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Geotechnics | Environment | Groundwater

Integrated Practical Solutions

Report on
Land Capability, Salinity & Contamination Investigation
Volume 3 – Contamination

Vineyard Precinct
North West Priority Growth Area

Prepared for
Mott MacDonald Pty Ltd

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Volume 3 – Preliminary Contamination Investigation Results

Report on Land Capability, Salinity & Contamination Investigation

Vineyard Precinct, North West Priority Growth Area

1. Introduction

This report comprises Volume 3 of the overall Land Capability, Salinity and Contamination Investigation for the Vineyard Precinct of the North West Priority Growth Area. The report presents results of the preliminary contamination investigation (PSI) portion of the project. This volume should be read in conjunction with the entire report.

Volume 1 presents and outlines the detailed background for the overall project and includes the following Sections;

- Study Area
- Proposed Development
- Scope of Works
- Previous Assessments
- Site Description
- Regional Topography, Geology, Soils and Water
- Methodology
- Limitations

Volume 2 provides the results of the geotechnical and salinity assessment and Volumes 4 to 8 provide the Appendices.

2. Search of NSW EPA Registers

A search was undertaken on 21 July 2014 for current Statutory Notices issued under the *Contaminated Land Management Act 1997* (the CLM Act) and *Protection of the Environment Operations Act 1997* (the POEO Act) available on the NSW EPA website.

The search results are detailed below.

2.1 CLM Act

- No properties within the Precinct were listed as being regulated by the EPA under the CLM Act; and

- No properties within the Precinct were listed as being notified to the EPA under Section 60 of the CLM Act.

A review of relevant records for off-site properties which could potentially impact the Precinct identified the following:

- The former Shell Coles Express Service Station site at 731 Windsor Road Vineyard had been notified to the EPA under the Section 60 of the CLM Act (duty to report contaminated sites). The EPA had concluded that *"This is a premises with an operational underground petroleum storage system, such as a service station or fuel depot. The contamination of this site is managed under the Protection of the Environment Operations Act 1997 and the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2008."* and *"Based on the information made available to the EPA to date, the contamination of this site is considered by the EPA to be not significant enough to warrant regulatory intervention under the Contaminated Land Management Act 1997."*

DP notes that this property is located south east of Boundary Road, approximately 150 m up-gradient of the Precinct. Whilst petroleum contamination can migrate, given the EPA conclusion and the distance of the property from the Precinct, it is considered unlikely that the property is significantly impacting the site. However groundwater results would need to be reviewed to confirm this.

- The Woolworths Petrol, Windsor Road (Corner of Melbourne Street), Vineyard had been notified to the EPA under the Section 60 of the CLM Act (duty to report contaminated sites). The EPA initial assessment is still reported as *"in progress"*. The EPA also states that *"This is a premises with an operational underground petroleum storage system, such as a service station or fuel depot. The contamination of this site is managed under the Protection of the Environment Operations Act 1997 and the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2008"*.

Although "Melbourne Street, Vineyard" could not be clearly located, the subject property appears to be located across Windsor Road from the Precinct approximately 150 m north west of Boundary Road. DP notes that this property is located approximately 50 m up-gradient of the Precinct. Based on the available information contamination from this property could be impacting the Precinct.

2.2 POEO Act

The following records were held for the Precinct:

- 62 Level Crossing Road, Vineyard was listed as having surrendered a previous Environmental Protection Licence (EPL). This property covers an area in the north west of the Precinct, and extends beyond the Precinct boundary to the north and west. The property is bound to the south by Level Crossing Road and to the east by Railway Road.

The Licensee was listed as "Absolute Tyre & Rubber Recycling Pty Ltd (C/- Scott Darren Pascoe-Liquidator)".

The fee based activities in the EPL are listed as “Used Tyre Processing or Disposal; Scale 0-All” and “Environmentally Sensitive or Inappropriate Landfilling; Scale 0-All”. The EPL further states (Section L5) that “Except as provided by any other condition of this licence, only the inert waste listed below may be treated, processed, reprocessed or stored at the premises: Tyres, Shredded tyres, Tyre pieces”.

Other conditions in the EPL included: “The licensee must ensure that no more than three (3) cells are open at any one time.”; “The dimensions of the cells: (a) must not exceed a length of 8.1 metres or a width of 6 metres, and (b) must maintain a depth to a level which is not less than 500 mm above the underlying ground water.”

The EPL states that groundwater monitoring was required. The EPL refers to Monitoring bores labelled as ‘A’ and ‘B’ on map titled ‘Plan showing proposed tyre landfill site within Lot 1 in DP123962 - Level Crossing Road, Vineyard, NSW’ submitted to the EPA on 31.10.02. The map was not provided with the EPL. The monitoring was required for alkalinity, cadmium, chloride, conductivity, lead, sulphate, total iron, total zinc and pH.

The Licence Surrender was issued in 2007, with Annual Returns recorded covering the period between 25 November 2002 to 5 December 2007.

A copy of the EPL is provided in Appendix D.

A review of relevant records for off-site properties which could potentially impact the Precinct identified the following:

- Bandon Road, Sewage Treatment Plant (STP). This site is located adjacent and up-gradient of the Precinct.

The Licensee is listed as “Sydney Water Corporation”.

The fee based activity is “sewage treatment processing by small plants; scale >1000-5000 mL discharged”.

The EPL requires various monitoring, including of monitoring points described as “discharge point located at the outfall to Eastern Creek” and “irrigation within the fenceline of the STP”.

The EPL does not allow “pollution of waters at any time during dry weather”.

Wet weather bypass overflows must not exceed 14 overflows per 10 years. During overflows exceedances of some concentration limits are permitted.

The EPL requires monitoring to include BOD [biological oxygen demand], oil and grease, total phosphorus, total suspended solids, aluminium, chlorine, cobalt, copper, cyanide, hydrogen sulphide, iron, nickel, nitrogen (ammonia, total), zinc, faecal coliforms.

The required treatment varies with the flow rate (of the effluent), with a minimum of “partial disinfection” required, up to “Secondary sedimentation, dual media filtration and disinfection” required for flow ranges less than 190L/s.

The EPL prohibits the acceptance of organochlorine and organophosphate pesticides.

- Bandon Road was listed as having surrendered a previous Environmental Protection Licence (EPL). This site is located adjacent and up-gradient of the Precinct.

The Licensee is listed as “Bio-Recycle Australia Proprietary Limited”.

The fee based activity is “Waste Storage, Transfer, Separating or Processing; scale 0 - All”.

The EPL listed inert and/ or solid waste which could be received and stored at the premises. These included wood products, paper pulp, water filter (lime) soil, spent mushroom compost, poultry and dried cow manure, Enviro-soil, peat moss, engineered timber products, Gyprock and sand/ clay.

The Licence Surrender was issued in 2003, with Annual Returns are recorded covering the period between 4 August 1999 to 25 September 2003.

3. Review of Site History Information

The site history investigation is undertaken to identify significant large scale historical land use categories and issues of potential contamination concern. The information obtained is detailed below, with the results used in determining the recommendations of this investigation, as detailed in Section 7.

3.1 Historical Aerial Photography

Aerial photographs from the years 1947, 1961, 1970, 1982, 1991 and 2002 were examined. Drawings D1 to D5 Appendix D provide an extract of aerial photography from 1961 to 2002. The 1947 aerial photography shows the area to be sparsely developed with varying degrees of tree clearing and areas under agricultural use.

3.2 Library Local Studies

A review was undertaken of relevant information in the Local Studies Section of the Hawkesbury Library Service. The following relevant documents were identified:

- Windsor Municipal Council, 1980, *Environmental Study Vineyard*, Windsor, N.S.W
- Strachan, Frank Ernest, 2008, *Frank Ernest Strachan and a history of the Vineyard District*
- Strachan, Alan R., 2011, *Godfrey families of the Vineyard and Riverstone Districts New South Wales*
- Hawkesbury (N.S.W.). Council, 1989, *Hawkesbury Local Environmental Plan 1989*, Index of items of heritage significance (Vineyard Volume)

Relevant extracts from these documents are provided in Appendix D, and have been considered in this assessment. These include drawings with information on previous land uses for selected properties.

In general, the documents recorded the commencement of grazing in the area *circa* 1800. The land was naturally heavily wooded, and woodcutting and sawmilling were undertaken as the land was progressively cleared for agricultural use. Historical land uses in the area were predominantly agricultural, including grazing, viticulture, orchards, dairy, market gardens, poultry, pigs, mushrooms and wheat. Individual businesses are also recorded to include petrol stations/ depot, a blacksmith, hardware stores and a Mains Road Depot.

The railway line is recorded as being constructed in the 1860s, and gravel pits were recorded at four locations in the Precinct as a source of material for local roads. No information was included relating to backfilling of the gravel pits.

Local recreational activities included motorcycle racing, with two racing tracks recorded as being present in the area of the Precinct *circa* 1930.

Toilet wastes were buried on individual farms.

Air raid shelters were constructed during World War 2.

A large bushfire was recorded at the Precinct in 1944, and various smaller fires were recorded for the district.

3.3 Search on the Department of Defence Website for Sites Affected by Unexploded Ordnance

A search on 31 March 2014 for sites affected by Unexploded Ordnance (UXO) on the Department of Defence website¹ indicated that the Hawkesbury Local Government Area does not contain a known UXO contaminated area.

4. Current Land Uses

The current land uses were reviewed based on aerial photography from 2014 and site inspections.

The contamination investigation identified that:

- The majority of the Vineyard Precinct is currently used for rural residential purposes, including low intensity agriculture and minor commercial activities; and
- Other land uses include market gardens, poultry sheds, low and medium to high-risk commercial, including a disused service station.

Drawing C5, Appendix A provides a visual representation of current land use types.

¹ http://www.defence.gov.au/uxo/where_is_uxo/where_is_uxo.asp

5. Site Observations and Personnel Communications: Contamination Issues

Land uses which can be indicative of contamination are summarised in Section 4.

Potential issues of environmental concern not related to specific land uses generally include:

- Filling with soil of unknown origin, which could potentially include contaminants. Extensive filling was observed in a number of locations in the Precinct, particularly along sections of the Killarney Chain of Ponds and its tributaries. Drawing C6, Appendix A shows some of the areas considered to have an elevated risk of being impacted by extensive filling. A history of damming and dumping of wastes in creeks in the region was confirmed by personnel communications with some land owners;

Filling is also present at the Precinct in dam walls, however, this usually comprises local cut-and-fill with a lower potential for contamination;

Filling is also likely to be present along some local drainage lines, and where cut and fill has occurred in localised areas;
- Asbestos cement from demolition or degradation of buildings is likely to be present on some properties within the Precinct. No obvious signs of asbestos cement were observed at the ground surface but may be present in unobserved areas;
- Some potentially contaminating activities associated with former or current land uses were observed, including a former service station (with oily sheen in run-off water at the surface), commercial/ industrial and agricultural land uses. These are considered under the review of previous and current land uses;
- Migration of contamination from other sites. Two active service stations are present immediately up-gradient of the Precinct across Windsor Road (shaded red on Drawing C5, Appendix A). These service stations could potentially impact properties within the Precinct through migration of contaminants through surface water run-off and groundwater;
- Disposal of carcasses (e.g. cattle) by on site burial has taken place in the Precinct based on personnel communications with some land owners;
- Pesticide use has occurred across the Precinct based on personnel communications with some land owners;
- Previous land uses in the Precinct include orchards, vegetable gardens, mushroom production, poultry, pigs and grazing;
- Water from the creeks and dams is used for agriculture. This includes extraction of water with diesel powered pumps; and
- Electrical poles have been reclaimed on some properties for use as fence posts. These may have been treated with creosote.

6. Discussion of Laboratory Results

6.1 Soil

A summary of soil results is provided in Table E2, Appendix E, with NATA Laboratory Reports provided in Appendix F.

Selected soil samples from across the Precinct were analysed, with samples of natural materials from depths of between 0.1 and 1 m below ground level selected for analysis.

The soil testing aimed to provide data to calculate preliminary environmental investigation levels (EILs) for the Precinct. It is considered that these Preliminary EILs could be used as default thresholds for the Precinct in the absence of other data. It is anticipated that the Preliminary EILs may be updated as required for specific sites based on site specific data and assumptions.

Table 3.1: Preliminary EILs

Analyte	Preliminary EIL (mg/kg)	Comments
Arsenic	100	Generic for landuse
Chromium (III)	520	Based on clay content, background concentrations, traffic volume
Copper	170	Based on CEC, pH, OC, background concentrations, traffic volume
Lead	1,100	Generic for landuse
Nickel	200	Based on CEC, background concentrations, traffic volume
Zinc	340	Based on CEC, pH, background concentrations, traffic volume
DDT	180	Generic for landuse
Naphthalene	170	Generic for landuse

The Preliminary EILs have been prepared based on the following:

- The assumption and methods in the *Ecological Investigation Level Calculation Spreadsheet* developed by CSIRO for NEPC (copyright 2010)²;
- An Urban Residential or Public Open Space Landuse;
- Traffic Volumes being “low”;
- The contamination being “aged”;
- The mean measured CEC of 11 cmolc/kg;
- The mean measured pH of 5.7;
- The mean measured iron content of 2.2%;
- An assumed organic carbon content of 1%;
- An assumed clay content of 20%;
- The calculated 95% upper confidence limit (UCL) of the copper results of 18 mg/kg, used as a background concentration;

² As sourced from the ASC NEPM Toolbox: <http://www.scew.gov.au/node/941>

- The calculated 95% UCL of the nickel results of 15 mg/kg, used as a background concentration;
- The calculated 95% UCL of the chromium (III) results of 21 mg/kg, used as a background concentration; and
- The calculated 95% UCL of the zinc results of 30 mg/kg, used as a background concentration.

6.2 Groundwater

A summary of groundwater analyte concentrations is provided in Table E3, Appendix E, with NATA Laboratory Reports provided in Appendix F. The results for BH1 to BH5 (from Wells 1 to 5 respectively) are from the Vineyard Precinct. It is noted that the laboratory report also includes results for wells BH42 to BH45, from the Riverstone East Precinct (i.e. outside of the current investigation area).

All groundwater analyte concentrations were within the investigation levels³ with the exception of manganese. This is, however, considered to be naturally occurring and not to present a limitation on residential rezoning or development.

Low concentrations of the organochlorine pesticide dieldrin were detected in three samples, however the two most down-gradient wells did not have detectable concentrations of dieldrin. These results were within the investigation level, but are considered to be indicative of the use and presence of dieldrin in the groundwater catchment. The highest result was recorded in Well 5, located at the up-gradient site boundary, indicating a potential off-site source. The other two detectable results came from the next two wells down-gradient from Well 5 (Wells 3 and 4). Well 4 is located relatively close and down-stream of market gardens, and Well 3 is in immediate proximity to market gardens.

7. Contamination Risks and Recommendations

7.1 Overall Risks and Constraints from Contamination

The risk of contamination over the Precinct is generally considered to be low to moderate, although more elevated risk is associated with some commercial properties (i.e. sites where DSI is recommended, refer to Drawing C7, Appendix A). The main constraints for residential redevelopment of the Precinct from contamination issues are expected to be additional costs and time associated with the development process. With the exception of the property discussed below these risks are not considered to be significant enough to prevent rezoning or redevelopment of the Precinct for residential development.

³ Australian and New Zealand Environment and Conservation Council (ANZECC) / Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (2000). 95% Level of Protection thresholds for freshwater

The potential for contamination at the following property is considered to present a significant potential constraint for residential redevelopment:

- The disused service station located at 405-419 Windsor Road (shown on Drawing C8, Appendix A).

Observations of the area of the former service station indicated that the former underground petroleum storage systems (UPSS) and bowers were still present. An oily sheen was observed at the ground surface during an inspection during rainfall. General observations of the service station and the remainder of the property (much of which had been extensively filled) indicated that previous management practices at the service station were unlikely to have met current standards. Contaminants of concern include petroleum compounds, lead, chlorinated solvents, polycyclic aromatic hydrocarbons and the pH of the medium. Other contaminants which may be present, particularly given the extensive filling at the site include heavy metals, asbestos, phenols, pesticides, polychlorinated biphenyls.

It is recommended that a Detailed Site Investigation be undertaken for this site, and that the contaminated land assessment and management process be subject to a Site Audit.

The potential for contamination at and down-gradient of the disused service station may constrain residential development in the short to medium term (several years or more), particularly if significant groundwater contamination is present.

7.2 Recommendations for Minimum Investigation

Drawing C7, Appendix A provides a visual representation of the recommended categories for further contamination investigation to be undertaken on each property prior to redevelopment. The minimum initial investigation scope for each category is detailed below. Additional investigation and/ or remediation and/ or management are expected to be required for some properties depending on the recommendations of the initial investigation, or to meet Council specific requirements.

Category 1 – Site Inspection

- Detailed site inspection for signs of concern;
- Hazardous Building Materials Survey of any buildings built during or before 2003;
- Implementation of the recommendations from the above; and
- Unexpected Finds Protocol (see below).

Category 2 – PSI

- PSI, including a detailed review of site history;
- Hazardous Building Materials Survey of any buildings built during or before 2003;
- Implementation of the recommendations from the above; and
- Unexpected Finds Protocol (see below).

Category 3 – PSI with Limited Sampling

- PSI with limited sampling aimed at targeting any areas of potential chemical use and filling;
- Hazardous Building Materials Survey of any buildings built during or before 2003;
- Implementation of the recommendations from the above; and
- Unexpected Finds Protocol (see below).

Category 4 – DSI

- Preliminary and Detailed Site Investigation, including detailed site history review, and intrusive sampling, analysis and reporting in accordance with NSW EPA guidelines;
- Hazardous Building Materials Survey of any buildings built during or before 2003;
- Implementation of the recommendations from the above; and
- Unexpected Finds Protocol (see below).

Category 5 – DSI and Site Audit

- Preliminary and Detailed Site Investigation, including detailed site history review, and intrusive sampling, analysis and reporting in accordance with NSW EPA guidelines;
- Contaminated Land Site Audit by a NSW EPA accredited Site Auditor;
- Hazardous Building Materials Survey of any buildings built during or before 2003;
- Implementation of the recommendations from the above; and
- Unexpected Finds Protocol (see below).

An Unexpected Finds Protocol should be included in all site management plans for redevelopment works setting out the steps to be taken to ensure that any signs of potential environmental concern are appropriately identified and managed.

Douglas Partners Pty Ltd