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28 August 2019

Ref. JC0361_LSUM-01

Grazio Maiorano

Urban and Regional Planning Solutions

12/154 Fullarton Road

Rose Park SA 5067

Via Email: grazio@urps.com.au

Dear Grazio,

RE: Regency and Days Road, Proposed Croydon Park Rezoning Area – Summary of Environmental Condition

On behalf of the Salandra Group (Salandra), Agon Environmental Pty Ltd (Agon) is pleased to present this summary of environmental conditions in support of the Proposed Croydon Park Rezoning Area ('the site').

1. INTRODUCTION

The site is composed of 14 land parcels (identified in this document as Lots A to N, see Table 1) and is located on the corner of Regency Road and Days Road, Croydon Park.

It is understood that the site is in the preliminary stages of a planned zone amendment from Light Industry to allow mixed uses including low to high density residential land use.

In order to appraise the environmental condition of the site for the proposed rezoning amendment, Agon has compiled this document to summarise the findings of previous environmental assessments conducted within site bounds. This include detailed investigations previously undertaken within Lot A, Lots E to K and Lot N.

Where a previous assessment has not been undertaken (Lots B to D, L and M), a limited review of historical information has been undertaken by Agon to provide USPS with a preliminary evaluation of each allotment's environmental condition.

2. AREA OF INVESTIGATION

This document defines the site to be composed of the following 14 land parcels as summarised in Table 1 below:

Table 1: Allotments with Proposed Rezoning Amendment

Lot ID	CT Volume / Folio	Allotment / Plan	Address	Approx. Area (Ha)
A	CT 5451/741	Lot 102 D22109	121 Regency Rd	4.705
B	CT 6128/46	Lot 1 F12126	141 Regency Rd	0.148
C	CT 5204/642	Lot 9 F11272	92 Days Rd	0.088
D	CT 5421/682	Lot 1 D32496	90 Days Rd	0.081
E	CT 5421/933	Lot 3 D32496	86-88 Days Rd	0.081
F	CT 5421/934	Lot 2 D32496	86-88 Days Rd	0.081
G	CT 6100/770	Lot 111 D35388	80-83 Days Rd	2.86
H	CT 6100/771	Lot 114 D35388	76-78 Days Rd	0.186
I	CT 5951/426	Lot 200 D65185	74 Days Rd	0.599
J	CT 5951/435	Lot 209 D66244	26 Ena St	0.0529
K	CT 6129/140	Lot 202 D65185	76 Days Rd	2.053
L	CT 5795/482	Lot 33 F117915	70 Days Rd	0.082
M	CT 5390/495	Lot 32 F117914	68 Days Rd	0.072
N	CT 5402/300	Lot 29 F117911	72 Days Rd	0.981

The proposed rezoning area is situated in the suburb of Croydon Park, within the City of Port Adelaide Enfield as shown in Figure 1**.** The site is currently zoned "Light Industry". Under the City of Port Adelaide Enfield (DPTI 2018), the primary objectives of the Light Industry are:

- *A zone accommodating a range of light industrial, storage and warehouse land uses that do not create any appreciable nuisance or generate heavy traffic within the locality; and*
- *Development that contributes to the desired character of the zone*.

The zone accommodates warehousing and distribution, industrial, commercial, retail, manufacturing, engineering, automotive services, offices and storage. Activities range in scale from small to medium, with a number of large industrial premises.

3. SITE DESCRIPTION AND CURRENT LAND USE

The site is approximately 12.1 ha in total area and is bound by the following:

- Regency Road to the north;
- Days Road to the east;
- Range of commercial and residential facilities to the west; and
- Residential properties to the south.

The location and approximate bounds of each allotment within the proposed rezoning area has been provided in Figure 2.

The site is currently being utilised for the purposes outlined in Table 2.

Table 2: Site Use Details

Lot ID	Identified Site Use
A, E & F	Range of commercial/ light industrial operations. Detailed information regarding site uses within this land parcel is provided in Attachment A.
B	Bridgestone Select – mechanics workshop and tyre fitting
C	Office/ warehouse property
D	B & P Auto Repairs – mechanics workshop and air-conditioning repairs
G & H	Vacant. An abandoned building is present in Lot H.
I, J, K	Regency Building Supplies
L	Residential property
M	Residential property
N	SA Precast Pty Ltd

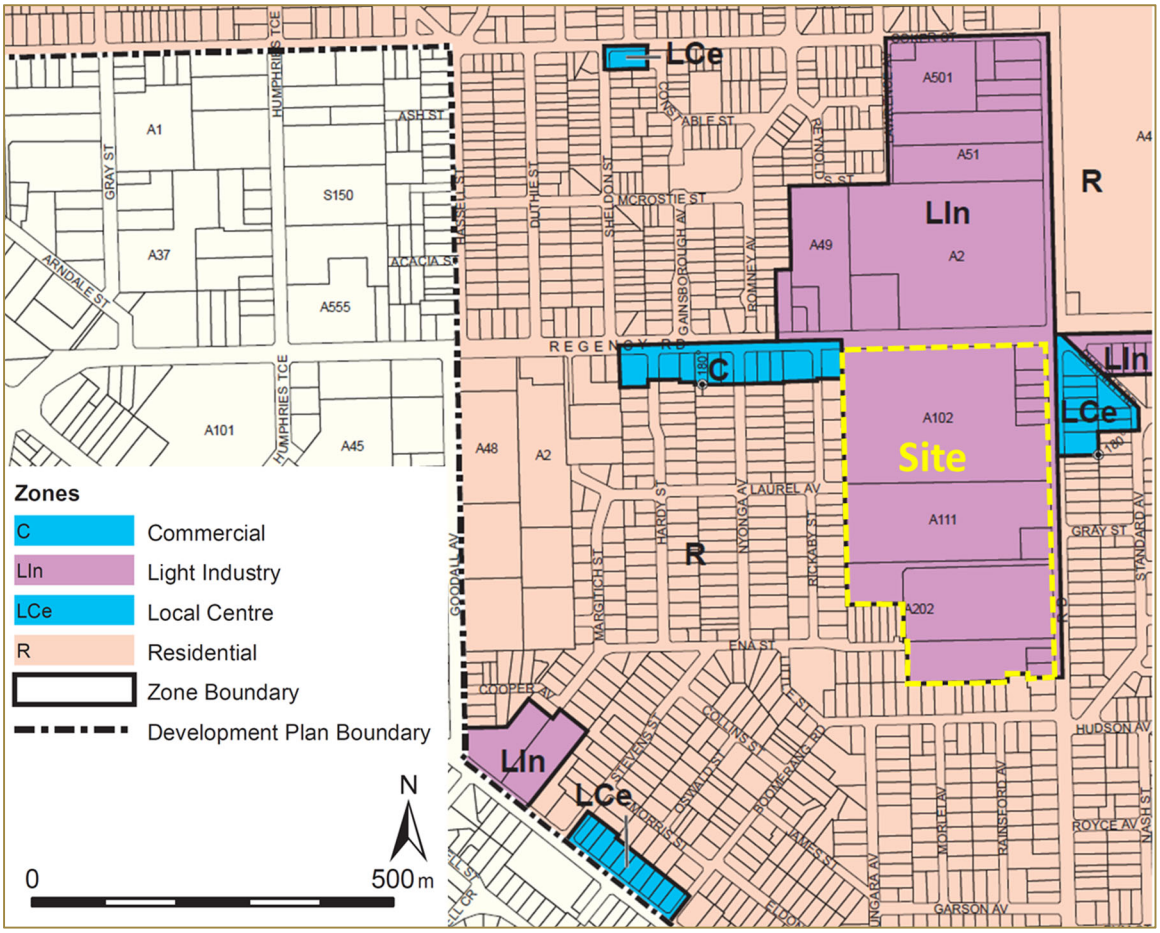

Figure 1: Site Zoning

Source: City of Port Adelaide Enfield (DPTI 2018)

Figure 2: Allotment Plan

Source: Location SA Viewer (DPTI 2019)

4. SUMMARIES OF ENVIRONMENTAL CONDITION

Information regarding the environmental site history, soil and/or groundwater conditions beneath each allotment have been summarised as follows:

4.1 Lot A and Lots E to H

A Detailed Site Assessment (DSI) was recently completed for Lot A and Lots E to H (the northern and central portion of the site), as reported in the following document:

- Agon (2019) Detailed Site Investigation, Lots 2,3, 102, 111 and 114, Croydon Park. Ref: JC0361_DSI.01b (provided in Attachment A).

This assessment included a review of the site history, soil and conditions within Lot A, E and F along with supplementary soil and groundwater investigations on Lots G and H.

Historical documentation indicates that the site was used for agricultural purposes up until around 1959, when the site was developed for commercial/light industrial purposes. Evidence of this site use is indicated by the appearance of sheds/warehouses within Lots A, E and H. This includes the development of the main central shed in Lot A (which exists to date). Commercial/light industrial uses at the site progressively expanded over the years until present day. Historic commercial/light industrial uses were primarily related to steelworks and concrete fabrication activities; the latter was a predominant industry throughout the proposed rezoning area.

Intrusive soils investigations reported that underlying shallow soils (fill and natural) recorded concentrations of heavy metals, PCB, TRH and benzo(a)pyrene in excess of a range of human health and ecological criteria applicable to future site rezoning. These impacts are largely attributable to the nature and source of fill and are not widespread, nor do they pose any significant health or environmental risk that would preclude redevelopment under the proposed rezoning.

Asbestos clad roofing has also been identified as a source of contamination at the site. Asbestos clad footing is present in the main shed in Lot A and likely present in other buildings structures throughout the site. Determination of the condition of the asbestos clad roofing was not part of this assessment but is relevant in establishing environmental risk present onsite in relation to the proposed rezoning.

Groundwater investigation at the site did not report any evidence that it is either the recipient or a source of impact from previous and current activities. Of note, elevated concentrations of a range of anions/cations were reported in excess of the recreational environmental value. Agon has established that these concentrations are likely background in nature.

Overall, soil and groundwater analytical results obtained from the site have not identified the presence of significant or widespread impact within Lots A, E to H which would preclude the rezoning of the site for the proposed mixed-use development (including low to high density residential land use.

Minor identified soil impacts (localised in shallow soils) and ACMs (identified in building materials) may require management measures to enable the redevelopment of the site for a range of uses (which includes a range of low to high density residential use) as envisaged in the proposed rezoning. It is anticipated that any required measures would be feasibly incorporated into the management plans for the demolition and civil works required for any redevelopment.

4.2 Lot G and H

A DSI was previously completed for Lot G and H (the central portion of the site), as reported in the following document:

- Agon (2016a) Detailed Site Investigation, Lots 111 and 114 DP 35388, Days Road, Croydon Park. Ref: JC0021/02 (provided in Attachment B).

This assessment consisted of a detailed review of environmental history documentation and a detailed assessment of site soils underneath Lot G and H.

Research suggests that the site was historically used for agricultural purposes up until around 1954, when the SA Structural Steel Fabrication Works began operations from the building to the north of Lot G. These operations used Lot G and H to store materials until 1993, when it was acquired by DeLuca Pty Ltd. Since 1993, Lots G and H have been vacant, although around 2001, fill materials of unknown origin were imported, placed in stockpiles and spread across the site. Fill material not spread across the site remains in stockpiles in the middle of Lot G. This is consistent with the review of aerial photographs and observations during Agon's 2019 investigation (see Attachment A).

Soil analytical results were generally below the relevant residential land use criteria. This excludes one elevated lead result within shallow fill soils at the southern portion of Lot G. The remaining lead results from across Lot G and H (below relevant criteria) indicated this lead result was an outlier, possibly caused by a small fragment of lead metal in the sample; as such, it is not considered to be representative of impact at the site. Some metal and other minor inclusions were observed occasionally within fill across Lots G and H.

Based on the data collected, there is no evidence to indicate that soil conditions beneath Lot G and H will preclude the proposed zone amendment to a mixed-use development (including low to high density residential land use).

4.3 Lots I, J, K and N

Agon simultaneously completed two previous environmental assessments within Lots I, J, K and N as follows:

- Lots I, J and K: Agon (2016b) Environmental Site Investigation, 76 Days Road, Croydon Park. Ref JC0057R/01 (provided in Attachment C); and
- Lot N: Agon (2016c) Environmental Site Investigation, 72 Days Road, Croydon Park. Ref: JC0057P/01 (provided in Attachment D).

In both assessments, Agon conducted a detailed site history review which was supplemented by a soil analytical programme targeting chemical compounds based on each site's historical and current site use. Notable features identified that could potentially contaminate each allotment were the presence of fuel storage infrastructure in the following areas:

- Disposal of concrete slurry in the western portion of Lot I;
- An underground storage tank (UST) along the northern boundary of Lot N; and
- An above ground storage tank (AST) in the south-western portion of Lot K.

Soil chemical analysis of soils from both properties identified limited evidence for chemical impacts to site soils. Notable detections included the following:

- Elevated lead concentrations in one fill soil sample in Lot N and one fill sample in Lot K;

- Elevated hydrocarbons concentrations (limited to shallow fill materials) beneath a former concrete batching plant (above ecological screening criteria) and within hydrocarbon stained soils within Lot K (above residential and ecological screening criteria); and
- Detectable concentrations of OCPs (below residential screening criteria) within two fill samples and one natural soil sample.

Where detected, impacts were limited to shallow fill soils and did not appear extensive, nor was it sufficiently substantial to indicate a non-trivial environmental threat to groundwater.

A groundwater well was previously located within Lot J as part of an Environmental Audit of the site adjoining Lot J to the west (formerly part of the same property as Lots I, J and K and now has been redeveloped for residential purposes). The purpose of this well was to investigate potential groundwater impacts associated with former fuel storage infrastructure (UST) located to the west of Lot J. The Audit did not identify groundwater impacts which could pose a threat to groundwater beneath Lot J or any adjoining properties. Groundwater investigations were not undertaken beneath Lots I, J, K and N.

Based on the data collected, there is no evidence to indicate that soil conditions beneath Lot I, J K and N will preclude the proposed zone amendment to a mixed-use development (including low to high density residential land use).

4.4 Lots B, C and D

A formal environmental investigation has not been undertaken for Lot B, C and D (which forms the north-eastern portion of the proposed rezoning area) to date. To provide a preliminary evaluation of the environmental condition of these allotments, Agon conducted the following:

- A review of each allotment's historical title history; and
- A review of historical aerial imagery from previous assessments.

Copies of historical titles for Lot B, C and D have been provided in Attachment E including a tabulated history (Table E1).

4.4.1 Title Ownership

Lands which include a major proportion of the proposed rezoning area was previously owned by William Duthie, an Islington Dairyman. The land remained in the Duthie family until 1949, when the land was subsequently subdivided with allotments including Lot B, C and D transferred to the Director of War Service Homes.

In 1950, the allotment now identified as Lot B was transferred to James Archibald Duthie, a Kilkenny Dairyman. In 1956, Lot B was then transferred to The Commonwealth Oil Refineries Limited, who remained in possession of the allotment until 1991, when the land was transferred to Francesco Patrinostro. Between 2006 to 2016, Lot B was leased to Raymond Business Services Pty Ltd and from 2016 until present day, to Bridgestone Tyre Australia. In addition, a current encumbrance by BP Australia Ltd (BP) is currently held over the title. This could be in relation to the presence of petroleum-related infrastructure within Lot B.

In 1955, Lot C and D were transferred to Stanley and Margaret Foote from the Director of War Service Homes. Lot C underwent numerous transfers of ownerships between private individuals including those registered as mechanics between 1959 and 1994. Lot C was then eventually acquired by Francesco Patrinostro (title owner of Lot B) in 1994. Similar to Lot B, Lot C was then leased by Raymond Business Services Pty Ltd in 2015 and to Bridgestone Tyre Australia during

2016 until present day. It is not known whether the current use of Lot C (assumed to be either office space or warehouse) is in relation to the commercial activities being undertaken within Lot B. It is also likely that Lot C would have been utilised as a mechanic's workshop during its history.

Lot D (as a subdivision of lands owned by Stanley and Margaret Foote) was transferred to Silvo and Elisabeth Stepan in 1991 who remain in current ownership of the land.

4.4.2 Limited Aerial Photography

Limited aerial imagery has been acquired for Lots B to D. These images were acquired from the previous investigation within Lot A and Lot E to H (see Attachment A). Images with sufficient observable resolution were selected for review. Figure 3 shows a selection of four aerial photographs from 1949, 1959, 1969 and 1989.

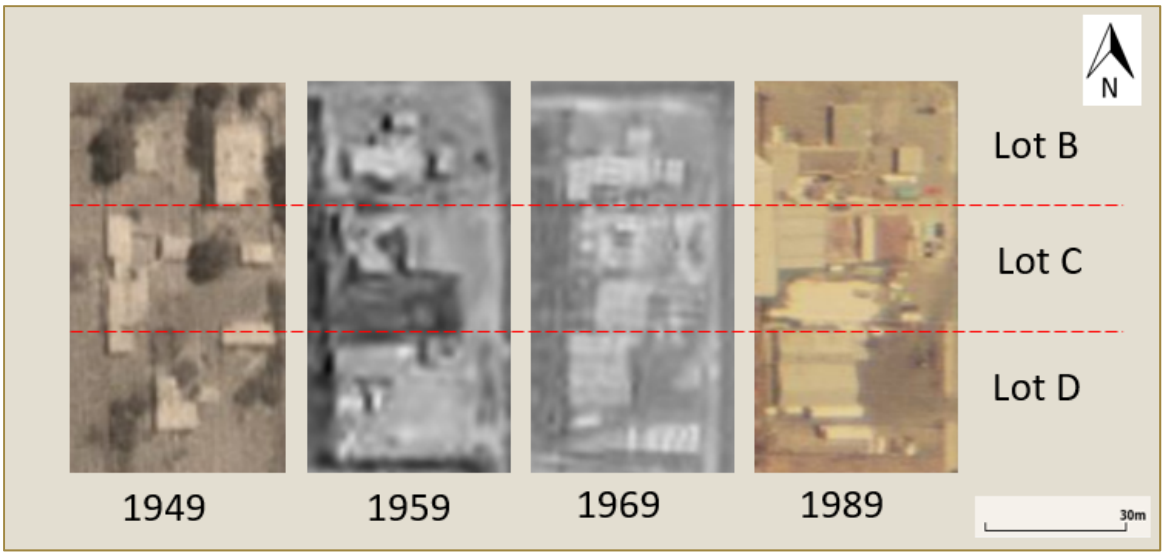

Figure 3: Lot B, C and D Historical Aerials
Source: Agon report JC0361/01b

Aerial photography from 1949 shows site infrastructure present within Lot B, C and D when the area was still utilised for agricultural purposes. There appears to be a house within Lot B and a number of sheds within Lot C and D.

Site infrastructure appears to have changed during 1959 when commercial/industrial operations began within the local area. The residence in Lot B appears to have been replaced with another structure towards the western portion of Lot B. The smaller sheds previously identified within Lot C and Lot D have been replaced much larger buildings. The 1959 structure within Lot B appears to be a building with a canopy to the north (consistent with the layout of a service station). This layout persisted over time and exist to the present day.

Between 1959 to 1989, building extents have expanded within Lot C whilst the large shed/building in Lot D have reduced in extent over the same time period. Both Lot C and Lot D appear to have been historically utilised for commercial purposes since 1959.

4.4.3 Summary of Limited Historical Information

The following can be summarised based on the limited information available for Lot B, C and D:

- Notable historical ownership details which may indicate potential contaminating activities include the ownership of Lot B by the Commonwealth Oil Refineries Limited (COR) from 1956 to 1991. COR was an Australian oil company that operated between 1920 and 1952 which was subsequently sold to The British Petroleum Company (now BP). Of note, BP still hold a title encumbrance over Lot B. Based on historical title history and current site layout, it is likely that Lot B was utilized as a service station for a significant period of time;
- Limited information could be obtained regarding former site uses for Lot C and D. It is likely that Lot C could have been utilized as a mechanics workshop based on previous ownership details. Lot D is currently being utilized as a mechanics workshop.

Based on the likely use of Lot B as former service station and the use of Lot C and D as a mechanics workshop, the potential for hydrocarbon and solvent related contaminants to be present within the north-east portion of the proposed rezoning area is likely. Residual service station infrastructure may potentially be present underneath Lot B in the form of UST(s) and associated pipe infrastructure. It is also likely that imported fill (with similar characteristics to those logged underneath Lots A, E to K and N) is also present beneath Lot B, C and D.

Although no investigations beyond this desktop historical assessment has been undertaken, it is anticipated that these allotments are suitable for ongoing commercial use.

4.5 Lot L and M

A formal environmental investigation has not been undertaken for Lot L and M (which form the south-eastern portion of the proposed rezoning area) to date. To provide a preliminary evaluation of the environmental condition of these allotments, Agon conducted the following:

- A review of each allotment's title history; and
- A review of historical aerial imagery from previous assessments.

Copies of historical titles for Lot L and M have been provided in Attachment F including a tabulated history (Table F1).

4.5.1 Title Ownership

The various allotments that used to comprise Lot L and M were owned by dairymen and farmers between 1911 until 1949, when ownership was transferred to the Director of War Service Homes.

Lot L was transferred to Giuseppe Linarello in 1947 (North Croydon Extension Tailor) then to his son in 1951. Lot L was eventually transferred to Ruggerio and Anninna D'Amico in 1992 who remain in ownership of the land until present day.

Lot L was transferred to Giuseppa Amodeo in 1962, then to Severino and Antonietta Battistella in the same year, to Rosemary Caputo in 1992 and to Kim Theng Trea and Keang Lim in 1997 (the current title owners).

4.5.2 Limited Aerial Photography

Limited aerial imagery has been acquired for Lots L and M. These images were acquired from the previous investigation within Lot N (see Attachment C). Images with sufficient observable resolution were selected for review. Figure 3 shows a selection of three aerial photographs from 1949, 1969 and 1989:

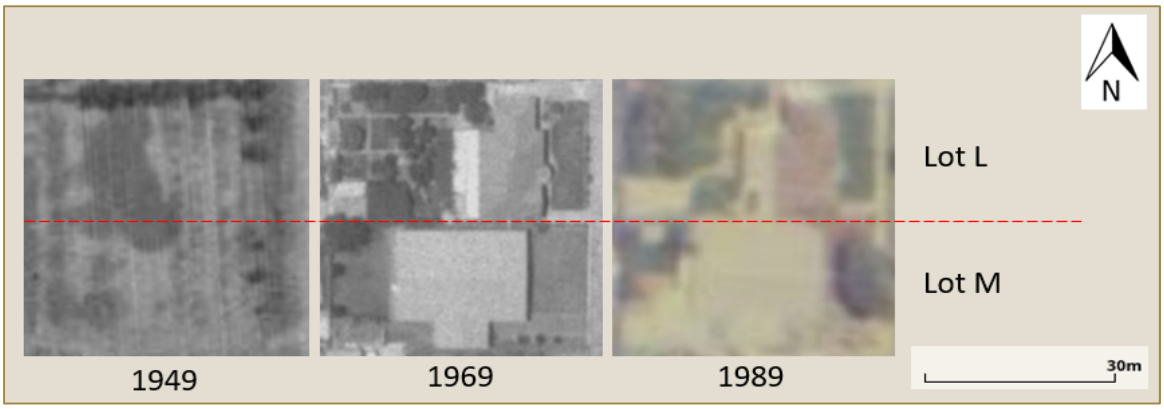

Figure 4: Lot L and M Historical Aerials
Source: Agon report JC0057P/01

Aerial photography shows Lot L and M as an agricultural plot during 1949 with rows of crops running north to south. Residential properties, which exist today, appear to have been established at least during 1969. Changes in the extent of landscaped/garden areas appear to be the only changes within Lot L and Lot M over the years.

4.5.3 Summary of Limited Historical Information

Based on limited site information, both Lot L and Lot M appear to have been utilised for residential purposes from at least the 1960's. Transfer of ownership has not identified ownership by a corporation (or similar) to indicate historical commercial or industrial use within either allotment. Aerial photography confirms that the residential properties on each allotment have been established since 1969.

The most likely activities which could be source of contamination on either allotment are limited the former use of pesticides for the following purposes:

- Pest and weed control as part of former agricultural activities; and
- Termite and weed control as part of residential construction or property maintenance.

It is unlikely that significant contamination is present at Lot L or M based on historical land use.

5. CONCLUSIONS

Based on a range of detailed and preliminary investigations undertaken within the proposed rezoning area, Agon have identified the following notable environmental conditions at the site:

- Soils across Lot A, E to K and N contain minor impacts in the form of heavy metals, PCB, TRH and benzo(a)pyrene. These impacts are present in shallow fill and natural soils. Where reported, reported impacts are neither significant nor widespread and are not likely to preclude the proposed zone amendment to a mixed-use development (including low to high density residential land use).
- Although no specific soil or groundwater investigations have been undertaken on Lots B to D, it is considered likely that similar shallow soil conditions to those observed in Lots A and Lots E to K are present. These allotments have an extensive history of commercial land use, including the use of Lot C for a service station and Lot C and D for mechanics' workshops. These activities may be source of related potential impacts; however,

previous land uses and activities are not considered to preclude the ongoing use of these allotments for commercial purposes.

- It is unlikely that significant concentration of contaminants is present in soils underneath Lot L and M based on each allotment's primarily residential use over several decades.
- Groundwater within the northern and central portion of the proposed rezoning area has been confirmed to neither be the source or receptor of groundwater-based impacts. The condition of groundwater within the remaining portions of the site including the southern allotments (Lot I to N) and the north-eastern allotments (Lot B to D) has not been investigated.
- Petroleum based infrastructure is present within Lot K (AST) and Lot N (UST) and is likely present in Lot C (former service station site).
- ACM materials have been identified within Lot A and are likely to be present within existing building structures within the proposed rezoning areas.

Overall, Agon's findings have not identified the presence of significant or widespread impact at the site. Identified soil impacts (localised in shallow soils) and ACMs (identified in building materials) may require management to enable the redevelopment of the site for a range of uses (which includes a range of low to high density residential use) as envisaged in the proposed rezoning. However, any environmental issues identified at the site are not considered likely to preclude the proposed zone amendment at the site (which includes low to high density land use).

6. CLOSURE

The environmental conditions observed at the site are not considered likely to preclude the site's future rezoning for a mixed-use development (including low to high density residential land use). Where identified, any impacts are localised (not extensive), would not preclude the redevelopment of the land and are able to be suitably managed and/ or remediated in line with the envisaged land uses.

Please contact the undersigned if you have further questions about any aspect of this submission. Agon looks forward to providing ongoing environmental support during the rezoning and development application for the above site.

Kind Regards,

Carlo Echevarria
Senior Environmental Scientist

Attachments

Attachment A: JC0361/01b DSI Report for Lot A, E to H

Attachment B: JC0021/02 DSI Report for Lot G and H

Attachment C: JC0057R/01 ESA Report for Lot N

Attachment D: JC0057P/01 ESA Report for Lots I, J and K

Attachment E: Lot B to D Title History

Attachment F: Lot L and M Title History

ATTACHMENT A: JC0361/01b DSI Report for Lot A, E to H

Detailed Site Investigation
Lot 2, 3 102, 111 and 114, Croydon Park
South Australia

Prepared for:	Salandra Group
Date:	28 August 2019
Reference No:	JC0361
Report Version:	JC0361.DSI/01b

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CONTENTS

TABLES

FIGURES

AGON DOCUMENT CONTROL

Report Title:	Project Reference
DETAILED SITE INVESTIGATION REPORT Lots 2, 3, 102, 111 and 114 Croydon Park SA	JC0361.DSI
Written:	**Approved:**
Carlo Echevarria Senior Environmental Scientist	**David Probert** National Manager Environment

Rev No	Status	Date	Author	Reviewer
01b	Final	28/08/2019	CE	DP

Rev No	Copies	Recipient
01b	1 electronic	Adam Salandra – Salandra Group
01b	1 electronic	Grazio Maiorano – UPRS

EXECUTIVE SUMMARY

Salandra Group (Salandra) engaged Agon Environmental Pty Ltd (Agon) to conduct a Detailed Site Investigation (DSI) of five (Lots A, E to H) of the 14 land parcels proposed for rezoning within Croydon Park ('the site').

The objective of this DSI was to establish the environmental condition of Lot A, E to H in relation the site's proposed rezoning amendment to allow a proposed mixed-use development (including low and high density residential land use).

The DSI included a review of the site history, soil and conditions within Lot A, E and F along with supplementary soil and groundwater investigations on Lots G and H.

The site history research has identified that the primary sources of contamination at the site are related to former site filling activities; the use of the site for a range of industrial uses including pre-cast concrete and steel formwork manufacture; and the use of asbestos containing building materials (notably the asbestos cement roof of the main building within Lot A).

Soils underneath the site are composed of granular fill (sand and gravel) material across the investigation area, some of which were observed with non-soil inclusions including ash and cinders. This was underlain by natural sands and clays consistent with published geological information.

The soil analytical programme reported that underlying shallow soils (fill and natural) were impacted with concentrations of heavy metals, PCB, TRH and benzo(a)pyrene in excess of a range of human health and ecological criteria applicable to future site rezoning. These impacts are largely attributable to the nature and source of fill and are neither significant nor widespread.

The groundwater assessment programme did not identify impact to be present within the underlying groundwater. Elevated concentrations of cations/anions were identified in excess of adopted recreational use criteria. Agon have established that these elevated concentrations are representative of background conditions and do not represent site impact.

Based on the results of this assessment, the reported environmental condition at the site is not considered likely to preclude the site's future rezoning for a mixed-use development (including low and high density residential use).

Agon recommends that Salandra develop a detailed construction and environmental management plan (CEMP) to address the management of localised impact within both shallow fill and natural materials and the removal and/or management of asbestos-clad roofing within the primary building/warehouse in Lot A.

1.0 Introduction

An area of land (comprising fourteen land parcels) located at the corner of Days Road and Regency Road, Croydon Park, is in the preliminary stages of a planned zone amendment from Light Industry to allow mixed uses including low to medium density residential land use.

Salandra Group (Salandra) engaged Agon Environmental Pty Ltd (Agon) to conduct a Detailed Site Investigation (DSI) of five of the 14 land parcels (see Figure 1 and Figure 2) proposed for rezoning within Croydon Park ('the site').

Agon have appraised the site in the context of a range of potential land uses that may be considered for the development (including low to high density residential land use).

This DSI has been undertaken in general accordance with the guidance provided within following documents.

- National Environment Protection Council (1999; amended 2013) National Environmental Protection Measures – Assessment of Site Contamination – "the NEPM";
- SA EPA (2018) Guideline for the assessment and remediation of site contamination – "the GAR";
- SA EPA (2010) Current criteria for the classification of waste—including Industrial and Commercial Waste (Listed) and Waste Soil – "the EPA Waste Criteria"; and
- Standards Australia (2005) *AS4482.1 Guide to the investigation and sampling of sites with potentially contaminated soil. Part 1: Non-volatile and semi-volatile compounds* – "AS4482.1"

1.1 Objective

The objective of this DSI is to characterise the environmental condition of the site to determine if the potential for unacceptable risks to human health or the environment exist in the context of the proposed zone amendment in the context of a future mixed-use development which includes low to high density residential land use.

1.2 Area of Investigation

This report defines the current area of investigation to be composed of the following five land parcels:

Table 1: Land Parcel Details

Lot ID	CT Volume / Folio	Allotment / Plan	Address	Approx. Area (Ha)	Hundred
A	CT 5451/741	Lot 102 D22109	121 Regency	4.705	Yatala
E	CT 5421/933	Lot 3 D32496	86-88 Days	0.081	
F	CT 5421/934	Lot 2 D32496	86-88 Days	0.081	
G	CT 6100/770	Lot 111 D35388	80-83 Days	2.86	
H	CT 6100/771	Lot 114 D35388	76-78 Days	0.186	

*Lot ID reference based on previous assessments

Detailed information regarding the site history and soil conditions beneath Lot G and H have been previously reported by Agon on 2 February 2016 (*Detailed Site Investigation, Lots 111 and 114 DP 35388, Days Road, Croydon Park, ref: JC0021/02*). This report has been summarised in Section 3.3 and should be read in conjunction with this report.

Information regarding the site history, soil conditions within Lot A, E and F and the groundwater condition across within Lot A, E and F are detailed within this report, along with supplementary soil and groundwater investigations on Lots G and H.

1.3 Scope of Work

The scope of work undertaken as part of this investigation included the following tasks:

- Conduct a review of site history information for Lot A, E and F;
- Review and summary of available background data including the site history and soil analytical results for Lot G and H;
- Undertake an intrusive soil assessment programme within Lots A, E and F
- A groundwater drilling and sampling programme across within Lots A, E, F, G and H;
- Complete a Tier 1 Risk Assessment (soil and groundwater) and assess the site's suitability for the proposed rezoning to a mixed-use development (including low to high density residential land use);
- Development of a Conceptual Site Model (CSM) for the entire development area; and
- Provision of recommendations.

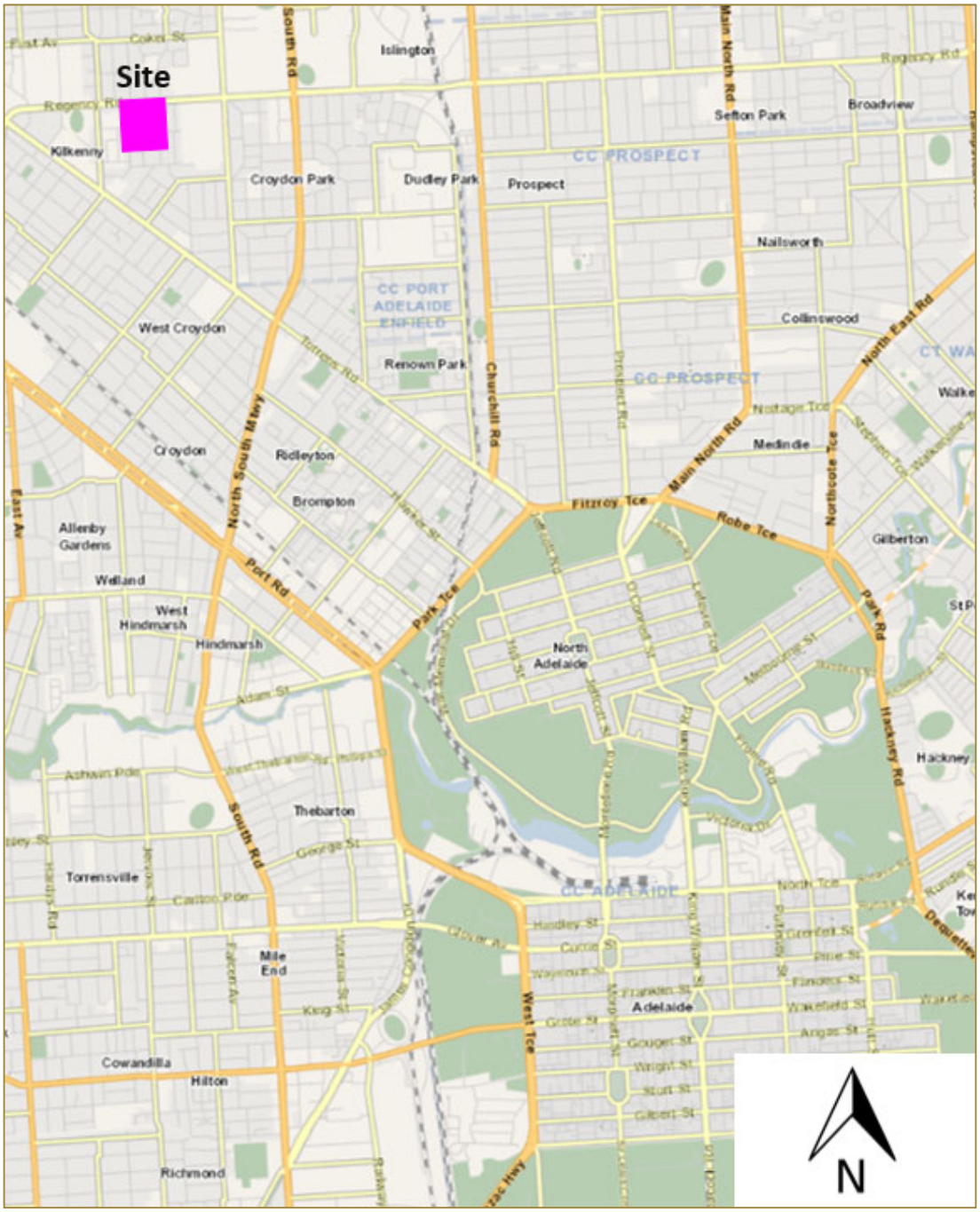

Figure 1: Site Location
Source: SAPPA 2019

Figure 2: Allotment Plan
Source: Location SA Viewer (DPTI 2019)

2.0 ENVIRONMENTAL SETTING

2.1 Site Location and Identification

The site is located on the corner of Days and Regency Road in the suburb of Croydon Park, approximately 6.1 km north-west of the Adelaide GPO (see **Error! Reference source not found.**). The location and extent of each land parcel which form the current area of investigation are shown in **Error! Reference source not found.**. Current and historical title details for Lot A, E and F are provided as Appendix A.

2.2 Local Government Area and Zoning

The site is situated in the suburb of Croydon Park, within the City of Port Adelaide Enfield as shown in Figure 3. The site is currently zoned "Light Industry". Under the City of Port Adelaide Enfield (DPTI 2018), the primary objectives of the Light Industry are:

- *A zone accommodating a range of light industrial, storage and warehouse land uses that do not create any appreciable nuisance or generate heavy traffic within the locality; and*
- *Development that contributes to the desired character of the zone.*

The zone accommodates warehousing and distribution, industrial, commercial, retail, manufacturing, engineering, automotive services, offices and storage. Activities range in scale from small to medium, with a number of large industrial premises.

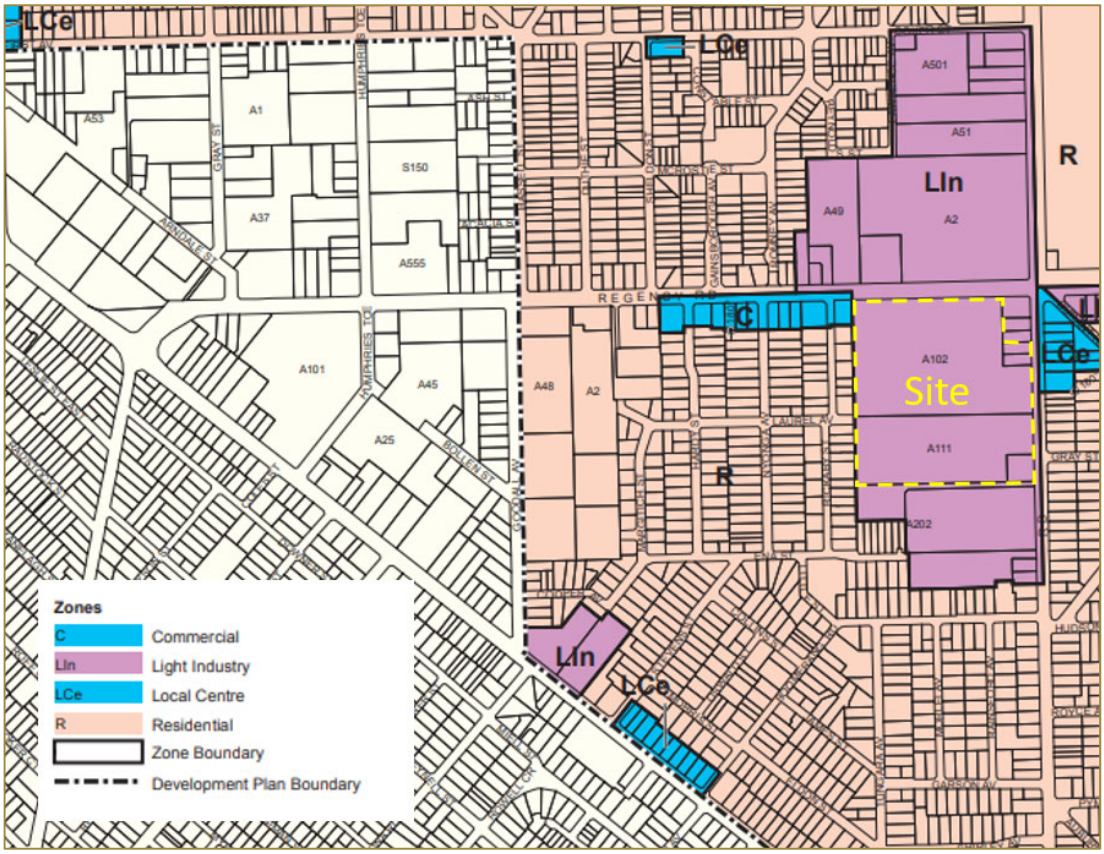

Figure 3: Site Zoning

Source: City of Port Adelaide Enfield (DPTI 2019)

2.3 Site Description and Current Land Use

The site is approximately 7.9 ha in total area and is bound by the following:

- Regency Road to the north;
- Days Road to the east;
- Range of commercial and residential facilities to the west;
- The remaining allotments which form the remainder of proposed rezoning area are adjacent the site to the north east (Lots B, C and D) and to the south (Lots H to Lot N); and
- South of the proposed rezoning area are residential properties.

Lots A, E and F are currently being utilised for a range of light industrial operations. Lots G and H are currently vacant. A summary of current site operations and site features have been tabulated in

Table 2 with locations shown in Figure 4.

Remaining areas not indicated by

Table 2 and Figure 4 are predominantly open space (bare earth) areas, roadways and access paths. Notable site features are as follows:

- Raisebore utilise a temporary chemical storage area (hydraulic oils, possibly cleaning solvents) on the southern side of their operations area (southern area of A1);
- The primary warehouse located centrally within Lot A (identified by A2 and A3) has an asbestos roof structure, and asbestos-containing materials (ACM) are anticipated to be present in other buildings of similar age (e.g. in areas A1, A5);
- Primary storage and laydown areas are generally unsealed at (eastern portion of A1, A10, E1 and F1). However, the presence of stains or soil discoloration was generally not evident within surface soils throughout the site to indicate leaks and spills from chemicals including fuels;
- During a number of site visits, the volume, extent and type of refuse stored within A5 varied greatly. Agon did not identify substantial volumes of chemicals within the stored refuse;
- Agon could not identify whether the drum platform (A6) was currently storing petro-chemical products;
- The transformer (A12) did not show any indication of leaks or damage which could indicate previous leaks of insulating fluids.
- The area between A9, A10 and Lot G boundary appear to be undeveloped based on the presence of natural soils at surface. The use of granular fill as a site levelling and surface treatment tool is evident across the site.

Table 2: Site Use Details

Lot ID		Identified Site Use	
Site Use Ref (see Figure 4)		**Identified Tennant**	**Summary of operations**
A	A1	Raisebore Australia	Maintenance of drilling equipment including refurbishment of drilling augers and storage of drilling products/equipment.
	A2	Stoddart	Production of precast metal forms
	A3	Adelaide Integrated Precast	Production of precast concrete forms
	A4	Bianco Precast Flooring	
	A5	Composed of vacant buildings (offices and warehouses). At the time of assessment, hard waste refuse was being stored within this portion of the site.	
	A6	Is a former drum platform for the storage of petroleum products	
	A7	Is a vacant portion of the site historically used for staff car parking	
	A8	Tenant unknown	For the storage of plumbing equipment
	A9	Bianco Timber Truss	Production of timber ladder and A-frames for residential structures
	A10	Temporary product and equipment storage and mobile plant parking area.	
	A11	In abandoned gantry-style overhead crane alignment. It is being utilised for product and equipment storage.	
	A12	An active transformer is present along the northern boundary	
E	E1	Temporary product and equipment storage and mobile plant parking area.	
F	F1		
G	G1	Soil stockpiling area.	
	G2	Abandoned building. This building is un disrepair with portion of the structures and furnishing removed.	
H	-	Vacant. No notable features.	

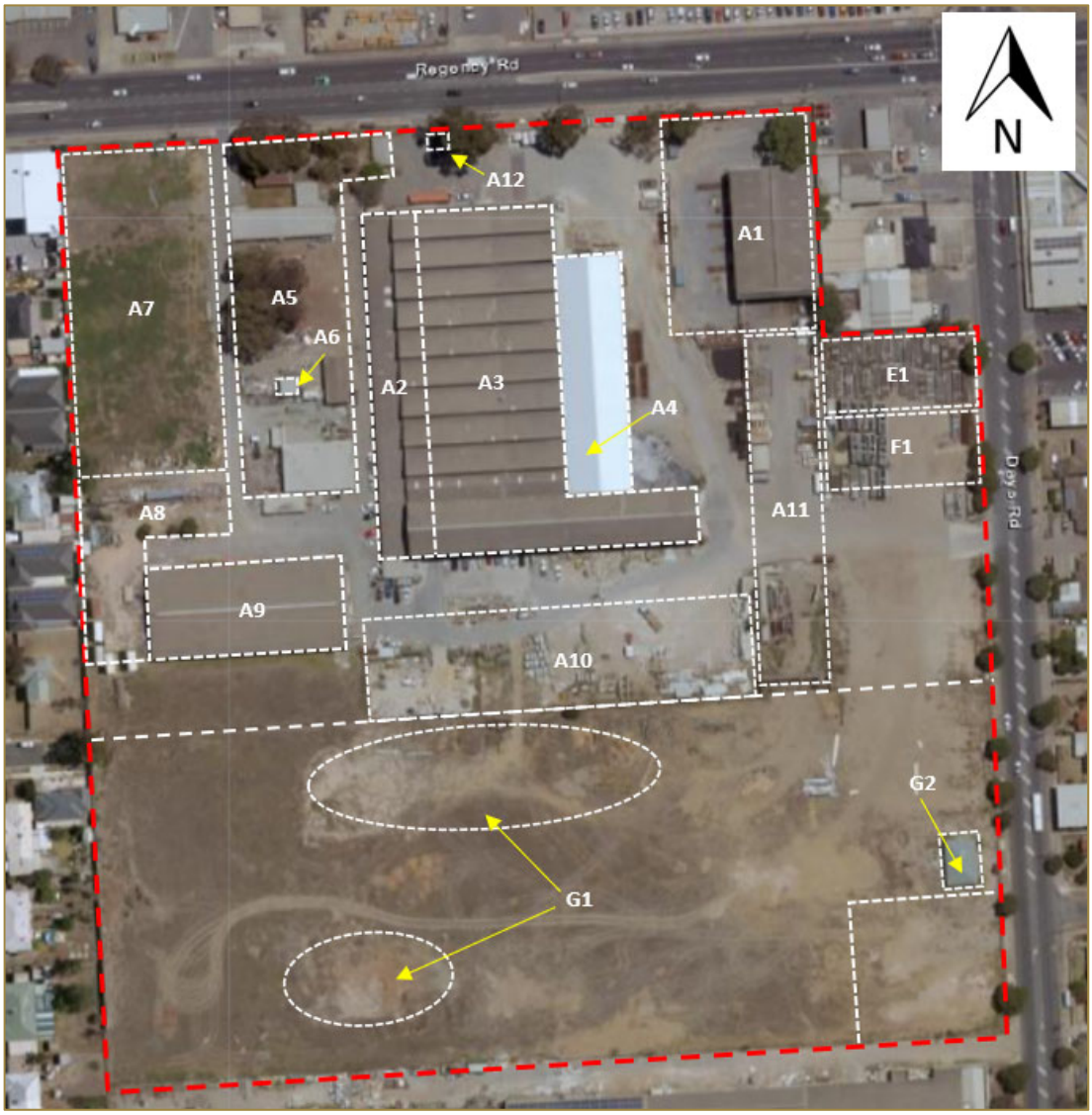

Figure 4: Site Use and Features Plan
Source: Location SA Viewer (DPTI 2019)

2.4 Surrounding Land Use

The general land use surrounding the site are detailed in Table 3.

Table 3: Surrounding Land Uses

Direction	Land Use
North	Light Industry Zone across Regency Road (Lai Industries, Yamaha Retro Spares, Terrain Tamers)
East	Retail facilities (supermarkets and restaurants) and residential properties across Days Road.
South	Light Industry Zone (Regency Building Supplies)
West	Primarily residential with a commercial allotment to the north-west

2.5 Local Geology

Information from the South Australian Resource and Information Gateway (SARIG, see Figure 5), indicates that soils in the vicinity of the site comprise silty clay and sand deposits of the late Pooraka Formation (Qpap) which containing carbonates of the Loveday Soil underlain by grey and red brown mottled clays (Hindmarsh Clay). These Quaternary aged sediments are underlain at depth by Tertiary aged sand, sandstone and limestone of the Port Willunga Formation.

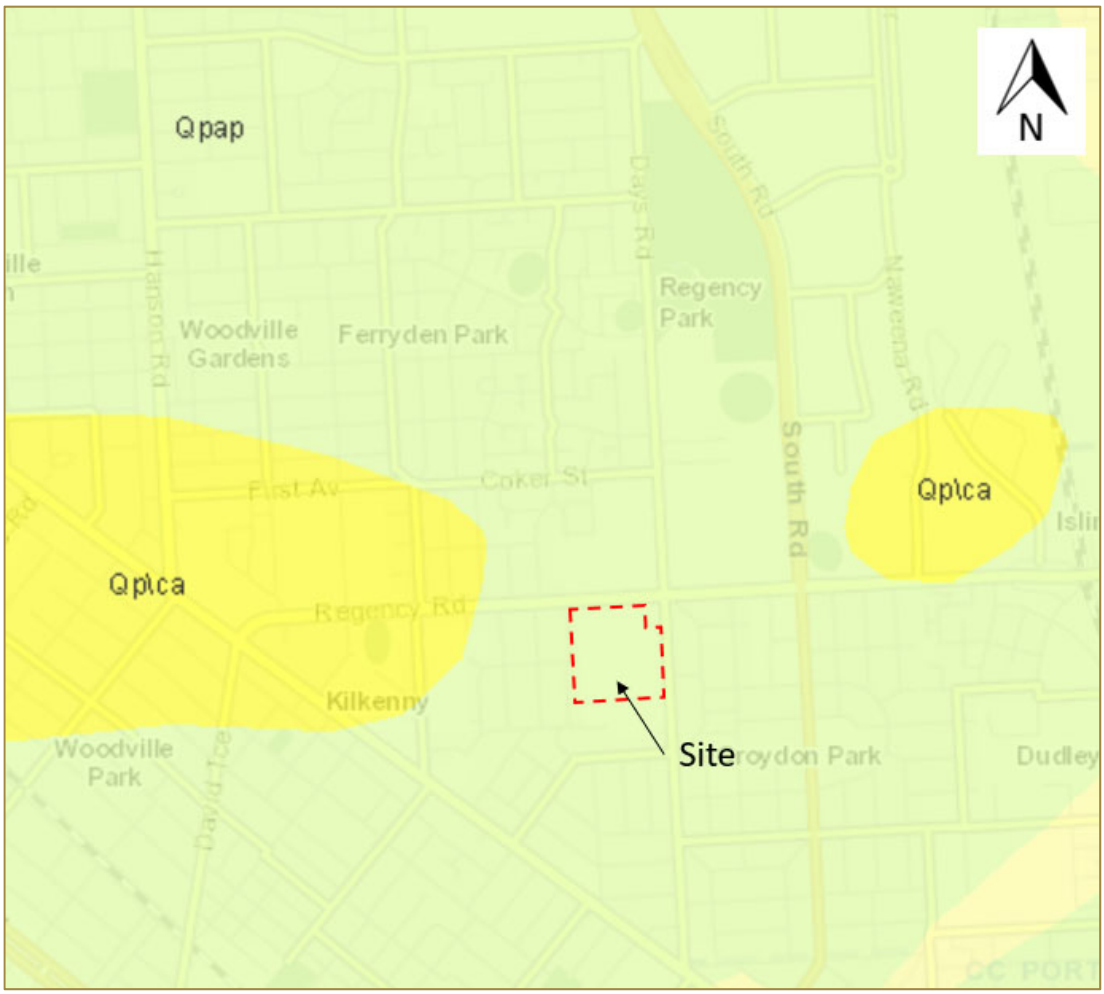

Figure 5: Local Geology
Source: SARIG 2019

2.6 Local Hydrogeology

Groundwater information obtained from the Water Connect website (DEW 2019) indicates that there five wells on-site (the five wells drilled during this investigation). There are also 585 registered bores located within a 2 km radius of the site. Summary data for these bores are presented in Appendix C and presented in Figure 6.

Notable registered bore uses within 2 km of the site include the following:

- 126 domestic bores 27 of which are registered as operational. Three registered domestic bores (6628-16555, 6628-19459 and 6628-19523) are located within 500m of the site;

- 10 industrial use bores three of which are registered as operational;
- Six irrigational use bores none of which are registered as operational; and
- Two recreational use bores which have been backfilled.

The remaining bores are either registered for investigation or unidentified purposes.

Registered bores drilled within the Quaternary aquifer indicate an average SWL of 6.86 mBGL and average TDS of 2,475 mg/L. Groundwater flow within the local area is expected to the north-west.

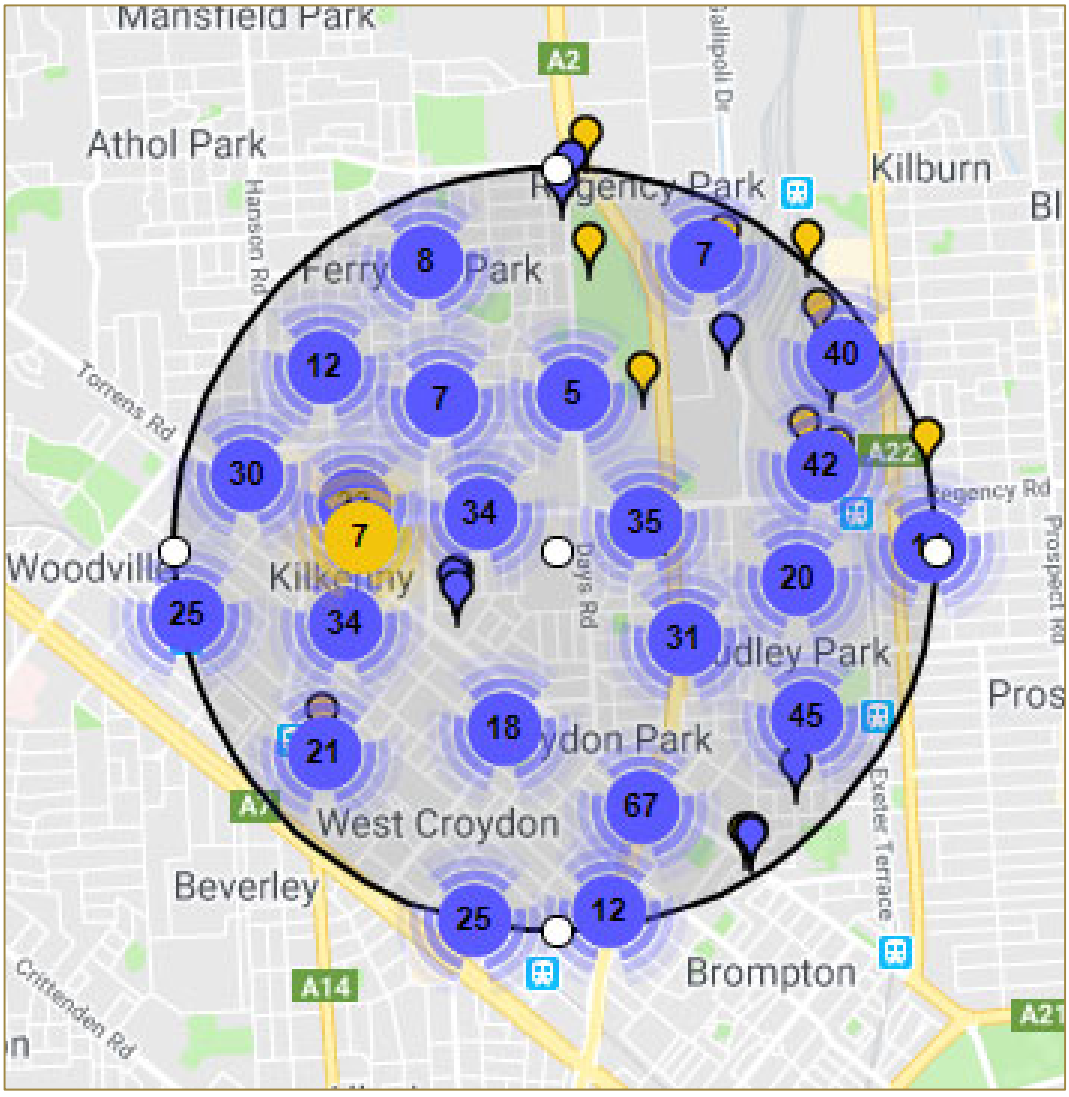

Figure 6: Local Registered Bores
Source: DEW 2019

2.7 Safework SA Dangerous Substance Licence Search

A search of the SafeWork SA database was requested for Lot A, E and F. A licence for the storage of an above ground, Class 2 (380 kg) gas cylinder is held for the site. The SafeWork SA response is attached in Appendix D.

2.8 Section 7 Searches and Public Register Information

A search of the SA EPA Public Register was completed for the site, under Section 7 of the Land and Business (Sale and Conveyancing) Act 1994 (SA Government 1994), which enable members of the general public to obtain site information relating to environmental protection.

Copies of the Section 7 searches (from both the local Council and the SA EPA) for Lot A, E and F is provided in Appendix D. The following has been regarding the searches:

- Available Council Section 7 searches have not identified information pertaining to potential environmental notices relating to Lots A, E and F;
- SA EPA Section 7 Search has identified a licence to produce waste of a prescribed kind for Lot A. The nature of this waste has not been established specifically. No notices were identified for Lot E and F.

2.9 SA EPA Site Contamination Index

A search of the SA EPA's Contamination Site Index (SA EPA 20149) was also undertaken to identify any site contamination notifications or reports held by the EPA pertaining to the site or nearby properties (sites registered under Audit). As summarised in Table 4, there are four sites in the Croydon Park area which are listed on the Index.

In addition, the listings also include six S83A notifications, which are notifications of actual or potential groundwater contamination under Section 83A of the Environment Protection Act 1993 (SA Government 1993).

It is noted that all of the identified properties are either down or across hydraulic gradient from the site with the exception of 61474 (1 Days Road) which is located approximately 830 m to the south (a considerable distance from the site). It is not expected that contamination is likely to be present at these properties which will impact soil and groundwater at the site.

Table 4: SA EPA Contaminated Site Index for Croydon Park

Notification #	Type	Allotment	Potentially Contaminating Activity	Location from the site
61471	Audit Notification	1 Days Road	Listed Substances (storage); Motor vehicle repair or maintenance; Transport depots or loading sites.	830 m to the south
60122	Audit Notification	83-95 Regency Road	Not recorded.	250 m to the west
61976	Audit Notification	1-2 / 342-346 Torrens Road	Fill or soil importation.	500 m south west
61488	Audit Notification	Lot 2 Regency Road and Lot 18 Goodall Avenue	Fill or soil importation; Metal coating, finishing or spray painting; Motor vehicle repair or maintenance; Printing works	550 to the west
61184 - 01	S83A Notification	107 Regency Road	Motor vehicle repair or maintenance	200 m to the west
60910 - 01	S83A Notification	83-93 Regency Road	Not recorded	200 m to the west
61611 - 03	S83A Notification	Lot 18 Goodall Avenue	Listed Substances (storage)	550 to the west
61611 – 01 & 61611 - 02	S83A Notification	Lot 2 Regency Road & Lot 18 Goodall Avenue	Fill or soil importation; Metal coating, finishing or spray painting; Motor vehicle repair or maintenance; Printing works.	550 to the west
62040 - 01	S83A Notification	Unit 1-2 342-346 Torrens Road	Fill or soil importation.	500 m south west

3.0 HISTORICAL INFORMATION

3.1 Ownership History

Titles for the site exist from the early 1900s. The land encompassing the site was owned by William Duthie, an Islington Dairyman. The land remained in the Duthie family until 1949, when the land was subdivided and a portion of the land encompassing the site was transferred to the Director of War Service Homes. Copies of historical titles have been provided in Appendix A including a tabulated history (Table A1).

3.1.1 CT 5451/741 (Lot A)

In 1954, a portion of the land owned by the Director of War Services Home was transferred to Forwood Down and Co Limited. Later that year, the land was transferred to Forwood Johns and Waygood Limited, who remained in possession until 1969, when the land was transferred to the South Australian Housing Trust.

The land was leased to J.R Tregoning Limited between 1969 and 1986, during which time (in 1985) the land was transferred to Malco Industries Limited (later known as Mallcap Corporation Limited).

In 1988, the land was subdivided, and Lot 102 was transferred to Malcolm Moore Engineering (S.A) Pty Ltd, who leased the site in 1999 to Malco Engineering Pty.

In 2001, the site was transferred to Adelaide Property Leasing Pty. Ltd. The site under lease to Orrcon Pty. Ltd was rejected in 2001 and a transfer of lease was lodged in 2004 to Ludowici Mineral Processing Equipment Pty. Ltd.

The site remains in the possession of the Adelaide Property Leasing Pty. Ltd under the current CT (5451/741).

3.1.2 CT 5421/933 (Lot E) and CT 5421/933 (Lot F)

In 1953, a portion of the land owned by the Director of War Services Home was transferred to Thomas Alfred Wilton and Stanley Reginald Foote, Bus Proprietors.

The land encompassing Lot E and Lot F was owned by Wilton and Foote Limited in 1955. In 1956 the land was transferred to Days Road Services Limited, who in 1975, leased the land to The Municipal Tramways Trust for a year, expiring 1976.

By 1981, Vincenzo Francesco Salvatore Alvino (Cartage Contractor) and his wife Grazia Alvino gained ownership of the land and, leased the site to John Edward Barlow for a period of 4 years (expiring 1985) and, later Croydon Auto Centre Pty Ltd in 1993 for two years (expiring 1995).

In 1997, the site was subdivided, and Lot E and Lot F were issued under separate titles and were transferred to Alvin Investments Pty. Ltd .In 2005, both allotments were transferred to Adelaide Property Leasing Pty. Ltd. and Mare Property Pty. Ltd, who remain in possession under the current CTs (5421/933 and 5421/934).

Copies of historical titles have been provided in Appendix A including a tabulated history (Table A1).

3.2 Review of Aerial Photographs

Historical aerial photographs were previously obtained from DEW (Mapland). A selection of these photographs taken at intervals of around ten years from 1949 (the earliest available photograph) were reviewed by Agon. Relevant historical aerial photographs (from 1949, 1959, 1969 and 1989) have been provided and summarised below.

A copy of the 1949 photograph showing the approximate outline of site (bordered in red) is presented as Figure 7 below.

Figure 7: 1949 Aerial Photograph
Source: DEW, Mapland

The 1949 photograph shows the site and general surrounding areas to be predominantly utilised for agricultural purposes (consistent title ownership history). Two rows of north-south oriented paddocks are present towards the west and a farm property is present to the south-east (within Lot H). Some low-density residential properties are present, off-site to the south-east.

The next earliest photograph available was taken in 1959. The main warehouse within Lot A has been established in this photograph. A building/warehouse is also present within Lot E and F with possibly car parking or open storage areas. The surface of the site appears to have been disturbed and roadways are visible throughout the site which may suggest in-filling activities. Residential properties have expanded off-site towards the west and east of the site. Off-site areas to the north appear to remain undeveloped and a large warehouse has

been established within the property previously identified as Pioneer Concrete (now Regency Building Supplies).

A copy of the 1959 photograph showing the approximate outline of site (bordered in red) is included as Figure 8.

The 1959 and 1969 aerial photograph (Figure 9) shows what appears to be additional warehousing towards the north-west. The crane gantry is visible and further roadways and soils disturbances are visible throughout (suggesting likely infilling activities).

The site appears to be utilised for open air storage of materials, with materials visibly laid out in rows on the 1989 photograph, Figure 10 below. These materials could be associated with both on-site activities and activities associated with the property to the south, which was then operating as Pioneer Concrete. Further sheds/warehouses have been established within Lot A and the configuration observed is not dissimilar to present day.

Further aerial photography research was conducted using online sources from 2001 to the present day.

Imagery from 10 March 2000 shows that Lot G and H are relatively free of previously stored materials. The building east of Lot G (now abandoned) is visible. Likely in-filling activities are present within Lot G and H between 2000 until 2010 as shown by continued soil disturbances across the area.

Figure 8: 1959 Aerial Photograph
Source: DEW, Mapland

Figure 9: 1969 Aerial Photograph
Source: DEW, Mapland

Figure 10: 1989 Aerial Photograph
Source: DEW, Mapland

3.3 Previous Environmental Reports

A DSI was previously completed for Lot G and H (the southern portion of the site). This assessment consisted of the following scope:

- A review of relevant site history information to identify potentially contaminating activities (PCAs) which may have occurred at the site;
- Undertaking of an intrusive soil sampling programme across the site. A total of 40 soil sampling locations were excavated across Lot G and H;
- Soil samples were analysed for key contaminants of potential concern (COPCs) including heavy metals, polycyclic aromatic hydrocarbons and pesticide compounds;
- Results were compared against Tier 1 assessment criteria being NEPM HIL A, NEPM HIL D and NEPM EILs; and
- Development of a preliminary CSM.

Research suggests that the site was used for agricultural purposes up until around 1954, when the SA Structural Steel Fabrication Works began operations from the building to the north of Lot G. These operations used the Lot G and H to store materials until 1993, when it was acquired by DeLuca Pty Ltd. Since 1993, the Lot G and H has been vacant, although in around 2001, fill materials of unknown origin were imported, placed in stockpiles and spread across the site. Fill material not spread across the site remains in stockpiles in the middle of the site. This is consistent with the review of aerial photographs and recent site observations.

Soil analytical results were below the relevant residential land use criteria (NEPM A), with one exception: a lead result of 4,100 mg/kg, (which exceeds the residential criterion of 300 mg/kg). This result was identified within shallow fill soils at TP28 the approximate location of which has been shown in Figure 11 below.

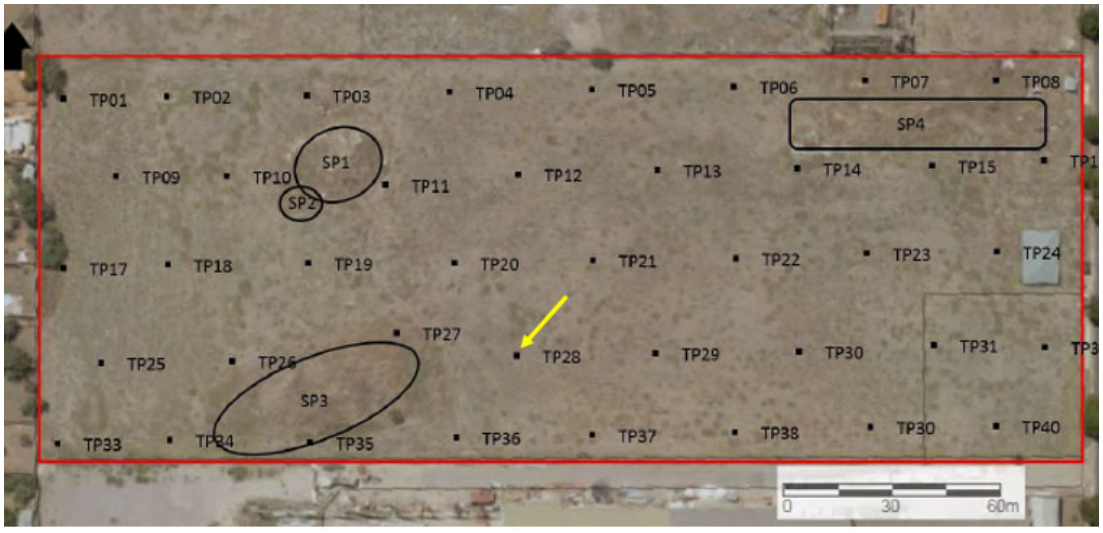

Figure 11: Location of lead exdeedance
Source: Agon (2016) JC0021/02

Lead results from across the site range from <5 mg/kg to 160 mg/kg, indicating this this result is an outlier, possibly caused by a small fragment of lead metal in the sample; as such, it is

not considered to be representative of contamination at the site. Some metal and other inclusions were observed occasionally within fill across the site.

Based on the data collected there is no evidence to indicate that soils present on site will preclude the use of the site for the proposed residential development. It is suggested that the site is re-zoned to allow residential development and that a soil management plan is prepared as part of the development process to facilitate the development.

In addition to this DSI, Agon also completed two environmental assessments within the following properties to the south of the site:

- SA Precast Equipment Holdings at 72 Days Road, Croydon Park identified as Lot N (Agon ref: JC0057P/01); and
- Regency Building Supplies at 76 Days Road, Croydon Park identified as Lot I, J and K (Agon ref: JC0057R/01).

These properties represent the majority of the southern extent of the proposed rezoning area. In both of these assessments, Agon conducted a detailed site history review which was supplemented by a soil analytical programme targeting similar COPCs. Notable features which could potentially contaminate the site are the presence of fuel storage in the following areas:

- An underground storage tank (UST) along the northern boundary of Lot N; and
- An above ground storage tank (AST) along the south-western portion of Lot K.

Soil chemical analysis of soils from both properties identified limited evidence for soil impacts. Notable detections included the following:

- Elevated lead concentrations in one fill soil sample within Lot 29 and another fill sample in Lot K;
- Elevated hydrocarbons (limited to fill materials) beneath a former concrete batching plant (above NEPM ESL) and within hydrocarbon stained soils within Lot K (above NEPM HIL A, HSL and ESL for TRH); and
- Detectable concentrations of OCPs (below NEPM HIL A criteria) within two fill samples and one natural sample.

Where detected, impacts was limited to fill soils and did not appear extensive nor was it substantial to indicate a non-trivial environmental threat to groundwater.

A groundwater well was previously located within Lot J as part of an Environmental Audit to the site adjoining Lot J to the west. The purpose of this well was to investigate potential groundwater impacts which could migrate from former fuel storage infrastructure west of Lot J. The Audit did not identify groundwater impacts which could pose a threat to groundwater beneath Lot J and adjoining properties (which includes the site).

3.3 Summary of Potentially Contaminating Activities

Based on our understanding of historical land use at and in the vicinity of the site, the following Potentially Contaminating Activities (PCAs) and Contaminants Potential of Concern (COPCs) have been identified, as described Table 5.

Table 5: Potentially Contaminating Activities

Identified Potentially Contaminating Activities (PCA)		Likely Contaminants of Concern (COPCs)
PCA01	Agricultural land use	Pesticide related compounds including organophosphate/organochlorine pesticide compounds and heavy metals in the form of copper and arsenic.
PCA02	Storage of steel and other materials used for steel fabrication	Heavy metals
PCA03	Storage of precast concrete panels and other materials used in their fabrication	Heavy metals
PCA04	Hydrocarbon leaks (fuels and lubricants) from: vehicles/mobile plant traversing the site or being parked on-site; the drum store within Lot A; hydraulic oils storage within the Raisebore facility within Lot A; from the UST and AST located at off-site locations adjacent to the south of the site.	Total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene and total xylene (BTEX) compounds and polycyclic aromatic hydrocarbons (PAHs).
PCA05	Leaks of insulating fluid from the on-site transformer	Polychlorinated biphenyls (PCBs)
PCA06	In-filling activities throughout the site including importation of fill of unknown origin.	Heavy metals and PAHs
PCA07	General storage of refuse across the sure	Heavy metals
PCA08	Use of asbestos containing materials (ACM) within site buildings, notably asbestos cement sheeting (Deep 6) on the roof of the primary building/warehouse in Lot A. Other buildings at the site are likely to have ACM present in building materials, including roofs, wall and infill panels, eaves and other applications.	Asbestos

4.0 FIELDWORK AND LABORATORY TESTING

4.1. Underground Services Location

Prior to the DSI fieldworks commencing, Dial Before You Dig (DBYD) plans were reviewed. Professional underground service location was completed across the areas to be investigated on 25 March 2019 prior to soil bore drilling activities and on 29 April 2019 prior to groundwater well drilling field activities.

4.2 Soil Assessment Methodology

The following methodology was undertaken across the site during the soil assessment fieldworks:

- Soil samples were recovered through 41 soil bores (BH01 to BH36 and BH38 to BH42) across accessible open areas across the site. Soil bores were drilled for the following purposes:
    - BH01 to BH36 were primarily utilised for assessing soil conditions up to 3.0 m at depth. Although most of these bores were spatially oriented for general coverage, some were utilised to target the features (see Table 6).
    - Five soil bores were drilled to a maximum investigation depth of 9.0 m and converted into groundwater monitoring wells (MW01 to MW05);
- The position of each soil investigation location was recorded using a handheld Global Positioning System (GPS);
- Drilling returns from the soil bores was used to backfill each individual soil bore and excess drilling spoil from the monitoring well construction was placed at a designated area on-site (within Lot G adjacent to existing stockpiles);
- Soil samples were typically collected at each investigation location from the surface (0-0.2m), sub surface (0.5m) and at one metre intervals and where changes in lithology were observed and visual/olfactory observations indicate the presence of contamination for submission of selected laboratory analysis (see Section 4.2);
- Soil returns were logged in accordance with the Unified Soil Classification System (USCS) and field screened for the presence of volatile organic compounds (VOCs) using a pre-calibrated photoionization detector (PID);
- All equipment used to collect soil samples (i.e. augers, hand trowels) was decontaminated between sample locations by removing soil, washing with a solution of Decon 90 (or similar), rinsing with potable water and then with distilled water;
- Soil samples were collected in new laboratory supplied containers and placed in a cooler with ice for transport under chain of custody procedures to the analytical laboratories; and
- Quality assurance/quality control samples were collected in the form of soil replicate samples and equipment rinsates.

Table 6: Targetted sampling bores

Soil bore ID	Feature
BH01	Active electrical transformer north of Lot A. Please note that this bore is located 3 m from the transformer for safety reasons.
BH05	Adjacent to the hydraulic oil storage area south of the Raisebore facility.
BH16 and BH18	Are located south and north (respectively) of the drum platform. The bores have been drilled as close as possible to the drum platform noting that the area is surrounded with refuse at the time of investigation.

4.3 Groundwater Assessment Methodology

The following methodology was undertaken across the site during the groundwater assessment fieldworks;

- Following drilling to the target depths as described above, the monitoring wells were with slotted 50mm PVC screen installed generally 2m below the depth of water cut and 1m above with slotted PVC casing to surface. The well annulus was backfilled with graded sand and bentonite, with wells finished with flush mounted gatic covers or standpipes where required;
- Following installation, the new wells were developed by removing water and purging the standing water column using a decontaminated stainless-steel bailer until a minimum of three well volumes were removed, and the produced water shows significant reduction in suspended sediment;
- A qualified surveyor surveyed the location of each new groundwater monitoring well (MGA coordinates), and the elevation of each well (to Australian Height Datum);
- Following at least seven days after installation to allow for stabilisation, the groundwater monitoring event (GME) was conducted at every new monitoring well. Initial groundwater sampling was undertaken at each well on 8 May 2019 with additional sampling conducted at MW05 on 18 June 2019. Every groundwater well was gauged during both sampling events to confirm the presence of a groundwater mound within MW03;
- Each groundwater monitoring well was gauged for depth to water, total depth and depth to LNAPL (none identified) from a clearly marked and designated point at the top each well casing using an interface probe (IP). The IP was decontaminated using a solution of Decon 90 (or similar), followed by rinsing in potable water between locations;
- Monitoring wells were purged and sampled using a low-flow flow sampler with dedicated (single-use) pump bladders and tubing. Groundwater was purged until groundwater quality parameters stabilised and sampled thereafter;
- Purged groundwater was disposed of in a designated area;
- Groundwater samples were collected in new laboratory supplied containers and placed in a cooler for transport under chain of custody procedures to the analytical laboratories;

- Quality assurance/quality control samples were collected in the form of a groundwater replicate sample, trip and equipment rinsate blanks.

4.2 Laboratory Testing

Laboratory testing of soil and groundwater samples was completed in general accordance with the NEPM for the following analytes:

4.2.1 Soil Analytical programme

Selected fill and natural soil samples were analysed for a selection heavy metals, TRH, BTEX compounds and PAHs. Soils were also analysed for the following analytical screens:

- NEPM HIL Screen for assessing general site suitability of selected soils;
- NEPM EIL Screen for establishing EIL calculation parameters;
- SA Waste Screen for assessing general soil disposal classification; and
- Semi-volatile and volatile organic compound (SVOC/VOC) screen for general identification of hydrocarbon-based contaminants in soil.

Soil replicate and equipment rinsate samples were analysed for heavy metals, being the primary contaminant of concern in site soils.

4.2.2 Groundwater Analytical programme

Groundwater samples were analysed for heavy metals, TRH, BTEX compounds, PAHs and an SVOC/VOC screen. Groundwater was also analysed for a cation/anion screen to establish groundwater hydrochemistry and source identification.

A groundwater replicate samples was analysed for heavy metals, TRH, BTEX compounds, PAHs. A trip blank was analysed for TRH C6-C9 and an equipment rinsate was analysed for heavy metals.

4.3 Analytical Laboratories

All soil and groundwater primary and intra-laboratory replicate (duplicate) sample analysis was undertaken by Eurofins mgt (Eurofins) and all soil and groundwater inter-laboratory replicate (triplicate) sample analysis was undertaken by Envirolab Laboratories (Envirolab). Eurofins and Envirolab are National Association of Testing Authorities (NATA) accredited for all requested analyses.

5.0 GROUND CONDITIONS ENCOUNTERED

5.1 Site Specific Geology

The site is underlain by a generally narrow band of granular type fill either in the form of sandy gravels or gravely sands similar to imported-quarry sourced material. Other notable fill materials which were logged underneath the site were:

- A layer of ash, clinker and/or slag were logged at BH03, BH05, BH08, BH035 and BH41. These layers are distinctly black;
- Gravely sand materials with ash and cinder were identified at BH24;
- Reworked natural materials were identified at BH16, BH21 and BH23. Of note, BH16 was identified with black staining but without observable odours.

Fill was identified at every soil bore excluding BH25 to BH27. These bores correspond to an area within Lot A which appears to be previously undisturbed/undeveloped. Fill thicknesses were delineated at every soil bore location excluding BH30 and BH36. Due to the presence of stored equipment, these locations were drilled manually with a hand auger to refusal at 0.5 m and 0.2 m respectively.

Natural soil materials underlying fill were logged as either sandy clays or clayey sands of the Pooraka Formation to the maximum investigative depth of 9.0 mBGL. Of note, areas of the site which were identified with little disturbance or no fill (particularly BH25 to BH27) were logged with desiccated and fissured clays (indicating dry soil conditions).

Field screening results were below background concentrations (less than 10 ppmv) and did not indicate the presence of volatile compounds in site soils.

Overall, evidence for potential soil contamination were limited to ash, cinders and/or slag at BH03, BH05, BH08, BH24, BH35, BH41 and black stained soils at BH16.

The location of every soil sampling location is shown in Figure 12, with the aforementioned areas of potentially contaminated fill identified. Soil bore logs have been provided as Appendix H.

AGON ENVIRONMENTAL

Client: Salandra Group
Site: Croydon Park DSI
Location: 121 Regency Road

REF# JCC361 Drafted CE
REVISION A Dated 05/07/2019

Legend

- Soil Sampling Location
- Site Boundary
- Internal Title Boundaries
- Location of potentially contaminated fill

Figure 12: Sample Location Plan

N

0 80 m

Approximate scale (m).

5.2 Site Specific Hydrogeology

Groundwater gauging data and field water quality measurements collected during the groundwater sampling events are provided in Appendix F as Table F1. Groundwater gauging data has been summarised as follows:

5.2.1 Groundwater Gauging Results

Groundwater gauging data collected during the groundwater assessment period has been summarised as follows:

- Non-aqueous phase liquids (NAPL) were not observed during the gauging and development undertaken at each well during the GME event;
- Depth to standing water levels (SWLs) and groundwater elevations across the area of investigation were measured within the following ranges.

Table 7: Groundwater Gauging Results

Gauging Event	SWL range	Groundwater Elevation Range
1 May 2019	6.072 mbtoc (MW05) to 7.096 mbtoc (MW02)	2.549 mAHD (MW04) to 3.343 mAHD (MW03)
18 June 2019	5.904 mbtoc (MW05) to 6.591 mbtoc (MW02)	2.721 mAHD (MW04) to 3.485 mAHD (MW03)

Both gauging events confirm the presence of a groundwater mound currently centred around MW03. This mound could be attributable to the following:

- MW03 is located within a portion of the site which appears previously undeveloped (east of soil bores BH26 and BH27). Clays within this portion of the site have been logged with fissures. As the general surrounding area is either under hardstand or compacted fill, it is possible that this area may be acting as a local groundwater recharge location which explains the observed groundwater mound; and
- A stormwater pipe is present along the northern boundary of Lot G. Potential leaks from this pipe could be sufficient to elevate groundwater locally.

5.2.2 Inferred Groundwater Flow

Groundwater flow characteristics interpreted during the current investigation have been summarised as follows:

- Hydraulic conductivity measurements for groundwater beneath the site range between 1 x 10^{-8} to 1 x 10^{-4} m/day (Domenico and Schwarz, 1994)
- An effective porosity of 0.34 (Morris and Johnson, 1967) has been assumed in keeping with sandy clay aquifer beneath the site;
- The groundwater gradient beneath the site was calculated between MW03 to the following wells (based on the latest groundwater gauging results):
    - 2.39 x 10^{-3} towards MW01;

- 5.00 x 10^{-3} towards MW02;
- 3.52 X 10^{-3} towards MW04; and
- 2.97 X 10^{-3} towards MW05.

Agon has calculated an average groundwater flow gradient of 3.47 x 10^{-3} based on a radial groundwater flow from MW03. Based on the above groundwater parameters, the radial groundwater flow interpreted beneath the site ranges from 1.02 x 10^{-10} to 1.02 x 10^{-6} m/day. This is consistent with the low-yield of the aquifer observed during groundwater sampling.

An inferred groundwater flow gradient map based on the latest round of gauging is presented as Figure 13.

5.2.3 Field Groundwater Quality

Field groundwater quality data ranges have been summarised below:

- Dissolved oxygen (DO) values range between 2.86 mg/L (MW04) to 5.45 mg/L (MW01) indicating low to average DO values;
- Redox Potential (Eh) values ranged between 182.3 mV (MW05) to 219.7 mV (MW02) indicating an aerobic groundwater environment;
- pH values range between 7.26 (MW04) to 7.62 (MW05);
- Electrical conductivity (EC) values range between 2,136 us/cm (MW05) to 3,608 us/com (MW03). This results to calculated total dissolved solids (TDS) value between 1,388 mg/L (MW05) to 2,345 mg/L (MW03). This range is consistent with TDS ranges reported within surrounding registered bores;
- Temperatures ranged between 19.3°C (MW03) and 20.9°C (MW04).

Groundwater parameters are typical of groundwater within the area of investigation. Evidence for the presence of gross contamination in groundwater, such as odours and discoloration, was not observed during any of the groundwater sampling events.

5.2.4 Groundwater Source Chemistry

As part of the current assessment, an anion and cation analytical assessment has been undertaken for each groundwater sample collected from the site. The result of this assessment has been plotted in a trilinear Piper Plot (Appendix G) and are summarised below:

- Groundwater beneath the site is of a mixed type hydrochemical facies composed of a sodium-potassium type cation and bicarbonate type anion waters;
- There is minimal spatial variance regarding the position of each groundwater sample within the Piper Plot Diagram; and
- The results of the Piper Plot Diagram suggest that groundwater beneath the site are from a common source (i.e. the same aquifer).

Results of the cation/anion assessment show consistency in hydrochemical parameters across the site and is likely representative of regional groundwater conditions.

Figure 13: Inferred Groundwater Flow Direction

6.0 TIER 1 SCREENING ASSESSMENT

Tier 1 screening assessment criteria were selected with consideration of the site conditions and the proposed land use to from light industrial as mixed use.

The criteria presented below are generic Tier 1 risk-based screening criteria. The screening assessment criteria are for comparative purposes only and should not be regarded as "clean-up" levels. Where concentrations of a COPC exceed the generic assessment criteria, then further consideration of the specific exposure pathway is required which may warrant further investigation, assessment or the development of a strategy to mitigate the potential risks identified.

6.1 Soil Assessment Framework

The soil screening criteria have been derived on the basis of conservative assumptions relating to land use, receptor behaviour, and site soil characteristics as follows:

6.1.1 Human Health Screening Criteria

Noting that site design has not been established, Agon has considered every site scenario which can be considered as part of the site's zoning amendment. Within the body of this report soil analytical results have been discussed against the following ASC NEPM (NEPC 2013) Health Investigation Levels (HILs) criteria:

- HIL A – Low Density Residential;
- HIL B – Medium to High Density Residential
- HIL C – Recreational; and
- HIL D – Commercial/Industrial.

Due to the lack of comparable TRH fractions, a comparison of results to ASC NEPM Health Screening Levels (HSLs) (derived from CRC CARE HSLs (CRC CARE, 2011)) for vapour intrusion for further evaluation of potential risks to human health resulting from intrusion of hydrocarbon vapours emanating from soil impacts at the site have not been undertaken.

To assess the top 2 metres of soils for potential effects of petroleum hydrocarbons associated with formation of LNAPL, fire and explosives hazards and effects on buried structures, the ASC NEPM (2013) Management Limits for TRH have been adopted.

A comparison of soil analytical results against human health screening criteria has been included in Appendix F as Attachment F2.

6.1.2 Ecological Screening Criteria

The ASC NEPM (NEPC 2013) requires consideration of Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) on sites (relevant to soils that will be within 2m of the surface). Soil data from the top 2m was also compared to these EILs and ESLs and site-specific data collected to determine site specific EILs with calculations presented in Appendix

H and summarised below. In both cases the urban/recreational and commercial and industrial criteria have been adopted.

6.1.3 EIL Calculations

In order to evaluate the potential impact of identified potentially contaminating activities (PCAs) on soil with respect to ecological receptors, the ASC NEPM approach has been followed to establish site-specific EILs.

Key soil characteristics for EIL calculation have been derived from three soil natural soil samples inferred to be within a background location. The average values for each of these parameters are presented in Table 8 below.

Table 8: Average EIL Parameters

Average EIL parameter values				
Iron %	**Clay %**	**pH**	**CEC (meq/100g)**	**Carbon Content %**
2.9	11.8	7.9	24.6	0.3

Based on these EIL parameters, Agon calculated each EIL value using the NEPM EIL worksheet (Appendix H) the results of which have been summarised in Table 9.

Table 9: Calculated EIL Screening Criteria

Adopted EIL screening criteria (mg/kg)								
EIL Segment	**Arsenic**	**Copper**	**Chromium III**	**Lead**	**Nickel**	**Zinc**	**DDT**	**Naphthalene**
Urban	100	230	440	1100	310	880	180	170
Commercial/ Industrial	160	330	720	1100	530	1300	180	170

In each case, the EIL value for 'aged' contaminants have been selected as the most representative ecological screening criteria.

6.1.4 Preliminary Soil Disposal Criteria

For the purposes of establishing potential off-site disposal classification, soils have been compared against the SA EPA WDF criteria. Please note that these criteria are not an indication of site contamination but rather to assess soils for importation or landfill disposal suitability.

6.2 Groundwater Assessment Framework

The South Australian Environment Protection Authority (SA EPA) previously issued the Guidelines for the Assessment and Remediation of Site Contamination (the 'GAR') on October to describe the legislative and policy approach to risk-based assessment and remediation of site contamination in South Australia.

This guideline supports the Objects of the Environment Protection Act 1993 and provides information to assist consultants and auditors to adopt a consistent and compliant interpretation of relevant legislation, policy and guidance. This guideline also provides information to ensure the assessment and remediation of site contamination is conducted to an appropriate standard in South Australia.

In order to establish whether there is actual or potential harm to groundwater (that is not trivial) exists, the GAR requires site-specific environmental values (EVs) to be established. EVs have been developed using the following process:

- Application of Table 3 of the Environment Protection (Water Quality) Policy 2015 (WQEPP) based on the TDS range of the groundwater beneath the site;
- Assess and identify surface water bodies within the 2km of the site;
- Conduct a registered bore search (See section 2.6) within a 2 km area around the site and identify relevant uses with respect to the GAR; and
- Application of an SA EPA recognised criteria for the most sensitive EV.

Agon have conducted a site-specific EV determination in-line with the requirements of the GAR as follows:

6.2.1 Determination of EV using TDS Values

Groundwater beneath the site has been reported with a TDS range between 1,388 to 2,345 mg/L based on field groundwater quality measurements. For the purposes of this determination, Agon has selected 1,388 mg/L as the representative TDS value to ensure a conservative approach is utilised. This value lies with segment B of WQEPP Table 3 which defines an EV in protection of Primary Waters for the following:

- Irrigation and general water use;
- Livestock drinking water;
- Aquaculture and general consumption of aquatic foods.

6.2.2 Protection of Surface Waters

The closest water body (significant or otherwise) from the site is the Torrens River (Karrawirra Parri) located approximately 3.6 km south of the site. This distance is in excess of the 2 km buffer distance required by the GAR for determining whether EVs for Aquatic Ecosystems (fresh and marine) and Recreational (non-domestic) are relevant for consideration.

6.2.3 Registered Groundwater Bore Search

A review of registered groundwater bores has been previously conducted in Section 2.5. This search has previously identified registered bores to be utilised for domestic, industrial and irrigational use. 27 domestic bores and 1 industrial bore are currently reported as operational.

6.2.4 Determination of Applicable Environmental Values

Based on a review of TDS values, registered groundwater bores and location of surface water bodies, Agon have determined the following environmental values to be applicable to the site (in order of sensitivity):

- Potable/Drinking Water;
- Recreational and aesthetics;
- Primary Industries – Agriculture and Aquaculture; and
- Industrial.

The likelihood of impacts to each EV has been determined in Table 10 below:

Table 10: Environmental Values Assessment

Environmental Value (EV)	Likelihood of Impact to EV	
	Current	**Potential**
Potable/Drinking Use	**Unlikely** (onsite) **Likely** (offsite)	**Unlikely**
Onsite: Currently not occurring. Future potable use of groundwater onsite is possible but unlikely based on low yield and availability of reticulated water. **Offsite:** Current or future extraction for potable use is possible based on the presence of registered domestic wells within 2 km of the site. However, offsite potable use is considered unlikely based on the low yield and availability of reticulated water.		
Recreation Use/ Aesthetics (surface water discharge)	**Unlikely** (onsite) **Unlikely** (offsite)	**Unlikely** (onsite) **Unlikely** (offsite)
Onsite: No surface water bodies on site nor anticipated. **Offsite:** The nearest surface water body to the site is River Torrens, 3.6 km south of the site. Groundwater connectivity with River Torrens is unlikely.		
Recreation Use/ Aesthetics (extractive/ swimming pools)	**Unlikely**(onsite) **Possible** (offsite	**Possible**
Onsite: Currently not occurring. **Offsite:** Current or future extractive use for recreational purposes (i.e. to fill swimming pools) on site and within the vicinity of the site is possible due to the presence of registered groundwater domestic and recreational wells within 2 km of the site.		
Agriculture (domestic irrigation)	**Unlikely** (onsite) **Possible** (offsite)	**Unlikely**
Onsite: Currently not occurring. Future extractive use for domestic irrigation onsite is possible based on salinity TDS 1,388 mg/L. However, onsite domestic irrigation use is considered unlikely based on low yield and availability of reticulated water. **Offsite:** Current and future extraction for domestic irrigation within the vicinity of the site is possible due to the presence of domestic and irrigation bores located offsite. Unregistered bores may have historically used groundwater for this purpose; therefore, this use may be possible in the future. However, offsite use of groundwater for domestic irrigation is considered unlikely based on low yield and availability of reticulated water.		
Agriculture (irrigation/ stock/ aquaculture)	**Unlikely**	**Unlikely**
Onsite: Currently not occurring. Future extractive use for agriculture is unlikely due to the availability of mains water, low yield and land use. **Offsite:** Current and future extractive use of groundwater for agriculture is unlikely due to the availability of reticulated water, low yield and land use.		
Industrial Use	**Unlikely** (onsite) **Possible** (offsite)	**Unlikely** (onsite) **Possible** (offsite)
Onsite: Currently not occurring. Future extractive use for industrial use is unlikely due to the availability of reticulated water, low yield and land use. **Offsite:** Current and future extractive use of groundwater for industrial use is possible due to the presence of industrial wells offsite within a 2 km of the site.		

Based on the GAR's process, the following EV's and prescribed protection criteria have been applied to groundwater beneath the site:

Table 11: Environmental Values Selected

EV	Adopted Criteria
Drinking Water	ADWG – NHMRC, NRMMC (2011)
Recreation and Aesthetics	GMRRW – NHRMC (2008) WHO (2017)
Primary Industries - Agriculture	AWQG – ANZECC & ARMCANZ (2000)

The following should be noted regarding the selected groundwater criteria:

6.2.5 Recreation and Aesthetics Criteria

Both the NHMRC 2008 (where it supersedes the ANZECC 2000 criteria) and the ANZECC 2000 (where NHMRC, 2008 are not available) have been the previous main source of Primary Contact Recreation criteria.

The GAR specifies primary contact recreation indicators and objectives using the NHMRC published values (NHMRC Guidelines for Managing Risks in Recreational Groundwater 2008 (NHMRC, 2008)) which in turn are derived from NHMRC 2004 Australian Drinking Water Drinking Guidelines (ADWG, 2004) which since been superseded in 2011 (ADWG, 2011).

Criteria have therefore been derived from NHMRC 2008, the values of which have been based on ADWG, 2011 health-based drinking water and aesthetic criteria.

6.2.6 Industrial Criteria

It should be noted, that assigning objectives for industrial use is difficult due to specific and variable uses by each industry type. However, criteria protective of Agricultural Irrigation and should be adequately protective of most of the industrial groundwater uses within the subject area (should it occur).

The adopted criteria been summarised and compared against relevant groundwater results in Table F5, Appendix F.

7.0 ANALYTICAL RESULTS

7.1 Soil Screening Assessment

Soil analytical results are presented in the Table Appendices (Tables F2 to F4). Chain of custody documentation and laboratory certificates of analysis are presented in Appendix I.

7.1.1 Human Health and Ecological Screening Assessment

Table 12 below summarises soil chemical concentrations in excess of either human health or ecological screening criteria.

Elevated concentrations of contaminants exceeding the either human health or ecological screening criteria are primarily localised in shallow fill soils or is located within natural soils adjacent to fill material. In cases such as in sample BH03 0.2-0.3 and BH16 0.2-0.4, elevated results are attributable to observed soil inclusions (ash, cinders and staining). In most cases, contamination reported within fil, lacking visual not olfactory evidence of impact. Where identified, reported soil contamination has bene delineated at depth.

It should be noted that of the contaminants detected, the primary detection is in the form of lead in fill which is consistent with the previous findings from reports at Lot G and adjoining off-site properties to the south. It is likely that the source of granular fill within the entire industrial precinct is from a similar source.

On specifically targeted soil assessment locations, the following has been established:

- PCB concentrations were not identified at BH01; i.e., there is no indication that leaks of insulating oil have occurred from the transformer on-site; and
- Hydrocarbon concentrations were not identified at BH05, BH16 and BH18 which indicates that leaks from noted hydrocarbon sources (Raisebore's hydraulic oil storage area and drum platform) are unlikely.

Remaining soil concentrations of potential contaminants are below the laboratory limit of reporting (LOR) or at detection levels below relevant human health or ecological screening criteria.

Table 12: Soil Samples exceeding human health or ecological screening criteria

Sample	Analyte and Concentrations	Human Health Screening Criteria Exceeded				Ecological Screening Criteria Exceeded				Soil Type	Comments
		NEPM HIL Criteria				ESL		EIL			
		A	B	C	D	Urban Residential	Commercial Industrial	Urban Residential	Commercial Industrial		
BH03 0.2-0.3	Lead (500 mg/kg)	x								Ash and cinder fill	Lead has not been delineated at depth. Benzo(a)pyrene has been delineated at 0.4-0.5 m in depth within natural soil. Concentrations attributable to ash and cinder inclusions.
	Benzo(a)pyrene TEQ (7.6 mg/kg)	x	x	x	x	x	x				
BH05 0.0-0.1	Lead (2,200 mg/kg)	x	x	x	x			x	x	Sandy gravel fill	Lead delineated to 0.2-0.3 m in depth within underlying fill. TRH has not been delineated but is likely localised in fill material.
	TRH > C10 to C16					x					
BH07 0.4-0.6	PCBs (2.1 mg/kg)	x	x	x						Gravelly sand fill	PCB delineated to 0.9-1.0 m in depth within natural soils.
BH10 0.0-0.1	Lead (2,500 mg/kg)	x	x	x	x					Sandy gravel fill	Lead and zinc concentrations delineated to 0.4-0.5 m within natural soils
	Zinc (5,400 mg/kg)							x	x		
BH12 0.4-0.5	Lead (1,200 mg/kg)	x		x				x		Natural clayey sand	Lead concentrations delineated to 0.9-1.0 m.
BH16 0.2-0.4	Lead (6,300 mg/kg)	x	x	x	x			x	x	Sandy clay fill	Lead, manganese and zinc concentrations delineated to 0.5-0.6 m in depth within natural soils. These impacts are likely attributable to black stained soils logged within the fill material.
	Manganese (12,000 mg/kg)	x									
	Zinc (2,400 mg/kg)							x	x		
BH18 0.0-0.2	Arsenic (110 mg/kg)	x						x		Sandy gravel fill	Arsenic and lead concentrations delineated to 0.4-0.5 m in depth within natural soils.
	Lead (320 mg/kg)	x									
BH24 0.4-0.5	Lead (600 mg/kg)	x						x		Sand fill	Lead concentrations delineated to 0.9-1.0 m in depth within natural soils.
BH40 0-0.1	Lead (500 mg/kg)	x								Silty sand fill	Lead concentrations delineated to 1.9-2.0 m in depth within natural soils.
	Zinc (1,700 mg/kg)							x			
BH41 0.1-0.3	Benzo(a)pyrene (1.4 mg/kg)					x	x			Natural clayey sand	Benzo(a)pyrene concentrations delineated to 0.4-0.5 m in depth within natural soils.

Notes:
x = sample exceeds criteria

7.1.2 Soil Disposal Criteria

A comparison of soil analytical results against relevant soil disposal criteria has been presented as Table F4, Attachment F. The following chemical compounds were identified exceeding the Waste Fill criteria:

- **Arsenic** – within three fill samples at a maximum depth of 0.4 m;
- **Copper** – within six fill samples at a maximum depth of 0.5 m and one natural soil sample at BH12 0.4-0.5;
- **Lead** – within four fill samples at a maximum depth of 0.5 m and one natural soil sample at BH12 0.4-0.5;
- **Manganese** – within 11 fill samples at a maximum depth of 0.4 m and at two natural soil samples, BH05 2.9-3.0 and BH12 0.4-0.5.
- **Nickel** – within fill sample, BH03 0.2-0.3, and one natural sample, BH12 0.4-0.5;
- **Zinc** – within 21 fill samples at a maximum depth of 0.2 m and one natural sample BH12 0.4-0.5;
- **PCB** – within fill at sample BH07 0.4-0.6; and
- **Benzo(a)pyrene and PAHs** within one fill sample, BH41 0.1-0.3;

The following chemical compounds were identified exceeding Intermediate Waste criteria:

- **Lead** at BH05 0.0-0.1 and BH10 0.0-0.1; and
- **PAHs** at BH03 0.2-0.3.

Most notable are the following concentrations of chemical compounds in excess of the Low Level Contaminated Waste criteria:

- **Lead** and **manganese** at fill sample BH16 0.2-0.4; and
- **Benzo(a)pyrene** concentrations at BH03 0.2-0.3.

Remaining fill and natural soil samples have been reported with chemical concentrations below the Waste Fill criteria.

Not dissimilar to the human health and ecological screening assessment, exceedances to the soil disposal criteria are primarily reported within fill samples (regardless if there is an observable inclusion or evidence of impact). Without further analysis including statistical consideration, comparisons to the soil disposal criteria have demonstrated the following:

- The fill disposal category of fill soils beneath the site range from Waste Fill to above the Low-Level Contaminated Waste Criteria; and
- That natural soils are generally suitable for Waste Fill disposal. Natural soil material pre-classified for Intermediate Waste disposal was identified at three locations.

Overall, the results of the Tier 1 screening and waste classification assessment were similar to the results of the previous assessments on adjacent allotments.

7.2 Groundwater Screening Assessment

Groundwater analytical results are presented in the Appendix F (Table F5). Chain of custody documentation and laboratory certificates of analysis are presented in Appendices I and J respectively.

Concentrations of contaminants in groundwater were either below the laboratory LOR or below the applicable screening criteria. This excludes concentrations of chloride, sodium calcium carbonate, and sulphate at MW03.

Overall, chemical compounds were not identified at levels that would suggest that gross impacts are present within the underlying groundwater. A summary of groundwater results as they relate to site specific environmental values are presented below:

7.2.1 Potable or Drinking Water

The environmental value for Potable or Drinking Water refers to the use of groundwater for possible consumption at off-site registered domestic bores. Groundwater beneath the site was not identified with chemical concentrations which may pose a risk to this environmental value.

7.2.2 Recreation and Aesthetics

Primary contact recreation in this context refers to the use of groundwater to fill a swimming pool or spa. Reported analytical results indicate that chloride, sulphate, sodium and calcium carbonate results exceed screening criteria adopted for the protection of Primary Contact Recreation as a beneficial use.

The cited chemical species are not considered to be associated with anthropogenically sourced contamination and are more likely to be representative of regional aquifer characteristics.

Observed chloride, sulphate, sodium, and calcium carbonate concentrations are considered naturally occurring based on their reported consistency within the underlying aquifer and the lack of potential source(s) (on and off-site) for these compounds. Agon also notes that chloride, sulphate, sodium and calcium carbonate are not considered COPCs and are routinely utilised to establish the hydrochemical facies of groundwater (as they are considered common throughout the natural environment).

7.2.3 Primary Industries - Agriculture

The environmental value of Agriculture refers to the potential use of groundwater for irrigation. Groundwater beneath the site was not identified with chemical concentrations which may pose a risk to this environment value.

7.2.4 Industrial Use

In the absence of an environmental criteria for industrial use, the environmental value for agricultural was adopted. Similar to the environmental value of for agriculture, chemical concentrations are not present beneath the site which may pose a risk to the environmental value of industrial use.

8.0 QUALITY ASSURANCE QUALITY CONTROL

8.1 Soil Quality Control

Field QC duplicates and field QC triplicates were collected and analysed during the soil investigation. Duplicate and triplicate samples were identified sequentially and as a "QC sample" but were not marked duplicate/triplicates samples relating to specific primary samples. Field soil duplicates and triplicates collected and the respective analytical schedule for each are summarised in Table 13 below. Results are presented in soil analytical tables in Appendix F.

Table 13: Field soil duplicates and triplicates

Primary Sample	Table Header	Table Header
BH02 0.9-1.0	QC03	QC03A
BH07 0.4-0.5	QC05	QC05A
BH39 0-0.2	QC19	QC19A
BH41 0.1-0.3	QC16	QC16A

Precision of analytical techniques is measured by the relative percent difference (RPD) between replicate results. However, for field replicates there is no universally accepted method for comparing results. This is mainly due to the high likelihood for heterogeneous analyte distribution within the sample; hence, results can only be reviewed qualitatively. In-line with the requirements of the ASC NEPM, acceptance value of 30% was applied for field replicate RPD calculations.

The calculated RPDs were acceptable for the majority of primary and replicate soil samples with the exceptions of some metal species between each inter-laboratory sample and corresponding primary sample. These elevated RPDs are not expected to affect the integrity of the results and are caused by low analyte concentrations exaggerating the percentage differences with respect to small total concentration differences and the particulate nature of metals in soils causing variations in RPDs from the distribution of these contaminants within the highly disturbed soils. In each case, the highest concentration has been adopted (as a conservative measure) as the representative sample.

8.2 Soil equipment rinsate samples

A total of 4 equipment rinsate samples were collected and analysed for a range of metals, TRH and BTEX during soil sampling activities. Results of this analysis is provided in Appendix F (Table F6):

Concentrations of most analytes were below detection limits excluding:

- Toluene at QC02 and QC08;
- Boron at QC15 and QC18.

Agon have investigated the nature of these detections (including discussions with the laboratory who supplied the deionised water for rinsate collection). It is likely that these

chemicals are attributable to the deionised water utilised. The laboratory has confirmed that some batches of deionsed water during the assessment period has been reported with similar types of chemicals. This should not affect the reliability of the result of the soil analytical programme as boron has not been confirmed as a contaminant of concern and toluene was not reported in site soils.

8.3 Groundwater Quality Control

One QC replicate pair (QC22 and QC22A from MW04) was were collected and analysed during the groundwater investigation. These samples were identified sequentially and as a "QC sample" but were not marked replicate samples relating to specific primary samples. Results of this analysis is presented in Appendix F (Table F5).

The calculated RPDs were acceptable for all primary and duplicate/triplicate groundwater samples.

These elevated RPDs are not expected to affect the integrity of the results and are caused by low analyte concentrations exaggerating the percentage differences with respect to small total concentration differences. The highest concentration has been adopted (as a conservative measure) as the representative sample.

8.4 Groundwater Equipment Rinsate and Trip Blank Samples

One equipment rinsate blank (QC21) was collected and analysed for metals analysis during the groundwater investigation works. Concentrations of all requested analytes were reported below the laboratory LOR.

8.5 Laboratory Quality Control

Accuracy of laboratory QC results (laboratory control samples, matrix spikes and surrogates) is measured by percentage recovery (%R) of known additions. Acceptance targets for laboratory control samples and matrix spikes is generally between 70% and 130% recovery for organics and 80-120% recovery for metals (APHA 1992), however acceptable accuracy for certain methods may exceed these limits (USEPA 1986). Acceptance targets for surrogates are between 80% and 120% recovery for organics. It should be noted that matrix dependant QC methods (matrix spikes, surrogates) can be affected by the matrix; hence these %R results have been reviewed qualitatively.

Laboratory QC analytical results are presented in Appendix J and summarised below:

- All target analytes in the analysis blank samples, were below the laboratory LOR;
- RPDs for all analytes in duplicate samples were within the laboratory acceptance criteria;
- Laboratory internal standards, calibration blanks and mid-range calibration verifications were acceptable; and
- All spike recoveries were within the acceptable limits.

Agon considers that the laboratory QC results are acceptable for the purposes of interpreting and verifying the primary analytical results of the soil and groundwater investigation.

9.0 CONCEPTUAL SITE MODEL

9.1 Introduction

A Conceptual Site Model (CSM) is an integral part of the site assessment process and requires a detailed description of the site conditions history, geology, hydrogeology, sources of contamination, and potential exposure pathways by which the actual or potential site contamination may reach and impact on receptors.

9.2 Ground Conditions

A review of available information, including bore logs indicate that site geology/hydrogeology can be summarised as follows:

- 0-0.5 mBGL of granular sand-type fill, sometimes incorporating inclusions of various materials including ash, cinders and black staining.
- 0.5 mBGL to around 9 mBGL, natural clays and sands of the Pooraka Formation.
- Groundwater (upper Quaternary Aquifer) around 6.5 mBGL within a sandy clay formation. Groundwater flow is interpreted in a radial direction from MW03 at a seepage velocity of from 1.02 x 10^{-10} to 1.02 x 10^{-6} m/day.

9.3 Identified Sources of Contamination

The principal source of contamination identified at the site was the underlying fill material. This includes fill material logged with ash, cinder and stained inclusions and shallow natural materials adjacent.

Fill and some shallow natural materials have bene identified with localised zones of impacted material in excess of a range of residential, recreational and commercial/industrial guidelines. These exceedances are primarily in the form of metals, in particular lead. Fill has also been identified with aesthetic issues (ash, cinder and staining) which will require future consideration as part of the proposed development.

Site observation have also identified asbestos containing materials (ACM), including roofing within the primary building/warehouse in Lot A, as potential source of contamination at the site. It is anticipated that ACM is present in buildings elsewhere on the site.

This investigation has not identified impact in groundwater underlying the site. Elevated concentrations of chloride, sulphate, sodium and calcium carbonate are representative of local groundwater chemistry (background) and are not considered a contaminant of concern.

9.4 Extent of Impact

Identified impact has been identified at the site and is limited to the following:

- Underlying fill and adjacent shallow natural material across the site within Lot A and at one fill location at Lot G. It is expected that elevated concentrations of similar contaminants are likely to be present within the footprint of existing site structures; and

- Asbestos clad roofing within the primary building/warehouse in Lot A.

9.5 Exposure Pathways and Receptors

Agon have established the following exposure pathways to be likely:

- Dermal contact, ingestion or inhalation of contaminant laden dust and/or soil to current and future site users who may undertake soil disturbance works;
- Inhalation of asbestos fibres by current site workers. Determination of the condition of the asbestos clad roofing was not part of the current assessment but us relevant in establishing environmental risk on-site.

9.4 Graphical CSM

Based on the findings of the current assessment, the following CSM has been developed for the site in Figure 14.

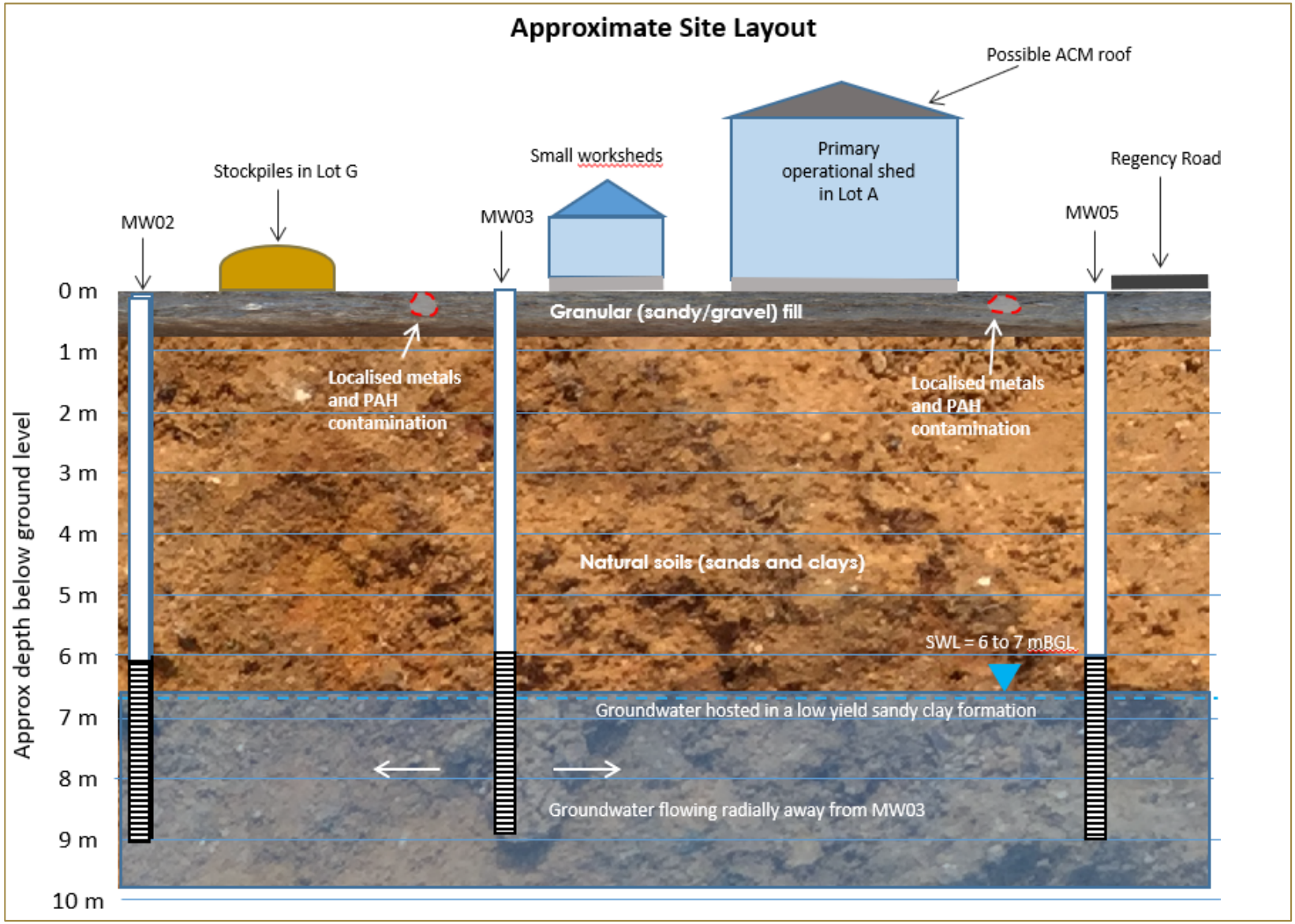

Figure 14: Conceptual Site Model (view to north)

10.0 CONCLUSIONS AND RECOMMENDATIONS

Agon was engaged by Salandra to undertake a detailed environmental assessment within 5 of the 14 Allotments which form the proposed rezoning area within Croydon Park. Specifically, these allotments have been identified as Lots A, E to H.

This investigation complements an initial DSI conducted by Agon within Lot G and H (Agon, 2016a).

The primary contaminating activities identified at the site was the importation of fill and the site's use for general industries which include concrete and steelwork fabrication.

The following conclusions were made in relation to final contamination conditions of the site in the context of the proposed zone amendment from allow mixed uses including low to high density residential land use.

10.1 Soil Conditions

This report has established the following regarding underlying soil conditions:

- Soils underneath the site were generally composed of granular fill with some inclusion in the form of ash, cinders and minor staining. This material is underlain by natural clays and sands and is consistent with published information and previous investigations at the southern extent of the proposed rezoning area;
- An intrusive assessment of site soils was undertaken (primally within Lot A, E and F, with minor supplemental assessment in Lots G and H) from a number of soil bores drilled at the site. Laboratory analysis of soils reported that underlying shallow soils (fill and natural) were impacted with concentrations of heavy metals, PCB, TRH and benzo(a)pyrene in excess of a range of human health and ecological criteria applicable to future site rezoning. These concentrations are largely attributable to the nature and source of fill;
- Fill and shallow natural materials have also been identified with a range of potential disposal categories from Waste Fill to in excess of the Low-Level Contaminated Waste criteria. Natural soils at depth meet the requirements of the Waste Fill criteria; and
- Asbestos clad roofing within the main shed at Lot A has also been identified as a source of contamination at the site. It is likely that other asbestos containing material is present within other buildings across the site. Determination of the condition of asbestos (where present) was not part of the current assessment but is relevant in establishing environmental risk present on-site.

Based on the analysis of site soils, Agon concludes that former site filling activities and industrial activities have not adversely affected the overall environmental condition of soils on-site. Lines of evidence suggest that impacted soils (where identified) are localised within shallow fill and natural materials and are not extensive throughout the site. These localised impacts are expected to be present within soils underlying current site buildings and structures, are consistent with previous investigations undertaken within the southern portions of the proposed rezoning area and are not anticipated to preclude the proposed rezoning of the site or any subsequent redevelopment.

10.2 Groundwater Conditions

This report has established the following regarding underlying groundwater conditions:

- The direction of groundwater flow is inferred to be in a radial direction from groundwater monitoring well MW03 based on two round of groundwater gauging data. This should not affect the conclusion of then report noting the groundwater seepage velocity is very slow (1.02×10^{-10} to 1.02×10^{-6} m/day) and contamination was not identified within groundwater.
- Hydrochemical of groundwater analysis indicates that the groundwater at each well comes from the same aquifer with a high content of anions/cations and elevated TDS;
- Groundwater beneath the current area of investigation did not report any evidence that it is either the recipient nor a source of contamination from previous and current activities undertaken the site;
- Elevated concentrations of a range of anions/cations were reported in excess of the recreation environmental value. Agon has established that these concentrations are likely background in nature and are not representative of contamination.
- Agon considers that the environmental values for groundwater beneath the site are protected from contamination in satisfaction of the GAR.

Overall, there is no evidence to suggest that current soil and groundwater conditions would preclude the rezoning of the site for the proposed mixed-use development (including low to high density residential land use).

10.3 Summary

Overall, soil and groundwater analytical results obtained from the site have not identified the presence of significant or widespread impact at the site. Identified soil impacts (localised in shallow soils) and ACMs (identified in building materials) may require management to enable the redevelopment of the site for a range of uses (which includes a range of low to high density residential use) as envisaged in the proposed rezoning.

It is anticipated that minimal works will be required to manage the identified localised impacts as part of redevelopment of the site and that these will be typical of standard management measures (which may include design of the development to minimise risk to site occupants or civil remediation earthwork). Agon's recommendations below would be sufficient to address the localised impacts reported to date in support of the proposed rezoning amendment.

10.4 Recommended Actions

Agon recommends that a comprehensive construction and environmental management plan (CEMP) be established for the site. The CEMP will include the following:

- Establish risk management procedures with regards to shallow fill and natural soils beneath Lot A and Lot G (where localised impacts were identified). This will also consider management of aesthetic items observed in site soils;
- A scope to assess soil conditions within the footprint of the existing site buildings (which are likely similar to the findings of this report). Agon recommends that this activity be undertaken once the building has been vacated and where possible when overhead plant such as cranes have been secured. At the time of investigation, it was not feasible to safely undertake this task due to ongoing site activities;
- Provision of a Soil Management Plan. It is expected that shallow soil materials may be surplus to the site's future requirements; the Soil Management Plan will provide guidance on ensuring that site soils are suitably segregated for appropriate classification and management (including disposal and/ or onsite reuse) and, where possible, minimise the generation of waste; and
- Provide management guidelines in the handling and removal of ACMs. Furthermore, it is recommended that an Asbestos Register be prepared (or updated) for site buildings.
- Establish an Unexpected Finds Protocol to ensure that potentially contaminating material which have not been identified under this investigation are suitably managed in in-line with regulatory requirements during future developmental works. Although unlikely, there is still a potential for items such as buried wastes and unidentified underground structures to be present beneath the site. Please note that that this investigation has identified thin layers of ash wastes at localised areas within Lot A.

Based on the results of this assessment, the environmental conditions observed at the site (represented by five of the 14 allotments within the proposed Croydon Park rezoning area detailed in Section 1.2) are not considered likely to preclude the site's future rezoning for a mixed-use development (including low to high density residential land use). Where identified, any impacts are localised (not extensive), would not preclude the rezoning or redevelopment of the land and are able to be suitably managed and/ or remediated in line with the proposed land use.

All conclusions and findings presented in this report must be read in accordance with Limitations provided in Section 11.

11.0 LIMITATIONS OF THIS REPORT

This report has been prepared in accordance with industry recognised standards and procedures current at the time of the work. The report presents the results of the assessment based on the quoted scope of works (unless otherwise agreed in writing) for the specific purposes of the engagement by the Client. No warranties expressed or implied are offered to any third parties and no liability will be accepted for use of this report by third parties.

The assessment of environmental and human health risk included in this report relate to the whole site as described in the report. If the site is subject to demolition works or redevelopment, the risk profile of the site will change and the conclusions of this report will no longer be valid. If the site is subject to subdivision, the risk profile of each division of the site will change and the conclusion of this report will no longer be valid.

Consideration of the aesthetic and geotechnical suitability of site soils has been excluded from this report. Aesthetic and geotechnical suitability may need to be addressed in subsequent assessments.

Although no onsite sources of groundwater contamination were identified during this investigation, given the regional history of land use around the site, groundwater contamination may have occurred in the vicinity of the site. Groundwater investigation was excluded from the scope of this investigation and comments in relation to potential groundwater at the site have been excluded from this report.

All information provided by third parties has been assumed to be correct and complete. Agon does not assume any liability for misrepresentation of information by third parties or for matters not visible, accessible or present on the subject site.

Opinions and judgements expressed herein are based on Agon's understanding of current regulatory standards and should not be construed as legal opinions.

No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties other than those listed above.

This report should be read in full.

12.0 REFERENCES

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