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86072.00.R.002.Rev0
14 December 2017
PMO

Mirvac Projects Pty Ltd
Level 28, 200 George Street
SYDNEY NSW 2000

Attention: Ms Amanda Blake

Dear Sirs

Response to Comments from The Hills Shire Council
Planning Proposal 1/2018/PLP
55 Coonara Avenue, West Pennant Hills

In response to Council's letter dated 21 November 2017 we provide an updated Report on Geotechnical Assessment (Ref. 86072.00.R.001.Rev1 dated 20 November 2017).

We also provide the following responses to the specific items raised in Council's letter (Council words shown in *italics*):

The Geotechnical Report is to be amended to satisfy the following criteria:

- *Be specific to the development that is proposed;*

The Report on Geotechnical Assessment was prepared with reference to the specific development proposed in the planning proposal for 55 Coonara Avenue, West Pennant Hills comprising 200 houses and 400 apartments. The purpose of the assessment was to provide guidance on geotechnical risks associated with the proposed development, including landslide risk, rather than for specific buildings or structures.

- *Be prepared in accordance with the Australian Geomechanics Society Guidelines for Landslide Susceptibility, Hazard and Risk Zoning for Land Use Planning (AGS 2007a), associated Practice Note (AGS 2007c) and Commentary (AGS 2007b);*

The updated report now includes a preliminary slope risk assessment undertaken with reference to the Australian Geomechanics Society (AGS) guidelines and documents outlined above.

- *Be prepared by a consultant registered with the Institute of Engineers Australia or similar, and who is experienced in the fields of landslides, soil and rock mechanics, slope stabilisation and residential developments;*

Douglas Partners is a geotechnical engineering company with over 50 years of consulting experience. This experience includes the fields of landslides, soil and rock mechanics, slope stabilisation and residential developments. The slope stability assessment component of the work was undertaken by Mr John Braybrooke, Principal Engineering Geologist, who has over 45 years of experience. His CV is attached for information.

- *Certify that the design of all the structures the subject of the application is suitable to withstand the effects of high plasticity clays subject to shrink/swell movements and possible creep movement of near surface soils;*

Design of the structures will be undertaken at Development Application stage once rezoning is complete. Mirvac is committed to designing all structures to withstand the effects of high plasticity clays subject to shrink/swell movements and possible creep movement of near surface soils. Geotechnical assessments undertaken by Douglas Partners to date have not found any site attributes that would prevent the proposed structures from being designed to accommodate these issues.

- *Satisfy Council that an acceptable level of risk is achieved with respect to the possibility of movement or slip adversely affecting the proposed subdivision or development or being caused by the proposed subdivision or development; and*
- *An 'acceptable risk level' is defined in accordance with the AGS Guidelines for Landslide Susceptibility, Hazard and Risk Zoning for Land Use Planning (AGS 2007) as the loss of life for the person most at risk (from the landslide) as 1 in a million per annum and for property loss the risk is to be 'low'.*

It is noted that the development plans are preliminary only, and detailed design with regard to landform, buildings, foundations and retaining walls has not yet been undertaken. As such, the slope risk assessment provided in our revised Report on Geotechnical Assessment is preliminary and risk of life assessment could not be undertaken at this stage as many of the inputs required are not available.

More detailed slope risk assessments will be undertaken as part of the Development Application process for the various stages of the development once the actual design has been refined. It is considered unreasonable to expect this level of design detail at this planning proposal stage of the development, and without more detail any risk assessment is considered meaningless.

The Douglas Partners geotechnical assessment confirms that the site has a very low risk of landslide activity. Mirvac is committed to ensuring the design incorporates measures to ensure that the risk level for ‘loss of life’ is no greater than 1 in 1 million per annum and for ‘property loss’ is low.

Geotechnical assessments undertaken by Douglas Partners to date have not found any site attributes that indicate a level of risk greater than ‘low’ for the proposed development with respect to the possibility/of movement or slip.

Please contact the undersigned if further information is required.

Yours faithfully,
Douglas Partners Pty Ltd

Peter Oitmaa
Principal

for John Braybrooke
Principal

Attachment: CV for Mr John Braybrooke

Curriculum Vitae

John Braybrooke

Senior Consultant/Engineering Geologist

Sydney
Rock Mechanics

Education

Bachelor of Science (Hons) (), UWA, 1964

Master of Science (), Uni London, 1966

Diploma of Imperial College (), Imperial College, 1966

Biography

John Braybrooke is a Senior Consulting Engineering Geologist with over 50 years of post-graduate experience in all facets of engineering geology, ranging from house sites to large scale infrastructure projects. Prior to joining DP 30 years ago, John was Head, Geotechnical Services, Electricity Commission, NSW for 9 years; a supervising engineering geologist with SMEC and the Snowy Mountains Hydro-Electric Authority for 9 years; in the engineering geology group of the Bureau of Mineral Resources, Australia, for 3 years and with Conzinc Riotinto in Bougainville in 1965, for 8 months. John has worked in all states of Australia as well as Papua New Guinea, New Zealand, Indonesia, Malaysia, Philippines and Western Samoa.

His main areas of expertise are:

Civil and mining underground structures, particularly tunnels, declines, drifts and shafts, having been involved with over 250 underground projects at pre-feasibility, feasibility, design, construction or post construction including latent condition claims for both contractors and owners. This experience includes having worked on most tunnels in Sydney, constructed since and including the Eastern Suburbs Railway in the 1970's,and in various roles.

Dams, ranging from prefeasibility to post construction and from mine dams to a 150m high earth and rock, hydro-electric dam in Malaysia. This experience includes designing and supervising grouting programs. He was the resident engineering geologist, in the 1970's, on the Shoalhaven water transfer and pump-storage scheme, a mini Snowy Hydro Scheme with 4 dams, 2 tunnels, 3 power/pump stations, canals and pipelines. More recently John supervised and was intimately involved with the field work for the 3 year study of the infrastructure for the Frieda River Gold/Copper mine in the Sepik District of PNG and for the Ramu 2 Hydro-electric Scheme, also in PNG

Deep excavations in the city, particularly Sydney, starting with World Square where near surface high horizontal stresses were identified in Sydney for the first time, to Barangaroo Central, particularly involved with shoring design and construction and excavatability issues, including productivity.

Slope stability issues ranging from house sites, to the Thredbo debris flow, debris flows in PNG to major landslides at Ok Tedi, PNG.

Experience

Dams

Koolan Island Sea Wall, WA – Development of safe work construction methods.

Cockatoo Island Sea Wall, WA – Review of design and monitoring during construction by others following major wall failure.

Ross River Dam – Rip-rap problems, post construction.

Warragamba Dam Auxiliary Spillway – Provide advice on excavation and construction materials, stability and design.

Aldridges Creek Dam , NSW – Design, construction and performance.

Dartbrook Staged Discharge Dam, Dartbrook Mine, NSW – Investigation and design.

Eloise Mine Tailings Dam – Investigation, design, construction and performance.

Prefeasibility and Feasibility Studies

Wafi-Golpu – Supervised and largely carried out a prefeasibility study of 3, six kilometre long declines through sedimentary, metamorphic and igneous rocks with attendant deep weathering, alteration and faulting. The study comprised developing geotechnical ground condition models and assessing preferred excavation methods and support requirements for costing purposes.

Frieda River Copper Mine Infrastructure – Supervised and partly carried out the extended scoping, prefeasibility and then the Bankable Feasibility three year study of over 70 sites at various levels of detail including 10 hydro-electric dam schemes, 7 tailings dam sites, 8 process plant sites, 660 km of alternative main access road, 4 airstrip sites, 4 waste rock dump sites, five construction camp sites, one sea port site, 8 river port sites and numerous quarry sites. Supervision and training of Papua New Guinean Geologists in geotechnical bore core logging made up a large component of the second half of the project together with sampling and laboratory testing of soils and rocks.

The project was a greenfields site in the jungles to the south and north of the Sepik River, Papua New Guinea, access limited to helicopter set-downs and bush “bashing”.

Jetty Sites in Morobe Province, E & W New Britain, Papua New Guinea – Supervised and partly carried out the desk-top study of 20 jetty sites based on limited site investigation data, Landsat interpretation, literature searches and general knowledge of the areas, for an Asian Development Bank Study.

Hides LNG Pipeline between Kutubu (Southern Highlands) and Wewak, PNG – Supervised the study then formed part of the international team carrying out a two-week review of the proposed and alternative legs of a 410 km pipeline route. The route ran from the lower Southern Highlands, across the rugged Central Range, crossing under the Sepik River and ending at a potential gas facility site near Wewak.

The study entailed reviewing the alternative alignments in terms of:

geotechnical hazards including earthquakes, volcanic activity, major landslides, mud flows, Karst topography, floods and river avulsion, constructability/cost issues including topographic shapes, construction m aterials, spoil disposal, river crossings by directional drilling, crossings of active faults and mud flow zones.

Ramu 2 Hydro Electric Scheme, PNG – Entailing geological mapping of the Weir and power station sites and the entire tunnel route, overviewing the drill core logging, seismic traversing, report preparation and seismicity studies.

Tunnels and Shafts

Wallaby Underground Gold Mine – Investigated the variations in depth of Tertiary alluvium over the mine then fully investigated a 740 m deep vent shaft, the upper 70 m being through Tertiary alluvium with a number of aquifers. Prepare reports for tendering purpose which included alternative excavation and treatment methods. Client: Goldfields Australia.

Awaba Mine Closure – Inspected the underground conditions in the vicinity of the proposed mine entry plugs, helped prepare mine closure details and attended risk assessment workshop. Client: Centennial Coal.

Oaky North TBM Drift – Assess likely geological and strength profile, assess likely productivity for different excavation methods and likely support design. Client: Thiess

Ranger Uranium – Overview of re-design and excavation of box cut through very low strength, low grade metamorphics, re-design of decline portal and stub tunnel, review and redesign of decline support down to a depth of 400 m. Provide advice during recovery of the collapsed upper portion of the vent shaft designed by others. Providing advice on core and long-term maintenance after the scheme was mothballed. Client: ERA Major Projects.

Wafi - Golpu Declines, PNG – Prefeasibility model of ground conditions and preliminary design of decline support for 3 by 6 km long declines to 700 m deep through sedimentary rocks, major fault zones, low grade metamorphics and highly altered (metasom atised) rocks. Client: Redpath Australia Pty Ltd.

Metropolitan Colliery – Review ground support being installed and compare with actual ground conditions, using, inter alia, CMRR, Voissoir Beam Analysis and 3 DEC. Client: Peabody, Energy Australia.

Crinum M Block – Review borehole logs, prepare geological model, carry out preliminary designs for box cut and twin drifts through basalt, very low strength then low to medium strength coal measure rocks. Client: BMA.

Wards Well Coal Mine – Prefeasibility studies for potential access locations for coal mine drifts and shafts and preliminary assessment of likely excavation, groundwater and support conditions. Client: BMC.

Grasstree Ventilation Shaft – Design investigations for ventilation shaft, including assessment of stability. Client: Anglo American Australia Pty Ltd.

Dugald River Mine – Assessment of installed mine support in terms of “Fit for Purpose”.

Carmichael Mine – Re-assessment of slope stability of mine boxcut.

El Teniente Access Tunnels, Chile – Prepare geotechnical model for proposed decline route for a 10 m diameter TBM. Client: SKM.

Yarwun Pipejacks – Reviewed and overviewed analysis of two under-rail directionally bored crossings of 3 by 800 mm diameter product lines. Client A J Lucas Pty Ltd.

Thompson - Yarra Tunnel – In conjunction with Redpath Australia, prepare safe-work methods for accessing the nominally supported tunnel for full audit inspection. Client: Melbourne Water.

Sydney South Cable Tunnel – Arbitration then Supreme Court proceedings as Expert Witness for the contractor in relation to high groundwater inflows into cable tunnel and high iron contents in groundwater. Client: Downer Pty Ltd.

Mt Lyell Mine, Tasmania – Provision of geotechnical advice to contractor about underground support issues in a high stress environment. Client: Redpath Australia Pty.

Eagle Downs Coal Mine – Design of box cuts and of support for two new drifts through Coal Measure Rocks in the Bowen Basin plus negotiations with the preferred tenderer followed by overviewing DP personnel providing geotechnical advice during construction. Client: Eagle Downs Coal.

Publications

John Braybrooke. Tunnelling in the Sydney Region. *Engineering Geology of the Sydney Region*

John Braybrooke. The Treatment and Monitoring of Unstable Rock Wedges During Excavation of Bendeela. *Soil Slope Instability and Stabilisation*

John Braybrooke. International Conference on Terrain and Geohazard Challenges facing onshore oil and gas pipelines. *ICE, London, 2004*

Contact Details

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