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Report on
Preliminary Site Investigation for Contamination

Proposed Rezoning
Sanderling Avenue, Hawks Nest

Prepared for
Lands Advisory Services Pty Ltd

Project 91588.00
July 2019

Douglas Partners
Geotechnics / Environment / Groundwater

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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

	Signature	Date
Author	Patrick Heads	11 July 2019
Reviewer	Stephen Jones	11 July 2019

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Report on Preliminary Site Investigation for Contamination
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1. Introduction

This report presents the results of a preliminary site investigation for contamination undertaken for a proposed rezoning at Sanderling Avenue, Hawks Nest. The investigation was commissioned 4 June 2019 by Brett Phillips of Lands Advisory Services Pty Ltd and was undertaken with reference to Douglas Partners Pty Ltd (DP) proposal NCL190338 dated 3 June 2019.

The site investigation was undertaken to provide a preliminary assessment of contamination at the site as part of an application to rezone the property from RE1 Public Recreation to R3 Medium Density Residential.

The investigation comprised the following:

- Review of available published information on the site, including geological, topographical and acid sulfate soil maps;
- Brief site history review to assess the potential for contamination at the site comprising a review of in-house aerial photograph records, search of registered groundwater bores in the area, historical title deeds search, Council search and a NSW EPA search;
- Site inspection to identify areas of potential contamination and assess current site condition;
- Preparation of a preliminary Conceptual Site Model (CSM);
- Preparation of this report presenting the findings of assessment.

The assessment was undertaken with reference to NSW EPA (2011) and NEPC (2013).

2. Site Description

The site is identified as Lot 1 DP 1234229, Sanderling Avenue Hawks Nest, within the Mid-coast Council local government area. The site is approximately 1.48 ha in area and is shown in Drawing 1, Appendix B and Figure 1 below.

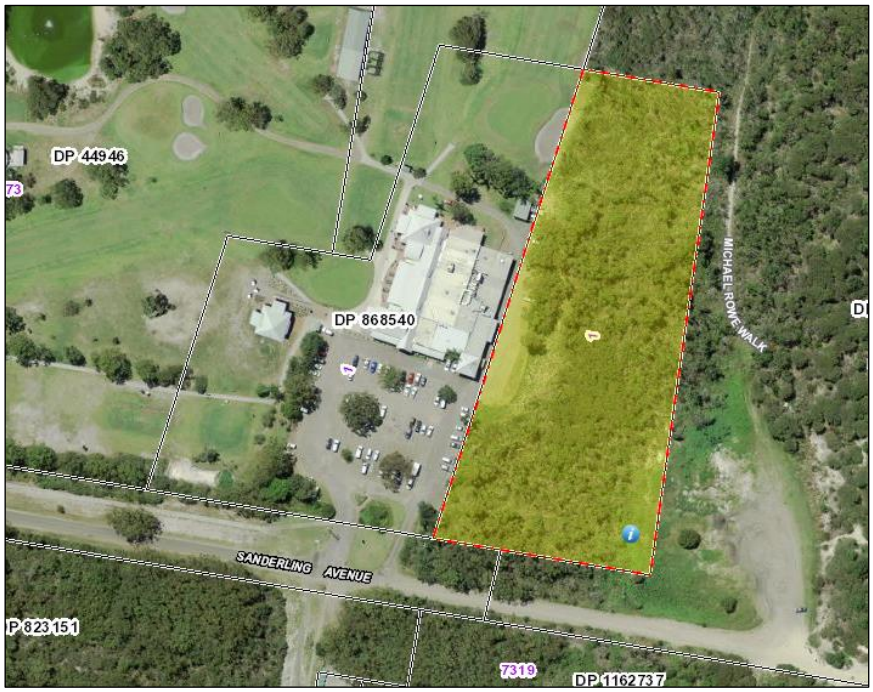

Figure 1: Subject site (in yellow)

The site is bounded to the north and east by vacant vegetated land, to the south by Sanderling Avenue and a holiday park and to the west by the Hawks Nest Golf Club.

3. Geology and Hydrogeology

Reference to the 1:250 000 Geological Survey of NSW Statewide geodatabase indicates that the site is underlain by Quaternary alluvium formation which generally comprises gravel, sand, silt and clay.

The regional groundwater flow regime is believed to be towards either the Myall River located approximately 1.2 m west-south-west of the site, or the Tasman Sea located approximately 30 m east of the site. These water bodies are considered to be the nearest sensitive receptors. Based on site topography the depth to groundwater is likely to be within approximately 5 m depth from the ground surface. It should be noted that groundwater levels are affected by climatic conditions and soil permeability and will therefore vary with time.

An on-line records search of groundwater wells registered with the WaterNSW indicated that there are two registered groundwater wells within 500 m of the site. Available information for the two registered wells is as follows:

- 201641 located approximately 400 m north-west of the site, within the golf course, 5 m depth no details, registered for irrigation
- 078885 23.2 m depth, approximately 500 m north of the site, monitoring bore, 4.4 m standing water level, sand to 11 m underlain by silty sand to termination

Further registered groundwater wells were observed further west and north of the site, with similar subsurface conditions.

Reference to the Acid Sulfate Soil Risk Map for Port Stephens, prepared by the Department of Land and Water Conservation (DLWC) indicates that the site is within an area mapped as having a low probability of occurrence of acid sulfate soils (ASS) at depths greater than 3 m below the ground surface.

Reference to the Department of Lands 2 m elevation contours database indicates a site level of approximately RL8 (AHD).

4. Site History

4.1 Extent of Site History

The brief review of site history for the current assessment comprised the following:

- Review of Section 10.7 Certificate for the site;
- Historical Title Deed search (provided by the client);
- Review of historical aerial photos;
- Discussion with client;
- Searches with NSW EPA.

Details are presented in the following sections.

4.2 Section 10.7 Certificate

A review of the Section 10.7 (Parts 2 and 5) certificate for the site, supplied by Midcoast Council indicated the following for the site:

- The site is zoned RE1 Public Recreation;
- No additional matters are recorded under the Contaminated Land Management Act 1997 for the site.

4.3 Review of Historical Aerial Photos

The results of the historical aerial photographs review are presented in Table 1 below.

Table 1: Historical Aerial Photo Review

Year	Scale (Colour)	Main Observations
1963	B & W photo 1:40 000	• Site is vegetated and vacant; • Some formed streets in Hawks Nest; • Adjacent land to west and north is vegetated and vacant; • Golf course is not constructed.
1979	B & W photo 1:40 000	• Clearing of vegetation adjacent to the site to the west and north and possibly in the western portion of the subject site; • Exposed soils at the surface; • Possible structure to the west of the site (possible golf club); • Some unpaved access tracks within and/or adjacent to the site.
1987	B & W photo 1:80 000	• Site is generally vegetated, with some minor cleared areas; • Site is vacant; • Golf club and course is formed to the west of the site; • Cleared area immediately east of the south-eastern site boundary.
1998	Colour photo 1:25 000	• Similar to 1987 photo; • South-eastern corner of the site is cleared and grassed, with the remaining site areas vegetated with trees; • Golf course and golf club on the western site boundary; • Access track and beach area to the east of the site; • Cleared area immediately east of the south-eastern site boundary.
2010	Colour photo Google Earth	• Similar to 1998 photo; • Cleared area on the western site boundary, adjacent to the golf club; • Remainder of the site is vegetated and vacant; • Cleared area immediately east of the south-eastern site boundary.
2012	Colour photo Google Earth	• Similar to 2010 photo; • Possible additional small cleared area in the north-western corner of the site.
2013	Colour photo Google Earth	• Similar to 2012 photo
2015	Colour photo Google Earth	• Similar to 2013 photo
2018	Colour photo Google Earth	• Site is vacant and vegetated with cleared areas as previous; • Tree coverage is more sparse, with grassed areas visible.
2019	Colour Photo Nearmap	• Site is vacant and vegetated with cleared areas as previous; • Tree coverage is more sparse, with grassed areas visible; • Cleared area on western boundary used as car parking; • Some soil stockpiles visible in cleared area immediately east of the south-western site boundary.

It is noted that data obtained from aerial photos was limited due to the relatively small scale and poor resolutions.

4.4 Historical Title Deed Search

Historical title information was provided by the client and indicated the following:

- Search dated 14 November 2017 indicated that the land owner was the Karuah Local Aboriginal Land Council;
- Search dated 7 June 2019 indicated that the land owner was Core Property Developments Pty Ltd and Leric Group Pty Ltd.

4.5 Discussions with Former Employee

Discussions were held with Mr Ken Woodward, who was a former employee of a sand mining company that previously operated in the area. Mr Woodward provided the following information:

- Mr Woodward worked for Mineral Deposits from 1966 until 2002 as part of the management team (purchasing / logistics);
- The company operated sand mining operations in the Hawks Nest area, operating several dredges and a processing plant to extract rutile, zircon and ilmenite;
- Mr Woodward's recollection was that the subject site was not actively sand mined;
- Sand mining occurred to the north and west of the site, and possibly to the east of the site;
- The sand mining methodology used in the Hawks Nest area comprised a floating dredge in approximately 4 m to 5 m of water, which dredged the sand, removed the heavy minerals from the sand and hydraulically replaced the sand back into the pond (ie behind the dredge);
- The site area may have been used as a car park area, or temporary storage area for heavy minerals. Mr Woodward noted that any if any heavy mineral stockpiles were stored on the site, the stockpile footprints would have been over excavated and removed entirely due to the value of the minerals;
- Mr Woodward was not aware of any fuel or chemical storage on the subject site during operations;
- Sand mining operations by Mineral Deposits ceased in the late 1970s;
- Following completion of sand mining, the adjacent golf course expanded from nine holes to 18 holes, following rehabilitation and levelling of former dredged areas.

4.6 NSW EPA Records

A search of NSW EPA registers indicated the following for the site:

- There are no notices on the site with reference to the NSW Contaminated Land Management Act. The site is not listed on the contaminated land management register;

- No licences are registered to the site with respect to the Protection of the Environment Operations Act;
- The site is not listed on the register of sites notified to the NSW EPA.

Surrounding / neighbouring sites were not listed on the above registers.

5. Site Condition

A site walkover inspection was conducted by a senior environmental engineer from DP on 14 June 2019.

At the time of the inspection, the majority of the site was vacant and vegetated with ground cover (grass and ferns) and scattered mature trees, as shown in Figure 2.

Figure 2: Ground cover at the site, looking north-west from the southern site boundary

Figure 3: Ground cover and mature trees within the site, looking south from the north-western corner of the site

A fill stockpile, approximately 4 m high, was observed immediately east of the site as shown in Figure 4. Based on site observations, possible encroachment of fill onto the subject site may have occurred.

Figure 4: Fill stockpile and possible encroachment of fill on the eastern portion of the site, looking north

An unpaved car park was observed in the western portion of the site, as shown in Figure 5. The area had been graded with some evidence of recent clearing observed (Figure 6), and placement of quarry gravel at the surface.

Figure 5: Unpaved car park in the western portion of the site, looking east

Figure 6: Clearing/grading of the surface in the western portion of the site, looking south

Some localised quarry gravel filling was observed in the south-eastern corner of the site as shown in Figure 7 below.

Figure 7: Exposed quarry gravel (in red) within a localised filled area in the south-eastern corner of the site, looking north

Three 200 litre drums were observed in the western portion of the site, as shown in Figure 8. The drums were labelled as waste cooking oil and were empty at the time of the walkover.

Figure 8: 200 litre drums (possible cooking oil drums) in the western portion of the site

Localised scattered minor building rubble was observed at several locations along the western site boundary as shown in Figures 9 and 10. Concrete and tile fragments, brick fragments, sheet metal and asphalt fragments were observed at the time of the walkover.

Figure 9: Concrete and tile fragments in the north-western corner of the site

Figure 10: Brick and tile fragments in the western portion of the site

6. Potential Contaminants

On the basis of the desktop review, available site history information and observations made during the site inspection, sources of potential contamination have been identified for the site as follows:

- Imported fill materials (source unknown) which may have been placed on the site as part of illegal dumping, adjacent fill placement or as general site filling. It is noted that the site was open to Sanderling Avenue and the Golf Club. Fill materials may be a source of hydrocarbons, pesticides, heavy metals and asbestos, depending on the source;
- Car parking in the western portion of the site. At the time of the assessment the unpaved car park area was in use by the golf club in the western portion of the site. Vehicles may be a source of hydrocarbons and heavy metals;
- Possible site use associated with sand mining activities. Site history information suggested that the site may not have been sand mined, however may have been used as a car parking or mineral storage area. Vehicles stoed/carked on the area may be a source of hydrocarbons and heavy metals. Remnant stored minerals at the site may be a low-level radiation source;
- Adjacent golf course activities. Site history indicates that the adjacent golf course has operated immediately west of the site since sand mining activities ceased in the area. Maintenance of the golf course may be a source of pesticides and herbicides.

On the basis of site observations and site history, the potential for gross contamination from the above potential contaminant sources is considered to be low.

The risk of gross contamination from adjoining properties is considered to be low.

7. Conceptual Site Model

A Conceptual Site Model (CSM) has been prepared for the site with reference to the National Environment Protection (Assessment of Site Contamination) Measure 1999 (Amendment Measure 2013) Schedule B2. The CSM identifies potential contaminant sources and contaminants of concern, contaminant release mechanisms, exposure pathways and potential receptors. The CSM is presented in Table 2 below.

Table 2: Conceptual Site Model

Known and Potential Primary Sources	Primary Release Mechanism	Secondary Release Mechanism	Potential Impacted Media	Contaminants of Concern	Exposure Pathway	Potential Receptors	
						Current	Future
Imported filling	Placement within the site	Long-term leaching of contaminants via runoff, rain water infiltration / percolation; disturbance of impacted materials.	Soil, groundwater, surface water	TRH, BTEX, PAH, Metals, pesticides, asbestos	Dermal contact, inhalation (dust / vapours), ingestion	Maintenance workers, site users, trespassers, consultants, groundwater, surface water	Site users / residents, trespassers, maintenance workers, construction workers, consultants, groundwater, surface water
Car parking	Spills/leaks of fuel/oil from vehicles	Long-term leaching of contaminants via runoff, rain water infiltration / percolation.	Soil, groundwater, surface water	TRH, BTEX, PAH, Metals.	Dermal contact, inhalation (dust / vapours), ingestion		
Former sand mining activities	Spills/leaks of fuels/chemicals, placement of mineral sands	Long-term leaching of contaminants via runoff, rain water infiltration / percolation; disturbance of impacted materials.	Soil, groundwater, surface water	TRH, BTEX, PAH, Metals, low-level radiation	Dermal contact, inhalation (dust / vapours), ingestion		
Golf Course	Chemical use, chemical storage/spills/leaks	Long-term leaching of contaminants via runoff, rain water infiltration / percolation.	Soil, groundwater, surface water	Pesticides, herbicides	Dermal contact, inhalation (dust / vapours), ingestion		

8. Conclusions

The results of the available site history review and site inspection indicated the site has had limited use in the period of assessment. The site history has also suggested the historical absence of structures at the site.

Site observations indicated the presence of minor and localised filling at the surface in the western, southern and eastern portions of the site.

A number of potential on-site and off-site sources of contamination were identified due to former and current site activities including fill placement, car park areas and possible ancillary activities associated with sand mining activities.

The potential for gross contamination at the site is considered to be low. Targeted subsurface investigation for soil is recommended to assess the potential contamination sources identified in Sections 6 and 7. It is anticipated that the subsurface investigation could be conducted as part of future planning activities.

Based on the results of the investigation, it is considered that the site could be made suitable for possible development from a contamination perspective, subject to confirmation of the absence of gross contamination via additional investigation described above and appropriate remediation and validation, if required.

9. References

NEPC (2013), *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013*, 11 April 2013.

NSW EPA (2011), *Guidelines for Consultants Reporting on Contaminated Sites*, NSW Environmental Protection Authority, August 2011.

10. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report for this project at Sanderling Avenue Hawks Nest with reference to DP's proposal dated 3 June 2019 and acceptance received from Lands Advisory Services dated 4 June 2019. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Lands Advisory Services for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the surface conditions on the site only at the time the work was carried out. Site conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in surface conditions across the site. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

Asbestos has not been detected by observation or by laboratory analysis on the surface of the site. Building demolition materials, such as concrete, brick, sheet metal and were, however, located in surface soils, and these are considered as indicative of the possible presence of hazardous building materials (HBM), including asbestos.

Although the site walkover adopted for this investigation is considered appropriate to achieve the stated project objectives, there are necessarily parts of the site that have not been observed. This is either due to undetected variations in ground conditions or to budget constraints (as discussed above), or to parts of the site being inaccessible and not available for inspection/sampling, or to vegetation preventing visual inspection and reasonable access. It is therefore considered possible that HBM, including asbestos, may be present in unobserved parts of the site, and hence no warranty can be given that asbestos is not present.

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the environmental components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

Douglas Partners Pty Ltd

Appendix A

About This Report
Drawing 1 – Site Plan

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Locality Plan

0 25 50 m

Drawing adapted from Nearmap Image dated February 2019

Legend

- Approximate Extent of Possible Filling
- Approximate Location of Observed Building Rubble
- Approximate Site Boundary
- Approximate Figure Location and Orientation

Douglas Partners
Geotechnics / Environment / Groundwater

TITLE: Site Plan
Proposed Rezoning
Sanderling Avenue, Hawks Nest

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OFFICE: Newcastle
DRAWN BY: PLH
DATE: 05.July.2019

CLIENT: Lands Advisory Services Pty Ltd
PROJECT No: 91588.00
DRAWING No: 1
REVISION: 0
SCALE: 1:1 (A3 Sheet)