

Memo

Subject Douglas Partners Groundwater report
Date 26 March 2020
Client City of Yarra
Project Yarra River Tree Collapse Project – Yarrabend project

1 Introduction

The City of Yarra has engaged the Alluvium Group (Alluvium) to investigate recent tree collapse and bank slumping events on the Yarra River adjacent to the former Amcor paper mill site in Fairfield. The subject site adjoins the right bank of the Yarra River and is the subject of an urban renewal / development project by Glenvill.

Alluvium convened an expert panel to review the issues associated with the bank slump and tree collapse. Alluvium submitted interim investigation reports arising from our review of the issues.

City of Yarra has subsequently engaged Alluvium to provide ongoing technical assistance and review of investigations recommended in the interim report.

The purpose of this memo is to provide comments on a geotechnical investigation and groundwater study for the subject site, undertaken by Douglas Partners Report (Project 79075.12 R.012. Rev 0 12 March 2020), commissioned by Alphington Developments Pty Ltd at the request of the City of Yarra.

The memo has been based on a review of the geotechnical investigation and groundwater study by Ross Hardie from Alluvium and Dr Jon Fawcett from CDM Smith. The findings of Dr Fawcett have been incorporated into this summary memo and are provided in full as an attachment to this memo.

2 Background

The Yarrabend development site adjoins the Yarra River at Alphington. The Yarra River adjacent to the development has been subject to recent river-bank slumping and tree collapse.

Alluvium (2029) previously reported that the recent bank collapse at the site is out of character with the site and most likely a result of water logging of the lower terrace adjacent to the Yarra River. Alluvium were of the opinion that such water logging was most likely associated with changes to surface water management at the Yarrabend site. Alluvium were of the opinion the development activities had resulted in an increase in the surface water infiltration and that it was this infiltration that has led to an increase in groundwater levels.

At the time of preparing that report there were also suggestions by others that the rise in groundwaters at the site may be the result of the decommissioning of an old sewer main at the site. The decommissioning of the sewer main is understood to have occurred in two stages with the most relevant stage occurring in 2015 (circa). The decommissioning comprised the grouting of the old sewer main. It was hypothesised that prior to such grouting, the sewer main was 'leaky' and rather than allowing sewerage to leak out of the pipe, allowed groundwater to leak into the pipe. Such 'leakage' of groundwater into the pipe had the potential to lower adjoining groundwater. It was hypothesised that the grouting of the sewer main prevented such groundwater from being drained and has resulted in a raising of groundwater levels. It is understood that Melbourne Water, responsible for the subject sewer main has dismissed this hypothesis.

3 Understanding of report approach and findings

The investigations by Douglas Partners reported in the documentation provided to Alluvium has comprised an analysis of groundwater data. The data have comprised groundwater levels from historic, existing and recently installed groundwater monitoring bores.

3.1 Factual (data based) findings

The report has provided factual information on the soil conditions at the site and reported on the results of recent groundwater monitoring data.

3.2 Qualitative interpretations and findings

This soils, geology and groundwater data and other site information has been used by Douglas Partners to provide qualitative statements on the possible causes of the recent bank slumps and tree collapse at the site.

Douglas Partners have identified three potential factors that have contributed to the bank collapse

1. The steep 2 to 3metre high river banks
2. Variations in river water level, and
3. Increases in upgradient groundwater conditions.

Douglas Partners report that;

- The escarpment between the lower terrace and the upper terrace is stable
- There has been no significant change to groundwater conditions on the lower terrace west of Latrobe Ave and that the river banks in this section are at low risk of collapse
- Groundwater levels in the lower terrace, east of Latrobe Ave are a probable contributing factor to slump activity

Douglas Partners report that the data does not provide conclusive evidence on the cause of any elevated groundwater levels

However, Douglas Partners suggest that

- slumping in this reach of river is not unusual, and
- waterlogging of the lower terrace is consistent with the soils encountered at the site

Douglas partners propose ongoing monitoring of the site including groundwater levels and geotechnical investigations of river bank stability.

4 Alluvium commentary

4.1 Alluvium interpretation of data

Alluvium is association with CDM Smith have reviewed the report and the data provided. From our review of the data we are of the opinion that

- The decommissioned sewer main does not appear to have completely drained the groundwater (refer Figure 4 from CDM Smith attached). While the sewer main may have had some influence on groundwater levels, it does not appear to have been a dominant factor in groundwater levels

- There was a substantial increase in GW on the upper terrace from around 2015/ 16. This is likely to have had an influence of groundwater levels in the lower terrace
- The increase in ground water levels from around 2015/ 16, beneath the upper terrace coincides with both the decommissioning of the sewer main and the commencement of changes to the surface drainage at the site. However, the increase in groundwater levels occurred in areas which were unlikely to be affected by the decommissioning of the sewer main. This suggests that factors other than the decommissioning of the sewer main have contributed to the increase in groundwater levels
- The increase in ground water levels is consistent with increased local infiltration. However, there is insufficient data to identify infiltration as the dominant cause

4.2 Alluvium commentary on report contents

We concur with Douglas Partners that the steep river bank and the rise and fall river water level may be contributing factors to the bank slumps. However, these factors have been present for many hundred years and do not explain the recent increase in occurrence and rate of slumps and tree collapse. We consider these as factors that contribute to a predisposition to slumps and tree loss.

The comments by Douglas Partners that the water logging on the lower terrace and bank slumps are consistent with this reach of river are not supported by community observations and that of the Alluvium team.

We remain of the opinion that the recent bank slumping and tree collapse have been triggered by water logging of the lower terrace adjacent to the Yarra River. Further we remain of the opinion that the water logging of the lower terrace is most likely as a result of changes in groundwater levels within the Yarrabend site. The most likely cause of this change is a change to the site infiltration. However, the decommissioning of the sewer main cannot be completely dismissed.

We agree with Douglas Partners recommendations for further action (Section 8.4). However, we are also of the opinion that these recommendations alone will not be sufficient to identify the cause of the issues and therefore provide direction on the most appropriate remedial action.

5 Next steps

The analysis and reporting by Douglas Partners is qualitative and not conclusive. The monitoring and investigations proposed by Douglas Partners are unlikely to significantly advance the understanding of the cause of the elevated groundwater at the site within an acceptable timeframe.

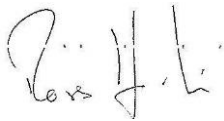
A set of investigations are set out below that should be undertaken in addition to that proposed by Douglas Partners. These investigations will provide multiple lines of evidence that will assist to identify the cause of elevated groundwater. The investigations can be undertaken without significant delay and contribute to the development of the most appropriate remediation measures for the site.

1. Additional bore to replace GW 15 and GW 24. We propose that an additional up gradient groundwater monitoring bore be installed. This bore would be used to identify whether there is any mounding of groundwater associated with site based infiltration.
1. Groundwater modelling and analysis: We propose that the groundwater processes at the site be assessed via modelling. The purpose of the modelling would be to
 - Estimate groundwater flux (flow rate) to the riverbank slumps in order to assess how long groundwater discharge may persist
 - Undertake groundwater recharge and mounding calculation to determine the relative influence of the decommissioned sewer and site sourced recharge to the development of the elevated groundwater levels.

- Identify how effective draining of the subsurface will be in reducing soil moisture and drawing down the groundwater mound.
2. Data collection: We propose data collection to inform and calibrate the groundwater modelling. This data collection should include:
- Monitoring data from existing bores and the replacement monitoring bore for GW15 / GW24
 - Slug test on bores
 - Flow rate monitoring from the temporary agricultural (ag) drain
3. GW chemistry: We propose relatively simple groundwater chemistry analysis to identify the age and origin of the elevated groundwater at the site. The analysis would assist to identify whether the elevated groundwater at the site is consistent with the composition of regional groundwater or more recent rainfall (and local infiltration). If the elevated groundwater has a similar composition to the regional groundwater it would be less likely to have originated from local rainfall and infiltration.

I trust that the response is in accordance with your expectations and will await any further instructions.

Sincerely



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