

**Expert witness report on geotechnical aspects of proposed development at
275 Barham River Road, Apollo Bay
Colac Otway Planning Permit Application No 169/2017-1
4 September 2018**

(a) Author:

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(b) Qualifications:

1979 Monash University Bachelor of Science (BSc) in geology.
1998 University of NSW – short course in quantitative risk assessment of soil and rock slopes.
2004 Centre for Environmental Training – short course in soil assessment for wastewater systems.
2011 Certificate IV in Training and Education – Gordon TAFE Geelong

(c) Experience:

2010-2018 Owner, managing director and senior geologist of Lanasco Pty Ltd.
1989-2010 Part owner, managing director, company director and senior geologist of Saunders Consulting Group Pty Ltd.
1985-1989 Senior geologist for Universal Soil Laboratories Pty Ltd Melbourne.
1981-1985 Field geologist for Universal Soil Laboratories Pty Ltd Melbourne.
1980-1981 Experimental officer in the CSIRO Division of Mineral Chemistry, Melbourne.

(d) Affiliations (recently retired but previously):

Member of the Australian Institute of Geoscientists
Registered Professional Geoscientist (RPGeo) No. 10142
Member of the Australian Institute of Mining and Metallurgy
Member of the Foundations and Footings Society (Vic.)
Member of the Australian Geomechanics Society
Member of the Geological Society of Australia

(e) Area of expertise:

Since 1981 the author's principle field of employment has been in engineering geology, offering technical advice to government, corporate and individual clients in the fields of geotechnical, civil and structural engineering. The author has planned and coordinated field and laboratory testing activities for thousands of residential, commercial and industrial projects, has conducted hundreds of geotechnical site investigations and field geomorphological mapping appraisals and has prepared and presented numerous geotechnical assessments and landslide risk assessments on dozens of sites in the Colac Otway Shire.

(f) Other contributors:

The author has personally inspected the proposed development site and prepared the following report without assistance from any other person.

(g) Instructions and scope of report:

Instructions to prepare this report were received from Shelly Fanning of Coastal Planning and can be summarised as follows:

1. Provide a geotechnical overview of the proposal
2. Critique the geotech reports prepared to date
3. Identify significant gaps in the geotech documentation
4. Provide general geotech advice to the Objectors group as required

(h) Documentation:

The following documents and reports that have been considered in preparing this report.

1. Godfrey Spowers (Victoria) Pty Ltd, Architectural Plans entitled Town Planning Permit Application, dated July 2017, project 2017005, issue date 06/30/17
2. Godfrey Spowers (Victoria) Pty Ltd, Architectural Plans entitled Amended Town Planning Permit Application, dated 15th May 2018, project 2017005, issue date 15/05/18
3. Bruce Hollioake Consulting Civil and Structural Engineers, Geotechnical Assessment and Land Stability Assessment Report, Reference 17310, dated 29th June 2017
4. Golder Associates, Landslide Risk Assessment Report, Reference No. 1787175-002-R-Rev1, dated 1 November 2017
5. Golder Associates, Revised Landslide Risk Assessment Report, Reference No. 1787175-007-L-Rev2, dated 15 May 2018
6. Planning Panels Victoria (PPV), Notice of Further Information Outstanding, dated 5 June 2018
7. Golder Associates, Response to Planning Panels Victoria letter, dated 15 June 2018
8. Colac Otway Shire, Erosion Management Overlay (EMO) Schedule 1
9. Australian Geomechanics Society (AGS), Practice Note Guidelines for Landslide Risk Management, AGS Journal Vol 42 No 1 March 2007

1.0 EXECUTIVE SUMMARY

- 1.1. The revised masterplan prepared by the architect improves the risk situation by removing some elements and relocating others.
- 1.2. The revised geotechnical report and clarifying letter by Golders does not supply any new information but revises the risk analysis matrix and attempts to justify the absence of detailed geotechnical data, suggesting it can be postponed until the design stage.
- 1.3. The planning panel notice sharply requests more detailed geotechnical data.
- 1.4. The Shire's EMO and the AGS Guidelines strongly imply that detailed geotechnical data should be provided.
- 1.5. In my opinion the planning permit should not be granted without more detailed geotechnical analysis.

2.0 FINDINGS AND OPINIONS

2.1 The Updated Architectural Plans reflect some recommendations in the Golder LRA report dated 1 November 2017, regarding the elements at risk. Some of these elements have been removed (e.g. the hotel expansion, conference centre and yoga retreat all proposed for Stage 2), others have been re-located (e.g. the villas on the steeper northern slopes and steep slopes near the dam) and it appears the Hotel Guestrooms have been re-designed to mostly minimise the extent of significant excavation required.

2.2 The amended architectural plans describe an additional 60 villas (15 "Creek Plateau Villas and 45 "Pasture Villas) on the southern part of the site.

2.3 The main hotel building remains partly within an identified high-risk zone and the “11 Hotel Villas” in the north together with many of the “60 Resort Villas” in the south remain adjacent to high or very high-risk zones as identified in the Golder reports.

2.4 The revised Golder LRA Report (dated 15 May 2018) does not present any new information on the site conditions and it appears that no Golder representatives have re-examined the site since the initial report of November 2017. It seems apparent that Golder have not performed any geotechnical investigations and have relied on their own a desktop study, a site walk-over and on the manifestly inadequate Hollioake report for interpretation of the sub-surface conditions.

2.5 The Hollioake Geotechnical Assessment and Land Stability Assessment Report (reference 17310) emphasises that it is “preliminary” in nature as final designs are not available.

2.6 Although the Hollioake report refers to the development being “a large multi-level hotel building” the extent of the investigation and the report format is applicable to low level residential style construction. For example, the report refers to just 15 boreholes (but the report appendix details only 13) and none of these boreholes extended deeper than 2.0m. Furthermore no in-situ strength testing and no laboratory testing on representative samples has been performed. In my opinion this is appropriate for residential construction, but inadequate for the current proposal given its scale and location “within an area of historic and current landslips”.

2.7 As the Hollioake report was completed for the initial design and not the amended proposal, there has been no exploration of the sub-surface conditions for the proposed “water villas” near the dam, nor for the additional villas described in paragraph 2.2 above.

2.8 The Hollioake report recommends footings founded 3m below surface (Risk Mitigation Works – dot point 1) which is deeper than the investigation depth. In my opinion it is poor geotechnical practice to make a recommendation to a depth that has not been explored.

2.9 The revised Golder LRA report mainly re-assesses the risk analysis in the light of modifications to the masterplan and presents an “updated landslide risk assessment” as well as a summary of Risk Mitigation Measures adopted from the original LRA. The risk assessment is more favourable than the original report due to the fact that some elements of the original masterplan have been removed or relocated as mentioned above.

2.10 A summary of the recommended remedial measures is presented in Table 3 (page 8) which provides an “estimate of residual risk” for each of the building elements, assuming that the “proposed mitigation measures” are achieved, however these measures cannot be designed or even estimated without comprehensive geotechnical data.

2.11 The Notice of Further Information Outstanding from PPV dated 5 June 2018 makes it clear that the Panel requires more geotechnical details and verification of the tolerable risk assessment based on data rather than assumptions.

2.12 The Panel states, that the revised Golder LRA does not ... “provide the technical verification that the total development and site disturbance proposed can meet the tolerable risk criteria.” And further: “... the Panel requires documentation to be submitted that details what further geotechnical investigations were undertaken on site, the results of such investigations and technical verification as

requested. Implicit in relation to the above is the expectation that sampling/modelling results will be supplied in support of the technical verification."

2.13 The Golders Response to Planning Panels Victoria letter is an attempt to justify the absence of specific geotechnical investigations. The letter endeavours to defend the absence of geotechnical data by re-stating the conclusion "... *that the land can meet the tolerable risk criteria*" (dot point 2 middle of Page 1).

2.14 The Golder letter confirms that the tolerable risk criteria can only be met "*following implementation of the recommended remedial measures*" (dot point 3 bottom of Page 1) but then later adds that "*further geotechnical investigation will be performed as part of detailed design*" and that: "*Our assessment that the residual risk level meets tolerable criteria is subject to these investigation(s) being performed*" (dot point 3 middle of Page 2).

2.15 In other words, the Golder report is asking that the reader accept the assertion that the risks can be mitigated to a tolerable level (without a detailed geotechnical investigation), but that the design of the measures to achieve the recommended mitigation is dependent on the outcome of further investigation.

2.16 The Golder report admits that further investigation works will be required as part of the detailed design of the proposed development. The question is whether such investigations can be postponed until the "design phase" or whether they are required now.

2.17 The notice from PPV makes it clear that there is a requirement that the documentation regarding further detailed geotechnical investigations is to be submitted for the planning approval and not later at the design stage or for the building approval.

2.18 The EMO Schedule in the Colac-Otway Shire Planning Scheme specifies requirements for the assessment of landslip prone sites such as the subject site. Under Item 4.0 Objectives – dot point 4: "*To ensure that applications for development are supported by adequate investigation and documentation of geotechnical and related structural matters.*"

2.19 The EMO Schedule lists further requirements, under Item 6.0 Application Requirements – Geotechnical Assessment:

Dot point 5: "*A detailed assessment of subsurface conditions, including the underlying geology.*"

Dot point 7: "*Details of all site investigations and any other information used in preparation of the geotechnical report.*"

Dot point 8: "*A statement indicating whether site investigation requires subsurface investigation or may involve boreholes and/or test pit excavations or other methods necessary to adequately assess the geotechnical/geological model for the subject lot and details of all such investigations, boreholes, test pits or other methods.*"

2.20 Both the original and revised Golder reports concluded that the subject site contained some intolerable risks and that mitigation measures are essential to make the risks tolerable. (See for example 4.0 Conclusions on Page 9 of the revised report: "*Landslide hazards have been identified that in the absence of risk mitigation measures pose intolerable risk levels.*")

2.21 Section 5.2.8 of the AGS Practice Note Guidelines for Landslide Risk Assessment 2007 states: *“If required, further detailed investigations should be completed to better define the model, the landslides, the triggers, the frequency (likelihood) or design of stabilisation measures to control the risk.”* And also: *“Such additional investigation is most likely to be required on sites where the risk is judged to be intolerable and/or where further input is required to resolve uncertainties.”*

2.22 In my opinion there has been insufficient geotechnical investigations to adequately inform the geological model or the risk mitigation measures and therefore the documentation falls short of both the EMO requirements and the AGS practice note guidelines.

3.0 CONCLUSIONS

3.1 The Planning Panel, the Shire’s EMO Schedule and AGS Guidelines all require more geotechnical data.

3.2 In my opinion there has been insufficient and inadequate sub-surface investigation of the subject site to properly define the geological conditions.

3.3 In my opinion the geotechnical risks cannot be adequately defined and a meaningful mitigation plan cannot be prepared without more comprehensive geotechnical data.

3.4 I have made all the inquiries that I believe are desirable and appropriate and no matters of significance which I regard as relevant have to my knowledge been withheld from the Panel.