	<1	<3	<0.1	<0.1	<0.1	0.20	<0.1	0.25	<0.1	0.10	0.30	1.90	<0.1	<0.1			
BH512/3.4-3.5	3.4-3.5	16/01/2008	Lot 9	NATURAL	DP 2008**	<4	<1	2.00	<1	2.00	<0.1	<1	<1	<25	<50	<100	-	<0.5	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	0.20	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1			
BH513/4.9-5.0	4.9-5	16/01/2008	Lot 9	NATURAL	DP 2008**	<4	<1	1.00	<1	1.00	<0.1	<1	2.00	<25	<50	<100	-	<0.5	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	0.20	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1			
BH7/3.0-3.1	3-3.1	22/03/2001	Lot 9	NATURAL	ES 2014b**	<4	<0.4	3.00	1.00	6.00	<0.1	<1	5.00	-	-	-	<100	<0.2	<1	<3	<0.1	0.50	0.90	4.00	0.50	2.00	0.10	4.90	3.90	23.00	<0.1	<0.1			
BH7/4.0-4.1	4-4.1	22/03/2001	Lot 9	NATURAL	ES 2014b**	<4	<0.4	<1	<1	1.00	<0.1	<1	13.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	0.10	0.30	<0.1	<0.5	<0.1	0.30	0.30	1.30	<0.1	<0.1			
BH7/5.0-5.1	5-5.1	22/03/2001	Lot 9	NATURAL	ES 2014b**	<4	<0.4	<1	<1	1.00	<0.1	<1	6.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	0.10	0.40	<0.1	<0.5	<0.1	0.50	0.40	2.00	<0.1	<0.1			
BH7/6.0-6.1	6-6.1	22/03/2001	Lot 9	NATURAL	ES 2014b**	<4	<0.4	<1	<1	<1	<0.1	<1	2.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	0.10	<0.1	<0.5	<0.1	0.20	0.10	0.43	<0.1	<0.1			
BH7/6.5-6.6	6.5-6.6	22/03/2001	Lot 9	NATURAL	ES 2014b**	<4	<0.4	9.00	4.00	9.00	<0.1	7.00	20.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1			
BH7/7.0-7.1	7-7.1	22/03/2001	Lot 9	NATURAL	ES 2014b**	<4	<0.4	11.00	2.00	13.00	<0.1	5.00	16.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1			
BH7/8.0-8.1	8-8.1	22/03/2001	Lot 9	NATURAL	ES 2014b**	10.00	0.50	38.00	<1	14.00	<0.1	1.00	4.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<1.55	<1	<1			
BH70/2.2-2.45	2.2-2.45	3/01/2001	Lot 9	NATURAL	HLA 2001**	<1	<1	2.00	3.00	8.00	<0.1	<1	8.00	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	0.96	<0.5	<0.5	<0.5	6.80	-	-		
BH73/1.4-1.85	1.4-1.85	3/01/2001	Lot 9	NATURAL	HLA 2001**	<1	<1	2.00	1.00	9.00	<0.1	<0.1	19.00	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	0.96	<0.5	<0.5	<0.5	6.80	-	-		
BH76/2.0-2.45	2-2.45	3/01/2001	Lot 9	NATURAL	HLA 2001**	<1	<1	1.00	2.00	5.00	<1	1.00	7.00	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	0.96	<0.5	<0.5	<0.5	6.80	-	-		
BH8/2.0-2.1	2-2.1	22/03/2001	Lot 9	NATURAL	ES 2014**	30.00	0.50	19.00	6.00	21.00	<0.1	1.00	41.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	0.10	0.30	<0.1	<0.5	<0.1	0.40	0.40	1.90	<0.1	<0.1			
BH8/3.0-3.1	3-3.1	22/03/2001	Lot 9	NATURAL	ES 2014**	<4	<0.4	2.00	1.00	3.00	<0.1	<1	3.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	0.20	<0.1	<0.5	<0.1	0.20	0.30	1.30	<0.1	<0.1			
BH8/4.0-4.1	4-4.1	22/03/2001	Lot 9	NATURAL	ES 2014**	<4	<0.4	1.00	<1	<1	<0.1	<1	5.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1			
BH8/5.0-5.1	5-5.1	22/03/2001	Lot 9	NATURAL	ES 2014**	<4	<0.4	1.00	<1	<1	<0.1	<1	2.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1			
BH8/6.0-6.1	6-6.1	22/03/2001	Lot 9	NATURAL	ES 2014**	<4	<0.4	1.00	<1	1.00	<0.1	<1	-	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1			
BH8/7.0-7.1	7-7.1	22/03/2001	Lot 9	NATURAL	ES 2014**	<4	<0.4	6.00	3.00	6.00	<0.1	4.00	2.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	0.08	<0.1	<0.1			
BH8/8.0-8.1	8-8.1	22/03/2001	Lot 9	NATURAL	ES 2014**	4.00	<0.4	18.00	<1	17.00	<0.1	3.00	7.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1			
BH80/3.0-3.45	3-3.45	3/01/2001	Lot 9	NATURAL	HLA 2001**	3.00	<1	3.00	13.00	50.00	<0.1	3.00	286.00	-	-	-	-	-	-	-	-	1.40	12.60	9.20	26.30	6.00	12.50	10.20	33.60	23.10	170.70	-	-		
BH81/3.0-3.45	3-3.45	3/01/2001	Lot 9	NATURAL	HLA 2001**	<1	<1	2.00	4.00	28.00	<0.1	1.00	96.00	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	0.96	<0.5	<0.5	<0.5	6.80	-	-		
BH87/2.0-2.45	2-2.45	3/01/2001	Lot 9	NATURAL	HLA 2001**	<1	<1	2.00	41.00	3.00	<0.1	<1	2.00	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1.21	<0.5	<0.5	<0.5	7.50	-	-		
BH90/3.0-3.45	3-3.45	3/01/2001	Lot 9	NATURAL	HLA 2001**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1.21	<0.5	<0.5	<0.5	7.50	-	-		
BH99/2.0-2.45	2-2.45	3/01/2001	Lot 9	NATURAL	HLA 2001**	<1	<1	4.00	9.00	125.00	0.40	1.00	33.00	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	0.50	<0.5	<0.5	<0.5	8.00	-	-		
BH1/5.5-5.6	5.5-5.6	25/03/2014	Lot 12	NATURAL	ES 2014*	<4	<0.4	6.00	3.00	6.00	<0.1	2.00	2.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1			
BH1/6.0-6.1	6-6.1	25/03/2014	Lot 12	NATURAL	ES 2014*	<4	<0.4	5.00	<1	21.00	<0.1	<1	2.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1			
BH1/7.0-7.1	7-7.1	25/03/2014	Lot 12	NATURAL	ES 2014*	<4	<0.4	19.00	5.00	17.00	<0.1	<1	1.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1			
BH1/8.0-8.1	8-8.1	25/03/2014	Lot 12	NATURAL	ES 2014*	8.00	0.40	13.00	6.00	18.00	<0.1	<1	<1	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1			
BH1/9.0-9.1	9-9.1	25/03/2014	Lot 12	NATURAL	ES 2014*	<4	<0.4	6.00	9.00	11.00	<0.1	<1	1.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1			
BH147B/ 3.0-3.1	3-3.1	30/03/2003	Lot 12	NATURAL	DP 2003*	13.00	<0.5	13.00	0.50	22.00	-	0.20	0.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH2/3.5-3.6	3.5-3.6	25/03/2014	Lot 12	NATURAL	ES 2014*	<4	<0.4	<1	5.00	2.00	<0.1	<1	7.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1			
BH2/4.0-4.1	4-4.1	25/03/2014	Lot 12	NATURAL	ES 2014*	7.00	<0.4	18.00	5.00	13.00	<0.1	2.00	17.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1			
BH2/5.0-5.1	5-5.1	25/03/2014	Lot 12	NATURAL	ES 2014*	7.00	<0.4	17.00	6.00	15.00	<0.1	1.00	16.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.							

Field_ID	Depth	Date	Location Matrix			Reference																														
BH3/2.0-2.1	2-2.1	25/03/2014	Lot 12	NATURAL	ES 2014*	<4	<0.4	12.00	7.00	24.00	<0.1	1.00	3.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH3/3.0-3.1	3-3.1	25/03/2014	Lot 12	NATURAL	ES 2014*	4.00	<0.4	7.00	39.00	28.00	<0.1	2.00	9.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH3/4.0-4.1	4-4.1	25/03/2014	Lot 12	NATURAL	ES 2014*	5.00	<0.4	11.00	57.00	32.00	<0.1	4.00	14.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH3/4.7-4.8	4.7-4.8	25/03/2014	Lot 12	NATURAL	ES 2014*	<4	<0.4	5.00	13.00	15.00	<0.1	<1	4.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH3/5.0-5.1	5-5.1	25/03/2014	Lot 12	NATURAL	ES 2014*	7.00	<0.4	10.00	210.00	45.00	<0.1	6.00	27.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH3/6.0-6.1	6-6.1	25/03/2014	Lot 12	NATURAL	ES 2014*	9.00	<0.4	18.00	2.00	18.00	<0.1	<1	1.00	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH3/7.0-7.1	7-7.1	25/03/2014	Lot 12	NATURAL	ES 2014*	20.00	<0.4	10.00	7.00	14.00	<0.1	<1	<1	-	-	-	<100	<0.2	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH3/8.0-8.1	8-8.1	25/03/2014	Lot 12	NATURAL	ES 2014*	6.00	<0.4	7.00	13.00	10.00	<0.1	1.00	1.00	-	-	-	<100	0.20	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH3/9.0-9.1	9-9.1	25/03/2014	Lot 12	NATURAL	ES 2014*	10.00	<0.4	7.00	16.00	16.00	<0.1	3.00	6.00	-	-	-	<100	0.20	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH4A/5.0-5.1	5-5.1	25/03/2014	Lot 12	NATURAL	ES 2014*	6.00	<0.4	17.00	4.00	14.00	<0.1	3.00	5.00	-	-	-	<100	0.20	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH4A/6.0-6.1	6-6.1	25/03/2014	Lot 12	NATURAL	ES 2014*	5.00	<0.4	4.00	11.00	13.00	<0.1	3.00	3.00	-	-	-	<100	0.20	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH4A/7.0-7.1	7-7.1	25/03/2014	Lot 12	NATURAL	ES 2014*	10.00	<0.4	5.00	14.00	14.00	<0.1	<1	3.00	-	-	-	<100	0.20	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH4A/8.0-8.1	8-8.1	25/03/2014	Lot 12	NATURAL	ES 2014*	6.00	<0.4	4.00	14.00	13.00	<0.1	<1	4.00	-	-	-	<100	0.20	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH4A/9.0-9.1	9-9.1	25/03/2014	Lot 12	NATURAL	ES 2014*	4.00	<0.4	5.00	6.00	14.00	<0.1	<1	2.00	-	-	-	<100	0.20	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH5/3.0-3.1	3-3.1	25/03/2014	Lot 12	NATURAL	ES 2014*	7.00	<0.4	17.00	6.00	15.00	<0.1	<1	3.00	-	-	-	<100	0.20	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH5/4.0-4.1	4-4.1	25/03/2014	Lot 12	NATURAL	ES 2014*	6.00	<0.4	15.00	16.00	27.00	0.10	1.00	14.00	-	-	-	<100	0.20	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH5/5.0-5.1	5-5.1	25/03/2014	Lot 12	NATURAL	ES 2014*	20.00	<0.4	9.00	9.00	17.00	<0.1	11.00	<1	-	-	-	<100	0.20	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH5/6.0-6.1	6-6.1	25/03/2014	Lot 12	NATURAL	ES 2014*	7.00	<0.4	9.00	12.00	20.00	<0.1	<1	5.00	-	-	-	<100	0.20	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH5/7.0-7.1	7-7.1	25/03/2014	Lot 12	NATURAL	ES 2014*	7.00	<0.4	10.00	18.00	25.00	<0.1	<1	8.00	-	-	-	<100	0.20	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH5/8.0-8.1	8-8.1	25/03/2014	Lot 12	NATURAL	ES 2014*	7.00	<0.4	10.00	27.00	21.00	<0.1	<1	37.00	-	-	-	<100	0.20	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH5/9.0-9.1	9-9.1	25/03/2014	Lot 12	NATURAL	ES 2014*	7.00	<0.4	11.00	36.00	21.00	<0.1	<1	120.00	-	-	-	<100	0.20	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH53/1.0-1.45	1-1.45	5/01/2001	Lot 12	NATURAL	HLA 2001*	6.00	<1	2.00	18.00	13.00	<0.1	<1	11.00	<2	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1.16	-	<0.5	<0.5	<1.55	-	-				
BH53/6.0-6.5	6-6.5	11/05/1993	Lot 12	NATURAL	Jet 1993*	11.00	<0.5	25.00	15.00	25.00	-	-	11.00	0.10	0.10	0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
BH53/7.5-8.0	7.5-8	11/05/1993	Lot 12	NATURAL	Jet 1993*	6.00	<0.5	10.00	19.00	22.00	-	-	16.00	<2	1.50	3.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
BH56/3.0-3.5	3-3.5	11/05/1993	Lot 12	NATURAL	Jet 1993*	-	-	-	-	-	-	-	-	<2	7.50	9.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
BH56/4.5-5.0	4.5-5	11/05/1993	Lot 12	NATURAL	Jet 1993*	<5	<0.5	8.00	58.00	42.00	-	-	21.00	<2	2.10	10.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
BH6/0.5-0.6	0.5-0.6	25/03/2014	Lot 12	NATURAL	ES 2014*	10.00	0.50	6.00	2900.00	310.00	0.30	<1	620.00	-	-	-	<100	0.20	<1	<3	<0.1	0.10	0.20	1.60	<0.1	<0.172	<0.1	1.10	1.60	8.80	<0.1	<0.1				
BH6/1.5-1.6	1.5-1.6	25/03/2014	Lot 12	NATURAL	ES 2014*	8.00	<0.4	17.00	26.00	33.00	0.10	<1	24.00	-	-	-	<100	0.20	<1	<3	<0.1	<0.1	<0.1	0.10	<0.1	1.00	<0.1	<0.1	0.20	0.36	<0.1	<0.1				
BH6/2.0-2.1	2-2.1	25/03/2014	Lot 12	NATURAL	ES 2014*	10.00	<0.4	15.00	5.00	12.00	<0.1	<1	2.00	-	-	-	<100	0.20	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	0.11	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH6/3.0-3.1	3-3.1	25/03/2014	Lot 12	NATURAL	ES 2014*	5.00	<0.4	9.00	11.00	7.00	<0.1	<1	2.00	-	-	-	<100	0.20	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH6/4.0-4.1	4-4.1	25/03/2014	Lot 12	NATURAL	ES 2014*	5.00	<0.4	8.00	23.00	17.00	<0.1	<1	14.00	-	-	-	<100	0.20	<1	<3	<0.1	<0.1	<0.1	0.10	<0.1	0.11	<0.1	<0.1	0.10	0.26	<0.1	<0.1				
BH6/5.0-5.1	5-5.1	25/03/2014	Lot 12	NATURAL	ES 2014*	<4	<0.4	6.00	20.00	10.00	<0.1	<1	7.00	-	-	-	<100	0.20	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH6/6.0-6.1	6-6.1	25/03/2014	Lot 12	NATURAL	ES 2014*	7.00	<0.4	6.00	22.00	11.00	<0.1	<1	7.00	-	-	-	<100	0.20	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH6/7.0-7.1	7-7.1	25/03/2014	Lot 12	NATURAL	ES 2014*	5.00	<0.4	5.00	300.00	9.00	<0.1	<1	9.00	-	-	-	<100	0.20	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	0.10	<0.1	<0.1				
BH6/8.0-8.1	8-8.1	25/03/2014	Lot 12	NATURAL	ES 2014*	9.00	0.90	4.00	230.00	11.00	<0.1	<1	210.00	-	-	-	<100	0.20	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH6/9.0-9.1	9-9.1	25/03/2014	Lot 12	NATURAL	ES 2014*	6.00	0.60	7.00	120.00	15.00	<0.1	<1	140.00	-	-	-	<100	0.20	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<1.55	<0.1	<0.1				
BH600/5.9-6.0	5.9-6	6/08/2008	Lot 12	NATURAL	DP 2008*	4.00	<0.5	13.00	16.00	9.00	-	6.00	1.00	<25	<50	<100	-	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	-				
BH602/4.9-5.0	4.9-5	6/08/2008	Lot 12	NATURAL	DP 2008*	5.00	<0.5	15.00	10.00	17.00	<0.1	2.00	5.00	<25	<50	<100	-	<0.5	<1	<3	0.10	0.10	0.10	0.10	0.10	0.19	0.10	0.10	0.10	0.10	<0.1	-	-			
BH603/7.9-8.0	7.9-8	6/08/2008	Lot 12	NATURAL	DP 2008*	5.00	<0.5	7.00	17.00	15.00	<0.1	1.00	1.00	<25	<50	<100	-	<0.5	<1	<3	1.20	0.10	0.30	0.40	0.60	0.19	0.20	1.20	0.30	4.20	-	-				
BH605A/6.9-7.0	6.9-7	6/08/2008	Lot 12	NATURAL	DP 2008*	<4	<0.5	19.00	9.00	6.00	<0.1	9.00																								

Field_ID	Depth	Date	Location Matrix		Reference																														
BH624/6.9-7.0	6.7-7	6/08/2008	Lot 12	NATURAL	DP 2008*	4.00	<0.5	11.00	42.00	22.00	<0.1	8.00	44.00	<25	<50	<100	-	-	<0.5	<1	<3	0.10	0.10	0.10	0.10	0.10	0.19	0.10	0.10	0.10	1.00	-	-	-	
BH625/1.9-2.0	1.9-2	6/08/2008	Lot 12	NATURAL	DP 2008*	-	-	-	-	-	-	-	-	<25	<50	<100	-	-	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH625/4.9-5.0	4.9-5	6/08/2008	Lot 12	NATURAL	DP 2008*	<4	<0.5	9.00	8.00	11.00	<0.1	3.00	7.00	<25	<50	<100	-	-	<0.5	<1	<3	0.70	0.10	0.30	0.60	0.40	0.24	0.10	1.20	-	4.09	-	-	-	
BH48/4.5-5.0	4.5-5	7/05/1993	Area 1	NATURAL	JET 1993*	11.00	<0.5	9.00	12.00	13.00	-	-	9.00	1.90	3289.00	9681.00	-	-	-	-	-	-	<4.6	<4.6	<4.6	<4.6	0.03	<4.6	<4.6	-	-	1.26	0.95	-	-
BH48/6.0-6.5	6-6.5	7/05/1993	Area 1	NATURAL	JET 1993*	-	-	-	-	-	-	-	-	0.00	0.00	10.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH48/7.5-8.0	7.5-8	7/05/1993	Area 1	NATURAL	JET 1993*	6.00	<0.5	27.00	10.00	28.00	-	-	13.00	0.20	5.20	92.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH60/6.0-6.5	6-6.5	17/05/1993	Area 1	NATURAL	JET 1993*	<5	<0.5	16.00	2.00	8.00	-	-	4.00	4.50	2910.00	6393.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH60/9.0-9.5	9-9.5	17/05/1993	Area 1	NATURAL	JET 1993*	<5	<0.5	20.00	5.00	18.00	-	-	9.00	0.00	63.70	213.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH61/3.0-3.5	3-3.5	18/05/1993	Area 1	NATURAL	JET 1993*	<5	<0.5	32.00	4.00	9.00	-	-	28.00	0.00	1.70	9.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH61/4.5-5.0	4.5-5	18/05/1993	Area 1	NATURAL	JET 1993*	<5	<0.5	<2	4.00	-	-	-	10.00	0.00	2.40	11.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH61/6.0-6.5	6-6.5	18/05/1993	Area 1	NATURAL	JET 1993*	<5	<0.5	77.00	4.00	6.00	-	-	6.00	0.00	1.50	25.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH61/7.5-8.0	7.5-8	18/05/1993	Area 1	NATURAL	JET 1993*	11.00	<0.5	24.00	5.00	19.00	-	-	8.00	0.00	1.90	33.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH64/1.5-2.0	1.5-2	18/05/1993	Area 1	NATURAL	JET 1993*	<5	<0.5	<2	19.00	36.00	-	-	11.00	0.30	2.40	39.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH64/3.0-3.5	3-3.5	18/05/1993	Area 1	NATURAL	JET 1993*	<5	<0.5	15.00	5.00	20.00	-	-	4.00	0.00	1.30	14.60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH65/3.0-3.5	3-3.5	18/05/1993	Area 1	NATURAL	JET 1993*	<5	<0.5	62.00	5.00	10.00	-	-	10.00	0.10	1.30	34.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH65/4.5-5.0	4.5-5	18/05/1993	Area 1	NATURAL	JET 1993*	<5	<0.5	<2	1.00	-	-	-	6.00	0.10	1.30	17.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH65/6.0-6.5	6-6.5	18/05/1993	Area 1	NATURAL	JET 1993*	<5	<0.5	11.00	4.00	13.00	-	-	18.00	0.00	7.30	14.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH69/3.0-3.5	3-3.5	20/07/1993	Area 1	NATURAL	JET 1993*	-	-	-	-	-	-	-	-	0.00	0.00	15.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH71/1.5-2.0	1.5-2	20/07/1993	Area 1	NATURAL	JET 1993*	<5	<0.5	3.00	4.00	12.00	-	-	4.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH73/3.0-3.5	3-3.5	21/07/1993	Area 1	NATURAL	JET 1993*	-	-	-	-	-	-	-	-	0.50	0.40	5.60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH74/6.0-6.5	6-6.5	21/07/1993	Area 1	NATURAL	JET 1993*	-	-	-	-	-	-	-	-	0.00	0.00	31.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH77/3.0-3.5	3-3.5	21/07/1993	Area 1	NATURAL	JET 1993*	-	-	-	-	-	-	-	-	2.30	0.40	7.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH77/4.5-5.0	4.5-5	21/07/1993	Area 1	NATURAL	JET 1993*	-	-	-	-	-	-	-	-	0.00	0.00	1.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH77/6.0-6.5	6-6.5	21/07/1993	Area 1	NATURAL	JET 1993*	-	-	-	-	-	-	-	-	0.00	0.50	5.60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH77/7.5-8.0	7.5-8	21/07/1993	Area 1	NATURAL	JET 1993*	-	-	-	-	-	-	-	-	1.60	0.00	5.80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH77/9.0-9.5	9-9.5	21/07/1993	Area 1	NATURAL	JET 1993*	-	-	-	-	-	-	-	-	0.00	0.00	8.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BHAH11/0.8-1.0	0.8-1	27/07/1993	Area 1	NATURAL	JET 1993*	<5	<0.5	7.00	18.00	33.00	-	-	35.00	0.00	6.50	6.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BHAH12/0.3-0.5	0.3-0.5	23/07/1993	Area 1	NATURAL	JET 1993*	<5	<0.5	7.00	75.00	432.00	-	-	306.00	0.00	3.70	69.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BHAH12/0.8-1.0	0.8-1	23/07/1993	Area 1	NATURAL	JET 1993*	<5	<0.5	4.00	4.00	11.00	-	-	19.00	0.00	1.20	4.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BHAH3/0.5-0.6	0.5-0.6	27/05/1993	Area 1	NATURAL	JET 1993*	<5	<0.5	3.00	15.00	38.00	-	-	62.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BHAH5/0.9-1.0	0.9-1	27/05/1993	Area 1	NATURAL	JET 1993*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BHN/3.4-3.5	3.4-3.5	9/08/2010	Area 1	NATURAL	ES 2010	<4	<0.5	<1	<1	<1	<0.1	<1	<1	<25	<50	<100	-	-	<0.5	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	0.19	<0.1	<0.1	<0.1	-	-	-	-	
BHS/3.3-3.4	3.3-3.4	9/08/2010	Area 1	NATURAL	ES 2010	<4	<0.5	<1	<1	<1	<0.1	<1	4.00	<25	<50	<100	-	-	<0.5	<1	<3	<0.1	<0.1	<0.1	<0.1	<0.1	0.19	<0.1	<0.1	<0.1	-	-	-	-	
BHGN/3.3-3.4	3.3-3.4	9/08/2010	Area 1	NATURAL	ES 2010	<4	<0.5	11.00	170.00	350.00	0.60	9.00	310.00	<25	<50	110.00	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	0.19	0.40	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
BHGS/3.3-3.4	3.3-3.4	9/08/2010	Area 1	NATURAL	ES 2010	<4	<0.5	6.00	65.00	190.00	0.40	3.00	190.00	<25	<50	<100	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	0.19	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
TP97/1.7-1.8	1.7-1.8	11/08/1994	Area 1	NATURAL	CMP&F 1994*	6.50	<0.5	5.35	140.00	150.00	-	-	75.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
TP97/1.8-1.9	1.8-1.9	11/08/1994	Area 1	NATURAL	CMP&F 1994*	6.50	<0.5	5.35	140.00	150.00	-	-	75.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
TP98/1.4-1.5(2)	1.4-1.5	11/08/1994	Area 1	NATURAL	CMP&F 1994*	1.50	<0.5	1.00	0.50	-	-	-	3.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH45/0.5-1.0	0.5-1	10/05/1993	Area 2	NATURAL	JET 1993*	<5	<0.5	6.00	115.00	148.00	-	-	40.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH45/1.5-2.0	1.5-2	10/05/1993	Area 2	NATURAL	JET 1993*	<5	<0.5	9.00	45.00	41.00	-	-	21.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
TP99/1.6-1.7	1.6-1.7	12/08/1994	Area 2	NATURAL	CMPS&F 1994*	4.00	<0.5	5.00	25.00	23.00	-	-	5.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
TP99/1.8-1.9	1.8-1.9	12/08/1994	Area 2	NATURAL	CMPS&F 1994*	9.00	1.50	44.00	6600.00	6500.00	-	-	2950.00	20.00	1980.00	16000.00	-	-	<1	1.00	2.00	2.90	0.50	3.10	12.00	5.40	8.08	8.20	13.00	13.00	102.40	<0.01	<0.01	-	-
TP99/2.0-2.1	2-2.1	12/08/1994	Area 2	NATURAL	CMPS&F 1994*	2.00	<0.5	3.50	2.00	2.00	-	-	4.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH14/3.0-3.5	3-3.5	22/04/1993	Area 4	NATURAL	JET 1993*	<5	<0.5	3.00	8.00	9.00	-	-	14.00	1.70	0.00	7.60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH14/4.5-5.0	4.5-5	22/04/1993	Area 4	NATURAL	JET 1993*	<5	<0.5	2.00	5.00	-	-	-	10.00	0.40	0.00	9.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH2/4.5-5.0	4.5-5	19/04/1993	Area 4	NATURAL	JET 1993*	<4	<0.5	4.00	3.00	6.00	-	-	8.00	0.00	0.00	4.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH4/3.0-3.5	3-3.5	20/04/1993	Area 4	NATURAL	JET 1993*	<5	<0.5	19.00	2.00	27.00	-	-	7.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH611/3.5-4.0	3.5-4	16/10/2007	Area 4	NATURAL	DP 2010*	<4	<1	110.00	5.70	31.00	0.17	56.00	24.00	<25	<50	<100	-	-	<0.5	<1	<3	<0.1													

Summary of Total Concentrations in Groundwater Considered



Arsenic (Total)	Cadmium	Chromium (Total)	Copper	Lead	Mercury (Inorganic)	Nickel	Zinc	>C10-C16 Fraction	Acenaphthene
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L

Field_ID	Date	Location	Reference										
MW107	30/01/2014	Area 4	ES2014d	<1	<0.1	<1	<1	<1	<0.05	<1	9	<50	<1
MW328	30/01/2014	Lot 8	ES2014d	3	<0.1	<1	<1	<1	<0.05	<1	5	<50	<1
MW402	30/01/2014	Lot 8	ES 2014d	3	0	<1	2	<1	0	<1	47	<50	<1
MW403	30/01/2014	Lot 8	ES2014d	<1	<0.1	<1	<1	<1	<0.05	<1	1	<50	<1
MW405	30/01/2014	Lot 8	ES2014d	2	<0.1	1	<1	<1	<0.05	<1	14	<50	<1
MW503	30/01/2014	Lot 9	ES2014d	1	<0.1	<1	<1	<1	0	<1	5	<50	<1
MW504	30/01/2014	Lot 9	ES 2014d	<1	<0.1	<1	<1	<1	<0.05	<1	5	<50	<1
MW507	30/01/2014	Lot 9		<1	<0.1	<1	1	1	<0.05	<1	6	<50	<1
MW508	30/01/2014	Lot 9	ES2014d	4	<0.1	<1	<1	<1	<0.05	3	690	<50	<1
MW511	30/01/2014	Lot 9	ES2014d	<1	<0.1	<1	<1	<1	<0.05	<1	<1	<50	<1
MW103	31/01/2014	Area 1	ES2014d	<1	<0.1	<1	<1	<1	<0.05	<1	3	<50	<1
MW104	31/01/2014	Lot 12	ES2014d	<1	<0.1	<1	<1	<1	<0.05	<1	31	<50	<1
MW301	31/01/2014	Lot 12	ES2014d	<1	0	<1	10	<1	<0.05	2	90	<50	<1
MW619	31/01/2014	Lot 12	ES2014*	2	<0.1	<1	<1	<1	<0.05	1	9	<50	2
MW625	31/01/2014	Lot 12	ES2014*	<1	0	<1	10	<1	<0.05	2	90	<50	<1
MWAH1	31/01/2014	Area 1		2	<0.1	<1	1	<1	<0.05	11	83	<50	<1
MW14	3/04/2014	Lot 9	ES2014*	2	<0.1	<1	1	<1	<0.05	7	17	<50	<1
MW15	3/04/2014	Lot 9	ES2014*	2	<0.1	<1	<1	<1	<0.05	1	25	<50	<1
MW15	3/04/2014	Lot 9	ES2014*	<1	<0.1	1	<1	<1	<0.05	2	10	<50	<1
MW1	4/04/2014	Lot 12	ES2014*	<1	<0.1	<1	6	<1	<0.05	<1	17	<50	<1
MW3	4/04/2014	Lot 12	ES2014*	2	<0.1	<1	<1	<1	<0.05	<1	12	<50	<1
MW1	24/03/2015	Lot 12	ES 2015b	<1	<0.1	1	2	<1	<0.05	<1	4	<50	-
MW104	24/03/2015	Lot 12	ES 2015b	<1	<0.1	<1	<1	<1	<0.05	2	37	<50	-
MW107	24/03/2015	Area 4	ES 2015b	<1	<0.1	<1	2	<1	<0.05	<1	9	<50	-
MW14	24/03/2015	Lot 9	ES 2015b	<1	<0.1	<1	1	<1	<0.05	2	4	<50	-
MW15	24/03/2015	Lot 9	ES 2015b	2	<0.1	<1	<1	<1	<0.05	3	3	<50	-
MW16	24/03/2015	Lot 9	ES 2015b	<1	<0.1	1	<1	<1	<0.05	<1	1	<50	-
MW3	24/03/2015	Lot 12	ES 2015b	<1	<0.1	<1	<1	<1	<0.05	<1	<1	<50	-
MW504	24/03/2015	Lot 9	ES 2015b	4	<0.1	<1	<1	<1	<0.05	<1	2	<50	-
MW507	24/03/2015	Lot 9	ES 2015b	<1	<0.1	<1	<1	<1	<0.05	<1	9	<50	-
MW508	24/03/2015	Lot 9	ES 2015b	20	<0.1	<1	<1	<1	<0.05	3	650	<50	-
MW511	24/03/2015	Lot 9	ES 2015b	<1	<0.1	<1	<1	<1	<0.05	<1	<1	<50	-
MW513	24/03/2015	Lot 9	ES 2015b	<1	<0.1	<1	<1	<1	<0.05	<1	4	<50	-
MW619	24/03/2015	Lot 12	ES 2015b	<1	<0.1	<1	2	<1	<0.05	2	16	<50	-
MW625	24/03/2015	Lot 12	ES 2015b	-	-	-	-	-	-	-	-	150	-
MW103	25/03/2015	Area 1	ES 2015b	<1	<0.1	<1	1	<1	<0.05	<1	6	<50	-
MW328	25/03/2015	Lot 8	ES 2015b	7	<0.1	<1	1	<1	<0.05	<1	1	<50	-
MW402	25/03/2015	Lot 8	ES 2015b	4	0	<1	3	<1	0	<1	57	<50	-
MW405	25/03/2015	Lot 8	ES 2015b	2	<0.1	<1	2	<1	<0.05	<1	8	<50	-
MW403	30/03/2015	Lot 8	ES 2015b	1	<0.1	<1	<1	<1	<0.05	<1	55	<50	-
MWAH1	30/03/2015	Area 1	ES 2015b	<1	1	<1	4	<1	<0.05	12	92	<50	-

Appendix B Statistical Analysis

	0	1	2	3	4	5	6	7	8	9	10	11
	As	d_As	Cd	d_Cd	Cu	d_Cu	Pb	d_Pb	Hg	d_Hg	Ni	d_Ni
1	4	1	0.4	0	9	1	22	1	0.1	0	4	1
2	4	0	0.4	0	8	1	23	1	0.1	0	2	1
3	4	0	0.4	0	1	0	2	1	0.1	0	1	0
4	4	0	0.4	0	4	1	11	1	0.1	0	4	1
5	4	0	0.4	0	36	1	29	1	0.1	0	4	1
6	4	0	0.4	0	40	1	39	1	0.1	0	1	1
7	10	1	0.4	0	26	1	45	1	0.1	0	1	1
8	5	0	0.5	0	11	1	20	1	0.07	1	6	1
9	18	1	2	1	5210	1	2139	1	0.05	1	7	1
10	22	1	1.9	1	3660	1	2270	1	0.05	0	13	1
11	5	0	0.5	0	280	1	138	1	0.12	1	5	1
12	3	0	0.5	0	37	1	68	1	0.05	0	190	1
13	3	0	0.5	0	24	1	31	1	0.1	0	5.5	1
14	3	0	0.5	0	40	1	20	1	0.2	1	8.2	1
15	3	0	0.5	0	220	1	67	1	0.1	0	1	0
16	3	0	0.5	1	61	1	9	1	0.1	0	10	1
17	4	0	1	0	9	1	20	1	0.1	0	6.1	1
18	4.8	1	1	0	80	1	95	1	0.1	0	1.4	1
19	4	0	1	0	4.9	1	6.1	1	0.1	0	1	0
20	4	0	1	0	23	1	42	1	0.1	0	4.2	1
21	4	0	1	0	71	1	110	1	0.1	0	7.2	1
22	4	0	1	0	3.2	1	3.8	1	0.1	0	4	1
23	4	0	1	0	1.4	1	3	1	0.1	0	4.9	1
24	4	0	1	0	8.1	1	13	1	0.1	0	1.7	1
25	4	0	1	0	5.7	1	19	1	0.1	0	5.7	1
26	4	0	1	0	5.4	1	16	1	0.1	0	4.3	1
27	4	0	1	0	59	1	130	1	0.1	0	1.1	1
28	4	0	1	0	2.7	1	1.9	1	0.2	1	2	1
29	4	0	1	0	3.2	1	9.9	1	0.1	0	4	1
30	4	0	1	0	9	1	52	1	0.1	0	3	1
31	4	0	1	0	1	0	3.2	1	0.1	0	3	1
32	2	1	1	0	6	1	15	1	0.1	0	8	1
33	3	1	1	0	7	1	18	1	0.1	0	4.9	1
34	2	1	1	0	19	1	65	1	0.1	0	4.5	1
35	3	1	1	0	23	1	35	1	0.44	1	1	0
36	2	1	1	0	50	1	27	1	0.1	0	1	0
37	4	0	1	0	12	1	35	1	0.1	0	6	1
38	4	0	1	0	21	1	22	1	0.1	0	12	1
39	4	0	1	0	3.5	1	11	1	0.1	0	8	1
40	4	0	1	0	1	0	2.6	1	0.1	0	6	1
41	5	0	0.5	0	131	1	15	1	0.1	0	5	1
42	5	0	0.5	0	20	1	31	1	0.9	1	4	1
43	5	1	0.4	0	10	1	16	1	0.2	1	25	1
44	10	1	1	1	160	1	190	1	0.3	1	3	1
45	4	1	0.4	0	11	1	23	1	0.1	1	3	1
46	4	1	0.4	0	11	1	19	1	0.3	1	1	0
47	4	0	0.4	0	110	1	17	1	0.1	0	6	1
48	6	1	0.4	0	35	1	120	1	0.1	0	1	1
49	10	1	1	1	190	1	310	1	1	1	15	1
50	4	0	0.4	0	29	1	50	1	1	1	9	1
51	4	0	0.4	0	23	1	75	1	0.1	0	19	1
52	4	0	0.4	0	9	1	36	1	1	1	3	1
53	5	0	0.5	0	12	1	15	1	0.1	0	3	1
54	5	0	0.5	0	33	1	85	1	0.1	0	6	1
55	5	0	0.5	0	5	1	14	1	1	1	19	1
56	5	0	0.5	0	10	1	19	1	0.1	0	2	1

	0	1	2	3	4	5	6	7	8	9	10	11
	As	d_As	Cd	d_Cd	Cu	d_Cu	Pb	d_Pb	Hg	d_Hg	Ni	d_Ni
57	10	1	1.6	1	148	1	954	1	0.1	0	9	1
58	8	1	0.5	0	22	1	24	1	0.1	0	5	1
59	5	0	0.5	0	8	1	13	1	0.1	0	9	1
60	7	1	0.7	1	147	1	471	1	0.1	0	3	1
61	4.3	1	1	0	18	1	20	1	0.1	0	2	1
62	4	0	1	0	6	1	22	1	0.1	0	11	1
63	74	1	3	1	220	1	550	1	0.1	0	7	1
64	34	1	2	1	91	1	300	1	0.1	0	4	1
65	4	0	1	0	34	1	76	1	0.1	0	5	1
66	5.4	1	1	0	76	1	63	1	0.1	0	1	0
67	4	0	1	0	8	1	13	1	0.1	0	8	1
68	5.9	1	1	0	20	1	61	1	0.1	0	1	0
69	7.5	1	1	0	370	1	210	1	0.1	0	5	1
70	4.7	1	1	0	3	1	54	1	0.1	0	1	0
71	4.6	1	1	0	10	1	15	1	0.1	0	2	1
72	4	0	1	0	36	1	390	1	2	1	2	1
73	4	0	1	0	220	1	110	1	0.1	0	4	1
74	4	0	1	0	37	1	260	1	0.1	0	3	1
75	4	0	1	0	3	1	9	1	0.1	0	9	1
76	6.4	1	1	0	47	1	130	1	0.4	1	6	1
77	4	0	1	0	11	1	15	1	0.1	0	6	1
78	4	0	1	0	23	1	180	1	0.1	0	2	1
79	4	0	1	0	53	1	89	1	0.1	0	2	1
80	4	0	1	0	2	1	7	1	0.1	0	2	1
81	5	1	1	0	64	1	200	1	0.1	0	2	1
82	4	0	1	0	3	1	9	1	0.1	0	3	1
83	4	0	1	0	11	1	27	1	0.1	0	1	1
84	4	0	1	0	7	1	30	1	0.1	0	6	1
85	9	1	1	0	9	1	56	1	0.1	0	6	1
86	4	0	1	0	81	1	69	1	0.1	0	2	1
87	3	1	1	0	7	1	18	1	0.1	0	18	1
88	2	1	1	0	19	1	65	1	0.1	0	6	1
89	4	1	0.4	0	13	1	15	1	0.1	0	3	1
90	6	1	0.4	0	38	1	150	1	0.1	0	3	1
91	4	1	0.4	0	15	1	170	1	0.1	0	4	1
92	1	1	1	0	10	1	33	1	0.1	0	7	1
93	3	1	1	0	29	1	102	1	0.1	1	3	1
94	2	1	1	0	7	1	17	1	0.1	0	1	0
95	3	1	1	0	46	1	101	1	0.3	1	25	1
96	3	1	1	0	8	1	13	1	0.1	0	7	1
97	1	0	1	0	3	1	7	1	0.1	0	4	1
98	4	0	0.4	0	150	1	23	1	0.1	0	1	0
99	4	0	0.8	1	150	1	23	1	0.1	0	3	1
100	4	1	1	0	139	1	98	1	0.1	0	3	1
101	12	1	4	1	223	1	1180	1	0.1	0	1	1
102	3	1	1	0	8	1	11	1	0.1	0	2	1
103	2	1	1	0	9	1	12	1	0.1	0	6	1
104	1	1	1	0	80	1	28	1	0.12	1	11	1
105	4	0	0.4	0	9	1	51	1	0.05	0	2	1
106	5	1	0.5	1	78	1	110	1	0.22	1	11	1
107	1	1	1	0	16	1	182	1	0.05	0	2	1
108	1	1	1	0	5	1	23	1	0.05	0	4	1
109	20	1	0.4	1	1800	1	270	1	0.62	1	14	1
110	9	1	0.4	0	260	1	43	1	0.05	0	16	1
111	9	1	0.4	0	900	1	44	1	0.28	1	2	1
112	4	0	0.4	0	6	1	4	1	0.06	1	8	1

	0	1	2	3	4	5	6	7	8	9	10	11
	As	d_As	Cd	d_Cd	Cu	d_Cu	Pb	d_Pb	Hg	d_Hg	Ni	d_Ni
113	7	1	0.4	0	110	1	30	1	0.32	1	64	1
114	6	1	0.4	0	81	1	24	1	0.05	0	0.6	1
115	4	0	0.4	0	6	1	14	1	0.05	0	0.9	1
116	4	0	0.4	0	39	1	21	1	0.1	0	5	1
117	4	0	0.4	0	45	1	40	1	0.1	0	1	0
118	3	0	0.5	0	3700	1	410	1	0.2	1	7	1
119	3	0	0.5	0	110	1	39	1	0.5	1	3	1
120	3	0	0.5	0	690	1	160	1	0.2	1	16	1
121	3	0	0.5	0	160	1	66	1	0.3	1	21	1
122	3	0	0.5	0	290	1	120	1	0.5	1	7	1
123	9	1	3	1	1000	1	580	1	0.1	1	8	1
124	8	1	8	1	4700	1	1000	1	0.1	0	2	1
125	3	0	0.5	0	270	1	33	1	0.1	0	14	1
126	3	0	0.5	0	140	1	100	1	0.1	0	3	1
127	26	1	1	1	1800	1	1000	1	0.1	1	1200	1
128	3	0	0.5	0	2	1	3	1	0.4	1	15	1
129	3	0	0.5	0	3	1	4	1	0.1	0	1	0
130	4	0	0.4	0	120	1	61	1	0.1	0	3	1
131	7	1	0.4	0	50	1	51	1	0.1	0	3	1
132	6	1	0.4	0	300	1	140	1	0.1	0	1	0
133	4	0	0.4	0	150	1	67	1	0.1	0	1	0
134	13	1	0.6	1	3200	1	440	1	0.1	0	1	0
135	20	1	0.9	1	7300	1	1300	1	0.1	1	1	0
136	20	1	0.9	1	2300	1	1100	1	0.1	0	5	1
137	5	1	0.5	1	820	1	170	1	0.2	1	12	1
138	4	0	0.4	0	72	1	17	1	0.1	0	1	0
139	6	1	0.4	0	310	1	187	1	0.1	0	4	1
140	4	1	0.4	0	35	1	17	1	0.1	0	4	1
141	10	1	0.7	1	1900	1	910	1	0.1	0	28	1
142	8	1	1	0	2340	1	301	1	0.1	0	8	1
143	3	1	1	0	13	1	15	1	0.1	1	3	1
144	7	1	0.4	0	69	1	48	1	0.1	1	8	1
145	4	0	0.5	1	44	1	29	1	0.1	0	1	0
146	4	0	0.4	0	3	1	15	1	0.3	1	1	0
147	4	0	0.4	0	1	0	1	1	0.1	0	1	1
148	4	0	0.4	0	160	1	110	1	0.1	0	18	1
149	4	0	0.4	0	23	1	23	1	0.1	1	25	1
150	15	1	0.5	0	401	1	440	1	0.1	0	4	1
151	4	1	1	0	54	1	51	1	0.1	0	81	1
152	14	1	0.5	0	336	1	303	1	0.1	0	22	1
153	8	1	0.5	0	103	1	95	1	0.1	0	6	1
154	5	0	0.5	0	58	1	31	1	0.1	0	2	1
155	5	0	0.5	0	31	1	31	1	0.1	0	33	1
156	12	1	1	0	2340	1	342	1	0.1	0	6	1
157	3	1	1	0	12	1	8	1	0.1	0	6	1
158	3	1	1	0	7	1	18	1	0.1	0	9	1
159	35	1	1	1	3800	1	3440	1	0.1	0	2	1
160	4	1	1	0	201	1	149	1	0.1	0	2	1
161	26	1	1	1	2160	1	2880	1	0.1	0	21	1
162	407	1	7.1	1	1500	1	314	1	0.1	0	5	1
163	5	0	0.5	0	66	1	58	1	0.1	0	5	1
164	29	1	2	1	2940	1	1040	1	0.1	0	39	1
165	625	1	2	1	324	1	154	1	0.1	0	9	1
166	87	1	0.5	0	7340	1	737	1	0.1	0	11	1
167	243	1	0.5	0	104	1	1590	1	0.1	0	79	1
168	5	0	0.5	0	380	1	40	1	0.1	0	8	1

	0	1	2	3	4	5	6	7	8	9	10	11
	As	d_As	Cd	d_Cd	Cu	d_Cu	Pb	d_Pb	Hg	d_Hg	Ni	d_Ni
169	5	1	0.5	0	66	1	28	1	0.1	0	7	1
170	2	1	1	0	108	1	63	1	0.1	0	17	1
171	27	1	1	1	1250	1	592	1	0.1	0	2	1
172	5	0	0.5	0	233	1	98	1	0.1	0	2	1
173	5	0	0.5	0	116	1	49	1	0.1	0	15	1
174	5	0	0.5	0	76	1	84	1	0.1	0	7	1
175	5	1	1	0	467	1	2890	1	0.1	0	4	1
176	5	0	0.5	0	124	1	88	1	0.1	1	16	1
177	5	0	0.5	0	69	1	48	1	0.2	1	58	1
178	5	0	0.5	0	46	1	85	1	0.1	0	3	1
179	6	1	1	0	1750	1	524	1	0.1	0	3	1
180	1	0	1	0	73	1	22	1	0.1	0	9	1
181	20	1	0.4	0	260	1	530	1	0.1	0	3	1
182	1	0	1	0	48	1	32	1	0.1	0	5	1
183	4	0	0.5	0	60	1	41	1	0.1	0	9	1
184	20	1	0.9	1	10000	1	180	1	0.1	0	46	1
185	4	0	0.5	0	18	1	23	1	0.1	1	8	1
186	5	1	0.5	0	110	1	72	1	0.4	1	18	1
187	4	0	0.5	0	260	1	260	1	0.3	1	19	1
188	4	0	0.5	0	48	1	53	1	0.1	0	37	1
189	8	1	0.5	0	21	1	27	1	0.5	1	18	1
190	5	1	0.5	0	1500	1	220	1	0.3	1	26	1
191	6	1	0.5	0	58	1	28	1	0.3	1	33	1
192	7	1	0.5	0	480	1	56	1	0.2	1	20	1
193	10	1	0.5	0	1400	1	68	1	0.4	1	16	1
194	4	0	0.5	0	19	1	17	1	0.1	1	38	1
195	4	0	0.5	0	4	1	5	1	0.3	1	12	1
196	15	1	0.7	1	3400	1	5000	1	0.5	1	82	1
197	4	1	0.5	0	5400	1	1300	1	0.1	0	3	1
198	4	0	0.5	0	140	1	560	1	0.1	0	11	1
199	32	1	1.5	1	5100	1	12000	1	0.1	1	14	1
200	4	0	0.5	0	160	1	820	1	0.1	1	60	1
201	4	0	0.5	0	100	1	95	1	0.1	0	11	1
202	130	1	2	1	27000	1	290	1	0.2	1	44	1
203	9	1	0.5	0	170	1	29	1	0.1	0	1	1
204	7	1	0.5	0	290	1	30	1	0.1	0	3	1
205	4	0	0.5	0	46	1	25	1	0.1	0	3	1
206	4	0	0.5	0	15	1	25	1	0.1	0	14	1
207	5	1	0.5	0	6	1	24	1	0.1	0	11	1
208	4	0	0.5	0	70	1	170	1	0.1	0	9	1
209	4	0	0.5	0	20	1	18	1	0.1	0	2	1
210	4	0	0.5	0	17	1	23	1	0.1	0	3	1
211	5	1	0.5	0	960	1	140	1	0.1	0	2	1
212	44	1	1.5	1	21000	1	370	1	0.6	1	2	1
213	4	0	0.5	0	28	1	5	1	0.1	0	7	1
214	2	1	0.1	0	97	1	182	1	0.1	0	5	1
215	5	1	0.5	0	96	1	53	1	0.1	0	8	1
216	7	1	0.5	0	7	1	18	1	0.1	0	6	1
217	4	0	0.5	0	31	1	22	1	0.1	1	0.1	0
218	4	1	0.5	0	290	1	130	1	0.1	0	0.1	0
219	9	1	0.6	1	620	1	120	1	0.1	0	8	1
220	6	1	0.5	0	990	1	380	1	0.1	1	2	1
221	19	1	0.7	1	1800	1	490	1	0.3	1	26	1
222	19	1	0.7	1	1500	1	520	1	0.3	1	7	1
223	17	1	0.8	1	2500	1	960	1	0.2	1	5	1
224	19	1	0.7	1	1200	1	380	1	0.1	1	45	1

	0	1	2	3	4	5	6	7	8	9	10	11
	As	d_As	Cd	d_Cd	Cu	d_Cu	Pb	d_Pb	Hg	d_Hg	Ni	d_Ni
225	25	1	0.7	1	2800	1	690	1	0.3	1	19	1
226	18	1	0.5	1	650	1	250	1	0.3	1	3	1
227	27	1	0.8	1	7400	1	1300	1	0.2	1	4	1
228	30	1	0.6	1	1800	1	430	1	0.2	1	2	1
229	15	1	0.5	0	100	1	510	1	0.1	0	2	1
230	12	1	0.9	1	870	1	480	1	0.1	1	7	1
231	17	1	0.7	1	1100	1	1100	1	0.1	0	2	1
232	4	0	0.5	0	34	1	31	1	0.4	1	17	1
233	4	0	0.5	0	30	1	26	1	0.1	1	13	1
234	20	1	0.5	0	190	1	100	1	0.1	0	13	1
235	20	1	0.5	0	140	1	140	1	0.1	0	15	1
236	4	0	0.5	0	68	1	22	1	0.1	0	3	1
237	4	0	0.5	0	160	1	110	1	0.1	0	4	1
238	4	0	0.5	0	7	1	6	1	0.1	0	1	0
239	4	0	0.5	0	30	1	53	1	0.2	1	34	1
240	4	0	0.5	0	4	1	1	1	4.6	1	17	1
241	4	1	1	0	211	1	85	1	0.1	0	1	0
242	4	0	0.5	0	72	1	74	1	2.4	1	15	1
243	16	1	0.8	1	6200	1	1500	1	1.2	1	21	1
244	4	0	0.5	0	11	1	47	1	0.2	1	11	1
245	4	0	0.5	0	19	1	10	1	0.1	1	3	1
246	4	0	0.5	0	3	1	6	1	0.6	1	19	1
247	4	0	0.5	0	23	1	65	1	0.1	0	1	1
248	4	0	0.5	0	100	1	290	1	0.2	1	37	1
249	4	0	0.5	0	42	1	55	1	0.4	1	7	1
250	4	0	0.5	0	39	1	54	1	0.1	1	3	1
251	4	0	0.5	0	250	1	52	1	0.7	1	21	1
252	4	0	0.5	0	10	1	27	1	3.4	1	19	1
253	4	0	0.5	0	3	1	12	1	0.1	0	1	1
254	4	0	0.5	0	110	1	95	1	0.1	0	1	1
255	5	1	0.5	0	8	1	15	1	0.1	1	10	1
256	9	1	0.5	0	980	1	830	1	0.1	0	5	1
257	4	0	0.5	0	190	1	230	1	0.1	0	1	1
258	5	1	0.5	0	92	1	290	1	0.1	0	12	1
259	11	1	0.5	1	650	1	130	1	0.4	1	31	1
260	4	1	0.5	0	58	1	150	1	0.3	1	18	1
261	4	0	0.5	0	7	1	21	1	0.2	1	23	1
262	4	0	0.5	0	15	1	39	1	0.2	1	38	1
263	12	1	0.5	0	100	1	880	1	0.7	1	7	1
264	4	0	0.5	0	35	1	200	1	0.2	1	4	1
265	5	1	0.5	0	110	1	460	1	0.2	1	13	1
266	4	0	0.5	0	3	1	8	1	0.1	0	3	1
267	21	1	0.5	0	910	1	320	1	0.1	0	4	1
268	7	1	0.5	0	310	1	540	1	0.2	1	10	1
269	15	1	0.5	0	790	1	2100	1	0.1	0	39	1
270	18	1	0.5	0	600	1	4300	1	0.1	1	13	1
271	6	1	0.5	0	57	1	140	1	0.3	1	20	1
272	5	1	0.5	0	5	1	29	1	0.1	0	6	1
273	4	0	0.5	0	1	0	1	0	0.5	1	6	1
274	26	1	0.5	0	1000	1	910	1	0.3	1	21	1
275	12	1	0.7	1	1300	1	1000	1	0.1	0	3	1
276	9	1	0.5	0	46	1	43	1	0.1	0	4	1
277	20	1	0.5	0	1800	1	450	1	0.1	0	5	1
278	16	1	3.5	1	1200	1	1200	1	0.2	1	21	1
279	7	1	1.5	1	590	1	560	1	0.1	0	4	1
280	6	1	0.6	1	500	1	74	1	0.1	0	2	1

	0	1	2	3	4	5	6	7	8	9	10	11
	As	d_As	Cd	d_Cd	Cu	d_Cu	Pb	d_Pb	Hg	d_Hg	Ni	d_Ni
281	16	1	0.5	0	1100	1	790	1	0.1	0	25	1
282	4	0	0.5	0	1	0	2	1	0.1	0	27	1
283	35	1	3	1	510	1	540	1	0.2	1	12	1
284	5	1	0.5	0	210	1	200	1	0.2	1	3	1
285	4	0	0.5	0	75	1	77	1	0.1	0	10	1
286	12	1	0.5	0	1900	1	350	1	0.1	0	14	1
287	13	1	0.5	1	1500	1	430	1	0.2	1	15	1
288	4	0	0.5	0	30	1	32	1	0.1	0	21	1
289	4	0	0.5	0	43	1	25	1	0.1	0	1	1
290	7	1	0.5	0	580	1	180	1	0.1	0	46	1
291	6	1	0.5	0	16	1	37	1	1.8	1	430	1
292	5	1	0.5	0	4	1	24	1	0.1	0	12	1
293	6	1	0.5	0	25	1	25	1	0.1	0	2	1
294	21	1	0.5	0	990	1	500	1	0.1	0	2	1
295	11	1	0.5	0	1800	1	400	1	0.1	0	4	1
296	22	1	1	1	7200	1	1300	1	0.1	0	7	1
297	20	1	1.2	1	2900	1	1500	1	0.1	0	6	1
298	8	1	0.5	0	1200	1	540	1	0.6	1	9	1
299	14	1	0.5	0	660	1	260	1	0.1	0	1	0
300	7	1	0.5	0	1100	1	190	1	0.1	0	1	1
301	4	1	0.5	0	58	1	49	1	0.4	1	3	1
302	5	1	0.5	0	21	1	22	1	0.1	0	1	0
303	7	1	0.5	0	720	1	180	1	0.1	0	4	1
304	5	1	0.5	0	240	1	160	1	0.1	0	39	1
305	6	1	0.5	0	340	1	220	1	0.5	1	58	1
306	8	1	0.5	0	690	1	260	1	0.1	1	41	1
307	7	1	0.5	0	13	1	25	1	0.5	1	70	1
308	15	1	0.5	0	1806	1	718	1	0.2	1	52	1
309	27	1	1.7	1	680	1	1300	1	0.2	1	48	1
310	5	1	0.5	0	79	1	45	1	0.6	1	140	1
311	4	1	0.5	0	43	1	33	1	0.1	0	41	1
312	6	1	0.5	0	31	1	23	1	0.1	0	3	1
313	16	1	0.5	0	4600	1	860	1	0.1	0	1.8	1
314	4	0	0.5	0	17	1	9	1	0.12	1	5.7	1
315	4	0	0.5	0	6	1	6	1	0.28	1	9.3	1
316	4	0	0.5	0	58	1	10	1	0.1	0	4.9	1
317	4	0	0.5	0	58	1	7	1	0.1	0	5.1	1
318	14	1	0.5	0	1300	1	1900	1	0.1	0	4.4	1
319	5	1	0.5	0	110	1	64	1	0.1	0	6	1
320	4	0	0.5	0	65	1	35	1	0.1	0	3.6	1
321	4	0	0.5	0	60	1	33	1	0.14	1	3.5	1
322	7	1	0.5	0	1100	1	160	1	0.1	0	4.3	1
323	22	1	0.5	0	390	1	76	1	0.1	0	2.1	1
324	4	0	0.5	0	16	1	52	1	0.1	0	22	1
325	4	0	0.4	0	97	1	33	1	0.15	1	9.2	1
326	65	1	0.5	1	13000	1	3000	1	0.11	1	10	1
327	12	1	0.6	1	990	1	390	1	0.17	1	140	1
328	6	1	0.5	0	68	1	39	1	0.1	0	1.6	1
329	4	1	0.5	0	26	1	21	1	0.1	0	3.7	1
330	5.5	1	0.5	0	24	1	76	1	0.1	0	2.9	1
331	4	1	0.5	0	2750	1	2	1	0.1	0	5.3	1
332	8	1	0.5	0	1850	1	410	1	0.1	0	3.7	1
333	8	1	0.5	0	70	1	970	1	0.1	0	3	1
334	5	1	0.5	0	5200	1	26	1	0.1	0	45	1
335	9	1	1	1	5100	1	1350	1	0.1	0	80	1
336	10	1	2	1	14.5	1	1140	1	0.1	1	50	1

	0	1	2	3	4	5	6	7	8	9	10	11
	As	d_As	Cd	d_Cd	Cu	d_Cu	Pb	d_Pb	Hg	d_Hg	Ni	d_Ni
337	9	1	0.5	1	750	1	1830	1	0.1	0	4	1
338	7.5	1	0.5	0	83	1	55	1	0.1	0	3	1
339	5	0	0.5	0	19	1	86	1	0.1	0	2	1
340	5	0	0.5	0	9	1	49	1	0.1	0	2	1
341	7	1	0.5	0	59	1	23	1	0.1	0	1	0
342	5	0	0.5	0	55	1	34	1	0.1	0	8	1
343	5	0	0.5	0	10	1	81	1	0.1	0	1	1
344	24	1	0.5	0	54	1	18	1				
345	5	0	0.5	0	410	1	132	1				
346	5	0	0.5	0	38	1	183	1				
347	5	0	0.5	0	27	1	145	1				
348	5	0	0.5	0	82	1	110	1				
349	5	0	0.5	0	83	1	215	1				
350	5	0	0.5	0	1160	1	170	1				
351	24	1	1	1	83	1	2100	1				
352	24	1	1	1	22	1	368	1				
353	5	0	0.5	0	17	1	1850	1				
354	5	0	0.5	0	8650	1	216	1				
355	7	1	0.5	0	181	1	381	1				
356	5	0	0.5	0	90	1	164	1				
357	5	0	0.5	0	6	1	93	1				
358	5	0	0.5	0	325	1	16	1				
359	5	0	1	1	28	1	325	1				
360	5	0	0.5	0	119	1	28	1				
361	5	0	0.5	0	16	1	119	1				
362	5	0	0.5	0	3	1	13	1				
363	5	0	0.5	0	443	1	33	1				
364	36	1	3.6	1	398	1	616	1				
365	48	1	0.7	1	46	1	441	1				
366	5	0	0.5	0	197	1	603	1				
367	5	0	0.5	0	219	1	197	1				
368	5	0	0.5	0	27	1	219	1				
369	10	1	0.5	0	144	1	126	1				
370	5	0	0.5	0	59	1	315	1				
371	5	0	0.5	0	177	1	80	1				
372	5	0	0.5	0	687	1	157	1				
373	21	1	21	1	287	1	1020	1				
374	6	1	1	1	522	1	1230	1				
375	5	1	2	1	20	1	883	1				
376	5	0	0.5	0	270	1	31	1				
377	9	1	1.8	1	132	1	616	1				
378	5	0	0.7	1	46	1	360	1				
379	11	1	1.5	1	311	1	140	1				
380	12	1	2.2	1	492	1	711	1				
381	28	1	0.7	1	9	1	1620	1				
382	4	0	0.5	0	6	1	11	1				
383	4	0	0.5	0	24	1	8	1				
384	4	0	0.5	0	5	1	33	1				
385	4	0	0.5	0	13	1	13	1				
386	4	0	0.5	0	170	1	350	1				
387	4	0	0.5	0	1	0	1	0				
388	4	0	0.5	0	1	0	3	1				
389	4	0	0.5	0	65	1	190	1				
390	4	0	0.5	0	6	1	24	1				
391	4	0	0.5	0	100	1	38	1				
392	4	0	0.5	0	270	1	230	1				

	0	1	2	3	4	5	6	7	8	9	10	11
	As	d_As	Cd	d_Cd	Cu	d_Cu	Pb	d_Pb	Hg	d_Hg	Ni	d_Ni
393	6	1	0.5	1	2	1	1	1				
394	1.5	1	0.5	0	180	1	200	1				
395	5.5	1	0.5	0	1	1	0.5	1				
396	1	1	0.5	0	2260	1	720	1				
397	9	1	0.5	1	16	1	42	1				
398	4.5	1	0.5	0	5	1	1	1				
399	1	1	0.5	0	840	1	700	1				
400	6.5	1	0.5	1	0.5	1	1	0				
401	1.5	1	0.5	0	240	1	140	1				
402	5.5	1	0.5	0	1.5	1	1	0				
403	2.5	1	0.5	0	150	1	140	1				
404	5.5	1	0.5	1	150	1	140	1				
405	5.5	1	0.5	1	3	1	9	1				
406	1.5	1	0.5	0	120	1	88	1				
407	5.5	1	0.5	0	120	1	68	1				
408	5.5	1	0.5	0	0.5	1	88	1				
409	1.5	1	0.5	0	219	1	759	1				
410	5	0	0.5	0	1020	1	39	1				
411	9	1	0.5	0	24	1	22	1				
412	5	0	0.5	0	6	1	2130	1				
413	7	1	0.5	0	734	1	46	1				
414	26	1	0.5	0	9	1	5	1				
415	5	0	0.5	0	54	1	8	1				
416	4	0	0.4	0	230	1	11	1				
417	4	0	0.4	0	120	1	10	1				
418	4	0	0.4	0	300	1	36	1				
419	4	0	0.4	0	1	1	5	1				
420	4	0	0.4	0	160	1	4	1				
421	4	0	0.4	0	530	1	4	1				
422	4	0	0.4	0	130	1	1260	1				
423	4	0	0.4	0	1250	1	492	1				
424	7.5	1	1	1	659	1	401	1				
425	20	1	1	1	470	1	82	1				
426	24	1	1.1	1	97	1	78	1				
427	8	1	0.5	0	145	1	300	1				
428	5.5	1	0.5	0	180	1	940	1				
429	9	1	2	1	230	1	119	1				
430	11	1	13	1	103	1	55	1				
431	5	0	0.5	0	23	1	19	1				
432	5	0	0.5	0	7	1	328	1				
433	4	0	0.5	0	26	1	33	1				
434	4	0	0.5	0	15	1	31	1				
435	5	0	0.5	0	6	1	147	1				
436	5	0	0.5	0	78	1	67	1				
437	25	1	0.5	0	51	1	13	1				
438	5	0	0.5	0	7	1	18	1				
439	5	0	0.5	0	7.2	1	11	1				
440	4	0	1	0	2.9	1	37	1				
441	4	0	1	0	18	1	170	1				
442	5.1	1	1	0	130	1	11	1				
443	5.1	1	1	0	2.8	1	36	1				
444	4	0	1	0	13	1	25	1				
445	7	1	1	0	18	1	25	1				
446	5.7	1	1	0	16	1	36	1				
447	5.7	1	1	0	13	1	66	1				
448	4.3	1	1	0	32	1	13	1				

	0	1	2	3	4	5	6	7	8	9	10	11
	As	d_As	Cd	d_Cd	Cu	d_Cu	Pb	d_Pb	Hg	d_Hg	Ni	d_Ni
449	4	0	1	0	51	1	13	1				
450	4	0	1	0	5.9	1	11	1				
451	4	0	1	0	3.4	1	22	1				
452	4	0	1	0	17	1	21	1				
453	6.1	1	1	0	17	1	89	1				
454	5.8	1	1	0	24	1	12	1				
455	5.5	1	1	0	2.9	1	24	1				
456	4	0	1	0	15	1	21	1				
457	5.7	1	1	0	9.4	1	160	1				
458	4	0	1	0	36	1	15	1				
459	4	0	1	0	3.2	1	35	1				
460	5.7	1	1	0	23	1	6	1				
461	3	1	1	0	49	1	18	1				
462	5	0	0.4	0	29	1	21	1				
463	5	0	0.4	0	120	1	18	1				
464	5	0	0.4	0	5	1	140	1				
465	5	1	0.5	0	54	1	155	1				
466	7	1	0.5	0	30	1	24	1				
467	6	1	0.5	0	9	1	12	1				
468	5	0	0.5	0	3	1	31	1				
469	5	0	0.5	0	11	1	36	1				
470	5	0	0.5	0	19	1	18	1				
471	5	0	0.5	0	7	1	65	1				
472	3	1	1	0	19	1	33	1				
473	2	1	1	0	10	1	102	1				
474	1	1	1	0	29	1	23	1				
475	3	1	1	0	5	1	11	1				
476	1	1	1	0	14	1	500	1				
477	5	0	0.5	0	189	1	68	1				
478	14	1	2	1	34	1	10	1				
479	5	0	0.5	0	4	1	66	1				
480	5	1	0.5	0	91	1	32	1				
481	4.5	1	0.5	0	11	1	9	1				
482	5.5	1	0.5	0	4	1	120	1				
483	4.5	1	0.5	0	45	1	32	1				
484	5.5	1	0.5	0	6	1	41	1				
485	6	1	0.5	0	8	1	7	1				
486	6	1	0.5	0	5	1	47	1				
487	5	1	0.5	0	46	1	19	1				
488	7	1	0.5	0	10	1	28	1				
489	5	1	0.5	0	14	1	22	1				
490	5	0	0.5	0	16	1	67	1				
491	5	0	0.5	0	88	1	36	1				
492	5	0	0.5	0	20	1	876	1				
493	5	0	0.5	0	51	1	24	1				
494	5	0	0.5	0	12	1	40	1				
495	5	0	0.5	0	21	1	26	1				
496	5	0	0.5	0	11	1	20	1				
497	5	0	0.5	0	11	1	2139	1				
498	5	0	0.5	0	5210	1	12	1				
499	18	1	2	1	7	1	100	1				
500	5	1	0.5	0	44	1	44	1				
501	7	1	0.5	1	35	1	11	1				
502	6	1	0.5	0	8	1	13	1				
503	4.5	1	0.5	0	6	1	5	1				
504	5	1	0.5	0	4	1	66	1				

	0	1	2	3	4	5	6	7	8	9	10	11
	As	d_As	Cd	d_Cd	Cu	d_Cu	Pb	d_Pb	Hg	d_Hg	Ni	d_Ni
505	1.5	1	0.5	0	210	1	64	1				
506	6	1	0.5	0	11	1	35	1				
507	6	1	0.5	0	20	1	13	1				
508	5	1	0.5	0	2	1	27	1				
509	3.5	1	0.5	0	50	1	954	1				
510	2	1	1	0	148	1	10	1				
511	10	1	1.6	1	8.5	1	70	1				
512	5.5	1	0.5	0	19	1	5500	1				
513	7	1	0.5	0	1450	1	15	1				
514	9	1	3	1	6.5	1	11	1				
515	5.5	1	0.5	1	6	1	7	1				
516	5	1	0.5	0	3	1	19	1				
517	1	0	1	0	10	1						
518	5	0	0.5	0								

	12	13
	Zn	d_Zn
1	30	1
2	21	1
3	2	1
4	29	1
5	51	1
6	72	1
7	15	1
8	38	1
9	1353	1
10	1343	1
11	124	1
12	100	1
13	49	1
14	48	1
15	57	1
16	75	1
17	38	1
18	110	1
19	8.1	1
20	43	1
21	76	1
22	6.3	1
23	1.5	1
24	25	1
25	32	1
26	31	1
27	100	1
28	2.5	1
29	34	1
30	36	1
31	1.4	1
32	21	1
33	33	1
34	65	1
35	44	1
36	51	1
37	34	1
38	46	1
39	7.7	1
40	12	1
41	67	1
42	38	1
43	3	1
44	36	1
45	69	1
46	3	1
47	42	1
48	44	1
49	3	1
50	390	1
51	44	1
52	51	1
53	43	1
54	137	1
55	19	1
56	58	1

	12	13
	Zn	d_Zn
57	890	1
58	72	1
59	45	1
60	592	1
61	38	1
62	100	1
63	1200	1
64	620	1
65	100	1
66	64	1
67	19	1
68	49	1
69	220	1
70	12	1
71	47	1
72	320	1
73	150	1
74	160	1
75	16	1
76	130	1
77	47	1
78	78	1
79	77	1
80	7	1
81	230	1
82	9	1
83	35	1
84	11	1
85	34	1
86	32	1
87	33	1
88	65	1
89	48	1
90	230	1
91	81	1
92	52	1
93	86	1
94	28	1
95	119	1
96	23	1
97	9	1
98	42	1
99	46	1
100	114	1
101	2040	1
102	45	1
103	34	1
104	46	1
105	5	1
106	36	1
107	54	1
108	19	1
109	210	1
110	47	1
111	33	1
112	3	1

	12	13
	Zn	d_Zn
113	24	1
114	21	1
115	4	1
116	14	1
117	43	1
118	1100	1
119	53	1
120	150	1
121	21	1
122	44	1
123	700	1
124	2400	1
125	240	1
126	100	1
127	310	1
128	3	1
129	2	1
130	53	1
131	7	1
132	150	1
133	40	1
134	610	1
135	1000	1
136	830	1
137	220	1
138	58	1
139	87	1
140	11	1
141	350	1
142	163	1
143	8	1
144	90	1
145	49	1
146	21	1
147	5	1
148	96	1
149	47	1
150	239	1
151	65	1
152	271	1
153	74	1
154	35	1
155	8	1
156	207	1
157	3	1
158	33	1
159	853	1
160	69	1
161	213	1
162	4550	1
163	34	1
164	645	1
165	180	1
166	440	1
167	1560	1
168	33	1

	12	13
	Zn	d_Zn
169	27	1
170	54	1
171	394	1
172	101	1
173	34	1
174	33	1
175	259	1
176	50	1
177	73	1
178	38	1
179	242	1
180	10	1
181	220	1
182	29	1
183	78	1
184	670	1
185	10	1
186	230	1
187	140	1
188	23	1
189	7	1
190	160	1
191	20	1
192	38	1
193	38	1
194	7	1
195	3	1
196	440	1
197	36	1
198	23	1
199	1600	1
200	57	1
201	77	1
202	350	1
203	90	1
204	110	1
205	49	1
206	7	1
207	2	1
208	61	1
209	16	1
210	13	1
211	110	1
212	300	1
213	27	1
214	160	1
215	77	1
216	11	1
217	25	1
218	200	1
219	210	1
220	270	1
221	250	1
222	210	1
223	180	1
224	320	1

	12	13
	Zn	d_Zn
225	260	1
226	220	1
227	260	1
228	330	1
229	350	1
230	190	1
231	300	1
232	13	1
233	57	1
234	160	1
235	150	1
236	49	1
237	130	1
238	11	1
239	100	1
240	71	1
241	105	1
242	70	1
243	660	1
244	45	1
245	6	1
246	12	1
247	34	1
248	160	1
249	41	1
250	43	1
251	110	1
252	110	1
253	50	1
254	70	1
255	42	1
256	170	1
257	75	1
258	120	1
259	100	1
260	110	1
261	64	1
262	140	1
263	650	1
264	120	1
265	520	1
266	5	1
267	620	1
268	180	1
269	180	1
270	860	1
271	24	1
272	7	1
273	1	0
274	850	1
275	4409	1
276	9	1
277	310	1
278	3300	1
279	200	1
280	740	1

	12	13
	Zn	d_Zn
281	400	1
282	1	1
283	1600	1
284	190	1
285	57	1
286	560	1
287	610	1
288	22	1
289	29	1
290	180	1
291	19	1
292	8	1
293	28	1
294	440	1
295	410	1
296	1300	1
297	1100	1
298	540	1
299	540	1
300	70	1
301	26	1
302	26	1
303	190	1
304	110	1
305	220	1
306	220	1
307	18	1
308	570	1
309	2200	1
310	22	1
311	23	1
312	26	1
313	890	1
314	17	1
315	5	1
316	35	1
317	29	1
318	470	1
319	58	1
320	60	1
321	78	1
322	280	1
323	110	1
324	7	1
325	280	1
326	110	1
327	14	1
328	140	1
329	11	1
330	220	1
331	230	1
332	10	1
333	1160	1
334	1230	1
335	930	1
336	160	1

	12	13
	Zn	d_Zn
337	111	1
338	70	1
339	31	1
340	47	1
341	67	1
342	10	1
343	118	1
344	213	1
345	647	1
346	109	1
347	165	1
348	169	1
349	233	1
350	90	1
351	255	1
352	100	1
353	921	1
354	305	1
355	174	1
356	6	1
357	86	1
358	24	1
359	48	1
360	16	1
361	6	1
362	3340	1
363	579	1
364	238	1
365	196	1
366	157	1
367	121	1
368	150	1
369	100	1
370	182	1
371	1010	1
372	786	1
373	919	1
374	33	1
375	1130	1
376	802	1
377	825	1
378	635	1
379	931	1
380	28	1
381	31	1
382	100	1
383	33	1
384	72	1
385	310	1
386	1	1
387	1	1
388	190	1
389	26	1
390	41	1
391	165	1
392	3	1

	12	13
	Zn	d_Zn
393	89	1
394	2	1
395	410	1
396	9	1
397	1	1
398	200	1
399	2	1
400	140	1
401	2	1
402	87	1
403	87	1
404	7.5	1
405	67	1
406	67	1
407	3	1
408	64	1
409	277	1
410	15	1
411	7	1
412	213	1
413	4	1
414	270	1
415	1500	1
416	1100	1
417	112	1
418	100	1
419	500	1
420	2260	1
421	138	1
422	213	1
423	21	1
424	80	1
425	51	1
426	19	1
427	221	1
428	65	1
429	60	1
430	22	1
431	12	1
432	69	1
433	85	1
434	59	1
435	30	1
436	57	1
437	42	1
438	24	1
439	52	1
440	28	1
441	19	1
442	22	1
443	33	1
444	63	1
445	91	1
446	18	1
447	29	1
448	20	1

	12	13
	Zn	d_Zn
449	74	1
450	26	1
451	44	1
452	29	1
453	570	1
454	350	1
455	26	1
456	15	1
457	21	1
458	20	1
459	33	1
460	65	1
461	52	1
462	86	1
463	19	1
464	28	1
465	739	1
466	35	1
467	33	1
468	22	1
469	47	1
470	26	1
471	190	1
472	43	1
473	33	1
474	20	1
475	80	1
476	12	1
477	65	1
478	48	1
479	105	1
480	44	1
481	81	1
482	63	1
483	67	1
484	34	1
485	38	1
486	1353	1
487	27	1
488	240	1
489	110	1
490	5.5	1
491	35	1
492	6	1
493	100	1
494	48	1
495	45	1
496	8	1
497	51	1
498	890	1
499	20	1
500	120	1
501	4200	1
502	61	1
503	20	1
504	9	1

	12	13
	Zn	d_Zn
505	58	1
506		
507		
508		
509		
510		
511		
512		
513		
514		
515		
516		
517		
518		

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			11/20/2015 9:16:02 AM								
5	From File			WorkSheet.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	As											
11												
12	General Statistics											
13	Total Number of Observations				518		Number of Distinct Observations				60	
14	Number of Detects				284		Number of Non-Detects				234	
15	Number of Distinct Detects				60		Number of Distinct Non-Detects				4	
16	Minimum Detect				1		Minimum Non-Detect				1	
17	Maximum Detect				625		Maximum Non-Detect				5	
18	Variance Detects				2219		Percent Non-Detects				45.17%	
19	Mean Detects				15.04		SD Detects				47.11	
20	Median Detects				6.45		CV Detects				3.133	
21	Skewness Detects				10.25		Kurtosis Detects				117.8	
22	Mean of Logged Detects				2.034		SD of Logged Detects				0.924	
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic				0.233		Normal GOF Test on Detected Observations Only					
26	5% Shapiro Wilk P Value				0		Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic				0.383		Lilliefors GOF Test					
28	5% Lilliefors Critical Value				0.0526		Detected Data Not Normal at 5% Significance Level					
29	Detected Data Not Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	Mean				9.116		Standard Error of Mean				1.56	
33	SD				35.43		95% KM (BCA) UCL				12.35	
34	95% KM (t) UCL				11.69		95% KM (Percentile Bootstrap) UCL				11.95	
35	95% KM (z) UCL				11.68		95% KM Bootstrap t UCL				15.42	
36	90% KM Chebyshev UCL				13.8		95% KM Chebyshev UCL				15.92	
37	97.5% KM Chebyshev UCL				18.86		99% KM Chebyshev UCL				24.64	
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic				20.35		Anderson-Darling GOF Test					
41	5% A-D Critical Value				0.791		Detected Data Not Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic				0.206		Kolmogrov-Smirnoff GOF					
43	5% K-S Critical Value				0.0559		Detected Data Not Gamma Distributed at 5% Significance Level					
44	Detected Data Not Gamma Distributed at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)				0.868		k star (bias corrected MLE)				0.861	
48	Theta hat (MLE)				17.32		Theta star (bias corrected MLE)				17.46	
49	nu hat (MLE)				493		nu star (bias corrected)				489.1	
50	MLE Mean (bias corrected)				15.04		MLE Sd (bias corrected)				16.2	
51												
52	Gamma Kaplan-Meier (KM) Statistics											
53	k hat (KM)				0.0662		nu hat (KM)				68.58	
54	Approximate Chi Square Value (68.58, α)				50.52		Adjusted Chi Square Value (68.58, β)				50.48	
55	95% Gamma Approximate KM-UCL (use when n>=50)				12.38		95% Gamma Adjusted KM-UCL (use when n<50)				12.39	
56	Gamma (KM) may not be used when k hat (KM) is < 0.1											
57												

	A	B	C	D	E	F	G	H	I	J	K	L
58	Gamma ROS Statistics using Imputed Non-Detects											
59	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
60	GROS may not be used when kstar of detected data is small such as < 0.1											
61	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
62	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
63	Minimum				0.01		Mean				8.248	
64	Maximum				625		Median				3	
65	SD				35.65		CV				4.322	
66	k hat (MLE)				0.234		k star (bias corrected MLE)				0.233	
67	Theta hat (MLE)				35.32		Theta star (bias corrected MLE)				35.33	
68	nu hat (MLE)				241.9		nu star (bias corrected)				241.9	
69	MLE Mean (bias corrected)				8.248		MLE Sd (bias corrected)				17.07	
70							Adjusted Level of Significance (β)				0.0495	
71	Approximate Chi Square Value (241.85, α)				206.8		Adjusted Chi Square Value (241.85, β)				206.8	
72	95% Gamma Approximate UCL (use when n>=50)				9.644		95% Gamma Adjusted UCL (use when n<50)				9.648	
73												
74	Lognormal GOF Test on Detected Observations Only											
75	Lilliefors Test Statistic				0.119		Lilliefors GOF Test					
76	5% Lilliefors Critical Value				0.0526		Detected Data Not Lognormal at 5% Significance Level					
77	Detected Data Not Lognormal at 5% Significance Level											
78												
79	Lognormal ROS Statistics Using Imputed Non-Detects											
80	Mean in Original Scale				9.011		Mean in Log Scale				1.252	
81	SD in Original Scale				35.49		SD in Log Scale				1.208	
82	95% t UCL (assumes normality of ROS data)				11.58		95% Percentile Bootstrap UCL				11.74	
83	95% BCA Bootstrap UCL				13.05		95% Bootstrap t UCL				15.42	
84	95% H-UCL (Log ROS)				8.193							
85												
86	DL/2 Statistics											
87	DL/2 Normal				DL/2 Log-Transformed							
88	Mean in Original Scale				9.195		Mean in Log Scale				1.442	
89	SD in Original Scale				35.45		SD in Log Scale				0.958	
90	95% t UCL (Assumes normality)				11.76		95% H-Stat UCL				7.302	
91	DL/2 is not a recommended method, provided for comparisons and historical reasons											
92												
93	Nonparametric Distribution Free UCL Statistics											
94	Data do not follow a Discernible Distribution at 5% Significance Level											
95												
96	Suggested UCL to Use											
97	95% KM (t) UCL				11.69		95% KM (% Bootstrap) UCL				11.95	
98												
99	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
100	Recommendations are based upon data size, data distribution, and skewness.											
101	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
102	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
103												
104	Cd											
105												
106	General Statistics											
107	Total Number of Observations				518		Number of Distinct Observations				25	
108	Number of Detects				89		Number of Non-Detects				429	
109	Number of Distinct Detects				24		Number of Distinct Non-Detects				4	
110	Minimum Detect				0.4		Minimum Non-Detect				0.1	
111	Maximum Detect				21		Maximum Non-Detect				1	
112	Variance Detects				7.334		Percent Non-Detects				82.82%	
113	Mean Detects				1.707		SD Detects				2.708	
114	Median Detects				1		CV Detects				1.587	

	A	B	C	D	E	F	G	H	I	J	K	L
115	Skewness Detects				5.269	Kurtosis Detects				32.49		
116	Mean of Logged Detects				0.114	SD of Logged Detects				0.769		
117												
118	Normal GOF Test on Detects Only											
119	Shapiro Wilk Test Statistic				0.445	Normal GOF Test on Detected Observations Only						
120	5% Shapiro Wilk P Value				0	Detected Data Not Normal at 5% Significance Level						
121	Lilliefors Test Statistic				0.322	Lilliefors GOF Test						
122	5% Lilliefors Critical Value				0.0939	Detected Data Not Normal at 5% Significance Level						
123	Detected Data Not Normal at 5% Significance Level											
124												
125	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
126	Mean				0.392	Standard Error of Mean				0.0564		
127	SD				1.27	95% KM (BCA) UCL				0.723		
128	95% KM (t) UCL				0.485	95% KM (Percentile Bootstrap) UCL				0.684		
129	95% KM (z) UCL				0.485	95% KM Bootstrap t UCL				0.519		
130	90% KM Chebyshev UCL				0.561	95% KM Chebyshev UCL				0.638		
131	97.5% KM Chebyshev UCL				0.744	99% KM Chebyshev UCL				0.953		
132												
133	Gamma GOF Tests on Detected Observations Only											
134	A-D Test Statistic				6.063	Anderson-Darling GOF Test						
135	5% A-D Critical Value				0.775	Detected Data Not Gamma Distributed at 5% Significance Level						
136	K-S Test Statistic				0.233	Kolmogrov-Smirnoff GOF						
137	5% K-S Critical Value				0.0969	Detected Data Not Gamma Distributed at 5% Significance Level						
138	Detected Data Not Gamma Distributed at 5% Significance Level											
139												
140	Gamma Statistics on Detected Data Only											
141	k hat (MLE)				1.33	k star (bias corrected MLE)				1.293		
142	Theta hat (MLE)				1.283	Theta star (bias corrected MLE)				1.32		
143	nu hat (MLE)				236.8	nu star (bias corrected)				230.1		
144	MLE Mean (bias corrected)				1.707	MLE Sd (bias corrected)				1.501		
145												
146	Gamma Kaplan-Meier (KM) Statistics											
147	k hat (KM)				0.0953	nu hat (KM)				98.73		
148	Approximate Chi Square Value (98.73, α)				76.81	Adjusted Chi Square Value (98.73, β)				76.76		
149	95% Gamma Approximate KM-UCL (use when n>=50)				0.504	95% Gamma Adjusted KM-UCL (use when n<50)				0.504		
150	Gamma (KM) may not be used when k hat (KM) is < 0.1											
151												
152	Gamma ROS Statistics using Imputed Non-Detects											
153	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
154	GROS may not be used when kstar of detected data is small such as < 0.1											
155	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
156	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
157	Minimum				0.01	Mean				0.306		
158	Maximum				21	Median				0.01		
159	SD				1.288	CV				4.21		
160	k hat (MLE)				0.272	k star (bias corrected MLE)				0.272		
161	Theta hat (MLE)				1.124	Theta star (bias corrected MLE)				1.125		
162	nu hat (MLE)				281.9	nu star (bias corrected)				281.6		
163	MLE Mean (bias corrected)				0.306	MLE Sd (bias corrected)				0.587		
164						Adjusted Level of Significance (β)				0.0495		
165	Approximate Chi Square Value (281.62, α)				243.8	Adjusted Chi Square Value (281.62, β)				243.7		
166	95% Gamma Approximate UCL (use when n>=50)				0.353	95% Gamma Adjusted UCL (use when n<50)				0.354		
167												
168	Lognormal GOF Test on Detected Observations Only											
169	Lilliefors Test Statistic				0.188	Lilliefors GOF Test						
170	5% Lilliefors Critical Value				0.0939	Detected Data Not Lognormal at 5% Significance Level						
171	Detected Data Not Lognormal at 5% Significance Level											

	A	B	C	D	E	F	G	H	I	J	K	L
172												
173	Lognormal ROS Statistics Using Imputed Non-Detects											
174	Mean in Original Scale					0.391	Mean in Log Scale					-2.29
175	SD in Original Scale					1.274	SD in Log Scale					1.633
176	95% t UCL (assumes normality of ROS data)					0.483	95% Percentile Bootstrap UCL					0.493
177	95% BCA Bootstrap UCL					0.52	95% Bootstrap t UCL					0.55
178	95% H-UCL (Log ROS)					0.466						
179												
180	DL/2 Statistics											
181	DL/2 Normal					DL/2 Log-Transformed						
182	Mean in Original Scale					0.545	Mean in Log Scale					-1.015
183	SD in Original Scale					1.241	SD in Log Scale					0.676
184	95% t UCL (Assumes normality)					0.635	95% H-Stat UCL					0.481
185	DL/2 is not a recommended method, provided for comparisons and historical reasons											
186												
187	Nonparametric Distribution Free UCL Statistics											
188	Data do not follow a Discernible Distribution at 5% Significance Level											
189												
190	Suggested UCL to Use											
191	95% KM (t) UCL					0.485	95% KM (% Bootstrap) UCL					0.684
192												
193	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
194	Recommendations are based upon data size, data distribution, and skewness.											
195	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
196	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
197												
198	Cu											
199												
200	General Statistics											
201	Total Number of Observations					517	Number of Distinct Observations					231
202	Number of Detects					509	Number of Non-Detects					8
203	Number of Distinct Detects					231	Number of Distinct Non-Detects					1
204	Minimum Detect					0.5	Minimum Non-Detect					1
205	Maximum Detect					27000	Maximum Non-Detect					1
206	Variance Detects					3973289	Percent Non-Detects					1.547%
207	Mean Detects					584.7	SD Detects					1993
208	Median Detects					54	CV Detects					3.409
209	Skewness Detects					8.113	Kurtosis Detects					86.51
210	Mean of Logged Detects					4.186	SD of Logged Detects					2.076
211												
212	Normal GOF Test on Detects Only											
213	Shapiro Wilk Test Statistic					0.324	Normal GOF Test on Detected Observations Only					
214	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level					
215	Lilliefors Test Statistic					0.385	Lilliefors GOF Test					
216	5% Lilliefors Critical Value					0.0393	Detected Data Not Normal at 5% Significance Level					
217	Detected Data Not Normal at 5% Significance Level											
218												
219	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
220	Mean					575.7	Standard Error of Mean					87.04
221	SD					1977	95% KM (BCA) UCL					735.4
222	95% KM (t) UCL					719.1	95% KM (Percentile Bootstrap) UCL					725.5
223	95% KM (z) UCL					718.9	95% KM Bootstrap t UCL					767.4
224	90% KM Chebyshev UCL					836.8	95% KM Chebyshev UCL					955.1
225	97.5% KM Chebyshev UCL					1119	99% KM Chebyshev UCL					1442
226												
227	Gamma GOF Tests on Detected Observations Only											
228	A-D Test Statistic					31.71	Anderson-Darling GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L
229				5% A-D Critical Value		0.868	Detected Data Not Gamma Distributed at 5% Significance Level					
230				K-S Test Statistic		0.193	Kolmogrov-Smirnoff GOF					
231				5% K-S Critical Value		0.0436	Detected Data Not Gamma Distributed at 5% Significance Level					
232	Detected Data Not Gamma Distributed at 5% Significance Level											
233												
234	Gamma Statistics on Detected Data Only											
235				k hat (MLE)		0.313	k star (bias corrected MLE)					0.313
236				Theta hat (MLE)		1866	Theta star (bias corrected MLE)					1869
237				nu hat (MLE)		319	nu star (bias corrected)					318.5
238				MLE Mean (bias corrected)		584.7	MLE Sd (bias corrected)					1045
239												
240	Gamma Kaplan-Meier (KM) Statistics											
241				k hat (KM)		0.0848	nu hat (KM)					87.66
242	Approximate Chi Square Value (87.66, α)					67.08	Adjusted Chi Square Value (87.66, β)					67.03
243	95% Gamma Approximate KM-UCL (use when n>=50)					752.4	95% Gamma Adjusted KM-UCL (use when n<50)					752.9
244	Gamma (KM) may not be used when k hat (KM) is < 0.1											
245												
246	Gamma ROS Statistics using Imputed Non-Detects											
247	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
248	GROS may not be used when kstar of detected data is small such as < 0.1											
249	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
250	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
251				Minimum		0.01	Mean					575.7
252				Maximum		27000	Median					51
253				SD		1979	CV					3.438
254				k hat (MLE)		0.299	k star (bias corrected MLE)					0.299
255				Theta hat (MLE)		1924	Theta star (bias corrected MLE)					1927
256				nu hat (MLE)		309.4	nu star (bias corrected)					309
257				MLE Mean (bias corrected)		575.7	MLE Sd (bias corrected)					1053
258							Adjusted Level of Significance (β)					0.0495
259	Approximate Chi Square Value (308.96, α)					269.2	Adjusted Chi Square Value (308.96, β)					269.1
260	95% Gamma Approximate UCL (use when n>=50)					660.6	95% Gamma Adjusted UCL (use when n<50)					660.9
261												
262	Lognormal GOF Test on Detected Observations Only											
263				Lilliefors Test Statistic		0.0558	Lilliefors GOF Test					
264				5% Lilliefors Critical Value		0.0393	Detected Data Not Lognormal at 5% Significance Level					
265	Detected Data Not Lognormal at 5% Significance Level											
266												
267	Lognormal ROS Statistics Using Imputed Non-Detects											
268				Mean in Original Scale		575.7	Mean in Log Scale					4.105
269				SD in Original Scale		1979	SD in Log Scale					2.161
270	95% t UCL (assumes normality of ROS data)					719.1	95% Percentile Bootstrap UCL					733.7
271	95% BCA Bootstrap UCL					749.6	95% Bootstrap t UCL					777.4
272	95% H-UCL (Log ROS)					856						
273												
274	DL/2 Statistics											
275	DL/2 Normal						DL/2 Log-Transformed					
276				Mean in Original Scale		575.7	Mean in Log Scale					4.111
277				SD in Original Scale		1979	SD in Log Scale					2.146
278	95% t UCL (Assumes normality)					719.1	95% H-Stat UCL					830.1
279	DL/2 is not a recommended method, provided for comparisons and historical reasons											
280												
281	Nonparametric Distribution Free UCL Statistics											
282	Data do not follow a Discernible Distribution at 5% Significance Level											
283												
284	Suggested UCL to Use											
285	97.5% KM (Chebyshev) UCL					1119						

	A	B	C	D	E	F	G	H	I	J	K	L
286												
287	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
288	Recommendations are based upon data size, data distribution, and skewness.											
289	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
290	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
291												
292	Pb											
293												
294	General Statistics											
295	Total Number of Observations					516	Number of Distinct Observations					217
296	Number of Detects					512	Number of Non-Detects					4
297	Number of Distinct Detects					217	Number of Distinct Non-Detects					1
298	Minimum Detect					0.5	Minimum Non-Detect					1
299	Maximum Detect					12000	Maximum Non-Detect					1
300	Variance Detects					611833	Percent Non-Detects					0.775%
301	Mean Detects					293	SD Detects					782.2
302	Median Detects					55	CV Detects					2.67
303	Skewness Detects					8.494	Kurtosis Detects					106.1
304	Mean of Logged Detects					4.242	SD of Logged Detects					1.688
305												
306	Normal GOF Test on Detects Only											
307	Shapiro Wilk Test Statistic					0.394	Normal GOF Test on Detected Observations Only					
308	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level					
309	Lilliefors Test Statistic					0.354	Lilliefors GOF Test					
310	5% Lilliefors Critical Value					0.0392	Detected Data Not Normal at 5% Significance Level					
311	Detected Data Not Normal at 5% Significance Level											
312												
313	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
314	Mean					290.7	Standard Error of Mean					34.32
315	SD					778.8	95% KM (BCA) UCL					343.2
316	95% KM (t) UCL					347.2	95% KM (Percentile Bootstrap) UCL					349.7
317	95% KM (z) UCL					347.1	95% KM Bootstrap t UCL					364.6
318	90% KM Chebyshev UCL					393.6	95% KM Chebyshev UCL					440.3
319	97.5% KM Chebyshev UCL					505	99% KM Chebyshev UCL					632.2
320												
321	Gamma GOF Tests on Detected Observations Only											
322	A-D Test Statistic					22.89	Anderson-Darling GOF Test					
323	5% A-D Critical Value					0.835	Detected Data Not Gamma Distributed at 5% Significance Level					
324	K-S Test Statistic					0.157	Kolmogrov-Smirnoff GOF					
325	5% K-S Critical Value					0.0428	Detected Data Not Gamma Distributed at 5% Significance Level					
326	Detected Data Not Gamma Distributed at 5% Significance Level											
327												
328	Gamma Statistics on Detected Data Only											
329	k hat (MLE)					0.449	k star (bias corrected MLE)					0.448
330	Theta hat (MLE)					652.2	Theta star (bias corrected MLE)					654.1
331	nu hat (MLE)					460	nu star (bias corrected)					458.6
332	MLE Mean (bias corrected)					293	MLE Sd (bias corrected)					437.8
333												
334	Gamma Kaplan-Meier (KM) Statistics											
335	k hat (KM)					0.139	nu hat (KM)					143.8
336	Approximate Chi Square Value (143.76, α)					117.1	Adjusted Chi Square Value (143.76, β)					117
337	95% Gamma Approximate KM-UCL (use when n>=50)					357	95% Gamma Adjusted KM-UCL (use when n<50)					357.2
338												
339	Gamma ROS Statistics using Imputed Non-Detects											
340	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
341	GROS may not be used when kstar of detected data is small such as < 0.1											
342	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											

	A	B	C	D	E	F	G	H	I	J	K	L
343	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
344	Minimum				0.01	Mean				290.7		
345	Maximum				12000	Median				54		
346	SD				779.6	CV				2.682		
347	k hat (MLE)				0.433	k star (bias corrected MLE)				0.432		
348	Theta hat (MLE)				670.7	Theta star (bias corrected MLE)				672.6		
349	nu hat (MLE)				447.3	nu star (bias corrected)				446		
350	MLE Mean (bias corrected)				290.7	MLE Sd (bias corrected)				442.2		
351						Adjusted Level of Significance (β)				0.0495		
352	Approximate Chi Square Value (446.02, α)				398.1	Adjusted Chi Square Value (446.02, β)				397.9		
353	95% Gamma Approximate UCL (use when $n \geq 50$)				325.7	95% Gamma Adjusted UCL (use when $n < 50$)				325.8		
354												
355	Lognormal GOF Test on Detected Observations Only											
356	Lilliefors Test Statistic				0.0698	Lilliefors GOF Test						
357	5% Lilliefors Critical Value				0.0392	Detected Data Not Lognormal at 5% Significance Level						
358	Detected Data Not Lognormal at 5% Significance Level											
359												
360	Lognormal ROS Statistics Using Imputed Non-Detects											
361	Mean in Original Scale				290.7	Mean in Log Scale				4.206		
362	SD in Original Scale				779.6	SD in Log Scale				1.729		
363	95% t UCL (assumes normality of ROS data)				347.2	95% Percentile Bootstrap UCL				351.6		
364	95% BCA Bootstrap UCL				361.3	95% Bootstrap t UCL				369.2		
365	95% H-UCL (Log ROS)				369.9							
366												
367	DL/2 Statistics											
368	DL/2 Normal					DL/2 Log-Transformed						
369	Mean in Original Scale				290.7	Mean in Log Scale				4.204		
370	SD in Original Scale				779.6	SD in Log Scale				1.736		
371	95% t UCL (Assumes normality)				347.2	95% H-Stat UCL				374.1		
372	DL/2 is not a recommended method, provided for comparisons and historical reasons											
373												
374	Nonparametric Distribution Free UCL Statistics											
375	Data do not follow a Discernible Distribution at 5% Significance Level											
376												
377	Suggested UCL to Use											
378	97.5% KM (Chebyshev) UCL				505							
379												
380	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
381	Recommendations are based upon data size, data distribution, and skewness.											
382	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
383	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
384												
385	Hg											
386												
387	General Statistics											
388	Total Number of Observations				343	Number of Distinct Observations				28		
389	Number of Detects				114	Number of Non-Detects				229		
390	Number of Distinct Detects				28	Number of Distinct Non-Detects				2		
391	Minimum Detect				0.05	Minimum Non-Detect				0.05		
392	Maximum Detect				4.6	Maximum Non-Detect				0.1		
393	Variance Detects				0.374	Percent Non-Detects				66.76%		
394	Mean Detects				0.408	SD Detects				0.611		
395	Median Detects				0.2	CV Detects				1.5		
396	Skewness Detects				4.553	Kurtosis Detects				24.75		
397	Mean of Logged Detects				-1.364	SD of Logged Detects				0.858		
398												
399	Normal GOF Test on Detects Only											

	A	B	C	D	E	F	G	H	I	J	K	L	
400	Shapiro Wilk Test Statistic					0.509	Normal GOF Test on Detected Observations Only						
401	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level						
402	Lilliefors Test Statistic					0.282	Lilliefors GOF Test						
403	5% Lilliefors Critical Value					0.083	Detected Data Not Normal at 5% Significance Level						
404	Detected Data Not Normal at 5% Significance Level												
405													
406	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs												
407	Mean					0.171	Standard Error of Mean					0.0211	
408	SD					0.389	95% KM (BCA) UCL					0.209	
409	95% KM (t) UCL					0.205	95% KM (Percentile Bootstrap) UCL					0.208	
410	95% KM (z) UCL					0.205	95% KM Bootstrap t UCL					0.22	
411	90% KM Chebyshev UCL					0.234	95% KM Chebyshev UCL					0.263	
412	97.5% KM Chebyshev UCL					0.302	99% KM Chebyshev UCL					0.381	
413													
414	Gamma GOF Tests on Detected Observations Only												
415	A-D Test Statistic					5.73	Anderson-Darling GOF Test						
416	5% A-D Critical Value					0.778	Detected Data Not Gamma Distributed at 5% Significance Level						
417	K-S Test Statistic					0.196	Kolmogrov-Smirnoff GOF						
418	5% K-S Critical Value					0.088	Detected Data Not Gamma Distributed at 5% Significance Level						
419	Detected Data Not Gamma Distributed at 5% Significance Level												
420													
421	Gamma Statistics on Detected Data Only												
422	k hat (MLE)					1.211	k star (bias corrected MLE)					1.185	
423	Theta hat (MLE)					0.337	Theta star (bias corrected MLE)					0.344	
424	nu hat (MLE)					276.1	nu star (bias corrected)					270.2	
425	MLE Mean (bias corrected)					0.408	MLE Sd (bias corrected)					0.374	
426													
427	Gamma Kaplan-Meier (KM) Statistics												
428	k hat (KM)					0.193	nu hat (KM)					132.2	
429	Approximate Chi Square Value (132.18, α)					106.6	Adjusted Chi Square Value (132.18, β)					106.5	
430	95% Gamma Approximate KM-UCL (use when $n \geq 50$)					0.212	95% Gamma Adjusted KM-UCL (use when $n < 50$)					0.212	
431													
432	Gamma ROS Statistics using Imputed Non-Detects												
433	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
434	GROS may not be used when kstar of detected data is small such as < 0.1												
435	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
436	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
437	Minimum					0.01	Mean					0.142	
438	Maximum					4.6	Median					0.01	
439	SD					0.398	CV					2.802	
440	k hat (MLE)					0.415	k star (bias corrected MLE)					0.413	
441	Theta hat (MLE)					0.343	Theta star (bias corrected MLE)					0.344	
442	nu hat (MLE)					284.6	nu star (bias corrected)					283.4	
443	MLE Mean (bias corrected)					0.142	MLE Sd (bias corrected)					0.221	
444							Adjusted Level of Significance (β)					0.0493	
445	Approximate Chi Square Value (283.40, α)					245.4	Adjusted Chi Square Value (283.40, β)					245.3	
446	95% Gamma Approximate UCL (use when $n \geq 50$)					0.164	95% Gamma Adjusted UCL (use when $n < 50$)					0.164	
447													
448	Lognormal GOF Test on Detected Observations Only												
449	Lilliefors Test Statistic					0.139	Lilliefors GOF Test						
450	5% Lilliefors Critical Value					0.083	Detected Data Not Lognormal at 5% Significance Level						
451	Detected Data Not Lognormal at 5% Significance Level												
452													
453	Lognormal ROS Statistics Using Imputed Non-Detects												
454	Mean in Original Scale					0.155	Mean in Log Scale					-3.122	
455	SD in Original Scale					0.395	SD in Log Scale					1.609	
456	95% t UCL (assumes normality of ROS data)					0.19	95% Percentile Bootstrap UCL					0.193	

	A	B	C	D	E	F	G	H	I	J	K	L
457	95% BCA Bootstrap UCL					0.204	95% Bootstrap t UCL					0.204
458	95% H-UCL (Log ROS)					0.203						
459												
460	DL/2 Statistics											
461	DL/2 Normal					DL/2 Log-Transformed						
462	Mean in Original Scale					0.168	Mean in Log Scale					-2.47
463	SD in Original Scale					0.39	SD in Log Scale					0.93
464	95% t UCL (Assumes normality)					0.203	95% H-Stat UCL					0.145
465	DL/2 is not a recommended method, provided for comparisons and historical reasons											
466												
467	Nonparametric Distribution Free UCL Statistics											
468	Data do not follow a Discernible Distribution at 5% Significance Level											
469												
470	Suggested UCL to Use											
471	95% KM (t) UCL					0.205	95% KM (% Bootstrap) UCL					0.208
472												
473	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
474	Recommendations are based upon data size, data distribution, and skewness.											
475	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
476	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
477												
478	Ni											
479												
480		General Statistics										
481	Total Number of Observations					343	Number of Distinct Observations					79
482	Number of Detects					316	Number of Non-Detects					27
483	Number of Distinct Detects					78	Number of Distinct Non-Detects					2
484	Minimum Detect					0.6	Minimum Non-Detect					0.1
485	Maximum Detect					1200	Maximum Non-Detect					1
486	Variance Detects					5414	Percent Non-Detects					7.872%
487	Mean Detects					18.01	SD Detects					73.58
488	Median Detects					6	CV Detects					4.086
489	Skewness Detects					13.88	Kurtosis Detects					215.8
490	Mean of Logged Detects					1.94	SD of Logged Detects					1.142
491												
492	Normal GOF Test on Detects Only											
493	Shapiro Wilk Test Statistic					0.199	Normal GOF Test on Detected Observations Only					
494	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level					
495	Lilliefors Test Statistic					0.406	Lilliefors GOF Test					
496	5% Lilliefors Critical Value					0.0498	Detected Data Not Normal at 5% Significance Level					
497	Detected Data Not Normal at 5% Significance Level											
498												
499	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
500	Mean					16.62	Standard Error of Mean					3.822
501	SD					70.67	95% KM (BCA) UCL					24.42
502	95% KM (t) UCL					22.92	95% KM (Percentile Bootstrap) UCL					24.14
503	95% KM (z) UCL					22.91	95% KM Bootstrap t UCL					35.53
504	90% KM Chebyshev UCL					28.09	95% KM Chebyshev UCL					33.28
505	97.5% KM Chebyshev UCL					40.49	99% KM Chebyshev UCL					54.65
506												
507	Gamma GOF Tests on Detected Observations Only											
508	A-D Test Statistic					3.165E+28	Anderson-Darling GOF Test					
509	5% A-D Critical Value					0.808	Detected Data Not Gamma Distributed at 5% Significance Level					
510	K-S Test Statistic					0.177	Kolmogrov-Smirnoff GOF					
511	5% K-S Critical Value					0.0534	Detected Data Not Gamma Distributed at 5% Significance Level					
512	Detected Data Not Gamma Distributed at 5% Significance Level											
513												

	A	B	C	D	E	F	G	H	I	J	K	L
514	Gamma Statistics on Detected Data Only											
515	k hat (MLE)				0.644	k star (bias corrected MLE)				0.64		
516	Theta hat (MLE)				27.98	Theta star (bias corrected MLE)				28.16		
517	nu hat (MLE)				406.7	nu star (bias corrected)				404.2		
518	MLE Mean (bias corrected)				18.01	MLE Sd (bias corrected)				22.52		
519												
520	Gamma Kaplan-Meier (KM) Statistics											
521	k hat (KM)				0.0553	nu hat (KM)				37.95		
522	Approximate Chi Square Value (37.95, α)				24.84	Adjusted Chi Square Value (37.95, β)				24.8		
523	95% Gamma Approximate KM-UCL (use when n>=50)				25.39	95% Gamma Adjusted KM-UCL (use when n<50)				25.44		
524	Gamma (KM) may not be used when k hat (KM) is < 0.1											
525												
526	Gamma ROS Statistics using Imputed Non-Detects											
527	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
528	GROS may not be used when kstar of detected data is small such as < 0.1											
529	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
530	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
531	Minimum				0.01	Mean				16.59		
532	Maximum				1200	Median				5.3		
533	SD				70.78	CV				4.266		
534	k hat (MLE)				0.464	k star (bias corrected MLE)				0.462		
535	Theta hat (MLE)				35.73	Theta star (bias corrected MLE)				35.89		
536	nu hat (MLE)				318.6	nu star (bias corrected)				317.1		
537	MLE Mean (bias corrected)				16.59	MLE Sd (bias corrected)				24.4		
538						Adjusted Level of Significance (β)				0.0493		
539	Approximate Chi Square Value (317.11, α)				276.9	Adjusted Chi Square Value (317.11, β)				276.7		
540	95% Gamma Approximate UCL (use when n>=50)				19	95% Gamma Adjusted UCL (use when n<50)				19.01		
541												
542	Lognormal GOF Test on Detected Observations Only											
543	Lilliefors Test Statistic				0.0803	Lilliefors GOF Test						
544	5% Lilliefors Critical Value				0.0498	Detected Data Not Lognormal at 5% Significance Level						
545	Detected Data Not Lognormal at 5% Significance Level											
546												
547	Lognormal ROS Statistics Using Imputed Non-Detects											
548	Mean in Original Scale				16.63	Mean in Log Scale				1.734		
549	SD in Original Scale				70.77	SD in Log Scale				1.309		
550	95% t UCL (assumes normality of ROS data)				22.94	95% Percentile Bootstrap UCL				23.56		
551	95% BCA Bootstrap UCL				28.38	95% Bootstrap t UCL				35.72		
552	95% H-UCL (Log ROS)				15.82							
553												
554	DL/2 Statistics											
555	DL/2 Normal					DL/2 Log-Transformed						
556	Mean in Original Scale				16.63	Mean in Log Scale				1.72		
557	SD in Original Scale				70.77	SD in Log Scale				1.342		
558	95% t UCL (Assumes normality)				22.93	95% H-Stat UCL				16.38		
559	DL/2 is not a recommended method, provided for comparisons and historical reasons											
560												
561	Nonparametric Distribution Free UCL Statistics											
562	Data do not follow a Discernible Distribution at 5% Significance Level											
563												
564	Suggested UCL to Use											
565	95% KM (Chebyshev) UCL				33.28							
566												
567	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
568	Recommendations are based upon data size, data distribution, and skewness.											
569	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
570	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											

	A	B	C	D	E	F	G	H	I	J	K	L
571												
572	Zn											
573												
574	General Statistics											
575	Total Number of Observations					505	Number of Distinct Observations					201
576	Number of Detects					504	Number of Non-Detects					1
577	Number of Distinct Detects					201	Number of Distinct Non-Detects					1
578	Minimum Detect					1	Minimum Non-Detect					1
579	Maximum Detect					4550	Maximum Non-Detect					1
580	Variance Detects					254622	Percent Non-Detects					0.198%
581	Mean Detects					227.2	SD Detects					504.6
582	Median Detects					63.5	CV Detects					2.221
583	Skewness Detects					5.165	Kurtosis Detects					33.62
584	Mean of Logged Detects					4.219	SD of Logged Detects					1.577
585												
586	Normal GOF Test on Detects Only											
587	Shapiro Wilk Test Statistic					0.452	Normal GOF Test on Detected Observations Only					
588	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level					
589	Lilliefors Test Statistic					0.327	Lilliefors GOF Test					
590	5% Lilliefors Critical Value					0.0395	Detected Data Not Normal at 5% Significance Level					
591	Detected Data Not Normal at 5% Significance Level											
592												
593	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
594	Mean					226.8	Standard Error of Mean					22.44
595	SD					503.7	95% KM (BCA) UCL					262.3
596	95% KM (t) UCL					263.7	95% KM (Percentile Bootstrap) UCL					265.5
597	95% KM (z) UCL					263.7	95% KM Bootstrap t UCL					270.9
598	90% KM Chebyshev UCL					294.1	95% KM Chebyshev UCL					324.6
599	97.5% KM Chebyshev UCL					366.9	99% KM Chebyshev UCL					450
600												
601	Gamma GOF Tests on Detected Observations Only											
602	A-D Test Statistic					17.71	Anderson-Darling GOF Test					
603	5% A-D Critical Value					0.82	Detected Data Not Gamma Distributed at 5% Significance Level					
604	K-S Test Statistic					0.153	Kolmogrov-Smirnoff GOF					
605	5% K-S Critical Value					0.0427	Detected Data Not Gamma Distributed at 5% Significance Level					
606	Detected Data Not Gamma Distributed at 5% Significance Level											
607												
608	Gamma Statistics on Detected Data Only											
609	k hat (MLE)					0.523	k star (bias corrected MLE)					0.521
610	Theta hat (MLE)					434.8	Theta star (bias corrected MLE)					436.2
611	nu hat (MLE)					526.8	nu star (bias corrected)					525
612	MLE Mean (bias corrected)					227.2	MLE Sd (bias corrected)					314.8
613												
614	Gamma Kaplan-Meier (KM) Statistics											
615	k hat (KM)					0.203	nu hat (KM)					204.7
616	Approximate Chi Square Value (204.70, α)					172.6	Adjusted Chi Square Value (204.70, β)					172.5
617	95% Gamma Approximate KM-UCL (use when n>=50)					268.9	95% Gamma Adjusted KM-UCL (use when n<50)					269.1
618												
619	Gamma ROS Statistics using Imputed Non-Detects											
620	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
621	GROS may not be used when kstar of detected data is small such as < 0.1											
622	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
623	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
624	Minimum					0.01	Mean					226.8
625	Maximum					4550	Median					63
626	SD					504.2	CV					2.223
627	k hat (MLE)					0.517	k star (bias corrected MLE)					0.515

[illegible]

	0	1	2	3
	C6-C10	d_C6-C10	C10-C16	d_C10-C16
1	20	0	50	0
2	20	0	50	0
3	20	0	50	0
4	20	0	50	0
5	20	0	50	0
6	20	0	50	0
7	20	0	50	0
8	20	0	50	0
9	25	0	50	0
10	25	0	50	0
11	25	0	50	0
12	25	0	50	0
13	25	0	50	0
14	25	0	50	0
15	25	0	50	0
16	25	0	50	0
17	25	0	50	0
18	25	0	50	0
19	25	0	1000	1
20	25	0	50	0
21	25	0	140	1
22	25	0	180	1
23	25	0	50	0
24	2	0	50	0
25	2	0	50	0
26	25	0	50	0
27	25	0	50	0
28	25	0	50	0
29	25	0	50	0
30	20	0	50	0
31	0.1	1	50	0
32	0	1	50	0
33	0	1	50	0
34	0	1	50	0
35	0	1	50	0
36	4.9	1	50	0
37	0	1	50	0
38	0	1	50	0
39	10.9	1	50	0
40	25	0	50	0
41	25	0	50	0
42	25	0	50	0
43	25	0	50	0
44	25	0	50	0
45	25	0	73	1
46	25	0	50	0
47	25	0	50	0
48	25	0	50	0
49	25	0	50	0
50	25	0	50	0
51	25	0	50	0
52	25	0	50	0
53	25	0	50	0
54	25	0	50	0
55	25	0	50	0
56	25	0	50	0

	0	1	2	3
	C6-C10	d_C6-C10	C10-C16	d_C10-C16
57	25	0	50	0
58	25	0	50	0
59	25	0	50	0
60	25	0	50	0
61	25	0	50	0
62	25	0	50	0
63	25	0	50	0
64	25	0	50	0
65	25	0		
66	2	1		
67	2	0		
68	2	0		
69	2	0		
70	20	0		
71	20	0		
72	20	0		
73	20	0		
74	20	0		
75	20	0		
76	20	0		
77	2	0		
78	2	0		
79	2	0		
80	2	0		
81	2	0		
82	2	0		
83	2	0		
84	0.1	1		
85	2	0		
86	2	0		
87	2	0		
88	0.3	1		
89	0.1	1		
90	0.1	1		
91	2	0		
92	2	0		
93	2	0		
94	2	0		
95	0.1	1		
96	2	0		
97	0.1	1		
98	2	0		
99	2	0		
100	2	0		
101	0.1	1		
102	2	0		
103	2	0		
104	2	0		
105	25	0		
106	25	0		
107	25	0		
108	25	0		
109	25	0		
110	25	0		
111	25	0		
112	25	0		

	0	1	2	3
	C6-C10	d_C6-C10	C10-C16	d_C10-C16
113	25	0		
114	25	0		
115	25	0		
116	25	0		
117	25	0		
118	25	0		
119	25	0		
120	25	0		
121	25	0		
122	25	0		
123	25	0		
124	25	0		
125	25	0		
126	25	0		
127	25	0		
128	25	0		
129	25	0		
130	25	0		
131	25	0		
132	25	0		
133	25	0		
134	25	0		
135	25	0		
136	2	0		
137	25	0		
138	25	0		
139	25	0		
140	25	0		
141	25	0		
142	25	0		
143	25	0		
144	25	0		
145	25	0		
146	25	0		
147	25	0		
148	25	0		
149	25	0		
150	25	0		
151	25	0		
152	25	0		
153	25	0		
154	25	0		
155	25	0		
156	25	0		
157	25	0		
158	25	0		
159	25	0		
160	25	0		
161	25	0		
162	25	0		
163	2	0		
164	25	0		
165	25	0		
166	25	0		
167	25	0		
168	25	0		

	0	1	2	3
	C6-C10	d_C6-C10	C10-C16	d_C10-C16
169	25	0		
170	25	0		
171	25	0		
172	25	0		
173	25	0		
174	25	0		
175	25	0		
176	25	0		
177	25	0		
178	25	0		
179	25	0		
180	25	0		
181	25	0		
182	25	0		
183	25	0		
184	25	0		
185	2	0		
186	25	0		
187	0.6	1		
188	0	1		
189	0.3	1		
190	0	1		
191	1.5	1		
192	0	1		
193	2.2	1		
194	0	1		
195	0.1	1		
196	0	1		
197	0	1		
198	0	1		
199	0.2	1		
200	0.6	1		
201	0.3	1		
202	0.4	1		
203	0.3	1		
204	0	1		
205	0	1		
206	0.5	1		
207	0	1		
208	0	1		
209	0	1		
210	0	1		
211	0	1		
212	0.2	1		
213	0.2	1		
214	0.1	1		
215	0.3	1		
216	0.2	1		
217	0	1		
218	0	1		
219	0	1		
220	0	1		
221	0	1		
222	25	0		
223	25	0		
224	25	0		

	0	1	2	3
	C6-C10	d_C6-C10	C10-C16	d_C10-C16
225	25	0		
226	25	0		
227	25	0		
228	25	0		
229	25	0		
230	25	0		
231	25	0		
232	25	0		
233	10	0		
234	10	0		
235	10	0		
236	0.2	1		
237	3.3	1		
238	8.2	1		
239	1506	1		
240	7.3	1		
241	25	0		
242	25	0		
243	25	0		
244	25	0		
245	25	0		
246	25	0		
247	25	0		
248	25	0		
249	0.1	1		
250	0	1		
251	0	1		
252	0	1		
253	0	1		
254	0	1		
255	0.1	1		
256	0	1		
257	25	0		
258	25	0		
259	25	0		
260	25	0		
261	25	0		
262	25	0		
263	25	0		
264	25	0		
265	25	0		
266	25	0		
267	25	0		
268	25	0		
269	25	0		
270	25	0		
271	25	0		
272	25	0		
273	25	0		
274	25	0		
275	25	0		
276	25	0		
277	25	0		
278	2	0		
279	25	0		
280	25	0		

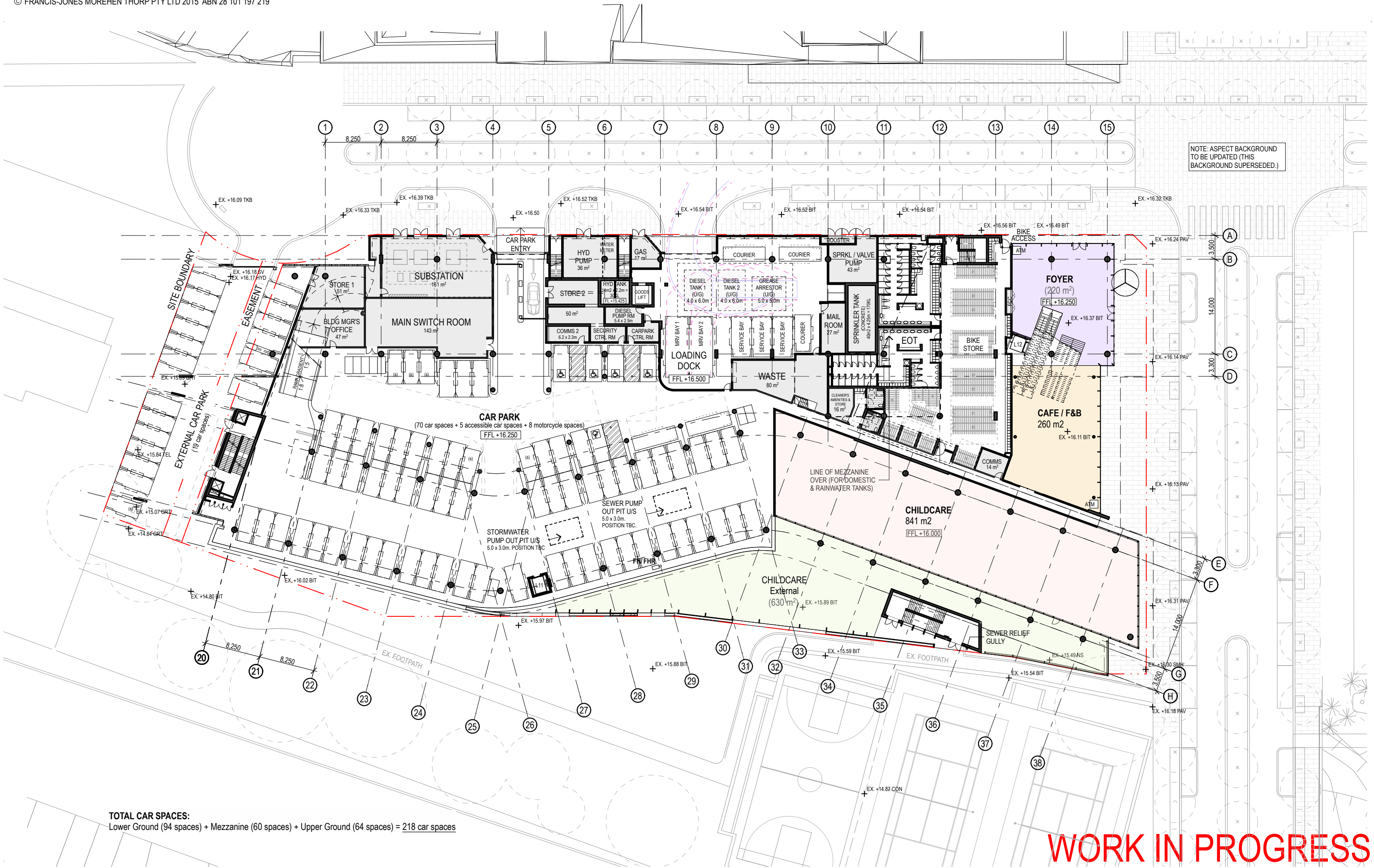
	0	1	2	3
	C6-C10	d_C6-C10	C10-C16	d_C10-C16
281	25	0		
282	0.1	1		
283	0	1		
284	2	0		
285	2	0		
286	0	1		
287	0.1	1		
288	0.2	1		
289	0	1		
290	0	1		
291	0	1		
292	0	1		
293	0	1		
294	0	1		
295	0.9	1		
296	0	1		
297	0	1		
298	2	0		
299	4.9	1		
300	0	1		

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			20/11/2015 10:18:46 AM								
5	From File			WorkSheet.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	C6-C10											
11												
12	General Statistics											
13	Total Number of Observations				300		Number of Distinct Observations				20	
14	Number of Detects				81		Number of Non-Detects				219	
15	Number of Distinct Detects				17		Number of Distinct Non-Detects				4	
16	Minimum Detect				0		Minimum Non-Detect				2	
17	Maximum Detect				1506		Maximum Non-Detect				25	
18	Variance Detects				27980		Percent Non-Detects				73%	
19	Mean Detects				19.24		SD Detects				167.3	
20	Median Detects				0		CV Detects				8.695	
21	Skewness Detects				8.998		Kurtosis Detects				80.98	
22												
23	Normal GOF Test on Detects Only											
24	Shapiro Wilk Test Statistic				0.116		Normal GOF Test on Detected Observations Only					
25	5% Shapiro Wilk P Value				0		Detected Data Not Normal at 5% Significance Level					
26	Lilliefors Test Statistic				0.508		Lilliefors GOF Test					
27	5% Lilliefors Critical Value				0.0984		Detected Data Not Normal at 5% Significance Level					
28	Detected Data Not Normal at 5% Significance Level											
29												
30	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
31	Mean				5.512		Standard Error of Mean				5.043	
32	SD				86.79		95% KM (BCA) UCL				15.68	
33	95% KM (t) UCL				13.83		95% KM (Percentile Bootstrap) UCL				15.52	
34	95% KM (z) UCL				13.81		95% KM Bootstrap t UCL				247.1	
35	90% KM Chebyshev UCL				20.64		95% KM Chebyshev UCL				27.5	
36	97.5% KM Chebyshev UCL				37.01		99% KM Chebyshev UCL				55.69	
37												
38	Gamma Statistics on Detected Data Only											
39	Dataset Contains Values <= 0 - Cannot Compute Gamma Statistics!											
40												
41	Gamma Kaplan-Meier (KM) Statistics											
42	k hat (KM)				0.00403		nu hat (KM)				2.42	
43							Adjusted Level of Significance (β)				0.0492	
44	Approximate Chi Square Value (2.42, α)				0.224		Adjusted Chi Square Value (2.42, β)				0.221	
45	95% Gamma Approximate KM-UCL (use when n>=50)				59.64		95% Gamma Adjusted KM-UCL (use when n<50)				60.26	
46	Gamma (KM) may not be used when k hat (KM) is < 0.1											
47												
48	DL/2 Statistics											
49	Mean in Original Scale				12.85		SD in Original Scale				86.68	
50	95% t UCL (Assumes normality)				21.1							
51	DL/2 is not a recommended method, provided for comparisons and historical reasons											
52												
53	Nonparametric Distribution Free UCL Statistics											
54	Data do not follow a Discernible Distribution at 5% Significance Level											
55												
56	Suggested UCL to Use											
57	97.5% KM (Chebyshev) UCL				37.01							

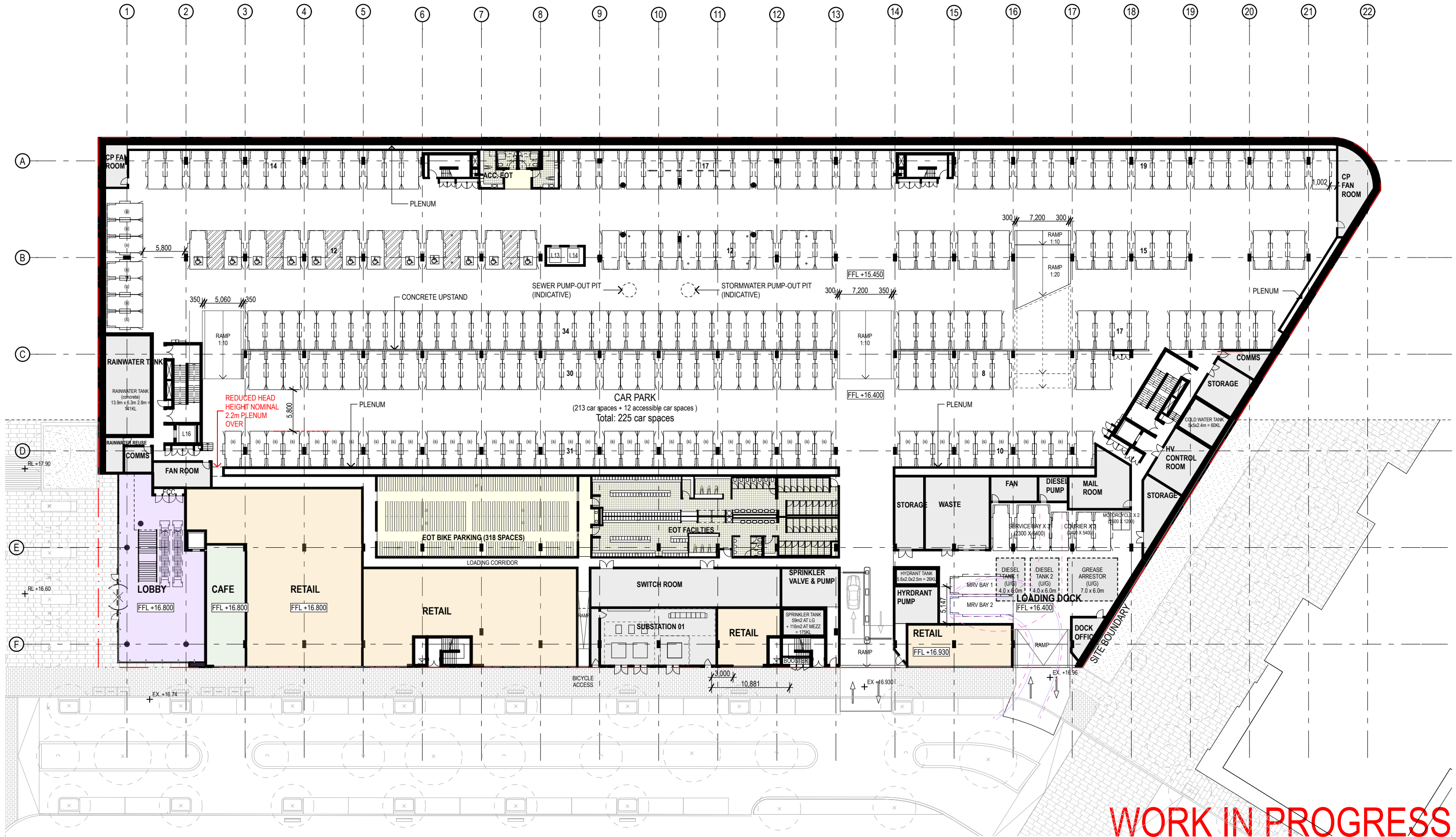
	A	B	C	D	E	F	G	H	I	J	K	L
58												
59	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
60	Recommendations are based upon data size, data distribution, and skewness.											
61	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
62	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
63												
64	C10-C16											
65												
66	General Statistics											
67	Total Number of Observations					64	Number of Distinct Observations					5
68	Number of Detects					4	Number of Non-Detects					60
69	Number of Distinct Detects					4	Number of Distinct Non-Detects					1
70	Minimum Detect					73	Minimum Non-Detect					50
71	Maximum Detect					1000	Maximum Non-Detect					50
72	Variance Detects					190739	Percent Non-Detects					93.75%
73	Mean Detects					348.3	SD Detects					436.7
74	Median Detects					160	CV Detects					1.254
75	Skewness Detects					1.938	Kurtosis Detects					3.804
76	Mean of Logged Detects					5.333	SD of Logged Detects					1.116
77												
78	Normal GOF Test on Detects Only											
79	Shapiro Wilk Test Statistic					0.724	Shapiro Wilk GOF Test					
80	5% Shapiro Wilk Critical Value					0.748	Detected Data Not Normal at 5% Significance Level					
81	Lilliefors Test Statistic					0.4	Lilliefors GOF Test					
82	5% Lilliefors Critical Value					0.443	Detected Data appear Normal at 5% Significance Level					
83	Detected Data appear Approximate Normal at 5% Significance Level											
84												
85	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
86	Mean					68.64	Standard Error of Mean					17.17
87	SD					119	95% KM (BCA) UCL					N/A
88	95% KM (t) UCL					97.31	95% KM (Percentile Bootstrap) UCL					N/A
89	95% KM (z) UCL					96.88	95% KM Bootstrap t UCL					N/A
90	90% KM Chebyshev UCL					120.2	95% KM Chebyshev UCL					143.5
91	97.5% KM Chebyshev UCL					175.9	99% KM Chebyshev UCL					239.5
92												
93	Gamma GOF Tests on Detected Observations Only											
94	A-D Test Statistic					0.499	Anderson-Darling GOF Test					
95	5% A-D Critical Value					0.666	Detected data appear Gamma Distributed at 5% Significance Level					
96	K-S Test Statistic					0.364	Kolmogrov-Smirnoff GOF					
97	5% K-S Critical Value					0.402	Detected data appear Gamma Distributed at 5% Significance Level					
98	Detected data appear Gamma Distributed at 5% Significance Level											
99												
100	Gamma Statistics on Detected Data Only											
101	k hat (MLE)					1.099	k star (bias corrected MLE)					0.441
102	Theta hat (MLE)					316.9	Theta star (bias corrected MLE)					789
103	nu hat (MLE)					8.79	nu star (bias corrected)					3.531
104	MLE Mean (bias corrected)					348.3	MLE Sd (bias corrected)					524.2
105												
106	Gamma Kaplan-Meier (KM) Statistics											
107	k hat (KM)					0.333	nu hat (KM)					42.61
108	Approximate Chi Square Value (42.61, α)					28.65	Adjusted Chi Square Value (42.61, β)					28.38
109	95% Gamma Approximate KM-UCL (use when n>=50)					102.1	95% Gamma Adjusted KM-UCL (use when n<50)					103.1
110												
111	Gamma ROS Statistics using Imputed Non-Detects											
112	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
113	GROS may not be used when kstar of detected data is small such as < 0.1											
114	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											

	A	B	C	D	E	F	G	H	I	J	K	L
115	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
116	Minimum				0.01	Mean				21.78		
117	Maximum				1000	Median				0.01		
118	SD				127.7	CV				5.863		
119	k hat (MLE)				0.113	k star (bias corrected MLE)				0.118		
120	Theta hat (MLE)				192.5	Theta star (bias corrected MLE)				184.1		
121	nu hat (MLE)				14.48	nu star (bias corrected)				15.14		
122	MLE Mean (bias corrected)				21.78	MLE Sd (bias corrected)				63.32		
123						Adjusted Level of Significance (β)				0.0463		
124	Approximate Chi Square Value (15.14, α)				7.356	Adjusted Chi Square Value (15.14, β)				7.231		
125	95% Gamma Approximate UCL (use when $n \geq 50$)				44.8	95% Gamma Adjusted UCL (use when $n < 50$)				N/A		
126												
127	Lognormal GOF Test on Detected Observations Only											
128	Shapiro Wilk Test Statistic				0.906	Shapiro Wilk GOF Test						
129	5% Shapiro Wilk Critical Value				0.748	Detected Data appear Lognormal at 5% Significance Level						
130	Lilliefors Test Statistic				0.3	Lilliefors GOF Test						
131	5% Lilliefors Critical Value				0.443	Detected Data appear Lognormal at 5% Significance Level						
132	Detected Data appear Lognormal at 5% Significance Level											
133												
134	Lognormal ROS Statistics Using Imputed Non-Detects											
135	Mean in Original Scale				23.25	Mean in Log Scale				-2.702		
136	SD in Original Scale				127.5	SD in Log Scale				4.065		
137	95% t UCL (assumes normality of ROS data)				49.86	95% Percentile Bootstrap UCL				52.72		
138	95% BCA Bootstrap UCL				72.66	95% Bootstrap t UCL				166.2		
139	95% H-UCL (Log ROS)				4249							
140												
141	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
142	KM Mean (logged)				4.001	95% H-UCL (KM -Log)				65.72		
143	KM SD (logged)				0.42	95% Critical H Value (KM-Log)				1.816		
144	KM Standard Error of Mean (logged)				0.0607							
145												
146	DL/2 Statistics											
147	DL/2 Normal					DL/2 Log-Transformed						
148	Mean in Original Scale				45.2	Mean in Log Scale				3.351		
149	SD in Original Scale				123.7	SD in Log Scale				0.57		
150	95% t UCL (Assumes normality)				71.02	95% H-Stat UCL				38.52		
151	DL/2 is not a recommended method, provided for comparisons and historical reasons											
152												
153	Nonparametric Distribution Free UCL Statistics											
154	Detected Data appear Approximate Normal Distributed at 5% Significance Level											
155												
156	Suggested UCL to Use											
157	95% KM (t) UCL				97.31	95% KM (Percentile Bootstrap) UCL				N/A		
158	Warning: One or more Recommended UCL(s) not available!											
159												
160	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
161	Recommendations are based upon data size, data distribution, and skewness.											
162	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
163	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
164												

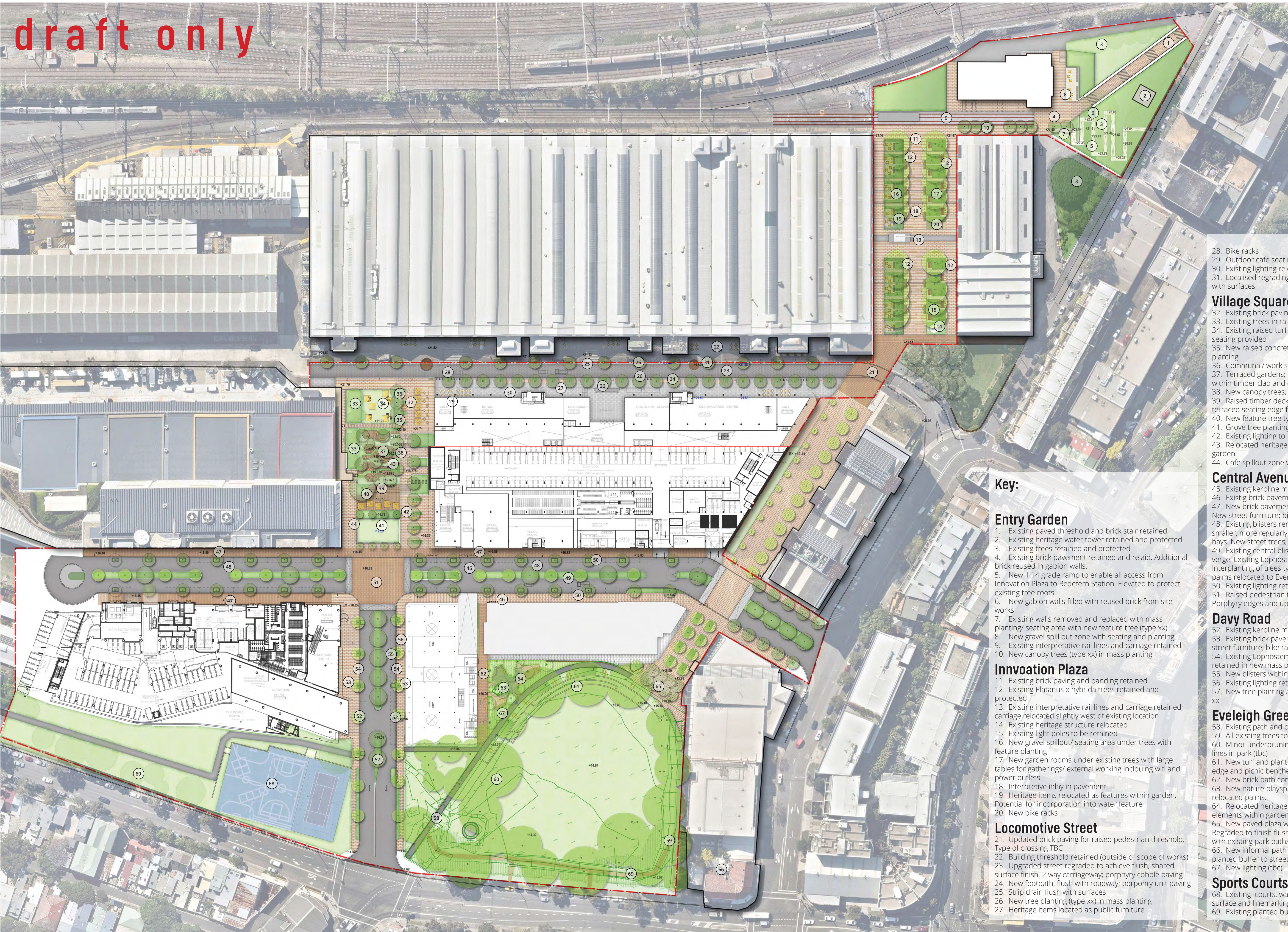
Appendix C Proposed Development



Notes All dimensions and setbacks to be verified prior to commencement on site. All omissions or discrepancies to be notified to the architect. Copyright The copyright of this drawing together with any other documents prepared by Sissons Architects (SA) remains the property of SA. SA grants licence for the use of this document for the purpose for which it is intended. The licence is not transferable without the permission of SA.	Legend GE: Gymn amenity exhaust KE: Retail kitchen exhaust G: General tenant exhaust RP: Refrigerant pipework riser FHR: Fire hydrant reel RH Riser: Fire hydrant riser SR: Sewer relief gully TE: Tenant elec distribution point TC: Tenant comms distribution point FHBC: Fire hydrant brigade booster connection	Revision	Date	Comment	Revision	Date	Comment	Revision	Date	Comment	Drawn	Checked	Created Date	Project AUSTRALIAN TECHNOLOGY PARK Redfern NSW 2015 COMMUNITY CENTRE	Drawing Title GROUND FLOOR PLAN CONCEPT DESIGN						
												File Name									



WORK IN PROGRESS



draft only

- 28. Bike racks
- 29. Outdoor cafe seating zone
- 30. Existing lighting relocated to new street alignment
- 31. Localised regrading of roadway to finish pit lid flush with surfaces

Village Square

- 32. Existing brick paving retained
- 33. Existing trees in raised planters retained
- 34. Existing raised turf with concrete edge retained. New seating provided
- 35. New raised concrete planters with tree and mass planting
- 36. Communal/ work station seating within garden
- 37. Terraced gardens; timber platforms and bench seating within timber clad and concrete raised planters
- 38. New canopy trees; type xx, in mass planting
- 39. Raised timber deck with communal bench seating and terraced seating edge for informal events/ gathering
- 40. New feature tree type xx
- 41. Grove tree planting, type xx, in flush gravel surface
- 42. Existing lighting to be retained (to be confirmed)
- 43. Relocated heritage items to form water feature within garden
- 44. Cafe spillout zone with seating and umbrellas

Central Avenue

- 45. Existing kerbline maintained
- 46. Existig brick pavement maintained
- 47. New brick pavement as consistent footpath treatment. New street furniture; bike racks and street benches.
- 48. Existing blisters removed and replaced with new, smaller, more regularly spaced blisters between parking bays. New street trees; type xx, in mass planting
- 49. Existing central blister extended as continuous verge. Existing Lophostemon confertus trees retained. Interplanting of trees type xx, in new mass planting. Existing palms relocated to Everleigh Green playspace
- 50. Existing lighting retained (tbc)
- 51. Raised pedestrian threshold for shareway crossing. Porphyry edges and updated brick. Type of crossing TBC

Davy Road

- 52. Existing kerbline maintained
- 53. Existing brick pavement footpath maintained with new street furniture; bike racks and street benches
- 54. Existing Lophostemon confertus street trees to be retained in new mass planting
- 55. New blisters within parking lane; mass planted
- 56. Existing lighting retained
- 57. New tree planting and understory to central verge, tye xx

Eveleigh Green

- 58. Existing path and bridge retained
- 59. All existing trees to be retained and protected
- 60. Minor underpruning of Casaurinas to improve sight lines in park (tbc)
- 61. New turf and planted terraces with concrete seating edge and picnic benches
- 62. New brick path connection to park
- 63. New nature playspace with mass planted garden with relocated palms.
- 64. Relocated heritage items to form water feature/ play elements within garden
- 65. New paved plaza with grove tree planting in gravel. Regraded to finish flush with upper terrace, and marry in with existing park paths
- 66. New informal path at top of bank within new mass planted buffer to street
- 67. New lighting (tbc)

Sports Courts

- 68. Existing courts, walls, lighting and edges retained. New surface and linemarking for multi-purpose courts
- 69. Existing planted buffer to street retained

Key:

Entry Garden

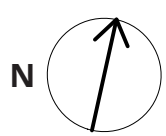
- 1. Existing paved threshold and brick stair retained
- 2. Existing heritage water tower retained and protected
- 3. Existing trees retained and protected
- 4. Existing brick pavement retained and relaid. Additional brick reused in gabion walls.
- 5. New 1:14 grade ramp to enable all access from Innovation Plaza to Redefern Station. Elevated to protect existing tree roots.
- 6. New gabion walls filled with reused brick from site works
- 7. Existing walls removed and replaced with mass planting/ seating area with new feature tree (type xx)
- 8. New gravel spill out zone with seating and planting
- 9. Existing interpretative rail lines and carriage retained
- 10. New canopy trees (type xx) in mass planting

Innvoation Plaza

- 11. Existing brick paving and banding retained
- 12. Existing Platanus x hybrida trees retained and protected
- 13. Existing interpretative rail lines and carriage retained; carriage relocated slightly west of existing location
- 14. Existing heritage structure relocated
- 15. Existing light poles to be retained
- 16. New gravel spillout/ seating area under trees with feature planting
- 17. New garden rooms under existing trees with large tables for gatherings/ external working including wifi and power outlets
- 18. Interpretive inlay in pavement
- 19. Heritage items relocated as features within garden. Potential for incorporation into water feature
- 20. New bike racks

Locomotive Street

- 21. Updated brick paving for raised pedestrian threshold. Type of crossing TBC
- 22. Building threshold retained (outside of scope of works)
- 23. Upgraded street regraded to achieve flush, shared surface finish, 2 way carriageway; porphyry cobble paving
- 24. New footpath, flush with roadway; porphory unit paving
- 25. Strip drain flush with surfaces
- 26. New tree planting (type xx) in mass planting
- 27. Heritage items located as public furniture



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Document Status

Rev No.	Author	Reviewer	Approved for Issue		
		Name	Name	Signature	Date
A	Matt Parkinson	Greg Dasey	For Site Auditor Review	For Site Auditor Review	23/11/2015
B	Matt Parkinson	Greg Dasey	For Site Auditor Review	For Site Auditor Review	8/12/2015

