APPENDIX F

GEOTECHNICAL ASSESSMENT REPORT

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Crozier Geotechnical Consultants is a division of PJC Geo-Engineering Pty Ltd

REPORT ON GEOTECHNICAL ASSESSMENT OF SLOPE STABILISING
McCARRS CREEK ROAD, CHURCH POINT

Crozier Geotechnical were requested to provide a letter regarding the stability of the existing excavation and slope along the eastern side of McCarrs Creek Road, Church Point, where it passes the proposed new car park for the Commuter Wharf upgrade. The request was made by Hyder Consulting for inclusion with Review of Environmental Factors report to be supplied to Pittwater Council.

Previous inspections and investigations into the site conditions was undertaken by Crozier Geotechnical as part of the design phase. To provide the required information for the Review of Environmental Factors an inspection was undertaken on the 22nd September 2015 by a Principal Engineering Geologist from Crozier Geotechnical of the existing excavation, slope and driveway/corridor above.

The existing excavation extends from the intersection between McCarrs Creek Road and Pittwater Road at the northern end of the site. It begins as a low (0.2m) steep soil slope before increasing in height and slope to the south becoming a sub-vertical excavation into the bedrock that varies up to approximately 4.0m in height. The bedrock is thinly sub-horizontally bedded, fine grained sandstone with numerous sub-vertical joint defects striking oblique to the excavation. These defects are concentrated in some locations. Lower angle west dipping planar to curved joint defects were also identified whilst extensive small scale fracturing due to weathering and stress relaxation were also noted throughout the bedrock.

The bedrock appears to have been generally excavated near vertical at the time of construction of McCarrs Creek Road however there are areas where the excavation is formed along steep west dipping joint defects with the section of bedrock above previously removed. There are no indications of the previous installation of stabilizing measures across the excavation which is exposed for the entire length of the site other than two small non-engineered rock retaining walls near the northern end. There is evidence of small scale failures in the form of rock slides, rock topples and soil slumping and erosion along the length of the excavation whilst larger sections of bedrock above the steep west dipping joint defects have previously failed or been excavated/removed.

The slope above the excavation is densely covered in vegetation making inspection very limited. The slope has been measured at slope angles varying between 20° and 50° however there were no signs of previous or impending instability. The road reserve to the east, above this slope contains a bitumen pavement with no kerb or gutter. A variable width but generally narrow grass verge is located along the western side of the pavement, at the slope crest. There were no indications of significant cracking or deformation within this pavement to suggest larger scale slope movement.

Along the length of the excavation numerous joint and fracture defects were mapped with the intersection of these defects creating some areas of detached rock that have the potential for future landslip instability. The following photos illustrate some of the potential landslip hazards. In general these hazards are of small scale however there is the potential for some larger scale block sliding to occur along the west dipping joint defects.

Section of rock detached along steep west dipping joint defect along with fractures in the bedrock, action of tree above providing separation, as viewed looking west.

As viewed looking north, along excavation, section of detached rock with weathering at base along curved steeply west dipping joint and tree at rear.

Very steeply west dipping joint defect separating bedrock and creating potential small scale (<1.0m³) rock slides/falls

Steeply west dipping joint defects creating larger scale (1-5m³) rock sliding hazard.

Thinly bedded sandstone bedrock intersected by fractures and steep west dipping joint defects creating highly fragmented rock mass.

Concentration of sub-vertical joint defects striking oblique to excavation creating numerous small scale detached sections of rock.

Tree undermined by soil and rock erosion

Stabilizing Assessment

The inspection identified numerous joint and fracture defects within the existing excavation along the eastern side of McCarrs Creek Road. These have generally created potential small scale rock slide and topple hazards from detached fragments of rock and these can be managed via ongoing slope grooming and maintenance.

There are some steeply west dipping joint defects which dip out of the excavation face, and along with the sub-vertical oblique joint defects have created potential larger scale (up to $5m^3$) blocks of rock that present more significant rock slide hazards. These may require more significant excavation or stabilizing measures.

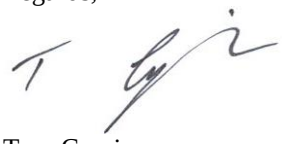
A detailed inspection of the slope above the existing excavation was not possible due to the extensive vegetation. However there were no signs of erosion or previous land sliding. Several trees within the excavation face/crest should be assessed by an arborist and will likely require removal.

It is recommended that upon construction of the car parking area that low weed vegetation be cleared from the crest of the existing excavation and extending several metres upslope as a minimum. Following this work slope grooming should be undertaken under geotechnical supervision to remove existing potential landslide hazards. It is expected that this slope grooming may need to occur on an occasional but ongoing basis over the life time of the carpark. Further detailed geotechnical assessment of larger scale rock blocks that cannot be removed by grooming processes should also occur prior to use of the car park for assessment of the need for insitu stabilizing measures (i.e. excavation/rock bolting etc).

To further reduce the risk of potential instability an engineered shotcrete retaining wall could be constructed along the length of the excavation face thus reducing the need for ongoing grooming and maintenance, though the initial cost outlay may not be feasible.

Hope the above comments meet your present needs, should you require clarification on any of the above detail or any further advice please donôt hesitate to contact on the undersigned.

Regards,



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