

ATTACHMENT E – DEEP END RETAIL INVESTIGATIONS

DRAFT

Kidman Park (Metcash) Residential and Mixed Use Code Amendment

Retail, commercial & community land use investigations

Prepared for Fairland Group Pty Ltd
7 November 2022



Deep End Services

Deep End Services is an economic research and property consulting firm based in Melbourne. It provides a range of services to local and international retailers, property owners and developers including due diligence and market scoping studies, store benchmarking and network planning, site analysis and sales forecasting, market assessments for a variety of land uses, and highest and best use studies.

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This report should be read in its entirety, as reference to part only may be misleading.

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1

Background

A Code Amendment Process has been initiated for approximately 12.6 hectares of industrial land comprising the former Metcash Distribution Centre at 404-450 Findon Road and two adjoining properties at 5 and 7 Valetta Road (Kidman Park land).

Grocery warehousing and distribution activities on the Kidman Park land ceased in mid-2000 when Metcash shifted its operations to a new 68,000 sqm warehouse facility in Gepps Cross. The Kidman Park land is zoned 'Strategic Employment Zone' however Council's *Industrial Land Study (2008)* and *Urban Employment Land Review (2019)* both found that the land is not a Prime Employment Area, had ongoing residential interface issues and presented a higher long-term value for residential use.

A range of residential zones is being considered for the Kidman Park land including:

- Housing Diversity Neighbourhood Zone
- General Neighbourhood Zone
- Urban Neighbourhood Zone
- Urban Renewal Neighbourhood Zone
- Master Planned Neighbourhood Zone

Preliminary master planning of the Kidman Park land shows an internal road network and subdivision pattern for medium density housing with several mid-rise (3-5 storey) apartment sites. Land is also set aside on the corner of Findon Road and Valetta Road (Kidman Park site) for potential local retail and commercial uses.

Most of the residential zones under consideration allow up to 1,000 sqm of 'shop' use and a range of commercial and community uses including offices, consulting room, pre-school and indoor recreation facility.

The Minister's endorsement of the Proposal to Initiate the Code Amendment for the Kidman Park (Metcash) Residential and Mixed Use Code Amendment sets out a range of further investigations including *"Consideration of the economic potential for population serving retail, commercial or community activities"*.

This report provides an assessment of the supportable retail, commercial and community-based land uses that could be planned for and developed on the Kidman Park site having regard to the demands from new on-site and other local area residents and the distribution of competing facilities in the wider area.

2

Local context & demand drivers

2.1 Local setting

The 12.6-hectare Kidman Park land is central to a large residential area of almost 18,000 people bounded by Tapleys Hill Road (west), Grange Road (north), Holbrooks Road (east) and Henley Beach Road (south) – refer Figure 1.

This area includes:

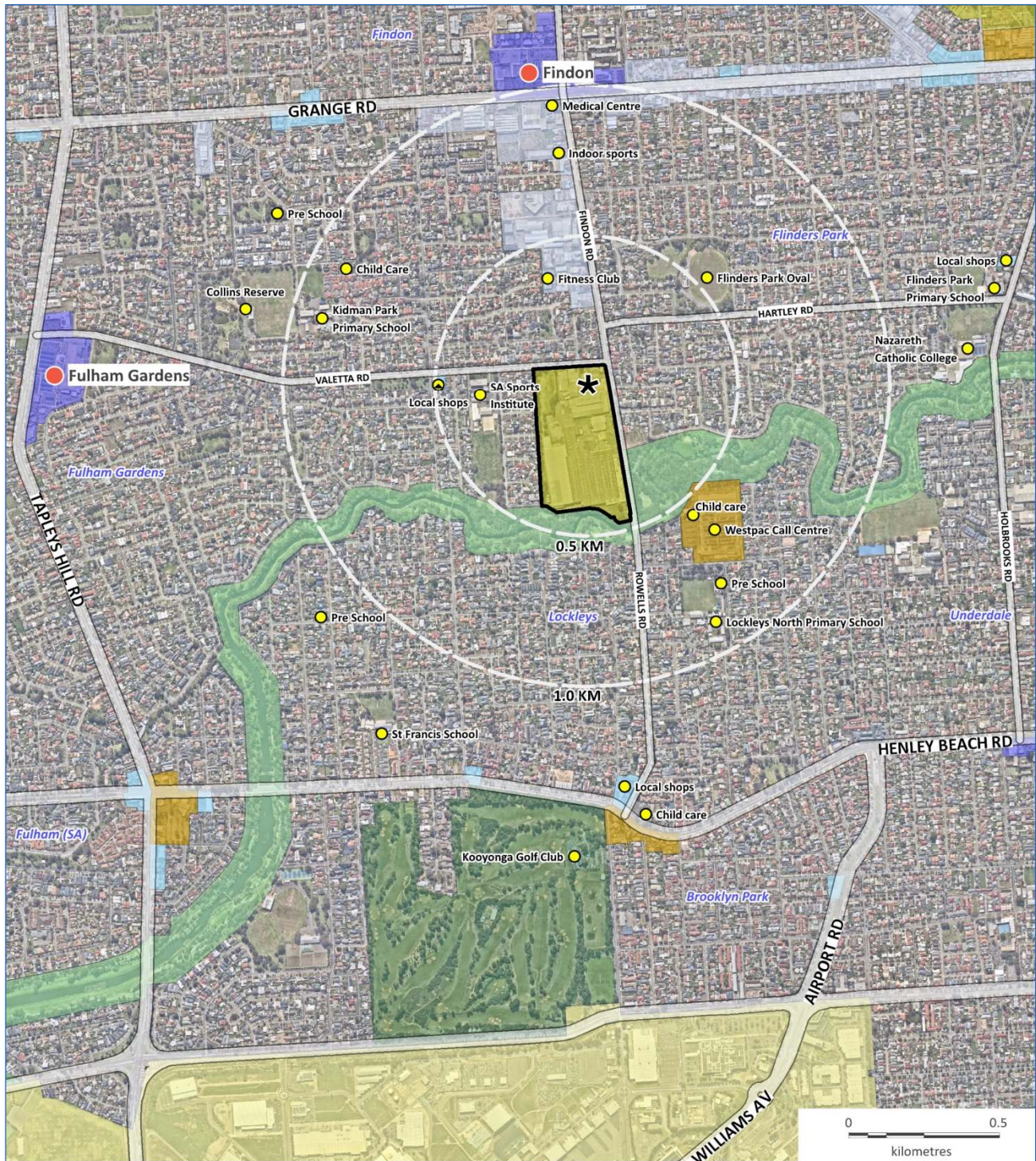
- All of the suburb of Kidman Park (population 3,700)
- All of Flinders Park (pop. 5,318)
- Part of Fulham Gardens, east of Tapleys Hill Road (pop. 2,740)
- Most of Lockleys north of Henley Beach Road (pop. 4,960); and
- Small sections of Underdale and Fulham (pop. 1,500)

The area is dissected by Findon Road / Rowells Road, an important and busy north-south distributor road with a southern connection to Adelaide Airport and a continuous northern link to Port Road. Findon Road / Rowells Road provides the only crossing of Karrawirra Parri (River Torrens) between Tapleys Hill Road (west) and Holbrooks Road (east).

Karrawirra Parri on the Kidman Park land's southern boundary has a meandering, westerly flow through the area and forms the boundary between Kidman Park and Flinders Park to the north and Lockleys to the south. It is a valuable open space and recreation resource for the adjoining suburbs.

Valetta Road and Hartley Road are cross-suburb (east-west) connectors through Findon Park and Flinders Park to Findon Road. The Kidman Park land is strategically positioned at the intersection of Findon Road and Valetta Road extending south to Karrawirra Parri and its linear open space reserve. Most of the 18,000 people within the four outer arterial roads are within 5-minutes' drive of the Kidman Park land.

Figure 1— Local context



Source: Nearmap, SA Planning, Deep End Services

The Kidman Park land is close to a number of commercial and community assets which serve their surrounding local areas and, in some cases, wider user or employment catchments including:

- School, recreation and community facility precincts in Kidman Park around Collins Reserve, in Flinders Park and in Lockleys, all within 1-1.5km of the site.
- A small light industrial / commercial area on Findon Road north of the Kidman Park land which has a local employment base that would utilise local services.
- Shopping centres on Grange Road at Findon (1km north) and Fulham Gardens (1.5 km west) with multiple supermarkets and a range of shops and services catering to most daily and weekly needs. While Fulham Gardens is a stand-alone shopping centre with several external pad sites for other retail food and fuel, Findon has a long section of Grange Road where the Suburban Activity Zone accommodates a broad range of commercial and main road-based uses.
- The South Australian Sports Institute (SASI) which is a training, medical and administration facility for elite sports people, 200 metres west of the Kidman Park land on Valetta Road. SASI will be vacating the site within the next few years to a new complex to be built at Mile End.
- Westpac's mortgage processing facility on Pierson Street, Lockleys. The former warehouse converted to a data and call centre is thought to employ up to 1,000 people and is situated just 350 metres from the southern boundary of the Kidman Park land. The Westpac site is also subject to a Code Amendment process to rezone the land from Employment Zone to a neighbourhood-type zone to facilitate medium density housing and smaller low-scale non-residential uses.

The Kidman Park area is characterised by a broad range of housing styles but mainly brick and tile dwellings originating from the 1950's and 60's when the area was subdivided. The older housing stock is interspersed with replacement homes built in the last 20 years which is gradually changing the quality of housing and character of the area.

Areas of former South Australian Housing Trust (SAHT) land in Kidman Park have been disposed and redeveloped with high quality homes in the last 10 years, changing the profile of the area. SAHT homes still prevalent in some areas are part of an ongoing program of redevelopment or disposal.

The Kidman Park land has good public transport connections with bus routes extending along Findon Road and Valetta Road. Three Valetta Road bus services extend from West Lakes or Henley Beach to the Bonython Park tram stop while the two Findon Road bus services run from the West Lakes and Arndale interchanges to Oaklands Park.

2.2 Assumed development

A preliminary layout for the Kidman Park land (excluding 5 & 7 Valetta Road) shows a local street pattern with connections to Findon Road and Valetta Road, a central open space from Karrawirra Parri and a medium density residential subdivision providing:

- 218 single dwelling and townhouse lots
- 4 apartment sites
- 5 lots labelled as 'other' including two on the Findon Road / Valetta Road corner for 'shop' and 'childcare' uses, one lot on Valetta Road and two adjoining lots on Findon Road. Uses on the mid-block sites are undetermined and could be residential sites.

The unit yield on the apartment sites is unknown at this stage however 3-5 level developments are assumed.

The total single dwelling and apartment yield on the preliminary layout is assumed to be 350 dwellings plus an assumption of 40 dwellings on 5 & 7 Valetta Road. In total, approximately 390 dwellings or a population of between 850 and 900 people.

A commercial or mixed-use site on the controlled corner of Findon Road and Valetta Road will have good exposure to about 19,000-20,000¹ existing vehicles per day on Findon Road and about 8,000 vpd on Valetta Road.

**Figure 2—
Commercial site -
Corner Findon Road
& Valetta Road**

Source: Google
Maps



2.3 Local catchment

For the purpose of population profiling, a local catchment area within a relatively close walk or drive-time of the site is defined (refer Figure 3). The catchment extends approximately 1km and covers most of Kidman Park and Flinders Park and the northern areas of Lockleys.

A comfortable walking distance to obtain goods and services is often considered to be 40-500 metres although most areas of the catchment are within 800-1,000 metres which would be a 10-12 minute walk.

Small proportions of the population within the defined catchment are marginally closer to the Fulham Gardens or Findon centres. The precise boundary itself is not critical to any analysis but is justified because the relative distances and differences

¹ Government of South Australia, Department of Infrastructure & Transport. <https://location.sa.gov.au/viewer/?map=hybrid&uids=138>

in travel times to either the Kidman Park site or the nearest centre are negligible, the Kidman Park site has advantages of distributor road and local street connections and residents will be attracted to a modern, convenience-based centre with a good mix of local shops and services.

Figure 3— Local catchment area

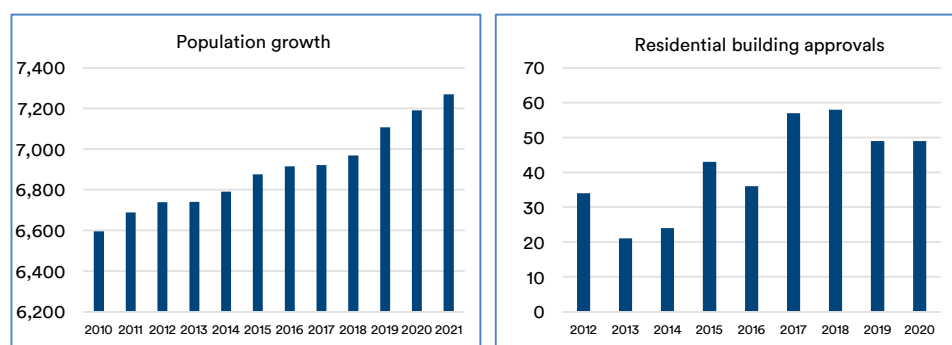


2.3.1 Population growth

The local population has grown steadily in the last 10 years, from 6,600 in 2010 to approximately 7,280 in 2021 (refer Figure 4). The steady growth has come through a consistent rate of new dwelling construction which has increased in the last five years to over 50 per annum (refer Figure 4). Larger homes replacing old dwellings including former SAHT dwellings and townhouse developments are increasing housing densities and population levels.

Figure 4— Kidman Park local catchment population & dwelling approvals

Source: ABS



2.3.2 Demographic and housing profile

The demographic and housing characteristics of the local catchment area at the 2016 Census are presented in Table 1 compared to Adelaide averages.

The area is characterised by:

- A high proportion of ‘couples with children’ and older ‘couples without children’.
- Traditional family structures yield a household size (2.56) slightly above the Adelaide average.
- An older age profile with 23% aged over 65 years (Adelaide 17%) although 11% are aged 0-9 (similar to Adelaide 12%) indicating a need for childcare facilities.
- A higher proportion of (older) Italian-born residents. While many Greek and Italian migrants who settled in the area in the 1950’s and 60’s have moved or passed on, successive generations of European migrants living in the area are evident with 44% of the population citing Southern or Eastern European ancestry compared to a 16% average across Adelaide.
- Many families are long established, evident by the high proportion (71%) living in the same dwelling as 5 years earlier and the high proportion (51%) who fully own their home.
- Household income levels are 11% above the Adelaide average and the SEIFA index (a measure of socio-economic advantage) is 1,024 or 4% above the Adelaide average.
- Detached dwellings (89%) dominate the housing stock. With an ageing population potentially looking to downsize there could be a high demand for townhouses and other small dwellings on the Kidman Park land.

Table 1—Population and housing characteristics

Source: ABS

Demographic characteristic (2016 Census)	Kidman Park trade area	Adelaide
<u>Persons and dwellings</u>		
Usual resident population	6,729	1,295,714
Total private dwellings	2,788	562,089
- % unoccupied	8%	8%
Average household size	2.56	2.46
At same address:		
- 1 year ago	90%	85%
- 5 years ago	71%	61%
<u>Economic indicators</u>		
Participation rate	60%	59%
Unemployment rate	5.3%	7.7%
White collar occupations	54%	49%
Bachelor degree or higher	21%	21%
SEIFA	1,024	983
<u>Age group</u>		
0-9	11%	12%
10-19	12%	12%
20-34	17%	21%
35-49	19%	20%
50-64	19%	19%
65+	23%	17%
Average age	42.9	39.8
<u>Annual household income</u>		
Average household income	\$93,351	\$83,748
Variation from Adelaide average	11%	-
<u>Country of birth</u>		
Australia	76%	72%
Italy	6%	1%
England	3%	7%
Greece	2%	1%
China	2%	2%
India	2%	2%
Other	10%	15%
<u>Top 4 regions of ancestry</u>		
North-West European	48%	68%
Southern and Eastern European	44%	16%
Oceanian	26%	34%
North-East Asian	4%	5%
<u>Occupied private dwelling tenure</u>		
Fully owned	51%	32%
Being purchased	32%	38%
Rented	17%	30%
<u>Dwelling type</u>		
Separate house	89%	75%
Townhouse/semi-detached	9%	17%
Apartment	2%	8%
<u>Household composition</u>		
Couples with children	35%	30%
Couples without children	32%	26%
One parent family	9%	12%
Lone person	21%	28%
Group	2%	4%
<u>Motor vehicles per dwelling</u>		
None	4%	8%
One	33%	38%
Two	42%	37%
Three or more	20%	17%

2.5 Key drivers

In summary, the key drivers for a small retail and commercial node on the Kidman Park site are:

- A large and growing population within a short distance with a favourable demographic and income profile.
- A self-contained community with a wide range of nearby community, recreation and education facilities.
- A significant new population on the site (and potentially on the Westpac site) which limited local shopping facilities
- A relatively large workforce within a short drive-time and high levels of passing traffic.

3

Prospective land uses

3.1 Local retail

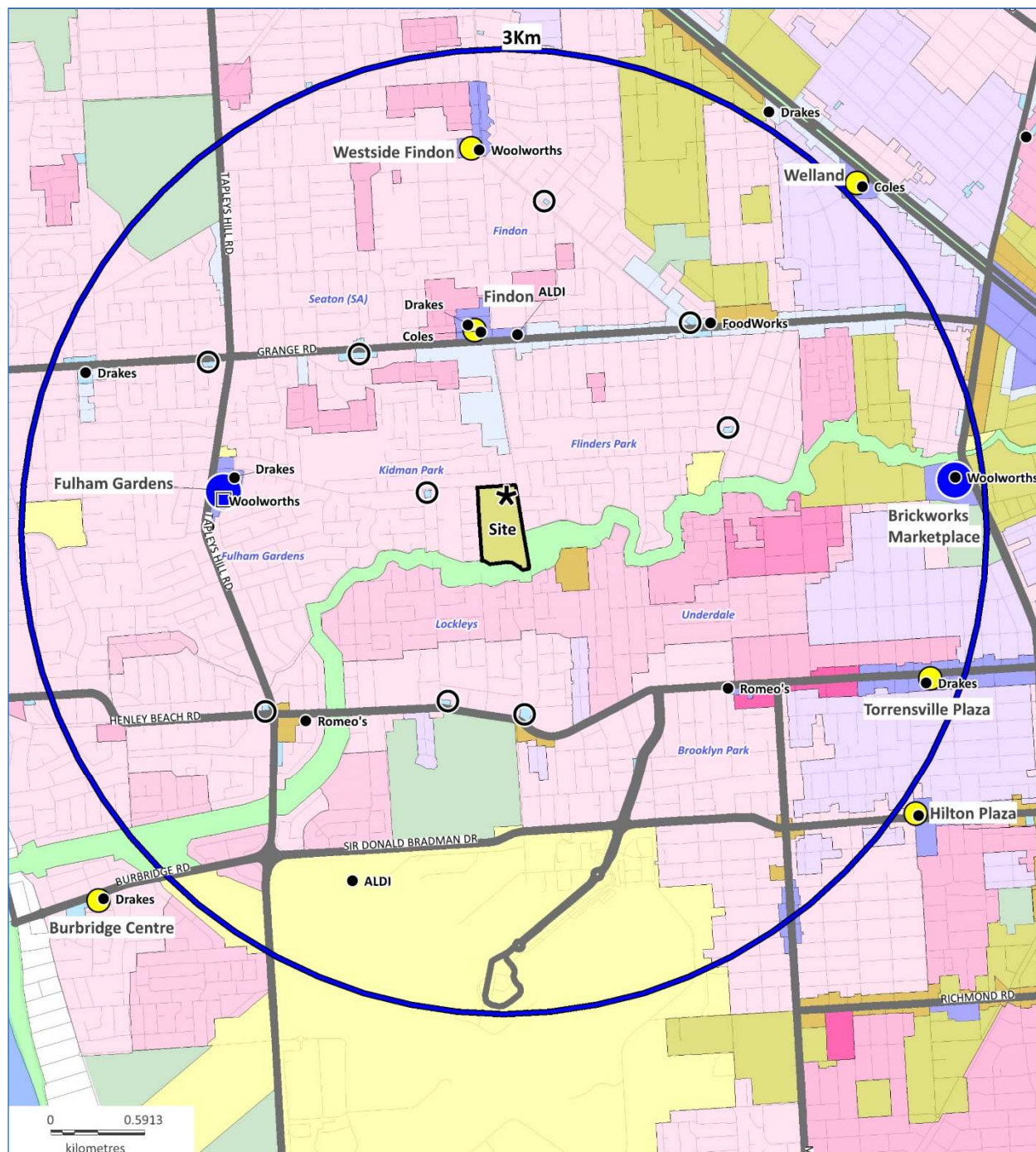
The Kidman Park site lies in an area with good access to major and independent supermarkets and neighbourhood-level retailing. The primary catchments of the Fulham Gardens Centre on Tapleys Hill Road (1.6 km west of the site) and the Findon Centre on Grange Road (0.9 km north) intersect and overlap through Kidman Park with both centres within a 2-minute drive of the site from most areas of Kidman Park and within 4-5 minutes from most areas of Flinders Park, east of Findon Road.

The **Fulham Gardens** centre is a 14,700 sqm GLA mall-based complex with a large Drakes supermarket and 17 shops. With Target vacating its 8,200sqm tenancy in August 2020, the centre is now undergoing a \$10 million redevelopment with Woolworths, Dan Murphy's and a mini-major moving into the former Target premises. These changes will significantly increase foot traffic and strengthen the centre against its main competitor, Findon. Fulham Gardens has some pad site and peripheral commercial uses including fast food, fuel, a fitness centre and offices.

Findon Shopping Centre (9,820 sqm GLA) is an external facing strip complex with Coles and Foodland supermarkets and 28 shops. It sits within a broader commercial strip on Grange Road where ALDI developed and opened a freestanding store in December 2020. Grange Road has a range of other showroom and commercial uses including medical and childcare centres.

Between Fulham Gardens and Findon there will soon be five supermarkets and a good range of existing shops and supporting services within a short distance of the Kidman Park site. These are major influences on the range and style of retailing that can be supported on the site.

Figure 6— Centres & supermarkets

**Shopping centres**

- Sub-regional
- Neighbourhood
- Local Centre

Supermarkets

- Existing
- Under construction

Source: Deep End Services

Figure 6 shows the distribution of Local Centres on the surrounding arterial roads where small businesses provide for local residential areas and high levels of through traffic. Within the Kidman Park and Flinders Park residential areas there are two Local Centre nodes (refer Figure 6 and Figure 7).

Just 500 metres west of the Kidman Park site, on the corner of Valetta Road and Frogmore Road, is a small but dated development of five shops with upper-level residential units. The complex would date back to the 1960's when the area was subdivided. Current tenants are a sign writer, hairdresser, Chinese takeaway food, Kumon tuition office and a vacancy (former café).

In Flinders Park to the east, a small group of shops on Holbrooks Road, just north of Flinders Park Primary School, contains a bakery, two hairdressers, a beautician and an office. On Hartley Road Flinders Park, two standalone shops comprise a butcher and hairdresser.

Figure 7—Local Centres



Valetta Rd / Frogmore Rd, Kidman Park



Holbrooks Road, Flinders Park

The relevant considerations for the provision of local shops and services at the Kidman Park site are:

- The suite of residential zones within the Planning & Design Code generally allows up to 1,000 sqm of 'shop' floorspace.
- The current provision of local centre floorspace in Kidman Park and Flinders Park is low and dated although competition from centres at Findon and Fulham Gardens is high.
- New residents on the site itself will generate demands for local services which could be provided within an attractive local node designed into the development.
- To the south, Lockleys has lower access to neighbourhood and local shopping and the site could be a convenient option for a range of basic services.
- The area is self-contained with schools, community and sporting / recreation facilities which can encourage other services (if available) to be sourced from the local area.

- The range of tenants that can viably trade in local centres is limited to a range of fresh / convenience store tenants, takeaway food, cafes & restaurants, personal services and some office tenants.
- The COVID-19 period is creating a revival in local shopping as consumers seek safe and simplified shopping experiences close to home.
- The new housing development(s) will reimagine the area and will present a new face to an ageing area and a local shopping / service node.
- The Westpac Mortgage Centre less than 10 minutes' walk from the Kidman Park which could be developed in the short term as a significant in-fill housing site.

A simple supply and demand assessment of the local catchment area (refer Table 2) can determine the potential for additional local centre floorspace. Using the local catchment area in Figure 3, the key calculations are:

- The 2021 population of 7,270 will increase by underlying growth (+75 persons per annum) and the Kidman Park DPA site development (+850 people) to approximately 8,500 people by 2026. This is a conservative estimate and could be significantly higher if the Westpac Mortgage Centre site is rezoned and developed in the same period.
- Previous analysis by Deep End Services of the *SA Retail Database* found that Adelaide's average rate of retail floorspace provision in 2007 – being the last comprehensive survey of Adelaide's retail floorspace - was 2.12 sqm per capita across all centre and retail floorspace categories. It is conservatively estimated to be 2.20 sqm per capita in 2021. The supply of retail floorspace in Local Centres was calculated at 10% in 2007 or 0.22 sqm per capita in 2021.
- Applying 0.22 sqm to the 2026 population (8,495 persons) generates a theoretical demand for 1,869 sqm of local centre floorspace in 2026.
- Excluding the supply level (861 sqm) in three small existing centres, the residual opportunity is 1,008 sqm. This will likely be higher factoring further population from the Westpac site.

The analysis shows that a Local Centre of up to 1,000 sqm on the Kidman Park site is supportable by the projected population in 2026.

Table 2— Local Centre floorspace supply & demand

Source: Deep End Services; SA Retail Database

Variable	Unit	
Catchment population		
2021	Persons	7,270
2026 inc. Kidman Park	Persons	8,495
Retail floorspace provision		
All retail (Adelaide)	sqm per capita	2.20
Local centres	(@10% total)	0.22
Local Centre demand (2026)	sqm (pop.x0.22)	1,869
Local Centre supply		
Frogmore & Valetta	sqm	431
Holbrooks Rd / Hartley Rd	sqm	430
Total existing	sqm	861
Local centre opportunity	sqm (demand - supply)	1,008

On balance, a shop area of 800-1,000 sqm should be planned for the site. An aspirational but achievable tenant profile would include:

- Pharmacy – 200 sqm (ideally located close to a medical centre on-site)
- 2x Café / lunch bar / bakery – 200 sqm
- 2 x basic or franchised lunch /evening take away food operators – e.g., Subway, pizza, chicken, fish & chips – 200 sqm
- 1 x restaurant (Italian, Chinese, Thai) – 150 sqm
- 1 x hairdresser – 70 sqm
- 1 x nails / massage / beautician – 60
- 1 x liquor – 120 sqm

3.2 Medical centre

The distribution of medical centres with the number of attending general practitioners (GPs) within a 3km radius of the Kidman Park site is set out in Figure 8.

In total, there are 11 medical centres with 43 GPs at an average of 3.9 GPs per clinic. The 3km radius has 60,050 people (2020) which indicates an average provision of 1 GP for every 1,397 people (refer Table 3).

In the broader region of Western Adelaide (pop. 275,250), extending from Port Adelaide to Glenelg and east to South Road, there are 78 medical centres with 348 GPs at an average on one GP for every 791 residents.

Table 3— Medical centres & GP provision rates

Source: Deep End Services,

	Kidman Park (3km radius)	Adelaide western suburbs
Population	60,050	275,250
Medical Centres		
No.	11	78
GPs	43	348
GPs per clinic	3.9	4.5
Population per GP	1,397	791

While there are several large medical centres just outside the 3km radius (e.g., Western Hospital GP Clinic and others on Port Road), they are offset by a large clinic of 12 GPs just within the radius at Torrensville. On balance, the 3km radius is considered to have a relatively low provision of GPs compared to the wider regional average.

The local distribution of medical centres close to the site shows a strong presence of four clinics along Findon Road (including two with 5 and 8 GPs) however elsewhere clinics are widely spaced with particular gaps in the following areas:

- In or adjoining the Fulham Gardens centre on Tapleys Hill Road. The residential area from the Kidman Park site through to Tapleys Hill Road and the Fulham Gardens centre has no local medical centre and a population of 3,200 people.

- Residential areas of Lockleys east and west of Rowells Road through to Henley Beach Road with a population of 2,800 people. Other than the large medical centre at Torrensville (3km east) this area has a low provision of GPs.

An indicative catchment area for a medical centre on the Kidman Park site is overlaid on Figure 8. The local area has a 2020 population of 7,080 people with the furthest homes within a 5-minute drive of the site. While most residents will have existing GP relationships, some may opt to switch to a new centre close to home while new residents moving to the site may seek a new or additional GP to visit.

The commercial and industrial workforce in Kidman Park and in, or near, the Airport are potential users of a local medical centre, given the light distribution of GPs to the south.

Findon Road carries sufficient traffic to attract the interest of a medical centre as part of a modern, mixed-use local centre. Based on the current population and size and distribution of existing clinics, a medical centre of 3-4 practitioners could be supported on the site.

The medical centre could be developed with additional consulting rooms to accommodate a range of para-medical services or specialists that chose to operate as a single practitioner or service within a broad health and wellness practice. While dentists tend to operate from separate premises, compatible sessional services well-suited to a medical centre are:

- Physiotherapy
- Psychiatry
- Dietician
- Podiatry
- Audiology
- Blood collection

3.3 Flexible commercial space

The take-up of small (ground or upper level) office tenancies is difficult to predict however there appears to be limited available space at Fulham Gardens and Findon. An attractive, well planned local centre could provide some flexible office or commercial space attractive to small professional services firms, health practitioners, service businesses, NGOs or instructional services /classes such as educational tuition, self-defence, music or dance classes.

3.4 Childcare

The Kidman Park land presents an opportunity for a long day childcare centre (LDC) to service the surrounding commercial and industrial areas, new families on site and for workers commuting through the area who may find the site convenient, being either close to home or work (such as the airport).

An assessment of the demand and supply for LDC places within the defined catchment area is set out in Table 4. It draws conclusions on the supportable number of LDC places that could be provided on the site. Figure 9 identifies the existing LDC centres and their registered places with a catchment area for the

Kidman Park site based on the pattern of residential and industrial land use in the area, access to the site and the size and the location of existing LDC centres.

It should be noted that the catchment area is for the site and does not apply to the surrounding child care centres that are either on the boundary, or beyond it. The demand for child care places within the catchment area cannot be directly compared to the supply of places in centres that are on the boundary or beyond it, as those centres (including two on arterial roads and a third in the Westpac call centre) will operate from different catchments than the Kidman Park site.

Table 4— Childcare supply & demand

	2016	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Kidman Park Catchment population	9,090	9,464	9,503	9,559	9,616	9,672	9,728	9,784	9,844	9,903	9,962	10,021
Childcare demand analysis												
Children - % 0-4	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%
No. of children 0-4 yrs	482	502	504	507	510	513	516	519	522	525	528	531
Modelled proportion 0-4 yrs in childcare (%)		48.3%	49.3%	49.8%	50.3%	50.8%	51.3%	51.8%	52.3%	52.9%	53.4%	53.9%
Children 0-4 yrs in formal childcare (No.)		243	249	253	257	261	265	269	273	278	282	286
Avg. SA weekly hours of care per child		26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6
Avg. hours per LDC day		10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Total child care days per week		646	662	673	684	694	705	716	726	739	750	761
Weekly demand for 0-4 yr old places		129	132	135	137	139	141	143	145	148	150	152
Total inc. children aged > 4 yrs (@5%)		136	139	142	144	146	148	151	153	156	158	160
LDC supply opportunity (@ 80% place occupancy)		170	174	178	180	183	185	189	191	195	198	200
Childcare supply in or near the catchment												
Stepping Stone Kidman Park			150	150	150	150	150	150	150	150	150	150
Kidman Park Community Child Care Centre			53	53	53	53	53	53	53	53	53	53
Lockleys Child Care & ELC			70	70	70	70	70	70	70	70	70	70
Kidman Park site												
Supportable places (@ 25% share of supply opport.)						45	46	46	47	48	49	50
Plus children from outside catchment (@25%)						15	15	15	16	16	16	17
Total recommended ELC size						60	61	62	63	64	65	66

Source: ABS, Department of Education

The inputs and calculations to the assessment of the **demand** for childcare places are as follows:

- The catchment population is based on published ABS small area data at the Statistical Area 1 (SA1) level to 2020. The current population of approximately 9,500 people is growing slowly with small additions assumed until the Kidman Park site is developed and occupied over a 2-3 year period.
- The 0-4 year age cohort of about 500 infants and children made up 5.3% of the catchment population at the 2016 Census – a proportion slightly below the Adelaide average of 5.9%. This proportion is held constant for future years.
- The proportion of children using long day care is drawn from state-based data in *Early Childhood and Child Care in Summary* (ECCC), a quarterly publication by the Federal Department of Education, Skills and Training. Within the catchment,

the estimated proportion of children placed in long day care (48.3% in 2020) is adjusted up from the 2019/20 SA state average (44.0%) to allow for:

- A higher propensity to use childcare in metropolitan areas than regional areas.
- More affluent families compared to state and Adelaide average.
- A higher proportion of families where the single parent or both parents work.
- The proportion of children using long day childcare is grown gradually across the forecast period to reflect and continue the recent historic increases in formal childcare use in the State.
- The estimated number of 0-4 year old children seeking long day care grows from 249 in 2021 to 278 in 2028.
- The daily demand for places is based on:
 - a state average of 26.6 hours in care per child per week or the equivalent of 2.66 days per week (assuming 10 hours of care per day)
 - The estimated 0-4-year-old children in childcare in 2021 (249) multiplied by 2.66 days per week generates total weekdays in demand (662). This is divided by 5 to generate the average daily places in demand by 0-4-year old's (132 places in 2021) from Monday to Friday.
 - The demand level from 0-4 year old's is grossed up by 5% to account for the smaller demand from children aged over 4 years.
- Total place demand assumes that all childcare centres have an average 80% occupancy rate – a benchmark based on surveys for Australian Childcare Alliance (ACA).

On these assumptions and calculations, the total number of daily places in demand from the catchment area is **174** places in 2021 increasing to **195** in 2028.

Current LDC centres within or just outside the catchment area include:

- Stepping Stone Kidman Park Childcare & Early Development Centre at 346 Grange Road. This is the largest LDC centre in the region licensed for 150 places on a 3,900 sqm site. It has a strong position on the edge of the Findon Centre and would partly service the coastal suburbs which have low rates of childcare provision and commuters moving to and from central city.
- Kidman Park Community Child Care Centre, centrally located in the suburb beside Kidman Park Primary School. The facility is licensed for 53 places.
- The new Montessori House LCD centre at 399 Tapleys Hill Rd Fulham Gardens. Built in 2017, it is licensed for 80 children on a site of 2,600 sqm.
- Lockleys Child Care and Early Learning Centre at 25 Pierson Street - a 70-place employer-sponsored facility on the grounds of the 5-hectare Westpac call centre. Westpac appears to have a workforce of well over 700 people which would largely support the on-site childcare centre. It is unknown at this stage whether the childcare centre would be replaced in a medium density residential redevelopment of the site proposed under the current Lockleys Code Amendment.

Three of these four centres are listed in Table 4 however their total space capacity cannot be directly compared to the level of assessed demand within the catchment because of their different catchment characteristics. In other words, only a proportion of the children in these centres would be sourced from the Kidman Park catchment.

The Kidman Park site is central to the catchment and will be visible for the 19,000 – 20,00 existing vehicles per day on Findon Road. A contemporary, well designed and operated childcare centre could attract 25% of the LDC supply opportunity of 183 places in 2024 – or 45 places. A further 25% of total places (or 15 places) could be generated from families outside the catchment, from the nearby workforce and commuters on Findon Road.

On this basis a small-midsized LDC centre of 60-70 places is supportable on the site with a land area requirement in the range of 1,500-2,000 sqm.

3.5 Gym & fitness centres

The distribution of gyms, fitness clubs and instructional fitness classes held within commercial premises and located within 3km of the Kidman Park site is mapped in Figure 10. These venues exclude Pilates and yoga studios.

There are 17 gym / fitness clubs within 3km at an average density of one for every 3,532 people (refer Table 5). This is a slightly higher density than for the broader western suburbs of Adelaide where the average is close to one for every 4,000 people – although rates across Adelaide are not uniform and vary according to income and age structures.

Table 5— Provision of gyms & fitness clubs

Source: Deep End Services

	Kidman Park (3km radius)	Adelaide western suburbs
Population	60,050	275,250
Gyms / Fitness Clubs		
No.	17	70
Population per gym	3,532	3,932

The local area is generally well supplied with large franchised and national chain fitness clubs such as Anytime Fitness (3), EFM Health Clubs (3), Zap (1), Curves (1), Derrimut 24:7 (1) and F45 (2).

Clusters have emerged in the area with major operators around centres and along major roads and some smaller independents in secondary locations and industrial areas. The centre and main road sites are probably drawing on commuter traffic to and from the central city area.

The obvious clusters are in or adjoining:

- Fulham Gardens Centre (2)
- Findon Centre (2)
- East end of Grange Road (Flinders Park & Welland)
- East end of Henley Beach Road (Mile End & Torrensville)

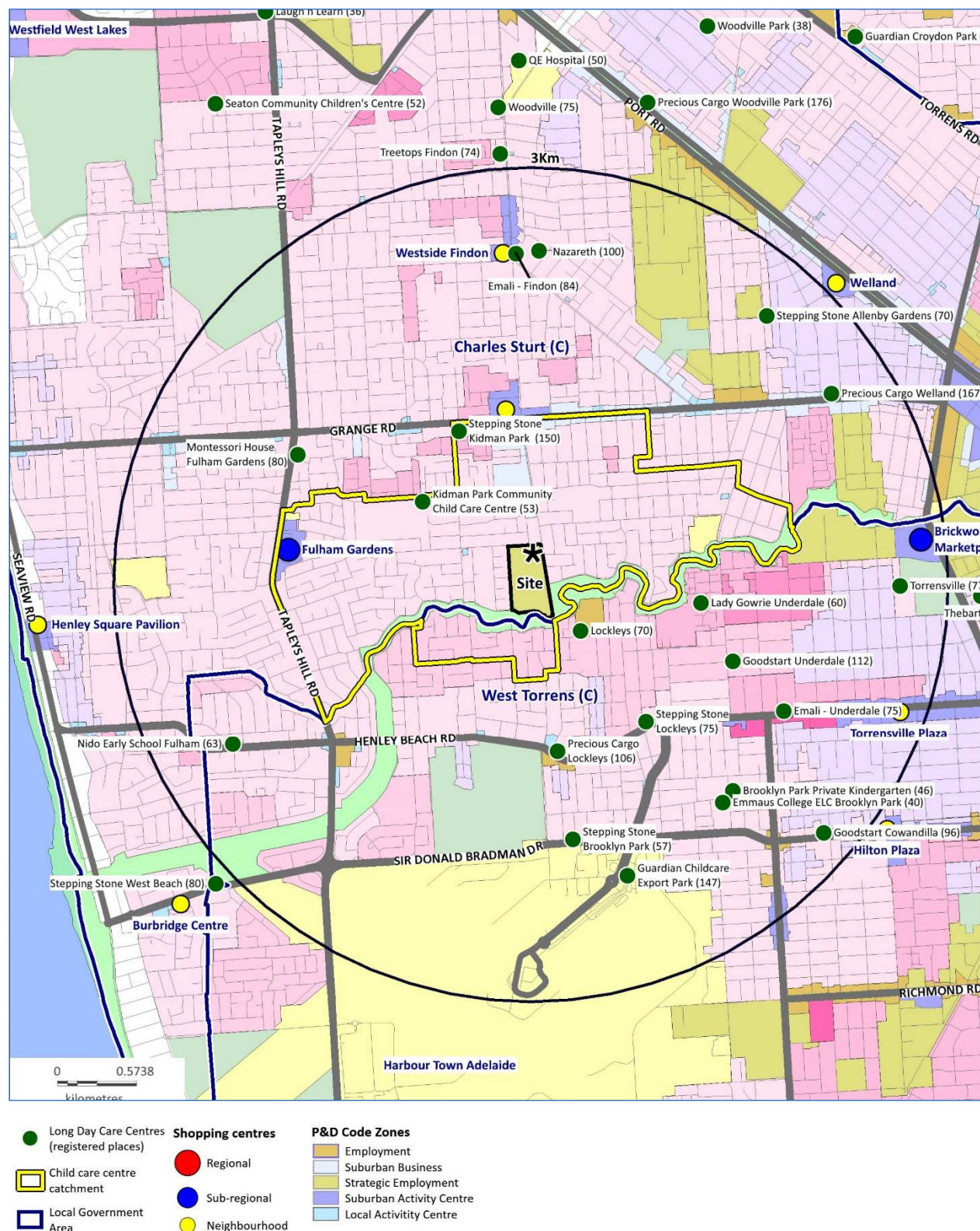
Just north of the Kidman Park site is an independent operator (Viva Fitness) located at the end of a cul-de-sac in the Kidman Park industrial area, off Findon Road.

The Kidman Park site is likely to have less appeal to the major franchised groups that seek high exposure and passing traffic and often in, or close to, centres. However, with the re-imaging of the Kidman Park site with a modern town house and apartment product and the establishment of a small commercial node, a small independent fitness club potentially specialising in instructional classes than offering large fully equipped training and exercise rooms could be attracted.

The residential area of Lockleys to the south is an area of opportunity where access to fitness clubs is a lower than areas north of Karrawirra Parri.

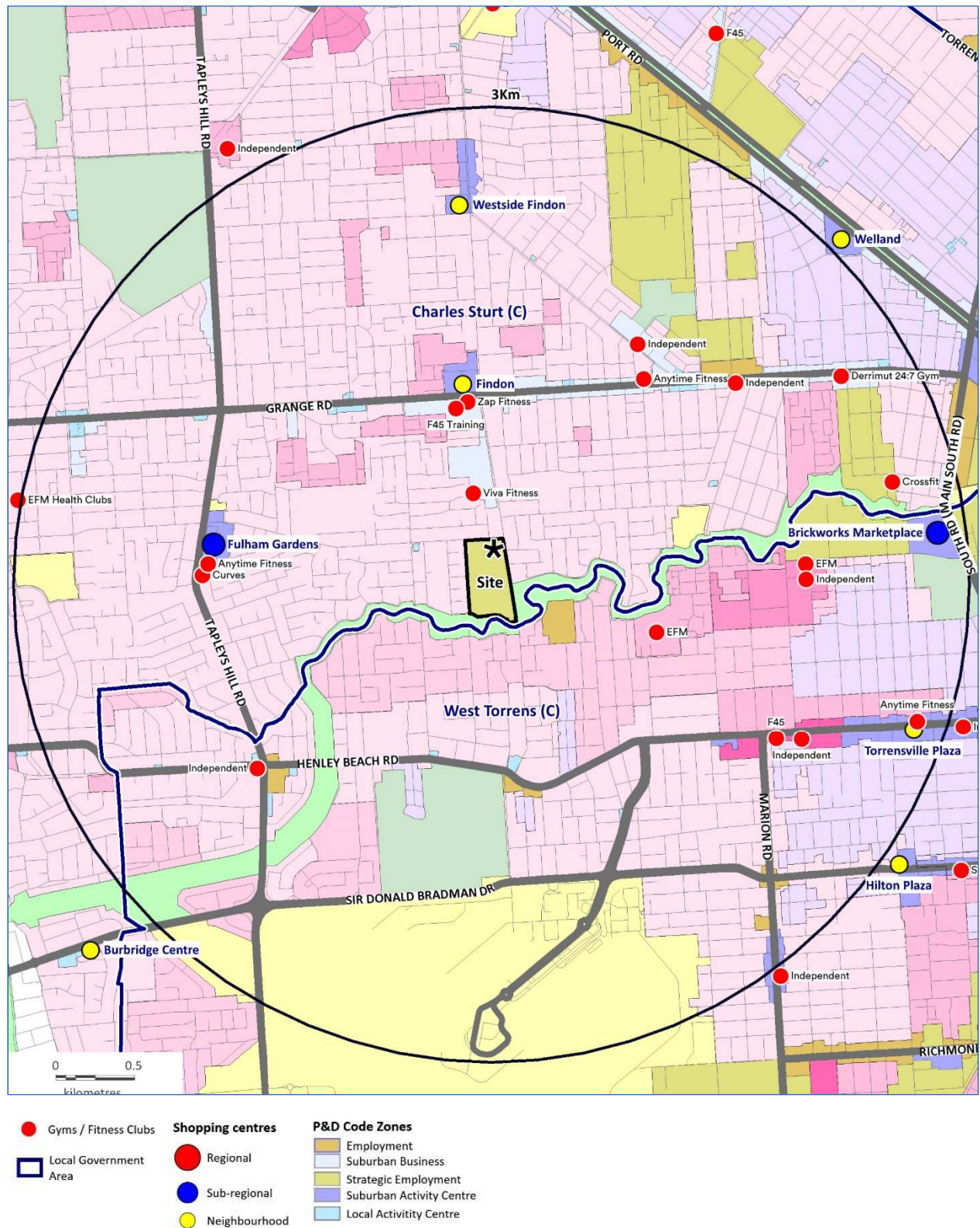
The area has a positive and improving income profile that can support the higher provision of fitness clubs in the area. Planning for the site should make allowance for a 300-400 sqm multi-purpose and flexible fitness / health instruction studio. This could incorporate Pilates, Zumba, yoga or meditation-type programs. The space could be provided at ground or upper level.

Figure 9— Long Day Child Care Centres & registered places



Source: Deep End Services

Figure 10— Gyms & Fitness Clubs



Source: Deep End Services

4

Conclusions

The Kidman Park PDA land and its local catchment area have a range of positive attributes which support a small local retailing and commercial node on the high-profile corner of Findon Road and Valetta Road. The favourable characteristics are:

- An established but growing local population with above average income levels and up to 850-900 new residents on the DPA site.
- A further potentially significant population increase on the Westpac Mortgage Centres site (subject to the current DPA process) 350 metres from the Kidman Park land. The Westpac site is less suited to providing a local centre than the Kidman Park land.
- A high-profile site, central and well connected to the broader housing area with residential interfaces, linear river reserves and strong levels of passing traffic.
- A low provision and quality of local centre floorspace in Kidman Park, Flinders Park and Lockleys.
- A good range of local schools and leisure facilities encouraging a level of self-containment for some services and activities.

The supportable commercial and community land uses and indicative land area requirements for the Kidman Park site are summarised in Table 6.

To optimise the available land area, a small Local Centre comprising a shop / retail area of 1,000 sqm with upper space for a gym (400 sqm) and other flexible commercial areas (300 sqm) should fit on a 4,000 sqm site.

A medical centre of 400 sqm (potentially on a separate title) will need a land area of approximately 1,000 sqm.

These uses would fill out the corner site of approximately 5,000 sqm with a two-level building that will provide a focal point and feature design element for the wider project.

A 60-70 place childcare centre would require a land area of approximately 1,500-1,800 sqm. A larger site of 2,000 sqm provides flexibility if an operator elects to develop a facility with a larger capacity.

Table 6—Kidman Park commercial site recommendations

Land use	Gross leasable floor area (sqm)	Estimated land area (sqm)
Shops/ retail	1,000	4,000
Gym (upper level)	400	-
Commercial space (upper level)	300	-
Medical centre	400	1,000
Total Local Centre	2,100	5,000
Childcare centre	-	1,500 - 2,000

The retail floor area and other recommended uses on the Kidman Park site will have little or no overall effect on the Suburban Activity Centres of Findon and Fulham Gardens because:

- The recommended retail floorspace (up to 1,000 sqm GLA) is minor in the context of the combined 24,500 sqm GLA in the Fulham Gardens and Findon shopping centres. Other retail and commercial floorspace at Fulham Gardens and Findon outside the supermarket-based malls of these centres serves to further dilute any small effect of the additional floorspace.
- The Fulham Gardens centre is presently undertaking a major redevelopment adding new high traffic generators (Woolworths and Dan Murphy's) in place of the former Target store while the Findon centre recently added ALDI.
- The Kidman Park DPA will support a small range of shops and services, some of which will be duplicated in the Suburban Activity Zones however the significant traffic generators (supermarkets) and most shops and service tenants will have no direct competition.
- Very low impacts will be spread around other centres that draw across the area including Brickworks Marketplace and Torrensville (Henley Beach Road)
- The area is deficient in some uses such as medical centres and childcare facilities.

The retail floor area and other recommended uses on the Kidman Park site will have little or no overall effect on the two small Local Centres in Kidman Park and Flinders Park because:

- These centres have some specialised tenancies (unlikely to be duplicated) and would appear to operate on highly localised catchments and passing traffic.
- The floorspace across the two centres is very small, amounting to a low level of local centre floorspace provision compared to metropolitan averages.

- The Flinders Park centre on Holbrooks Road is on parallel main road with different traffic movements and has its own local traffic generators including a primary school and secondary school.
- The small Kidman Park local centre offers only a low level of service to the area.

A small local retail and community node on the Kidman Park land will have a range of positive benefits including:

- It will provide an active focus and community hub for the key corner site of the DPA land and deliver on the concept of a true mixed-use development.
- The opportunity for new and existing residents to access essential retail stores and potentially childcare and medical services by foot. This enhances the efficiency and sustainability credentials of a future development.
- It will generate up to 75 full and part-time local employment opportunities.
- That part of the floorspace will be sustained by the new on-site population.
- The proposal improves the efficiency and serviceability of the activity centre network in the southern areas of the City of Charles Sturt.

ATTACHMENT F – GREENCAP ENVIRONMENTAL INVESTIGATIONS

DRAFT

ENVIRONMENTAL CONDITION – SITE CONTAMINATION STUDY

December 2021
J174764

Fairland Group Pty Ltd

Cnr Findon & Valetta Roads,
Kidman Park

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Environmental Condition – Site Contamination Study

Fairland Group Pty Ltd

Cnr Findon & Valetta Roads, Kidman Park

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1 INTRODUCTION

1.1 Background

Greencap Pty Ltd (Greencap) was engaged by Fairland Group Pty Ltd (Fairland) to undertake a Site Contamination Study to assess the environmental condition of the land located on the corner of Findon and Valetta Roads, Kidman Park, South Australia (referred to as 'the site'). The location of the site is presented in Figure 1.



Figure 1 - Site Location Plan

Fairland is looking to redevelop a large portion of the site for mixed use purposes, including low to medium density residential use.

The site is currently within a Strategic Employment Zone, but the Zone's Desired Outcomes (DOs) and Performance Outcomes (POs) are unsuitable to facilitate the desired development outcome. The objective of this assessment is to provide a summary of the environmental condition of the site (specifically relating to site contamination) to support the rezoning of the site.

Previous environmental investigations have been undertaken across a large portion of the site. These works were limited to 404-450 Findon Road, Kidman Park, commonly referred to as the former Metcash site. This review summarises the findings of the previous investigations and presents updated information. For portions of the site where environmental investigations have not been carried out historically, Greencap has undertaken a limited review of historical information to form an opinion on the contamination status of that land.

2 SITE DETAILS

2.1 Site Identification

The site is described by four Certificates of Title as detailed in Table 1. A plan showing the allotment layout is presented as Figure 2. The current Certificates of Title for the Metcash site and the Property Parcel Reports from the South Australian Property Parcel Atlas (SAPPA) are presented in Appendix A.

Volume	Folio	Allotment	Plan	Street Address	Zoning
6154	507	401	D19661	436 - 450 Findon Road	Strategic Employment
6155	62	301	F6069	404 – 406 Findon Road	
5415	550	306	F13538	5 Valetta Road	
5830	738	305	F13538	7 Valetta Road	



Figure 2 - Plan Showing Allotment Layout (SAPPA)

2.2 Current Land Use of the Site & Surrounding Properties

The site has a total area of approximately 12.85 hectares. The site and surrounding areas are relatively level, but the land immediately south of the site drops steeply away to the River Torrens.

For this report, the site has been split into three areas, based on the current ownership and the most recent site uses:

- **Area 1:** 404 – 450 Findon Road. This portion of the site was previously used as a distribution centre by Metcash. The site is now owned by Fairland and while most of the site is vacant, with no specific uses, two areas are leased to civil contractors for use as laydown areas / storage. Area 1 is scheduled for demolition in early 2022 and is proposed to be redeveloped for mixed use purposes.
- **Area 2:** 5 Valetta Road. This portion of the site is currently occupied by Wormald, who provide fire protection services and equipment. The site appears to be used primarily as offices and warehousing, but Greencap was unable to undertake a site inspection as part of this investigation.
- **Area 3:** 7 Valetta Road. This portion of the site is currently occupied by Fugro, who provide geo-data services. The site appears to be used primarily as offices, but Greencap was unable to undertake a site inspection as part of this investigation.

Additional detail regarding the current uses of the site, where available, is provided in subsequent sections of this report. A plan showing the areas above is presented as Figure 3.

The site is surrounded by the following:

- North – Valetta Road, beyond which are residential properties.
- South – The River Torrens Linear Park, which includes the River Torrens and recreation space. Beyond this to the south are residential properties.
- East – Findon Road, beyond which are residential properties to the north east and recreational space (dog park) to the south east. The River Torrens also winds its way through the area to the south east.
- West – There is a commercial property (South Australian Sports Institute) located approximately 120 metres west of the site, but otherwise there are primarily residential properties in this direction.



Figure 3 – Aerial image showing site areas

3 ENVIRONMENTAL SETTING

3.1 Regional Geology

The Soil Association Map of the Adelaide Region indicates that the surface geology of the area consists of layered stream alluvium comprising silts, sands and gravels. The 1:50,000 scale Adelaide geological map produced by the South Australian Department of Mines and Energy shows the surface soils of the site are underlain by grey fluviatile silts, sands and gravels of the modern drainage channels.

Reference to the former Department of Mines and Energy Report Book 94/9 “Soils stratigraphy and engineering geology of the Adelaide Plains” indicates the site is situated in the Adelaide Plains in a landform area known as the lower alluvial plain. The general geological sequence in the lower alluvial plain comprises:-

- Quaternary Age sediments of fluvial and marine origin of the order of 100 metres thickness. The dominant formation is Hindmarsh Clay, which is predominantly clay, but has lenses of gravels, silts and sands. Groundwater in the Quaternary sediments occurs in relatively thin layers (up to a few metres in thickness) of more permeable materials (sands, silts, gravels). There are reportedly up to six distinct aquifers within the Quaternary sediments. These aquifers are not highly utilised as the yield and water quality are highly variable.
- Tertiary sediments of marine origin (limestones, sands and sandstones) up to 500 metres thickness. The Tertiary aquifers generally have better quality water and yields and are highly utilised in some areas.
- Precambrian Age basement rock below approximately 600 metres depth.

3.2 Regional Hydrogeology and Local Groundwater Users

The closest water body to the site is the River Torrens which is located approximately 25 metres to the south of the site.

Information regarding the regional hydrogeology for the site was obtained from the online South Australian Resource Information Gate (SARIG) map produced by the Department of Primary Industries and Resources of South Australia. SARIG indicates that expected depth to shallow groundwater is 5 to 10 metres below ground level (m bgl). The groundwater salinity is expected to range between 1,500 and 3,000 parts per million (ppm) expressed as total dissolved solids (TDS).

A search of groundwater wells within a two-kilometre radius was conducted using the WaterConnect database produced by the Department for Environment and Water. The results are included in Appendix D. The two-kilometre radius search identified hundreds of wells installed within the search radius, including 12 reportedly onsite. A detailed review of the entire dataset was beyond the scope of this investigation, but further site-specific information is provided in Section 3.3.

The expected regional groundwater flow direction for the Adelaide Plains is north-west, but there may be local variations. The River Torrens is located along the site’s southern boundary, which may have an impact on the regional groundwater flow direction. However, the River Torrens has been assessed to be a losing stream, which recharges the uppermost aquifer was assessed in the report ‘Groundwater Issues in the Torrens Catchment’ issued by the former Department of Mines and Energy (reference RB 96/41, dated December 1996).

3.3 Site Specific Geology and Hydrogeological Information

The soil profile encountered during previous investigations (refer Section 4) comprised fill material (sand and gravel mixtures) to a maximum depth of 1.4 metres. The fill included silts and sands with crushed rock/gravelly sand. Secondary constituents included organic matter, ash, bitumen, red brick and glass fragments at some locations. The underlying natural soils generally comprised brown to dark brown silty clay.

From the available information reviewed, including previous investigations across Area 1 (refer Section 4), 12 groundwater monitoring wells were reported to have been installed on-site. Details of these wells are presented in Table 2. There may have historically been other wells located on the site, but these were not identified during the investigations.

Table 2: On-site Groundwater Wells					
Well ID	Drill Date	Drill Depth (m)	Screening interval	SWL – October 2015 (m TOC)	TDS - October 2015 (mg/L)
EBT1	unknown	7.8	unknown	5.6	1,500
EB2	unknown	blocked			
GW1	November 2011	10	7 – 10m	6.14	2,400
GW2	November 2011	8	5 – 8m	5.76	2,300
GW3	November 2011	8	5 – 8m	5.53	1,100
MW01	September 2015	9	6 – 9m	6.26	3,200
MW02	September 2015	8	5 – 8m	6.46	3,200
MW03	September 2015	8	5 – 8m	5.51	1,900
MW04	September 2015	8	5 – 8m	5.63	2,400
MW05	September 2015	8	5 – 8m	5.70	2,700
MW06	September 2015	8	5 – 8m	6.54	2,500
MW07	September 2015	8	5 – 8m	6.15	1,900

TOC – top of well casing

As shown in Table 2, the depth to water in 2015 ranged between approximately 5.5m and 6.5m and salinity ranged between 1,100mg/L and 3,200mg/L, and were generally within the expected ranges for the area. The groundwater flow direction was inferred to be in a general westerly direction.

3.4 Nearest Environmental Receptors

The nearest surface water body is the River Torrens, located approximately 25 metres to the south of the site.

4 AREA 1: 404-450 FINDON ROAD

This portion of the site has been the subject of several environmental investigations over the past decade or below. Greencap is aware of the following reports:

- *'Phase 1 Environmental Site Assessment – Kidman Park IGA'* prepared by Noel Arnold and Associates (October 2011).
- *'Due Diligence Environmental Site Assessment (with Limited and Targeted Sampling) – 404-450 Findon Road, Kidman Park'*, prepared by Site Environmental and Remediation Services (SERS) (December 2011).
- *'Due Diligence Site Assessment, 404-450 Findon Road, Kidman Park'*, prepared by Greencap (July 2015).
- *Environmental Site Assessment, 404-450 Findon Road, Kidman Park'* prepared by Greencap (November 2015).

Copies of the main body (text only, excluding all associated appendices) of the two most relevant reports in terms of the overall assessment of the site, being the October 2011 Phase 1 Environmental Site Assessment and the November 2015 Environmental Site Assessment are provided in Appendix B and Appendix C, respectively.

Based on a review of the historical reports and additional information obtained by Greencap (including information presented in Appendix D) and a site inspection (on 24 September 2021), the following sections detail relevant site contamination information for Area 1.

4.1 Site History

The site appears to have been used for market gardening from the early 1900s until the mid-1960s. The site was developed in the 1960s for commercial / industrial purposes and was used as an industrial complex for warehousing of goods prior to distribution to various supermarkets across South Australia. Additional development occurred on the site over time as the site expanded to its current layout. The site use remained unchanged from the 1960s until recently when the site was purchased by Fairland. Site operations included warehousing and distribution of goods, washing of trucks, truck maintenance (including refuelling) and forklift maintenance.

A plan showing the layout during the site's most recent use as a distribution centre (based on information presented in the 2015 report is presented as Figure 4.

Although most of Area 1 is currently disused, Figure 4 also shows the two areas currently leased to third party civil companies for use as laydown areas/storage.



Figure 4 – Area 1 Layout (including historical uses)

4.2 Potentially Contaminating Activities

The potential sources of site contamination associated with past and present site use include (but may not be limited to):

- Former use of the site as market gardens. No specific mixing areas were identified, and any application of pesticides, herbicides or fertiliser is likely to have been on a broader scale.
- Imported fill material from various unknown sources for site levelling purposes and more specifically:
 - In the southern portion of the site (to build up the site from former floodplains).
 - While not identified in previous reports, page 54 of Appendix D makes reference to the presence of a clay mine located in the south western portion of the site. This is described to be rehabilitated and associated with the *'first clay pit opened west of Adelaide, being opened in 1840'* and redeveloped as a major shopping centre complex. Given the site has not ever been used as a shopping centre complex and historical drilling on the site does not appear to have identified the presence of deep areas of fill, it is possible this is incorrect location data.
 - Within a noise mound along the site's western boundary.
 - Areas of deeper fill were present around the underground storage tanks in the northern and central portion of the site.
 - A stockpile of waste material adjacent the pump station in the south western portion of the site.
 - Stockpiling of imported soil during recent use of two areas as laydown / storage areas.
- Five underground storage tanks (USTs) containing diesel and leaded petrol and associated infrastructure. There are two areas where USTs are located. There appears to be two USTs located in the western portion of the site and at least three USTs located in the eastern portion of the site. Photographs of the two areas are presented below:



Photographs 1 & 2 – USTs in the western (left) and eastern (right) portions of the site (24 September 2021)

- A truck washing area including a sump and interceptor trap. There also appears to be a former rubbish compactor or similar in this area. During the 2021 site inspection, there was some evidence of staining on the ground surface in this area.



Photograph 3 – view of the interceptor adjacent the former wash bay

- Forklift and truck maintenance areas. The main workshop was in the northern portion of the site as shown on Figure 4, and during operation (in 2015), there was evidence of small quantities of chemicals and waste oil stored in this area. Given the size of the site, it is possible maintenance activities also occurred in other portions of the site historically.
- Fire pumps including a diesel-powered generator and diesel storage tanks. A fire pump house (containing a diesel generator and storage drum) and two water storage tanks are present in the south western portion of the site. A fire pump house containing a diesel generator is present in the north of the site adjacent to the former maintenance building. There was no evidence of any staining on the ground surface associated with the generators or diesel storage.
- Electrical transformers. Three electrical transformers are present on site in the car park in the south east of the site, adjacent to the fire pump house in the south western portion of the site and adjacent to the fire pump house in the north east of the site. A generator was present in the transformer structure in the south eastern portion of the site. No obvious signs of leaks were evident around any of the transformers and all equipment appeared to be in reasonable condition.

4.3 Soil Investigations

Soil investigations have been carried out during two historical sampling events at the site:

- 28 soil bores were drilled as part of SERS 2011 limited investigation. These were generally targeted locations. Greencap has considered the reported results with respect to current site assessment criteria and the only exceedances were for copper (at two locations) and zinc (at one location) exceeding conservative ecological investigation levels within the upper 0.5 metres of the soil profile. There were also minor concentrations of hydrocarbons identified in soils around the two UST areas, but these were below the adopted assessment criteria.
- 112 grid based and 25 targeted soil bores were drilled as part of Greencap's 2015 investigation. The results from most locations tested did not exceed the adopted health or ecological criteria, but impacts were identified as follows:
 - One result for benzo(a)pyrene exceeded the adopted health investigation level (HIL) for standard residential land use from SB83_0.1-0.3. The reported result was below the adopted HIL for high density residential and commercial/industrial land uses.
 - Elevated results were reported for hydrocarbons above the adopted health screening criteria in near surface soils at five locations. Most of these were under existing bitumen surfaces and there did not appear to be any obvious contamination indicators within the soil profile (i.e. staining and/or odours).

- Elevated results were also reported for hydrocarbons around the two UST areas. Some of the results at depth around the eastern USTs exceeded the health screening levels for vapour intrusion (assuming a residential land use). There were also soil impacts around the western USTs, but at the locations tested, the results did not exceed the adopted assessment criteria.
- Asbestos containing material was identified at one location under the former dry goods warehouse at a depth greater than 1.0m. This was in the form of cement sheet fragments, but there were also some loose fibre bundles identified.

4.4 Groundwater Investigations

Groundwater investigations were initially undertaken in 2011 targeting the underground infrastructure including the two UST areas and the interceptor associated with the wash bay. Fuel related compounds were identified in groundwater adjacent both areas of USTs, most significantly adjacent the USTs in the eastern portion of the site. There were also elevated concentrations of volatile organic chemicals and heavy metals (chromium and lead).

During later sampling in 2015, the reported results generally indicated a decrease in concentrations of the chemicals of concern at wells that had been installed and sampled in 2011. Overall, the 2015 results identified the following:

- Elevated levels of the chlorinated hydrocarbon dichloromethane were reported above potable water assessment criteria in one well in the southern portion of the site. Several results were reported above the laboratory limit of reporting, but below the assessment criteria for chlorinated hydrocarbons (trichloroethene and tetrachloroethene) in the north western portion of the site.
- Pesticides were detected at low concentrations at two locations in the northern and western portions of the site.
- Fuel related compounds were identified in several wells around the USTs in the eastern portion of the site. Results were generally below the adopted assessment criteria during the most recent sampling event.
- There were some isolated heavy metals results, but these were in an upgradient well and may be representative of water quality entering the site from the east.

The SA EPA was notified of the existence of site contamination of groundwater in accordance with S83A of the *Environment Protection Act, 1993*.

4.5 Soil Vapour Investigations

Due to the potential for volatile chemicals around the USTs limited soil vapour investigations were carried out in these portions of the site in 2015.

- Elevated concentrations of chlorinated hydrocarbons were reported above the adopted assessment criteria around the USTs in the north western portion of the site. The source of these impacts was not determined as part of the investigations but given the absence of significant concentrations of these chemicals in groundwater, they may be a result of soil impacts.
- Elevated concentrations of fuel related compounds were also reported from all soil vapour points, but the results were below the adopted assessment criteria.

4.6 Summary of Findings

Several areas of interest were identified during previous investigations at the site. The areas in which remediation, management or additional assessment would likely be required in terms of site redevelopment include:

- Soils in the vicinity of the underground storage tanks in the eastern portion of the site. Soil impacts have been identified at depth (estimated 4.5 to 7m below ground level). The underground tanks and associated infrastructure will need to be removed prior to any redevelopment works so it is expected the impacted soil will be removed at the same time.
- Soils in the vicinity of the underground storage tanks in the north western portion of the site. While no soil impacts have been identified above the adopted screening levels in this area, the presence of solvent related soil vapours in soil (but not in groundwater) suggests there is likely to be impacted soil in this area. Given the underground tanks will need to be removed as part of any redevelopment works, it is expected that impacted soils will also be removed at this time.
- Asbestos containing material identified in soil at one location under the northern portion of the dry goods warehouse. The nature and extent of these impacts would require further assessment.
- Groundwater impacts in the north western and western portions of the site. Solvents and pesticides have been identified (albeit at relatively low concentrations) that would require further assessment if the site was to be redeveloped, and ongoing management.
- Soil vapour impacts in the vicinity of the underground tanks in the north western portion of the site. Impacts have been identified that exceed the adopted investigation levels.

5 AREA 2: 5 VALETTA ROAD

Greencap is not aware of any historical environmental investigations having been completed for this parcel of land.

A limited assessment of the history of the site has been researched to identify the characteristics including current and past site activities and uses of the site, where available. Much of the information has been obtained through a property report for the site and surrounding area provided by LotSearch Pty Ltd, which is provided in Appendix D.

5.1 Site Description and Layout

Area 2 is approximately 4,360 square metres in size and fronts Valetta Street. The site is almost entirely sealed except for a small area of garden beds adjacent the northern site boundary. Several large inter-connecting buildings cover most of the site. An aerial image showing the current site layout is presented as Figure 5 and photographs from the site boundary follow.



Figure 5 – Area 2 Layout

Greencap notes that no site inspection has been completed for Area 2 as the site is owned by a third party. Greencap is not aware of any proposals for redevelopment of this area. During the inspection of Area 1, the adjacent properties were viewed from accessible locations. There was some evidence of chemical storage

(1,000L Intermediate Bulk Containers (IBCs)) under a large canopy in the central portion of the site (refer Photograph 4). The nature of chemicals stored is not known but there was no evidence of leaks or spills in the areas visible.



Photograph 4 – view looking north west across central portion of Area 2



Photograph 5 – view looking west along northern boundary of Area 2



Photograph 6 – view looking south along eastern boundary of Area 2

5.2 History of Ownership / Occupancy

An historical ownership search was conducted on the current Certificate of Title to assess the potential for site contamination to exist because of present or historical land uses.

Copies of the historical Certificates of Title are presented in Appendix E and the sequence of ownership is summarised as follows:

- 1895 to 1931: Edward John Keele (licensed surveyor).
 - Leases over various portions of the land were granted during this period.
- 1931 to 1960: Henry Newton Spencer Wollaston & Rupert James Hamer (solicitors).
- 1960 to 1970: Rupert James Hamer & William George Campbell (solicitors)
- 1970 to 1972: Edward David Bisdee Keele (civil servant).
- 1972 to 1997: Ciba – Geigy Australian Limited (chemical manufacturer).
- 1997 to present: Z & M Investments Pty Ltd.
 - Lease to Wormald Australia Pty Ltd in 2019.

A search of the Universal Business Directory and Sands and McDougall Directory records, from years 1991, 1984, 1973, 1965, 1955, 1950, 1940, 1930, 1920 and 1910, mapped to a premise or road intersection (refer Appendix D) identified the following business of interest on the site:

- 1984: Ciba – Geigy Australia Pty Ltd (agricultural chemicals manufacturers and / or importer and or/distributors).
- 1991: Ciba – Geigy Australia Pty Ltd (dye / dyestuff / adhesive / agricultural chemicals / chemical manufacturers and / or importer and or/distributors).

5.3 Historical Aerial Photography

Aerial photographs of the site dating from 1935 in approximate 10-year intervals have been reviewed by Greencap. A summary of the observations made from these photographs for Area 2 is provided in Table 3. The aerial photographs reviewed are presented in Appendix D.

Table 3: Summary of Aerial Photograph Observations (Area 2)

Year	Observations
1935	Area 2 appears to be part of a larger agricultural area primarily used for market gardening, or similar. The land is essentially vacant, except for a small structure visible fronting Valetta Road, which may extend into the north eastern corner of Area 2.
1949	The site still appears to be used for agricultural purposes. A series of glasshouses, or similar have been constructed fronting Valetta Road, and some of these appear to fall within the footprint of Area 2. There are some additional structures visible in the south eastern portion of the site (possibly an additional glasshouse and shed). The remainder of the site appears to remain essentially vacant.
1959	The 1959 aerial photograph shows that the glasshouses visible in 1949 have been removed. There are still some structures near the south eastern corner of the site, but it is not clear if these extend onto the subject land or not. The site continues to be used for market gardening purposes.
1969	The 1969 aerial photograph shows Area 2 has been cleared and does not appear to be used for market gardening purposes (based on the absence of patterns on the ground surface). The site appears to be part of a larger parcel of essentially vacant land. There is some evidence of soil disturbance / earthworks in the south eastern portion of the site which may be associated with activities on Area 1.
1979	The 1979 aerial photograph shows that the site has been developed. A large building has been constructed fronting Valetta Road, with a bitumen sealed surface surrounding the building. A second smaller building has been constructed in the southern portion of Area 2. The ground surface in the central and southern portions of the site appears to be unsealed.

Table 3: Summary of Aerial Photograph Observations (Area 2)

Year	Observations
1989	Additional development has occurred on the site with a new structure constructed immediately south of the main building on the site. Most of the area now appears to have been sealed with concrete and/or bitumen, with the exception of an area along the northern and western boundaries.
1999	The 1999 aerial photograph shows no significant changes to Area 2 when compared with the 1989 aerial photograph.
2006	The 2006 aerial photograph shows that the building in the southern portion of Area 2 has been demolished and a larger building has been constructed which covers the majority of the southern portion of the site. This appears to be associated in with the existing building in the northern portion of the site.
2011 - 2021	The 2011, 2016 and 2021 aerial photographs show no significant changes to Area 2 when compared with the 2006 aerial photograph.

5.4 Potentially Contaminating Activities

Based on the limited desktop reviews for Area 2, the potentially contaminating activities identified include (but may not be limited to):

- Use of pesticides, herbicides and fertilisers during the historical use of the site for agricultural activities, and more specifically market garden purposes. Pesticides and herbicides may also have been used across the site since development occurred for general maintenance purposes.
- Historical use of the site by Ciba – Geigy Australia Pty Ltd from the early 1970s until at least the late 1990s. Details of the use of the site during this period are extremely limited but Ciba-Geigy are known to be a chemical manufacturer and distributor. As such, the manufacture, storage and potential disposal of chemicals at the site is possible.
- More recent use of the site by Wormald. The nature of site activities during their lease period is unknown, but without further evidence the potential for storage of firefighting chemicals possibly including per- and polyfluoroalkyl substances (PFAS) cannot be ruled out.
- Use of imported fill materials of unknown origin prior to / during site development for site levelling and as a base course under site buildings and sealed areas.

The nature and extent of any site contamination is unknown and Greencap is not aware of any intrusive investigations having been undertaken across this area.

6 AREA 3: 7 VALETTA ROAD

Greencap is not aware of any historical environmental investigations having been completed for this parcel of land.

A limited assessment of the history of the site has been researched to identify the characteristics including current and past site activities and uses of the site, where available. Much of the information has been obtained through a property report for the site and surrounding area provided by LotSearch Pty Ltd, which is provided in Appendix D.

6.1 Site Description and Layout

Area 3 is approximately 4,550 square metres in size and fronts Valetta Street. The site is almost entirely sealed except for a grassed area in the northern portion of the site and garden beds along the western site boundary. A large building covers most of the site, and there are several smaller structures in the southern portion of the Area. Greencap notes that no site inspection has been completed as the site is owned by a third party. Greencap is not aware of any proposals for redevelopment of this portion of the site. An aerial image showing the current site layout is presented as Figure 6 and photographs from the site boundary follow.



Figure 6 – Area 3 Layout



Photograph 7 – view looking south east across the northern portion of Area 3



Photograph 8 – view looking south along the western boundary of Area 3

6.2 History of Ownership / Occupancy

An historical ownership search was conducted on the current Certificate of Title to assess the potential for site contamination to exist because of present or historical land uses.

Copies of the historical Certificates of Title are presented in Appendix E and the sequence of ownership is summarised as follows:

- 1895 to 1931: Edward John Keele (licensed surveyor).
 - Leases over various portions of the land were granted during this period.
- 1931 to 1960: Henry Newton Spencer Wollaston & Rupert James Hamer (solicitors).
- 1960 to 1970: Rupert James Hamer & William George Campbell (solicitors)
- 1970 to 1970: Mary Joyce Peppin Swan.
- 1970 to 2010: Research Laboratories of Australia Pty Ltd.
- 2010 to present: Rolleb Investments Pty Ltd.
 - Lease to Research Laboratories of Australia Pty Ltd in 2010.
 - Lease to Fugro Lads Corporation Pty Ltd in 2011.
 - Lease to Fugro Australia Marine Pty Ltd in 2021.

A search of the Universal Business Directory and Sands and McDougall Directory records, from years 1991, 1984, 1973, 1965, 1955, 1950, 1940, 1930, 1920 and 1910, mapped to a premise or road intersection (refer Appendix D) did not identify any businesses of interest on the site.

6.3 Historical Aerial Photography

Aerial photographs of the site dating from 1935 in approximate 10-year intervals have been reviewed by Greencap. A summary of the observations made from these photographs for Area 3 is provided in Table 4. The aerial photographs reviewed are presented in Appendix D.

Table 4: Summary of Aerial Photograph Observations (Area 3)	
Year	Observations
1935	Area 3 appears to be part of a larger agricultural area primarily used for market gardening, or similar. The land is essentially vacant, except for a small structure visible fronting Valetta Road, which may extend into the north western corner of Area 3.
1949	The site still appears to be used for agricultural purposes. A series of glasshouses, or similar have been constructed fronting Valetta Road. The remainder of the site appears to remain essentially vacant.
1959	The 1959 aerial photograph shows that the glasshouses visible in 1949 have been removed. The site continues to be used for market gardening purposes. An access driveway is visible near the western boundary of Area 3.
1969	The 1969 aerial photograph shows Area 3 has been cleared and does not appear to be used for market gardening purposes (based on the absence of patterns on the ground surface). The site appears to be part of a larger parcel of essentially vacant land.
1979	The 1979 aerial photograph shows that the site has been developed. A large building has been constructed fronting Valetta Road, with grass areas visible to the north and south of this building. A second smaller structure (possibly two structures) has been constructed in the southern portion of Area 3. The ground surface in the southern portion of Area 3 appears to be bitumen paved.
1989	Additional development has occurred on the site with a new structure constructed immediately south of the main building on the site, which appears to be connected to the other structures in the southern portion of the area. The balance of the site appears to be used primarily for car parking purposes.
1999	The 1999 aerial photograph shows no significant changes to most of Area 3, but an additional building (or possibly multiple smaller structures) appear to have been constructed on the southern boundary.
2006	The 2006 aerial photograph shows no significant changes to most of the site. A shipping container (or similar) is visible in the southern portion of the site, but there does not appear to be any obvious changes to the buildings on the site.
2011 - 2021	The 2011, 2016 and 2021 aerial photographs show no significant changes to Area 3 when compared with the 2006 aerial photograph.

6.4 Potentially Contaminating Activities

Based on the limited information reviews for Area 3, the potentially contaminating activities identified include (but may not be limited to):

- Use of pesticides, herbicides and fertilisers during historical use of the site for agricultural activities, and more specifically market garden purposes. Pesticides and herbicides may also have been used across the site since development occurred for general maintenance purposes.
- Historical use of the site by Research Laboratory from the 1970s until around 2010. Details of the use of the site during this period are extremely limited, but the potential for the storage, use and disposal of laboratory chemicals and production of waste substances cannot be ruled out.
- Use of imported fill materials of unknown origin prior to / during site development for site levelling and as a base course under site buildings and sealed areas.

The nature and extent of any site contamination is unknown and Greencap is not aware of any intrusive investigations that have been undertaken across this area.

7 SURROUNDING AREA

GreenCap has considered the use of surrounding properties and the potential for contamination that may impact on the proposed rezoning of the site. It is acknowledged that the surrounding properties are currently largely residential (refer Section 2.2).

7.1 Historical Business Directory Searches

Searches of the Universal Business Directory and Sands and McDougall Directory records, from years 1991, 1984, 1973, 1965, 1955, 1950, 1940, 1930, 1920 and 1910, mapped to a premise or road intersection identified numerous results for the site and surrounding area. The search results are included in Appendix D. Several off-site occupiers of note were identified, including:

- 68A Rowells Road (52m south east) – various listings for crash repairers, panel beaters/spray painters, and welders (1965, 1973, 1984 and 1991). A furniture manufacturer / furnisher was also listed at this address in 1965.
- 66 Rowells Road (82m south east) – listing for motor engineer and repairers.

Other listings are noted, but aerial imagery for the periods indicated suggests the allotments of interest were of residential size and as such, the businesses listed are more likely to be occupations of residences, rather than specifically relating to activities being undertaken.

There were also road matches (no listed current address) for various businesses including: sand and metal suppliers (Findon Road, 1973), plastic goods manufacturer and supplier (Valetta Road, 1973), motor engineers, garage or service station (Rowells Road, 1965) and market gardeners and horticulturalists (Rowells Road, 1930).

There were other listings for activities of interest such as dry cleaners, motor garages and service stations, but these all appear to be more than 300 metres from the site.

7.2 Government Searches

EPA Site Contamination Index

A search was conducted of the EPA's on-line Site Contamination Index for information relating to notifications and reports received by the EPA. The Index provides information relating to Site Contamination, Audit notifications and reports that relate to specific suburbs or towns. The search was undertaken within a 1 kilometre radius of the site.

A notification under Section 83A of *the Act* (i.e. groundwater contamination) is recorded for the site. This relates to the groundwater assessment completed as part of historical investigations (refer Section 4).

Other nearby sites (within 500m) with information on the Index include:

- An Audit report (pre-2009) for a property located 22m to the north east at 323 Findon Road, Kidman Park. The activity of interest is listed as liquid organic chemical substances storage.
- An Audit report (pre-2009) for a property located 172m to the south west on Dunrobin Street, Lockleys, but no activity of interest was recorded.
- A Section 109 notification for a property located 204m south at 59 Main Street, Lockleys relating to agricultural activities.
- A Section 83A notification for a property 495m north at 338-342 Findon Road, Kidman Park. The activity of interest is listed as liquid organic chemical substances storage.

Most of the listings within the search radius are not in the inferred up-hydraulic gradient direction of the site. The only site in the up-hydraulic gradient direction (east / south east) within 500m is the property at 323 Findon Road, Kidman Park, which is located across Findon Road immediately to the east. Greencap has not obtained / reviewed reports for offsite activities as part of this investigation.

EPA Public Register Authorisations, Applications, and EPA assessment Areas

A search was undertaken for EPA Protection or Clean Up Orders within a 1 kilometre radius of the site. Two Environment Protection Orders were recorded within the search area. One for a site located at 55 Torrens Avenue, Lockleys (255m south west), where the activity was described as '*disposal of asbestos contaminated waste soil at site not licenced to receive waste*'. The other site listed was more than 500m from the site.

A search for EPA authorisation and authorisation applications did not identify any results within 500m of the site. The nearest EPA Licence relates to a site 779m north and relates to activities producing listed wastes..

No EPA assessment areas were listed within the 1 kilometre radius search area.

PFAS Investigation Sites

No Defence PFAS investigation and management programs were found within a 1 kilometre search of the site. An Airservices Australia National PFAS management programs was identified for Adelaide Airport, located almost 1.7km south of the site. This is not considered relevant to the subject land.

Waste Management and Liquid Fuel Facilities

A search for waste management and liquid fuel facilities was undertaken within a 1 kilometre radius of the site. No waste management facilities were recorded on the site or neighbouring sites. A National Liquid Fuel Facility (petrol station) was recorded 920m north of the site at 245 Findon Road, Findon.

Heritage

Searches were undertaken Commonwealth Heritage List, National Heritage List and State Heritage Areas and SA Heritage Places on-site and within a 1 kilometre radius of the site. The site was not listed on any of the search results.

Aboriginal Land

No records were listed for grants relating to Aboriginal land on-site or within a 1 kilometre radius of the site.

8 CONCLUSIONS

Greencap has reviewed the contamination status of the site utilising a range of historical reports and readily available information. For this assessment, the site was separated into three areas; Area 1 – 404-450 Findon Road, Area 2 – 5 Valetta Road and Area 3 – 7 Valetta Road.

The entire site appears to have been used for agricultural purpose (market gardens) until the 1960s at which point Area 1 was developed for commercial / industrial purposes for use by Metcash as a distribution centre. Over time, Area 1 was developed with additional warehousing and associated facilities and used for similar purposes until recently. Area 1 is currently essentially vacant, but some areas of the site are leased for use as laydown / storage for construction/civil businesses.

The remainder of the site was undeveloped until the 1970s when Area 2 was developed for use by Ciba – Geigy Australia (a chemical manufacturer and distributor) and Area 3 was developed for use as a research laboratory. Area 2 appears to have been used by Ciba – Geigy until at least the late 1990s and while details of site use since this time are largely unknown, it is currently occupied by Wormald Australia, fire safety specialists. Area 3 appears to have been used for research laboratory purposes until approximately 2010, at which point Fugro (geo-data specialists) took over occupancy.

The identified potentially contaminating activities include (but may not be limited to):

- Use of pesticides, herbicides and fertilisers during historical use of the site for agricultural activities, and more specifically market garden purposes. Pesticides and herbicides may also have been used across the site since development occurred for general maintenance purposes.
- Use of imported fill materials of unknown origin prior to / during site development for site levelling (particularly in the southern portion of the site near the River Torrens) and as a base course under site buildings and sealed areas and for construction of a noise mound along the western boundary of the site.
- Use of Area 1 as a distribution centre by Metcash since the 1960s. Activities of interest include two areas of underground fuel storage and dispensing, a truck wash down bay and associated interceptor pit, forklift and vehicle maintenance activities and various areas where quantities of fuels (diesel), oils and other chemicals may have been stored.
- Use of Area 2 by Ciba – Geigy Australia Pty Ltd from the early 1970s until at least the late 1990s. Details of the use of the site during this period are limited but Ciba-Geigy are a chemical manufacturer and distributor. As such, the manufacture, storage and potential disposal of chemicals at the site is possible.
- Use of Area 2 by Wormald over recent years. The nature of site activities during their lease period is unknown, but without further evidence the potential for storage of firefighting chemicals, possibly including per- and polyfluoroalkyl substances (PFAS), cannot be ruled out.
- Use of Area 3 by a research laboratory from the 1970s until around 2010. Details of the use of the site during this period are limited, but the potential for spillage/leakage of laboratory chemicals and production of waste substances cannot be ruled out.

Site contamination investigations have been completed across most of the site (roughly 90% based on area). The main findings are as follows:

- At most locations where soil was tested, there were no elevated results that exceed the adopted assessment criteria. As such, there is no evidence of widespread soil contamination across the site.
- Site contamination has been identified in the vicinity of both areas of underground fuel storage and dispensing. This is in the form of soil impacts surrounding the tanks and there is also evidence of groundwater and soil vapour impacts associated with leakage from the underground infrastructure.

- Asbestos containing material was identified in soil under the northern portion of the former dry goods warehouse (largest building within Area 1). The nature and extent of these impacts requires further assessment. While asbestos was not identified at any of the other locations tested, the assessment was undertaken using soil bores only.
- Groundwater impacts (in addition to the fuel impacts around the underground storage tanks) have been identified in the north western and western portions of the site. Solvents and pesticides have been identified (albeit at relatively low concentrations). At the concentrations detected, the results are unlikely to present an unacceptable risk to future site users if groundwater is not extracted for use. Further assessment is required to better define the nature and extent of these impacts and (where possible) identify sources.

It is acknowledged that additional works will be required to confirm the site's suitability for any future use, particularly where more sensitive land uses are proposed in accordance with the requirements of 'Practice Direction 14 – Site Contamination Assessment 2021' issued by the State Planning Commission. There will be a requirement for targeted remediation and/or management of identified site contamination issues, but these would be addressed through future intrusive site assessment. Where future development includes sensitive land uses (such as residential), a Site Contamination Auditor will be required to provide the ultimate statement of suitability.

There are portions of the site (specifically Areas 2 and 3) where no site-specific investigations have been undertaken. There has been some limited assessment of groundwater in the inferred downhydraulic gradient of these areas and no significant widespread issues were identified.

Overall, based on the available information and the identified environmental condition of the site, no site contamination issues have been identified which would preclude rezoning for mixed-use purposes, which may include low to medium density residential.

Environmental Condition – Site Contamination Study

Fairland Group Pty Ltd

Cnr Findon & Valetta Roads, Kidman Park

APPENDIX A SAPPA REPORTS

SAPPA Parcel Report

Date Created: November 9, 2021

The South Australian Property and Planning Atlas is available at the Plan SA website <https://sappa.plan.sa.gov.au/>



Address Details

Unit Number:
Street Number: 436
Street Name: FINDON
Street Type: RD
Suburb: KIDMAN PARK
Postcode: 5025

Scale ≈ 1:4383 (on A4 page)

200 metres≈

The information provided, is not represented to be accurate, current or complete at the time of printing this report.

Property Details:

Council: CITY OF CHARLES STURT
State Electorate: COLTON (2014), COLTON (2018), COLTON (2022)
Federal Electorate: HINDMARSH (2013), HINDMARSH (2016), HINDMARSH (2019)
Hundred: YATALA
Valuation Number: 2513185505
Title Reference: CT6154/507
Plan No. Parcel No.: D19661A401

The Government of South Australia accepts no liability for the use of this data, or any reliance placed on it.

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Zoning details next page

Zone Details

Zones

Strategic Employment (Z5720) - SE

Overlays

Airport Building Heights (Regulated) (O0303) - All structures over 15 metres

The Airport Building Heights (Regulated) Overlay seeks to ensure building height does not pose a hazard to the operation and safety requirements of commercial and military airfields.

Advertising Near Signalised Intersections (O0305)

The Advertising Near Signalised Intersections Overlay seeks to ensure advertising near signalised intersections does not pose an unacceptable risk to pedestrian or road safety.

Building Near Airfields (O0601)

The Building Near Airfields Overlay seeks to ensure development does not pose a hazard to the operational and safety requirements of commercial and military airfields.

Hazards (Flooding) (O2403)

The Hazards (Flooding) Overlay seeks to minimise flood hazard risk to people, property, infrastructure and the environment.

Hazards (Flooding - General) (O2414)

The Hazards (Flooding - General) Overlay seeks to minimise impacts of general flood risk through appropriate siting and design of development.

Prescribed Wells Area (O4804)

The Prescribed Wells Area Overlay seeks to ensure sustainable water use in prescribed wells areas.

Regulated and Significant Tree (O5404)

The Regulated and Significant Tree Overlay seeks to mitigate the loss of regulated trees through appropriate development and redevelopment.

Traffic Generating Development (O6001)

The Traffic Generating Development Overlay aims to ensure safe and efficient vehicle movement and access along urban transport routes and major urban transport routes.

Urban Transport Routes (O6301)

The Urban Transport Routes Overlay seeks to ensure safe and efficient vehicle movement and access along urban transport routes.

Water Resources (O6902)

The Water Resources Overlay seeks to protect the quality of surface waters in South Australia.

Variations

Maximum Building Height (Metres) (V0002) - 12

Maximum building height is 12m

SAPPA Parcel Report

Date Created: November 9, 2021

The South Australian Property and Planning Atlas is available at the Plan SA website <https://sappa.plan.sa.gov.au/>



Address Details

Unit Number:
Street Number: 404
Street Name: FINDON
Street Type: RD
Suburb: KIDMAN PARK
Postcode: 5025

Scale ≈ 1:672 (on A4 page)

25 metres≈

The information provided, is not represented to be accurate, current or complete at the time of printing this report.

Property Details:

Council: CITY OF CHARLES STURT
State Electorate: COLTON (2014), COLTON (2018), COLTON (2022)
Federal Electorate: HINDMARSH (2013), HINDMARSH (2016), HINDMARSH (2019)
Hundred: YATALA
Valuation Number: 2513233001
Title Reference: CT6155/62
Plan No. Parcel No.: F6069A301

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Zoning details next page



Government of South Australia
Attorney-General's Department

Zone Details

Zones

Strategic Employment (Z5720) - SE

Overlays

Airport Building Heights (Regulated) (O0303) - All structures over 15 metres

The Airport Building Heights (Regulated) Overlay seeks to ensure building height does not pose a hazard to the operation and safety requirements of commercial and military airfields.

Advertising Near Signalised Intersections (O0305)

The Advertising Near Signalised Intersections Overlay seeks to ensure advertising near signalised intersections does not pose an unacceptable risk to pedestrian or road safety.

Building Near Airfields (O0601)

The Building Near Airfields Overlay seeks to ensure development does not pose a hazard to the operational and safety requirements of commercial and military airfields.

Hazards (Flooding - General) (O2414)

The Hazards (Flooding - General) Overlay seeks to minimise impacts of general flood risk through appropriate siting and design of development.

Prescribed Wells Area (O4804)

The Prescribed Wells Area Overlay seeks to ensure sustainable water use in prescribed wells areas.

Regulated and Significant Tree (O5404)

The Regulated and Significant Tree Overlay seeks to mitigate the loss of regulated trees through appropriate development and redevelopment.

Traffic Generating Development (O6001)

The Traffic Generating Development Overlay aims to ensure safe and efficient vehicle movement and access along urban transport routes and major urban transport routes.

Urban Transport Routes (O6301)

The Urban Transport Routes Overlay seeks to ensure safe and efficient vehicle movement and access along urban transport routes.

Variations

Maximum Building Height (Metres) (V0002) - 12

Maximum building height is 12m

SAPPA Parcel Report

Date Created: November 9, 2021

The South Australian Property and Planning Atlas is available at the Plan SA website <https://sappa.plan.sa.gov.au/>



Address Details

Unit Number:
Street Number: 5
Street Name: VALETTA
Street Type: RD
Suburb: KIDMAN PARK
Postcode: 5025

Scale ≈ 1:931 (on A4 page)

25 metres≈

The information provided, is not represented to be accurate, current or complete at the time of printing this report.

Property Details:

Council: CITY OF CHARLES STURT
State Electorate: COLTON (2014), COLTON (2018), COLTON (2022)
Federal Electorate: HINDMARSH (2013), HINDMARSH (2016), HINDMARSH (2019)
Hundred: YATALA
Valuation Number: 2513234004
Title Reference: CT5415/550
Plan No. Parcel No.: F13538A306

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Zoning details next page



Government of South Australia
Attorney-General's Department

Zone Details

Zones

Strategic Employment (Z5720) - SE

Overlays

Airport Building Heights (Regulated) (O0303) - All structures over 15 metres

The Airport Building Heights (Regulated) Overlay seeks to ensure building height does not pose a hazard to the operation and safety requirements of commercial and military airfields.

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Variations

Maximum Building Height (Metres) (V0002) - 12

Maximum building height is 12m

SAPPA Parcel Report

Date Created: November 9, 2021

The South Australian Property and Planning Atlas is available at the Plan SA website <https://sappa.plan.sa.gov.au/>



Address Details

Unit Number:
Street Number: 7
Street Name: VALETTA
Street Type: RD
Suburb: KIDMAN PARK
Postcode: 5025

Scale ≈ 1:967 (on A4 page)

50 metres≈

The information provided,
is not represented to be accurate,
current or complete at the time of
printing this report.

Property Details:

Council: CITY OF CHARLES STURT
State Electorate: COLTON (2014), COLTON (2018), COLTON (2022)
Federal Electorate: HINDMARSH (2013), HINDMARSH (2016), HINDMARSH (2019)
Hundred: YATALA
Valuation Number: 2513240009
Title Reference: CT5830/738
Plan No. Parcel No.: F13538A305

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Zoning details next page

Zone Details

Zones

Strategic Employment (Z5720) - SE

Overlays

Airport Building Heights (Regulated) (O0303) - All structures over 15 metres

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Variations

Maximum Building Height (Metres) (V0002) - 12

Maximum building height is 12m

REAL PROPERTY ACT, 1886



South Australia

The Registrar-General certifies that this Title Register Search displays the records maintained in the Register Book and other notations at the time of searching.



Certificate of Title - Volume 6154 Folio 507

Parent Title(s) CT 6134/993**Creating Dealing(s)** DDA 12292290**Title Issued** 25/03/2015 **Edition** 9 **Edition Issued** 03/06/2021

Estate Type

FEE SIMPLE

Registered Proprietor

FAIRLAND GROUP PTY. LTD. (ACN: 609 132 363)
OF 19 FULLARTON ROAD KENT TOWN SA 5067

Description of Land

ALLOTMENT 401 DEPOSITED PLAN 19661
IN THE AREA NAMED KIDMAN PARK
HUNDRED OF YATALA

Easements

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED A AND B (TG 11640603)

Schedule of Dealings

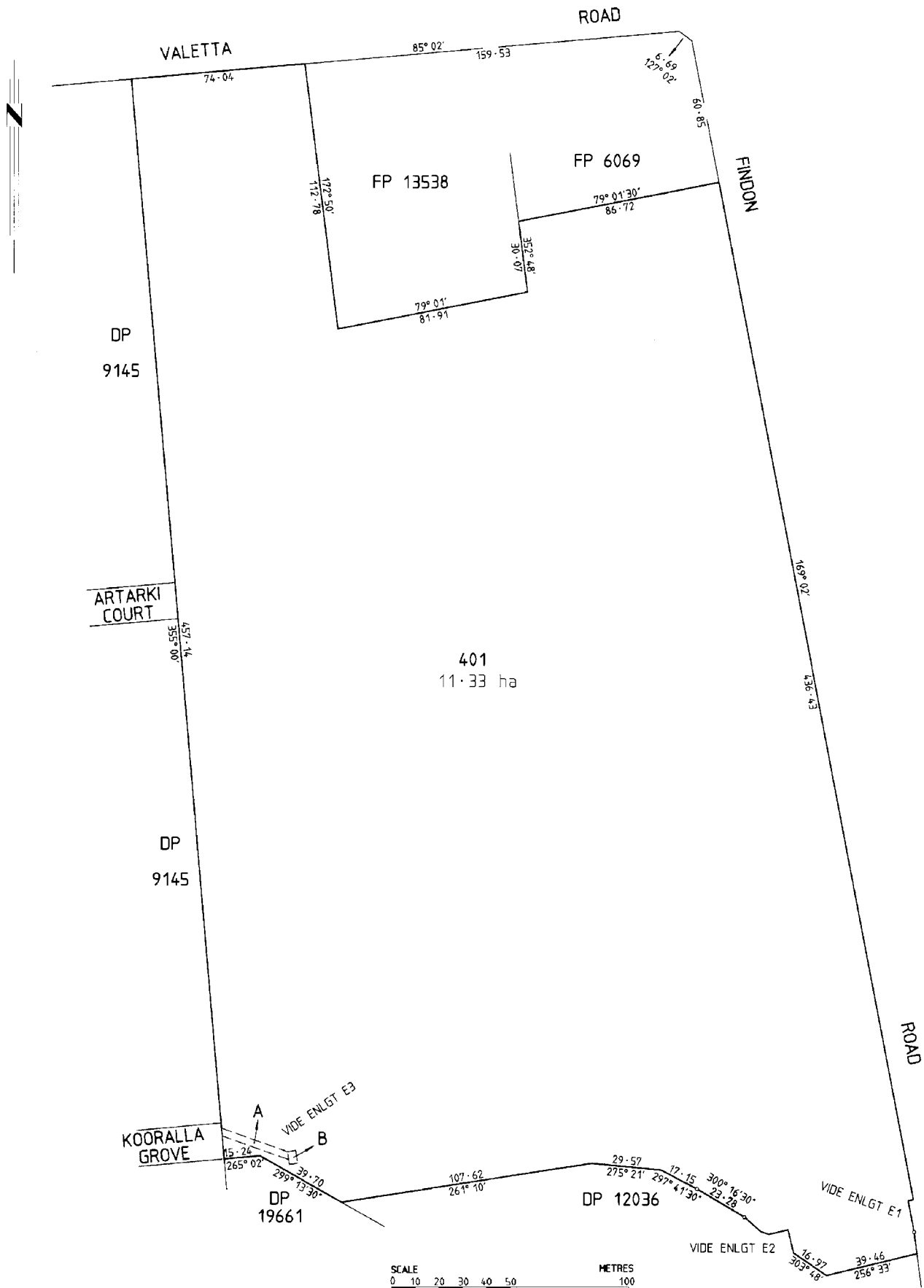
Dealing Number	Description
8549394	LEASE TO METCASH TRADING LTD. COMMENCING ON 18/05/1998 AND EXPIRING ON 30/06/2021

Notations

Dealings Affecting Title NIL**Priority Notices** NIL**Notations on Plan** NIL

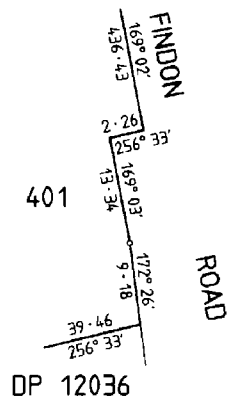
Registrar-General's Notes

PLAN FOR LEASE PURPOSES VIDE G168/2000
TEXTUAL AMENDMENT VIDE 12491414**Administrative Interests** NIL

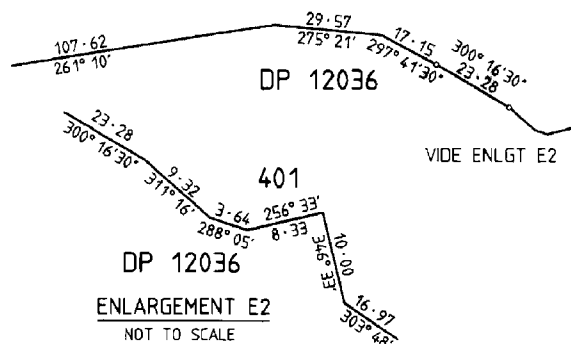
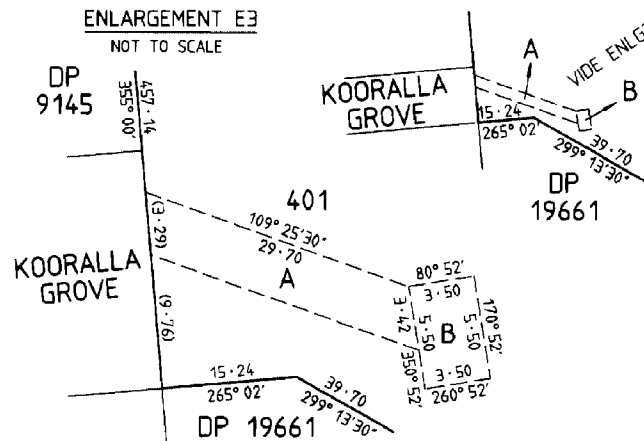




ENLARGEMENT E1
NOT TO SCALE



ENLARGEMENT E3
NOT TO SCALE



REAL PROPERTY ACT, 1886



The Registrar-General certifies that this Title Register Search displays the records maintained in the Register Book and other notations at the time of searching.



Certificate of Title - Volume 6155 Folio 62

Parent Title(s) CT 6134/985
Creating Dealing(s) DDA 12295631
Title Issued 31/03/2015 **Edition** 8 **Edition Issued** 03/06/2021

Estate Type

FEE SIMPLE

Registered Proprietor

FAIRLAND GROUP PTY. LTD. (ACN: 609 132 363)
OF 19 FULLARTON ROAD KENT TOWN SA 5067

Description of Land

ALLOTMENT 301 FILED PLAN 6069
IN THE AREA NAMED KIDMAN PARK
HUNDRED OF YATALA

Easements

NIL

Schedule of Dealings

Dealing Number	Description
8549395	LEASE TO METCASH TRADING LTD. (ACN: 000 031 569) COMMENCING ON 18/05/1998 AND EXPIRING ON 30/06/2021

Notations

Dealings Affecting Title NIL

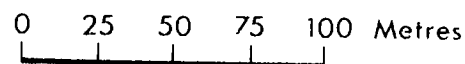
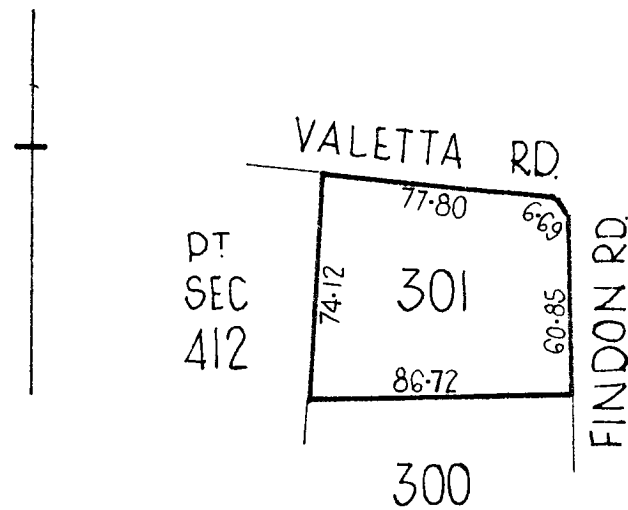
Priority Notices NIL

Notations on Plan NIL

Registrar-General's Notes

TEXTUAL AMENDMENT VIDE 12491414

Administrative Interests NIL



Environmental Condition – Site Contamination Study

Fairland Group Pty Ltd

Cnr Findon & Valetta Roads, Kidman Park

APPENDIX B 2011 PHASE 1 REPORT



Phase 1 Environmental Site Assessment Kidman Park IGA

Centro Properties Group

Kidman Park



October 2011

95223

Statement of Limitations

This report has been prepared in accordance with the agreement between Centro Properties Group and Noel Arnold & Associates Pty Ltd.

Within the limitations of the agreed upon scope of services, this work has been undertaken and performed in a professional manner, in accordance with generally accepted practices, using a degree of skill and care ordinarily exercised by members of its profession and consulting practice. No other warranty, expressed or implied, is made.

This report is solely for the use of Centro Properties Group and any reliance on this report by third parties shall be at such party's sole risk and may not contain sufficient information for purposes of other parties or for other uses. This report shall only be presented in full and may not be used to support any other objective than those set out in the report, except where written approval with comments are provided by Noel Arnold & Associates Pty Ltd.

Sampling Risks

It is noted that professional judgment has been used to interpret the data obtained from site sampling and subsequent laboratory testing in order to characterise contamination that is present on site. Centro Properties Group accepts that even a comprehensive sampling and testing program, implemented with the appropriate equipment and experienced personnel under the direction of a trained professional who functions in accordance with a professional standard of care, may fail to detect certain conditions because they are hidden and therefore cannot be considered in development of a sub-surface exploration program.

The extent of soil sampling and analysis has been targeted towards areas where contamination is considered to be most likely, based on site history and visual assessment. The methods adopted are in accordance with recognised industry standards. This approach maximises the probability of identifying contaminants. However, it may not identify contamination that occurs in unexpected locations or from unexplained sources. Soil contamination can be expected to be non-homogenous across the stratified soils where present on site, and the concentrations of contaminants may vary significantly within areas where the contamination has occurred. For this reason the results should be regarded as indicative only.

Contaminant movement within the soil and within groundwater can follow paths of high permeability and it is possible that sampling will not have intersected these preferential pathways. In the case of groundwater, the flow can follow relatively narrow migration paths within minor aquifers. Noel Arnold & Associates Pty Ltd is available to explain these risks and risk reduction methods to Centro Properties Group, but in any event, the scope of services included with the Proposal is that which Centro Properties Group agreed to or selected in light of his own risk preferences and other considerations.

Sampling of soil or groundwater may result in contamination of certain sub-surface areas, as when a probe or boring device moves through a contaminated area, linking it to an aquifer or other water body not previously contaminated. Noel Arnold & Associates Pty Ltd has applied its best efforts to minimise and eliminate such cross contamination during the conduct of any sub-surface investigation. Because sub-surface sampling is a necessary aspect of the work which Noel Arnold & Associates Pty Ltd may perform on Centro Properties Group's behalf, Centro Properties Group waives any claims against Noel Arnold & Associates Pty Ltd and agrees to defend, indemnify and hold Noel Arnold & Associates Pty Ltd harmless from any claims or liability for injury or loss which may arise as a result of alleged cross contamination caused by sampling.

Reliance on Information Provided by Others

Whilst the techniques used in the assessment are in accordance with recognised industry standards, the investigations also rely on information provided to Noel Arnold & Associates Pty Ltd by third parties. Naturally, Noel Arnold & Associates Pty Ltd cannot guarantee completeness or accuracy of any descriptions or conclusions based on information supplied to it during site surveys, visits and interviews. The extent of risk Centro Properties Group wishes to accept is something which Centro Properties Group must determine and accordingly, Centro Properties Group waives any claim against Noel Arnold & Associates Pty Ltd and agrees to defend, indemnify and hold Noel Arnold & Associates Pty Ltd harmless from any claim or liability for injury or loss allegedly arising from errors, omissions or inaccuracies in documents or other information provided to Noel Arnold & Associates Pty Ltd by Centro Properties Group.

Recommendations for Further Study

Noel Arnold & Associates Pty Ltd's preliminary findings which may result from this investigation/study may require verification through further analytical testing programs. The final decision to conduct additional investigative activities will be dependent upon Centro Properties Group's assessment of the business risks involved. Centro Properties Group agrees to hold Noel Arnold & Associates Pty Ltd harmless from any claim, losses or damages arising out of Centro Properties Group's rejection of any additional work suggested by Noel Arnold & Associates Pty Ltd as a result of the work performed hereunder.

Phase 1 Environmental Site Assessment Kidman Park IGA

Centro Properties Group

Kidman Park

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1. Introduction

1.1 Terms of Reference

This report has been prepared for Centro Properties Group (Centro) by Noel Arnold and Associates (NAA). It documents a Phase 1 Environmental Site Assessment (ESA) of 404-450 Findon Road, Kidman Park, SA (the site). A site location plan is included as Figure 1.

1.2 Background

NAA understand that the site is to be sold to a third party and Centro commissioned this Phase 1 report to provide information relating to the site history and potential sources of contamination at the property.

1.3 Objectives

The objective of the proposed work was to reduce the uncertainty associated with any potential contamination that may exist at the site as a result of past activities and/or the current environmental setting of the site.

1.4 Scope of Works

The scope of services included the following:

- Site inspection to establish the general nature and condition of the property and detail potential contamination sources and pathways;
- A review of selected publicly available historical information, including historical aerial photographs, Certificates of Title, SA EPA Site Contamination Groundwater Notification Index and Section 7 search, national pollution inventory and Dangerous Substance Licence search;
- A review of the environmental site setting, including a review of relevant geological, hydrological and hydrogeological information; and
- Compilation of the information into a report highlighting potential environmental contamination issues that may be present.

2. Property Location and Setting

2.1 Site Description and Location

The site is an irregular shaped parcel of land with a total area of approximately 11.9 hectares. The site consists of numerous warehouses, offices and maintenance sheds.

The site is situated in the suburb of Kidman Park, located approximately 6 kilometres north west of the Adelaide CBD and 3.6 kilometres west of the coast (Gulf St Vincent). The site is generally level and the surrounding areas are slightly undulating. The nearest watercourse or surface water body is the River Torrens which is located approximately 25 metres to the south of the site (adjacent to the southern site boundary).

2.2 Title Information and Site Boundary

The Site, known as 404-450 Findon Road, Kidman Park is described by two Certificates of Title, as summarised in Table 1.

Table 1. Certificates of Title

Certificate of Title Volume / Folio	Lot Number	Street number	Street name	Plan
5117 / 256	301	404-406	Findon Road	Filed Plan 6069
5117 / 253	401	436-450	Findon Road	Deposited Plan 19661

The registered owner of both Certificates of Title is CPT Manager Ltd.

Copies of the Certificates of Title are included in Appendix A.

2.3 Site Inspection

As part of the Phase 1 ESA, a site inspection was undertaken on 27 September 2011 by an Environmental Scientist from NAA. At the time of the site inspection, the site was operating as a large warehousing and distribution complex. The inspection covered the warehouse area, maintenance areas, fire pump rooms and the outside areas. It should be noted that the roof (and therefore cooling towers) were not accessed.

General observations include:

- Underground storage tanks – Two areas containing decommissioned diesel and lead petrol underground storage tanks (USTs) were located in the northern and central portions of the site. Both areas were covered in concrete hardstand. There are a total of five USTs on the site with associated fuel lines and bowsers. NAA was informed that the USTs and underground infrastructure had been decommissioned and the bowsers had been removed. However, no associated records were provided.
- A sump and an interceptor trap were noted within and adjacent to the truck washing area. It was noted that although the truck wash area was bunded, there was the potential for overspray from the truck wash to enter the stormwater system located adjacent to the southern side of the truck wash area.
- Fill material – An elongated soil mound (approximately 100 metres long and 3 metres high) was located on the north western boundary of the site. In addition, areas of fill material were noted on the ground surface in the northern portion of the site (where exposed soil is evident). It was also noted that the land adjacent to the southern boundary of the site was at least five metres lower than the site. This is likely to be a result of fill being brought onto the site for site levelling and build up.
- Workshop – The workshop area located in the central portion of the site was utilised as an area to conduct maintenance on the on-site forklifts. A minor chemical / waste oil store was noted on shelves in an unbunded area with a concrete floor.
- Electrical transformers – Three electrical transformers are located on-site – in the south western corner, south eastern corner and central portion of the site adjacent to the service department. The transformer rooms had concrete floors in good condition.
- Fire Pump House - Two fire pump houses containing diesel powered generators were located on the site. Each Fire Pump House contained an estimated 200 litre capacity diesel day storage drum. Both rooms were bunded and had a concrete floor. One Fire Pump House is located on the central portion of the site (adjacent to the service department) and the other is located in the south eastern corner of the site.
- Water tanks and Fire Pump House – A third Fire Pump House and two associated large water tanks were noted in the south western corner of the site. The Fire Pump House contained a diesel powered generator and an estimated 20 litre capacity diesel day storage drum.
- Asbestos – Potential asbestos containing materials were observed in many of the buildings on site. It is noted that the asbestos register for the site is current.
- Two groundwater monitoring wells were observed on-site. One well (Well ID 628-7460) was located near the main truck loading area adjacent to the decommissioned underground fuel storage tanks. The other well (Well ID 6628-7458) was located adjacent to the southern boundary of the site adjacent to the River Torrens (and is likely to be a down-gradient well targeting the river as an environmental receptor).
- A NAA field scientist attended the site on 4 October 2011 to gauge these wells. The total depth of Well ID 6628-7460 was 7.83 metres below the top of casing (TOC) and the depth to standing water level was 5.83 metres below the TOC. No free phase product was detected within the well. The total depth and the depth to standing water level of Well ID 6628-7458 were unable to be measured as the well was filled with large amounts of organic matter.

Site photographs are included in Appendix B.

2.4 Current Surrounding Land Use

The surrounding land use comprises a combination of residential, open space and light commercial / industrial. The site is bound to the north by Valetta Street and to the east by Findon Road. The site is surrounded by residential properties to the north and west, a dog park 'Pooch Park' to the east over Findon Road and the River Torrens Linear Park and bicycle way to the south.

In addition, two commercial / industrial properties are situated on the central northern boundary of the site (fronting Valetta Road). The properties consist of a fitness equipment retailer and a former business which developed commercial and industrial digital printing applications.

2.5 Planning Scheme, Zoning and Title Information

A search of the Government of South Australia (SA Government) website relating to local planning schemes¹ indicated that the site lies within the City of Charles Sturt and is zoned 'Industry'. In addition, the site is located within the Precinct 30 Kidman Park and has specific provisions relating to building set back and height and vehicular access points. A copy of the council zoning information is presented in Appendix C.

Surrounding land use to the north, north east and west is zoned Residential and land use to the south and south east is zoned Metropolitan Open Space System (MOSS). The general purpose of the MOSS zone is to provide conservation and restoration of existing and modified habitats, conservation of sites of scientific or heritage interest, the provision of corridors for the movement of wildlife and recreation and leisure areas. In addition, the MOSS zone may be utilised for stormwater management associated with recreation, aquifer recharge and water quality management.

2.6 National Pollution Inventory

A search of the National Pollution Inventory on 30 September 2011 found one property listed on the inventory within a 2 kilometre search radius of the site.

The property is occupied by Morganite Australia Pty Ltd a manufacturer and supplier of insulation and is located approximately 2 kilometres north east of the site. The pollution in the 2009/2010 financial year related to the release of carbon monoxide, formaldehyde, oxides of nitrogen, particulate matter (10 µm), sulphur dioxide and total volatile organic compounds. A copy of the search correspondence is presented in Appendix D.

2.7 SA EPA Site Contamination Groundwater Notification Index

The South Australian Environment Protection Australia (SA EPA) provides an index of notifications of actual or potential groundwater contamination which have been received by the SA EPA since 1 July 2009 (referred to as S83A notifications under the Environment Protection Act 1993). It is provided to assist residents and members of the public to become aware of notifications that have been received that relate to their suburb or town.

It is important to note that this index provides a list of notifications only and notifications are not evidence that contamination has been confirmed. Each notification will be at varying stages of assessment and further investigation may be required to determine whether contamination exists and the level of risk it presents. When any evidence is found which indicates there may be a risk to the public, affected communities are directly advised.

SA EPA maintains the Site Contamination Groundwater Notification Index and the index is available to the public. It is important to note that the Site Contamination Groundwater Notification Index is not a listing of all contaminated sites in South Australia.

1

<http://www.sa.gov.au/subject/Housing%2C+property+and+land/Building+and+development/Building+and+development+applications/Development+plans+and+their+use/Accessing+relevant+development+plans/Online+development+plans> accessed 30/9/11

A search of the SA EPA site contamination groundwater notifications index indicates that the property is not on the register. However, a site located at 338-342 Findon Road, Kidman Park (approximately 700 metres to the north of the site) is listed due to contamination relating to the use of liquid organic chemicals. A copy of the search correspondence is presented in Appendix D.

2.8 EPA SECTION 7 SEARCH

A freedom of information search was conducted of the SA EPA database for information relating to the subject land in accordance with Section 7 of the Land & Business (Sale & Conveyancing) Act, 1994. The EPA advised (in written form) that it has no records of issues associated with:-

- Particulars of mortgages, charges, prescribed encumbrances affecting the land; or
- Particulars relating to environmental protection including:
 - Environmental assessments;
 - Waste depots;
 - Production of certain waste; and
 - Waste on land.

A copy of the EPA's written responses from the Section 7 searches are presented in Appendix E.

2.9 UNDERGROUND STORAGE TANK SEARCH

SafeWork SA (under the Department of the Premier and Cabinet) was contacted regarding knowledge of dangerous goods storage at the site.

The WorkSafe dangerous substance licence search noted the following current registrations:

- 0.12 kl 'package internal' - drum/can/bin/box (unknown content)
- 0.98 kl 'package internal' - drum/can/bin/box (unknown content)
- 1.48 kl 'package internal' - drum/can/bin/box (unknown content)
- 3.13 kl 'package internal' - drum/can/bin/box (unknown content)
- 15.5 kl gas tank (above ground, external)

A number of cancelled registrations were also listed including two external above ground gas tanks and a 20 kl underground liquid tank (unknown contents). A copy of the WorkSafe dangerous substance licence search response is provided in Appendix F.

3. Environmental setting

3.1 Regional Geology

The Soil Association Map of the Adelaide Region indicates that the surface geology of the area consists of layered stream alluvium consisting of silts, sands and gravels. The 1:50,000 scale Adelaide geological map produced by the South Australian Department of Mines and Energy shows the surface soils of the site are underlain by grey fluviatile silts, sands and gravels of the modern drainage channels.

Reference to the former Department of Mines and Energy Report Book 94/9 "Soils stratigraphy and engineering geology of the Adelaide Plains" indicates the site is situated in the Adelaide Plains in a landform area known as the lower alluvial plain. The general geological sequence in the lower alluvial plain comprises:-

- Quaternary Age sediments of fluvial and marine origin of the order of 100 metres thickness. The dominant formation is Hindmarsh Clay, which is predominantly clay, but has lenses of gravels, silts and sands. Groundwater in the Quaternary sediments

occurs in relatively thin layers (up to a few metres in thickness) of more permeable materials (sands, silts, gravels). There are reportedly up to six distinct aquifers within the Quaternary sediments. These aquifers are not highly utilised as the yield and water quality are highly variable.

- o Tertiary sediments of marine origin (limestones, sands and sandstones) up to 500 metres thickness. The Tertiary aquifers generally have better quality water and yields, and are highly utilised in some areas.
- o Precambrian Age basement rock below approximately 600 metres depth.

3.2 Hydrology and Hydrogeology

The closest water body to the site is the River Torrens which is located approximately 25 metres to the south of the site.

The South Australian Department of Mines and Energy Information Sheet 21 indicates the expected water table level is between 8 and 10 metres from the surface, with total dissolved solids levels in the range of 1,500-2,500 mg/L. The regional groundwater flow direction is west to north west, however it is possible there are local variations.

Groundwater information from bores located within a 200 metre radius of the site was obtained from the Department of Water Land and Biodiversity Conservation (DWLBC). The standing water level in groundwater wells in the local area ranged from 5.0 to 15.24 metres below ground level (bgl). The groundwater salinity ranged from 799 to 3,098 mg/L TDS. However, it is noted that some of these wells are likely to be targeting aquifers below the water table aquifer.

4. Historical Review

The following historical information was reviewed as part of the Phase 1 ESA:

- Selected historical aerial photographs (copies included in Appendix G);
- Historical Certificate of Title searches; and
- Search of the Sands & McDougall directory.

4.1 Historical Aerial Photographs

An aerial photograph review was undertaken to assess the potential for historical uses of the site which may have adversely impacted on the site's contamination status. Photographs were obtained for review from the Department of Environment and Natural Resources covering the period 1949 to 2005. Copies of the aerial photographs are presented in Appendix G. A summary of the review of the aerial photographs is provided in Table 3 below.

Table 3. Summary of Historical Aerial Photographs

Date	Description
1949	<p>The majority of the site is vacant land. There appears to be a series of rectangular structures (possibly greenhouses) situated in the central and southern portion of the site. Small structures (possibly sheds) are located in the north western, central, southern and south eastern portions of the site. A larger structure (possibly a residence) is situated on the south eastern portion of the site.</p> <p>The River Torrens is visible on the southern boundary of the site. The present day Findon Road and Valetta Roads are also present to the east and north of the site, respectively.</p> <p>The surrounding land use appears to consist of market gardens and light density rural residential.</p>
1959	<p>The site remains relatively unchanged since the 1949 aerial photograph, except for the removal of the structures in the central portion of the site. Two sets of additional rectangular structures (possibly greenhouses) have been constructed in the eastern portion of the site (north and south of the residential property). A small shed like structure in the central portion of the site has been removed and an additional shed like structure has been constructed on the south western portion of the site.</p> <p>The surrounding land use remains mostly unchanged.</p>
1969	<p>A large commercial structure and car parking area have been constructed in the south eastern portion of the site. An additional large structure has been built on the northern boundary of the site. The residential structure and all of the rectangular greenhouse structures have been removed. No further changes have occurred on the site.</p> <p>Large pockets of residential properties replacing the former market gardens / farmland are visible to the north, south east and west of the site. A large commercial type structure is visible to the south east of the site.</p>
1979	<p>The 1979 aerial photograph shows that the existing commercial type building on the site has been extended to the north. Several additional commercial type structures have been constructed in the north eastern portion of the site.</p> <p>Surrounding land use to the north, south and west remains relatively unchanged from the 1969 photograph. Residential properties continue to replace market gardens / farmland to the north, north east and west of the site. Industrial / commercial properties have been constructed in the pocket of land on the northern boundary of the site and to the west of the site.</p>
1989	<p>The site remains relatively unchanged from the 1979 photograph except for an additional extension to the commercial type building situated in the southern portion of the site.</p> <p>Surrounding land use remains relatively unchanged from the 1979 photograph. The market gardens formerly located to the south east of the site have been replaced with an open space area.</p>
1999	<p>The site remains relatively unchanged from the 1989 photograph apart from the replacement of the former grassed area on the south western boundary of the site being replaced with concrete hardstand.</p> <p>The surrounding land use remains relatively unchanged.</p>
2005	<p>The site remains relatively unchanged apart from an extension to the buildings located in the southern and north eastern portions of the site.</p> <p>The surrounding land use remains relatively unchanged.</p>

4.2 Historical of Ownership

An historical ownership search was conducted for the two present day Certificates of Title. A summary of the ownership for each of the Certificates of Title is as follows:

Certificate of Title Volume 5117 Folio 253

- 1961 – 1976: Myrtle West (Widow) and Reginald West (Gardener).
- 1976 – 1998: S.C. Eyles and Company Limited.
- 1998 – 2002: Sandhurst Trustees Ltd.
 - 1998 – Lease to Davids Ltd.
- 2002 to present: CPT Manager Ltd.

Certificate of Title Volume 5117 Folio 256

- 1895 – 1913: Edward John Keele (Licensed Surveyor).
 - Leases over various portions of the land were granted during this period.
- 1955 – 1967: Antonio Zampin (Gardener).
- 1967 – 1973: Permanent Trustee Nominees (Canberra) Limited.
- 1973 – 1978: Bowater-Scott Corporation of Australia Limited (formerly Bowater-Scott Australia Limited).
- 1980 – 1990: Associated Growers Co-operative Limited.
 - 1987 – 1989. Lease to J. Blackwood & Son Ltd.
 - 1988 – 1994. Lease to Thorn EMI Pty Ltd.
 - 1990. Application to register Independent Holdings Ltd as proprietor.
- 1998 – 2002: Sandhurst Trustees Ltd.
 - 1998 – Lease to Davids Ltd.
- 2002 to present: CPT Manager Ltd.

4.3 History of Occupancy

A search of the Sands and McDougall's South Australian Street, Trade, Professional, and Municipal Directory was conducted from 1913 (in approximately 10 year intervals) up to the last edition published in 1973. The past occupancy of the site and neighbouring properties is presented as a table in Appendix H. From the list of occupants, it appears that the site originally comprised market gardens until the mid 1960s.

NAA notes that it is difficult to correlate the exact occupancy of the site prior to the late 1940s as the aerial photographs suggest that the site did not contain any buildings and was therefore unoccupied prior to this date.

5. Conclusions

NAA have undertaken a Phase 1 Environmental Site Assessment (ESA) of 404-450 Findon Road, Kidman Park, SA (the site). The findings of Phase I ESA have reduced the uncertainty associated potential contamination that may exist at the site as a result of past activities and/or the environmental setting of the site.

5.1 Historical Findings

The findings of the site history indicate that the site and surrounding areas were used for market gardening purposes from the early 1900s until the mid 1960s. The site appears to have been developed in the 1960s with the construction of some of the present day light commercial/ industrial buildings.

Metcash Trading Limited (under its former name) commenced operations on the site in the mid to late 1960's utilising the site as an industrial complex for warehousing of goods prior to distribution to various supermarkets across South Australia. The site operations have included

warehousing and distribution of supermarket goods, washing of trucks, truck maintenance (including refuelling) and forklift maintenance.

5.2 Summary of Potential Contaminants

Table 2 below provides a summary of the potential contaminants that may be associated with the land uses detailed above.

Table 2 - Summary of Potential Contaminants

Issue	Description	Likely Chemicals of Interest
Former historical use (market gardens)	Residual soil contamination associated with human health, environmental effects including soil quality and surface water effects.	Metals (Arsenic), OCP, OPP and herbicides.
Building ruins/imported fill	It is possible that potentially contaminated fill was imported to site historically for site levelling during the building/demolition of buildings.	Metals, PAH and potentially asbestos containing materials.
Underground storage tanks (formerly contained petroleum (diesel and leaded)) and associated underground infrastructure	It is possible that the petroleum formerly contained in the underground storage tanks and associated underground infrastructure may have leaked potentially contaminating the surrounding soil and groundwater. The former tank farms are located in the central and south western portions of the site.	TPH, BTEX, PAH and potentially metals (lead).
Sump and interceptor pit associated with the truck wash	It is possible that liquid which drains into the sump within the truck wash bay and feeds into the interceptor trap located outside of the truck wash may contain potentially harmful chemicals. If the waste water treatment is not correctly undertaken, the chemicals may flush into the stormwater system.	TPH, oils, PAH and solvents.
Fire pump house containing diesel day storage tanks	The rooms were bunded with concrete floors and the risk of potential spills or leaks from these tanks impacting upon the soils under the slab is considered low.	TPH
Electrical transformer	Electrical transformers formerly contained polychlorinated biphenyls (PCBs).	PCBs
Forklift and (former) truck maintenance areas	A forklift maintenance area and former truck maintenance area are located on-site. It is noted that there are no former or current service pits or waste oil pits in these areas.	TPH, BTEX, PAH, metals, acids
Uncontrolled imported fill	It is possible that potentially contaminated fill (possibly including dredged material) was used to build up the site from the former floodplains prior to market garden use.	Metals, TPH and PAHs.

Note:

PAH = Polycyclic aromatic hydrocarbons

TPH = total petroleum hydrocarbons

OCP = organochlorine pesticides

Metals = As, Cd, Total Cr, Cu, Pb, Hg, Mo, Ni, Se, Ag, Zn

BTEX = benzene, toluene, ethylene and xylene

OPP = organophosphorous pesticides

6. Recommendations

It is considered that there is a potential for soil and/or groundwater contamination at the site, principally associated with the underground fuel storage tanks and fill imported onto the site for site build up, levelling and as a base course under buildings.

It is recommended that prior to future redevelopment works, an environmental site assessment is undertaken to determine actual contaminant concentrations in the soil and/or groundwater underlying the site and enable a contamination risk assessment to be conducted.

7. Limitations

Your attention is drawn to the document – 'Statement of Limitations', which is included at the front of this report. The statements presented in this document are intended to advise you of what your realistic expectations of this report should be. The document is not intended to reduce the level of responsibility accepted by NAA, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.

This report was prepared in October 2011 and is based on conditions encountered and information reviewed at the time of preparation. NAA disclaims responsibility for any changes that may have occurred after this time.

Information in a report about zoning or related land use or environmental controls does not imply that the land is suitable for any particular use or that approval could be obtained from relevant regulatory bodies to use or develop the land with or without conditions.

No assessment has been made about the potential impact that impending legislative or regulatory changes may have on the potential development. Advice should be sought from your planning or legal consultant to review the implications of planning and regulatory constraints.

Environmental Condition – Site Contamination Study

Fairland Group Pty Ltd

Cnr Findon & Valetta Roads, Kidman Park

**APPENDIX C 2015 ENVIRONMENTAL SITE ASSESSMENT
REPORT**

ENVIRONMENTAL SITE ASSESSMENT

HSBC Institutional Trust Services (Singapore) Limited
(in its capacity as Trustee of Cache Logistics Trust)
ARA-CWT Trust Management (Cache) Limited (in its
capacity as Manager of Cache Logistics Trust)
In For A Pound Pty Ltd

404-450 Findon Road, Kidman Park

November 15

J134221

Report Version: J134221/ESA/01



Environmental Site Assessment

HSBC Institutional Trust Services (Singapore) Limited (in its capacity as Trustee of Cache Logistics Trust)

ARA-CWT Trust Management (Cache) Limited (in its capacity as Manager of Cache Logistics Trust)

In For A Pound Pty Ltd

404-450 Findon Road, Kidman Park

EXECUTIVE SUMMARY

Greencap was commissioned by HSBC Institutional Trust Services (Singapore) Limited (in its capacity as trustee of Cache Logistics Trust), ARA-CWT Trust Management (Cache) Limited (in its capacity as manager of Cache Logistics Trust) and In For A Pound Pty Ltd to undertake an Environmental Site Assessment for the site located at 404-450 Findon Road, Kidman Park, South Australia.

The objective of this assessment was to undertake investigations to determine the significance of the contamination reported at the site to date, and to further assess whether any of the activities that have been carried out on the site have caused site contamination that would require management or remediation as part of future redevelopment of the site.

Soil Investigation

A soil investigation was conducted comprising the drilling of 112 grid based soil bores across the site and 25 targeted soil bores in areas of identified potential contamination. The maximum depth of the soil investigation was 8.0 metres below ground level (mbgl). The identified impacts include:

- Isolated elevated levels of fuel related compounds above ecological screening levels for residential land use but below the ecological screening levels for commercial/industrial land use.*
- Elevated results for fuel related compounds above the adopted health screening level around the eastern underground tank area.*
- An isolated result for benzo(a)pyrene (commonly associated with fill material) was reported above the adopted health investigation level for residential use. Statistically, this elevated result is not considered significant.*
- Asbestos containing material was identified at one location under the dry goods warehouse at a depth greater than 1.0m.*

Groundwater Investigation

The most recent investigations comprised the sampling of four existing onsite groundwater monitoring wells and the installation and sampling of seven additional groundwater wells. Groundwater was encountered at depths between 5.5 and 6.5 metres below ground level and the groundwater flow direction was inferred to be west to north westerly. The results of interest include:

- Elevated levels of solvents in the north western and western portions of the site. Only one result exceeded the adopted water quality criteria along the site's western boundary.*
- Elevated concentrations of pesticides were reported above the adopted water quality criteria at two locations; west of the cold store warehouse and along the site's western boundary.*
- Fuel related compounds above the adopted water quality criteria were identified at one location adjacent to the underground fuel tanks in the eastern portion of the site. Several other results for fuel related compounds were reported at detectable concentrations around the underground tanks, but these did not exceed the adopted water quality criteria.*
- An elevated result was reported for the heavy metal selenium in a well that was installed to assess the background quality of groundwater entering the site from the east (up inferred hydraulic gradient).*

Previous groundwater investigations undertaken at the site identified elevated concentrations of similar compounds. Overall, the reported results from this monitoring round (for those wells sampled previously) indicate a decrease in concentrations of the chemicals of concern identified in these sampling events.

Soil Vapour Investigation

A soil vapour investigation was undertaken around underground tanks located in the north western and eastern portions of the site to measure the potential presence of vapours.

Detectable concentrations of fuel related compounds were reported from all soil vapour points, but these were below the adopted assessment criteria for residential land use. A number of soil vapour concentrations exceeding the adopted criteria for residential land use were reported for solvent related chemicals. The highest results were from the southern side of the north western underground tank area. It is noted that a groundwater well in this area did not report elevated concentrations of the chemicals identified in soil vapour. This may indicate that the soil vapours detected are from contamination in soil rather than groundwater.

Concluding Comments

No impacts have been identified that would preclude ongoing commercial / industrial use in the site's current layout. If the site was to be redeveloped for a more sensitive land use (i.e. residential), additional works would be required. These have been detailed under a separate cover.

Statement of Limitations

This report has been prepared in accordance with the agreement between HSBC Institutional Trust Services (Singapore) Limited (in its capacity as trustee of Cache Logistics Trust), ARA-CWT Trust Management (Cache) Limited (in its capacity as manager of Cache Logistics Trust) and In For A Pound Pty Ltd and Greencap.

Within the limitations of the agreed upon scope of services, this work has been undertaken and performed in a professional manner, in accordance with generally accepted practices, using a degree of skill and care ordinarily exercised by members of its profession and consulting practice. No other warranty, expressed or implied, is made.

This report is solely for the use of HSBC Institutional Trust Services (Singapore) Limited (in its capacity as trustee of Cache Logistics Trust), ARA-CWT Trust Management (Cache) Limited (in its capacity as manager of Cache Logistics Trust) and In For A Pound Pty Ltd and any reliance on this report by third parties shall be at such party's sole risk and may not contain sufficient information for purposes of other parties or for other uses. This report shall only be presented in full and may not be used to support any other objective than those set out in the report, except where written approval with comments are provided by Greencap.

Environmental Site Assessment

HSBC Institutional Trust Services (Singapore) Limited (in its capacity as trustee of Cache Logistics Trust)

ARA-CWT Trust Management (Cache) Limited (in its capacity as manager of Cache Logistics Trust)

In For A Pound Pty Ltd

404-450 Findon Road, Kidman Park

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Environmental Site Assessment



HSBC Institutional Trust Services (Singapore) Limited (in its capacity as trustee of Cache Logistics Trust)

ARA-CWT Trust Management (Cache) Limited (in its capacity as manager of Cache Logistics Trust)

In For A Pound Pty Ltd

404-450 Findon Road, Kidman Park

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1.0 INTRODUCTION

1.1 Background

Greencap was commissioned by HSBC Institutional Trust Services (Singapore) Limited (in its capacity as trustee of Cache Logistics Trust), ARA-CWT Trust Management (Cache) Limited (in its capacity as manager of Cache Logistics Trust) and In For A Pound Pty Ltd to undertake an Environmental Site Assessment for the site located at 404-450 Findon Road, Kidman Park, South Australia.

The objective of this assessment was to undertake a detailed investigation to determine the significance of the contamination reported at the site to date, and to further assess whether any of the activities that have been carried out on the site have caused site contamination that would require management or remediation as part of future redevelopment of the site.

It is understood the medium to long term plan to develop the site for residential purposes, which in South Australia will trigger the need for a Site Contamination Audit Report to be completed by an independent Site Contamination Auditor accredited by SA EPA. The location of the site is presented in Figure 1.

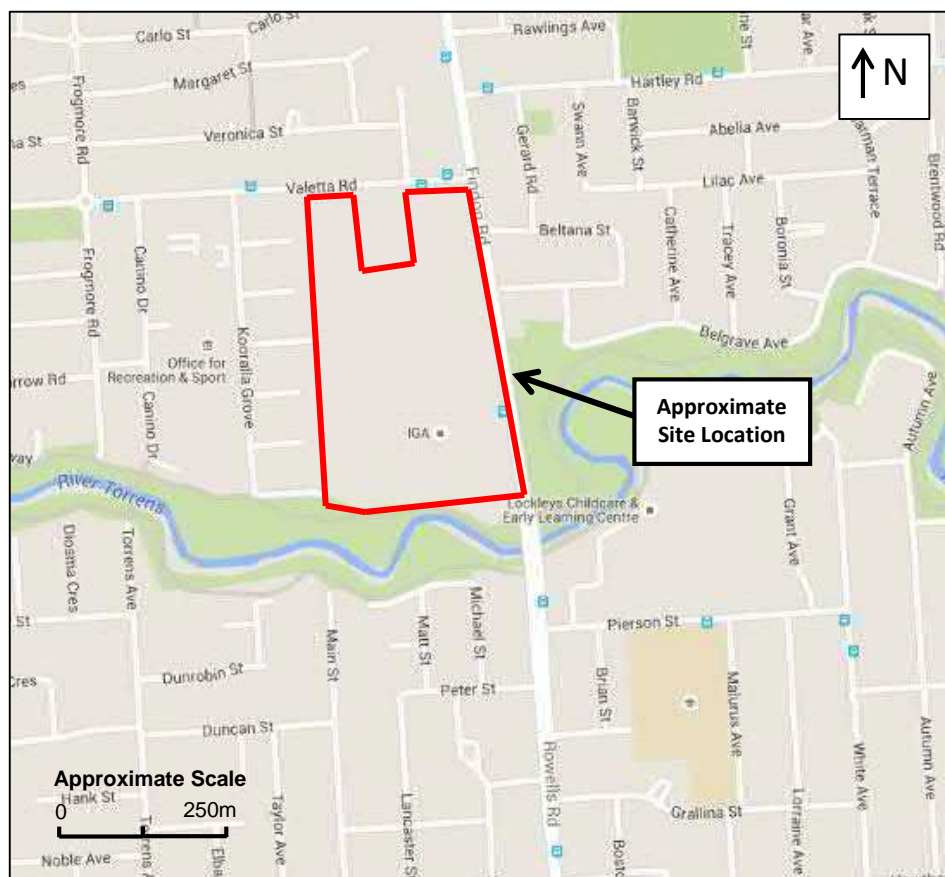


Figure 1 - Site Location

The scope of the work has comprised:

- A review of existing reports in order to identify potentially contaminating activities at the site.
- A soil investigation comprising the drilling of 112 grid soil bores and 25 targeted soil bores.
- A groundwater investigation comprising the sampling of four existing onsite groundwater monitoring wells and the installation and sampling of seven additional groundwater wells.
- A soil vapour investigation around two known areas of former underground fuel storage. A total of four soil vapour points were installed around in these areas and sampled for volatile compounds.

The assessment has been prepared with reference to industry standards and guidelines including the National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) and the Australian Standard "Guide to the investigation and sampling of potentially contaminated soil": AS4482.1-2005.

1.2 Contaminated Land Management in SA

The management of contaminated land in South Australia is achieved through a variety of national and state laws and guidelines. The principal legislation is the Environment Protection Act (1993) which includes amendments related to site contamination which were enacted in 2009, and subordinate legislation the Environment Protection Regulations 2009. The Land and Business (Sale and Conveyancing) Act 1994 was also amended in 2009 as part of new site contamination provisions introduced in the Environment Protection Act. The Development Act 1993 is in the process of being amended to include new site contamination provisions.

Planning Advisory Notice 20 (Site Contamination) issued by Planning SA in December 2001 outlines the responsibilities of planning authorities in relation to addressing site contamination through the Plan Amendment Report (PAR) Process and when assessing development applications.

Planning Advisory Notice 20 also outlines the requirements for confirming the suitability of sites, depending on the sensitivity of the proposed future use. Where a sensitive use is proposed (residential, primary school, preschool or child care centre) on a site where site contamination exists or a potentially contaminating activity has occurred, the use of an independent site contamination auditor, accredited by the Environmental Protection Authority (EPA), is required to confirm the suitability of the site for the intended use. For development or continuation of an existing commercial, industrial or similar use, assessment by an experienced site contamination consultant should generally be acceptable.

Guidance for conducting site assessments is provided in the NEPM, published by the National Environment Protection Council (NEPC). The NEPM has been adopted in all States and Territories of Australia for overall guidance on assessment of contaminated land.

Sites with groundwater contamination issues must be dealt with in accordance with EPA's risk based groundwater management framework, as outlined in the Guidelines for Assessment and Remediation of Groundwater Contamination (EPA, Feb 2009). This includes remediating groundwater impacts to the point of necessity, with the point of necessity as determined by a site specific risk assessment. There are certain circumstances relating to groundwater contamination and remediation work where an accredited site contamination auditor will need to be engaged, if they are not already involved.

The EPA is responsible for administering the site contamination audit system. Further details are provided in the EPA Information Sheet 'Overview of the Site Contamination Audit System' (EPA, Sept 2009). The EPA maintains the integrity of the audit system by accrediting individuals as site contamination auditors and ensuring site contamination audits are carried out in accordance with the legislation and guidance issued or approved by the EPA. Guidance for conducting Audits of contaminated land in South Australia is provided in Guidelines for the Site Contamination Audit System (EPA, Jan 2009).

2.0 SITE DETAILS

2.1 Site Identification and Zoning

The site is described by Certificates of Title Volume 6154, Folio 507 and Volume 6155, Folio 62. The legal description of the site is Allotment 401 of Deposited Plan 19661 and Allotment 301 of Filed Plan 6069 in the area named Kidman Park, Hundred of Yatala.

The site is located within an Industrial Zone within the City of Charles Sturt, and is bordered by residential zoned areas to the north, east and west. A copy of the current Council zoning information is provided in Appendix A.

2.2 Physical Setting

The site is located in Kidman Park, which is approximately 6 kilometres north west of Adelaide and 3.6 kilometres east of the coast (Gulf St Vincent). The site is generally level and the surrounding areas are slightly undulating. A raised area (soil mound) is present running along the north western boundary of the site. The nearest permanent watercourse is the Torrens River, located adjacent to the southern site boundary.

2.3 Site Description and Current Land Use

The site is an irregular shaped parcel of land with a total area of approximately 11.9 hectares. The site is currently operating as a food distribution outlet (dry and frozen goods) and comprises several warehouses, offices and loading areas. The current site operations include warehousing and distribution of goods, washing of trucks and forklift maintenance.

Figure 2 shows the current site layout and photographs of the site (taken 20 July 2015) follow.



Figure 2 – Current Site Layout



Photograph 1 – View of the car park and office building in the south east of the site



Photograph 2 – View along the southern boundary of the site from west to east



Photograph 3 – View of the south western boundary of the site from north to south



Photograph 4 – View of the paddock in the north western corner of the site from south to north



Photograph 5 – View of the pallet storage and truck loading area in the north of the site from south west to north east



Photograph 6 – View of the dry goods warehouse in the central portion of the site from north to south



Photograph 7 – View of the dry goods warehouse truck loading area in the centre of the site from north to south



Photograph 8 – View inside the dry goods warehouse



Photograph 9 – View of the Maintenance Building in the northern portion of the site from west to east



Photograph 10 – View of the cold store warehouse in the north eastern portion of the site from west to east



Photograph 11 – View of the cold store warehouse loading area in the north east of the site



Photograph 12 – View of the car park in the north east of the site



Photograph 13 – View inside Building 404 in the north eastern portion of the site

2.4 Surrounding Land Use

The surrounding land use comprises a combination of residential, open space and light commercial / industrial. The site is surrounded by the following:

- The site is bound to the north by Valetta Street and residential properties are present beyond. In addition, two commercial / industrial properties are situated on the central northern boundary of the site (fronting Valetta Road).
- The site is bound to the east by Findon Road and residential properties and a dog park are located beyond.
- The River Torrens Linear Park, River Torrens and a cycleway are present to the south of the site.
- Residential properties are present to the west of the site.

2.5 Site Inspection for Contamination Indicators

A site inspection was conducted by a Greencap field engineer on 20 July 2015. The objectives of the inspection were to locate and identify:

- Structures and storage areas including underground tanks, waste pits and lagoons, hazardous materials storage, electrical transformers and hydraulic equipment, asbestos products, septic tanks and drain fields.
- Obvious visual contamination indicators such as disturbed vegetation, discoloured, oily or disturbed soil and / or the presence of any odours.

The following features were noted during the inspection:

Stockpile

A stockpile of waste material (bricks, concrete, soil and wood) was noted to be present adjacent to the fire pump house in the south western portion of the site.



Photograph 14 – View of the stockpile in the south western portion of the site

Soil Mounds

A soil mound is present along the north western boundary of the site.



Photograph 15 – View of the soil mound in the north west of the site

Truck Wash

A truck wash area and associated sump and interceptor trap were present in the northern area of the site.



Photograph 16 & 17 – View of the truck wash in the north of the site

Fire Pump Houses

A fire pump house (containing a diesel generator and storage drum), electrical transformer and two water storage tanks are present in the south western portion of the site. A fire pump house containing a diesel generator and electrical transformer are present in the north of the site adjacent to the maintenance building. A secondary pump house is present adjacent to the main warehouse in the centre of the site.



Photograph 18 & 19 – View of the fire pump houses in the south west and north of the site

Underground Storage Tanks

Underground storage tanks (USTs) are present in the north western and eastern portions of the site. Previous investigations undertaken in these areas have identified some fuel related impacts in soil and groundwater. Further details on the nature of the impacts along with details relating to the USTs are presented in Section 3.0.



Photograph 20 & 21 – View of the USTs in the north western and eastern portions of the site

Maintenance Building

A workshop used for the maintenance of forklift trucks (and formerly trucks) is present in the northern portion of the site.



Photograph 22 & 23 – View of the forklift maintenance area in the north of the site

Electrical Transformers

Three electrical transformers are present on site in the car park in the south east of the site, adjacent to the fire pump house in the south western portion of the site and adjacent to the fire pump house in the north east of the site. No obvious signs of leaks were evident around any of the transformers.



Photograph 24, 25 & 26– View of the forklift maintenance area in the north of the site

Asbestos

Many of the buildings were noted to contain asbestos containing materials. As asbestos register for the site was not reviewed by Greencap as part of this investigation, but one is understood to exist.



Photograph 27 – View of asbestos containing material Building 404 in the north east of the site

Existing Groundwater Wells

Five existing groundwater monitoring wells (GW1, GW2, GW3, EBT1 and EB2) are located onsite and appeared to be in good condition, with the exception of EB2 which was blocked with soil and organic matter. The groundwater wells were located adjacent to USTs in the northern western portion of the site, adjacent to a truck wash and interceptor in northern portion of the site, adjacent to a former workshop and two disused USTs located in the eastern portion of the site and adjacent to an electrical transformer in the south western portion of the site. Plans showing the locations of these wells are presented in Section 9.3 of this report and attached as Figure 4.

3.0 PREVIOUS INVESTIGATIONS

Several environmental assessments have been previously undertaken for the site as follows:

- Noel Arnold and Associates (October 2011) Phase 1 Environmental Site Assessment – Kidman Park IGA.
- Site Environmental and Remediation Services (December 2011) Due Diligence Environmental Site Assessment (with Limited and Targeted Sampling) – 404-450 Findon Road, Kidman Park.
- Greecap (July 2015) Due Diligence Site Assessment, 404-450 Findon Road, Kidman Park.

The main findings are summarised in the following sections.

3.1 Phase 1 Environmental Site Assessment (October 2011)

A Phase 1 Environmental Site Assessment was undertaken at the site in 2011 and included a review of available current and historical information in relation to the site and a site inspection.

The assessment indicated that the site and surrounding areas were used for market gardening from the early 1900s until the mid-1960s. The site was developed in the 1960s for commercial / industrial purposes. Metcash Trading Limited (under its former name) commenced operations on the site in the mid to late 1960's utilising the site for warehousing of goods prior to distribution to various supermarkets across South Australia. The site operations since the 1960s have included warehousing and distribution of goods, washing of trucks, truck maintenance (including refueling) and forklift maintenance.

The following items of interest were identified at the site during the site inspection:

- Underground storage tanks – Two areas containing decommissioned diesel and petrol underground storage tanks were located on the north western and eastern portions of the site.
- A sump and an interceptor trap were noted within and adjacent to the truck washing area.
- Fill material – An elongated soil mound (approximately 100 metres long and 3 metres high) was located on the north western boundary of the site. In addition, areas of fill material were noted on the ground surface on the northern portion of the site (where exposed soil is evident). It was also noted that the land adjacent to the southern boundary of the site was at least five metres lower than the site. This was thought to likely be a result of fill being brought onto the site for site levelling and build up.
- Workshop – The workshop area located in the central portion of the site was utilised as an area to conduct maintenance on the on-site forklifts. A small chemical / waste oil store was noted on shelves in an unbunded area with a concrete floor.
- Electrical transformers – Three electrical transformers were noted to be located on-site in the south western corner, south eastern corner and central portion of the site adjacent to the service department.
- Fire Pump House – Two fire pump houses containing diesel powered generators were located on the site. Each Fire Pump House contained an estimated 200 litre capacity diesel day storage drum. Both rooms were bunded and had a concrete floor.
- Water tanks and Fire Pump House – A third Fire Pump House and two associated large water tanks were noted in the south western corner of the site. The Fire Pump House contained a diesel powered generator and an estimated 20 litre capacity diesel day storage drum.
- Asbestos – many of the buildings were noted to contain asbestos containing materials.
- Two groundwater monitoring wells on-site – One well was located near the main truck loading area adjacent to the decommissioned underground fuel storage tanks. The other well was located adjacent to the southern boundary of the site next to the River Torrens.

It was concluded that there were several potential contamination issues present at the site including:

- Historical use of the site for market garden purposes.
- Importation of uncontrolled fill for site levelling purposes, including fill used to build up the site from former floodplains in the southern portion of the site and to construct a noise mound along the site's western boundary.
- Five underground fuel storage tanks.

- A sump and interceptor pit associated with a truck wash bay.
- Electrical transformers.
- Some small diesel storage tanks (200L drums) within the fire pump houses.
- Current (and former) vehicle maintenance areas.

It was recommended that prior to future redevelopment works, further environmental site assessment should be undertaken to determine the contamination status of the soils and groundwater underlying the site.

3.2 Due Diligence Environmental Site Assessment (December 2011)

A Due Diligence Environmental Site Assessment was undertaken at the site in 2011. The aim of the investigation was to identify any contamination or environmental issues at the site.

Soil Investigation

The investigation included the sampling of soil at 28 locations across the site. The following contaminants were identified to be elevated above the adopted guidelines (National Environment Protection (Assessment of Site Contamination) Measure 1999):

- Benzo(a)pyrene elevated above health investigation levels (HILs) and ecological investigations levels (EILs) in one soil sample;
- Benzene, toluene, ethyl benzene and xylenes (BTEX) elevated above EILs in three samples;
- Total recoverable hydrocarbons (TRH) elevated above EILs in one sample; and
- Copper and zinc elevated above EILs in four samples.

The following contaminants were also detected above the laboratory's limit of reporting:

- Pesticides (DDT and DDE) detected in two soil samples;
- Polycyclic aromatic hydrocarbons (PAHs) detected in several samples across the site; and
- Volatile organic compounds (VOCs) detected in several samples across the site.

The adopted guidelines have been updated since this assessment work was undertaken (National Environment Protection (Assessment of Site Contamination) Measure 1999 was amended in 2013).

The investigation included the installation and sampling of three groundwater monitoring wells and the sampling of an existing groundwater monitoring well. It was noted that a second pre-existing groundwater was present on site but was damaged and not able to be sampled.

Elevated levels of VOCs, heavy metals (chromium and lead) and fuel related compounds (TRH, PAHs and BTEX) were reported in the groundwater underlying the site, with elevated levels of contaminants being reported in all the groundwater wells sampled. It is understood that the South Australian Environmental Protection Authority (SA EPA) was made aware of these impacts through a Section 83A notification in accordance with the Environment Protection Act (1993).

The investigation recommended that further works were conducted to assess the nature and extents of the identified contamination and determine any management measures to be implemented.

3.3 Due Diligence Site Assessment (July 2015).

A Due Diligence Site Assessment was undertaken at the site in July 2015. The objectives of the assessment were to undertake a detailed review of the available reports relevant to the site and conduct a groundwater sampling event of existing monitoring wells to obtain current data and inform any recommendations for additional work (assessment and / or remediation).

Main Potential Contamination Issues

The following potential contamination issues were identified from the previous assessments undertaken for the site:

- Several potentially contaminating activities (historical and current) were identified including:
 - Former use of the site as market gardens.
 - Imported fill material which has used to build up the site from former floodplains in the southern portion of the site and to construct a noise mound along the site's western boundary.
 - Five underground storage tanks (containing diesel and leaded petrol) and associated infrastructure.
 - A truck washing area including a sump and interceptor trap.
 - Fire Pump house which contains a diesel powered generator and diesel storage tanks.
 - Electrical transformers.
 - Forklift and (former) truck maintenance areas.
- Elevated levels of contaminants (heavy metals and fuel related compounds) were reported in several soil samples across the site.
- Elevated levels of contaminants (fuel related compounds, volatile organic compounds and heavy metals) were identified to be present in the groundwater underlying the site.
- Asbestos was noted to be present in several buildings at the site.

Comparison of Historical Soil Results against Current Guidelines

Commonly adopted guidelines have been updated since the previous assessment work was undertaken (National Environment Protection (Assessment of Site Contamination) Measure 1999 was amended in 2013). The soil results presented in the Due Diligence Environmental Assessment were compared to amended guidelines to provide an up to date indication of the contamination status of soils at the site.

The following contaminants were identified to be elevated above current guidelines:

- An elevated result for benzo(a)pyrene at one location (MG SURFACE) in the northwest of the site. The reported result at this location was 1.8mg/kg which exceeds the ecological screening level (ESL) of 0.7mg/kg. It is noted that the ESL is considered to be overly conservative and it is generally accepted to use the relevant health investigation level for benzo(a)pyrene as ecological screening criteria. The reported result is below this screening criteria for all land uses.
- Elevated results were reported for copper in two locations (BH6 0.5m bgl and BH12 0.3m bgl) in the northwest and south of the site. The reported results were 160mg/kg and 110mg/kg respectively which exceed / meet the ecological investigation level (EIL) of 110mg/kg. It is noted that site specific EILs were not derived as outlined in the NEPM and conservative values were selected for soil properties in order to calculate the aforementioned EIL. Based on recent testing (September 2015, discussed in Section 5.4), EILs were derived using site specific data. The EIL for copper in a residential scenario was calculated to be 230mg/kg and both results are below this concentration.
- Elevated results were reported for zinc in two locations (BH7 0.5m bgl and MG SURFACE) in the northwest of the site. The reported results were 1,590mg/kg and 290mg/kg respectively which exceed the ecological investigation level (EIL) of 290mg/kg. It is noted that site specific EILs were not derived as outlined in the NEPM and conservative values were selected for soil properties in order to calculate the aforementioned EIL. Based on recent testing (September 2015, discussed in Section 5.4), EILs were derived using site specific data. The EIL for zinc in a residential scenario was calculated to be 810mg/kg and only one result (BH7 0.5m) exceeds this concentration.

Data Gaps

The following data gaps were identified in the previous investigations undertaken at the site:

- The density of the soil sampling undertaken in previous site investigations was not in accordance with the relevant Australian Standards (Table 2 in AS4482.1). Fewer soil locations were tested than is recommended and the soil locations appeared to be targeted and not undertaken on a grid. It was noted that several areas were not targeted as part of previous investigations.
- The soil beneath the buildings was not investigated.
- Fill was noted to be present at the site, but the extent of the fill material was not fully investigated.

- The groundwater well in the south of the site was unable to be sampled and information was only provided for the groundwater underlying the north and centre of the site.
- Overall the groundwater investigation was identified to be limited in nature and it was recommended that additional groundwater monitoring wells would be required to provide site coverage and appropriately assess the potential contamination issues. It was recommended that this would need to include an assessment of groundwater flow direction.
- The extent of contamination identified at the site in both the soil and groundwater was not delineated.
- Soil vapour has not been assessed. The amended guidelines present additional focus on soil vapour in terms of site assessment. Due to the presence of volatile compounds in groundwater and soil, it is likely that soil vapour investigations would be required.

Groundwater Investigation

A groundwater investigation was undertaken at the site comprising the sampling and analyses of four existing on site groundwater monitoring wells (GW1, GW2, GW3 and EBT1). It is noted that an additional groundwater well was present onsite (EB2), but was blocked with dirt and organic matter and could not be sampled. Due to the limited timeframe, it was also not possible to install and sample additional groundwater monitoring wells as part of this investigation.

It was noted that groundwater wells were located near both areas of underground fuel storage, but as no survey data was available to assess the groundwater flow direction, it was not known if these monitoring wells were in the most appropriate locations to assess contamination from the various potential sources identified.

Elevated results were reported for fuel related compounds (ethyl benzene and naphthalene) above adopted water quality criteria at one location (GW3) adjacent to the underground fuel tanks in the eastern portion of the site. Trace concentrations of fuel related compounds were also reported from EBT1 which is located in the same part of the site. Trace concentrations of tetrachloroethene were also reported from one monitoring well in the north western portion of the site adjacent to the USTs in this area (GW1).

The previous groundwater investigation undertaken in 2011 identified elevated concentrations of VOCs, heavy metals (chromium and lead) and fuel related compounds (TRH, PAHs and BTEX) in all the groundwater wells well above adopted guidelines. Overall, the reported results from this monitoring round indicated a decrease in concentrations of the chemicals of concern identified in the 2011 sampling event.

Recommendations

It was recommended that further site assessment (soil, groundwater and soil vapour investigations), along with remediation and/or management (i.e. underground fuel tanks would need to be removed along with any soils that are unsuitable for the proposed development) would be required prior to the proposed redevelopment of the site.

4.0 SUMMARY OF POTENTIAL CONTAMINANTS

Several potentially contaminating activities (PCA) were identified from the review of the previous investigations and the site inspection. The details of the PCAs, contaminant persistence / mobility and other comments are presented in Table 1.

Table 1 – Potential Contamination Sources and Contaminants of Concern (On-Site Only)

PCA and Likely Location	Contaminants of Potential Concern	Persistence / Mobility in Soils and Toxicity	Comments
Former use of the site as market gardens.	Heavy metals, OCPs, herbicides and fertilisers	Heavy metals - Mobility = low, persistence = high OCP - Mobility = low to moderate, persistence = high OPP - Mobility = low to moderate, persistence = low Herbicides – Mobility = low to moderate, persistence = low to moderate Fertilisers – Mobility = low to moderate, persistence = high	Previous investigations have indicated that the site and surrounding areas were used for market gardening from the early 1900s until the mid-1960s. No specific mixing areas were identified and any application of pesticides, herbicides or fertiliser is likely to have been on a broader scale. Elevated levels of heavy metals (copper and zinc) and PAHs (benzo(a)pyrene) were reported in several soil samples across the site above adopted assessment criteria for a residential land use in the previous investigation. Pesticides were reported above the laboratory limit of reporting, but below the adopted guidelines in the paddock in the north east of the site and in an area in the south west corner of the site.
Imported fill material (unknown source/s)	Heavy metals, PAH, BTEX, TRH, asbestos and OCP	Heavy metals - Mobility = low, persistence = high PAH - Mobility = low, persistence = high BTEX - Mobility = moderate, persistence = moderate TRH - Mobility = moderate, persistence = moderate OCP - Mobility = low to moderate, persistence = high	Information from previous investigations indicates that imported fill material was used in the southern portion of the site (to build up the site from former floodplains) and to construct a noise mound along the site's western boundary. The soil mound along the north western boundary of the site was noted to be present during the site inspection. The previous soil investigation undertaken at the site in 2011 identified fill material across the site to a maximum depth of 1.0m below ground level (mbgl). Areas of deeper fill were present around the underground storage tanks in the northern and central portion of the site. Analysis of the fill material identified elevated levels of heavy metals (copper and zinc) and PAHs (benzo(a)pyrene) above adopted assessment criteria for a residential land use in several soil samples across the site. Elevated levels of fuel related compounds (TRH and BTEX) were reported in the fill material associated with the underground storage tanks. Pesticides were reported above the laboratory limit of reporting, but below the adopted guidelines in the paddock in the north east of the site and in an area in the south west corner of the site.
Stockpile of waste materials (unknown source/s)	Heavy metals, PAH, BTEX and TRH	Heavy metals - Mobility = low, persistence = high PAH - Mobility = low, persistence = high BTEX - Mobility = moderate, persistence = moderate TRH - Mobility = moderate, persistence = moderate	A stockpile of waste material (bricks, concrete, soil and wood) was noted to be present adjacent to the pump station in the south western portion of the site during the site inspection. The soil mound was not assessed as part of the previous investigation undertaken at the site.
Underground storage tanks (containing diesel and leaded petrol) and associated infrastructure.	BTEX, TRH and lead	Lead - Mobility = low, persistence = high BTEX - Mobility = moderate, persistence = moderate TRH - Mobility = moderate, persistence = moderate	Underground storage tanks (USTs) are present in the north western and eastern portions of the site. The USTs are reported to be disused. Elevated levels of fuel related compounds (TRH and BTEX) were reported in soils adjacent to the USTs above adopted assessment criteria in the previous investigation undertaken in 2011. The investigation also identified elevated levels of heavy metals (chromium and lead) and fuel related compounds (TRH, PAHs, VOCs and BTEX) in the groundwater underlying the site, including around the USTs.

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PCA and Likely Location	Contaminants of Potential Concern	Persistence / Mobility in Soils and Toxicity	Comments
A truck washing area including a sump and interceptor trap.	Heavy metals, VOC, BTEX and TRH	Heavy metals - Mobility = low, persistence = high BTEX - Mobility = moderate, persistence = moderate TRH - Mobility = moderate, persistence = moderate	A truck wash area and associated sump and interceptor trap are present in the north of the site. The truck wash is currently in operation. The soils in the vicinity of the truck wash were not investigated during the previous soil assessment. A groundwater well was installed adjacent to the truck wash. Elevated levels of heavy metals and fuel related compounds (TRH and BTEX) were reported in the groundwater from this monitoring well.
Fire pump houses which contain a diesel powered generator and diesel storage tanks.	BTEX and TRH	BTEX - Mobility = moderate, persistence = moderate TRH - Mobility = moderate, persistence = moderate	A fire pump house (containing a diesel generator and storage drum), electrical transformer and two water storage tanks are present in the south western portion of the site. A fire pump house containing a diesel generator and electrical transformer are present in the north of the site adjacent to the maintenance building. A secondary pump house is present adjacent to the main warehouse in the centre of the site. Elevated levels of copper were reported in soils above adopted assessment criteria adjacent to the fire pump house in the south west of the site in the previous investigation undertaken at the site. Pesticides were also reported in soils above the laboratory limit of reporting, but below the adopted guidelines in this area.
Electrical transformers.	PCBs and TRH	TRH - Mobility = moderate, persistence = moderate PCBs - Mobility = moderate, persistence = high	Three electrical transformers are present on site in the car park in the south east of the site, adjacent to the fire pump house in the south western portion of the site and adjacent to the fire pump house in the north east of the site. Elevated levels of copper were reported in soils above adopted assessment criteria adjacent to the electrical transformer in the south west of the site in the previous investigation undertaken at the site. Pesticides were also reported in soils above the laboratory limit of reporting, but below the adopted guidelines in this area.
Forklift and (former) truck maintenance areas.	Heavy metals, BTEX, TRH and solvents	Heavy metals - Mobility = low, persistence = high TRH - Mobility = moderate, persistence = moderate BTEX - Mobility = moderate, persistence = high Solvents - Mobility = high, persistence = moderate to high	A workshop used for the maintenance of forklifts (and formerly for the maintenance of trucks) is present in the central portion of the site. PAHs and heavy metals were reported in soils above the laboratory limit of reporting, but below the adopted guidelines in this area in the previous investigation undertaken at the site.
Termite control chemicals used underneath buildings	Arsenic and OCPs	Arsenic - Mobility = low, persistence = high OCP - Mobility = low to moderate, persistence = high	Termite control chemicals may have been used under the buildings on the site. Any impacts are likely to be limited to near surface soils. The soil beneath the buildings was not assessed as part of the previous investigation.
Use of asbestos in buildings across the site.	Asbestos	Asbestos - Mobility = low to high (depending on whether friable or non-friable), persistence = high	Asbestos was noted to be present in several buildings at the site. No asbestos was noted in soils during the previous soil investigations.

NOTES:-

BTEX = benzene, toluene, ethylbenzene, xylene
PCBs = polychlorinated biphenyls

TRH = total recoverable hydrocarbons
OPP = organophosphate pesticide

PAH = polycyclic aromatic hydrocarbons

OCP = organochlorine pesticides

VOCs = volatile organic compounds

5.0 SOIL INVESTIGATION

5.1 Sampling Rationale

A soil investigation was undertaken at the site between 21 and 30 September 2015 comprising the drilling of 112 grid based soil bores across the site and 25 targeted soil bores. The sampling location rationale is detailed below in Table 2.

Table 2 – Soil Sampling Location Rationale

Sample ID	Sample Type	Location	Depth Drilled (mbgl)
SB01 to SB112	Grid based soil bore	Across the site	1.0 to 2.0
TB01	Targeted soil bore	Adjacent to the triple interceptor in the north of the site	2.0
TB03	Targeted soil bore	Adjacent to the fire pump house in the south western portion of the site.	1.0
TB04	Targeted soil bore	Adjacent to the transformer in the south western portion of the site	1.0
TB05	Targeted soil bore	Adjacent to the transformer in the south east of the site	1.0
TB02, TB06, TB07, TB08, TB09 and TB10	Targeted soil bore	Around USTs in the north western portion of the site	5.0 to 7.0
TB11, TB12, TB15, TB16, TB17, TB18 and TB19	Targeted soil bore	Around USTs in the eastern of the site	5.0 to 8.0
TB13	Targeted soil bore	Truck wash in the north of the site	1.0
TB14	Targeted soil bore	Forklift maintenance workshop in the centre of the site	1.0
TB20	Targeted soil bore	Adjacent to the fire pump house and transformer in the north of the site	1.0
HA1 to HA5	Targeted soil bore	Soil mound along the north western boundary of the site	1.0 to 2.0

The soil bore locations are presented in Figures 2 and 3 at the end of this report.

It is noted that the site has an approximate area of 11.9 hectares. The 112 grid based bores increases the total number of test locations (including those not targeting underground fuel infrastructure from the Due Diligence Environmental Assessment undertaken in 2011) to 131. This sampling density is in general accordance with the relevant Australian Standards (Table 2 in AS4482.1), but it is noted that no specific guidance is provided for site's larger than 5.0 hectares. Using the same diameter of hotspot that can be detected with 95% confidence for a site of 5.0 hectares, the number of test locations was determined to be 130 for a site 11.9 hectares in size.

Due to restricted access in the dry goods warehouse, soil bores were not able to be drilled on a strict grid pattern. As such, the soil bores were drilled in areas where access was possible (generally at the end of rows of shelving). Furthermore, no access was possible within the majority of the cold store warehouse to undertake intrusive investigations.

5.2 Sampling Methodology

Soil bores were drilled to a maximum depth of 8 metres below ground level (mbgl). All soil bores were drilled using push tube methods or hand equipment (depending on access).

Soil bores were drilled into natural soils where possible and were logged by an experienced Greencap environmental scientist. Soil samples were collected by the Greencap environmental scientist from the different material types encountered and at regular depth intervals.

Samples were screened in the field for volatile organic compounds (VOCs) using a photoionisation detector (PID) with a 10.6 eV ultraviolet lamp. The PID calibration record is attached in Appendix B.

Decontamination of push tube equipment was conducted between each sampling location by removing all adhered soil and / or other matter by means of scrubbing and flushing with clean water.

Soil samples were placed into acid-rinsed and solvent-washed screw top glass jars supplied by the testing laboratory. All soil samples were stored in an ice filled portable cooler immediately following sampling and delivered under similar conditions to the testing laboratory under chain of custody procedures.

5.3 Soil Analytical Program

Soil samples were analysed for a range of potential contaminants as summarised in Table 3.

The laboratories used for the soil testing were Eurofins-mgt (MGT) and Australian Laboratory Services (ALS). The laboratories are approved by the National Association of Testing Authorities (NATA), and the analyses conducted are within the NATA registration of the laboratories. Duplicate soil samples were submitted to the primary laboratory (MGT) and the secondary laboratory (ALS) for quality assurance / quality control (QA/QC) purposes. Results of QA/QC analyses are discussed in detail in Section 11.

It is noted that one suspect sample of cement sheet identified at one location (SB81) under the northern portion of the dry goods warehouse at a depth of 1.0m was tested at Greencap's in-house NATA accredited laboratory for asbestos.

A summary table of the soil analyses is presented at the end of this report and the results are discussed in Section 6.3.

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Table 3 - Soil Analytical Program

Sample	Location	pH	CEC/ Clay Content	Heavy Metals	Lead	TRH	BTEX	PAH	VOC	OPP	OCP	PCB	Vic EPA Screen	Asbestos in soils	Asbestos Identification
SB01 to SB112	Grid based across the site	29	25	190	-	37	34	138	12	14	116	-	15	6	1
TB01	Adjacent to the triple interceptor in the north of the site	-	-	-	1	1	1	-	1	-	-	-	-	-	-
TB03	Adjacent to the fire pump house in the south western portion of the site.	-	-	-	-	1	1	-	-	-	-	-	-	-	-
TB04	Adjacent to the transformer in the south western portion of the site	-	-	-	-	1	1	-	-	-	-	1	-	-	-
TB05	Adjacent to the transformer in the south east of the site	-	-	1	-	1	1	1	-	-	1	1	-	-	-
TB02, TB06, TB07, TB08, TB09 and TB10	Around USTs in the north western portion of the site	-	-	-	17	17	17	-	-	-	-	-	-	-	-
TB11, TB12, TB15, TB16, TB17, TB18 and TB19	Around USTs in the eastern of the site	-	-	-	15	15	15	-	-	-	-	-	-	-	-
TB13	Truck wash in the north of the site	-	-	2	-	2	-	2	2	-	-	-	-	-	-
TB14	Forklift maintenance workshop in the centre of the site	-	-	1	-	1	-	1	1	-	-	-	-	-	-
TB20	Adjacent to the fire pump house and transformer in the north of the site	-	-	1	-	1	1	1	-	-	-	1	-	-	-
HA1 to HA5	Soil mound along the north western boundary of the site	1	1	8	-	5	5	8	-	-	7	-	-	2	-
Total		30	26	203	33	82	76	151	16	14	124	3	15	8	1

NOTES:-

TRH = total recoverable hydrocarbons

OPP = organophosphate pesticide

PAH = polycyclic aromatic hydrocarbons

OCP = organochlorine pesticides

BTEX = benzene, toluene, ethylbenzene, xylene

PCBs = polychlorinated biphenyls

VOCs = volatile organic compounds

CEC = cation exchange capacity

Heavy metals = arsenic, cadmium, chromium, copper, nickel, lead, mercury, silver, tin, zinc

Vic EPA Screen - includes heavy metals (as above + molybdenum and selenium), OCP, TRH, volatile organic compounds, PCBs, vinyl chloride, PAH, phenols, hexavalent chromium, cyanide and total fluoride

5.4 Assessment Criteria / Investigation Levels

Analytical results have been compared with criteria specified in the National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) (NEPM). It is understood that the site will likely continue to be used for commercial/industrial purposes in the short term and potentially be redeveloped for residential purposes in the medium to long term. As such, the relevant investigation exposure settings are considered to be:

- Ecological Screening Levels (ESLs) for commercial and industrial, urban residential and public open space land use;
- Health Investigation Levels for commercial and industrial land use (HILs D), standard residential (accessible soil) land use (HILs A) and high density residential (no access to soils) land use (HILs B);
- Health Screening Levels for Vapour Intrusion (HSLs 'D') for commercial and industrial land use and (HSLs 'A and B') for Urban Residential and Public Open Space land use – the screening levels were selected based on overlying material type (unconsolidated fill / sand) and depth of sample; and
- 'Management Limits' for petroleum hydrocarbon compounds (Management Limits) for commercial and industrial, residential, parkland and public open space.

In addition, Ecological Investigation Levels (EILs) for commercial and industrial and residential land use were determined for some chemicals as outlined in the 2013 NEPM. In relation to the derivation of the EILs, the following values/rationale was used:

- The application of any chemicals and / or importation of material was likely to have been more than two years ago and are therefore considered to be 'aged'.
- An average pH of 8.7 was adopted for the site based on the average of reported results from near surface samples.
- An average clay content of 14.8% was adopted for the site based on the average of reported results from near surface samples.
- An average cation exchange capacity (CEC) of 23 cmol/kg was adopted for the site based on the average of reported results from near surface samples.

6.0 SOIL INVESTIGATION RESULTS

6.1 Subsurface Conditions

The maximum depth of the soil investigation was 8 metres below ground level (mbgl). The subsurface conditions of the site are described in further detail below.

6.1.1 Area Surrounding the Warehouses

A bitumen surface cover was present at the majority of soil bore locations drilled across the site in the areas surrounding the warehouses and in the car parks in the south west and north east of the site. A concrete cover was present in the loading area surrounding the cold storage warehouse in the north eastern portion of the site and within the truck wash in the northern portion of the site. Grass cover and leaf litter were present within the paddock in the north western of the site and along sections of the eastern and western boundaries of the site.

Fill material was encountered to a maximum depth of 1.1mbgl. Areas of deeper fill were present along the western boundary of the site (SB04 to SB10 and TB04), along the southern boundary of the site (SB33), in the paddock in the north west of the site (SB11 to SB13 and SB30 to SB32), in the car park in the south western portion of the site (SB36) and in the area to the north of the main warehouse (SB41 to SB47 and TB01). The fill material generally comprised crushed rock mixed with silts and sands and dark brown silty clay.

Secondary constituents were noted within the fill material in the paddock including crushed rock, organic matter, ash, bitumen, red brick and glass fragments (SB11 to SB14, SB31 and SB32). Red brick fragments were noted within the fill material along the southern boundary of the site (SB02, SB03 and SB04). Red brick fragments, ash and cinders and glass fragments were noted within the fill material along the western boundary of the site (SB05 to SB10). Bitumen and red brick fragments were noted within the fill material in the northern portion of the site (SB50, SB51 and SB65). No odours, suspected asbestos containing materials or staining were noted during the investigation.

Underlying natural soils were encountered at all soil bore locations comprising brown to dark brown silty clay.

6.1.2 Warehouses

A concrete surface was present at soil bore locations drilled within the warehouses in the centre and northern portion of the site. Fill material was encountered in the soil bores to a maximum depth of 1.4mbgl with areas of deeper fill noted beneath the northern portion of the main warehouse. The fill material generally comprised crushed rock mixed with silts and sands and yellow sand (typical sub-grade material). An underlying layer of fill (yellow sand) was present in areas of deeper fill in the northern portion of the warehouse. A concrete layer was encountered in several of soil bores SB79 (0.3mbgl), SB80 (0.3mbgl), SB81 (1.2mbgl), SB87 (0.3mbgl) and SB99 (0.3mbgl). Soil bores were not able to be extended to the target depth at these locations. Underlying natural soils were encountered at all soil bore locations comprising dark brown silty clay.

Suspected asbestos containing material was encountered in SB81 at 1.1mbgl above the layer of concrete identified at a depth of 1.3mbgl. No odours or staining were noted during the investigation.

6.1.3 Soil Mound

Leaf litter was present at the surface of the soil bores drilled in the soil mound located along the north western portion of the site. Fill material was encountered in the soil bores to a maximum depth of 1.2mbgl. The fill material generally comprised crushed rock mixed with silts and sands. Secondary constituents were noted within the fill material including bitumen, crushed rock, red brick, organic matter and glass fragments. Ash and cinders were noted to be present within HA3 and HA4. Underlying natural soils were encountered at all soil bore locations comprising dark brown silty clay. No odours, staining or suspected asbestos containing materials were noted during the investigation.

6.1.4 Underground Storage Tanks

A bitumen cover was present at soil bore locations drilled around the underground storage tanks (USTs) in the north western and eastern portions of the site, but it is noted that the tanks themselves were covered by concrete. Fill material was encountered in the soil bores to a maximum depth of 1.4mbgl, with deeper fill noted around the USTs in the northern portion of the site. The fill material generally comprised brown silty sand and grey / pale brown sand. Secondary constituents were noted within the fill material including crushed rock, red brick and bitumen fragments.

One location (TB19) refused on a metal pipe at a depth of 0.4m so the bore was not able to be extended to the target depth.

Natural soils were encountered comprising dark brown to red brown silty clay and silty sandy clay. Trace gravels were noted to be present between 2.0 to 2.2mbgl and an increase in sand content was noted from 2.7mbgl. Dark brown mottling was present from 3.0mbgl.

Grey and black staining and hydrocarbon odours were noted between 4.7 to 7.0mbgl in TB02, TB08, TB11, TB12 and TB16. Black staining was also noted in TB06 and TB07 between 2.0 and 2.2mbgl.

Soil bore logs are provided at the end of this report as Appendix B.

6.2 Field Screening of Volatile Organic Compounds

Selected samples were screened for volatile organic compounds (VOCs) in the field using a photoionisation detector (PID) which was calibrated prior to use. Samples were placed in sealable plastic bags, agitated, and then a headspace reading taken using the PID.

The majority of PID readings were recorded below 2 parts per million (ppm). Elevated PID readings (ranging from 15.2 to 222 ppm) were reported in TB02 and TB08 located around the USTS in the northern portion of the site between 4.7 and 6mbgl. Elevated PID readings (ranging from 4.2 to 344 ppm) were reported in TB11, TB12 and TB16 in the north eastern portion of the site between 4.0 and 7.0mbgl. All PID readings are noted on the soil bore logs presented in Appendix B.

6.3 Laboratory Testing Results and Discussion

Exceedences of either the adopted ecological or health based investigation/screening levels were reported for a number of analytes as follows:

- Elevated results for benzo(a)pyrene were reported above or equal to the ESL (0.7mg/kg) for urban residential land use in SB04_0.1-0.2 (0.7mg/kg), SB11_0.01-0.3 (1.3mg/kg), SB11_0.35-0.45 (0.7mg/kg), SB81_0.9-1.0 (1.7mg/kg), SB83_0.1-0.3 (2.0mg/kg) and SB83_0.5-0.6 (0.8mg/kg). It is noted that the SA EPA has recommended the consideration of other guidelines in the assessment of benzo(a)pyrene for ecological protection, including the health investigation level for residential land use (3mg/kg). The elevated levels of benzo(a)pyrene are below this guideline and the exceedences are therefore not considered to be significant.

One result for benzo(a)pyrene TEQ was reported above the adopted HIL for standard residential use of 3mg/kg from SB83_0.1-0.3 (3.4mg/kg). The reported result is below the adopted HIL for high density residential and commercial/industrial land uses. Statistically, this elevated result is not considered significant and is within acceptable levels. The maximum concentration (3.4mg/kg) is less than 2.5 times the adopted HILs, the standard deviation (0.3) is less than half of the adopted HILs and the 95% upper confidence limit of the average (0.7mg/kg) is below the adopted HILs.

- Elevated results for TRH C16-C34 were reported above the adopted ESL for urban residential land use (300mg/kg) in SB20_0.015-0.3 (440mg/kg), SB30_0.01-0.2 (1,100mg/kg), SB36_0.2-0.3 (350mg/kg), SB50_0.15-0.2 (370mg/kg) and SB51_0.15-0.2 (390mg/kg). The results are all below the ESL for commercial/industrial land use.
- Elevated results for TRH C6-C10 less BTEX were reported above the adopted HSL for urban residential land use for sand at depths greater than 4.0 metres (200mg/kg) in TB11_5.5-5.6 (220mg/kg) and

TB16_5.0-5.1 (340mg/kg) around the eastern UST area. Sand was selected as a conservative material type given the vicinity of the underground tanks and associated backfill material. It is noted that the reported results from the overlying and underlying samples tested at both locations were below the laboratory detection limit.

It is noted that fuel related compounds (TRH and BTEX compounds) were detected at a number of other locations around the underground fuel infrastructure, but none of the reported results were above the adopted assessment criteria.

Slightly elevated results for some individual OCP compounds (DDE, DDT, DDD, chlordane, aldrin and dieldrin) were identified at concentrations above the laboratory limit of reporting. All reported results were below the adopted site assessment criteria.

The one suspect sample of cement sheet (identified at SB81 under the northern portion of the dry goods warehouse) was confirmed to contain asbestos. A soil sample collected at the same location and depth was also analysed for asbestos at Eurofins-mgt. Asbestos was also identified in this sample in weathered cement fragments and in the form of loose fibre bundles.

Results of the soil analyses are summarised in tables at the end of this report. NATA laboratory certificates are presented in Appendix C.

7.0 GROUNDWATER INVESTIGATION

A groundwater investigation was conducted between September and October 2015 comprising the sampling of four existing onsite groundwater monitoring wells and the installation and sampling of seven additional groundwater wells.

7.1 Rationale and Well Installation Methodology

The installation of seven additional groundwater monitoring wells was conducted on 28 and 29 September 2015. The purpose of the additional groundwater wells was to further assess the contamination status of groundwater beneath the site. The rationale behind the selected locations for the additional wells is as follows:

- MW01 was installed to assess groundwater quality down inferred hydraulic gradient from the operations in the southern portion of the site.
- MW02, MW03, MW04 and MW06 were installed to further delineate the groundwater impacts (VOCs, heavy metals and fuel related compounds) identified around underground storage tanks during the previous site investigations.
- MW05 was installed to assess groundwater quality around the operations within the north eastern portion of the site.
- MW07 was installed to assess the background quality of groundwater entering the site from the east (up inferred hydraulic gradient).

The location of the groundwater monitoring wells is presented in Figure 4.

The seven additional groundwater monitoring wells were installed using solid flight auger drilling techniques to a maximum depth of 9 metres below the ground level (mbgl). All monitoring wells were installed with a 3 metre screened interval at the base and a sand pack to a minimum of 1m above the top of the screened interval. A one metre bentonite plug was installed on the top of the sand pack preventing surface water infiltration into the screened area. Cement grout was used above the bentonite layer to seal the wells to the surface. The wells were completed with a lockable gatic covers. The wells were developed the day after installation.

The well drilling logs, construction details and well permits of the additional seven monitoring wells are included in Appendix G.

7.2 Groundwater Sampling Methodology

Groundwater sampling from the four existing (EBT01, GW01 to GW3) and seven additional (MW01 to MW07) groundwater monitoring wells was undertaken on 1 October 2015. Generally, it is accepted practice to wait one week following well installation and development prior to sampling. However, due to time constraints for this work, the newly installed wells were sampled 24 - 48 hours after installation. It is noted that the SA EPA's groundwater sampling guideline specifies that *'following development, the well sampling should be postponed for at least 24 hours and may need to be delayed for as long as a week until it can be demonstrated that well chemistry has stabilised.'* Furthermore the NEPM states *'after development, bores should be left for a period until bore water chemistry can be demonstrated to have stabilised (generally between 24 hours and seven days) before samples are collected.'* All wells were sampled at least 24 hours after sampling and as demonstrated in field sampling records (discussed in Section 8.2) field parameters were able to be stabilised during sampling.

Initially, standing water levels were measured from the surveyed mark on the top of the well casing. The well gauging was undertaken using a water-product interface meter to check for the potential presence of any separate (non-aqueous) phase hydrocarbons in the groundwater monitoring wells. The wells were gauged prior to sampling to minimise the effects of any fluctuations in water levels that may influence the groundwater flow direction assessment.

Groundwater samples from all wells were collected using the low flow groundwater sampling technique with a peristaltic pump. Water quality parameters (pH, temperature, conductivity, oxidation reduction potential

and dissolved oxygen) were monitored during groundwater purging and prior to the sampling using a YSI Quatro Pro Plus water quality meter. Water levels were also monitored during sampling to ensure that minimal drawdown occurred. Samples were collected when water quality parameters had stabilised. Groundwater sampling records and calibration certificates (for the water quality meters) are presented in Appendix H.

All groundwater samples collected from the wells were placed in containers provided by the analytical laboratories. Groundwater samples collected for heavy metals were filtered through a Stericup pre-sterilised 150mL vacuum driven disposable filter (0.45 micron) prior to placement in sample containers supplied by the testing laboratory. The samples were stored on ice in a portable cooler immediately following sampling and were delivered under similar conditions to the National Association of Testing Authorities (NATA) accredited analytical laboratories with accompanying chain of custody documentation. Quality assurance and quality control (QA/QC) samples were also collected as discussed in Section 11.

7.3 Groundwater Analytical Program

The groundwater analytical program is summarised in Table 5 below.

Table 4 - Groundwater Analytical Program (October 2015)

Well I.D.	pH / TDS	VOC	TRH and PAH	Metals	Vic EPA Screen
GW1	X	X	X	X	
GW2	X	X	X	X	
GW3	X	X	X	X	
EBT1	X	X	X	X	
MW01	X	X			X
MW02	X	X	X	X	
MW03	X	X			X
MW04	X	X			X
MW05	X	X	X	X	
MW06	X	X	X	X	
MW07	X	X			X

NOTES:-

Metals - As, Cd, Cr, Cu, Ni, Pb, Zn, Hg

Vic EPA Screen - TRH/ PAH/ Phenols/ OCP/ PCB/ BTEX/ Metals (As, Cd, Cr, Cu, Pb, Hg, Mo, Ni, Se, Ag, Sn, Zn)/ CN/ Total Fluoride
Testing for Vinyl Chloride was undertaken at ultra-trace level

The laboratories used for the groundwater testing were Eurofins-mgt (MGT) and Australian Laboratory Services (ALS). The laboratories are approved by the National Association of Testing Authorities (NATA), and the analyses conducted are within the NATA registration of the laboratories. An inter laboratory duplicate groundwater sample was also submitted to the secondary laboratory (ALS) for quality assurance / quality control (QA/QC) purposes. Results of QA/QC analyses are discussed in detail in Section 11.

7.4 Beneficial Uses of Groundwater

The South Australian Environment Protection (Water Quality) Policy 2003 (EPP) identifies the following protected environmental values of underground waters in South Australia:

- Marine aquatic ecosystems.
- Freshwater aquatic ecosystems.
- Primary contact recreation.

- Aesthetics.
- Potable.
- Irrigation.
- Livestock.
- Aquaculture.
- Industrial.

The abovementioned environmental values are also protected for surface waters, but for surface waters the EPP also identifies secondary contact recreation as a protected environmental value. This includes activities involving partial body contact with water where swallowing of water is unlikely (e.g. fishing, wading, paddling and boating).

The risk based approach for assessing groundwater contamination outlined in Schedule B(6) of the National Environment Protection (Assessment of Site Contamination) Measure is based on protection of relevant (i.e. current or realistic) uses of groundwater. The SA EPA's groundwater assessment and management framework also involves deciding on appropriate beneficial uses of groundwater to be protected. There are a number of factors considered relevant in terms of the appropriate beneficial uses of groundwater within the site:

- Marine aquatic ecosystem is not considered to be a realistic beneficial use because the nearest marine water body is the Gulf of St Vincent located some 3.5 km to the west of the site and is unlikely to be impacted from the onsite groundwater.
- Future potable water use from the water table aquifer is considered possible as onsite groundwater at some locations has salinity less than 2,000 mg/L, which is the potable water limit as presented in the SA EPA Guideline 'Guidelines for the Assessment and Remediation of Groundwater Contamination' dated February 2009. It should be noted however that the 2009 SA EPA Guideline also states that *'the shallow aquifer through metropolitan Adelaide would not be considered for a potable water supply. Based on the salinity of the water and the fact that a town water supply is available for potable use, the assessor would consider that the use of the water from the shallow aquifer is for irrigation for domestic purposes.'*
- Following from the above, irrigation for domestic purposes groundwater use is considered a beneficial use of the uppermost aquifer.
- The River Torrens is located in the proximity of the eastern and southern boundaries of the site. Therefore the protection of the fresh aquatic ecosystem of the River Torrens has been considered.
- Livestock watering and aquaculture use of groundwater are not compatible with the likely future use of the site.
- Groundwater underlying the site is not currently used for industrial purposes. In the future, if groundwater was to be extracted for this purpose, the shallow aquifers would not have sufficient yield.
- The shallow groundwater may potentially be used for recreational purposes offsite within the residential areas. The recreational use may include filling spas or swimming pools. Accordingly, primary contact recreation may be considered a realistic beneficial groundwater use.

The realistic groundwater beneficial uses/environmental values are therefore considered to be potable, irrigation for domestic (local gardens) purposes, protection of fresh aquatic ecosystem (River Torrens) and primary/secondary contact and recreation.

It should be noted that although this review has discounted particular beneficial uses of groundwater under the site (i.e. current and likely future uses), the ultimate decision on whether the beneficial uses require protection rests with regulatory authorities in South Australia such as the Environment Protection Authority (SA EPA) and the Department of Environment, Water and Natural Resources (DEWNR).

7.5 Groundwater Assessment Criteria

The groundwater assessment criteria for the identified beneficial uses are provided in Table 6.

Table 5 - Protected Environmental Values (EPP, 2003)

Water body	Freshwater Ecosystem	Marine Ecosystem	Primary/ Secondary Contact & Recreation	Potable	Irrigation	Livestock	Aquaculture	Industrial
Groundwater	X		X	X	X			

The South Australian Environment Protection (Water Quality) Policy 2003 provides the assessment criteria for the environmental values outlined in Table 6. Where the abovementioned criteria have not been proposed for particular analytes, the following alternative sources have been used:

- National Environment Protection (Assessment of Site Contamination) Measure (NEPM) – Groundwater Investigation Levels;
- Australian Water Quality Criteria (ANZECC, 2000);
- Australian Drinking Water Guidelines (NHMRC & ARM CANZ, 2011);
- Guidelines for Managing Risks in Recreational Water (NHMRC, 2008); and
- World Health Organisation (WHO) drinking water guidelines (WHO 2011).

8.0 GROUNDWATER INVESTIGATION RESULTS

8.1 Groundwater Flow Direction

Groundwater elevations along with the inferred groundwater flow direction are discussed in detail in Section 9.3, however it is noted that the inferred groundwater flow direction was determined to be west to north westerly. This is consistent with the expected groundwater flow direction in the locality.

8.2 Field Measured Water Quality Parameters

Groundwater quality parameters as well as water turbidity, colour and presence of sheens or odours were monitored during groundwater purging and prior to sampling. Groundwater sampling records are presented in Appendix H. The stabilised values of groundwater quality parameters are summarised in Table 7 below.

Table 6 – Field measured groundwater quality parameters (October 2015)

Well I.D	pH	Temp (Deg C)	Electrical Conductivity (µS/cm)	Calculated TDS (mg/L)	Oxidation-Reduction Potential (mV)	Dissolved Oxygen (mg/L)
GW1	7.36	23.2	4,379	2,630	-331.3	0.27
GW2	7.12	21.9	4,276	2,570	-180.1	0.60
GW3	7.36	22.0	2,317	1,390	-406.2	0.12
EBT1	7.09	22.3	2,840	1,700	-89.2	0.01 [#]
MW01	7.01	20.0	6,480	3,890	-198.0	0.08
MW02	6.98	20.8	5,480	3,290	-42.7	0.11 [#]
MW03	7.28	19.7	3,480	2,090	22.0	0.23 [#]
MW04	7.05	21.2	4,330	2,600	70.2	0.14 [#]
MW05	7.32	23.3	4,557	2,735	-101.1	2.38
MW06	7.23	21.9	4,901	2,940	-100.4	4.59
MW07	7.22	21.4	4,809	2,885	-124.3	3.57

NOTES:-

* Conversion factor of 0.6 used to convert field Electrical Conductivity (µS/cm) to TDS (mg/L). #dissolved oxygen calculated from percent saturation to mg/L based on altitude and water temperature

Table 7 indicates that the groundwater within the uppermost aquifer is brackish and has the near neutral pH. Reducing conditions in groundwater were noted in the majority of wells.

Fuel related odours were noted in groundwater from monitoring wells EBT01 and GW3 and a slight sheen was also evident in monitoring well GW3. No other groundwater contamination indicators were identified during the October 2015 groundwater sampling.

8.3 Groundwater Analytical Results

Summary tables of the groundwater analyses are presented at the end of this report. Laboratory certificates are attached in Appendix J. It is noted that the groundwater results from the July 2015 sampling have also been included in the summary table for comparison purposes.

In the most recent round of groundwater sampling (October 2015), no elevated results above the adopted water quality criteria were reported for:

- Heavy metals (arsenic, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, silver, tin or zinc);
- Cyanide;
- Fluoride;
- TRH/BTEX; and
- PCBs.

Volatile Organic Compounds

Elevated levels of the chlorinated hydrocarbon dichloromethane were reported above potable water assessment criteria in MW01 located in the southern portion of the site. The reported result was 18µg/L compared with the adopted drinking water criteria of 4µg/L. MW01 was installed to assess groundwater quality along down inferred hydraulic gradient from the operations in the southern portion of the site.

It is noted that several results were reported above the laboratory limit of reporting, but below the assessment criteria for chlorinated hydrocarbons (trichloroethene and tetrachloroethene) in MW02, MW03 and MW04 in the north western portion of the site.

Organochlorine Pesticides

An elevated concentration of the organochlorine pesticide dieldrin was reported above the adopted criteria from monitoring well MW04. The reported result was 2µg/L compared with adopted drinking water and freshwater ecosystem protection criteria of 0µg/L. It is also noted that primary duplicate (QW01) reported elevated concentrations for dieldrin and DDE above the adopted criteria of 0µg/L. The primary sample (MW03) and secondary duplicate (QW02) from this location reported all results for pesticides below the laboratory detection limit.

Fuel Related Compounds

An elevated result was reported for total PAHs (likely to be associated with naphthalene and fuel related compounds) above the adopted drinking water criteria and the adopted freshwater ecosystem protection criteria at one location (GW3) adjacent to the underground fuel tanks in the eastern portion of the site. The reported result was 8µg/L compared with the drinking water criteria of 0.01µg/L and the freshwater ecosystem protection criteria of 3µg/L.

It is noted that several results were reported above the laboratory limit of reporting, but below the assessment criteria for fuel related compounds (ethylbenzene, TRH C6-C10, TRH C10-16 or TRH C10-C36) in GW3 and EBT1 around the USTs in the eastern portion of the site.

Heavy Metals

An elevated result was reported for selenium (0.045mg/L) at one location (MW07) on the eastern boundary of the site above the adopted drinking water criteria (0.01mg/L), freshwater ecosystem protection criteria (0.005mg/L) and irrigation criteria (0.02mg/L). MW07 was installed to assess the background quality of groundwater entering the site from the east (up inferred hydraulic gradient).

Total Dissolved Solids

Elevated levels of total dissolved solids were reported in all groundwater monitoring wells above the adopted guidelines for recreational use. The levels of total dissolved solids were reported in groundwater monitoring wells up inferred hydraulic gradient of the site as well as those on site and are considered to be representative of background conditions in the area.

Comparison with Previous Results

The previous groundwater investigations undertaken in 2011 and July 2015 identified elevated concentrations of VOCs, heavy metals (chromium and lead) and fuel related compounds (TRH, PAHs and BTEX) in all the groundwater wells above adopted guidelines. Overall, the reported results from this monitoring round indicate a decrease in concentrations of the chemicals of concern identified in the wells sampled in these sampling events.

Due to the reported results from newly installed wells, the SA EPA has been notified of the groundwater impacts in accordance with Section 83A of the Environment Protection Act.

9.0 GROUNDWATER CONCEPTUAL SITE MODEL

9.1 Regional Geology and Hydrogeology

9.1.1 Geology

The 1:50,000 scale Adelaide geological map produced by the South Australian Department of Mines and Energy shows the surface geology in the area is the Quaternary Pooraka Formation. The Pooraka Formation reportedly comprises alluvial / colluvial clays with varying amounts of sand and silt.

The general geological sequence in the area (as shown on the 1:50,000 scale Adelaide geological map) comprises:

- Quaternary Age sediments of fluvial and marine origin of the order of 100 metres thickness. The dominant formation is Hindmarsh Clay, which is predominantly clay, but has lenses of gravels, silts and sands. The Hindmarsh Clay is covered by clayey material of the Pooraka and other formations;
- Tertiary sediments of mainly marine origin up to 500 metres thickness are represented by limestones, sands and calcareous sandstones of the Port Willunga, Chinaman Gully, Blanche Point and other formations; and
- Precambrian Age basement rock below approximately 500-600 metres depth.

Reference to the former Department of Mines and Energy Report Book 94/9 “Soils stratigraphy and engineering geology of the Adelaide Plains” indicates the site is situated in the Adelaide Plains in a landform area known as the Lower Alluvial Plain (see Figure 5).

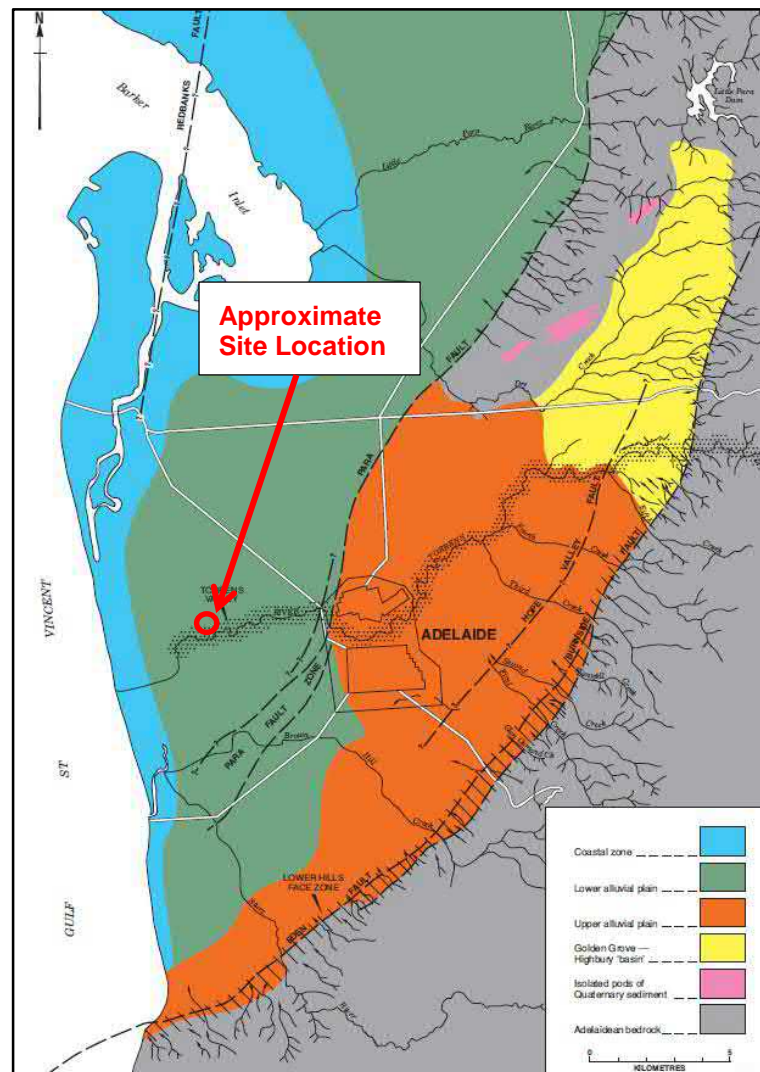


Figure 5 - Geomorphic and geologic zones of the Adelaide region (source: DME Report Book 94/9)

A number of cross-sections were presented in Report Book 94/9 as shown in Figures 6 and 7. Cross sections which run in the vicinity of the site (E-E and L-L) are reproduced in Figure 8 (E-E section) and Figure 9 (L-L section). Cross sections indicate that the site is likely be underlain by the following:-

- The Pooraka Formation – approximately 3 to 6 metres thick:
 - The Pooraka Formation typically consists of sandy clay and clayey to sandy silt, with interbedded clay layers, sand and occasional gravel. Layers rich in carbonate silt and segregations occur within the Pooraka Formation.
- Quaternary Alluvium – approximately 5 to 8 metres thick:
 - Quaternary Alluvium – is found throughout the Hindmarsh Clay and the Pooraka Formation. The deposits follow present and past drainage lines that emerge from the Eden–Burnside and Para Fault Escarpments. The material is predominantly sandy in texture and may also contain abundant silt, clay, gravel and pebbles.
- Hindmarsh Clay – greater than 10 metres thick:
 - Hindmarsh Clay is predominantly clay with some sand and silt content.

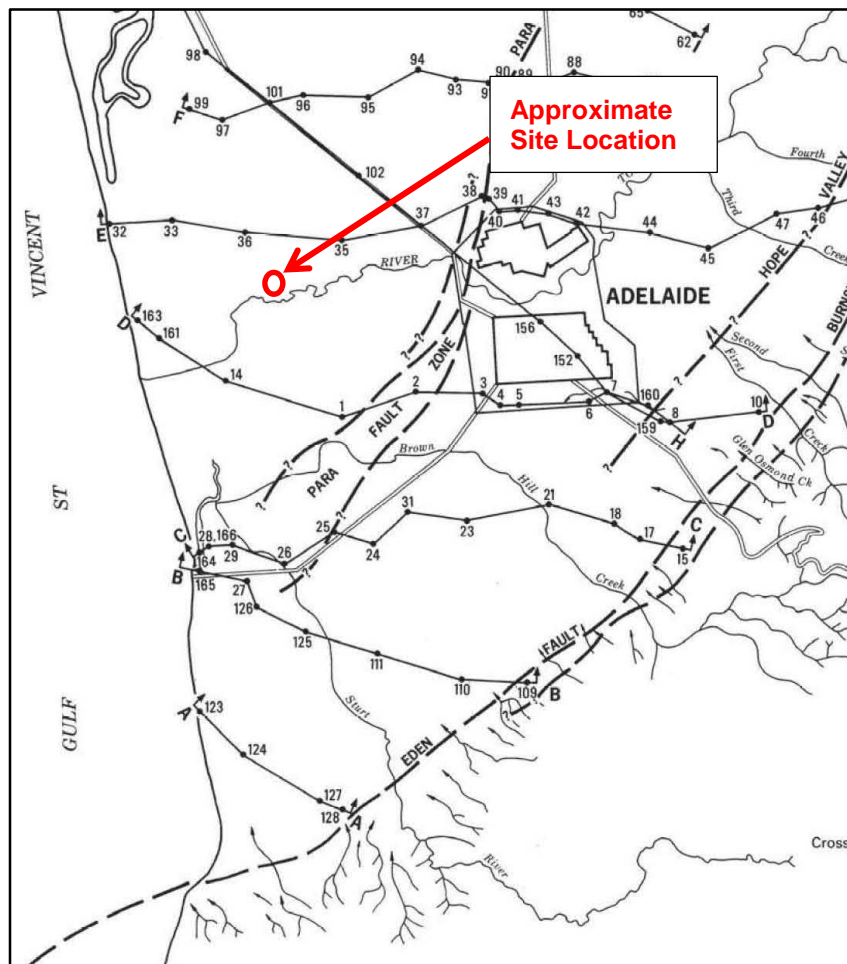


Figure 6 - West-East Cross Section Lines (source: DME Report Book 94/9)

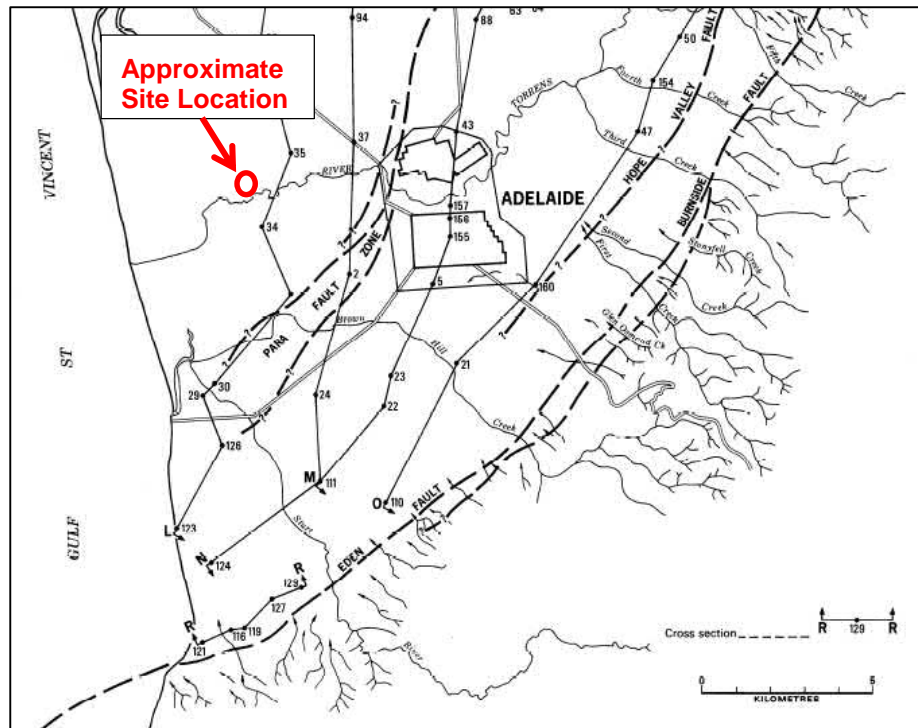


Figure 7 - North-South Cross Section Lines (source: DME Report Book 94/9)

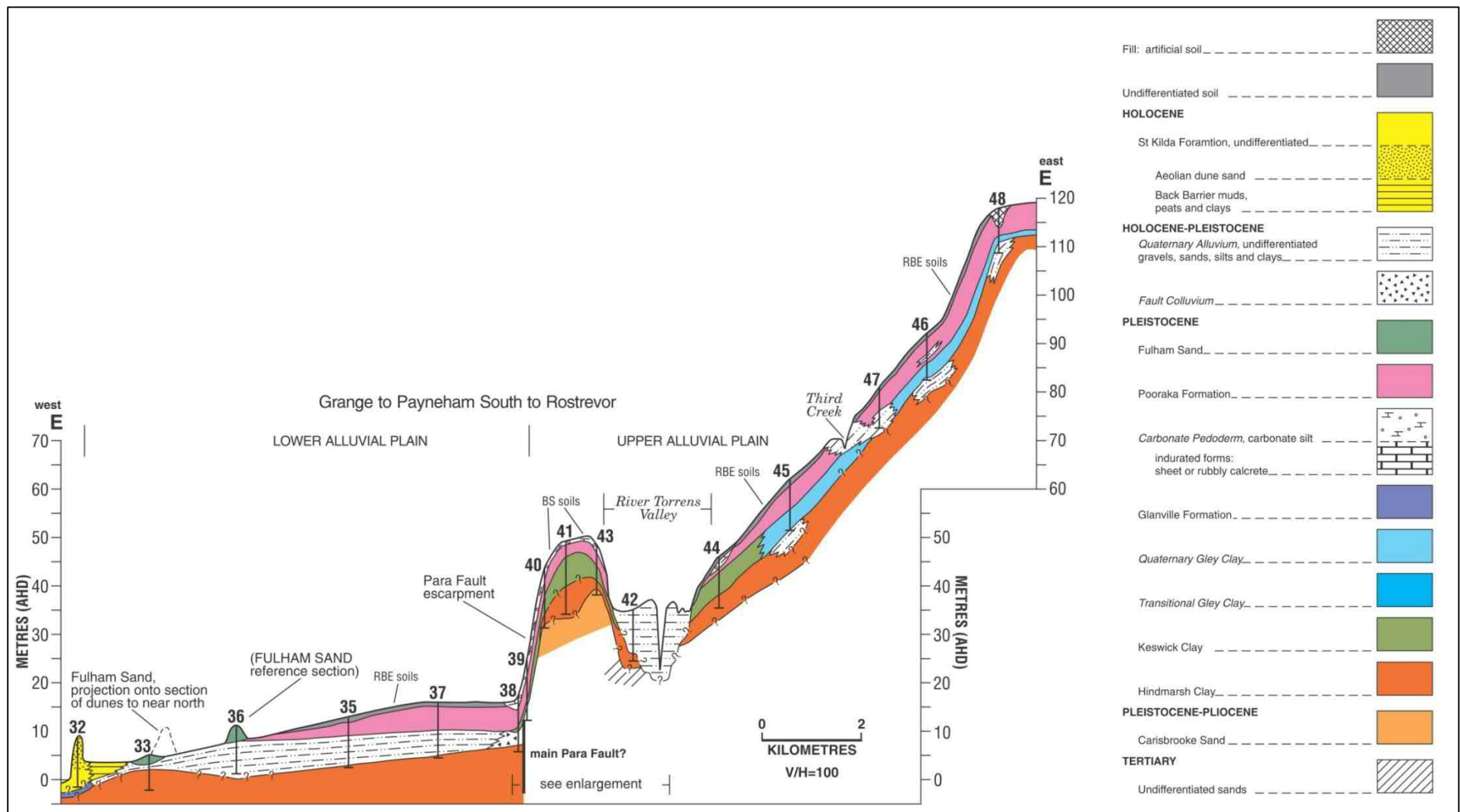


Figure 8 - E-E cross section and geological legend (source: DME Report Book 94/9)

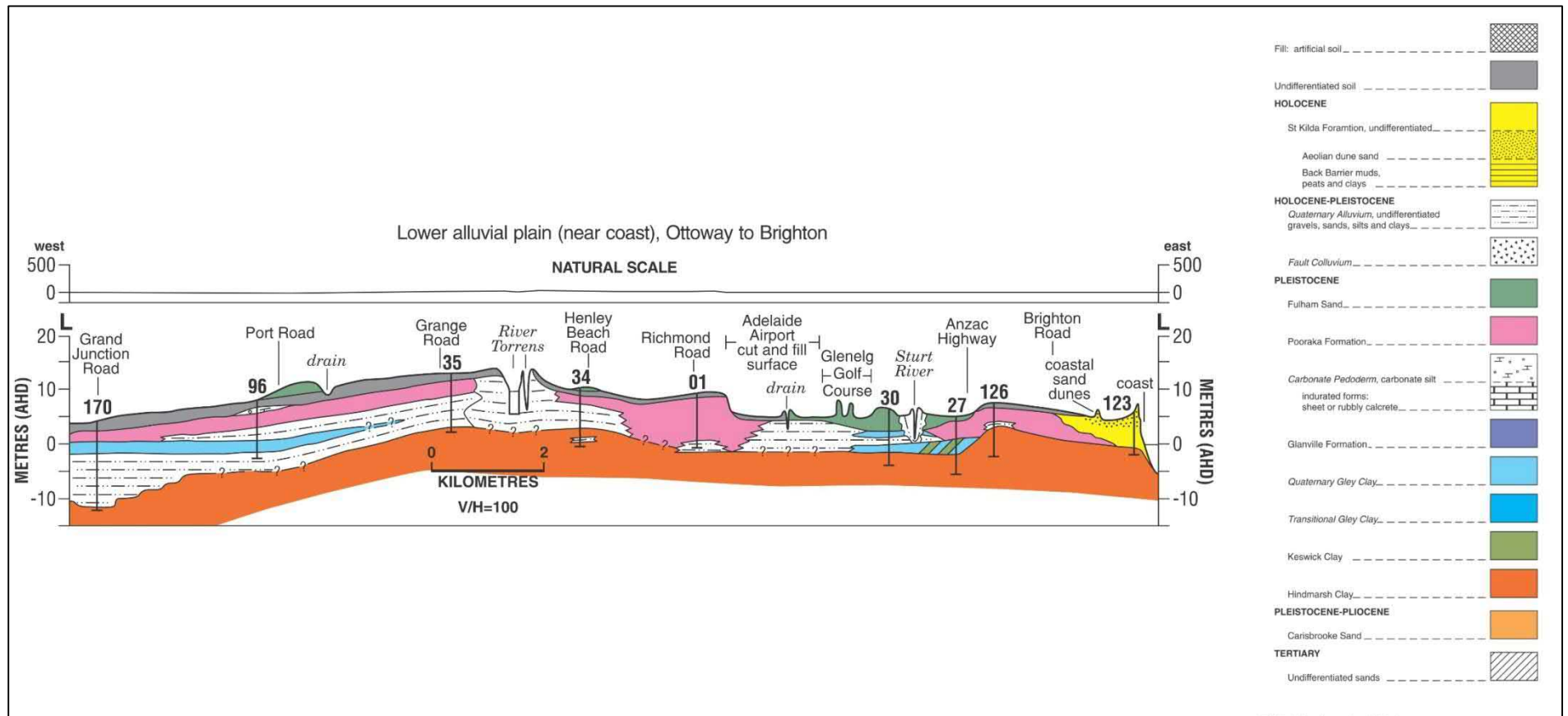
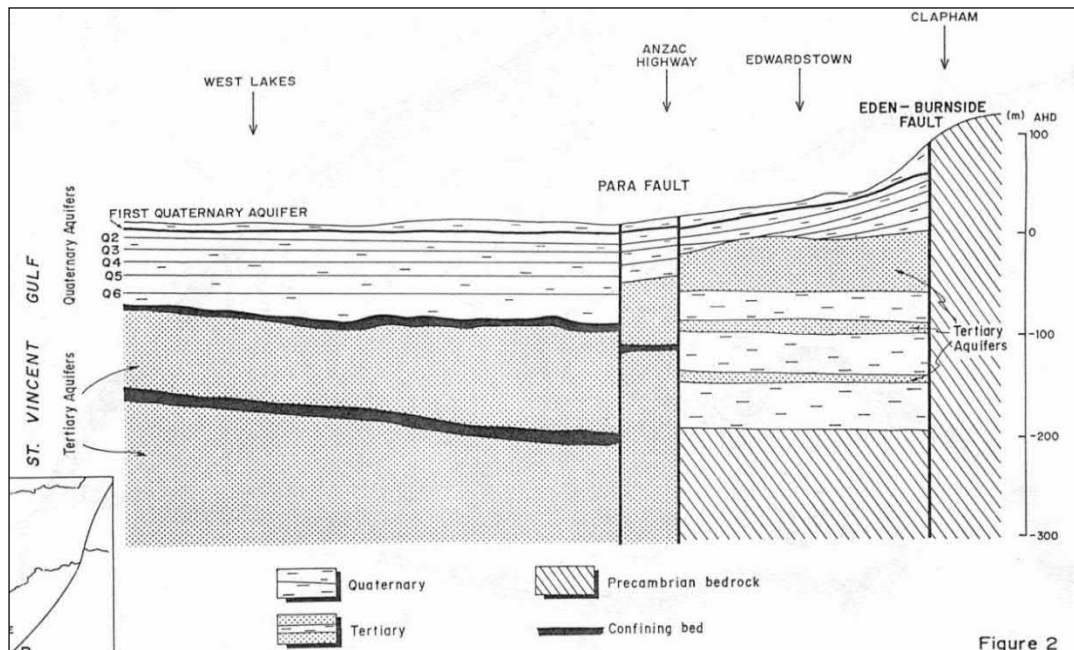


Figure 9 - L-L and N-N cross sections and geological legend (source: DME Report Book 94/9)

9.1.2 Hydrogeology

The Quaternary sediments within the Adelaide Plains include inter-bedded sand and gravel layers within which the water table (uppermost) aquifer generally occurs, and also from other deeper aquifers in the underlying Hindmarsh Clay Formation (reportedly up to six distinct Quaternary aquifers have been identified – designated Q1-Q6 in literature, Gerges 2006). These aquifers are not highly utilised as the yield and water quality are highly variable. The deeper Tertiary aquifers generally have better quality water and yields, and are utilised in some areas within the Adelaide Plains. A generalised cross section through the Adelaide Plains is presented below in Figure 10.



(Sourced from Centre for Groundwater Studies Report 'Potential for Storage and Reuse of Adelaide's Stormwater Runoff Using the Upper Quaternary Aquifer System' (CGS report No.40, April 1992)

Figure 10 - Generalised Cross Section – Adelaide Plains Geology & Aquifers

The report "Overview of the hydrogeology of the Adelaide metropolitan area" prepared by Gerges (reference RB 2006/10 June 2006) provides a general overview of the hydrogeological settings of the Adelaide Metropolitan area. Gerges sub-divided the Adelaide Metropolitan area into several hydrogeological zones as shown on Figure 11.

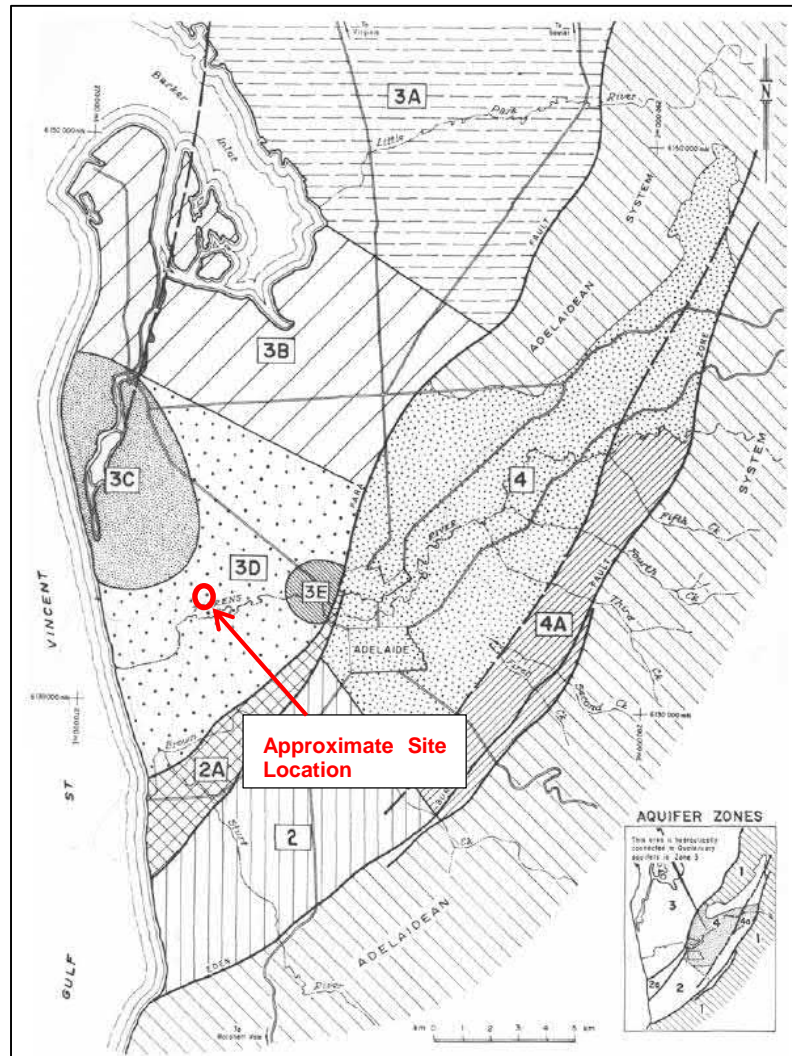


Figure 11 - Hydrogeological Zones (Gerges, 2006) Source "Overview of the hydrogeology of the Adelaide metropolitan area" (reference RB 2006/10, June 2006)

Figure 11 shows that the site is located within zone 3 which is described by Gerges as follows:

'This zone contains five to six Quaternary aquifers and also three to four, almost flat lying, Tertiary aquifers. The first and second Tertiary aquifers are the thickest and the most productive, with relatively low salinity. The greatest proportion of abstracted groundwater for industrial and recreational use comes from the first Tertiary aquifer.'

It should be noted that the sub-division of Zone 3 (e.g. 3A, 3B etc.) is related to the first Tertiary Aquifer (T1) and not to Quaternary aquifers.

Q1 aquifer

The uppermost aquifer (or Q1 aquifer as identified by Gerges) is of most relevance in terms of contamination and assessment for the completion of this DRA. The uppermost aquifer generally receives direct recharge from rainfall percolation through the ground surface and therefore is the most susceptible to contamination.

Report RB 2006/10 presents generalised groundwater contours for the uppermost aquifer within the Adelaide metropolitan area (refer Figure 12).

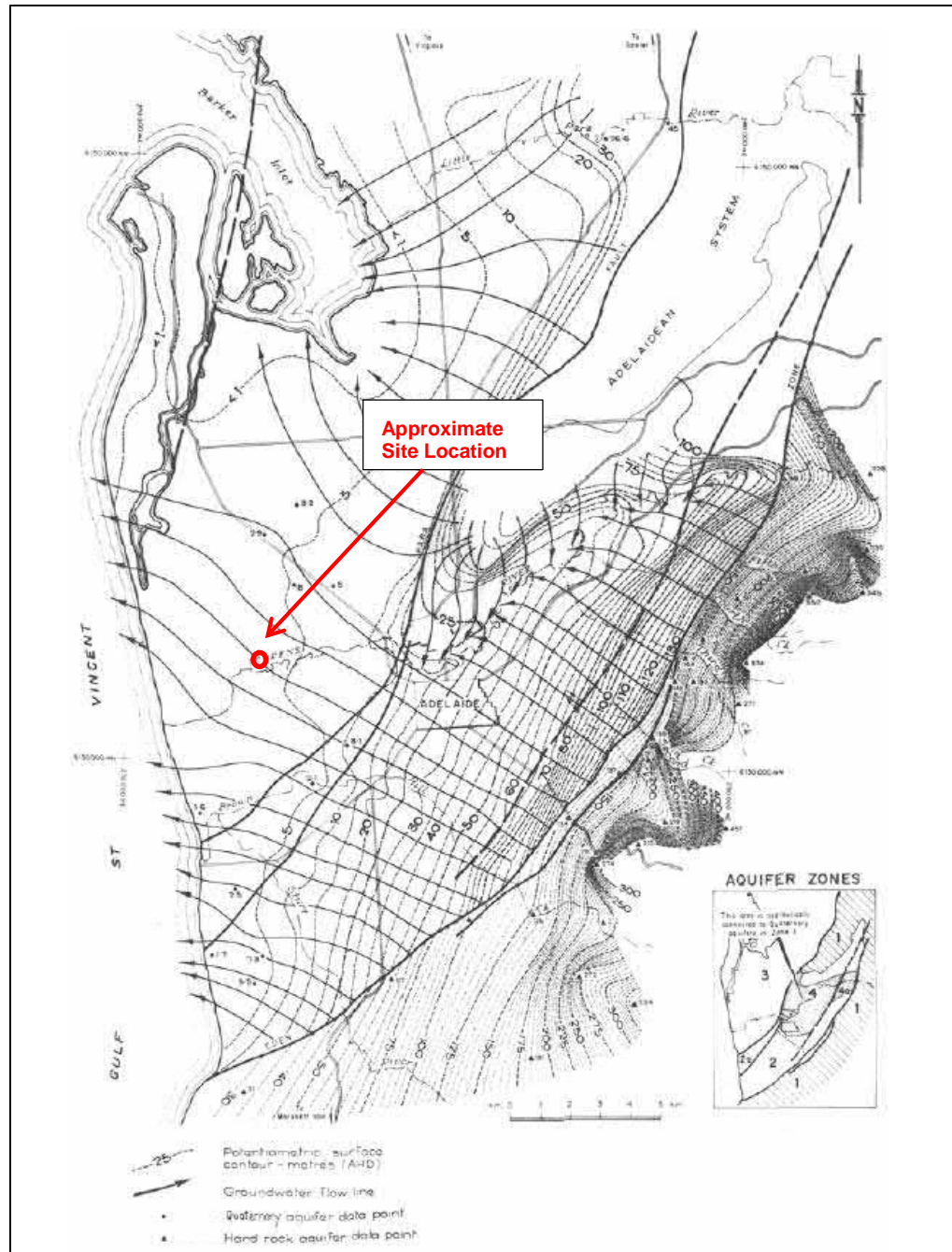


Figure 12 - Groundwater Level Contours, Uppermost aquifer (source Gerges 2006)

Figure 12 indicates that the movement of groundwater in the uppermost aquifer at the site is expected to be in a north westerly direction towards the Gulf St Vincent. The elevation of groundwater levels at the site area is expected to range between 3 and 5 metres Australian Height Datum (mAHd).

The salinity distribution for the uppermost aquifer is also presented in the Gerges, 2006 report and is reproduced in Figure 13.

Figure 13 indicates that the groundwater salinity of the uppermost aquifer in the vicinity of the site is expected to be between 1,000 and 2,500 mg/L.

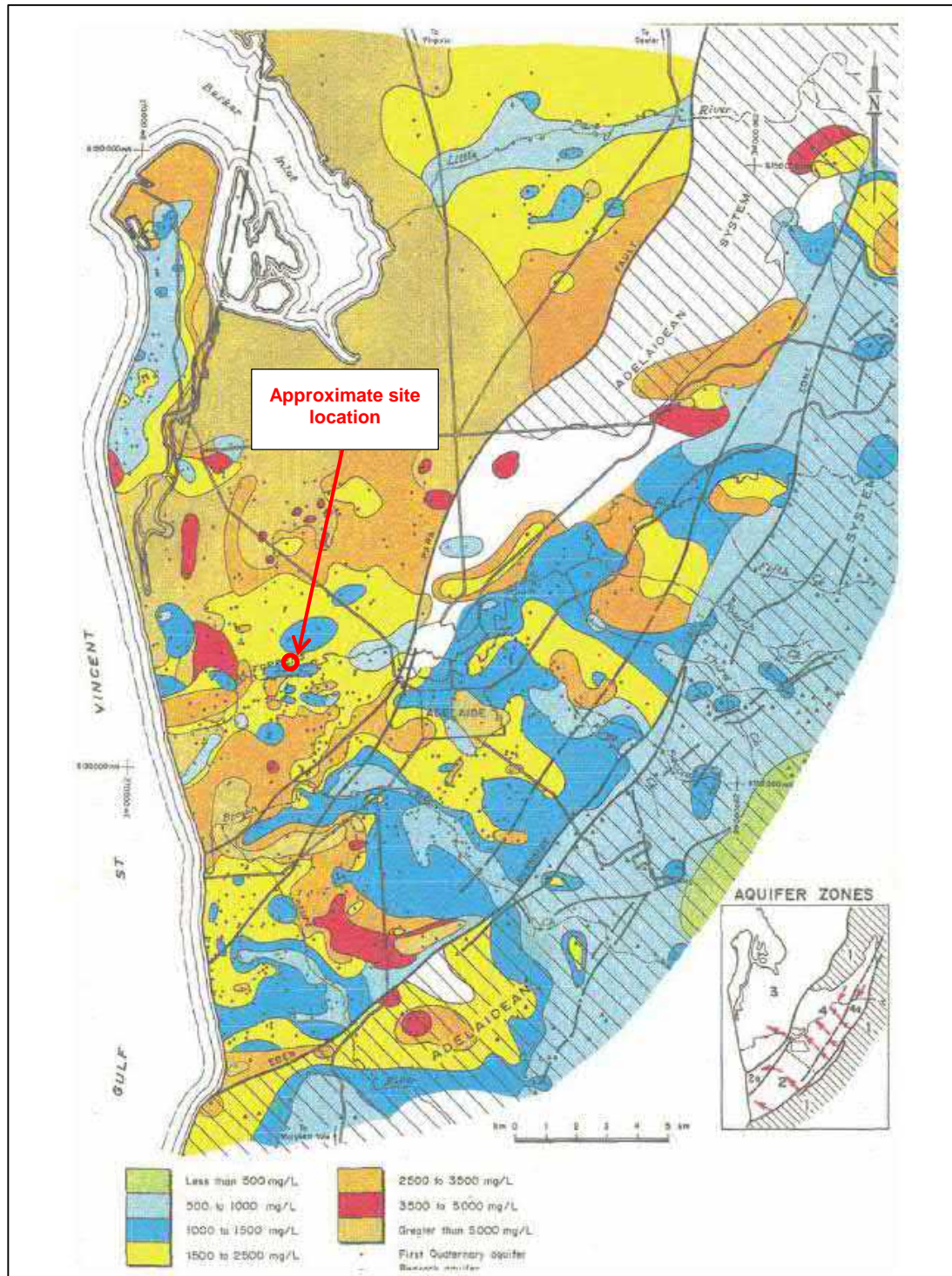


Figure 13 - Groundwater Salinity, Uppermost aquifer (Gerges, 2006)

9.2 Site Specific Groundwater Occurrence

Based on the groundwater well logs presented in Appendix G, the top of the uppermost (Q1) aquifer was encountered at around 7mbgl. The aquifer is located within the natural material represented by silty and sandy clays brown to dark brown in colour. This material was interpreted to represent the Quaternary Alluvial sediments (refer Section 10.1.1). Fuel hydrocarbon odours were noted in in monitoring wells EBT01 and GW3 during the investigation.

Depth to groundwater level in the uppermost aquifer ranged between 5.5 and 6.9 metres below the reference points on the top of well casings (mbTOC) over the October 2015 groundwater monitoring event.

The groundwater level gauging results and inferred groundwater flow direction is discussed in the section below.

9.3 Survey, Gauging & Groundwater Flow Direction

The elevations of the top of casings for on-site and the off-site wells were surveyed by a licenced surveyor (Alexander Symonds Surveying Consultants). The survey results are attached in Appendix I.

Groundwater levels from the most recent groundwater level gauging conducted on 1 October 2015 are presented in Table 8.

Table 7 – Groundwater Level Gauging Results (October 2015)

Well I.D	Date	Reference Point Elevation (mAHD)	Depth to groundwater level (m bTOC)	Groundwater level Elevation (mAHD)
EBT1	Oct - 2015	8.598	5.600	2.998
GW1	Oct - 2015	9.015	6.142	2.873
GW2	Oct - 2015	8.715	5.756	2.959
GW3	Oct - 2015	8.528	5.525	3.003
MW01	Oct - 2015	9.105	6.257	2.848
MW02	Oct - 2015	9.305	6.462	2.843
MW03	Oct - 2015	8.327	5.506	2.821
MW04	Oct - 2015	8.495	5.630	2.865
MW05	Oct - 2015	8.618	5.702	2.916
MW06	Oct - 2015	9.47	6.541	2.929
MW07	Oct - 2015	9.155	6.147	3.008

NOTES:

mAHD – metres Australian Height Datum

mbTOC – metres below top of casing.

Groundwater level elevations ranged from 2.82 to 3.01m AHD. The groundwater level data has been used to construct a groundwater contour plan as shown in Figure 14. The general groundwater flow direction was assessed to be in a west to north westerly direction. The direction is consistent with the expected regional flow direction (refer Section 9.1.2).

Averaged hydraulic gradient for the Q1 aquifer at the site calculated using the October 2015 contours is approximately 0.0008 m/m.

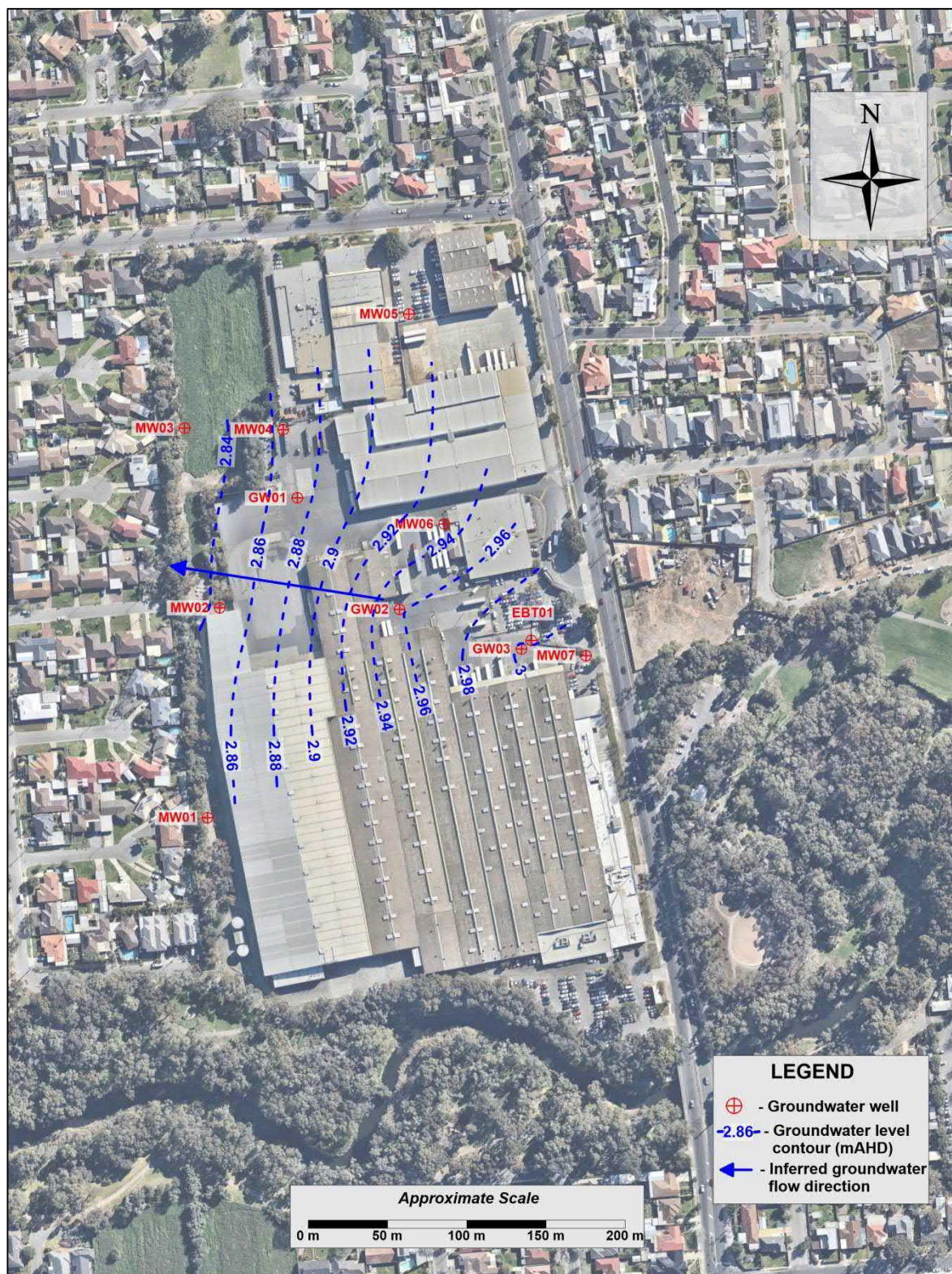


Figure 14 – Groundwater level Contours (October 2015)

9.4 Recharge Sources, Discharge Areas and Other Hydraulic Boundaries

The recharge to the uppermost aquifer (Q1) occurs as a result of two major mechanisms:

- Rainwater infiltration across the unpaved open space areas of the site and surrounding areas; and
- Groundwater through flow from up hydraulic gradient locations including the River Torrens.

Infiltration recharge rates are likely to be low due to the combined effects of urbanisation and the high evaporation potential, which exceeds rainfall for most months of the year. A review of available publications indicates that the infiltration generally comprises less than 10% of the annual rainfall. It is noted that infiltration rates may be greater in the unsealed areas within the site; however, the impact of this infiltration in these areas is relatively low compared to the large scale of the aquifer.

Groundwater through-flow from up hydraulic gradient sources is also expected to be low to moderate as the aquifer material is generally of low permeability (mainly comprising clays and silts).

Regionally, groundwater flow in the uppermost aquifer is in a north westerly direction towards the Gulf St Vincent, which is considered to be the primary discharge area for this aquifer.

There are no on-site watercourses, or water bodies deep enough to intersect the groundwater flow and to act as discharge areas for the shallow aquifer system. The nearest water body (River Torrens) acts as a recharge boundary for the Q1 aquifer.

9.5 Groundwater salinity

The groundwater TDS ranges between 1,400 and 3,900 mg/L which is generally consistent with the expected regional groundwater salinity (refer Section 9.1.2). The groundwater salinity distribution in the Q1 aquifer at the site area is presented on Figure 15. The extent of the fresher groundwater with salinity less than 2,000 mg/L was only observed at the locations of EBT01 and GW3 indicating a localised groundwater recharge at this location.



Figure 15 - Groundwater Salinity Contours (field data October 2015)

10.0 SOIL VAPOUR INVESTIGATION

Soil vapour investigations were undertaken around the underground storage tanks (USTs) located in the northern and north eastern portions of the site to assess the presence of soil vapour.

10.1 Installation of Soil Vapour Points

A total of four soil vapour monitoring points (two around each underground storage tank area) were drilled and installed on 29 September 2015 under the supervision of an experienced Greencap environmental scientist. The soil vapour points VP01 to VP04 (inclusive) were installed to 1.5 metres below ground level (mbgl). All soil vapour points were drilled using percussive push tube drilling equipment to reach the target depth. A summary plan showing the soil vapour point locations is presented in Figure 3 at the end of this report.

The soil vapour points comprised a stainless steel implant (with woven wire screen) connected to Teflon tubing extending to the ground surface. The vapour points were surrounded by a discrete lightly compacted sand pack (grain size of 2-3mm) finishing approximately 150mm above the implant. A bentonite seal/plug was installed above the sand pack finishing approximately 50mm from the ground surface. Following vapour sampling, the vapour points were removed and backfilled with bentonite and the ground surface reinstated with bitumen. Further construction details are shown on the soil vapour installation logs attached in Appendix D.

10.2 Sampling of Soil Vapour Point Network

A soil vapour monitoring event was undertaken on 30 September 2015 by an experienced environmental scientist using summa canister sampling methodology.

10.2.1 Vapour Point Sampling Methodology

Soil vapour samples were collected from all soil vapour points into summa canisters supplied by the primary and secondary analytical laboratories, EnviroLab and Australian Laboratory Services (ALS) respectively. The summa canisters were supplied with flow regulators to limit the flow of air from the soil vapour point into the canisters (which were under vacuum). These flow regulators were set to allow a sampling time of approximately 1 hour.

Prior to sampling (and during the helium leak test described in Section 11) all soil vapour points were purged to remove at least one well volume before basic gases (Oxygen, Carbon Dioxide, Methane, Hydrogen Sulphide and Carbon Monoxide) were measured and stabilised using a GA2000 landfill gas meter. A PID concentration was also collected during the purging process. The measured stabilised gases prior to sampling are discussed in Section 9.3.1.

Leak testing was undertaken prior to and during sampling using both helium and isopropanol testing techniques to ensure representative soil vapour was being sampled from each location. These tests are discussed in further detail within Section 11 and as well as the collection and analysis of duplicates and blanks.

Soil vapour sampling sheets and equipment calibration certificates (for the helium meter, landfill gas meter and PID) are attached to Appendix E.

10.2.2 Soil Vapour Analytical Program

Summa canister were submitted to the NATA accredited primary and secondary analytical laboratories (EnviroLab and ALS respectively) and analysed for a suite of volatile compounds (known as a TO-15 suite). The analytical suite includes BTEX compounds (benzene, toluene, ethylbenze and Xylene) and chlorinated hydrocarbons. Samples were also analysed for petroleum related compounds (TRH).

Results of the soil vapour analyses are discussed in Section 9.3. There is also a summary table of analytical results presented as an attachment to this report and NATA laboratory certificates presented in Appendix F. Samples of soil vapour submitted to the secondary laboratory (ALS) for QA/QC purposes are discussed in detail in Section 11.

10.3 Soil Vapour Investigation Results

10.3.1 Measured Basic Gas Levels

The measured basic gas levels during the September 2015 sampling event are summarised in Table 4.

Table 8 - Ambient Air and Stabilised Gases (September 2015)

Soil Vapour Point	Measured Parameters					
	Oxygen (O ₂) (%)	Carbon Dioxide (CO ₂) (%)	Methane (CH ₄) (%)	Hydrogen Sulphide (H ₂ S) (ppm)	Carbon Monoxide (CO) (ppm)	PID reading (ppm)
VP01	12.1	5.4	0	13	99	5.2
VP02	18.6	0	0	3	3	4.4
VP03	15.9	4.7	0	5	1	1.5
VP04	11.7	6	0	5	1	0.2

As shown in Table 4, oxygen levels in vapour points around the USTs in the northern portion of the site (VP01 and VP02) ranged between 12.1% and 18.6%. Vapour points VP03 and VP04 around the USTs in the north eastern portion of the site measured oxygen levels of 11.7% and 15.9%. The oxygen levels are similar in both locations. The slightly lower levels of oxygen recorded in VP01, VP03 and VP04 correspond to the higher carbon dioxide levels measured at these locations.

All of measured methane levels were at the ambient level of 0%. Hydrogen sulphide levels were measured between 3ppm and 13ppm above the ambient background level of 2ppm. Carbon monoxide levels were also measured above the ambient background level of 0ppm in all vapour points with levels ranging from 1ppm to 99ppm. Hydrogen sulphide and carbon monoxide levels were most elevated in VP01 located around the USTs in the northern portion of the site.

The elevated levels of carbon dioxide, hydrogen sulphide and carbon monoxide are an indication of oxygen reducing conditions and are may be the related to the elevated levels of hydrocarbons reported in the soils around the USTs.

The PID readings measured for the USTs in the north eastern portion of the site were below 2ppm. The PID readings measured for the vapour points around the USTs in the northern portion of the site were slightly elevated ranging from 4.4 to 5.2ppm.

The majority of ambient air levels were measured to be consistent across the soil vapour point network, with hydrogen sulphide levels measuring at 2ppm, carbon monoxide levels measuring 0ppm, carbon dioxide levels at 0.1% and oxygen levels measuring 20.3%.

10.3.2 Soil Vapour Assessment Criteria

Soil vapour results were compared with Interim Soil Vapour Health Investigation Levels (HILs) for volatile organic chlorinated compounds as outlined in Table 1A(2) 'Interim soil vapour health investigation levels for volatile organic chlorinated compounds' presented in the NEPM. Commercial/industrial and residential levels have been adopted for the investigation. It is noted that for some volatile compounds there was no criteria adopted. Alternative sources were not sourced as part of this investigation.

Soil vapour results were also compared to Health Screening Levels (HSLs) presented in the NEPM for fuel related compounds. The appropriate NEPM HSLs used were selected based on the depth of soil vapour point installation (either 0 to <1m or 1m to <2m), the material type in which the vapour points were installed (sand was selected as a conservative measure given the vicinity of the underground tank pits) and the land use (commercial/industrial or residential).

10.3.3 Laboratory Testing Results

A table summarising the soil vapour sampling results is attached to this report. NATA laboratory certificates are attached to Appendix F.

A number of soil vapour concentrations exceeding the adopted criteria were reported as follows:

- **cis -1,2-Dichloroethene (DCE)** – Elevated concentrations were reported to exceed the Interim Soil Vapour HIL for residential use of $80\mu\text{g}/\text{m}^3$ from one of the sample locations ($250\mu\text{g}/\text{m}^3$ at VP01) in the vicinity of the USTs in the north western portion of the site. The duplicate sample collected from this location (QV02) reported a result of $339\mu\text{g}/\text{m}^3$ which also exceeded the Interim Soil Vapour HIL for commercial/industrial use ($300\mu\text{g}/\text{m}^3$). Detectable concentrations of DCE were also reported from VP02, but these concentrations were below the Interim Soil Vapour HILs.
- **Trichloroethene (TCE)** – Elevated concentrations were reported to exceed the Interim Soil Vapour HIL for residential use of $20\mu\text{g}/\text{m}^3$ and the Interim Soil Vapour HIL for commercial/industrial use of $80\mu\text{g}/\text{m}^3$ from two of the sample locations (ranging from $110\mu\text{g}/\text{m}^3$ at VP02 to $2,400\mu\text{g}/\text{m}^3$ at VP01). It is noted that the duplicate result (collected from location VP01) reported a result of $3,120\mu\text{g}/\text{m}^3$. Both VP01 and VP02 are in the vicinity of the USTs in the north western portion of the site. Detectable concentrations of TCE were also reported from VP03 adjacent the USTs in the eastern portion of the site, but these concentrations were below the Interim Soil Vapour HIL for residential land use.
- **Vinyl chloride (VC)** – Elevated concentrations were reported equal to the Interim Soil Vapour HIL for residential use of $30\mu\text{g}/\text{m}^3$ from VP01 in the vicinity of the USTs in the north western portion of the site. The duplicate sample collected from this location (QV02) reported a result of $39.6\mu\text{g}/\text{m}^3$ which exceeds the Interim Soil Vapour HIL for residential use ($30\mu\text{g}/\text{m}^3$). These results are below the Interim Soil Vapour HIL for commercial/industrial use ($100\mu\text{g}/\text{m}^3$). All other reported results for vinyl chloride were below the laboratory detection limits.

Furthermore, the following observations have been made in relation to the soil vapour data:

- Elevated concentrations of tetrachloroethene (PCE) were reported from VP01 and VP02 adjacent the USTs in the north western portion of the site. Although none of the results exceeded the Interim Soil Vapour HILs, these results were still well above the laboratory detection limits.
- Detectable concentrations of fuel related compounds (TRH and BTEX) were reported from all soil vapour points. The most significant results were reported from VP01 and VP02 in the vicinity of the north western UST area, but these were still be below the adopted assessment criteria.
- Detectable concentrations were also reported from one or more locations for Dichlorodifluoromethane (VP02 only), Bromomethane (VP01 only), ethanol (all four vapour points), Trichlorofluoromethane (VP02 only), Isopropyl Alcohol (all four vapour points), 1,1-Dichloroethene (VP01 only), Carbon Disulfide (all four vapour points), trans-1,2-dichloroethene (VP01 only), MEK (VP01 and VP02), Hexane (all four vapour points), Benzene (VP01, VP02 and VP03), Cyclohexane (VP01, VP02 and VP04), Heptane (VP01 and VP02), MIBK (VP01 and VP02), Toluene (all four vapour points), Methyl Butyl Ketone (VP02 only), Ethylbenzene (all four vapour points), xylenes (all four vapour points), 4-ethyl toluene (VP02 only), 1,3,5-Trimethylbenzene (VP02 only), 1,2,4-Trimethylbenzene (all four vapour points), Naphthalene (VP01, VP02 and VP03). For all of these compounds, either there is no adopted assessment criteria, or the results did not exceed the adopted assessment criteria.

A number of solvents have been identified in soil vapour at the locations tested. The most significant results are from VP01 along the southern side of the north western area of underground storage tanks. It is noted that a groundwater well installed in this same area did not report any elevated concentration of solvents during this sampling event. As such, the identified soil vapour impacts may be related to contamination in the underlying soil and not groundwater.

Given the impacts have been identified in a portion of the site that does not contain any buildings, the risk to site users in the current site layout is unlikely to be unacceptable. Further site specific risk assessment would be required to confirm this.

11.0 QUALITY ASSURANCE AND QUALITY CONTROL

QA/QC measures for this investigation were based on AS4482.1–2005 and included:-

- Appropriate sample labelling, preservation, storage and transport under chain of custody procedures.
- Laboratory analyses conducted within appropriate holding times.
- Analysis of laboratory QA/QC samples including duplicates, blanks, matrix spikes, matrix spike duplicates, and surrogates.
- The use of laboratories that hold NATA accreditation for the analyses undertaken.
- Collection and analysis of field QA/QC samples including duplicates and blanks.

11.1 Internal Laboratory QA

The results of the internal quality assurance programs of the laboratory are presented with the NATA test certificates at the end of this report as Appendices C, F and J. According to the NEPM, the quality of data supplied by the analytical laboratory must meet the objectives of the testing laboratory's quality plan for at least 95% of test results for duplicates. The primary laboratory reported all internal duplicates passed internal laboratory testing.

11.2 Field Duplicates

11.2.1 Soil Analyses

Field duplicate soil samples were collected and submitted to the primary and secondary laboratories for testing respectively as summarised in Table 9.

Table 9 – Soil Duplicate Analyses

Sample ID	Primary laboratory (Eurofins-mgt)	Secondary laboratory (ALS)
SB05_0.0-0.1	QC01 – Vic EPA Screen	QC02 – Vic EPA Screen
SB08_0.2-0.4	QC03 – heavy metals, TRH, BTEX, OCP, OPP and PAH	QC04 – heavy metals, TRH, BTEX, OCP, OPP and PAH
SB10_0.3-0.5	QC07 – heavy metals and PAH	QC08 – heavy metals and PAH
SB31_0.01-0.3	QC11 – heavy metals, OCP and PAH	QC12 – heavy metals, OCP and PAH
SB34_0.9-1.0	QC13 – heavy metals, BTEX, TRH, OCP and PAH	QC14 – heavy metals, BTEX, TRH, OCP and PAH
SB39_0.25-0.4	QC15 – heavy metals and OCP	QC16 – heavy metals and OCP
SB41_0.6-0.8	QC17 – heavy metals, TRH, BTEX, PAH and OCP	QC18 – heavy metals, TRH, BTEX, PAH and OCP
SB44_0.8-0.9	QC19 – heavy metals and PAH	QC20 – heavy metals and PAH
SB46_0.6-0.8	QC21 – heavy metals and PAH	QC22 – heavy metals and PAH
TB11_0.4-0.5	QC25 – heavy metals and OCP	QC26 – heavy metals and OCP
TB13_0.15-0.25	QC27 – TRH, VOC, heavy metals, PAH	QC28 – TRH, VOC, heavy metals, PAH

NOTES:-

TRH = total recoverable hydrocarbons

PAH = polycyclic aromatic hydrocarbons

OCP = organochlorine pesticides

BTEX = benzene, toluene, ethylbenzene, xylene

VOCs = volatile organic compounds

Heavy metals = arsenic, cadmium, chromium, copper, nickel, lead, mercury, silver, tin, zinc

Vic EPA Screen - includes heavy metals (as above + molybdenum and selenium), OCP, TRH, volatile organic compounds, PCBs, vinyl chloride, PAH, phenols, hexavalent chromium, cyanide and total fluoride

The frequency of field duplicate analyses for the main contaminants of concern is considered to be acceptable when compared to the 1 per 20 analyses recommended in AS4482.1.

The majority of comparable results reported relative percentage differences (RPDs) below the accepted criteria of 50%. RPD exceedences were reported from the following samples:

- SB05_0.0-0.1 and secondary duplicate QC02 for nickel (63%).
- SB08_0.2-0.4 and primary duplicate QC03 for chlordane (67%).
- SB08_0.2-0.4 and secondary duplicate QC04 for chlordane (120%) and arsenic (52%).
- SB20_0.3-0.5 and secondary duplicate QC08 for nickel (52%).
- SB31_0.01-0.3 and primary duplicate QC11 for mercury (67%).
- SB31_0.01-0.3 and secondary duplicate QC12 for copper (62%), mercury (67%), nickel (57%) and total PAH (126%).
- TB13_0.15-0.25 and primary duplicate QC27 for lead (100%), arsenic (86%), chromium (75%), copper (108%) and zinc (102%).

All of the reported results (from both primary and duplicate samples listed above) are below the adopted guidelines. As such, in terms of this investigation, the variations are not considered significant. A table summarising the field duplicate results is attached to this report. Given the relatively low number of RPD exceedences compared to the total number of comparable duplicate samples, the data set is considered to be of acceptable quality for the purposes of this report.

11.2.2 Groundwater Analyses

Field duplicate samples were collected during the October 2015 sampling event and analysed at the primary and secondary laboratories (Eurofins-mgt and ALS respectively). Field duplicate samples QW01 and QW02 were collected from groundwater well MW03 and tested as outlined in Table 10.

Table 10 – Groundwater Duplicate Analyses

Sample ID	Primary laboratory (Eurofins-mgt)	Secondary laboratory (ALS)
MW03	QW01 – pH, TDS, VOC, vinyl chloride and Vic EPA Short Screen	QW02 – pH, TDS, VOC, vinyl chloride and Vic EPA Short Screen

NOTES:-

TDS = total dissolved solids

VOCs = volatile organic compounds

Vic EPA Short Screen - includes heavy metals (arsenic, cadmium, chromium, copper, nickel, lead, mercury, silver, tin, zinc, molybdenum and selenium), OCP, TRH, PAH, phenols, cyanide and total fluoride

The majority of comparable inter and intra laboratory duplicate groundwater analyses had relative percentage difference (RPD) values below the recommended comparison criteria of 50%. However, the following variations were reported:

- Dieldrin – a variation of 100% was calculated between the primary sample (MW03) and the intra laboratory duplicate (QW01). It is noted the duplicate sample also reported detectable concentrations of DDE where the primary sample did not.
- Lead – a variation of 67% was calculated between the primary sample (MW03) and the inter laboratory duplicate (QW02).
- Nickel – a variation of 100% was calculated between the primary sample (MW03) and the inter laboratory duplicate (QW02).

The heavy metals variations are not considered overly significant due to the low concentrations reported and all results being reported below the adopted groundwater quality criteria. Higher variations can be expected for samples with low analyte concentrations, such as in the case with those analytes mentioned above.

The OCP variations may warrant further consideration as part of any later stages of work. The secondary duplicate (QW02) from this location did not report detectable concentration of dieldrin or DDE, but it is noted the detection limit at this laboratory was higher.

A table summarising the field duplicate results for the investigation is presented with the groundwater result summary tables attached to this report.

11.2.3 Soil Vapour Analyses

Field duplicate samples were collected and analysed at the primary and secondary laboratories (using the summa sampling methods). A summary of the field duplicate samples collected are summarised in Table 11.

Table 11 – Soil Vapour Duplicate Analyses

Soil Vapour Point	Duplicate Sample Collected	Laboratory Analyses
VP01	QV02 – inter-laboratory duplicate (ALS)	TO-15 Suite* & TRH
VP02	QV01 – intra-laboratory duplicate (EnviroLab)	TO-15 Suite* & TRH

NOTES:-

* - comprises a suite of 62 volatile compounds

The majority of comparable inter and intra laboratory duplicate soil vapour analyses had relative percentage difference (RPD) values below the adopted comparison criteria of 50%. However, a number of volatile compound (isopropyl alcohol, trichloroethene and naphthalene) variations were calculated ranging between 52% and 186% between the primary and duplicate samples.

A variation in isopropyl alcohol results was reported between the primary sample and the inter laboratory duplicate samples. This compound is commonly used as a leak detection compound and the higher detection may be a result of cross contamination at the secondary laboratory.

A variation in the trichloroethene results was reported between the primary sample and the intra laboratory duplicate. The primary result (which was the higher reported result) has been adopted for the assessment in the first instance, so this variation is not considered overly significant.

A variation in naphthalene results was reported between the primary sample and the intra laboratory duplicate. This is not considered overly significant in terms of the investigation as none of reported concentrations from the primary or duplicate samples tested exceed the adopted criteria for this compound.

A table summarising the field duplicate results for the investigation is presented as an attachment to this report (with soil vapour result summary tables).

11.3 Soil Vapour Leak Testing

As discussed in Section 7.0, prior to the soil vapour sampling taking place, leak testing was undertaken on each sampling point to ensure that vapour samples were representative of the targeted soil depth being sampled and that ambient air was not being drawn into the vapour well. The leak testing procedure is discussed further below.

11.3.1 Helium Leak Test

The helium leak test methodology adopted comprised adding helium to a shroud (which overlies the soil vapour point) and the concentration was measured using a GasCheck 5000 handheld helium detector. Soil vapour was then drawn from the vapour point and a real-time helium concentration was measured. A comparison was then made between the shroud concentrations and measured vapour point concentration to ensure the difference in concentration was less than the recommended difference of 10%.

The measured helium concentrations detected within all soil vapour points sampled were less than 10% of the measured shroud concentration indicating the integrity of all soil vapour points are generally sound using the helium leak test method (refer Appendix E for sampling records).

11.4 Blank Samples

11.4.1 Soil and Groundwater

Rinsate blank samples (RB) and trip blank samples (TB) were collected during soil and groundwater sampling events and analysed at the primary laboratory. Rinsate samples were collected from clean sampling equipment and the trip blank samples were laboratory supplied samples (placed in the esky prior to sampling). The blank sample analysis is summarised in Table 12 below.

Table 12 - Blank sample Analyses

Date	Work Conducted	Samples Blanks	Analyses
21/9/15	Soil Sampling	Rinsate – RB01 Trip – TB01	Metals BTEX
22/9/15	Soil Sampling	Rinsate – RB02 Trip – TB02	Metals BTEX
23/9/15	Soil Sampling	Rinsate – RB03 Trip – TB03	Metals BTEX
24/9/15	Soil Sampling	Rinsate – RB04 Trip – TB04	Metals BTEX
25/9/15	Soil Sampling	Rinsate – RB05 Trip – TB05	Metals BTEX
29/9/15	Soil Sampling	Rinsate – RB06 Trip – TB06	Metals BTEX
30/9/15	Soil Sampling	Rinsate – RB07 Trip – TB07	Metals BTEX
1/10/15	Groundwater Sampling	Rinsate – RB08 Trip – TB08	Metals, VOC and vinyl chloride

All reported concentrations were below laboratory limits of reporting indicating that decontamination and sample handling procedures were acceptable.

11.5 Data Quality Conclusions

Overall, the internal QC procedures reported by the laboratories and the field duplicate analyses indicate the analytical data is of acceptable quality for the purposes of this investigation.

12.0 CONCLUSIONS

Soil Investigation

The soil investigation comprised the drilling of 112 grid soil bores across the site and 25 targeted soil bores in areas of identified potential contamination.

The maximum depth of the soil investigation was 8.0 metres below ground level (mbgl). All soil bores encountered fill material to depths ranging between 0.2 metres to 1.4mbgl comprising crushed rock mixed with silts and sands, grey / pale brown sand and dark brown silty clay. Secondary constituents were noted within the fill material including crushed rock, organic matter, ash, cinders, bitumen, red brick and glass fragments.

Hydrocarbon odours and staining were noted in several soil bores around the underground storage tanks (USTs) in the north western and eastern portions of the site between 4.0m to 7.0mbgl.

Selected samples were analysed for a range of potential contaminants of concern and the results were compared with ecological and health based investigation levels for commercial / industrial and residential land use. Exceedences of either the adopted ecological or health based investigation/screening levels were reported for a number of analytes as follows:

- Elevated results for benzo(a)pyrene were reported above or equal to the ecological screening level (for urban residential land use in shallow soils (<1.0m) at SB04_0.1-0.2, SB11_0.01-0.3, SB11_0.35-0.45, SB81_0.9-1.0, SB83_0.1-0.3 and SB83_0.5-0.6. It is noted that the SA EPA has recommended the consideration of other guidelines in the assessment of benzo(a)pyrene for ecological protection, including the health investigation level for residential land use (3mg/kg). The elevated levels of benzo(a)pyrene are below this guideline and the exceedances are therefore not considered to be significant.

One result for benzo(a)pyrene TEQ was reported above the adopted health investigation level for standard residential use from SB83_0.1-0.3. The reported result is still below the adopted HIL for high density residential and commercial/industrial land uses. Statistically, this elevated result is not considered significant and is within acceptable levels.

- Elevated results for TRH C16-C34 were reported above the adopted ecological screening level for urban residential land use in SB20_0.015-0.3, SB30_0.01-0.2, SB36_0.2-0.3, SB50_0.15-0.2 and SB51_0.15-0.2. The results are all below the ESL for commercial/industrial land use.
- Elevated results for TRH C6-C10 less BTEX were reported above the adopted health screening level for urban residential land use at depths greater than 4.0 metres in TB11_5.5-5.6 and TB16_5.0-5.1 around the eastern tank area. The reported results from the overlying and underlying samples tested at both locations were below the laboratory detection limit.

It is noted that fuel related compounds were detected at a number of other locations around the underground fuel infrastructure (both areas of underground tanks), but none of the reported results were above the adopted assessment criteria.

- Asbestos containing material was identified at one location under the dry goods warehouse at a depth greater than 1.0m.

Groundwater Investigation

The previous groundwater investigations undertaken in 2011 and July 2015 identified elevated concentrations of VOCs, heavy metals (chromium and lead) and fuel related compounds (TRH, PAHs and BTEX) in all groundwater above adopted water quality criteria.

The most recent investigations comprised the sampling of four existing onsite groundwater monitoring wells and the installation and sampling of seven additional groundwater wells. The purpose of the additional groundwater wells was to further assess the contamination status of groundwater beneath the site. Groundwater was encountered at depths between 5.5 and 6.5 metres below ground level and the groundwater flow direction was inferred to be west to north westerly.

Elevated levels of the chlorinated hydrocarbon; dichloromethane were reported above potable water assessment criteria in MW01 located in the southern portion of the site. MW01 was installed to assess

groundwater quality along down inferred hydraulic gradient from the operations in the southern portion of the site.

An elevated concentration of the organochlorine pesticide; dieldrin was reported above the adopted drinking water and freshwater ecosystem protection criteria in monitoring well MW04 (west of the cold store warehouse). It is also noted that a duplicate sample reported elevated concentrations for dieldrin and DDE above the adopted criteria. The primary sample (MW03, located along the site's western boundary) and secondary duplicate from this location reported all results for pesticides below the laboratory detection limit.

An elevated result was reported for total PAHs (likely to be associated with naphthalene and fuel related compounds) above the adopted drinking water criteria and the adopted freshwater ecosystem protection criteria at one location (GW3) adjacent to the underground fuel tanks in the eastern portion of the site.

An elevated result was reported for the heavy metal selenium at one location (MW07) on the eastern boundary of the site above the adopted drinking water criteria, freshwater ecosystem protection criteria and irrigation criteria. MW07 was installed to assess the background quality of groundwater entering the site from the east (up inferred hydraulic gradient).

Elevated levels of total dissolved solids were reported in all groundwater monitoring wells above the adopted guidelines for recreational use. The levels of total dissolved solids are considered to be representative of background conditions in the area.

It is noted that several results were reported above the laboratory limit of reporting, but below the assessment criteria for fuel related compounds in GW3 and EBT1 around the USTs in the eastern portion of the site and chlorinated hydrocarbons (trichloroethene and tetrachloroethene) in MW02, MW03 and MW04 in the north western portion of the site.

The previous groundwater investigations undertaken in 2011 and July 2015 identified elevated concentrations of VOCs, heavy metals (chromium and lead) and fuel related compounds (TRH, PAHs and BTEX) in all the groundwater wells above adopted guidelines. Overall, the reported results from this monitoring round indicate a decrease in concentrations of the chemicals of concern identified in these sampling events.

Soil Vapour Investigation

A soil vapour investigation was undertaken around USTs located in the northern and north eastern portions of the site to measure the potential presence of vapours.

A number of soil vapour concentrations exceeding the adopted criteria were reported as follows:

- cis -1,2-Dichloroethene – Elevated concentrations were reported to exceed the Interim Soil Vapour HIL for residential and commercial/industrial use at VP01 in the vicinity of the USTs in the north western portion of the site. Detectable concentrations of DCE were also reported from the other vapour point in this area, but these concentrations were below the Interim Soil Vapour HILs.
- Trichloroethene – Elevated concentrations were reported to exceed the Interim Soil Vapour HIL for residential and commercial/industrial use from both vapour points in the vicinity of the USTs in the north western portion of the site. Detectable concentrations of TCE were also reported from VP03 (adjacent the USTs in the eastern portion of the site), but these concentrations were below the Interim Soil Vapour HIL for residential land use.
- Vinyl chloride (VC) – Elevated concentrations were reported above the Interim Soil Vapour HIL for residential use from one location in the vicinity of the USTs in the north western portion of the site. All other reported results for vinyl chloride were below the laboratory detection limits.

Furthermore, the following observations have been made in relation to the soil vapour data:

- Elevated concentrations of tetrachloroethene (PCE) were reported from the vicinity of the USTs in the north western portion of the site. Although these results are above the laboratory detection limits, none of the results exceeded the Interim Soil Vapour HILs.
- Detectable concentrations of fuel related compounds (TRH and BTEX) were reported from all soil vapour points. The most significant results were reported from VP01 and VP02 in the vicinity of the north western UST area, but these were still be below the adopted assessment criteria.

- Detectable concentrations were also reported from one or more locations for a number of other volatile compounds, for which either there are no adopted assessment criteria, or the results did not exceed the adopted assessment criteria.

A number of solvents have been identified in soil vapour at the locations tested. The most significant results are from VP01 along the southern side of the north western underground storage tank area. It is noted that a groundwater well installed in this same area did not report any elevated concentration of solvents during this sampling event. As such, the identified soil vapour impacts may be related to contamination in the underlying soil and not groundwater.

Given the impacts have been identified in a portion of the site that does not contain any buildings, the risk to site users in the current site layout is unlikely to be unacceptable.

Concluding Comments

No impacts have been identified that would preclude ongoing commercial / industrial use in the site's current layout. If the site was to be redeveloped for a more sensitive land use (i.e. residential), additional works would be required. These have been detailed under a separate cover.

13.0 LIMITATIONS OF THIS REPORT

This environmental site assessment report has been prepared in accordance with industry recognised standards and procedures 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 commission. No warranties expressed or implied are offered to any third parties and no liability will be accepted for use of this report by any third parties.

Information provided by third parties has been assumed to be correct and complete. Greencap does not assume any liability for misrepresentation of information by third parties or for matters not visible, accessible or present on the subject property during any site inspections conducted during the time of the work.

The first stage in the site assessment process generally involves site history research and/or a site inspection. This stage is intended to establish whether there is a likelihood of site contamination. Depending on the location of the site and surrounding land use, there could be contamination present which could not have been identified by preliminary investigation of this nature - for example, if there had been dumping of waste liquids which has left no visual evidence and past owners were not aware of. If recommendations have been made on whether or not to conduct further investigation, these have been based on the likelihood of site contamination, and are generally based on the sensitivity of the proposed future use of the site. A more conservative approach is generally adopted for a sensitive future use such as residential or a child care centre. Subsequent stages of soil or groundwater investigation may follow. The site assessment process is often ongoing, with additional stages of investigation being required to resolve issues raised in previous stages of the investigation. In cases where sampling and analysis of soil and/or groundwater has been conducted, then the following standard limitations apply:-

- The results presented in the report apply only to the specific locations and the time the sampling was conducted. The nature and extent of contaminants present on a site can change due to physical disturbance or removal, chemical or biological transformation, or due to the migration of the contaminants to different areas.
- The borehole or test pit logs indicate the approximate subsurface conditions only at the specified test locations. Soil and rock formations are variable, and conditions in areas not sampled may differ from those at the actual sampling locations due to natural subsurface variation.
- The precision with which subsurface conditions are indicated depends largely on the frequency and method of sampling and investigation, and the degree of subsurface variation. There can be no complete guarantee that contaminants are not present at significant concentrations in some areas, even with the most thorough site assessment.
- Any conclusions or recommendations are based solely on the land use assumptions stated in the report. These conclusions or recommendations do not apply to any other land use for the site.

This report should be read in full. 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. Opinions and judgements expressed herein are based on Greencap's understanding of current regulatory standards and should not be construed as legal opinions.

Environmental Site Assessment

HSBC Institutional Trust Services (Singapore) Limited (in its capacity as trustee of Cache Logistics Trust)

ARA-CWT Trust Management (Cache) Limited (in its capacity as manager of Cache Logistics Trust)

In For A Pound Pty Ltd

404-450 Findon Road, Kidman Park

Figures



Project: Due Diligence Site Assessment

Location: 404-450 Findon Road, Kidman Park

Job Ref: J134221 | Drawn: MM | Checked: MS | Date: September 2015

Note: All data is approx only & subject to survey

SCALE (at A3) 1:2,000

0 10 20 30 40 Meters
Coordinate System: GDA 1994 MGA Zone 54
Aerial image sourced from Nearmap



Figure 1 - Site Layout



12 Greenhill Road Wayville SA 5034
PO Box 582 Unley SA 5061
(08) 8299 9955
www.greencap.com.au



Legend

- Site Boundary
- SB01 - Grid Soil Bore Location
- TB01 & HA1 - Targeted Soil Bore Location
- VP01 - Soil Vapour Monitoring Point

Project: Due Diligence Site Assessment

Location: 404-450 Findon Road, Kidman Park

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SCALE (at A3) 1:2,000





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Coordinate System: GDA 1994 MGA Zone 54
Aerial image sourced from Nearmap

Figure 2 - Soil Bore Locations



12 Greenhill Road Wayville SA 5034
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Project: Due Diligence Site Assessment				SCALE (at A3) 1:250  0 2 4 6 8 Meters Coordinate System: GDA 1994 MGA Zone 54 Aerial image sourced from Nearmap	Figure 3 - Soil Bore and Groundwater Well Locations (Enlargement)	 12 Greenhill Road Wayville SA 5034 PO Box 582 Unley SA 5061 (08) 8299 9955 www.greencap.com.au
Location: 404-450 Findon Road, Kidman Park						
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SCALE (at A3) 1:2,000

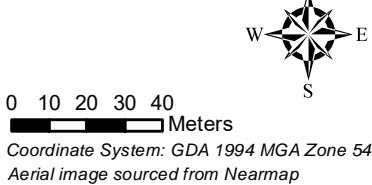


Figure 4 - Groundwater Monitoring Wells



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