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19 October 2023

My Ref: BG-296-221019-Rpt29-DRAFT

Glenorchy City Council

Attention: Mr Patrick Marshal

Dear Sir

REVIEW OF LANDSLIDES FOR GCC
REPORT 29 – 19 October 2023

1 INTRODUCTION

At the request of Mr Patrick Marshal of Glenorchy City Council (GCC) various aspects of the Rosetta Landslide and the Casuarina Landslide are being regularly reviewed. This is the twenty ninth review report by Baynes Geologic.

This report concludes that small localized movements of parts of the Rosetta landslide are probably continuing to develop but that overall landslide movements are probably not occurring. The temporary malfunction of pump 31 has caused an increase in groundwater level in borehole 23. Although no movements appear to have occurred, this incident illustrates the need to maintain the pump system and proactively respond to the results of monitoring in a timely fashion.

This report also concludes that there are probably small localized movements of parts of the Casuarina landslide occurring but that overall landslide movements are not occurring. However, movement at the toe of the landslide appears to be caused by cracking and leakage of a nearby sewer and it has been agreed with Taswater that the leakage will be rectified.

2 DATA FOR REVIEW

The data to be reviewed was attached to an email dated 29 September 2023 from Mr Dan Egodawatte and included:

- Rosetta Landslip Surveys 1990 – SEP2023
- Casuarina Monitoring – JUL 2015 – JULY2023

3 COMMENTS ON MONITORING DATA- ROSETTA

The most useful monitoring data to understand the behavior of the landslide is provided by nine monitoring points and the water levels in three piezometers installed in boreholes and three boreholes in which pumps have been installed, the locations of these are shown on Figure 1.

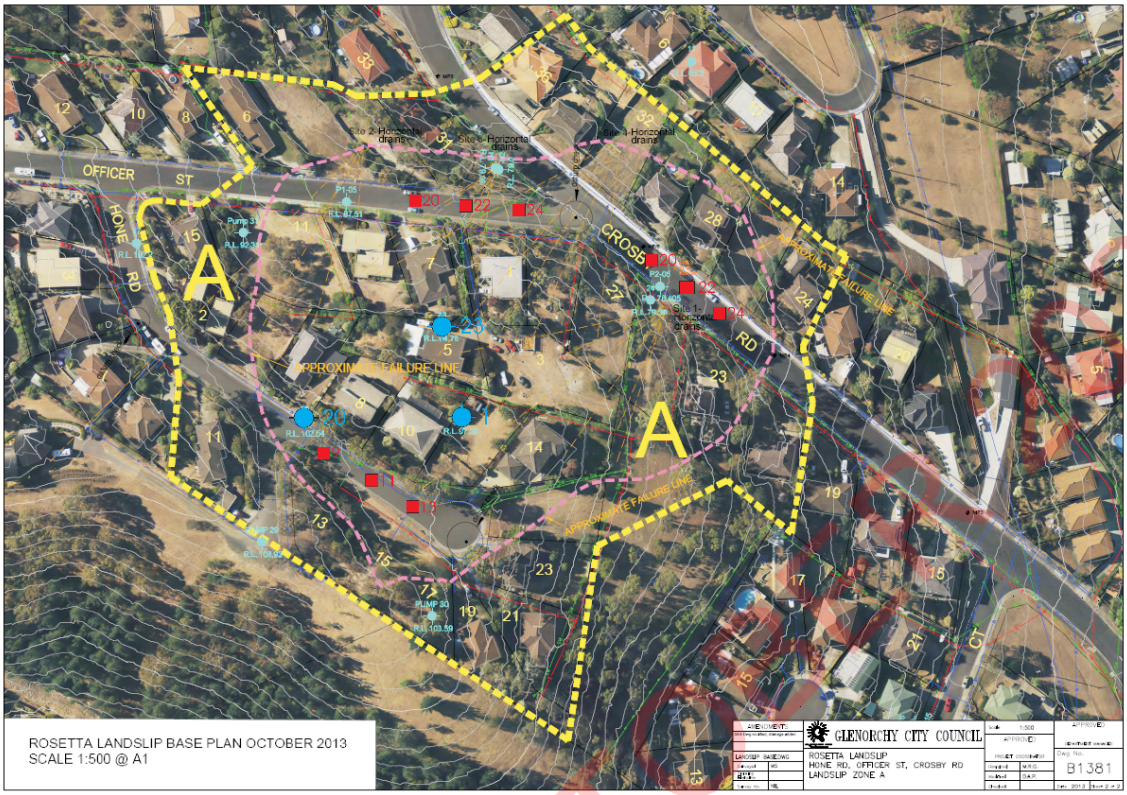

Figure 1 Critical survey monitoring points (in red) and groundwater monitoring boreholes (in blue).

The accuracy of the surveys is theoretically in the range of +/- 3 mm for the horizontal co-ordinates and +/- 1mm for the vertical co-ordinates (the level). It is possible that variations associated with setting up the instrument, operator error or the stability of the base station could be greater than this error, as systematic variations in the precise position of the survey points of up to 5 to 10 mm appear to occur regularly. The effects of swelling and shrinkage of clay rich soils during wet and dry periods and settlement associate with the long term consolidation of the landslide mass may also be contributing to the variations in the measurements.

Although the individual movement vectors deduced from the quarterly surveys are not in themselves useful to detect landslide movements, it is suggested that the overall trends that may be deduced from decades of monitoring do provide some insights as to what is happening to this landslide and these are discussed below.

Points 9, 11 & 13 Hone Road

The last survey was in August 2023. There continues to appear to be a long-term trend of settlement or slight landslide downwards movement of between 15 and 20 mm over the last 10 years in this area, with little in the way of lateral movements, which is consistent with the location of these monitoring points within the upper part of landslide, where downward movements would be anticipated. There is no significant movement of the landslide. Comment remains unchanged.

Points 20, 22 & 24 Officer Street

The last survey was in August 2023. There appears to be a long term trend of settlement and lateral displacement of between 10 and 15 mm over the last 10 years in this area with survey point 24 showing possibly 15 to 25 mm settlement over the same period, although this localized movement may have stabilized over the last few years. There is no significant movement of the landslide. Comment remains unchanged.

Points 20, 22 & 24 Crosby Road

The last survey was in March 2023. The three monitoring points may have settled by between about 5 to 10 mm over the last 10 years. There is no significant movement of the landslide. Comment remains unchanged.

Boreholes 1, 20 & 23

Groundwater levels in boreholes 1 and 20 continue to be below levels at which immediate actions are required, which indicates that the pumping and the gravity drainage is being successful in maintaining lower groundwater levels. However, the temporary malfunction of pump 31 appears to have caused an increase in groundwater level in borehole 23 to a level of 7.8 m below the surface. No landslide movements appear to be associated with this rise in groundwater levels and pump 31 has been replaced and commissioned. The observed increase in groundwater levels requires an action under the Landslide Management Plan (Section 3.4, Item 5 of Landslip Management Manual_Rev10.0.pdf). However, as the pump has been replaced, it is suggested that this action should suffice to meet the intent of Section 3.4, provided that the groundwater levels in borehole 23 drop down to more than 10 m below the surface in the next few months. This incident illustrates the need to continue with the pumping but also the need to respond proactively to the results of the monitoring in a timely fashion.

Horizontal Drains

Four arrays of horizontal drains were installed to drain and stabilize the landslide. Arrays 1, 2 and 3 are all dry with intermittent flows from two pipes in array 4. The flows appear to have increased slightly to around 1 litre/minute since July 2023 and this may have been cause by the temporary malfunction of pump 31. It is suggested that this localized increase in flow rates should continue to be observed, but that changes to the monitoring regime are not warranted at this stage.

Water Usage

The reporting of average daily water usage is considered to be beneficial to understanding the stability of the Rosetta landslide. It is understood that Taswater have investigated the properties which GCC identified as having excessive water usage and have confirmed that there are no leaks nor defects.

4 COMMENTS ON MONITORING DATA - CASUARINA

The last survey was in July 2023. There are movements of several millimetres both laterally and vertically, which probably reflect seasonal variations in moisture content of clay soils. There are no significant movements of the landslide apart from Control Point 2 which appears to be showing a displacement of up to 35 mm that is probably associated with a leak from the mains sewer. It is understood that the matter has been discussed with Taswater and that arrangements are being made to have the leaks repaired.

5 OVERVIEW

1. This report concludes that there are probably small localized movements of parts of the Rosetta landslide that are continuing to develop, although overall landslide movements are probably not occurring.

2. This report concludes that that there are probably small localized movements of parts of the Casuarina landslide occurring but that overall landslide movements of are not occurring. Point 2 appears to be moving due to leakage from the sewer. It is understood that the matter has been discussed with Taswater and that arrangements are being made to have the leaks repaired.

3. The existing monitoring system is excellent and monitoring according to the plan should continue. Modifications to the monitoring regime to reduce the frequency of monitoring will depend upon the succession plan to replace the involvement of Baynes Geologic which are currently being developed by GCC.

4. A schedule of the status of all properties and all infrastructure in the A zone at Rosetta should be created to develop a long-term strategy to manage the future of each property most effectively, with consideration of long term aims such as selective demolition of isolated houses, removal of services that could leak, minimization of maintenance of cleared areas, reducing costs of landslide management, working out how this might interface with the Open Spaces Plan etc. It is understood that GCC's policy in regard to this matter is starting to develop and it is possible that this could be documented within the Landslide Manual.

7 CLOSURE

The findings of both geotechnical and engineering geological reports are based on observation, interpretation and opinion derived from limited site investigations. The inherent uncertainty in the findings must be recognized. It will be essential to review and perhaps revise the findings of this report if the nature of the project changes, or if the use of the report, or the conditions encountered, differ from those anticipated.

Yours faithfully

Fred Baynes
Director, Baynes Geologic Pty Ltd