

30 March 2013
Ref: 30277

York and Company Pty Ltd
PO Box 202
East Maitland NSW 2323

Attention: Mr Oliver York

Dear Sir,

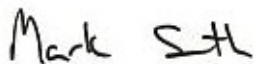
Geotechnical Engineers Report

**Re: Desktop Contaminated Site Investigation
Lot 1 DP 1119043 and Lots 17 and 18 DP 263196
Ryans Road, Gillieston Heights**

The following report presents the results of our Desktop Contaminated Site Investigation undertaken at the above site.

If you have any further enquiries please do not hesitate to contact the undersigned.

Yours faithfully
Forum Consulting Engineers

A handwritten signature in black ink that reads "Mark Smith".

Mark Smith
Geotechnical/Environmental Engineer
B.E. (Environmental)

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1. Introduction

Acting on your instructions, we have undertaken a Desktop Contaminated Site Investigation at the above site. The purpose of the investigation was to identify whether historical site uses have contaminated either soils, surfacewater or groundwaters on the site.

A Desktop Contaminated Site Investigation is a collection and examination of information derived from records of the site and site inspections. The collection and examination of information, pertaining to the prior use of the site, is to determine whether the site had previously or currently has potentially contaminating land uses, identify the probable contaminants and the possible location of the contaminants.

2. Scope of Work

The scope of the work for this investigation included:

- A review of available information held by relevant state and local authorities, as well as present landholders. This review included (but was not limited to):
 - o Ownership history;
 - o Zoning history;
 - o Development history;
 - o Contaminated Land Record and POEO Licensing Searches;
 - o Available licensed groundwater data;
 - o Local site knowledge; and
 - o Historical aerial photography interpretation.
- A comprehensive site (walkover) inspection;
- A review of available published information regarding site conditions, e.g. geology sheets, soil maps and notes etc.; and
- Incorporation of these findings into a report.

Guidance considered during the preparation of this report included:

- NSW EPA (1997) Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites;
- NSW EPA (1999) Contaminated Sites: Guidelines on Significant Risk of Harm from Contaminated Land and the Duty to Report;
- NSW DEC (2006) Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd Ed.); and



3. Site Description

The subject site is located on the western side of Ryans Road, Gillieston Heights. The site was bordered by Ryans Road to the east, Figtree Lane to the west, Kiah Road to the south and by a rural residential lot to the north.

At the clients request, this investigation was limited to the eastern portion of the site above the 1 in 100 year flood level. For the extent of this report, this area will be known as the "Investigation Area".

At the time of site inspection, the Investigation Area was undeveloped and supported a moderate to thick unmaintained grass cover in the northern third and a moderate to thick maintained cover across the remainder of the Investigation Area. Scattered intermediate to mature trees were located in the southeastern portion of the Investigation Area. Immediately to the west of the Investigation Area, three dams were located in an open watercourse and at the time of inspection, all dams appeared to be near or at their maximum capacities.

Open grassed drainage lines were located in the southern, central and northern portions of the Investigation Area. The southern and central drainage lines generally contained moderate sideslopes towards the centre of the drainage line. This is representative of all drainage lines within the greater site and surrounding areas. The northern drainage line contained moderate sideslopes in the eastern portion but spread and flattened in the central and western portions. This was not representative and there may be a possibility for fill material to be present within this area. The presence or absence of fill material was not confirmed. Limited fill material was identified in the eastern portion of the southern drainage line adjacent to Ryans Road.

Topographically, the Investigation Area sloped down in a general east to west direction at an average slope of approximately 5 – 7°. Localised changes in slope direction and grades were identified adjacent to the open drainage lines.

It is understood that the Investigation Area/site is to be rezoned for residential use and subdivided. At the time of writing this report, drawings of the proposed subdivision layout had not been provided to Forum Consulting Engineers. Drawing 30277/Geo1 and Photographs 1 – 11 show the existing site layout.



4. Site History

4.1 Interview with Current Owners

4.1.1 Mr Oliver York

During on site meeting with Mr Oliver York on 21 March 2013, he advised that:

- York and Company purchased Lot 1 DP 1119043 Ryans Road, Gillieston Heights in 2010;
- York and Company have not used or modified for any purpose;
- he was aware of fill material being present on the site;
- he was not aware of any major spills during occupation of the site.

4.1.2 Mr Gary Grant

During a telephone interview with Mr Gary Grant on 21 March 2013, he advised that:

- he had owned both Lot 17 and 18 DP 263196 Ryans Road, Gillieston Heights since approximately 1989;
- he constructed a residential dwelling in the southwestern corner of the site in 2001;
- he had only used the Investigation Area for grazing cattle and horses;
- he was unaware of the presence of the two tyres in the central portion of the Investigation Area and could not explain their origin;
- with the exception of fill material adjacent to Ryans Road in the southeastern portion of the Investigation Area, he was unaware of fill material being present across the Investigation Area;
- during his ownership, he was not aware of any fill material being placed or major spills which may have occurred across the Investigation Area.

4.2 Available Aerial Photographic Record

Historical aerial photographs taken in 1965, 1987 and 2001 were purchased from NSW Department of Land and Property Information. While the aerial photographs showed that minor variations had occurred with the construction of earthen dams in the central open watercourse, the Investigation Area layout had not varied since at least 1965.

A review of an aerial photograph taken in 2013 showed no variation in the Investigation Area or site from the historical aerial photograph taken in 2001.

Copies of historical aerial photographs can be seen in the attachment section of this report.



4.3 Current Historical Land Use

The Investigation Area is currently undeveloped and it is understood to have not contained any historical developments. It is believed that the current use of the Investigation Area is typical of historical land uses.

4.4 Land Zoning

Maitland City Council's Local Environmental Plan 2011 identified the entire Investigation Area as being located in "RU2 – Rural Landscape" zoning. Current land practices are representative of this zone.

It is understood that the Investigation Area is to be rezoned for use in residential development. The proposed land zoning is unknown.

4.5 Department of Environment and Climate Change

4.5.1 Contaminated Land Record

A search of the Department of Environment and Climate Change's "Contaminated Land Record" did not identify the sites as being identified on the Contaminated Land Record.

4.5.2 Protection of the Environment Operations Act Public Register

A search of the Department of Environment and Climate Change's "Protection of the Environment Operations Act Public register" did not identify any licences, applications or notices for the sites.

4.5.3 Council Records Review and s149 Planning Certificates

Section 149 planning certificates issued under the EP&A Act, 1979, for the relevant sites were viewed. There were no notations relevant to contamination on the certificates.

4.5.4 WorkCover Authority Search

The WorkCover Authority was requested to undertake a search of their database for 'Licences to Keep Dangerous Goods' for 208 - 212 Corrimal Street, Wollongong. The Authority searched the Stored Chemical Information Database and the microfiche records. Records indicated that the property has in the past held a license to store LPG gas. No records were found pertaining to the onsite underground storage tanks observed onsite.

5. Regional Geology and Soils

Reference to the 1:100 000 Newcastle Coalfield Regional Geology Map published by Department of Mineral Resources indicates that the Investigation Area lies within the Tomago Coal Measures. The Tomago Coal Measures consist of the Dempsey Formation (siltstone, sandstone, coal, tuff



and minor carbonaceous claystone), Four Mile Creek Formation (sandstone, minor siltstone, claystone, coal and tuff) and the Wallis Creek Formation (laminated sandstone, claystone, siltstone, coal and tuff).

The Investigation Area falls within the Bolwarra Heights Landscape as identified on the "Soil Landscapes of the Newcastle 1:100 000 Sheet" published by the Department of Land and Water Conservation. The Bolwarra Heights Landscape is an erosional landscape characterised by rolling low hills on Permian sediments in the East Maitland Hills region. The Bolwarra Heights Landscape contains slopes varying between 5% and 20% on local reliefs to 100m AHD. Soils consist of moderately deep (<150cm), well drained Yellow, Red and Brown Podzolic Soils with some moderately deep (<100cm) well-drained Lithosols on crests and moderately deep (<140cm) imperfectly drained yellow Soloths on lower slopes. Vegetation primarily consists of cleared tall open-forest.

6. Groundwater

A desktop study and subsurface geotechnical investigation was undertaken to determine the likelihood of potential contaminants contaminating groundwater below the Investigation Area.

A desktop study was undertaken using NSW DECC NRAtlas. During the search, no registered groundwater bores were identified within a 500m radius of the Investigation Area or site.

The depth to the local groundwater table is unknown.

7. Site Inspection

A site inspection was conducted on 4 December 2012 to visually assess and identify any potential indicators of contamination that were present across the Investigation Area. The Investigation Area was traversed on foot and inspected for the following:

- Areas of discoloured soil, polluted water, significant odours, and affected plant growth;
- Soil loss or depositing, and an evaluation of future erosion potential;
- The presence of stockpiled material, imported soil or fill material;
- Location of all visible features including foundations, tanks, pits, wells and bores;
- Chemical storage and transfer areas, including the presence of waste or chemical containers;
- The direction of surface water runoff from the Investigation Area;
- Adjacent landuse(s); and
- Any differences between existing conditions and the information obtained during the site history review.



During the Investigation Area inspection, the following was identified:

- The southern drainage line contained approximately 50m³ of fill material adjacent to Ryans Road.
- Two car tyres were located centrally on the Investigation Area. No other fill materials were identified within this area.
- The northern drainage line contained moderate sideslopes in the eastern portion but spread and contained lesser sideslopes in the central and western portions. This was not representative and there may be a potential for fill material to be present within the central and western portions of this drainage line. This was not confirmed.

A visual assessment of the Investigation Area and surrounding area did not identify any other potential sources of contamination.

8. Discussion

Based on the review of previous investigations, state and local-held information, the available historical aerial photographic records, it is understood that the Investigation Area has remained unchanged since at least 1965.

The only identified potential source of contamination identified across the Investigation Area was imported fill material located in the eastern portion of the southern drainage line adjacent to Ryans Road. While discussions with site owners could not confirm, it was also believed that is a potential of imported fill material being in the central and western portions of the northern drainage line. Historical aerial photographs indicated that this area has not changed since 1965.

Based on the results of the site history review, the Investigation Area has not been subject to development and is believed to contain a low risk of contamination.

It is recommended that a Preliminary Contaminated Site Investigation be undertaken to determine the suitability of fill material in the southern drainage line and the potential for fill material in the central and western portions of the northern drainage line. This investigation should accompany any future subdivision development application.

9. State Environmental Planning Policy 55

Based on findings made within this Desktop Contaminated Site Investigation, consistent with Clauses 7(1)(b) and (c) of SEPP55, it is believed that the Planning Authority would be able to be satisfied that “the land is suitable in its contaminated state (or will be suitable, after



remediation) for the purpose for which the development is proposed to be carried out” and “if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose”.

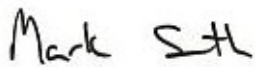
10. Investigation Limitations

The extent of testing associated with this assessment is limited to the visual assessment of the Investigation Area and variations in ground conditions may occur. Forum Consulting Engineers professional opinions presented in this report are based on observations of the site and information provided to Forum Consulting Engineers and are subject to modification if additional information is obtained, through further investigation, observation, verification testing or analysis during further investigations or subsequent building works.

Forum Consulting Engineers should be contacted immediately should subsurface conditions be found to differ from those described in this report.

Yours faithfully

Forum Consulting Engineers



Mark Smith

Geotechnical/Environmental Engineer
B.E. (Environmental)



Attachments



Photograph 1



Photograph 2



Photograph 3



Photograph 4



Photograph 5



Photograph 6



Photograph 7



Photograph 8



Photograph 9



Photograph 10



Photograph 11



NSW
1401
5061

11.5 A3
114.4

NORTHUMBER-
LAND PROJECT
1965

NSW1401



RUN 14
18.8.65



5.950' A.S.L
114.44MM



IST COPY

CROWN
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LANDS PHOTO
LOG-E





DATA 3057 6215



NSW
3575
98

NEWCASTLE 1987
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NSW3575 (M1773)

RUN 3
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2713 M ASL
153.10MM
→

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LAND PHOTO





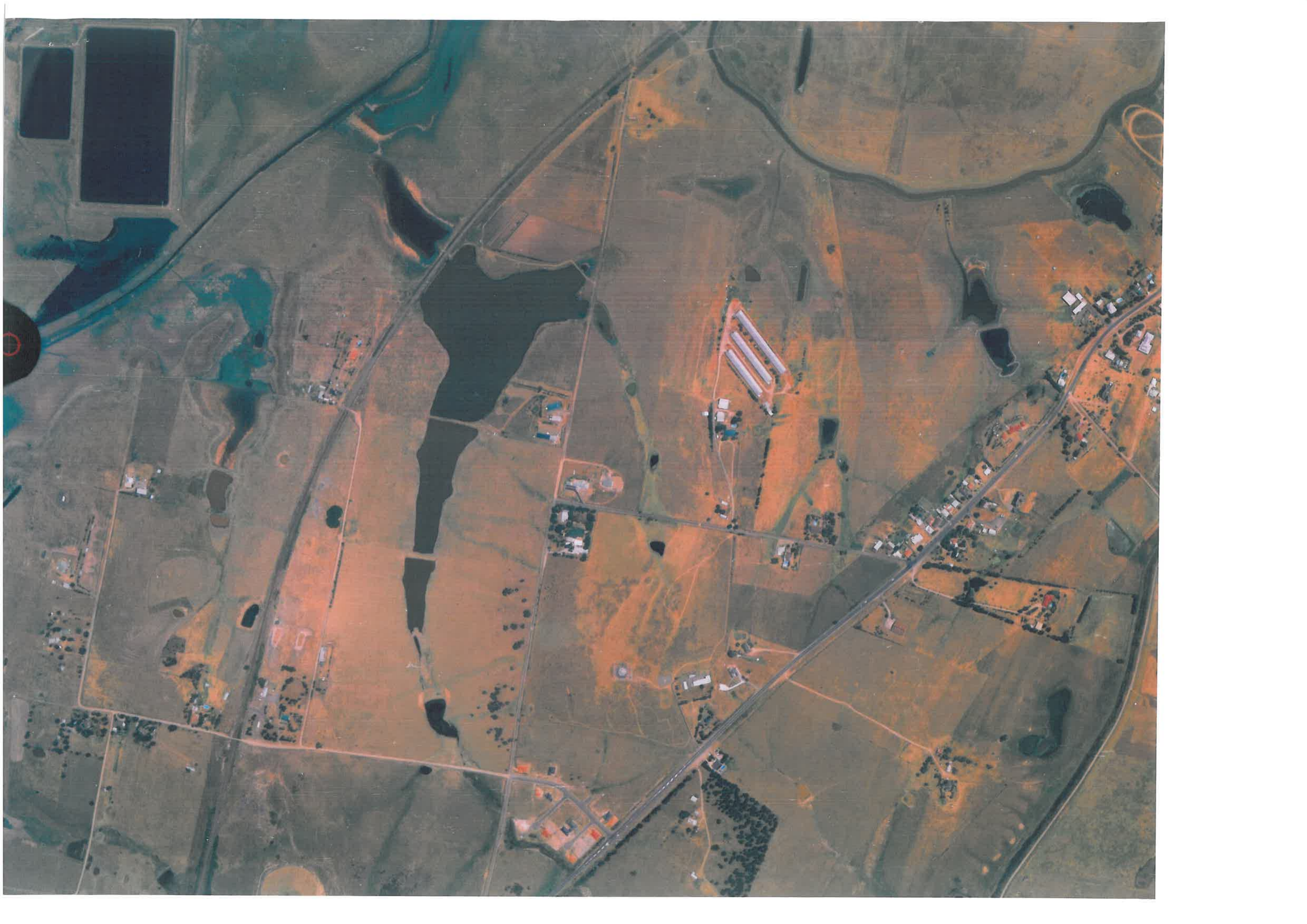
NEWCASTLE
1:25000 Approx. Scale
NSW4535 (M2227)

RUN 7
03-01-01
31-53

152.76 mm



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General Notes

Introduction

These notes are supplied with all geotechnical reports from **Forum** and therefore may contain information not necessarily relevant to this report. The purpose of the report is set out in the introduction section of this report. It should not be used by any other party, or for any other purpose, as it may not contain adequate or appropriate information in these events.

Engineering Reports

Forum engineering reports are prepared by qualified personnel and are based on information obtained, and on modern engineering standards of interpretation and analysis of that information. 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 the design proposal or construction methods do change, **Forum** request that it be notified and will be pleased to review the report and the sufficiency of the investigation work. Geotechnical reports are based on information gained from limited subsurface test boring and sampling, supplemented by knowledge of local geology and experience. For this reason, the report must be regarded as interpretative, rather than a factual document, limited, to some extent, by the scope of information on which it relies.

***Forum** cannot accept responsibility for problems which may develop if it is not consulted after factors considered in the report's development have changed.*

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

- Unexpected variations in ground conditions – the potential for this will depend partly on bore spacing and sampling frequency.
- The actions of contractors responding to commercial pressures.

If these occur, **Forum** will be pleased to assist with investigation or advice to resolve the matter.

A Geotechnical Engineering Report May Be Subject To Misinterpretation

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical engineering report. To help avoid these problems, **Forum** should be retained to review the adequacy of plans and specifications relative to geotechnical issues.

Engineering Logs Should Not Be Separated From The Engineering Report.

Final engineering logs are developed by the Geotechnical Engineer based upon interpretation of field logs and laboratory evaluation of field samples. Only final engineering logs are included in geotechnical engineering reports. To minimize the likelihood of engineering log misinterpretation, *give contractors ready access to the complete geotechnical engineering report.*

Site Inspection

Forum will always be pleased to provide inspection services for geotechnical aspects of work to which this report is related. This could range from a site visit, to full time engineering presence on site.

Change In Conditions

Subsurface conditions may be modified by constantly changing natural forces. Because a geotechnical engineering report is based on conditions, which existed at the time of subsurface exploration, *construction decisions should not be based on a geotechnical engineering report whose adequacy may have been affected by time.* Construction operations at or adjacent to the site and natural events such as floods, earthquakes or groundwater fluctuations may also affect subsurface conditions and thus, the continuing adequacy of a geotechnical report. **Forum** should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary. 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, **Forum** requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed during construction, than at some later stage, well after the event.

Ground Water

Unless otherwise indicated the water levels given on the engineering logs are levels of free water or seepage in the test hole recorded at the given time of measuring. This may not accurately represent actual ground water levels, due to one or more of the following:

- In low permeability soils, ground water although present may enter the hole slowly, or perhaps not at all during the time it 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 prior weather changes. They may not be the same at the time of construction as indicated at the time of investigation.

Accurate confirmation of levels can only be made by appropriate instrumentation techniques and monitoring programs.

General Notes – Continued

Foundation Depth

Where referred to in the report, the recommended depth of any foundation, (piles, caissons, footings etc) is an engineering estimate of the depth to which they should be constructed. The estimate is influenced and perhaps limited by the fieldwork method and testing carried out in connection with the site investigation, and other pertinent information as has been made available. The depth remains, however, an estimate and therefore liable to variation. Foundation drawings, designs and specifications based upon this report should provide for variations in the final depth depending upon the ground conditions at each point of support.

Engineering Logs

Engineering logs presented in the report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on the 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 economically. In any case, the boreholes or test pits represent only a very small sample of the subsurface profile. Interpretation of 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.

Drilling Methods

The following is a summary of drilling methods currently used by **Forum**, and some comments on their use and application.

Continuous Sample Drilling: The soil sample is obtained by screwing a 75 or 100mm auger into the ground and withdrawing it periodically to remove the soil. This is the most reliable method of drilling in soils as the moisture content is unchanged and soil structure, strength, appearance etc. is only partially affected.

Test Pits: These are excavated using a backhoe or tracked excavator, allowing close examination of insitu soil if it is safe to descend into the pit. The depth of digging is limited to about 3 metres for a backhoe, and about 5 metres for an excavator. A potential disadvantage is the disturbance of the site caused by the excavation.

Hand Auger: The soil sample is obtained by screwing a 75mm Auger into the ground. This method is usually restricted to approximately 1.5 to 2 metres in depth, and the soil structure and strength is significantly disturbed.

Continuous Spiral Flight Augers: The soil sample is obtained by using a 90 – 115mm diameter continuous spiral flight auger

which is withdrawn at intervals to allow sampling or insitu testing. This is a relatively economical means of drilling in clays, and in sands above the water table. Samples, returned to the surface, are very disturbed and may be contaminated. Information from the drilling is of relatively lower reliability. SPT's or undisturbed sampling may be combined with this method of drilling for reasonably satisfactory sampling.

Hand Penetrometers

Hand Penetrometer tests are carried out by driving a rod into the ground with a falling weight hammer and recording the number of blows for successive 50mm increments of penetration.

Two, relatively similar tests are used:

1. Perth Sand Penetrometer (AS 1289.5.3.3) – A 16mm flat ended rod is driven with a 9kg hammer, dropping 600mm. This test was developed for testing the density of sands and is mainly used in granular soils and loose fill.

2. Cone Penetrometer/Scala Penetrometer (AS 1289.5.3.2) – A 16mm rod with a 20mm diameter cone end is driven with a 9kg hammer dropping 510mm. The test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio (CBR) have been published by various road authorities.

Sampling

Sampling is carried out during drilling to allow engineering examination, and laboratory testing of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending on the amount of disturbance during drilling, some information on strength and structure.

Undisturbed samples are taken by pushing a thick walled sample tube into the soils and withdrawing this with a sample of soil in a relatively undisturbed state contained inside. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils. Details of the type and method of sampling are given in the report.

Laboratory Testing

Laboratory testing is carried out in accordance with Australian Standard 1289 series, Methods of Testing Soils for Engineering Purposes. Details of the test procedure used are given on the individual report forms.