

From: Sally Dodds [Sally.Dodds@brisbane.qld.gov.au]

Sent: Monday, 3 August 2015 4:06 PM

To: KARLE Matt; PUSCHMANN Cate; MCKENZIE Ben

CC: Erik Dekker; Matthew Pomeroy

Subject: RE: Coorparoo site alert - chlorinated solvents in shallow groundwater and soil vapour

Attachments: 2015_20_july_Results Summary Table_GW_Coorparoo gw.pdf; Soil vapour results_226 Old Cleveland Rd_July 2015.pdf; Coorparoo_chlorinated solvent investigation_20 July 2015.pdf; EN1512428_0_COA.pdf; EB1523525_0_COA.pdf; EB1523525_0_QC.pdf; EB1523525_0_QCl.pdf; EB1523525_COC.pdf; EN1512428_0_QCl.pdf; EN1512428_0_QC-USEPA.pdf; EN1512428_0_SRN_150729151332.pdf; EN1512428_COC.pdf; EB1523611_0_COA.pdf; 60 holdsworth st, coorparoo.pdf; chlorinated solvent bore logs.pdf; vapour well 226 old cleveland rd, coorparoo.pdf

Importance: High

Hi Matt and Ben

Further to our previous advice and discussions relating to volatile organic compounds in shallow groundwater associated with our previous notification for 226 Old Cleveland Rd, Coorparoo. Brisbane City Council (BCC) now has further information which is provided below.

BCC environmental staff have installed a series of additional groundwater monitoring wells in the vicinity of the previously identified groundwater solvent plume (GW8, GW9, GW10, GW11 and GW12).

All of the buildings on BCC-owned properties in this area have now been demolished and the concrete slab removed. One slab of concrete, approximately 5m by 5m square was left in place for the purpose of determining likely solvent concentrations which may be associated with vapour intrusion into structures. A soil vapour well was installed within this concrete slab on 226 Old Cleveland Road (VW1).

The locations of the new plus existing groundwater wells and the soil vapour well are shown in the attached Figure 1. The borelogs for the new monitoring wells including vapour well are also attached to this email. Bore logs for existing wells have been provided in previous emails.

Sampling and analysis of groundwater monitoring wells and preliminary sampling of the soil vapour well was conducted on 20 July 2015.

Groundwater collected from the wells and vapour collected from the soil vapour well was sent to a NATA-accredited laboratory for analysis of a variety of potential contaminants. The laboratory certificates are attached to this email as well as laboratory results summary tables (Table 1 groundwater and Table 2 soil vapour).

Chlorinated solvents were detected in the groundwater with the groundwater contaminant plume now reasonably defined on Council land. The contaminants identified were: cis-1,2 dichloroethene; trans-1,2-di-chloroethene; 1,1 dichloroethene; trichloroethene (TCE); vinyl chloride (chloro-ethene); and tetrachloro-ethene (PCE). These contaminants are consistent with a contaminant source comprising dry cleaning fluids.

The level of the groundwater was gauged prior to sampling and was in the range 1.19 to 3.28 metres below ground level. Groundwater sampling was conducted using low-flow sampling equipment.

The concentrations of chlorinated solvents within groundwater are highest closest to the adjacent property at 224 Old Cleveland Road and decrease moving away from this property. This data provides further weight to Council's previous assumption that this groundwater contamination may have migrated from the adjacent property at 224 Old Cleveland Road (Lot 1 on RP89855) which was formerly a dry cleaning operation.

The results of the preliminary soil vapour sampling and analysis showed that the concentrations of chlorinated solvents within shallow soil vapour beneath the concrete slab at 226 Old Cleveland Road exceed Health

Investigation Levels (as outlined in NEPM 1999, as amended 2013) for low density residential (HIL'A'), high density residential (HIL'B'), recreational open space (HIL'C') and commercial/industrial (HIL'D') land uses for vapour intrusion into buildings.

Council is aware that these results suggest that the concentrations of chlorinated solvents beneath the neighbouring property 224 Old Cleveland Road are likely to be at a level which would have the potential to present a risk to human health from vapour intrusion. The concentrations of chlorinated solvents beneath other nearby properties to the west and north of 224 Old Cleveland Road may also be at levels which may represent a risk to human health from vapour intrusion in confined spaces.

Council notes that buildings located on 224 Old Cleveland Road and neighbouring properties are occupied by a variety of operational businesses.

Council understands that the property at 100 Holdsworth Road has an approved Development Application for the construction of a multi-storey building with an underground car park. Council notes that the presence of chlorinated solvents within this area may present a risk to this development which may require management.

Council have now obtained sufficient data to support our proposed works in the area and Council do not propose to undertake any further investigations in relation to this matter.

Council strongly recommends that EHP notes this advice and takes action to address any potential risks to all parties involved.

Council are able to meet with EHP to discuss any of the findings collected to date in order for appropriate measures to be implemented such that improvements in groundwater (and associated vapour intrusion) can occur on Council land.

Attachments

Figure 1 – sample locations

Table 1 – groundwater results summary table

Table 2 – soil vapour results summary table

Borelogs

Laboratory certificates

Kind regards

Sally Dodds

Sally Dodds

Senior Environmental Scientist (Contaminated Land and Acid Sulfate Soils) | Contaminated Land Services | Planning and Design
City Projects Office | Brisbane Infrastructure | **BRISBANE CITY COUNCIL**

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From: Sally Dodds

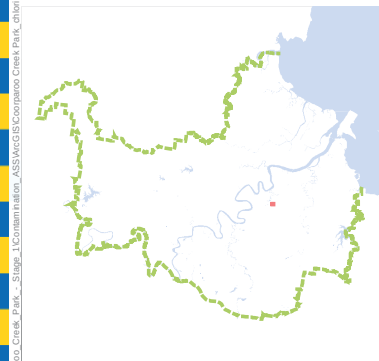
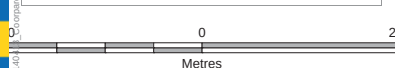
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Table 1 - Laboratory Results, Groundwater: Volatile Organic Compounds (VOCs), 226 Old Cleveland Road Coorparoo

				Assessment criteria																							
				ANZECC & ARMCANZ (2000) ^{1,2}		ANZECC & ARMCANZ (2000) ¹																					
				Fresh waters	Marine waters	Recreational waters primary contact ³	Recreational waters secondary contact ⁴	Recreational waters Visual Use (no contact) ⁵	1/04/2015	22/04/2015	22/04/2015	22/04/2015	20/07/2015	22/04/2015	20/07/2015	22/04/2015	20/07/2015	22/04/2015	20/07/2015	22/04/2015	20/07/2015	20/07/2015	20/07/2015	20/07/2015	20/07/2015	20/07/2015	20/07/2015
Analyte	Units	LOR																									
Sampling methodology																											
Dichlorodifluoromethane	µg/L	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloromethane	µg/L	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vinyl chloride	µg/L	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromomethane	µg/L	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloroethane	µg/L	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Trichlorofluoromethane	µg/L	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethene	µg/L	5	--	--	0.3	0.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iodomethane	µg/L	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
trans-1,2-Dichloroethene	µg/L	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethane	µg/L	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene	µg/L	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1,1-Trichloroethane	µg/L	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloropropylene	µg/L	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbon Tetrachloride	µg/L	5	--	--	3	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane	µg/L	5	--	--	10	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Trichloroethene (TCE)	µg/L	5	--	--	30	30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibromomethane	µg/L	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1,2-Trichloroethane	µg/L	5	6500	1900	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,3-Dichloropropane	µg/L	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene (PCE)	µg/L	5	--	--	10	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1,1,2-Tetrachloroethane	µg/L	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
trans-1,4-Dichloro-2-butene	µg/L	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
cis-1,4-Dichloro-2-butene	µg/L	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1,2,2-Tetrachloroethane	µg/L	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3-Trichloropropane	µg/L	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pentachloroethane	µg/L	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dibromo-3-chloropropane	µg/L	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexachlorobutadiene	µg/L	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Trihalo- methanes	Chloroform	µg/L	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Bromodichloromethane	µg/L	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dibromochloromethane	µg/L	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Bromoform	µg/L	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

--	no value
-	not analysed
4.98	yellow shaded, red, bolded font: value exceeds one or more criteria
1.32	black, bolded font: value exceeds one or more criteria but criteria exceeded is not of significance for the scenario at hand

1. ANZECC & ARMCANZ (2000). Australian Water Quality Guideline for Fresh and Marine Water Quality
2. ANZECC & ARMCANZ (2000) and ADWG (2011) are now incorporated into the Groundwater investigation levels within NEPM as per NEPM 1999 as amended 2013.
3. Primary Contact - water used for primary contact activities such as swimming, bathing and other direct water contact sports.
4. Secondary Contact - water used for secondary contact activities such as boating and fishing.
5. Surface waters used for visual recreational use (no-contact activity) should be free from floating debris, oil, grease and other objectionable matter; substances that produce undesirable colour, odour, taste or foaming; undesirable aquatic life, such as algal blooms, or dense growths of attached plants or insects.
6. NEPM (2013). National Environmental Protection (Assessment of Site Contamination) Measure 1999, as amended 2013.



Prepared: 16-374 File A
 Checked: [initials]
 Revision: 0
 Publication Date: 03 Aug 2015
 Project Number: 100001

Figure 1
Chlorinated Solvent Investigation
Groundwater well and
soil vapour well locations
July 2015

Legend

- Soil vapour well
- All groundwater wells July 2015 surveyed

Cadastre



Cadastre

DL Documents

DATA INFORMATION
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Aerial photograph dated May 2015

Brisbane City Council
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Coorparoo

Table 2 - Soil vapour results, 226 Old Cleveland Rd

				Assessment criteria				VW1
				Health Investigation Levels NEPM 1999 (as amended 2013)				Sub-slab soil vapour
	Chemical	units	LOR	Residential A	Residential B	Recreational C	Commercial /Industrial D	20-Jul-15
EP101: VOCs by USEPA Method TO15 (Calculated Concentration)	Vinyl chloride	mg/m ³	0.0051	0.03	0.03	0.5	0.1	<0.0128
	cis-1.2-Dichloroethene	mg/m ³	0.02	0.08	0.08	2	0.3	0.4
	1.1.1-Trichloroethane	mg/m ³	0.27	60	60	1200	230	<0.270
	Trichloroethene	mg/m ³	0.0054	0.02	0.02	0.4	0.08	4.93
	Tetrachloroethene	mg/m ³	0.34	2	2	40	8	40.1
	trans-1.2-Dichloroethene	mg/m ³	0.02	--	--	--	--	0.025
Sampling Quality Assurance	Pressure - As received	kPa	0.1	--	--	--	--	49.1
	Pressure - Laboratory Atmosphere	kPa	0.1	--	--	--	--	102
	Temperature as Received	°C	0.1	--	--	--	--	17

Notes

NEPM - National Environmental Protection (Assessment of Site Contamination) 1999 (NEPM) - Amendment Measure 2013

Health-based Investigation Levels (HILs) are levels below which long-term exposure to contaminants in soil/ terrestrial sediments are not considered to adversely impact human health. HILs are divided into four exposure settings depending upon proposed land-use type:

HIL 'A' – residential with garden/accessible soil (home grown produce <10% fruit and vegetables intake (no poultry), also includes childcare centres, preschools and primary schools

HIL 'B' – residential with minimal opportunities for soil access, includes dwellings with fully and permanently paved yard space such as high-rise buildings and apartments

HIL 'C' – public open space such as parks, playgrounds, playing fields, (e.g. ovals), secondary schools and footpaths, this does not include undeveloped public open space where the potential exposure is lower and where a site-specific assessment may be more appropriate

HIL 'D' commercial/industrial, includes premises such as shops, offices, factories and industrial sites.

From: WILLEY Ben [Ben.Willey@ehp.qld.gov.au]
Sent: Wednesday, 6 July 2016 1:44 PM
To: Richard Hooper
Subject: RE: Coorparoo Creek Park - Soil Disposal Permit - Asbestos Increase Request
Attachments: CLEB05758416_Final.pdf

Hi Richard,

I have amended the permit to now acknowledge that the **overall total is now 6,700m3**, which is an increase of the 2000m3 on the previous 4,700m3 granted on 22 June 2016.

I also can confirm that your understanding is correct, that being the original Soil Disposal still stands (see attached SDP – CLEB05758416) and that the amendments (willeyb 1-06-2016 14-16048 and CLEB05758416(01)) should be read in conjunction with this (i.e. they are in addition to the original permit and they have not replaced it).

I think any further changes proposed will require a whole new application rather just an amended acceptance letter - as you can see it starts becoming a little confusing.

Kind regards,

Ben Willey

Environmental Officer

Waste and Contaminated Land | Industry & Development Assessment

Department of Environment and Heritage Protection

P 07 3181 2429

400 George St, Brisbane

GPO Box 2454, Brisbane QLD 4001

From: Richard Hooper [mailto:richard.hooper@doval.com.au]
Sent: Wednesday, 6 July 2016 12:57 PM
To: WILLEY Ben
Cc: Bryce Wilson; Andrew Stafford
Subject: Coorparoo Creek Park - Soil Disposal Permit - Asbestos Increase Request

Hi Ben

Thank you for returning my call this afternoon.

As discussed I would like to increase the volume of Asbestos Soil by 200m3 from 4,700m3 to 6,700m3 for disposal at Ti-Tree Landfill. I have attached Ti-Tree's letter of acceptance (TF 247 AL Rev02) for this increase.

Could you also please confirm my understanding that our original Soil Disposal still stands (see attached SDP – CLEB05758416) and that the amendments (willeyb 1-06-2016 14-16048 and CLEB05758416(01)) should be read in conjunction with this (i.e. they are in addition to the original permit and they have not replaced it).

If you have any questions please do not hesitate to contact me.

Regards,

Richard Hooper | Project Engineer

Doval Constructions

sch4(6) Personal information

P: (07) 3376 6740 | **F:** (07) 3376 1589

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Unit 11, 14 Argon St, Sumner Park, Q 4074

PO Box 3116, Mount Ommaney, Q 4074

Doval Constructions Awards and Certifications

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EHP RTI DL Release

Information Notice

Environmental Protection Act 1994

Notice of decision to grant a soil disposal permit with conditions

This information notice is issued by the administering authority in accordance with section 424(5) of the Environmental Protection Act 1994 (EP Act) to advise you of a decision for your application for a soil disposal permit, and your review and appeal rights.

Our Reference: 439114

Doval Constructions

PO Box 3116

MT OMMANEY QLD 4074

Attn: Richard Hooper

Email: richard.hooper@doval.com.au

Re: Application to remove and dispose of contaminated soil from 228 Old Cleveland Road, Coorparoo QLD 4151 (Lot 3 on RP89855, Lot 13 on RP152617), 60 Holdsworth Street, Coorparoo QLD 4151 (Lot 12 on RP152616), 28 Primmer Street, Coorparoo QLD 4151 (Lot 42 on RP12769), 30 Primmer Street, Coorparoo QLD 4151 (Lot 44 on RP12769), 32 Primmer Street, Coorparoo QLD 4151 (Lot 1 on RP152618), 67 Holdsworth Street, Coorparoo QLD 4151 (Lot 4 on RP193691), 33 Lackey Avenue, Coorparoo QLD 4151 (Lot 59 on RP12771), 35 Lackey Avenue, Coorparoo QLD 4151 (Lot 60 on RP12771), 37 Lackey Avenue, Coorparoo QLD 4151 (Lot 61 on RP12771), 40 Lackey Avenue, Coorparoo QLD 4151 (Lot 867 on SL7451), 41 on Lackey Avenue, Coorparoo QLD 4151 (Lot 8 on RP69511) and 70 Barnes Avenue, Coorparoo QLD 4151 (Lots 834-835 on SL9742).

Decision

The administering authority has considered your application received on 22 June 2016 and **amended** application received 06 July 2016 and has decided to grant the application but to impose conditions on the permit.

Reasons for the decision

The granting of the permit subject to the conditions imposed is consistent with the standard criteria defined in schedule 4 of the *Environmental Protection Act 1994* (EP Act).

Assessment criteria used in making the decision

In accordance with section 424(4) of the EP Act in making its decision whether to grant or refuse the application for a disposal permit the administering authority has considered the standard criteria listed in Schedule 4 of the EP Act including:

- best practice environmental management for removal, treatment and disposal of contaminated soil
- any applicable environmental protection policy

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Notice of decision to grant a soil disposal permit with conditions

- any applicable site investigation report or validation report or site management plan
- any applicable Commonwealth, State or local government plans, standards, agreements or requirements.

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Information Notice

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Findings as a result of the administering authority's assessment of the application

The information provided in the disposal permit application is sufficient to justify the disposal of the soil.

Information considered by the administering authority in making its determination

Information provided in the amended application submitted by Doval Constructions on 04 July 2016, including:

- Part A and B application forms.
- Supporting Information provided with the application including a description of soil sampling methodology, a plan showing soil sample locations, a tabulation of soil analysis results and copies of laboratory reports.
- Amended Letter of Acceptance provided by Veolia Environmental Services dated 04 July 2016 stating they are willing to accept an approximately 6,700m³ (an additional 2,000m³ on the previous approval of 4,700m³ dated 22 June 2016) of contaminated soil from 228 Old Cleveland Road, Coorparoo QLD 4151 (Lot 3 on RP89855, Lot 13 on RP152617), 60 Holdsworth Street, Coorparoo QLD 4151 (Lot 12 on RP152616), 28 Primmer Street, Coorparoo QLD 4151 (Lot 42 on RP12769), 30 Primmer Street, Coorparoo QLD 4151 (Lot 44 on RP12769), 32 Primmer Street, Coorparoo QLD 4151 (Lot 1 on RP152618), 67 Holdsworth Street, Coorparoo QLD 4151 (Lot 4 on RP193691), 33 Lackey Avenue, Coorparoo QLD 4151 (Lot 59 on RP12771), 35 Lackey Avenue, Coorparoo QLD 4151 (Lot 60 on RP12771), 37 Lackey Avenue, Coorparoo QLD 4151 (Lot 61 on RP12771), 40 Lackey Avenue, Coorparoo QLD 4151 (Lot 867 on SL7451), 41 on Lackey Avenue, Coorparoo QLD 4151 (Lot 8 on RP69511) and 70 Barnes Avenue, Coorparoo QLD 4151 (Lots 834-835 on SL9742) for treatment to Lined Landfill Disposal (Asbestos Soil) at the Ti Tree bioENERGY Facility located on 55 Champions Way, Willowbank QLD 4306 (Lot 3 on SP168875 and Lot 8 on RP24574).

Review and appeal details

You may apply for an internal review of this decision under Chapter 11, Part 3 Division 2 of the EP Act in accordance with section 521 of the EP Act the application must be:

1. Made to the administering authority within 10 business days after receipt of this notice and be supported by enough information for the administering authority to decide the application;
2. Made to the administering authority in the approved form 'Application for internal review of an original decision' (EM219), which is available www.ehp.qld.gov.au using the publication number EM219 as a search term. The completed form must be sent to the address on the form; and
3. be supported by enough information to enable the authority to decide the application.

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For more information see the Information sheet: Internal review and appeal to Planning and Environment Court.

Notice of decision to grant a soil disposal permit with conditions

An application to review a decision does not stay the original decision. If you apply for an internal review of this decision you can also apply to the chief executive (using the same form) or the Queensland Civil and Administrative Tribunal (using form 44: Application to stay a decision, available at www.qcat.qld.gov.au for a stay of the original decision.

Sections 519-522 of the *Environmental Protection Act 1994* cover the internal review process.

Sections 531-539 of the *Environmental Protection Act 1994* cover the appeal to Court process.

Should you have any questions in relation to this matter, please contact Nicole Naylor of Waste and Contaminated Land Assessment on (07) 3330 5736.

sch4p4(6) Personal information
✓ Signature

6/7/2016
Date

Enquiries:

Ben Willey – (07) 3138 2429

Waste and Contaminated Land Assessment
Department of Environment and Heritage
Protection

Level 8, 400 George Street

GPO Box 2454

Brisbane QLD 4001

Phone 13 QGOV (13 74 68)

Email ben.willey@ehp.qld.gov.au

Allen Johns

Delegate of the administering authority
Environmental Protection Act 1994

Extracts from the *Environmental Protection Act 1994* regarding reviews and appeals

Procedure for review

s. 521

1. A dissatisfied person may apply for a review of an original decision.
2. The application must—
 - a) be made in the approved form to the administering authority within—
 - I. 14 days after the day on which the person receives notice of the original decision or the administering authority is taken to have made the decision (the "review date"); or
 - II. the longer period the authority in special circumstances allows not later than the review date; and
 - b) be supported by enough information to enable the authority to decide the application.
3. On or before making the application, the applicant must send the following documents to the other persons who were given notice of the original decision—
 - a) notice of the application (the "review notice");
 - b) a copy of the application and supporting documents.
4. The review notice must inform the recipient that submission on the application may be made to the administering authority within seven days after the application is made to the authority.
5. If the administering authority is satisfied the applicant has complied with subsection (2) and (3), the authority must, within 14 days after receiving the application—
 - a) review the original decision;
 - b) consider any submissions properly made by a recipient of the review notice; and
 - c) make a decision (the "review decision") to—
 - I. confirm or revoke the original decision; or
 - II. vary the original decision in a way the administering authority considers appropriate.
6. The application does not stay the original decision.
7. The application must not be dealt with by—
 - a) the person who made the original decision; or
 - b) a person in a less senior office than the person who made the original decision.
8. Within 14 days after making the decision, the administering authority must give written notice of the decision to the applicant and persons who were given notice of the original decision.
9. The notice must—
 - a) include the reasons for the review decision; and
 - b) inform the person of their right of appeal against the decision.

Release

Notice of decision to grant a soil disposal permit with conditions

10. If the administering authority does not comply with subsections (5) or (8), the authority is taken to have made a decision confirming the original decision.
11. Subsection (7) applies despite section *Acts Interpretation Act 1954*, section 27A.
12. This section does not apply to an original decision made by—
 - a) for a matter, the administration and enforcement of which has been devolved to a local government, the local government itself or the chief executive officer of the local government personally; or
 - b) for another matter—the chief executive personally.

Stay of operation of original decisions

s. 522

1. If an application is made for review of an original decision, the applicant may immediately apply for a stay of the decision to—
 - a) for an original decision mentioned in schedule 1, part 1 - the tribunal; or
 - b) for an original decision mentioned in schedule 1, part 2 - the Court.
2. The tribunal or Court may stay the decision to secure the effectiveness of the review and any later appeal to the tribunal or Court.
3. A stay may be given on conditions the tribunal or the Court considers appropriate and has effect for the period stated by the tribunal or Court.
4. The period of a stay must not extend past the time when the administering authority reviews the decision and any later period the tribunal or the Court allows the applicant to appeal against the review decision.

Who may appeal

s. 531

1. A dissatisfied person who is dissatisfied with a review decision, other than a review decision to which subdivision 1 applies, may appeal against the decision to the Court.
2. The chief executive may appeal against another administering authority's decision (whether an original or review decision) to the Court.
3. A dissatisfied person who is dissatisfied with an original decision to which section 202 does not apply may appeal against the decision to the Court.

SOIL DISPOSAL PERMIT
Environmental Protection Act 1994 (EP Act)

Disposal permit number: CLEB05758416 (01)

Commencement date: 22 June 2016

Expiry Date: 22 June 2017

Permit holder: Doval Constructions

Authorised activity: Disposal of approximately 6,700m³ (an additional 2000m³ to the 4700m³ granted on the 22 June 2016) of contaminated soil from 228 Old Cleveland Road, Coorparoo QLD 4151 (Lot 3 on RP89855, Lot 13 on RP152617), 60 Holdsworth Street, Coorparoo QLD 4151 (Lot 12 on RP152616), 28 Primmer Street, Coorparoo QLD 4151 (Lot 42 on RP12769), 30 Primmer Street, Coorparoo QLD 4151 (Lot 44 on RP12769), 32 Primmer Street, Coorparoo QLD 4151 (Lot 1 on RP152618), 67 Holdsworth Street, Coorparoo QLD 4151 (Lot 4 on RP193691), 33 Lackey Avenue, Coorparoo QLD 4151 (Lot 59 on RP12771), 35 Lackey Avenue, Coorparoo QLD 4151 (Lot 60 on RP12771), 37 Lackey Avenue, Coorparoo QLD 4151 (Lot 61 on RP12771), 40 Lackey Avenue, Coorparoo QLD 4151 (Lot 867 on SL7451), 41 on Lackey Avenue, Coorparoo QLD 4151 (Lot 8 on RP69511) and 70 Barnes Avenue, Coorparoo QLD 4151 (Lots 834-835 on SL9742) to Lined Landfill Disposal (Asbestos Soil) at the Ti Tree bioENERGY Facility located on 55 Champions Way, Willowbank QLD 4306 (Lot 3 on SP168875 and Lot 8 on RP24574).

Maximum volume: 6,700m³ (additional 2000m³ to the 4700m³ granted on the 22 June 2016)

This disposal permit is subject to the attached conditions in Schedule A.

The administering authority provides further information about the removal treatment and disposal of contaminated soil under section 424 of the EP Act on the EHP website at www.ehp.qld.gov.au. This document must be read in conjunction with any permit conditions found in Schedule A.

Release

sch4p4(6) Personal information

Signature

6/7/2016

Date

Allen Johns

Delegate of the administering authority
Environmental Protection Act 1994

Enquiries:

Ben Willey – (07) 3181 2429

Waste and Contaminated Land Assessment
Department of Environment and Heritage
Protection
Level 8, 400 George Street
GPO Box 2454
Brisbane QLD 4001
Phone 13 QGOV (13 74 68)

Email ben.willey@ehp.qld.gov.au

EHP RTI DL Release

Schedule A - Conditions

1. Records of soil removal, treatment and disposal authorised under this permit must be kept for a period of no less than seven years and be available to the administering authority by request. The information to be kept in the records must include:
 - a. the quantity of material disposed; and
 - b. acceptance receipts from the waste disposal/treatment facility.
2. The permit holder must provide a copy of the permit to any person acting under the permit.
3. Contaminated soil must not be released to air, land or water during excavation, loading, storage, treatment and transport of the soil in a manner that causes environmental harm.

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Release



Application form

Environmental Protection Act 1994

Application for a disposal permit for contaminated soil

OFFICIAL USE ONLY

DATE RECEIVED

FILE REF

PROJECT REF

DATE

This is the approved form for making an application to the administering authority for a disposal permit to treat or dispose of contaminated soil from land recorded in the environmental management register (EMR) or contaminated land register (CLR). The application is made under s.424¹ (as continued under s.739) of the Environmental Protection Act 1994 (EP Act).

Note: A soil disposal permit is not required when removing clean soil from a site listed on the EMR or CLR.

1. Applicant details

FULL NAME Bryce Wilson		TITLE Mr
COMPANY/ REGISTERED LEGAL ENTITY NAME (IF APPLICABLE) Doval Constructions		
REGISTERED ADDRESS PO Box 3116, Mt Ommaney		POSTCODE 4074
PHONE 3376 6740	FAX 3376 1589	
EMAIL info@doval.com.au		
POSTAL ADDRESS (WRITE 'AS ABOVE' IF THE SAME AS REGISTERED ADDRESS) AS ABOVE		POSTCODE

CONTACT PERSON FOR COMPANY/ REGISTERED LEGAL ENTITY (IF APPLICABLE) Bryce Wilson
POSITION

¹ S. 424 continues to have effect in accordance with s. 739 of the EP Act and can be found in the superseded version of the EP Act available at https://www.legislation.qld.gov.au/LEGISLTN/SUPERSED/E/EnvProtA94_150710.pdf

Release

Application form

Application for a disposal permit for contaminated soil

<div style="background-color: #cccccc; width: 200px; height: 100px; display: flex; flex-direction: column; align-items: center; justify-content: center;"><div style="margin-bottom: 10px;">sch4p4(6) Personal information</div><div>sch4p4(6) Personal information</div></div>	Project Manager	
	PHONE	FAX
	3376 1589	
	EMAIL	
	info@doval.com.au	

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Application form

Application for a disposal permit for contaminated soil

A soil disposal permit can only be approved where the site from which the soil is being removed is listed on the EMR or CLR.

For further information about how land is listed on the registers refer to the information available at the Queensland Government website:

<http://www.qld.gov.au/environment/pollution/management/contaminated-land/>

2. Site location

Please provide details of site(s) the soil is proposed to be removed from.

FULL STREET ADDRESS OF SITE(S)

228 Old Cleveland Road, Coorparoo, QLD, 4151

60 Holdsworth Street, Coorparoo, QLD, 4151

28 Primmer Street, Coorparoo, QLD, 4151

30 Primmer Street, Coorparoo, QLD 4151

32 Primmer Street, Coorparoo, QLD, 4151

67 Holdsworth Street, Coorparoo, QLD, 4151

33 Lackey Avenue, Coorparoo, QLD, 4151

35 Lackey Avenue, Coorparoo, QLD, 4151

37 Lackey Avenue, Coorparoo, QLD, 4151

40 Lackey Avenue, Coorparoo, QLD, 4151

41 Lackey Avenue, Coorparoo, QLD, 4151

70 Barnes Avenue, Coorparoo, QLD, 4151

LOT(S)

3, 13

12

42

44

1

4

59

60

61

867

8

84

83

3

835

PLAN(S)

RP89855, RP152617

RP152616

RP12769

RP12769

RP152618

RP193691

RP12771

RP12771

RP12771

SL7451

RP69511

RP12775

RP12775

RP133763

SL9742

LOCAL GOVERNMENT AREA

Brisbane City Council

Department of Environment and Heritage Protection

Application form

Application for a disposal permit for contaminated soil

It is better to overestimate the amount of soil to be removed. If the limit is reached before the disposal is complete, a new disposal permit will be required.

Soil disposal permits only authorise the disposal of soil for the term stated on the disposal permit. The standard period is one year.

The application must be accompanied by the written acceptance of the local government authority or registered owner of the site which will receive the soil. The written acceptance must:

- state the amount of soil and the type of contaminants present in the soil; and
- confirm that the soil can be lawfully received under the conditions of the environmental authority for the facility (if being taken to a landfill facility)

If the soil is being disposed at a non- local government administered landfill or another parcel of land on the EMR/CLR, a copy of the Certificate of Title must be provided.

3. Certificate of title

Please provide a copy of the current Certificate of Title for the land.

☒ Certificate of title attached

4. Soil volume

What is the approximate volume (in cubic metres) of soil to be removed (allowing for excavation bulking)?

<ENTER THE SOIL VOLUME IN CUBIC METRES>
13,000

5. Disposal period

What are the dates between which soil is proposed to be moved to the disposal or treatment location?

FROM DATE: 22/03/2016	TO DATE: 30/11/2016
--------------------------	------------------------

6. Disposal location

What is the proposed disposal location?

a. ☐ **Local government administered waste disposal or treatment facility**

NAME AND ADDRESS OF LOCAL GOVERNMENT ADMINISTERED LANDFILL

☐ Written acceptance from the local government authority is attached.

b. ☒ **Non-local government-administered waste disposal or treatment facility**

LOT(S) 3, 8	PLAN(S) SP168875, RP24574
-------------	---------------------------

FULL STREET ADDRESS OF SITE(S) Ti Tree bioenergy, Stage 1 of Veolia Environmental Pty Ltd landfill, 55 Champions Way, Willowbank QLD, 4306
--

☒ Written acceptance from registered owner of site is attached.

☒ Certificate of title is attached

c. ☐ **Another parcel of land which is listed on the EMR or CLR**

Application form

Application for a disposal permit for contaminated soil

Disposal to landfill should only be considered where no other method of dealing with the contaminated soil is available or viable.

If a site investigation report is being submitted simultaneously to the administering authority, refer to the

EMR/CLR ID	
LOT(S)	PLAN(S)
FULL STREET ADDRESS OF SITE(S)	

- ☐ Written acceptance from registered owner of site is attached.
- ☐ Certificate of title is attached.

7. Management options

State reason(s) why on-site/off-site treatment or management is not proposed.

<PROVIDE REASONS>

As per City Projects Office Coorparoo Creek Park Remediation (Attachment A):

- the site requires excavation for formation of a stormwater retention basin, excavation and net removal from site cannot be avoided.
- contaminated fill is unable to be reused for environmental and human health and safety reasons.
- contaminated soil is not viable to be treated and is exceed to the needs of the site.

8. Sampling

Is it proposed to undertake validation sampling to confirm that all soil has been removed?

- ☒ Yes
- ☐ No

9. Soil contamination

Provide a description of the contamination present in the soil to be removed.

<PROVIDE DESCRIPTION>

Soil contains elevated concentrations of heavy metals, total recoverable hydrocarbons, phenols, polycyclic aromatic hydrocarbons, possible asbestos, and acid sulphate soils. See attachments A and B for the Remediation Plan and Test results.

10. Required supporting information

Please tick relevant boxes below to indicate that you have attached the

Application form

Application for a disposal permit for contaminated soil

relevant sections of that report otherwise copies must be provided of all laboratory reports for contaminated soil analyses and leachate testing results.

A previously submitted site investigation report may be referred to, provided it is still relevant and accurate.

Soil sampling needs to be completed in accordance with Schedule B2 of the National Environment Protection (Assessment of Site Contamination) Measure 1999.

following information with this application and list the relevant attachments.

Required information	Name of attachment containing the required information
	(if the required information can be found in an attached site investigation report provide the title, version and section number for the report)
Scaled plan showing soil sampling locations and contamination source(s)	Attachment A - Remediation Plan
Tabulation of soil analysis results	Attachment A - Remediation Plan
Toxicity Characteristic Leaching Procedure (TCLP) results from relevant soil samples	Attachment A - Remediation Plan
Copies of all laboratory reports and sample receipt advices for all soil analysis	N/A
Explanation of location and depths of samples, how samples were collected, and how sample integrity was maintained	Attachment A - Remediation Plan

Application form

Application for a disposal permit for contaminated soil

11. Declaration

Note: If you have not told the truth in this application you may be liable for prosecution under the relevant Acts or Regulations.

- I do solemnly and sincerely declare that all information supplied on or with this application is true and correct to the best of my knowledge.
- I understand that it is an offence under s.480 of the *Environmental Protection Act 1994* to give to the administering authority or an authorised person a document containing information that I know to be false, misleading or incomplete in a material particular; and
- I understand that all information supplied on or with this application form may be disclosed publicly in accordance with the *Right to Information Act 2009* and the *Evidence Act 1977*.

APPLICANT NAME

Bryce Wilson

SIGNATURE OF INDIVIDUAL APPLICANT OR AUTHORISED SIGNATORY

DATE

22/07/16

Application form

Application for a disposal permit for contaminated soil

Applicant checklist

- ☒ Application form completed and signed (this form)
- ☒ Certificate of title attached (refer question 3)
- ☒ Written acceptance from disposal location attached (refer question 6)
- ☒ Certificate of title for disposal location attached where applicable (refer question 6)
- ☒ Required supporting information attached (or referenced in site investigation report) (refer question 10)

Please submit your complete application using one of the following methods:

Email:

palm@ehp.qld.gov.au

The email subject line should be 'Application for a disposal permit for contaminated soil'.

The file size limit for submission via email is 14MB. Any submission via email which exceeds 14MB will need to be broken down into separate emails, with each email clearly labelled Part X of X (e.g. Part 1 of 2), included in the subject line of the email.

Mail:

Permit and Licence Management
Department of Environment and Heritage Protection
GPO Box 2454, BRISBANE QLD 4001

Courier or hand delivery:

Permit and Licence Management
Department of Environment and Heritage Protection
Level 3, 400 George Street,
BRISBANE QLD 4001
Hours: 8.30 am—5.00 pm business days

Privacy statement

The Department of Environment and Heritage Protection (the department) is collecting your personal information to assess the application for a disposal permit under s.424 of the *Environmental Protection Act 1994*. Information will not be disclosed to any other person or agency unless you have given us permission or we are authorised or required by law. For queries about privacy matters email: privacy@ehp.qld.gov.au or telephone: (07) 3330 5436.

Attachment A
Remediation Plan

CITY PROJECTS OFFICE

Coorparoo Creek Park

Remediation Plan



SECURITY LABEL - FOR OFFICIAL USE ONLY

Project Quality Control

General Project Details

Client: Matt Curtis, Water Management, BCC City Projects

Office Contact: Lee Garnett - Project Manager, BCC City Projects

Office Project Title: Coorparoo Creek Park

Site: Coorparoo Creek Park, Remediation Plan

TRIM Reference: 165/210/179/1484

Project Document Approval

Author:

.....
Matthew Pomeroy
BCC City Projects Office

Reviewer:

.....
Erik Dekker
Unit Manager, Contaminated Land Services

Approved by:

.....
Erik Dekker
Unit Manager, Contaminated Land Services

Project Document Version Control

Internal Review Approved	Date: 15 Oct 15	Version 1
Draft Issued To Client	Date: 15 Oct 15	Version 1
Client Comments Received	Date:	Version 1
Final Document Issued	Date: 22 Oct 15	Version 2

SECURITY LABEL - FOR OFFICIAL USE ONLY

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Glossary

Acronym	
ACM	Asbestos Containing Material
AHD	Australian Height Datum
AASS	Actual Acid Sulfate Soils
ASS	Acid Sulfate Soils
BGL	Below Ground Level
BTEX	Benzene, Toluene, Ethylbenzene and Xylene compounds
CCP	Coorparoo Creek Park
CLA	Contaminated Land Auditor
CPO	City Projects Office
EHP	Department of Environment and Heritage Protection
EMR	Environmental Management Register
Ha	Hectare
HIL	Health Investigation Level
m AHD	metres Australian Height Datum
mBGL	metres below ground level
mg/L	milligrams per litre
mg/kg	milligrams per kilogram
NATA	National Association of Testing Authorities
NEPM	National Environment Protection (Assessment of Site Contamination) Measure
PACM	Potential Asbestos Containing Material
PAHs	Polycyclic Aromatic Hydrocarbons
PASS	Potential Acid Sulfate Soils
RP	Registered Plan
SQP	Suitably Qualified Person
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
µg/L	micrograms per litre
UST	Underground (fuel) Storage Tank
WH&S	Workplace Health and Safety

1 Introduction

Brisbane City Council (Council), City Projects Office (CPO), Contaminated Land Services Team (CLS) were commissioned by the BCC CPO Water Management Team to prepare a Remediation Plan associated with stormwater improvement works at Coorparoo Creek Park (CCP), Coorparoo. CCP extends from Old Cleveland Road to the South to a dissipation pond just north of Barnes Avenue.

Stormwater improvement works are being undertaken on the Site (detention basin and flow channels) to improve flood immunity in the area. Secondary outcomes of the Park improvements include:

- provision of a buffer between existing low-density residential to the west of the Park and proposed mixed use commercial/residential east of the Site,
- incorporation of a bicycle path,
- landscaping trees
- future children's playground and
- community garden.

The proposed park design is included in Attachment A. CCP is to be constructed in two stages with Stage 1 incorporating the earthworks associated with flood immunity works and minor surface improvements (i.e. trees, grasses, bicycle path) and Stage 2 incorporating frontages to neighbouring eastern properties, children's playground and community garden.

CCP is located on and adjacent-to a former creek alignment. The creek was converted to a concrete lined drain then culvert prior to 1950 to allow for the area to be filled and then developed. Prior to purchase of the CCP properties by Council, the Site was largely used for industrial land use with the exception of three small lots fronting Primmer Street which were low-density residential housing. All buildings across the Site have now been demolished.

CCP has been separated into three areas for this assessment to aid investigation design, reporting i.e. between major roads. The investigation reports for the Site notes these three areas as part of former Areas 1, 2 and 3 and these are included in brackets for direct correlation:

- Upper (located between Old Cleveland Road and Holdsworth Street)

- Lot 12 RP152616 (2528m²) – 60 Holdsworth Street (Area 1a)
- Lot 3 RP89855 (675m²) – 228 Old Cleveland Road (Area 1b)
- Middle (located between Holdsworth Street and Lackey Avenue)
 - Lot 42 RP12769 (607m²) (Area 1c)
 - Lot 44 RP12769 (607m²) (Area 1c)
 - Lot 1 RP152618 (405m²) (Area 1c)
 - Lot 4 RP 193691 (8440m²) (Area 2)
 - Lot 59 RP 12771 (405m²) (Area 2)
 - Lot 60 RP 12771 (405m²) (Area 2)
 - Lot 61 RP 12771 (405m²) (Area 2)
 - Lot 8 RP 69511 (792m²) (Area 2).
- Lower (located between Lackey Avenue and extending to the dissipation pond located immediately down gradient of Barnes Avenue)
 - Lot 867 SL7451 (1890m²) (Area 3)
 - Lot 834 SL9742 (899m²) (Area 3)
 - Lot 835 SL9742 (442m²) (Area 3).

The works currently proposed for each section of CCP include:

Upper: Creation of a clean planting layer (800mm depth), construction of a spoon drain to allow for stormwater to flow from south to the north, construction of an intake structure and culvert line to convey minor flows beneath Holdsworth St to the Middle portion of the CCP, grading of the western and eastern extents of the Upper Site to allow for future café frontage to the park.

Middle: Construction of an off take structure from the existing stormwater culvert near Holdsworth Street to daylight flows from the existing culvert line to the park through a head wall to a constructed flood storage waterway with low flow channel. The basin will extend through the majority of the Middle Site area and will include creation of a clean planting layer (400-800mm depth) allowing for a mixture of grassed and treed portions, grading from the eastern side of the Site to allow for future residential frontage to the park, installation of a bicycle path

and associated lighting, and future installation (Stage 2) of a children's playground and community garden.

Lower: Installation of a tidal flow chamber east of Lackey Avenue, construction of an additional stormwater culvert between the tidal chamber and the tidal pool north of Barnes Avenue, widening of the dissipation pond at Barnes Avenue and a bicycle path.

1.1 Environmental Management Register

All of the Lots are listed on the DEHP EMR with the exception of

- Lot 834 SL9742 (899m²) – 68 Barnes Avenue
- Lot 835 SL9742 (442m²) – 70 Barnes Avenue

It is expected that Lot 835 may require listing on the EMR (subject to discussions with DEHP) due to the presence of hazardous contaminant. None of the Lots currently have a Site Management Plan.

1.2 Previous Investigations

This Remediation Plan (RP) has been based on the following environmental assessment reports which should be reviewed in conjunction with this plan.

- Detailed Site Investigation, Cardno, 2015 – Includes the Middle area and a portion of the Lower area.
- Acid Sulfate Soil (ASS) Assessment, Cardno, 2015 – Includes all areas of the Site.
- Environmental Site Assessment, BCC City Projects Office, 2015 - Includes the Upper area and a portion of the Middle area and a portion of the Lower area.
- Hydrogeological Assessment, Butler Partners, 2015 – Includes all areas of the Site.

In summary, the investigations have identified:

- Contaminated fill extending across most areas of the Site.
- Deepest levels of fill (up to 2 metres depth) were identified in the portions of the Site formerly used as industrial land (Middle and Upper Areas). Only small isolated patches of fill were identified in the Lower area.

- Contaminated fill is defined by heterogeneous fill including ash, coking gravels, soils, steel, concrete, bricks, potential asbestos containing material (PACM) (bonded fragments) and minor asbestos fibres.
- Approximately 350m³ of grossly-impacted soils were removed from Lot 12 RP152616 (60 Holdsworth Street). Soils were disposed to a lined (double clay-lined) landfill. Characterisation samples post excavation were obtained and indicate residual contamination remains in surrounding soils.
- Contaminated fill characterised by elevated heavy metals (mainly copper, lead and zinc), hydrocarbons (TRH), PACM and polycyclic aromatic hydrocarbons. Concentrations detected indicated material on the Upper portion of the Site in general suitable for lined landfill disposal (double clay-lined) and material in the middle and lower portions of the Site suitable for unlined (single clay-lined) landfill disposal.
- Perched groundwater was identified in alluvium in the upper and lower areas and on the eastern and southern portion of the middle areas. Groundwater modelling indicates potential drawdown of the aquifer to the proposed excavations.
- ASS was identified in the alluvium layer in all areas with highest levels of ASS identified in the northern portion of the Site.
- Groundwater impacted by solvents in the Upper Site and southern portion of the Middle Site. Contamination included trichloroethylene and tetrachloroethylene. The extent and level of impact will requires control measures to prevent contamination migration into proposed excavations to address vapour intrusion issues.
- Surface water within the existing stormwater culvert noted contamination by sewage, solvents, hydrocarbons and heavy metals. The source of contamination was expected to be up-gradient sources, local tie-ins of sewage and stormwater to the culvert and leakage of contaminated groundwater into the pipe from incomplete seals around the tie-in points. As this portion of the stormwater pipe is at the extent of the tidal zone, contaminants do not regularly flush out of the system as the tide does not fully drain from the culvert.
- Based on the levels, extent and types of contamination identified in groundwater and soil, management measures need to be developed and implemented during

construction and an on-going Management Plan will be required post remediation to protect future users of the Park and the receiving environment.

2 Objective

The primary objectives of this Remediation Plan are to:

1. Provide a management strategy for the construction of the stormwater drainage and associated park that is protective of human health and the receiving environment.
2. Provide management tools to minimise human-health and environmental risk post construction.
3. Provide an option for remediating parcels of land to “any land use” suitability in the Lower area and portions of the Middle areas.

3 Remediation Design

The proposed design requires the removal of approximately 17,500m³ of soil and rock material from the Site. A further 1,700m³ may be removed (Option 2) from the Middle area to remove residual contamination in this area (subject to a cost-risk analysis). An additional volume of soil will be required to be removed for the construction of the stormwater culvert between Lackey Avenue and the Barnes Avenue dissipation pond.

Of the material requiring removal for the formation of the water body and park (i.e. excluding the culvert), the estimated volumes of each material are included in Table 1.

Table 1: Estimated volumes requiring removal

Soil type	Volume (m ³) in situ	Management Document
Contaminated Fill	5150	This document
Alluvium (ASS)	4290	ASS EMP, Horticultural specifications (if soil ameliorated and reused on-site)
Alluvium (non-ASS)	9120	No contaminated land or ASS issues. Material considered as clean fill. Horticultural specifications need to be applied if soil ameliorated and reused on-site.
Low strength rock	3450	
High strength rock	900	

Note: Horticultural specification (refer to separate document) for amelioration of alluvium in order for the alluvium to be reused as B-horizon soils.

Of the alluvium, approximately 7,500m³ of this material is estimated as required (following amelioration) for the construction of B-horizon soils for the park (Upper, Middle and Lower areas (excluding the culvert portion of the Lower Area). A further 1,700m³ of contaminated fill may

require removal from the Middle area and subsequently an additional 1700m³ of ameliorated alluvium is expected to remain on-site dependent on the remediation option chosen for this Area.

In accordance with the Waste Hierarchy (Attachment B), an assessment of waste reduction for the Site has been summarised as follows:

- Avoid – As this Site requires excavation for formation of a stormwater detention basin, excavation and net removal from the Site cannot be avoided.
- Reduce – No reduction in volume is possible as the volumes requiring removal are directed by the design.
- Reuse – Contaminated fill is unable to be reused for environmental and human health and safety reasons. It is proposed to reuse alluvium for formation of the B-horizon.
- Recycle – Rock material and alluvium (non ASS) may be recycled for use as clean fill on other sites.
- Recover – Soil is unable to be recovered.
- Treat – Contaminated soil is not viable to be treated and is exceed to the needs of the Site (i.e. still requiring disposal to landfill). Some alluvium and ASS material is proposed to be treated on-site.
- Dispose – Excess soils, especially contaminated fill and ASS will be disposed to landfill.

4 Remediation Principles

Remediation principles for this Site are as follows:

- Separation of residual underlying contaminated fill and placed clean fill through use of a geofabric layer (suitable for prevention of PACM fragments from contaminating the overlying placed fill). The geofabric is also to act as a demarcation layer for park maintenance workers in the future, i.e. material above the geofabric is clean and material below should be considered contaminated.

- Imported validated clean fill (or ameliorated alluvium) to be utilised in all planting zones to a depth 200mm greater than the maximum planting depth i.e. 800mm and 400mm of clean fill for treed and grassed areas respectively.
- Areas on the Upper and southern portion of the Middle area on the Site on top of or directly adjacent to the identified solvent plume are to be protected from vapour-intrusion risk, i.e. prevention of buildings in this area or limiting approval/use following a detailed risk assessment.
- Prevention of water table drawdown in the vicinity of the solvent plume to the south (approximate extent included on Figure 1), and ASS area on the eastern and southern sections of the Middle Area through use of piling and/or low permeability natural or reconstructed soil.
- Reuse of clean alluvium (including alluvium containing ASS) through amelioration (refer to horticultural specification and ASS EMP) for constructed soil layers.

4.1 Conditions and Limitations

Although detailed investigations have been completed across all Areas, the potential for unidentified contamination cannot be ruled out. The fill is heterogeneous and has been noted to vary significantly across even small areas of the Site.

Although all efforts have been made to verify whether an underground storage tank (UST) is present in the Upper area, the presence of a large number of underground services (including the existing stormwater culvert) limited the investigation in this area, and therefore although an UST is unlikely to exist, it cannot be ruled out.

5 Guidelines and Remedial Objectives

A list of guidelines adopted for the Site for the contaminants of concern identified are included in Table 2. These guidelines have been adopted for use in the following way:

- If soil exceeding these values requires disposal from the Site, this will be under a DEHP Disposal Permit
- Any imported material to the Site will be from a “virgin” quarry source or validated to the values below at a rate of 1 per 250m³ (or as agreed with superintendent prior to import).

- Any material exceeding these guidelines remaining on-site will be separable from clean reconstructed (B-2 and A horizon) soils by geofabric/demarcation layer in accordance with asbestos guidance (Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia – May 2009 Department of Health WA).
- Soils in the top 400mm (grassed areas) to 800mm (treed areas) of the remediated park are not to exceed these values.
- Any stockpiles of soils with exceedances of these values on “clean” areas will require validation (visual and analytical testing) to confirm any residual contamination is removed.

Table 2: Adopted Guidelines - Soils

Contaminant	Adopted “Any Use” (mg/kg)
Benzo(a) pyrene	0.7
B(a)P TEQ	3
Total PAHs	100
Arsenic	20
Cadmium	3
Copper	100
Lead	300
Nickel	60
Zinc	400
Mercury	1
TRH C ₆ -C ₁₀	180
TRH C ₁₆ -C ₃₄	120
TRH C ₃₄ -C ₄₀	2800
Asbestos	No asbestos present
Aesthetic	No ash, coking gravels, discoloured or odorous material

Groundwater is to be prevented from entering excavations through the use of retention systems i.e. piling and cut off walls. A dewatering management plan will be required for any lowering of the water table in areas outside of the waterway excavation footprint by >0.2m at 5m distance from the excavation for greater than 48 hours for Contamination and ASS purposes. The dewatering management plan is to be approved by the Superintendent and CLA prior to dewatering (including installation of dewatering infrastructure) and is to include as a minimum:

- the expected cone of depression and extraction volumes/rates
- dewatering method to be implemented
- expected volumes contaminants and concentrations in water (primary impact)

- expected contaminants and concentrations in water (secondary impact from acidification of Potential or Actual ASS)
- duration of dewatering and contingencies should the duration be extended
- disposal or reuse options for the water
- testing regime to confirm the cone of depression and contaminant impact levels (from primary and secondary impact)
- reporting requirements including frequency (i.e. fortnightly during dewatering and 1 month post dewatering) and detail (i.e. groundwater level and quality monitoring).

Any groundwater or collected stormwater requiring removal from the Site will be removed by either:

- discharge to stormwater, if water quality complies with ANZECC 95% protection (marine waters)
- discharge to sewer as trade waste, if a trade waste agreement can be obtained from Queensland Urban Utilities (QUU) and water quality complies with the trade waste approval limits
- removal as regulated waste by a licensed contractor
- reinjected in areas with comparable contamination in groundwater on the basis that no increase in flux of contaminants to excavations, receiving water bodies or other receptors occurs
- by other means as agreed by the Council Superintendent

Note: On-site water treatment may be utilised in combination with one of the methods above.

5.1 Suitably Qualified Person

A Suitably Qualified Person (SQP) S.565, EP Act (1994) will be required to perform the following functions:

- updates to this Remediation Plan
- preparation of the Environmental Management Plan
- preparation of a Dewatering Management Plan (if dewatering is required)

- confirming compliance with this Remediation Plan
- preparation of any reports documenting the remedial works i.e. soil disposal permit, progressive reports, remediation report, groundwater monitoring events.

The Superintendent is to be provided SQP details including relevant experience as part of any supplied tender documents and as an attachment to any of the above documents when provided. A statutory declaration is to be provided by the SQP in accordance with industry expectations for any reports completed.

It is recognised that other plans may be prepared by third parties separate to the SQP i.e. erosion and sediment control, asbestos management, stormwater management.

5.2 Independent Auditor

To ensure quality control for this project, a Contaminated Land Auditor (CLA) will be engaged by Council and will ensure that any documents required to be produced by the SQP meet the design intent and are protective of human health and the environment.

Regular meetings are expected between the Superintendent, the CLA and the SQP to identify any matters and resolve any issues. A report from the CLA will be provided at the completion of the project (and as requested throughout the program) confirming works completed by the SQP achieve the design intent and were/are protective of human health and the receiving environment.

6 EXTENT OF CONTAMINATION

The extent of soil contamination has been largely defined. The extent of contaminated fill and exceedances of relevant guidelines are included on Figures in Attachment A.

The extent of solvent impact in groundwater in the southern (Upper and southern portion of Middle areas) portion of the Site has been reasonably defined (refer to **Figure 1**).

6.1 Landfill Disposal Classification

Contaminated soils across the Site have been characterised as double clay-lined landfill, clay-lined landfill and material that may require further testing or treatment. These materials are summarised in **Table 3**

Table 3: Contaminated soil disposal requirements

Area	Contaminated Fill Requiring Disposal m ³ <i>in situ</i> [^]	Disposal Requirements	Comments
Upper	~2,100	Lined landfill	One sample exceeds lined criteria for lined landfill – further testing or treatment of this material (estimated at 50m ³) may be required.
Middle (Option A)	~3,400	Unlined landfill	
Middle (Option B) additional to Option A	1,700	Unlined landfill	Would result in all contaminated fill being removed from the Middle Area.
Lower	0-100	Unlined landfill	Material may not require removal to complete design

[^] Estimate Only

7 REMEDIATION PROGRAM

7.1 Overview

Figure 1 identifies mitigation measures to be implemented to address contamination issues identified and summarised as follows:

- Upper
 - Excavation of contaminated fill to 800mm below final finish level, placement of geofabric and backfill with clean soil horizons.
 - Signage added to manhole covers noting “Confined Space, Entry by Permit Only”
- Middle
 - Installation of cutoff walls to prevent lowering of the water table including sheetpile wall (south west corner), concrete headworks wall and low permeability reconstructed soil to 2m below the head wall ($K_s < 1 \times 10^{-9}$ m/s) and low permeability clay trench ($K_s < 1 \times 10^{-8}$ m/s) on the eastern side of the proposed detention basin.
 - Signage added to manhole covers on the southern portion of the area noting “Confined Space, Entry by Permit Only”.
 - Weighted outflow flap on stormwater off-take to stormwater flood storage and use of trash racks to prevent public access into pipes where solvents and low oxygen environments may be present.

- Excavation of all contaminated soil within the flood storage waterway footprint and west of the flood storage waterway basin.
- Two options are proposed (both to be costed during tender) for the area east and south of the detention basin, namely:
 - ▶ Option A: Excavation of contaminated fill to 800mm below final finish level, placement of geofabric and backfill with clean soil horizons.
 - ▶ Option B: Removal of all contaminated fill i.e. additional fill disposal compared to Option A. Backfill with clean soil-horizons to finish surface.
- Lower
 - Excavation of contaminated soils and reinstatement with clean fill where required.

Figure 1: Contamination mitigation measures to be implemented



Extracted from Overall Site Plan Cut – Surface (140413/205 dated 12 October 2015) – Base plan subject to change

7.2 .Proposed Works Staging

As part of the remediation planning phase, a works strategy was considered in order to:

1. Minimise potential environmental and human-health and safety impacts;
2. Minimise the generation of waste soils and minimise contaminated water generation
3. Provide for contingency in the case of extreme weather events

In this regard, the strategy preferred completed construction works from north to south as follows:

- First: Excavation of culverts and widening of dissipation pond in the Lower area.
- This method provides an option for disposing encountered clean water in this area to the outflow point and allows this area to be backfilled with cut ameliorated alluvial material from the Middle area (Second)
- Second: progressive removal of current surface finishing in the Middle area (geofabric, topsoil and turf) with potential reuse of the finishing material and ameliorated alluvium in the Lower area finishing works. Cutting of fill material progressively from north to south across the Middle area. Installation of the low permeability cut off wall, progressive treatment of alluvium and reuse.
- Third: Installation of the cut off wall, soil improvements under the head wall, construction of the off-take structure, culverts, head wall and access ramp to the clean out on the head wall.
- Fourth: Works in the Upper area.
- Fifth: Works in Holdsworth Street

7.3 Excavation and Disposal of Contaminated Soil

Contaminated fill requiring removal will need to be disposed under a DEHP Soil Disposal Permit to a landfill licensed to dispose such material. The level of information collected to date is expected to be sufficient to obtain landfill acceptance and a Soil Disposal Permit.

Any movement of contaminated soil on-site or off-site is to be documented under a soil tracking register.

7.4 Validation

Areas to be validated clean are to be visually confirmed as “contaminated fill” free including free of ash, bricks, PACM and coking gravels (photos to be obtained). Clean surfaces are to be validated for potential contaminants (heavy metals (8), PAHs) on a 10m x 10m grid. Validation

results are to be obtained and compared to criteria in Table 2 prior to excavation of underlying clean soils or weathered rock.

All works are to be undertaken on the Site in accordance with NEPM, 2013 and Guideline: Contaminated Land Practitioner, 2014.

7.5 Sample Dispatch and Documentation

All sample analysis is to be undertaken at National Association of Testing Authorities (NATA) – accredited laboratory. Samples are to be submitted appropriately i.e. under Chain of Custody documentation, within the holding times and appropriate preservation.

7.6 Quality Assurance/Quality Control (QA/QC) Program

Field QA/QC is to include sample duplicates at a rate of 1 sample per 10 primary samples analysed for the same analysis as primary samples. A volatile trip blank/trip spike is to be used during sampling events that include groundwater from Monitoring Wells B3, GW12 or B5.

An assessment of field and laboratory QA/QC is to be included in the Remediation Report.

8 WORK HEALTH AND SAFETY

A Work Health and Safety (WH&S) Plan is to be developed by the Contractor and supported by the SQP and be approved by the Superintendent prior to soil disturbance. The WH&S Plan is to include details in relation to control measures and monitoring required to prevent:

- loss of contamination as dust and asbestos fibres
- exposure to solvent impact including confined space entry
- exposure to contaminated groundwater or surface water (if collecting in excavations)

9 OPERATIONAL CONTROL

9.1 Control of Stormwater Run-off

Any stormwater runoff in contact with contaminated soils or contaminated groundwater collecting in excavations is to be retained on-site pending confirmation that concentrations do not exceed discharge levels (refer to Guidelines Section).

Where possible, clean waters are to be separated from potentially contaminating areas by diversion bunding, retaining clean topsoil and turf in areas of the Site pending future remediation and/or staging the works to minimise areas of disturbance at any one time.

9.2 Stockpile Management

As the Site is located in an overland flow pathway, residential properties are located adjacent and as asbestos fragments and trace fibres are present in the fill, stockpiles of contaminated fill are to be kept to a minimum on the Site. Any stockpiles greater than 1.5m in height that are to be retained on the Site overnight are to be covered in black plastic or geofabric. Additionally, no stockpiles are to be retained on-site if a high rainfall event (>50mm in 24 hours) is expected.

Contaminated fill stockpiles are to be placed on contaminated fill areas. If placed on areas that do not contain contaminated fill or areas that have had contaminated fill and been subsequently validated, validation of these areas will be undertaken visually and on a 5m x 5m grid for potential contaminants (heavy metals and PAHs) once the stockpile is removed.

9.3 Control of Soils and Sediment

An Erosion and Sediment Control (ESC) Plan is to be developed by the Contractor and be approved by the Superintendent prior to soil disturbance.

9.4 Management of Groundwater

Groundwater post remediation is to be returned to pre-existing levels outside of the stormwater basin excavation areas or a risk assessment completed to the satisfaction of the Auditor, that:

- any increase in hydraulic gradient from the water table height reduction does not pose a risk for increased migration of groundwater contamination (solvents) on the Site.
- risk posed by acidification of PASS or migration of ASS does not pose a risk to human-health or the receiving environment (including the storage waterway when dry and when full).

During excavation/remediation works, groundwater is to be managed to prevent increased hydraulic gradients forming into excavations through the installation of retention or engineering structures i.e. piling, low permeability soils.

Groundwater monitoring is to be undertaken in accordance with Table 4. Commencement of monitoring is to be undertaken a minimum 2 weeks prior to commencement of any dewatering or soil disturbance below the water table in individual areas as detailed in investigation reports completed by Butler Partners, Cardno and Council. Monitoring is to occur for a period of 1

month post completion of disturbance in an Area or following rebound to the pre excavation level or as agreed by the Council Superintendent.

Some monitoring wells are expected to be destroyed during earthworks. Wells are to be retained intact for the maximum duration prior to disturbance. Monitoring wells highlighted in red are to be replaced in 1 week following destruction at a comparable location and an additional sampling round obtained from the replaced well one week after installation and well development.

Table 4: Groundwater monitoring requirements

Area	Groundwater Well	Water level gauging frequency	Contaminant Testing frequency [^]	Testing Requirements
Upper	B3 and GW12	Weekly	Monthly	Volatile halogenated aliphatics, heavy metals (8), TRH
Middle	B5, GW10, B7, GW3	Weekly	Monthly	Heavy metals (8), TRH Volatile halogenated aliphatics (B5 and GW10 only)
Lower	B1, GW7	Weekly	Monthly	Heavy metals (8), TRH (silca gel clean-up)

Any dewatering proposed or expected as a result of the proposed works that results in a reduction in the groundwater table outside of the excavation of greater than 0.2m for a period of greater than 48 hours at a distance of 5m from the excavation, will require the preparation of a Dewatering Management Plan (to be approved by the Superintendent and CLA) prior to dewatering.

9.5 Management of Vapour

Works to be undertaken in and adjacent-to the solvent impact area (**Figure 1**) will require mitigation measures to be implemented to prevent exposure of contaminants to workers. Additionally any works within the Holdsworth Street corridor within the identified groundwater solvent plume including the existing stormwater pipe will also need to consider solvent impact to the general public as well as workers. Mitigation measures should include supplied air, signage on manholes and weighted access covers, vented excavations and monitoring i.e. Drager tubes for volatile halogenated compounds.

Any buildings (including temporary buildings) placed on the Site (i.e. site office) or underground services will need to consider vapour intrusion risk from solvent impact. Raised buildings should be used to prevent vapour intrusion, i.e. 200mm above existing ground.

9.6 Vehicle and Road Cleaning

Soil is not to be tracked onto roads through the use of site vehicles trafficking on geofabric/rock and use of rumble grids where required. No running of vehicles on bare soil is to be undertaken in contaminated fill areas. In areas without contaminated soils, prior to entering the road

corridor, tyres are to be confirmed clean or cleaned using rumble grids and/or wheel washes. A mitigation measure is to be implemented should road impact occur i.e. use of a road sweeper.

All material being removed from the Site are to be on covered trucks with care taken when loading to reduce the potential for loss of soil from trucks to the road.

9.7 Control of Dust

Dust levels are to be controlled on the Site through use of dust suppression, gravel tracks, minimising soil stockpiles and minimising dry soil disturbance on windy days (especially in the direction of residential properties). No dust is to be noted above background levels at the property boundary especially for neighbouring residential properties to the west of the Middle and Upper areas. Following fill disturbance on the Middle and Upper areas, quantitative boundary monitoring is to be undertaken for asbestos at the boundary fences twice weekly to confirm asbestos fibre levels are below appropriate guidelines until all exposed contamination is removed from the Site or capped.

Any complaints are to be documented and provided to the Superintendent within reporting timeframes. In association with the complaint records, any details of work undertaken on the day as well as site observations, wind direction/speed and immediate monitoring/control measures implemented are to be provided.

9.8 Odour Control

Excavations in the Upper area and properties fronting Primmer Street in the Middle Area have the potential to result in odours being generated associated with hydrocarbons and solvents in these areas. Odours are to be monitored at the excavation and site boundaries to confirm no offensive odours are emitted from the Site. Should elevated concentrations be detected at the property boundaries, vapour suppression (i.e. use of Biosolve or similar) and/or odour masking (i.e. deodorisers) are to be used to minimise complaints from neighbouring properties.

10 Reporting Requirements

The following reports are expected to be produced by the SQP (in addition to those proposed within the drawings and specifications):

- dewatering management plan
- any updates to this remediation plan or environmental management plan
- groundwater monitoring reports
- remediation report.

All reports are to be provided to the Superintendent with reports then being provided to the CLA. A statutory declaration from the SQP is to be provided with each final report that complies with industry standards for the declaration.

10.1 Site Management (Post Remediation)

A BCC Contaminated Land Management Plan (BCC CLMP) will be produced by the SQP and approved by the Auditor. The format of this document will be comparable to a Site Management Plan but include additional controls and responsibility matrix for the Council representatives to manage risks posed by the residual contamination on the Site. BCC will provide a template of this document for population by the SQP.

10.2 Statement of Suitability

The SQP will provide a statement of suitability based on the control measures implemented, remediation works undertaken that the site is suitable for use as parkland subject to the requirements of the BCC CLMP. The CLA will need to endorse this suitability statement.

11 References

Australian Standard 4482.1-2005 Guide to the Investigation and Sampling of Areas with Potentially Contaminated Soil.

ANZECC & ARMCANZ (2000). Australian Water Quality Guideline for Fresh and Marine Water Quality Fresh Waters.

Brisbane City Council 2013, Coorparoo Creek Park, Due Diligence Investigation, Contamination, Acid Sulfate Soil & Water Quality, dated December 2013.

Brisbane City Council 2015, Coorparoo Creek Park, Environmental Site Assessment.

Butler Partners (Third Draft), Hydrogeological Assessment, Coorparoo Creek Park, Old Cleveland Road and Barnes Avenue, dated 30 July 2014.

Cardno, Acid Sulfate Soil Characterisation Report, Coorparoo Creek Park, dated 15 September 2015.

Department of Environment and Heritage Protection (EHP) 2014, Guideline: Contaminated Land Professionals.

EHP (2009). Queensland Water Quality Guidelines (QWQG) Version 3, Republished by Department of Environment and Heritage Protection, State of Queensland July 2013.

EPP (2009). Environmental Protection (Water) Policy 2009, Brisbane River Estuary Environmental Values and Water Quality Objectives, Basin No. 143 (part), including all creeks of the Brisbane River estuary, other than Oxley Creek (Environmental Protection (Water) Policy 2009). Department of Environment and Resource Management, July 2010.

NEPC, 2013, Variation National Environment Protection (Assessment of Site Contamination) Measure (NEPM), National Environmental Protection Council.

NEPC, 1999, National Environment Protection Measure, Schedule B1, Investigation Levels for Soil and Groundwater, National Environmental Protection Council.

Attachment A: Relevant Figures

Figures extracted from Cardno and Council reports.

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Figure 6
Location of
groundwater monitoring wells

Legend

- Groundwater wells (surveyed July 2015)
- Area 1A: 60 Holdsworth St
- Area 1B: 226 Old Cleveland Rd
- Area 1C: Primmer St Park
- Area 2: Cardno: Investigation area
- Area 3 : Barnes Ave Dissipation Pond
- Stormwater Manhole
- Drain

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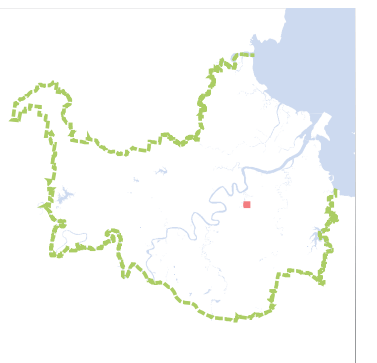
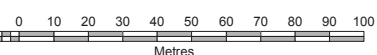
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Checked: [Name]
Revision: 0
Publication Date: 14 Oct 2015
Project Number: 100001

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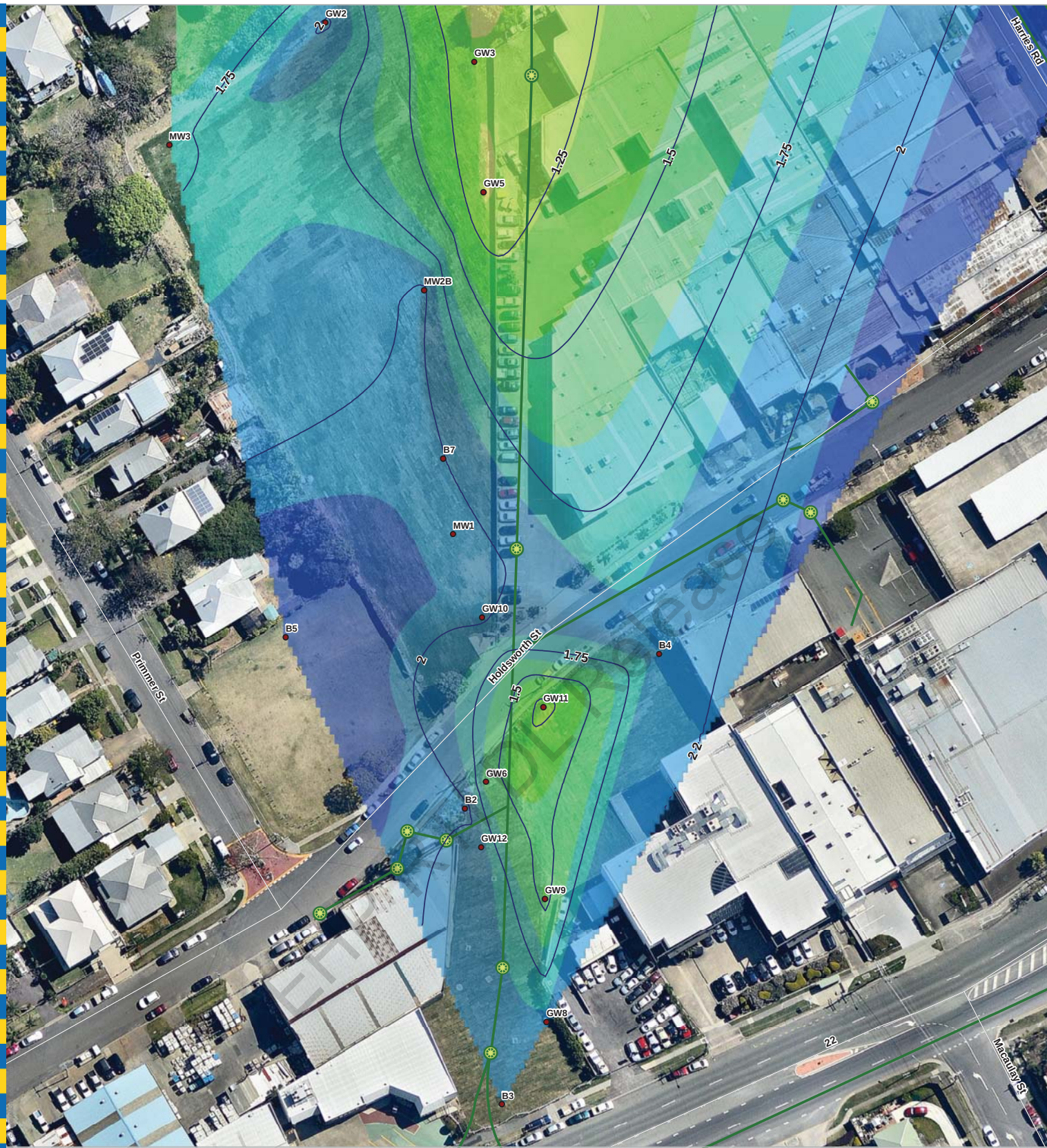
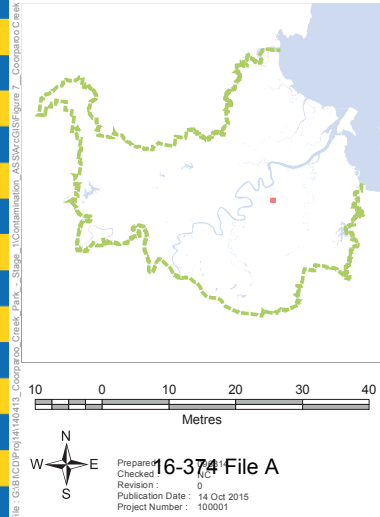
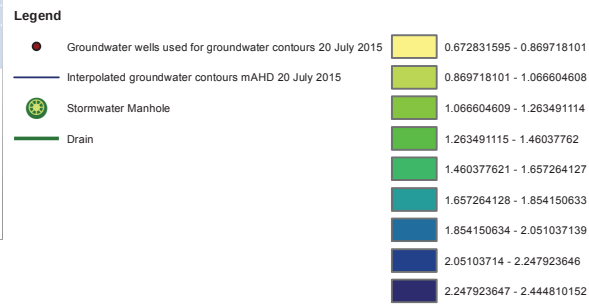


Figure 7
Groundwater elevations - South
20 July 2015



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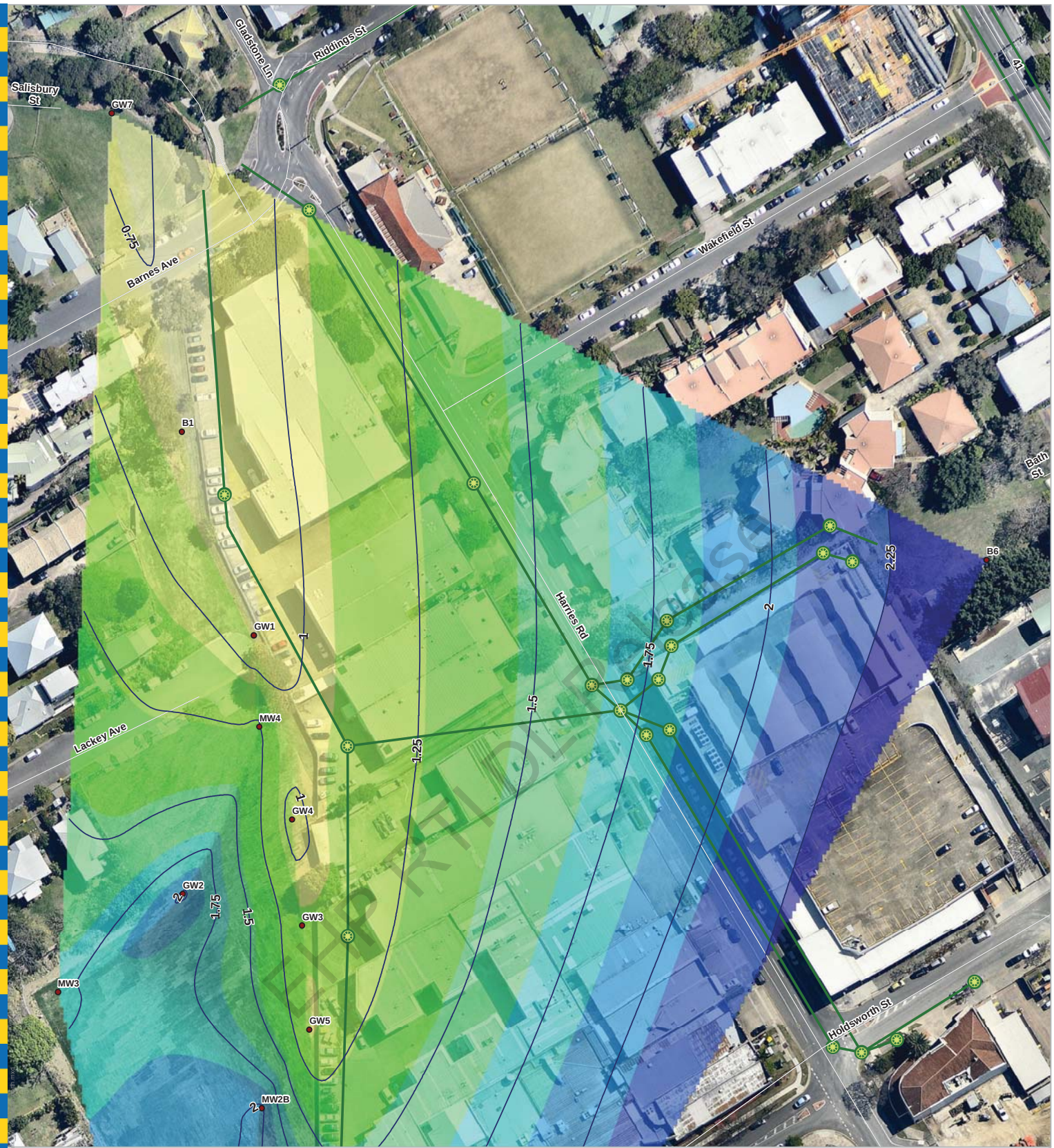


Figure 8
Groundwater elevations - North
20 July 2015

Legend

- Groundwater wells used for groundwater contours 20 July 2015
- Interpolated groundwater contours mAHd 20 July 2015
- ⊗ Stormwater Manhole
- Drain

0.672831595 - 0.869718101
0.869718101 - 1.066604608
1.066604609 - 1.263491114
1.263491115 - 1.46037762
1.460377621 - 1.657264127
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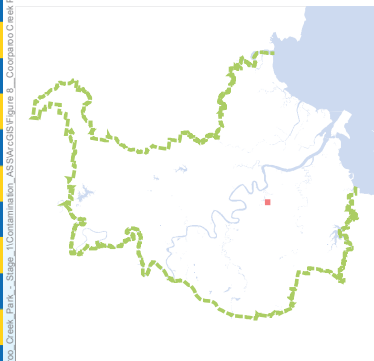
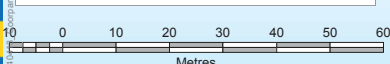
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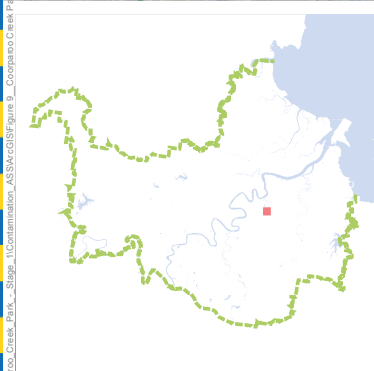
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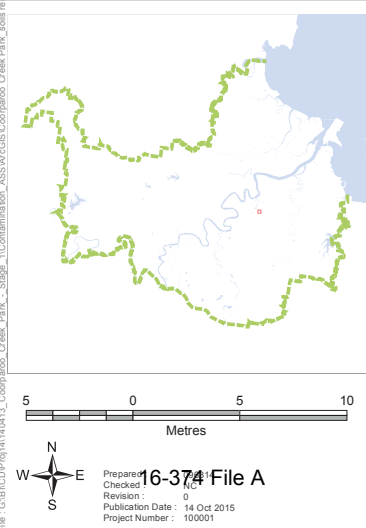
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-  Surface water sample location
-  Stormwater pipe sample locations
-  Stormwater Manhole

— Drain

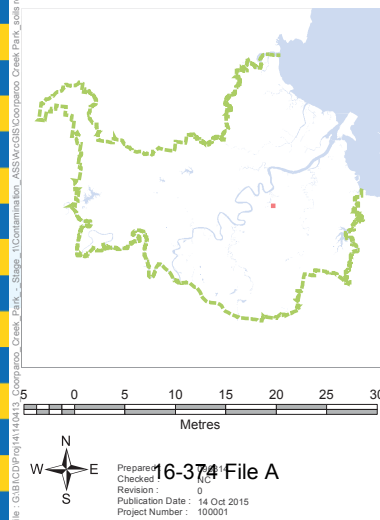
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Area 1A
Residual contamination on site



Contaminated Land Services Coorparoo Creek Park



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Analyte		Lead	Zinc	Benzo (a)pyrene	Sum of PAH	Benzo(a) pyrene TEQ
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Adopted Criteria		300	400	0.7	100	3
Date	Sample ID					
24/06/2015	GW7 0.4-0.5	495	439	0.8	9.3	1.1
24/06/2015	GW7 0.7-0.8	118	137	2.4	22.7	3.2
24/06/2015	GW7 1.2-1.3	82	116	0.8	6.9	1

Figure 12

**Area 3
Residual contamination on site**

Legend

- Materials remaining on site within Area 3
- Area 3 : Barnes Ave Dissipation Pond
- Stormwater Manhole
- Drain

DATA INFORMATION

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Aerial photograph
 dated 2 October 2015

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**Contaminated Land Services
 Coorparoo Creek Park**

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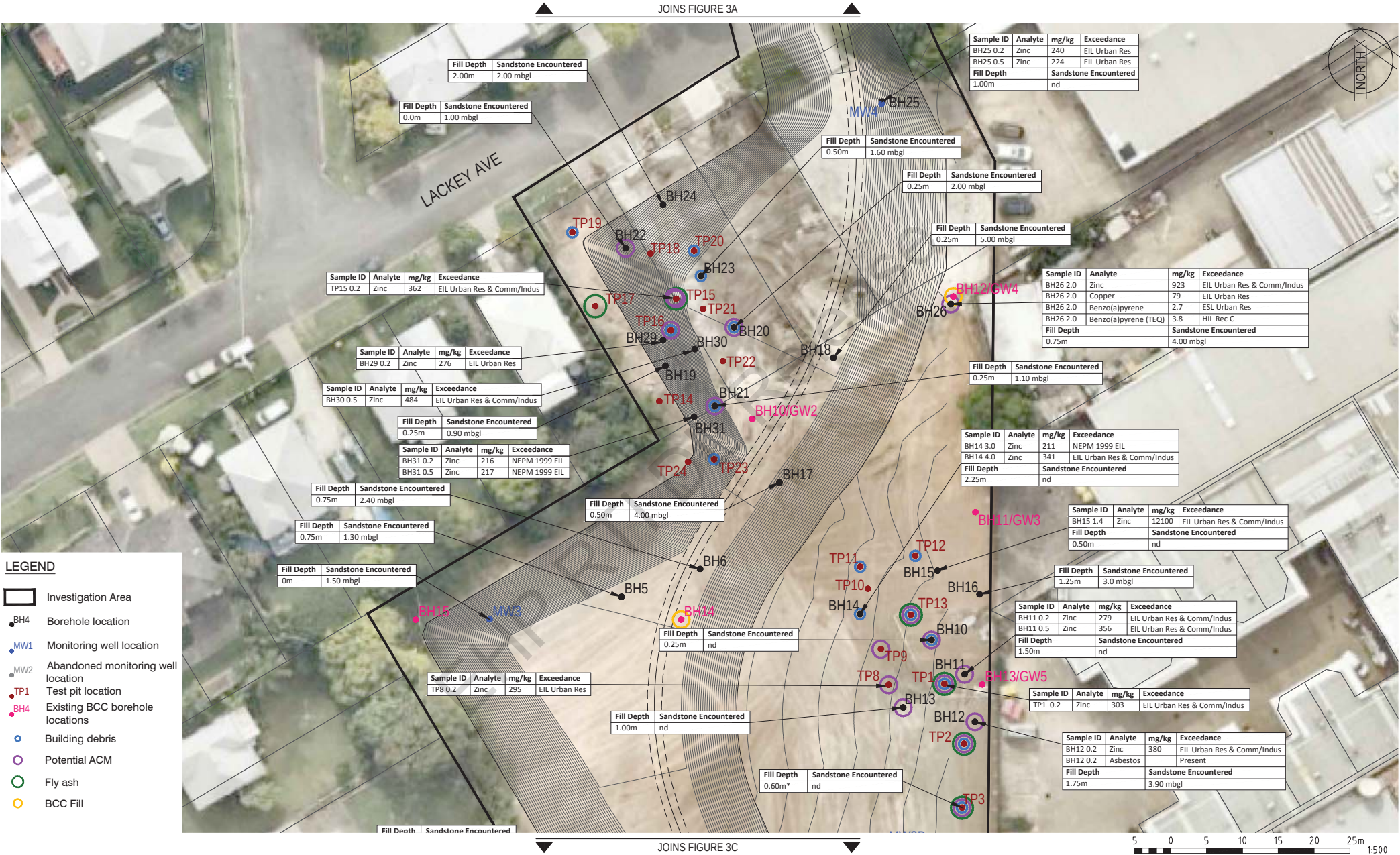


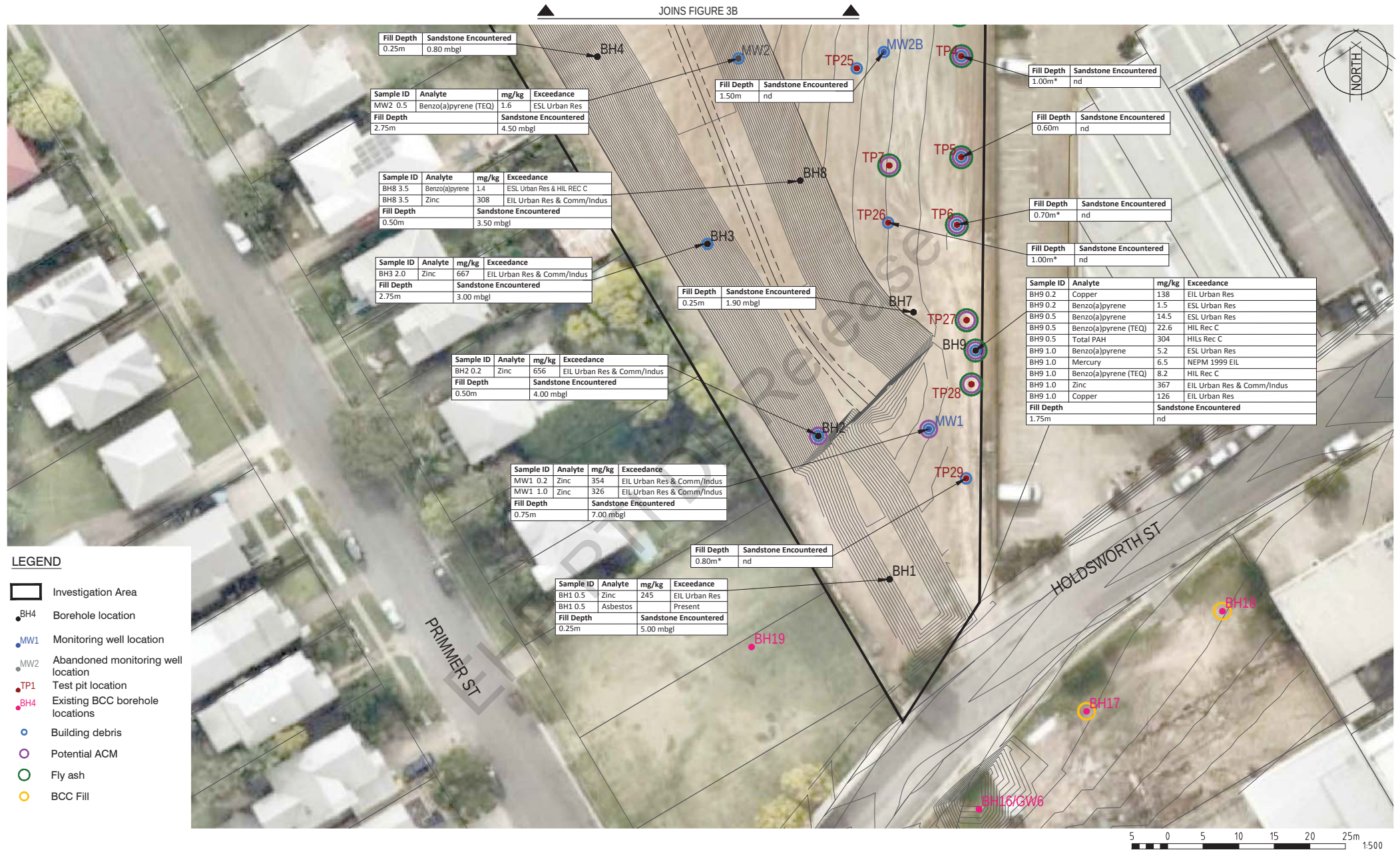
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16-374 File A
 Prepared: 14 Oct 2015
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 Revision: 0
 Publication Date: 14 Oct 2015
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16-374 File A

<Client Name>
CAD FILE: A:\7804-94 Coorparoo Creek Park Detailed Design Input\Acad\DSI Investigation\Figure 3 - Borehole, Monitoring Wells and Test Pit Locations Analytical Exceedances.dwg
XREF's: DCD8

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SAMPLING LOCATIONS ANALYTICAL EXCEEDANCES - SOUTH

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JOINS FIGURE 4B



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<Client Name> 16-374 File A
 CAD FILE: A:\7804-% Coorparoo Creek Park Detailed Design Input\Acad\DWG\Investigation\Figure 4 - Indicative extent of potential contamination.dwg
 XREF's: DCD8

INDICATIVE EXTENT OF POTENTIAL CONTAMINATION - SOUTH

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Attachment B: Waste Hierarchy Assessment

An assessment of options for each of the material streams generated against the waste hierarchy (Figure 2) is included in Table 5.

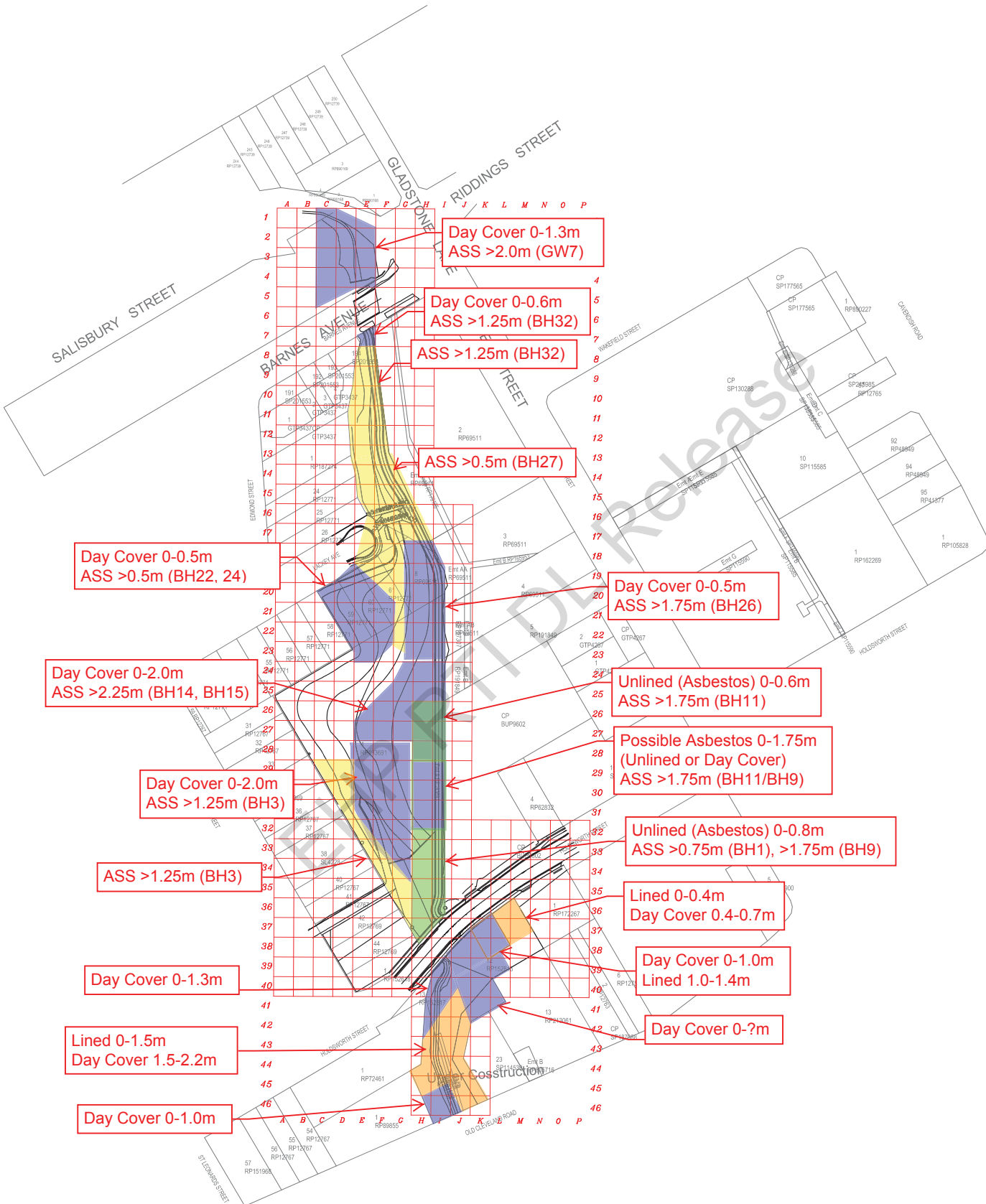
Figure 2: Waste Hierarchy



Table 5: Material Options

Soil type	Volume (m ³) insitu	Reuse Options	Option Chosen
Contaminated Fill	5,150	No reuse options identified. Off-site disposal only. Hazardous contaminants present.	Disposal to landfill as contaminated soil.
Alluvium (ASS)	4,290	On-site treatment and reuse (B-2 horizon) Off-site treatment and reuse	On-site treatment and reuse (B-2 horizon) where possible. Removal of excess alluvium to landfill for treatment
Alluvium (non-ASS)	9120	On-site amelioration and reuse (B-2 horizon) Disposal as clean fill Disposal to landfill	On-site treatment and reuse (B-2 horizon) where possible. TBA
Low strength rock	3450	Disposal as clean fill Disposal to landfill	TBA
High strength rock	900	Disposal as clean fill Disposal to landfill	TBA

Attachment B
Location and Type of Contamination



Legend:

- Area requiring Day Cover Disposal
- Area requiring Unlined Landfill Disposal
- Area requiring Lined Landfill Disposal
- Area requiring ASS Management

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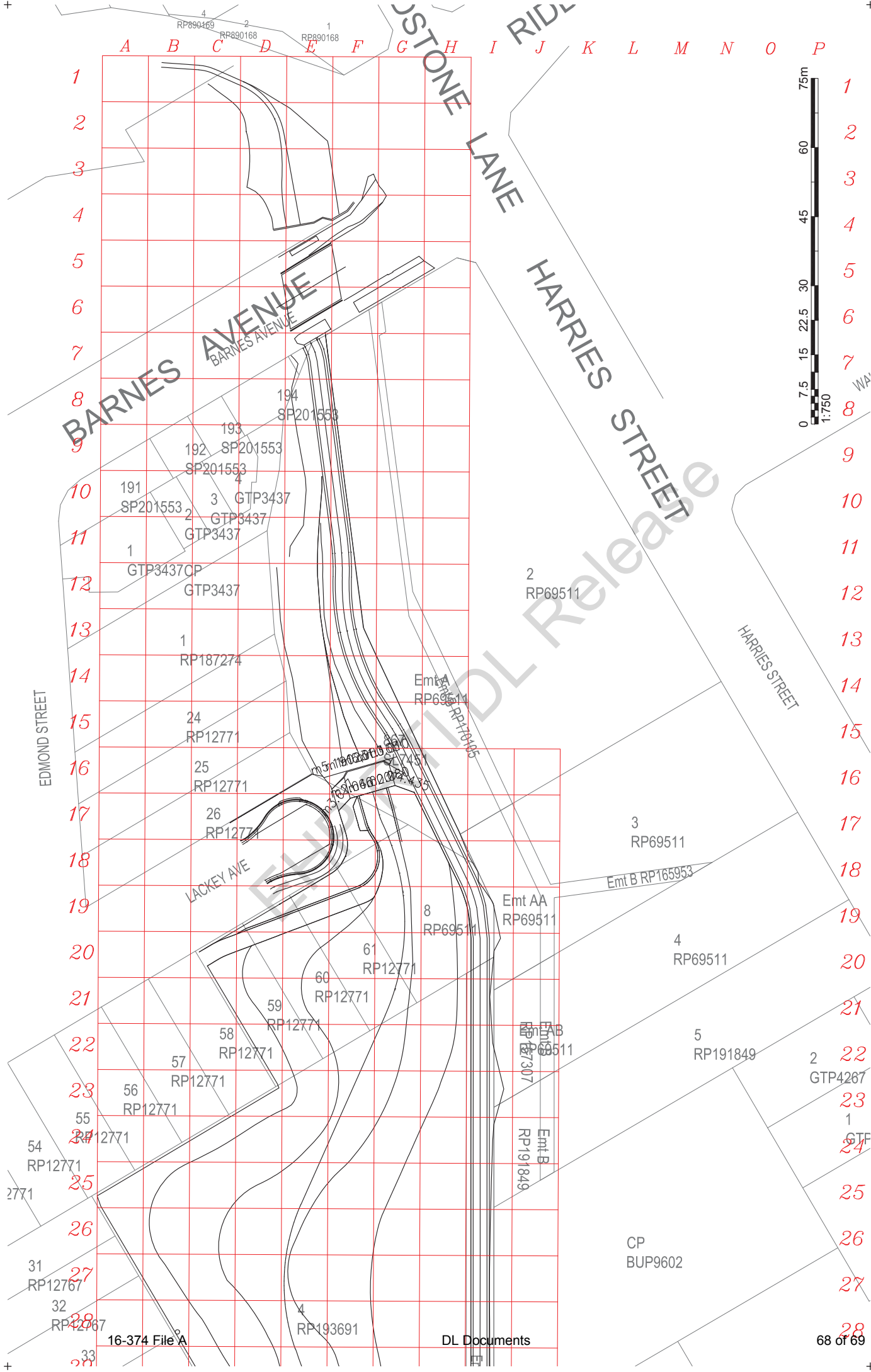
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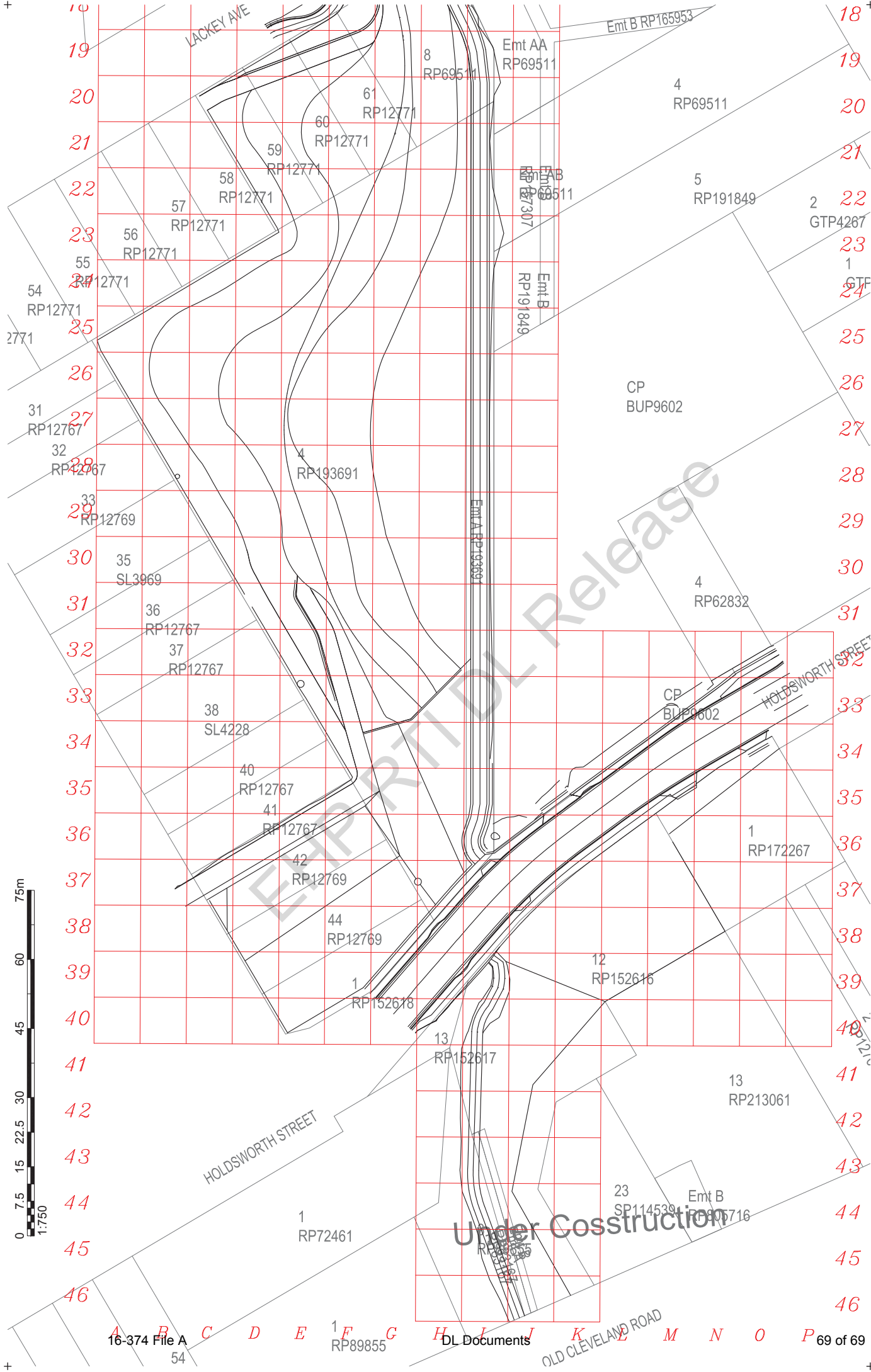
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