



ANNEXURE 1 - SITE MANAGEMENT PLAN

LOT : 2 PLAN : RP886522 FILE REF : BNE23163 PRINTED: 30/10/2019

DATE OF EFFECT : 09/10/2006

RPD: Part of Lot 400 on SL8424:

The metes and bounds description of the area of land being the part of the proposed River Precinct described as part of Lot 400 on SL8424, Parish of Indooroopilly, County of Stanley.

Commencing at the point being the north western corner of Lot 2 on RP886552 and thence bounded by lines:

Bearing 198° 12'40" for a distance of 98.13m
Bearing 285° 46'05" for a distance of 26.79m
Bearing 276° 47'55" for a distance of 136.17m
Bearing 276° 02'20" for a distance of 164.54m
Bearing 277° 09'05" for a distance of 49.31m
Bearing 81° 07'50" for a distance of 392.37m
Bearing 130° 31'00" for a distance of 21.74m
Bearing 285° 46'05" for a distance of 26.79m
To the point of commencement and containing an area of 2.056ha more or less.

and Part of Lot 2 on RP886522:

The metes and bounds description of the area of land being the part of the proposed River Precinct described as part of Lot 2 on RP886522, Parish of Indooroopilly, County of Stanley.

Commencing at the point being the north western corner of Lot 2 on RP889552 and thence bounded by lines:

Bearing 96° 15'10" for a distance of 61.06m
Bearing 61° 14'45" for a distance of 68.74m
Bearing 94° 44'45" for a distance of 14.13m
Bearing 142° 12'45" for a distance of 256.49m
Bearing 195° 33'15" for a distance of 8.66m
Bearing 286° 31'50" for a distance of 149.34m
Bearing 285° 46'05" for a distance of 184.33m
Bearing 18° 12'40" for a distance of 98.13m
To the point of commencement and containing an area of 3.233 ha more or less.

1.0 SUMMARY OF CONTAMINATION

The site forms part of Indooroopilly Golf Course that has been used for agriculture, landfill and open space (golf course) purposes. The metes and bounds area is known to contain fill material including:

Building rubble (including large pieces of concrete, timber and iron); and
Small amount of non-putrescible domestic waste (rags, plastic and glass).

Broken pipeline fragments (Chrysotile asbestos cement sheeting).

A nominal soil and vegetation cap remains from the original landfill closure and subsequent golf course construction works that provides a physical barrier to buried materials.

The strategy by which this material will be removed and/or managed is contained in the Remediation Action Plan (RAP) contained in Appendix 1.

2.0 OBJECTIVES OF THE SMP

The purpose of this SMP is to manage contamination on the site in a manner that protects human health and the environment.

3.0 ACHIEVEMENT AND MAINTENANCE OF OBJECTIVES

3.1 *Responsibility.* The owner of the land (as defined in the *Environmental Protection Act 1994*) is to ensure that this SMP and any variations approved or required by the administering authority are complied with. The obligations and conditions set out in this SMP bind the owner, from time to time, of the land.

3.2 *Site Use.* The site described by the metes and bounds is currently suitable for the existing land use (i.e. golf course). No Material Change in Use can be conducted on the subject land until the remediation works described in the RAP (Appendix 1) has been completed.

The conditions and limitations of this SMP for Lot 400 on SL8424 and Lot 2 on RP886522 only relate to the area described by the metes and bounds. Hence, without further investigation, no comment can be made with respect to of the site suitability for the balance portions of Lot 400 on SL8424 and Lot 2 on RP886522.

3.3 *Third Party Reviewer.* A Third Party Reviewer (TPR) approved by the Environmental Protection Agency (EPA) and operating in accordance with the EPA's Terms of Reference for TPR (August 2003) must be appointed for the duration of the site assessment and remediation activities.

3.4 *Provision of SMP to appropriate persons.* The owner must provide all persons involved in building design and planning and all contractors and lessees conducting building and/or excavation works with a copy of the SMP prior to commencement of site works. All persons occupying or working on the site must comply with the requirements of the SMP.

3.5 *Surface capping and protective barriers.* Until remediation works commence, a capping layer consisting of the existing surface cover or equivalent cover (including grass cover) is to remain over the area with the metes and bounds description to maintain a barrier between the contamination and individual site users. The capping layer is to be maintained in sound condition at all times.

3.6 *Soil Excavation & Removal.* Any soil excavated from the site must be assessed for the contaminants of concern, to determine if the material is contaminated and to identify appropriate management and disposal/re-use options.

Representative sampling and analysis of soil from excavation in contaminated areas must be managed by a suitably qualified and experienced person in accordance with Section 381 of the *Environmental Protection Act 1994* (EP Act). Contaminated soil must not be removed off-site without prior certification by the TPR and a disposal permit issued in accordance with Section 424 of the EP Act.

3.7 *Unexpected Contamination.* If during any site earthworks or excavation, offensive or noxious

odours and/or evidence of gross contamination not previously detected are observed, site works are to cease in that area and action taken to immediately abate the environmental harm. The administering authority is to be notified in writing within 2 business days of detection and advised of appropriate remedial action.

Any remedial action is to be developed by an appropriately qualified and experienced person in accordance with Section 381 of the EP Act.

3.8 *General Environmental Protection.* All earthworks are to be undertaken in accordance with general environmental protection measures to avoid unwanted migration and deposition of soil. These measures include the control of dust, noise, stormwater runoff, sediment, erosion, spillage from haulage trucks and odour releases involving the handling or movement of contaminated material.

3.9 *Workplace Health and Safety.* A Workplace Health and Safety Plan (WH&S plan), which conforms to the requirements of the *Workplace Health and Safety Act 1995* is to be developed for any site excavation works in contaminated areas. The WH&S plan must specifically address contaminants of concern.

3.10 *Underground Services.* All underground services must be constructed in either uncontaminated material or in trenches in which the services are surrounded by a minimum of 0.3 m of uncontaminated fill for minor services (< 100 mm in diameter), and 0.5 m of uncontaminated fill for services greater than 100 mm in diameter.

Maintenance of existing services should be undertaken in accordance with Sections 3.5 and 3.8 of this plan.

4.0 **MONITORING AND REPORTING**

Monitoring and reporting is to be conducted as required in Appendix 1 - Remediation Action Plan (RAP). The owner is to ensure that the following reporting and monitoring is performed to ensure compliance with the SMP:

Within 60 days from the completion of site development a report is to be submitted to the Third Party Reviewer documenting details of barrier capping, where present, the results of any sampling undertaken during construction, records of any site inspections and details of Site Management Plan compliance. The report is to be prepared by a suitably qualified and experienced person in accordance with Section 381 of the *Environmental Protection Act 1994* (EP Act).

A biennial inspection of the site is to be undertaken by the owner to ensure the integrity of any protective capping layers remain in good condition.

This Site Management Plan (SMP) has been developed to manage site contamination risks present at the issue date. Subsequent uses of the site may result in the need to review the plan.

This SMP makes reference to a plan attachment that is available from the Administering Authority if required.

This SMP makes reference to a Remediation Action Plan attachment that is available from the Administering Authority if required.

APPENDIX 1 REMEDIATION ACTION PLAN

Lot 400 on SL8424 and Lot 2 on RP886522

1. INTRODUCTION

1.1 General

This Remediation Action Plan (RAP) has been prepared for remediation of a part of the Indooroopilly Golf Course, Meiers Road Indooroopilly, and described as a portion of Lot 2, RP 886522 and a portion of Lot 400, SL8424, as per the metes and bounds attached as **Table 1** and shown on Figure 1.

For the purposes of this RAP, the following property descriptions apply:

The Site/On-site	The area that is planned to comprise the following two proposed allotments within the metes and bounds area as shown on Figure 1: Proposed Lot 10, 2.897 ha Proposed Lot 11, 2.392 ha
Remainder of Lot 400	The remaining portion of Lot 400 on SL 8424 outside the area comprising the Site.
Remainder of Lot 2	The remaining portion of Lot 2 on SL 8424 outside the area comprising the Site.
Off-site	Any land parcel, area or licensed waste treatment or disposal facility outside the boundary of Lot 400 on SL8424 and Lot 2 on RP 886522.

Sections of the Indooroopilly Golf Course have previously been used as a landfill. Putrescible waste is not known to be present within the Site, however, there are areas of soil fill containing construction and demolition waste. Planned redevelopment of the Site comprises medium density residential units (with restricted soil access) that require management and/or removal of hazardous contaminants primarily comprising oversized concrete fragments and broken asbestos piping. Remediation and management of other landfill areas present within the golf course outside the Site do not form part of this RAP.

1.2 Purpose of the RAP

The primary purpose of the RAP is to describe environmental remediation works required to permit the proposed medium density residential development of the Site. This document has been prepared to describe remediation strategies and control measures to minimise potential human health and environmental risks associated with identified site hazards.

Proposed development basement and building foundation construction works will require the excavation and removal of most existing fill material located within the Site.

Appropriate validation of the site following excavation works may demonstrate no contaminants or other hazards remain on-site, allowing the two proposed allotments to be removed from the Environmental Management Register (EMR) once gazetted.

This RAP is structured to support the primary remediation objective for the Site to be made suitable for the proposed redevelopment and an alternative approach of demonstrating that the Site is suitable for EMR removal.

1.3 Third Party Reviewer

A Third Party Reviewer must be appointed in accordance with the Environmental Protection Agency Terms of Reference for the duration of the remediation and validation of the site. The role of the TPR is to review and certify all relevant documentation associated with proposed remediation strategies and control measures forming the RAP, and when appropriate to certify to the Environmental Protection Agency that the Site is suitable for the intended uses and/or removal from the EMR.

2.0 BACKGROUND

2.1 Topography

The Site is located to the north east of the Indooroopilly Golf Course Clubhouse immediately adjacent to Meiers Road and the bank of Brisbane River. The Site is generally undulating with the terrain altered locally for golf course use and with an overall slope downwards towards the banks of the Brisbane River along the northern and eastern boundaries. An elevated and relatively level fill plateau is present at the western end of proposed Lot 10.

2.2 Geology

Geological Survey of Queensland, Brisbane (Sheet 9543) indicates the Site is underlain with quaternary age alluvium comprised of clay, silt, sand and gravel.

A total of 36 borehole or test pit locations have been investigated across the Site during contamination investigations in 2004 and 2005. These investigations have revealed ground conditions comprised of:

Proposed Lot 10:

Older alluvial river terrace sediments comprising of inter-bedded sequences of consolidated clays, sands, sandy clays and clayey sands.

Localised reworked natural soil intersected to depths of 0.4 m.

Proposed Lot 11:

Primarily underlain by older alluvial river terrace sediments as above.

Two distinct areas of fill are present as shown in Figure 1. The western Fill Mound generally comprises soils, building rubble including large concrete fragments and vegetation clippings. The depth of the Fill Mound varies between 0.2 m to 4.0 m. The Central Fill Area generally comprises reworked natural alluvial soils, with

localised areas of imported gravel. The depth of the Central Fill Area varied between 0.15 m and 0.7 m.

2.3 Hydrogeology

No groundwater seepage was encountered at soil investigation test pit or borehole locations to maximum depths of 7.5 m within the Site. Four monitoring wells installed in and around the Site intersected groundwater seepage within alluvial soils at depths of between approximately 8 m and 13 m during drilling, with stabilised standing groundwater depths of between approximately 5.7 m and 10.5 m measured at the time of sampling.

Groundwater is considered to flow from the centre of the Indooroopilly Peninsula towards the Brisbane River and groundwater levels near the River fluctuate in response to tidal movement within the River. Groundwater elevations for monitoring wells located within or immediately adjacent to the River Precinct range between 0 mAHD and 0.3 mAHD.

Saline conditions were present within the Brisbane River and monitoring wells closest to the river bank, with salinity decreasing with distance from the river to brackish or marginally fresh conditions where surface water infiltration would have a greater influence.

Use of groundwater as a source as drinking water, irrigation water, stock water and/or industrial water is restricted by salinity and limited permeability of the underlying geology. Given the proximity of the Peninsula Development to the Brisbane River, protection of the aquatic ecosystem from potentially impact groundwater discharge is considered to be the main issue in assessing groundwater quality.

2.3 Information Sources

Various soil and groundwater investigations have been carried out at the Site. Reports considered in the preparing this RAP include:

GHD Pty Ltd. *IGC Stage 1 Environmental Site Assessment Report*. Ref. 41/13649/88467, June 2004;

Golder Associates Pty Ltd. *Geophysical Investigation, Indooroopilly Golf Club, River Site Brisbane*. Ref. 04652009/R001, August, 2004;

Brisbane City Council. *Landfill Remediation Assessment Program (LRAP), Long Pocket, Meiers Road, Indooroopilly*. Ref. CD/G1-040148-LT001sh, September, 2004;

Golder Associates Pty Ltd. *Stage 1 Preliminary Site Assessment, Indooroopilly Golf Course, Indooroopilly, Queensland*. Ref. 002-04633040, September, 2004.

Golder Associates Pty Ltd. *Detailed Contaminated Land Assessment, Peninsula Residential Development, River Precinct, Meiers Road, Indooroopilly, Queensland*. Ref. 028-04633040R1, February, 2006.

2.4 Historical Data

Known use of the Indooroopilly Golf Course has comprised:

The Indooroopilly Peninsula was originally used for agricultural purposes, with areas, particularly towards the eastern end, used for sand extraction.

A major water main was constructed along the southern boundary of the River Precinct in 1961.

Voids from sand extraction were filled with refuse by the Brisbane City Council in the 1960's and 1970's.

The Indooroopilly Golf Club purchased a large area of the Indooroopilly Peninsula in 1977/78 and the construction of the golf course commenced around 1981. The golf club uses recycled grey water effluent water for irrigation purposes on the golf course.

The Site is located across portions of two properties included on the Environmental Management Register (EMR) for the notifiable activity of LANDFILL – disposing of waste (excluding inert construction and demolition waste).

Aerial photography information indicated that the bulk of landfilling activities took place to the south and west of the Site. Some fill placement was evident within proposed Lot 10, however, none was visually identified within proposed lot 11.

2.6 Site Hazards

The available data indicates that there are broadly two types of hazardous contamination in the soil that need to be addressed in the remediation strategy. These comprise oversized construction and demolition waste including concrete and steel reinforcing and broken asbestos pipe fragments.

The source of this contamination is fill material, identified in two distinct fill areas shown on Figure 1 and described in Section 2.2 (Fill Mound and Central Fill Area).

2.6.1 Oversized Materials

The extent of the Fill Mound area is defined by a raised mound above the general surface level of the surrounding area. Investigation of the Fill Mound identified approximately 7000m³ of predominantly soil containing building rubble including large pieces of concrete, timber and iron.

At the investigation locations the oversized solid building wastes were covered by at least 0.5 m thickness of clean soil. A small amount of rags, plastic and glass was detected at one location near the toe of the mound.

Analysis of samples of Fill Mound materials and natural soils did not identify concentrations of contaminants of concern that are considered a risk to the environment or human health for the current or proposed land uses.

2.6.2 Asbestos

Fragments of broken piping tested as containing asbestos fibres were identified at a depth of at least 0.2 m below clean soil at one location within the Central Fill Area. Asbestos fragments were not observed at investigation locations within the remaining areas of the Central Fill Area or the Fill Mound. Limited testing of fill material sampled from the Fill Mound did not detect the presence of asbestos fibres.

Asbestos building products were widely disposed of in Brisbane City Council landfills during the time the Indooroopilly Golf Course site was filled in the 1960's and 1970's and, therefore small quantities of such material may be present within the Fill Mound and Central Fill Area. The fragment of asbestos pipe detected in the Central Fill Area and other currently unidentified quantities in the Fill Mound (if present) do not represent a risk to the health of current or future site users whilst these materials remain buried below the surface with a cover of turf and clean soil at least 0.5 m thick.

2.6.3 Acid Sulfate Soils

An acid sulfate soils investigation was conducted for the Site within the proposed building footprints. The investigation did not identify any actual or potential acid sulfate soils within probable depths of disturbance on the proposed Lots 10 and 11.

2.6.4 Groundwater

Concentrations of metals detected in groundwater samples within and around the River Precinct were relatively consistent with those detected in the Brisbane River and are not considered to represent a significant risk to the ecology of the river. Concentrations of potential organic contaminants (petroleum hydrocarbons, polycyclic aromatic hydrocarbons and pesticides) were below laboratory limits of reporting.

Nutrient concentrations were, however, generally much higher in the groundwater samples than river water samples. Highest nutrient concentrations were detected in samples from monitoring wells located within the central northern and southern boundaries of the River Precinct where total P and total N concentrations were between 50 to 100 times higher than those in the river water samples.

No potential groundwater contaminant sources were identified within the River Precinct that may be contributing to the concentrations of nutrients in the groundwater. It appears that groundwater impacts are the result of current or historical activities external to the River Precinct.

On basis of the following, remediation and/or management of impacted groundwater is not required for the remediation works and is not considered further within the RAP:

There are no identified groundwater contaminant sources within the River Precinct.

Proposed development earthworks are unlikely require excavations to depths where groundwater would be intersected.

3.0 VALIDATION CRITERIA

3.1 General

Validation Criteria documented in the following sections form the basis to assess whether the remediation works have achieved the stated land use remediation objectives:

Primary Objective: Medium Density Residential Housing

Alternative Objective: Removal of the Property from the EMR.

The Validation Criteria are based on various national and international standards and have been adopted considering a range of issues including human health risk, environmental risk, groundwater risk and aesthetic considerations such as odour and discolouration.

These criteria may be amended during the remediation works, subject to approval by the TPR, where it can be demonstrated that alternative criteria are protective of human health, the environment and aesthetic considerations.

Validation works shall be undertaken by a suitably qualified and experienced person in accordance with Section 381 of the *Environmental Protection Act 1994* (EP Act). Standard procedures that include sample equipment decontamination, sample handling, sample storage and documentation shall be applied. Analytical testing for the validation program shall be conducted by a NATA accredited laboratory.

No fill material shall be reused within the Site, removed from Site or imported to the Site without characterisation or management and approval of the TPR. At the completion of remediation works a Validation Report shall be prepared by the suitably qualified and experienced person that documents the works undertaken and compliance with the RAP. This report will be submitted to the TPR for approval.

3.2 Protective Capping Thickness

The thickness of Protective Capping over the Central Fill and Fill Mound Areas (shown on Figure 1), any new area formed by excavated fill from beneath building locations and any other areas of non-inert fill identified during remediation/construction works shall be validated as follows:

New Capping: Surveying of the area containing Hazardous Contaminants to be capped prior to and following remediation works using a 10 m square grid or part thereof to confirm that the nominated protective capping thickness has been achieved.

The capping placement works shall be inspected by a suitably qualified and experienced person in accordance with Section 381 of the EP Act at least daily to document the nature of the capping materials used and identify possible changes to the original ground surface immediately prior to capping placement.

Existing Capping: Subsurface investigation of the area containing Hazardous Contaminants to be capped by the Environmental Consultant using a 10 m square grid or part thereof to confirm that the nominated protective capping thickness is present.

3.3 Hazardous Contaminant Concentrations – Soils

Where hazardous contaminants are to remain on-site following remediation works, with the property remaining on the EMR with a SMP, capping material and other fill material located within the nominated capping thickness depth from the final ground surface shall comply with '*Soil Acceptance Criteria A*' that will permit Medium Density Residential land use with minimal access to underlying soil by site users.

Where removal of the property from the EMR following remediation works is required, all fill material and natural soils shall comply with '*Soil Acceptance Criteria B*' that will permit sensitive land uses with full soil access by site users such as low density residential and child care.

'*Soil Acceptance Criteria A*' are generally based upon the Queensland Health-based Investigation Threshold Guideline Exposure Setting '*D*' for residential with minimal opportunities for soil access.

'*Soil Acceptance Criteria B*' are generally based upon the Queensland Environmental Investigation Threshold Guidelines. The exception is for copper where a value of 200 mg/kg has been adopted in preference to the interim urban environmental guideline value of 60 mg/kg. This higher value is considered appropriate given the minimal risk to aquatic ecosystems and low phyto-toxicity risk currently observed for site plant species. Similar copper values have been accepted by the EPA as remediation criteria on other sites where phyto-toxicity considerations are of low concern.

Soil Acceptance Criteria should be applied to the 95% Upper Confidence Level (UCL) on the mean of data for each domain of interest, with no hot-spot concentrations greater than 2.5 times the relevant criteria value. The domains of interest at this Site will be each individual proposed allotment (Lot 10 and Lot 11). This approach can only be used providing a statistically valid sample size has been achieved.

Parameter	Soil Acceptance Criteria A Medium Density Residential	Soil Acceptance Criteria B EMR Removal & "Clean" Fill
<u>Petroleum Hydrocarbons</u>		
TRH (C ₆ – C ₉)		100 mg/kg ⁽¹⁾
TRH (C ₁₀ – C ₁₄)		100 mg/kg ⁽¹⁾
TRH (C ₁₅ – C ₂₈)		1000 mg/kg ⁽¹⁾
TRH (C ₂₉ - C ₃₆)		1000 mg/kg ⁽¹⁾
<u>Monocyclic Aromatic Hydrocarbons</u>		
Benzene		1 mg/kg ^(1, 4)
Toluene		
Ethyl Benzene		Total BTEX = 7 mg/kg ⁽¹⁾
Xylene		
<u>Polycyclic Aromatic Hydrocarbons</u>		
Benzo(a)pyrene	4 mg/kg ⁽²⁾	1 mg/kg ⁽³⁾
Total PAH	80 mg/kg ⁽²⁾	20 mg/kg ⁽³⁾
<u>Inorganics</u>		
Arsenic	400 mg/kg ⁽²⁾	100 mg/kg ⁽³⁾
Cadmium	80 mg/kg ⁽²⁾	3 mg/kg ⁽⁴⁾
Chromium (VI)	400 mg/kg ⁽²⁾	50 mg/kg ⁽⁴⁾
Copper	4000 mg/kg ⁽²⁾	200 mg/kg ⁽⁵⁾
Lead	1200 mg/kg ⁽²⁾	300 mg/kg ⁽⁴⁾
Nickel	2400 mg/kg ⁽²⁾	60 mg/kg ⁽⁴⁾
Mercury	60 mg/kg ⁽²⁾	1 mg/kg ⁽⁴⁾
Zinc	28000 mg/kg ⁽²⁾	400 mg/kg ⁽⁵⁾
<u>Organochlorine Pesticides</u>		
Aldrin + Dieldrin	40 mg/kg ⁽²⁾	0.2 ⁽⁴⁾
Chlordane	200 mg/kg ⁽²⁾	-
DDT & Derivatives	800 mg/kg ⁽²⁾	0.2 ⁽⁴⁾
Heptachlor	40 mg/kg ⁽²⁾	-
Physical Criteria		
1) No Protective Capping - Odour - Staining <ul style="list-style-type: none"> - Domestic and Garden Refuse - Construction and Demolition Waste - Asbestos		
2) Below Protective Capping (comprising minimum nominated thickness of clean soil and vegetation, concrete slab, sealed road pavement or other equivalent capping system approved by the TPR)		- No detectable hydrocarbon odour - No visible hydrocarbon staining - No visible municipal waste materials - Concrete (including embedded steel reinforcing rods), pulverised to a maximum 300mm nominal size ⁽⁶⁾ - No visible timber or other deleterious materials - No detectable asbestos fibres or fragments Construction and Demolition Waste and asbestos acceptable subject to specific TPR approval

Notes:

- (1) Draft Hydrocarbon Guidelines – QLD EPA 1999
- (2) Health Based Investigation Levels for Exposure Setting ‘D’ (residential with minimal opportunities for soil access) – Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland, Queensland Department of Environmental 1998.
- (3) Health Based Investigation Levels for Exposure Setting “A” (‘Standard’ Residential with garden/accessible soil) – Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland, Queensland Department of Environmental 1998.
- (4) Environmental Investigation Levels – Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland, Queensland Department of Environmental 1998.
- (5) Values as agreed with Third Party Reviewer.
- (6) Clean Fill Guidelines – QLD EPA

3.4.7 On-site Soil Validation Sampling

3.4.1 Sample Field Screening

All soil samples shall be screened in on-site by a suitably qualified and experienced person in accordance with Section 381 of the *Environmental Protection Act 1994* for potential indications of contamination impact, including:

Field indicators such as odour, discolouration and presence of waste materials.

Potential hydrocarbon impacts using a calibrated portable Photoionisation Detector (PID).

Field observations for all soil samples shall be recorded and included in Validation Reports to be submitted to the TPR for approval.

3.4.2 Sample Density – Existing Protective Capping

The concentrations of Hazardous Contaminants present within existing Protective Capping material overlying solid waste Hazardous Contaminants shall be validated by the collection of soil samples by a suitably qualified and experienced person in accordance with Section 381 of the *Environmental Protection Act 1994* using a 10 m square grid or part thereof. A single sample from each sample location shall be taken from the ground surface following remediation works to a depth equal to the nominated protective capping thickness.

3.4.3 Sample Density – Natural Soils

Areas of the Site containing natural soils or rock exposed at the ground surface shall not require validation sampling except where field observations indicate potential contamination such as odour or discolouration. Such areas shall be validated by the collection of soil samples by a suitably qualified and experienced person in accordance with Section 381 of the *Environmental Protection Act 1994* using a 10 m square grid or part thereof.

Areas of the site where fill material and/or Hazardous Contaminants are excavated to expose underlying natural soils shall be validated by the collection of soil samples by a suitably qualified and experienced person in accordance with Section 381 of the *Environmental Protection Act 1994* using a 10 m square grid or part thereof.

3.4.4 Sample Density – On-Site Clean Fill Use

Fill material reused on-site shall be sampled and tested at a rate of 1 sample per 50 m³ (bulk density).

Only new quarry sourced fill or other material approved by the TPR shall be imported to Site.

3.5 Off-Site Fill and Hazardous Contaminant Disposal

3.5.1 Clean Fill

Only fill material complying with Soil Acceptance Criteria B shall be removed from site for disposal as Clean Fill suitable for any use. Excavated fill material shall be sampled and tested at a rate of 1 sample per 50 m³.

In-situ natural soils and rock can be disposed off-site as Clean Fill subject to validation of the exposed surface immediately underlying areas of fill material prior to excavation.

3.5.2 Hazardous Contaminants – Remainder of Lot 400 and Lot 2

The movement of soil and hazardous materials from the Site to the remainder of Lot 400 or Lot 2 shall be undertaken as follows:

Clean Fill Material classified as Clean Fill as described above (Section 3.4.4) is suitable for any use within these two properties.

Asbestos Asbestos products, fragments and fibres and soil containing such material exposed during remedial or development works shall not be reused Onsite. Where encountered, these materials must be collected and removed from site for disposed of at an appropriately licensed facility.

Other Material All materials not classified as Clean Fill or asbestos can be moved to the Remainder of Lot 400 or Remainder of Lot 2 without validation sampling, subject to the following:

Written approval is obtained from the Indooroopilly Golf Club for an agreed disposal location.

Fill materials are not located within 100 m of the banks of the Brisbane River.

Material sourced within Lot 400 on SL 8424 and Lot 2 on RP 886522 must remain their respective property boundaries.

Such material shall not be taken outside their respective property boundaries to other properties within the Indooroopilly Golf Course listed on the EMR without approval of the TPR and a Disposal Permit from the EPA.

Such material shall be covered by protective capping comprising of clean fill with a minimum of the nominated capping thickness.

The nature of the protective capping and location of buried material shall be documented and reported to the TPR, EPA and Indooroopilly Golf Club.

3.5.3 Hazardous Contaminants – Waste Management Facility

All materials removed off-site that do not comply with Acceptance Criteria B shall be disposed of to a licensed waste disposal or management facility. Such materials shall be categorised for disposal as follows in accordance with the licence conditions of the selected disposal facilities:

Clean Recycled Concrete	Concrete fragments free of soil. No Validation Sampling Required.
Unlined Landfill	Soil, domestic waste material or construction and demolition waste.
Lined Landfill	Soil material containing concentrations of contaminants of concern greater than Unlined Landfill criteria.
Treatment and Lined Landfill	Soil material containing concentrations of contaminants of concern that require treatment prior to landfill disposal.
Asbestos	Asbestos products, fragments and fibres and soil containing such material

Fill material removed from site other than Clean Recycled Concrete requires validation sampling at a rate of 1 sample per 200 m³ and an Environmental Protection Agency Disposal Permit approved by the TPR.

3.6 Sample Laboratory Analysis

3.6.1 Analysis Program

Analysis of collected samples for Hazardous Contaminants shall be undertaken as follows:

Metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn)	All soil samples.
Petroleum Hydrocarbons	All soil samples with visual or olfactory impacts otherwise 10% of soil samples.
Monocyclic Aromatic Hydrocarbons	All soil samples with visual or olfactory impacts otherwise 10% of soil samples.
Polycyclic Aromatic Hydrocarbons	All soil samples with visual or olfactory impacts otherwise 10% of soil samples.
Organochlorine Pesticides	All soil samples.
Physical Criteria	All soil samples.

or as agreed with the TPR.

3.6.2 Quality Assurance/Quality Control

A quality assurance/quality control program shall be conducted during validation sampling. This program shall include collection and analysis of:

Blind replicate samples at a frequency of 1 for every 20 samples collected.

Split samples at a frequency of 1 for every 20 samples collected.

Equipment rinsate samples for each day where sampling is conducted.

3.7 Landfill Gas Validation

Monitoring during investigation works did not identify the presence of landfill gasses within the Site.

To confirm the investigation findings, landfill gas monitoring shall be undertaken by a suitably qualified and experienced person in accordance with Section 381 of the *Environmental Protection Act 1994*, comprising construction of landfill gas monitoring wells immediately prior to the commencement of remediation works to be sampled and analysed in the field for the following compounds and subsequently at monthly intervals during remediation works up to, and immediately following satisfactory completion or as otherwise agreed with the TPR:

Methane Acceptable Range: < 10 % LEL

Hydrogen Sulphide Acceptable Range: <5ppm

Five landfill gas monitoring wells are to be constructed along the southern boundary of the Site adjacent to the water main pipeline as follows:

Within the fill mound to the base of the fill material present.

Within natural soils between 10 m and 20 m to the east of the Fill Mound to a depth of 5 m.

The results of each landfill gas monitoring event shall be reported to the TPR within one week of collection.

4 REMEDIATION STRATEGY

The remediation strategy for the Site comprises two options:

Excavation of all fill materials (including possible Hazardous Contaminants) from beneath proposed building footprints and placement of these materials onsite at a location agreed with the TPR. Construction or validation that a suitable Protective Capping layer is present over the remainder of the fill areas shown on Figure 1, any new fill area created from excavation beneath building footprints and any other areas of non-inert fill identified during remediation/construction works. Proposed allotments with areas containing hazardous contaminants with Protective Capping shall remain on the EMR and be subject to completion of a Validation Report and preparation of an appropriate Site Management Plan by the Environmental Consultant that are approved by the TPR.

Removal of all potential Hazardous Contaminants from Site and validation of any fill remaining on-site as Clean Fill. Where the entire area of a proposed allotment is validated as clean, the property shall be suitable for removal from the EMR upon completion of a Validation Report by the suitably qualified and experienced person, certified by the TPR and following gazettal of proposed subdivisions.

Detailed management procedures for this strategy are provided in the following sections.

5 REMEDIATION PROGRAM

5.1 Option 1 – Protective Capping of Hazardous Contaminants

5.1.1 Nominated Protective Capping Thickness

The Protective Capping layer over Hazardous Contaminants shall comprise one of the following:

Soil Material sampled and analysed in accordance with the Validation Criteria (Soil Acceptance Criteria A) with a minimum thickness of 0.5 m and a maximum final gradient of 1:2 (vertical:horizontal).

Concrete pavements, slab-on-ground foundations or retaining walls with a minimum thickness of 0.1 m.

Roadbase material and bitumen pavement with a minimum thickness of 0.2 m.

5.1.2 Fill Mound

Investigations completed to date indicate that the Fill Mound is generally covered by clean fill material to a depth of at least 0.5 m. Where the Fill Mound is to remain on-site and undisturbed, the in-situ surface soils shall be sampled and analysed to comply with the Validation Criteria and the Nominated Protective Capping Thickness.

Non-compliant sections of surface soils shall be removed and replaced or further covered with fill material that complies with Validation Criteria and the Nominated Protective Capping Thickness.

Where disturbance of the Fill Mound occurs, Protective Capping shall be constructed over the remaining Hazardous Contaminants using fill material that complies with Validation Criteria and the Nominated Protective Capping Thickness.

5.1.3 Central Fill Area

Investigations indicate that the Central Fill Area generally comprises fill material up to depths of 0.7 m overlying natural soils. Asbestos fragments were identified at one location within the Central Fill Area buried below at least 0.2 m of clean fill.

Where the Central Fill Area is to remain undisturbed, the in-situ surface soils shall be sampled and analysed to comply with the Validation Criteria and the Nominated Protective Capping Thickness.

Non-compliant sections of surface soils shall be removed and replaced or further covered with fill material that complies with Validation Criteria and the Nominated Protective Capping Thickness.

Where disturbance of the Central Fill area occurs, Protective Capping shall be constructed over the remaining Hazardous Contaminants using fill material that complies with Validation Criteria and the Nominated Protective Capping Thickness.

Areas of the site not containing Hazardous Materials shall be sampled and analysed in accordance with the Validation Criteria.

5.2 Option 2 – Removal of Hazardous Contaminants

Preliminary in-situ volume estimates of fill material present within the Site comprise:

Fill Mound	7,000 m ³
Central Fill Area	2,000 m ³

Removal of this material off-site shall be managed as follows.

Movement to Remainder of Lot 400 and Lot 2

Fill material not classified as Clean Fill or asbestos impacted shall be classified as Hazardous Contamination. Hazardous Contamination can be moved in bulk from the Site to the Remainder of Lot 400 and Lot 2 without further validation sampling subject to the Validation Criteria described in Section 3.5.2.

Off-site Disposal

Fill material shall be excavated and visually separated under the supervision of the Environmental Consultant into stockpiles of similar materials for sampling, analysis and classification for on-site re-use or off-site disposal in accordance with the Validation Criteria in Section 3.5.3.

Non-soil material shall be separated into the following distinct stockpiles for disposal:

Concrete.

Metal.

Domestic Waste.

Greenwaste.

Asbestos. This material shall be placed directly into lined containers and managed in accordance with asbestos workplace health and safety regulations (see below).

Following completion of remediation works, the Site shall be sampled and analysed in accordance with the Validation Criteria.

It should be noted that excavation works to remove Hazardous Contaminants adjacent to the southern boundary have the potential to undermine the existing water main pipeline. This issue shall be addressed, as required, during the remediation works.

5.3 Asbestos Disposal

Any asbestos fragments buried within the fill material will be classified as friable asbestos and removal off-site will be conducted by a suitably licensed asbestos removal contractor.

5.4 Oversized Concrete Disposal

Where Off-site disposal occurs, oversize concrete (> 300 mm length) shall be separated from soil and other material, where practical, for disposal to a recycling facility.

5.5 Landfill Gas

Where landfill gas is identified above the levels listed in Section 3.7 further assessment shall be conducted by suitably qualified and experienced person in accordance with Section 381 of the EP Act in consultation with the TPR to evaluate potential risks to human health and the environment and possible requirements for implementation of landfill gas management measures.

6 OPERATIONAL CONTROL

6.1 Construction Environment Management Plan

A Construction Environmental Management Plan (CEMP) for the Site shall be prepared that incorporates detailed elements covering environmental management of the Site to ensure environmental effects of the remediation work are kept to a minimum and in compliance with all relevant Acts of Parliament and Environmental Regulations. The CEMP shall be approved by the TPR prior to the commencement of remediation works.

The CEMP shall contain management approaches for but not limited to the following areas:

Land Disturbance

- Erosion and sediment control devices;
- Management of potentially contaminated stormwater;
- Management of excavation of potentially contaminated soils;
- Dust control;
- Management of stockpiles including large pieces of construction and demolition material;
- Management of groundwater.

Noise and Vibration

- Operating hours;
- Vehicles and equipment;
- Traffic;
- Noise abatement;
- Vibration.

Other

- Odour

Air quality;
Litter;
Storage of chemicals and fuel;
Road cleaning and truck wash;
Protecting infrastructure.

Development of the details within each of these segments of the CEMP shall incorporate the general management approach, the environmental criteria to be met and specific engineering controls to be used.

Requirements in the following sections shall also be considered and addressed as part of the CEMP.

6.2 Stormwater Management

A site-specific stormwater management plan shall be prepared prior to the commencement of site works. Stormwater management works are to include controls for construction activities and soil conservation measures such as diversion drains, silt traps, sediment traps, litter traps and bank stabilisation. The stormwater management plan shall be approved by the TPR prior to the commencement of remediation works.

Specific control measures are required to:

- Contain stormwater runoff generated within excavations, stockpile areas and the remediation area; and
- Prevent discharge of potentially contaminated waters into Brisbane River.

Control measures to be adopted may include:

- Use of bunds and spoon drains to isolate working areas from the remainder of the site catchment and to direct surface water from the working area into open excavations.
- Formation of a collection sump at the lowest corner of the remedial excavations to collect stormwater entering the excavations and allow for dewatering of the excavation.
- Inspection of the bunds, drains and sumps regularly during site remediation works to check their integrity and repair any faults as soon as practicable.

6.3 Soil and Sediment Control

A site-specific erosion and sediment control plan (ESCP) shall be prepared in accordance with Brisbane City Council (BCC) guidelines. TPR approval of the ESCP is required prior to the commencement of remediation works.

6.4 Noise Control

The nearest noise receptors are located in commercial/industrial buildings (CSIRO and Department of Forestry) and some residential housing to the north west of the River Precinct development. No residential areas are present within 200m of the site.

Site works shall be carried out between 7.00am and 6.00pm Monday to Saturday, in accordance with BCC guidelines.

6.5 Dust Control

Potential for dust generation from excavation works and/or stockpiles shall be managed on an as required basis by spraying from water trucks, or other TPR approved method.

6.6 Odour Control

Sufficient separation distance is considered to be available between excavation areas and nearby receptors to disperse odours that may result during remediation works.

In the event that odour complaints are received, the site operations shall be reviewed to evaluate if work methods can be altered or if odour masking agents need to be applied.

6.7 Community Consultation

All neighbouring property owners and occupants and Brisbane City Council shall be informed of the proposed remediation works prior to commencement.

Any complaints received during the works shall be recorded in writing in a single logbook. Complaints shall be investigated, actioned (if required) and responded to within 1 working day of receipt.

6.8 Site Access and Signage

Fencing shall be provided to restrict public (and golf course users) access to the site. Fencing shall be to a standard that meets Workplace Health and Safety requirements and prevents unauthorised access by the public. Warning and safety signs (as required under workplace legislation) shall be placed at site access points.

6.9 Excavation Stability

Excavations to remove contaminated materials shall be conducted in a manner that will maintain the integrity of surrounding infrastructure (including BCC water main). Where required, sheetpiles and excavation batters shall be supported by means approved by a Geotechnical Engineer. Excavation support shall be monitored and maintained in a safe condition until completion of backfilling.

7 DECONTAMINATION PROCEDURES

The Contractor shall reduce the potential for material to be tracked off the Site by the tyres of vehicles as far as practicable. This could include a restriction on off-site vehicle movement during wet conditions, the manual cleaning of vehicle wheels prior to vehicles leaving the Site, the use of a wheel wash or other measures. Details of the system to be implemented shall be provided in the CEMP and approved by the TPR.

8 HEALTH AND SAFETY

The Remediation Contractor shall be responsible for the safety of all persons engaged in the Contractor's Works and shall undertake all works necessary to ensure their safety including (without limitation) complying with the requirements of any Act or Ordinance in Queensland relating to safety.

The Remediation Contractor shall prepare a Site Specific Health and Safety Plan to address the physical and contamination hazards associated with the remediation works. The Health and Safety Plan shall consider and respond to the specific OHS hazards and issues relevant to the remediation works and be approved by the TPR.

A thorough safety induction process shall be required prior to commencement of works to inform site workers of the health and safety issues on the Site. A site safety induction shall be required for all persons engaged in the remedial works and other persons required to enter the site during the remediation works.

9 REPORTING REQUIREMENTS

All additional works and sampling results will be submitted to the TPR for review and certification. Pending the TPR review additional works may be required in consultation with the TPR.

Upon the completion of remediation and validation works, a validation report must be prepared and submitted to the TPR for review, approval and certification prior to submission to the EPA. A certified validation report must then be submitted to the EPA for review and approval.

The report must be prepared in accordance with the Draft Guidelines for the Assessment & Management of Contaminated Land in Queensland, May 1998, the NEPM and the *Environmental Protection Act 1994*.

The report must document remediation and validation program activities including the results of any further excavation and/or validation required by the results of the initial validation testing, an evaluation of the results against the remedial goals and information showing that the conditions of the SMP and RAP have been complied with. Photographic records and daily site diaries detailing volumes of soil moved, must be kept to ensure that all soil contaminated above the remedial goals has been excavated to the identified extent in each of the remediation areas.

The report must also include visual records and copies of documentation validating the appropriate handling, disposal and treatment of contaminated soil and water in accordance with EPA requirements. The validation report must be submitted to the EPA for review in accordance with the Environmental Protection Act 1994 and the Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland (1998).

A revised SMP for the metes and bounds area will be required to be submitted with the Validation Report, depending on the extent impact remaining.

10.0 KEY PERSONNEL

All site works will be supervised and monitored by environmental professionals whose qualifications and experience comply with sections 381 and 395 of the EP Act 1994. Provision will be made for work procedures to change or stop in any area where excessive noise or dust emissions are identified until the problem is rectified to the satisfaction of the TPR and processes implemented to prevent reoccurrence.

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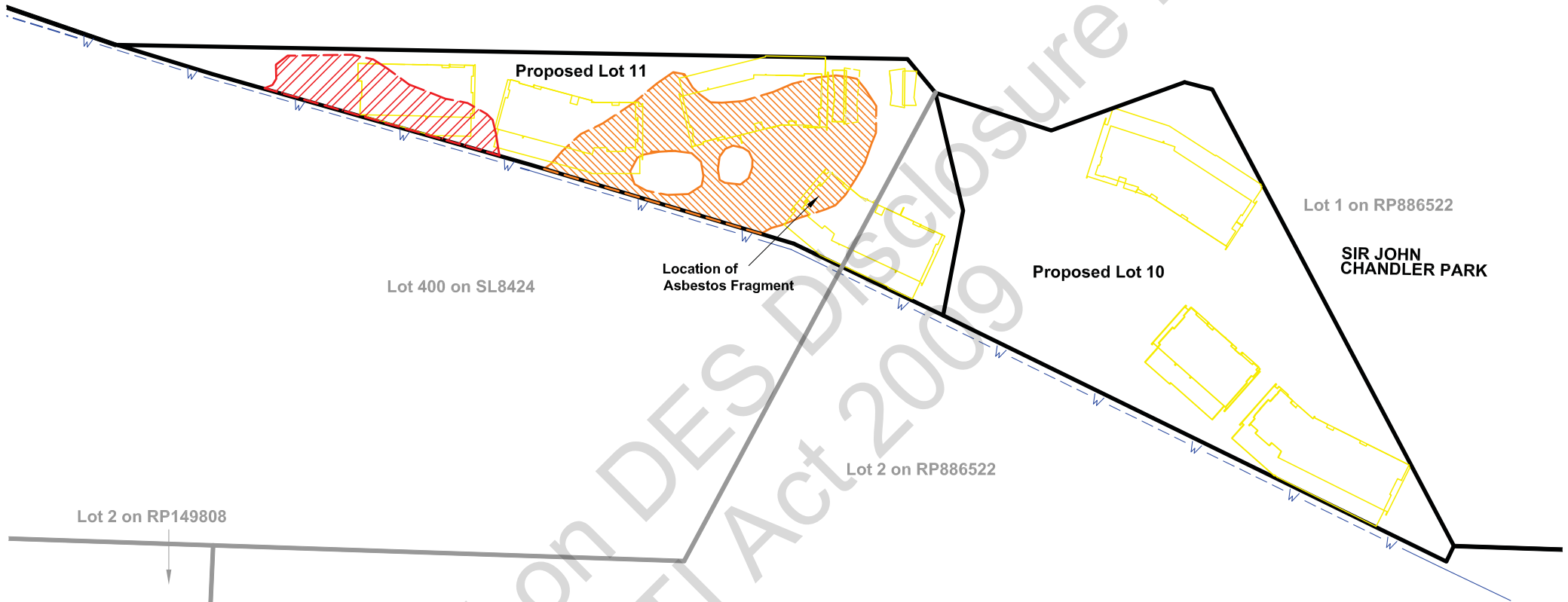
TABLE 1 - Metes and Bounds Description of the Site

Part of Lot 400 on SL8424 and Part of Lot 2 on RP886522 inclusive of metes and bounds commencing at the point being the north eastern corner of Lot 2 on RP889552 and thence bounded by lines:

Bearing 142°12'45" for a distance of 256.49m
Bearing 195°33'15" for a distance of 8.66m
Bearing 286°31'50" for a distance of 149.34m
Bearing 285°46'05" for a distance of 211.11m
Bearing 276°47'55" for a distance of 136.17m
Bearing 276°02'20" for a distance of 164.54m
Bearing 277°09'05" for a distance of 49.31m
Bearing 81°07'50" for a distance of 329.37m
Bearing 130°31'00" for a distance of 21.74m
Bearing 96°15'10" for a distance of 61.06m
Bearing 61°14'45" for a distance of 68.74m
Bearing 94°44'50" for a distance of 14.13m

To the point of commencement and containing an area of 5.289 hectares.

BRISBANE RIVER



Lot 400 on SL8424

Proposed Lot 11

Location of Asbestos Fragment

Proposed Lot 10

Lot 1 on RP886522

SIR JOHN CHANDLER PARK

Lot 2 on RP886522

Lot 2 on RP149808



Proposed Lot Boundaries



Fill Mound



Proposed Building Location



Existing Lot Boundaries



Central Fill Area



BCC Water Supply Pipeline

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TITLE	PROPOSED LOTS 10 AND 11 - FILL AREAS	
SCALE	1:2000 @ A3	FIGURE No Page 24 of 24 1