Client: MPSC	***Review of Consultant's Report***	**Project No:** 209242
Site Location: 14-16 View Point Road, McCrae		**Report Date:** 27/5/11
Report Title: Geotechnical Report, Proposed Residential Dwelling, 14-16 View Point Road, McCrae		**Reviewer:** DBS/JPP
Report Author: GeoAust Geotechnical Engineers		**Review Date:** 8/8/11

Notes:

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Item	Section	Page	Issue / Report Content	Reviewer's Comment/Query
1.	1.2	1	The report indicates there are three sections of proposed cut as part of the proposed development.	• These cuts need to be specifically addressed in the recommendations section of the report
2.	3.1	4	Site Description	• Site description is consistent with that observed on site. Creep was observed on the site
3.	3.3	5-6	The report indicates that the piezometer was dry on 24 May 2011. The report then states that it can be concluded that the ground water table is present at depths below RL 6.8 metres. The depth of RL 6.8m was conservatively adopted in the analysis	• The conservative adoption of RL 6.8m for the steady state analysis is appropriate but consideration of perched water in the analysis due to heavy rainfall should also be considered. GeoAust discuss overflow in the report.
4.	4.2	7-8	The report proposes three hazards for the risk analysis, Hazard A is a failure of the upper escarpment affecting only the proposed house, Hazard B is a failure of the lower escarpment affecting downslope of the house and Hazard C is creep movement	• It is considered that a further hazard which is a failure of the entire escarpment affecting the house and downslope of the house is also possible, although much less likely than other hazards. (This is referred to as Hazard D in this review)
5.	4.3	8	The annual probability adopted in the risk analysis are based on qualitative terms	• Part a) of Section 5.4.2 of AGS 2007 indicates that qualitative terms should not be used to derive the estimated annual probability. Considering the failure that has been noted in the report at 6 View Point Road, the annual probability should at best be 1 in 100 years for a landslide along the escarpment. However, when taking into account the probability of spatial impact along the length of escarpment, say 0.1, the likelihood of POSSIBLE is considered appropriate for Hazards A & B. The likelihood of ALMOST CERTAIN is also appropriate as creep is occurring on the site although a frequency of 1 could also be considered. • An appropriate likelihood for Hazard D would be one to two orders of magnitude lower than that for Hazards A & B, therefore UNLIKELY to

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				RARE
6.	4.4	8	The consequences of Hazards A, B and C were indicated to be CATASTROPHIC, MAJOR and MEDIUM respectively	• We concur with the consequence for Hazard A & C. In accordance with Appendix C of the AGS guidelines, if Hazard B causes major consequence damage on a neighbouring property, as described in the report, the consequence for Hazard B should be CATASTROPHIC.
7.	4.5	9	Shear strength parameters for the slope stability analysis are provided in Table 4.5.1	• The shear strength parameters for Units 1, 3 and 4 are based on correlations with SPT results. These values appear appropriate. • No justification has been given for the shear strength values for Unit 2. Preferably, as a minimum a correlation with the liquid limit of the clay should have been done. However, as the phi value of 24 degrees seems a little conservative and the c value of 10kPa is within that which would be expected, it is acceptable to adopt these values.
8.	4.5	10	The existing conditions were modelled and indicated a FoS of 1.14	• The FoS is consistent with the observed site conditions and therefore the shear strength parameters appear to be appropriate/
9.	4.5	10-13	The report discusses various analyses that were undertaken	• C3, C4, C5, C6, C7– concur • C8, C9, C10, C11 – Based on the analysis, it appears that the retention piles have been designed to penetrate to just below the slip circle with a FoS of 1.5. This is considered inappropriate as if a failure with a FoS of 1.5 or less occurred in front of the wall, all of the material providing passive resistance at the toe of the wall would be removed. • We recommend that the slip circle for a FoS of 1.5 be determined without the piles. The piles would then need to penetrate to a sufficient depth below that FoS of 1.5 circle that if the material in front of the wall moved, the piles would still act as a retaining wall. • The analysis did not consider perched water based on the assumption that appropriate drainage will be undertaken as part of the site cuts.
10.	4.6	15-16	Risk to Property	• Concur provided that: 1. The retaining wall piles are designed to act as a retaining wall that is designed to withstand the lateral forces that would be imparted on the wall should a Factor of Safety 1.5 landslide occur. 2. The foundation piles penetrate to below the FoS 1.5 landslide
11.	4.7	17-20	Risk to Life	• Again, concur provided that the piles are designed to tolerate a factor of safety of 1.5 landslide occurring in front of the piles. Furthermore, the presence of the piled wall slightly increases the FoS down slope of the

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				dwelling and therefore the risk is slightly reduced in that area.
12.	4.8	21	Risk Management	• Concur
13.	5.1	22	Site Classification	• Concur
14.	5.2	22	Earthquake Site Classification	• Concur
15.	5.3	22-23	Footings – The report recommends that retention piles be used to stabilise the slope with no construction downslope of the piles. Cantilevered soldier piles are then recommended for the remaining sides of the dwelling	• It is acceptable to adopt the recommended foundation system provided that the main retention piles are designed to act as a single retaining wall that prevents flow between the piles and therefore preventing movement of soil in the area of the soldier piles. • The dwelling piles and upslope retention piles would also need to be designed to penetrate to below the FoS 1.5 slip circle and resist any applied lateral loads.
16.	5.4	23-25	Retention Piles – The report recommends the following: • The piles are founded at least 15m below the bench at RL 23.0m • The pile spacing not exceed 2m • The uppermost 8m of the pile be designed to withstand the at rest lateral loads due to loss of support on the downslope side of the pile	• The choice of 15m for the length of pile and 8m for the section of the pile to act as a retaining wall has not been justified. As indicated above, the length of the pile acting as a retaining wall should be based on a Factor of Safety of 1.5 slip circle for the existing condition. The section of pile below the FoS of 1.5 would then provide the lateral resistance and vertical bearing resistance for the pile. Head lateral support by the structure to behind the slip circle can also be included.
17.	5.5	25-26	Dwelling Piles – The report for the piles for the dwelling recommends that these piles be founded a minimum of 8m below the benched surface level	• As a minimum, the piles should penetrate to below the FoS 1.5 slip circle. However, consideration should also be given to the transference of lateral load to the dwelling piles from the structure. Any lateral resistance required by the piles should only be considered below the FoS 1.5 slip circle
18.	5.6	26-29	Retention of Site Cuts	• Concur for 5.6.1-5.6.4 and 5.6.6
19.	5.6.5	29	Ground Anchors	• The report provides recommendations for the structure providing lateral support to the retaining wall. This is acceptable and the preferred approach. However, the section of structure that can provide the lateral support has not been defined. It is recommended that only the section of the structure that is located beyond the FoS 1.5 slip circle be used to provide lateral support. • Similarly, temporary ground anchors should also have their anchorage resistance beyond the FoS 1.5 slip circle.

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20.	5.7	30	Hillside Construction	• The report makes no recommendations for the treatment of water bearing services underneath and in the vicinity of the dwelling. It is recommended that all water bearing services be tied to the structure and that flexible joints be used where the services enter from the street to the structure. In the event of creep movement or slope failure, the water bearing services should not break or disconnect and then saturate the slope.