CONSULTING EARTH SCIENTISTS

CSR Limited
Triniti 3, 39 Delhi Road
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NSW 2113, Australia

CES Document Referenced:
CES110514-CSR-AI

30 April 2012

For the attention of Mr. Leon Kenny

Re: Geotechnical Assessment of Overburden Stockpile Material at Lot 22 Erskine Park, NSW.

Dear Sirs,

1) INTRODUCTION

Consulting Earth Scientists Pty Ltd (CES) were commissioned by CSR Limited (CSR (the Client)) to undertake geotechnical assessments of the Overburden Stockpile Material (OSM) located at Lot 22 (herein referred to as the Site).

CES have been informed that CSR intend to Subdivide Lot 22 and re-grade the site to construct batters and redistribute the OSM over the lot to a level of 60.5mAHD. CES have been informed that the OSM will not be sorted or processed as part of the proposed earthworks and the fill will not be placed under engineering controls or placed to an engineering standard or specification.

It is further understood that CSR propose to place a condition of the Development Application requiring the incoming purchaser of the lot to perform ground improvement works to bring the site to a condition suitable for purpose.

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2) THE SITE

2.1 SITE LOCATION

Erskine Park Lot 22 is situated west of Tyrone Place, Erskine Park NSW. Erskine Park is located approximately 40km west of Sydney.

The site is an irregular shape, approximately 300m north to south and approximately 350m east to west. It is bounded to the south by Erskine Park Landfill Facility and to the north by Erskine Park Road, Lenore Lane and a 60m wide nominal corridor (proposed location of reinstated creek alignment). Industrial units are located along the sites eastern and western boundaries.

2.2 SITE DESCRIPTION

The site may be accessed via a gate located at Erskine Park Road or via Tyrone Place. Unsurfaced access tracks are located throughout the site, providing access to the site office, working areas, OSM stockpile and a surface water storage dam. The greatest elevation of the site is in the central part of the site where it is approximately 67mAHD. The site descends to approximately 43mAHD in the northwest corner with a surface water storage dam located close to the western boundary of the site.

3) GEOTECHNICAL ASSESSMENT OF THE OVERBURDEN STOCKPILE MATERIAL

An initial geotechnical investigation was completed by CES in August 2001 (CES reference CES010505-EGD-01-F), as part of this investigation, seven test pits were excavated to depths between 5.5m and 9.7m and observed variable fill to their base. The fill, referred to as Overburden Stockpile Material (OSM) underwent further investigations by CES in July 2011 and an Environmental Site Assessment was also undertaken by CES in March 2012.

The results of these ground investigations indicate that the OSM consists of a highly variable mixture of soil and rock comprising boulders (>250mm), cobble (32mm to 64mm) and gravel (2mm to 16mm) size fragments of basalt, siltstone and volcanic breccia in a matrix of silty clay/silty sand. The composition of the OSM varies significantly with some layers/pockets of material assessed to comprise about 90% matrix of clay/sand size

particles (up to 1.41mm) and others layers/pockets assessed to comprise as low as 10% matrix of clay/sand size particles.

The highly variable nature of the OSM makes assessment of typical characteristics difficult, however, as a general assessment, the OSM comprises approximately 70% to 90% cobbles and boulders of between 300mm and 500mm clast size. Boulders up to 1500mm were observed during the fieldworks. The cobble and boulder size fragments were assessed to comprise highly weathered to slightly weathered rock, which varied from low the very high strength.

Minor secondary constituents including wood, coal, rubber, glass, ceramics and wire were also observed in the test pits. These were assessed to comprise less than about 5% of the material observed.

The results of insitu field density index testing carried out by CES, using an informal in-house method, indicate that the OSM has an insitu field dry density that varied between 1.44t/m^3 and 2.01t/m^3.

The OSM was placed with no engineering control, and therefore cannot be considered 'Controlled Fill' and is unlikely to provide uniform support to pavements, floor slabs or footings. To construct on the site without ground treatment and/or without the use of specialist footing systems, would carry a high degree of risk of damage and high degree of risk of impaired serviceability due to ground movements and in particular differential settlement of buildings, structures, pavements and services.

4) GEOTECHNICAL REHABILITATION OPTIONS

The purpose of any ground treatment method would be to provide a demonstrably compacted earth fill platform for which engineering properties are uniform and predictable and suitable for the proposed site use. A number of options for ground improvement could include one or a combination of the following methods.

- Excavate, process, replace and re-compact the OSM.
- Dynamic compaction by "square" impact roller.
- Deep dynamic compaction by dropping a heavy mass from height.

- Geogrid-reinforced and pile-supported earth fill platform(s) (piles taken to a competent stratum).
- Structural engineering options such as pile supported slab-on-grade (piles taken to a competent stratum).

The suitability of each option and the construction specification for the earth fill platform(s) will be dependent on the proposed final land use and intended constructions proposed for the site. Suitability, efficiency and economic viability of any ground treatment or structural engineering option should be subject to detailed analysis and design. Suitability of any ground treatment options should be confirmed by field trials.

5) CLOSURE

Should you require further information or clarification of any details, please do not hesitate to contact the undersigned on 8569 2200

For and on behalf of Consulting Earth Scientists Pty Ltd.

Duncan Lowe
Principal