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## **Fax Transmission**

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<b>To</b>	<b>Mr Rob Purdon</b>	<b>From</b>	<b>Dr Matthew Raine</b>
<b>Fax No</b>	<b>02 6248 8347</b>	<b>Date</b>	<b>21 December</b>
<b>Company</b>	<b>Purdon Associates Pty Ltd</b>	<b>Reference</b>	<b>GF8613AA-01</b>
<b>cc</b>		<b>Pages</b>	
<b>Subject</b>	<b>Proposed Transgrid Sub-Station, Williamsdale Region, ACT - Preliminary Geotechnical Assessment</b>		

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## **1 INTRODUCTION**

In accordance with your request, this report presents a preliminary geotechnical assessment of the proposed Transgrid sub-station site, Williamsdale Region, ACT. This preliminary geotechnical assessment is based on initial field observations made by Coffey Geotechnics Pty Ltd whilst attending an on-site meeting convened on 8 September, 2006.

It is our understanding that the proposed development will comprise the construction of a Transgrid sub-station and related infrastructure within the Williamsdale Region, ACT. It is also understood that the proposed development will include the construction of an access road from the Monaro Highway and that the road will be required to meet specific grade and alignment constraints.

## **2 PRELIMINARY ASSESSMENT OF SITE CONDITIONS**

### **2.1 Proposed Sub-station Site**

The proposed site for the sub-station is situated approximately 600m southwest of the Monaro Highway, Williamsdale Region, ACT. In plan, the proposed sub-station footprint is approximately 150m northwest-southeast by 180m northeast-southwest (~2.7ha) and encompassed by a buffer zone that is approximately 315m northwest-southeast by 350m northeast-southwest (~8.3ha).

The general topography in the vicinity of the proposed sub-station has a gentle to moderate slope down to the northwest and an approximate east-west trending creek. Within the proposed sub-station footprint the topographic surface undulates gently. The north-eastern side slopes gently down towards the north, whereas the south-western side slopes moderately down towards the west-northwest. This slope reversal is defined by an open ridgeline that trends southeast-northwest through the proposed footprint. A natural drainage line, which also trends southeast-northwest, traverses the south-western corner of the proposed sub-station footprint, with a second southeast-northwest trending drainage line located approximately 50m to the northeast of the proposed footprint.

Based on the supplied information and due to the slope of the grounds surface in the vicinity of the proposed sub-station footprint, it is envisaged that substantial cutting and/or filling will be required to allow for levelling of the site.

Within the vicinity of the proposed sub-station, outcrops of highly weathered rhyodacite of assessed low to medium strength are ubiquitous. A number of joint sets were observed in outcrops of rhyodacite with slickenlines clearly visible on a number of planar defects, which indicates that these defects are likely to have a strong influence on the stability of excavated slopes. The colluvial soils, where present, appear to be shallow and predominantly comprised of sandy gravelly clay of low plasticity, with fine to coarse grained sand, fine to coarse grained gravel and some low liquid limit silt.

The ground surface within the area of the proposed sub-station is generally covered by low to medium grasses and sparsely distributed small to large sized trees.

A number of farm tracks proximal to the proposed route of the access road meant that trafficability at the time of the on-site meeting was satisfactory.

## **2.2 Proposed Access Road**

It is our understanding that the proposed access road to the sub-station, which will be approximately 650m in length, will need to be approximately 6m to 8m wide, with a constant and shallow gradient and minimum turning radius of about 30m.

The area for the proposed junction between the access road and Monaro Highway is located on the northern side of a gently sloping hill. In order to meet the necessary alignment requirements it is envisaged that a significant cut of up to about 20m wide, parallel to the Monaro Highway, will be required. Outcrops of rhyodacite are abundant in the vicinity of the proposed junction. The rhyodacite observed in outcrop appears foliated and is assessed to be highly weathered, low to medium strength and cut by a number of joint sets. Proximal to outcrop, extremely weathered rhyodacite and colluvial soils appear to be shallow and predominantly comprised of sandy gravelly clay of low plasticity, with fine to coarse grained sand, fine to coarse grained gravel and some low liquid limit silt.

The general topographic profile between the Monaro Highway and proposed sub-station site undulates through a number of moderate slopes that define a series of southeast-northwest trending drainage lines and topographic highs. Due to the nature of the topography and despite the proposed road alignment being parallel to sub-parallel with the contours, substantial cutting and filling may be required in a number of places in order to meet the necessary grade and alignment requirements for construction and maintenance vehicles.

The amount of outcrop and the prominence of outcrop along the route of the proposed access road is varied. The lithologies exposed in outcrop appear to exhibit rhyodacitic to rhyolitic compositions, with quartz float evident in a number of places. Outcrops of rhyodacite are assessed to be highly weathered and of low to medium strength, whereas outcrops of rhyolite are assessed to be highly to moderately weathered and of medium to possibly high strength. The variability between outcrops, both in terms of extent and prominence, is assessed to be related to the observed variability in lithology, with the most prominent outcrops being characterised by the harder lithological compositions, fewer defects and a lower susceptibility to weathering. Slickenlines were observed on a number of defect planes.

Extremely weathered rhyodacite and rhyolite of assessed very low strength are apparent as fine to coarse grained gravelly sand, whereas colluvial soils predominantly comprised sandy gravelly clay of low plasticity, with fine to coarse grained sand, fine to coarse grained gravel and some low liquid limit silt. Both the colluvial soils and extremely weathered rock appeared to be shallow in the vicinity of rock outcrop and deeper weathering profiles should be anticipated proximal to natural drainage lines.

The ground surface along the route of and proximal to the proposed access road is generally covered by low to medium grasses and sparsely to densely distributed small to large sized trees.

A number of farm tracks in the vicinity of the proposed access route meant that trafficability at the time of the on-site meeting was satisfactory.

### **3 POTENTIAL GEOTECHNICAL FACTORS**

The following sections provide preliminary assessments of geotechnical factors that were observed on-site and are deemed to be of potential significance with regards to the proposed development.

#### **3.1 Excavation Conditions**

Based on the supplied information we understand that substantial cutting and filling will be required for levelling of the proposed sub-station site and in order to achieve specific grade and alignment constraints for the proposed access road.

Extensive rock outcrop is present along the proposed route for the access road and across the proposed sub-station site. A preliminary assessment of the weathered rock exposed in outcrop indicates that at least some of the outcropping rock is of medium, possibly high strength and that the observed defect spacings, in some instances, may not be close enough to be advantageous to the bulk excavation of the in-situ rock. The strength of the in-situ rock can be expected to increase with depth and therefore deep cuts, particularly in areas characterised by wide defect spacings, may require a combination of heavy ripping, rock hammering or blasting.

#### **3.2 Drainage Lines**

A number of obvious drainage lines traverse the proposed route for the access road and sub-station footprint. In terms of the proposed access road these include an existing man made drainage channel located adjacent to, and parallel with, the Monaro Highway and two southeast-northwest trending natural drainage gullies, which are located towards the proposed site for the sub-station. In terms of the proposed sub-station, a southeast-northwest trending natural drainage line traverses the south-western corner of the proposed footprint. The most significant of the natural drainage gullies is located proximal to, and sub-parallel with, the eastern boundary of the proposed buffer zone that encompasses the proposed sub-station footprint.

The natural drainage gullies will inevitably impact on the amount of cutting and filling required in order to achieve specific grade and alignment constraints for the proposed access road. Allowances will need to be made for adequate under road drainage and existing water courses that may impact on the proposed sub-station will need to be redirected.

#### **3.3 Reuse of site materials**

A preliminary assessment of the subsurface profile suggests that in areas away from to natural drainage lines the colluvial soils and extremely weathered rock comprise only shallow horizons, and therefore the volume of soil material available for reuse as fill may be in short supply.

Observed defect spacings and rock compositions may, in some instances, preclude excavated rock from being reused as general fill because the rock may not break down to suitably size fragments during extraction, handling and compaction. In this situation the excavated materials may be able to be placed as rock fill (without significant sand and finer sizes), encased top and bottom in a geotextile to provide separation from finer grained materials. Construction of rock fill layers may not be feasible if variable excavation conditions are encountered due to the difficulties of sorting the materials.

#### **4 ADDITIONAL INVESTIGATORY WORK**

The preliminary geotechnical assessment presented in this letter report is based entirely on observations made by Coffey Geotechnics when attending an on-site meeting. Although an initial assessment of the subsurface profile has been presented, a more extensive geotechnical investigation will be required in order to assess the sub-surface profile in the vicinity of the proposed development and access road. Such an investigation could comprise a combination test pitting and drilling using a rig capable of NMLC coring techniques to depths representative of the proposed construction levels.

Please do not hesitate to contact Dr Matthew Raine or the undersigned should you have any questions regarding this report.

For and on behalf of Coffey Geotechnics Pty Ltd



**SCOTT FINDLAY**

Senior Geotechnical Engineer

Encl:

Important Information About Your Coffey Report

## Important information about your **Coffey** Report

As a client of Coffey you should know that site subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

### **Your report is based on project specific criteria**

Your report has been developed on the basis of your unique project specific requirements as understood by Coffey and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

### **Subsurface conditions can change**

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project.

### **Interpretation of factual data**

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by

earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of Coffey through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

### **Your report will only give preliminary recommendations**

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

### **Your report is prepared for specific purposes and persons**

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

## Important information about your **Coffey Report**

### **Interpretation by other design professionals**

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other project design professionals who are affected by the report. Have Coffey explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they incorporate the report findings.

### **Data should not be separated from the report\***

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way.

Logs, figures, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

### **Geoenvironmental concerns are not at issue**

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment.

Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Coffey for information relating to geoenvironmental issues.

### **Rely on Coffey for additional assistance**

Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design towards construction, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

### **Responsibility**

Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

\* For further information on this aspect reference should be made to "Guidelines for the Provision of Geotechnical Information in Construction Contracts" published by the Institution of Engineers Australia, National Headquarters, Canberra, 1987.