

Lend Lease Communities (Wilton) Pty Ltd
C/- Cardno (NSW/ACT) Pty Ltd
Level 1, 47 Burrelli Street
Wollongong NSW 2500

43677.40.R.004.Rev0
2 December 2015
DW:mm

Attention: Mr Danyil Skora

Email: Danyil.skora@cardno.com.au

Dear Sirs

Preliminary Contamination Investigation
Fairways East -Stage 1J (2)
Bingara Gorge Estate, Wilton

1. Introduction

This letter report presents the findings of a site walkover and a review of historical aerial photographs for a preliminary contamination investigation at the site known as Fairways East – Stage 1J (2) at Bingara Gorge Estate, Wilton. This report forms part of ongoing consulting works by Douglas Partners Pty Ltd (DP) for the Bingara Gorge Estate and was commissioned by Cardno (NSW/ACT) Pty Ltd (Cardno) at the request of Danyil Skoda of Cardno, project managers acting on behalf of Lend Lease Communities (Wilton) Pty Ltd (LLC Wilton), site developers. It is understood that this letter will be provided to Wollondilly Shire Council to assist in the determination of a development approval. The site is shown on the attached drawing.

The purpose of this report is to:

- Note any observations that could indicate a potential for contamination at the site;
- Note any potential sources of contamination from historical aerial photographs; and
- Provide advice on managing potential contamination based on the findings.

2. Previous Contamination Assessment

According to an excerpt from of the *Wilton Parkland Residential Community: Statement of Environmental Effects* (reference J:\2005\05252\Reports\SEE.doc), a preliminary contamination assessment was undertaken by Johnstone Environmental Technology Pty Ltd (JET) in 1999 and the following was summarised from the JET report.

The Wilton/Douglas Park area was used during World War II as a RAAF High Explosive bombing and gunnery range. The Department of Defence in 1992 advised Wollondilly Council *that unexploded bombs or their components could exist buried below the surface, particularly in the target area,*

however, the presence of the latter items should not pose a major impediment to future development in this area. Workman involved in excavation should be alerted to the possible presence of unexploded ordnance and advise not to move the suspicious items until identified and cleared by qualified military personnel.

The JET report concluded that there was no reason to believe that there were any other possible contamination sources on the property which require any specific attention or further investigation. All personnel involved in construction would be alerted to the possible presence of unexploded ordnance and advised not to move any suspicious item and to call qualified military personnel for identification and handling. If previously undetected contaminated material is encountered during construction, such as zones of filling or waste dumping, all work on site will cease until further investigations are undertaken.

DP has not sighted the JET report.

3. Observations from Walkover

A site walkover was conducted by an experienced environmental scientist (Richard Lamont) from DP on 30 November 2015.

The site is absent of structures and is bound by The Irons Drive to the north and Ambrose Drive to the west. Patches of bare soil are surrounded by grass and some mature trees are present near the eastern boundary (Photograph 1, attached). Infrequent general waste materials were encountered on the ground surface (such as plastic, PVC pipes and concrete pieces) (Photograph 2, attached). A small stockpile (approximately 2 m³ in volume) of soil, grass and rootlets was present and appeared to be the returns from aeration works at the nearby golf course (given the small cylindrical clumps of soil, grass and roots of the same size) (Photograph 3, attached). Fences were present along the northern and western boundaries.

The site is relatively level with slight slopes down to the west across much of the site and slight slopes down to the south at the south.

Surrounding land uses included:

- Tennis courts and garden area to the east;
- A golf course to the south;
- Vacant land to the north (on the opposite side of The Irons Drive);
- Vacant land to the north-west (on the opposite side of Ambrose Drive); and
- A new (residential) construction site to the south-east.

4. Historical Aerial Photographs

Aerial photographs from 1956, 1966, 1979, 1988, 1994 and 2005 were review to determine possible historical uses of the site. The photographs are shown on Plate B1, attached. In each of these aerial photographs, the site appears to have been part of land used for animal grazing. No structures or dams were present at the site.

The 2013 aerial photograph is shown on Plate B2, attached. The site appears to have been used to access the neighbouring golf course construction site to the south. Stockpiles were present at the site and are likely to have been associated with the golf course earthworks/construction. Ambrose Drive had been constructed to the east. Apart from the road construction and golf course development, land surrounding the site had not been subject to development.

5. Discussion

Historical aerial photographs indicate that the site was probably used for animal grazing between 1956 and 2005. Potential contaminating activities at the site or surrounding land were not identified in the reviewed aerial photographs for this period.

In recent years, the site has probably been disturbed due to the general ongoing development of the Bingara Gorge Estate (including the golf course) as indicated by the 2013 aerial photograph. Given that historical potential contaminating sources or activities have not been identified at the site or surrounding land, it is considered that there is a low potential for contamination to be associated with this land disturbance.

The considered low potential for contamination is consistent with the conclusions of the JET report (listed in the Statement of Environmental Effects). The approach recommended by JET that *if previously undetected contaminated material is encountered during construction, such as zones of filling or waste dumping, all work on site will cease until further investigations are undertaken*, is considered reasonable for the development of the site. This approach is otherwise known as an Unexpected Finds Protocol (UFP), whereby if signs of contamination are encountered (in filling or natural soil), an environmental consultant should be engaged to investigate and assess the potential contamination. It is assumed that a UFP (or similar) is in place for the case that unexploded ordnance is encountered during site development.

6. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report for the site known as Fairways East – Stage 1J (2), at Bingara Gorge, Wilton, in accordance with instructions received from Mr Daniel Skora of Cardno (NSW/ACT) Pty Ltd (Cardno), on behalf of Lend Lease Communities (Wilton) Pty Ltd (LLC Wilton). The work was carried in accordance with the professional services agreement for the project. This report is provided for the exclusive use of Cardno and LLC Wilton 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 by a third party. 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 sub-surface conditions on the site only at the specific locations accessible during inspection. Sub-surface 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 inspection/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 ground conditions across the site between and beyond the locations accessible during the site inspection. 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.

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 / groundwater) components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

Although the results of this investigation are considered appropriate to achieve the stated project objectives, there are necessarily parts of the site that have not been inspected. 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, or to vegetation preventing visual inspection and reasonable access. It is therefore considered possible that hazardous building materials, including asbestos, may be present in unobserved parts of the site, between and beyond inspected locations, and hence no warranty can be given that asbestos is not present.

We trust that the attached information is satisfactory for your purpose. Please contact the undersigned if you have any queries in relation to this letter.

Yours faithfully

Douglas Partners Pty Ltd



David Walker

Environmental Engineer

Reviewed by



Tim Wright

Senior Associate

Attachments: Drawing – Bingara Gorge, Fairways East –Stage 1J (2), Development Application
 Photograph Plates A1, A2, B1, B2
 Notes About this Report



0 100 200 300 400 500m
SCALE 1:5000 (A1), 1:10000 (A3)

NOTES

GENERAL

1. DO NOT SCALE FROM PLANS
2. ALL WORKS TO BE CONSTRUCTED IN ACCORDANCE WITH THE WOLLONDILLY DESIGN SPECIFICATION SUBDIVISION AND ENGINEERING STANDARDS, ENGINEERING SPECIFICATIONS C201 TO C273, TECHNICAL POLICIES. IN THE ABSENCE OF RELEVANT DETAILS, THE RELEVANT AUSTRALIAN STANDARDS AND RMS SPECIFICATIONS.
3. ENGINEERING PLANS TO BE READ IN CONJUNCTION WITH PLANS FOR WATER, RECYCLED WATER, SEWER, ELECTRICAL, TELSTRA AND GAS.
4. THE CONTRACTOR SHALL ARRANGE A PRECONSTRUCTION MEETING WITH SERVICE AUTHORITIES TO ESTABLISH THE LOCATION OF UTILITY SERVICES AND SPECIAL REQUIREMENTS.
5. FENCES REMOVED OR DAMAGED DURING CONSTRUCTION TO BE REINSTATED IMMEDIATELY UPON COMPLETION.
6. NO WORK TO BE UNDERTAKEN ON ADJOINING LAND WITHOUT THE WRITTEN PERMISSION OF THE AFFECTED OWNERS.
7. COUNCIL'S TREE PRESERVATION ORDER TO BE OBSERVED AT ALL TIMES.
8. ALL RUBBISH AND STRUCTURES TO BE REMOVED BY THE CONTRACTOR AND DISPOSED. DOCUMENTATION SUCH AS RECEIPTS TO BE RETAINED TO VERIFY COMPLIANCE WITH WASTE MANAGEMENT PLAN.
9. ALL NEW WORKS TO MAKE SMOOTH WITH EXISTING.
10. ALL CONDUITS AND STUBS TO BE LAID UNDER ROAD PAVEMENT PRIOR TO LAYING FINAL ASPHALT SEAL.
11. ANY ROCK EXCAVATION TO BE REPORTED TO THE SUPERINTENDENT PRIOR TO UNDERTAKING SUCH EXCAVATION.
12. THE CONTRACTOR SHALL ARRANGE A PRE START MEETING WITH COUNCIL, A MINIMUM OF 7 DAYS BEFORE START OF CONSTRUCTION.
13. SOIL WATER MANAGEMENT CONTROLS TO BE ESTABLISHED PRIOR TO INITIATION OF BULK EARTHWORKS
14. LEVELS ARE BASED ON AHD. COORDINATES ARE BASED ON MGA.
15. REVEGETATION SHALL BE CARRIED OUT UPON COMPLETION OF EARTHWORKS IN A PROGRESSIVE MANNER.
16. CONTRACTOR SHALL BE RESPONSIBLE FOR DUST CONTROL MEASURES DURING CONSTRUCTION.

DRAINAGE WORKS

17. ALL STORMWATER DRAINAGE STRUCTURES TO BE CONSTRUCTED IN ACCORDANCE WITH RELEVANT WOLLONDILLY SHIRE COUNCIL PIPELINE DRAINAGE CONSTRUCTION SPECIFICATION C221.
18. ALL BEDDING TO BE HS3 UNLESS SPECIFIED OTHERWISE.
19. BEDDING AND BACKFILL TO BE CONSTRUCTED IN ACCORDANCE WITH AS3725.
20. CONCRETE PIPES TO BE PURCHASED FROM QUALITY ASSURED MANUFACTURER.
21. ALL LOTS ON HIGH SIDE OF ROAD TO BE PROVIDED WITH 90mm UPVC ON THE LOW SIDE OF THE ALLOTMENT FOR FUTURE ROOFWATER OUTLET TO KERB AND GUTTER. 90mm UPVC PIPE TO BE PROVIDED BY CONTRACTOR WITH KERB OUTLET.
22. ALL PITS TO INCLUDE WEEP HOLES AT INVERT WITH 3.0m PERFORATED SUBSOIL DRAIN WITH FILTER SOCK.
23. THE CONTRACTOR SHALL ENSURE ALL DRAINAGE LINES AND SERVICES ARE LAID WITHIN THE EXISTING OR PROPOSED EASEMENTS.
24. SUBSOIL DRAINAGE TO BE ALIGNED ON ALL HIGH SIDE OF ROADS AND ARE TO BE ACCURATELY MARKED ON THE WORK AS EXECUTED PLANS.
25. ALL PIPES TO BE MINIMUM R.C.P CLASS 2 U.N.O. SN8-U.P.V.C FOR ALL INTER ALLOTMENT DRAINAGE OR R.C.P FOR PIPES >375mm.
26. PITS DEEPER THAN 1.8m MUST COMPLY WITH TYPICAL DETAILS PLAN. PITS GREATER THAN 1.2m TO HAVE STEP IRONS PROVIDED.
27. INTER ALLOTMENT DRAINAGE EASEMENT WIDTH IS MIN 1.5m U.N.O.
28. ALL CONCRETE PIPES SHALL BE REINFORCED CONCRETE PIPES OR APPROVED EQUIVALENT TO THE STANDARDS SPECIFIED IN AS4058
29. ALL PROPRIETARY PRODUCTS TO BE INSTALLED AS PER MANUFACTURERS SPECIFICATIONS.
30. ALL KERB INLET PIT GRATES TO BE CYCLE PROOF.
31. TAILOUT DRAINS FROM HEADWALLS TO BE TURFED AS DIRECTED BY THE SUPERINTENDENT.

CONCRETE WORKS

32. COMPRESSIVE STRENGTH (F'c) FOR CAST IN SITU CONCRETE SHALL BE MINIMUM 25 MPa AT 28 DAYS. CUSTOM STORMWATER PITS WILL REQUIRE MIN 40MPa.

SURVEY

36. THE CONTRACTOR SHALL UNDERTAKE THE NECESSARY SURVEY SETOUT FOR THE WORKS.
37. THE CONTRACTOR SHALL CONFIRM THE LOCATION OF ANY UTILITY SERVICES OVER THE SITE. CONTRACTORS TO CARRY OUT COMPLETE SERVICES SEARCH BY AN ACCREDITED SERVICES LOCATOR PRIOR TO CONSTRUCTION.
38. ALL SURVEY MARKS TO BE RETAINED UNLESS ADVISED OTHERWISE BY THE SUPERINTENDENT.
39. THE CONTRACTOR SHALL SURVEY ALL AREAS OF OVER STRIPPING, AND ADVISE THE SUPERINTENDENT BEFORE PLACING FILL OVER SUCH AREAS.
40. THE CONTRACTOR SHALL SURVEY THE LOCATION AND LEVEL OF BURIED ENDS AND JUNCTIONS OF PIPES AND CONDUITS FOR FUTURE WORK AS EXECUTED PLANS.

GEOTECHNICAL

41. STRIPPED FILL AREAS TO BE PROOF ROLLED AND APPROVED BY GEOTECHNICAL CONSULTANT PRIOR TO PLACEMENT OF FILL.
42. UNSUITABLE MATERIAL TO BE TREATED AS RECOMMENDED BY THE GEOTECHNICAL CONSULTANT.
43. ABRUPT CHANGES IN SUBSURFACE CONDITIONS TO BE REPORTED IMMEDIATELY TO THE GEOTECHNICAL CONSULTANT.
44. ALL CUT AND FILL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH W.S.C 213-EARTHWORKS AND AUSTRALIAN STANDARDS.
45. PAYMENT DESIGN TO BE FINALISED BY GEOTECHNICAL CONSULTANT AFTER DETAILED SUBGRADE INVESTIGATION.
46. ALL FILL WORKS WITHIN LOTS TO BE UNDER LEVEL 1 GEOTECHNICAL SUPERVISION IN ACCORDANCE WITH AS3798 - 2007 OR SUBSEQUENT AMENDMENTS.
47. THE CONTRACTOR SHALL OBTAIN APPROVAL FROM THE GEOTECHNICAL CONSULTANT FOR THE USE OF VIBRATORY ROLLERS NEAR PERMANENT STRUCTURES DURING CONSTRUCTION.
48. GEOTECHNICAL TESTING OF PIPELINES TO BE AS PER WOLLONDLILLY SHIRE COUNCIL SUBDIVISION CODE OR CARRY OUT TESTING EVERY 50m OF PIPELINE WITH NOT LESS THAN TWO TESTS IN ANY SECTION OF PIPE EXCEEDING 25m TO VERIFY BEDDING AND BACKFILL COMPLIES WITH THE REQUIREMENTS FOR H33 BEDDING AND BACKFILL WHICHEVER IS GREATER.
49. SITE FILLING IS TO BE APPROVED ON SITE BY NOMINATED GEOTECHNICAL ENGINEER.
50. AREA TO BE SURVEYED PRIOR TO PLACING FILL.

1	6/11/2015	FOR APPROVAL			MAH	DMS	DMS
Rev.	Date	Description			Des.	Verif.	Appd.



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Drawn WPK	Date 5/11/2015	Client LEND LEASE COMMUNITES (WILTON)			
Checked FKK	Date 5/11/2015	Project BINGARA GORGE FAIRWAYS EAST -STAGE 1J (2) DEVELOPMENT APPLICATION	Status FOR APPROVAL		
Designed MAH	Date 2/11/2015		NOT TO BE USED FOR CONSTRUCTION PURPOSES		
Verified FKK	Date 5/11/2015		DATUMScaleSize AHD1:5000A1		
Approved		Title LOCALITY PLAN, DRAWING SCHEDULE AND NOTES	Drawing NumberRevision NA82013043-012-C20011		
DMS	5/11/2015				



Photograph 1 - Site



Photograph 2 - Some general waste materials next to tree



Photographs from Site Walkover

Fairways East -Stage 1J (2)

Bingara Gorge Estate, Wilton

CLIENT: Lend Lease Communities (Wilton) Pty Ltd

PROJECT: 43677.40


PLATE No: A1

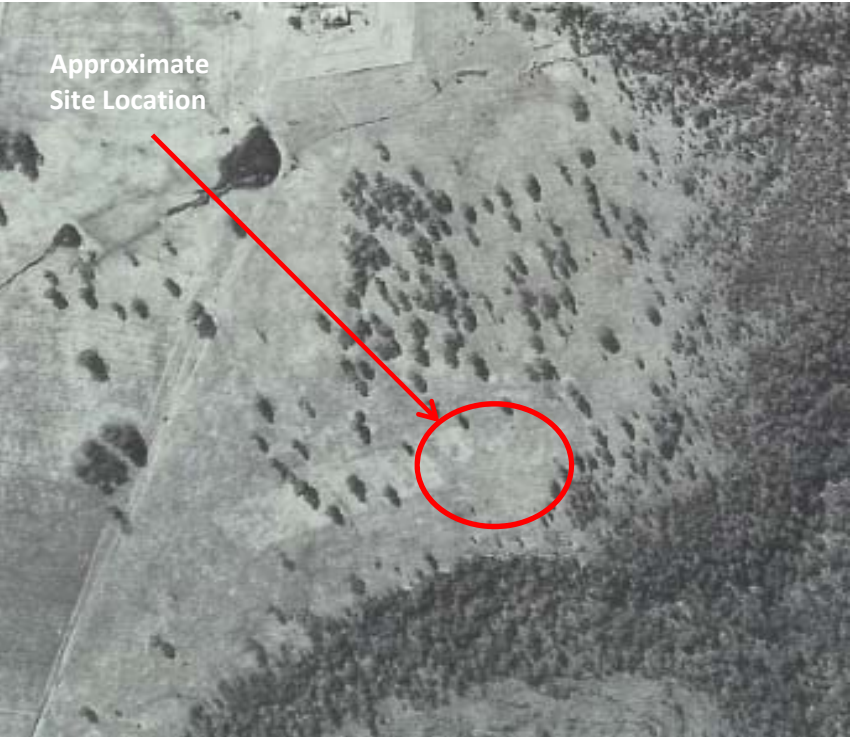
REV: A

DATE: 1.12.2015



Photograph 3 - Small soil stockpile

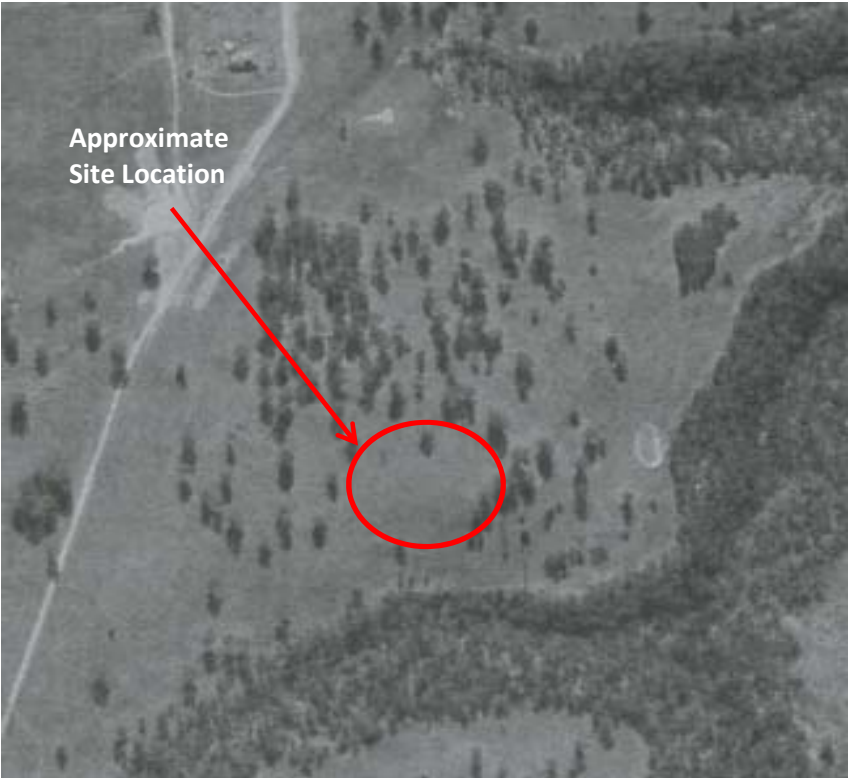
	Photographs from Site Walkover		PROJECT: 43677.40
	Fairways East -Stage 1J (2)		PLATE No: A2
	Bingara Gorge Estate, Wilton		REV: A
	CLIENT: Lend Lease Communities (Wilton) Pty Ltd		DATE: 1.12.2015



1956



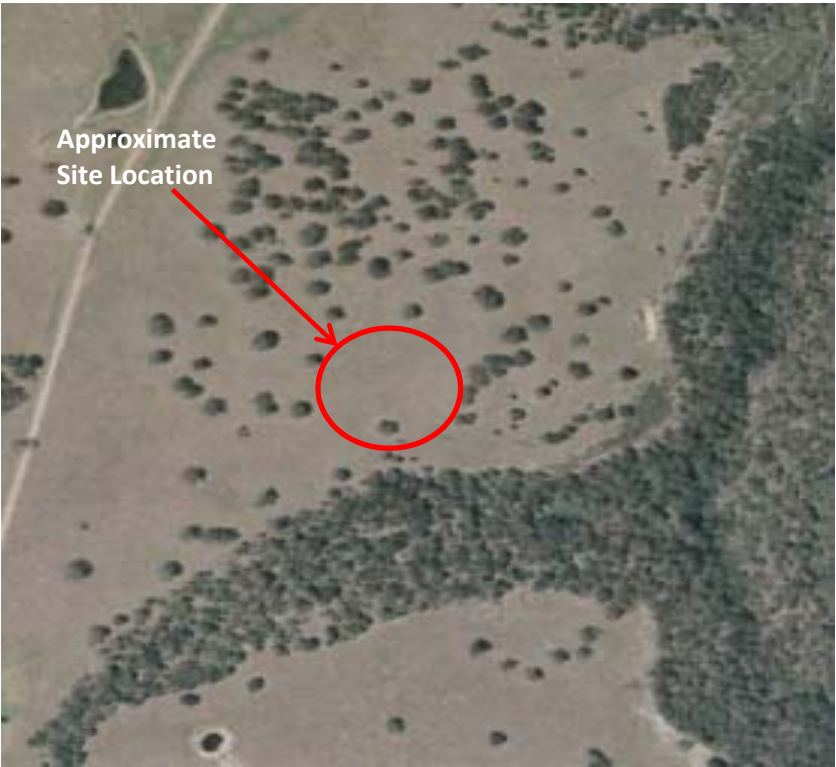
1966



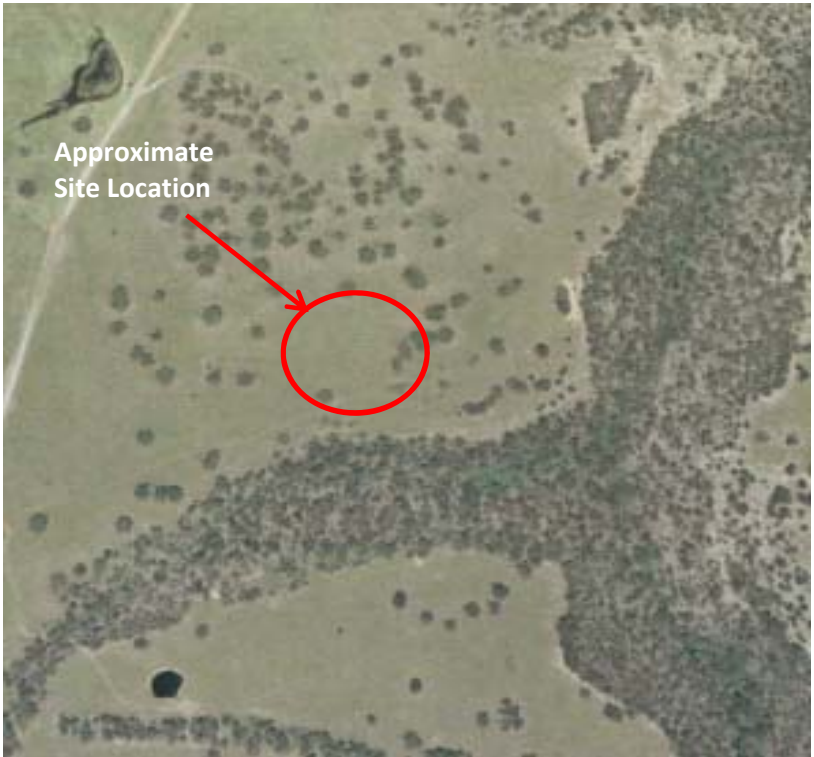
1979



1988



1994



2005





Source: NSW Land & Property Information SIX Maps website (<https://maps.six.nsw.gov.au>)

 Douglas Partners Geotechnics Environment Groundwater	CLIENT: Lend Lease Communities (Wilton) Pty Ltd		TITLE: 2013 Aerial Photograph Preliminary Contamination Investigation Fairways East - Stage 1J (2), Bingara Gorge Estate, Wilton	PROJECT No: 43677.40	
	OFFICE: Sydney	DRAWN BY: DW		PLATE No: B2	
	SCALE: NA	DATE: 1 Dec 2015		REVISION: A	

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

This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

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.