1 Introduction
City of Yarra has engaged Alluvium to investigate recent tree collapse and bank slumping events occurring on the Yarra River adjacent to the historical paper mill site in Fairfield. An expert panel convened by Alluvium Pty Ltd (Alluvium) conducted a site visit on 25 July along with John Ghasperidis (City of Yarra) and Travers Nutall (Glenvill).

The purpose of this memo is to identify any immediate issues arising from the site inspection including potential for imminent tree collapse and additional information requirements.

2 Background
The expert panel convened by Alluvium comprises specialists in the fields of hydrology and fluvial geomorphology (Ross Hardie), geotechnical bank stability (Tim Holt), groundwater dynamics (Jon Fawcett), surface water management (Jonathon McLean) and riparian canopy tree ecology (David Carew). Together the expert panel will undertake a preliminary review of the issues and report back to Council on interim findings of the likely mechanistic pathways causing tree slumping and any immediate actions that should be undertaken.

3 Site visit
The expert panel conducted a 2-hour site visit including locations of sediment pond, inceptor swale drains, retention dam connections, existing outfall drains, groundwater bores, and riverbank on the morning of 25 July 2019. The site inspection was undertaken to familiarise the expert panel with the site and review the bank morphology, existing slump areas, and condition of trees along the riverbank.

Figure 1. Location of trees assessed at bank slump zone
4 Comments

The expert panel has commenced its review of the information, this review will form the basis of an interim report. However, Council has sought immediate advice on the risk of further tree collapse at the site.

The issue of the tree collapse and management implications is confounded by the potential presence of asbestos on the lower bank in the vicinity of the subject trees. The expert panel were advised by Glenvill that the trees at risk of collapse may need to be removed as a component of the site remediation works. However, the panel was also advised that investigations into the presence of the asbestos or otherwise was nearing completion and the final program of asbestos remediation had not been finalised.

Three trees occur within and adjacent to a recent bank slump. One of these has fallen into the river and is not covered in this memo. Two other trees (shown in Figure 2 and Figure 3) have been identified as at risk of failure during previous visits by others.

![Figure 2](image1.png)  
**Figure 2.** Tree (T1) and bank slump site visit by Alluvium

![Figure 3](image2.png)  
**Figure 3.** Tree collapse (T2) at the edge of bank slump
The expert panel were of the opinion that:

1. The bank collapse is most likely associated with an increase in groundwater levels and lubrication at the site
2. There are limited practical management interventions that can be applied in the immediate and short term to address the groundwater and prevent further bank collapse
3. Ongoing bank collapse (instability) will continue to occur at the site until groundwater issues are addressed
4. The bank instability threatens a number of large trees on the riverbank. Two of these trees have been the subject of four recent arborist reports and are the main focus of this memo.
5. Two trees, referred to as T1 and T2 have been identified at imminent risk of collapse. The outcome of the arborists reports on these two trees is set out in Table 1 below.

Table 1. Summary of Arborist report recommendations

<table>
<thead>
<tr>
<th>Arborist report</th>
<th>Company</th>
<th>T1</th>
<th>T2</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>Tree Department Pty Ltd</td>
<td>Removal recommended</td>
<td>Removal recommended</td>
</tr>
<tr>
<td></td>
<td>(11th July)</td>
<td>Unacceptable risk to cause harm</td>
<td>Tolerable risk to cause harm –</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and costs</td>
<td>unacceptable risk due to costs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>post failure</td>
</tr>
<tr>
<td>#2</td>
<td>Ryder Arboriculture and Environment</td>
<td>Tree is likely to fail in short term (Weeks to months) Permit required for removal Assessed as Low risk to cause harm</td>
<td>Tree is stable unless ground moves. Permit required for removal Assessed as Low risk to cause harm</td>
</tr>
<tr>
<td></td>
<td>(12th July)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note: shown as T2 in report</td>
<td>Note: shown as T1 in report</td>
</tr>
<tr>
<td>#3</td>
<td>Tree Radar Australia</td>
<td>Removal recommended</td>
<td>Removal recommended</td>
</tr>
<tr>
<td></td>
<td>(2nd June)</td>
<td>Safety risk and reduce further damage</td>
<td>Safety risk and reduce further damage</td>
</tr>
<tr>
<td>#4</td>
<td>City of Yarra</td>
<td>Retain if possible. Monitor for movement.</td>
<td>Retain if possible. Monitor for movement.</td>
</tr>
<tr>
<td></td>
<td>(3rd June)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#5</td>
<td>Alluvium summary</td>
<td>Remove tree – permit will be required Tree is on unstable ground within an active slump zone. This tree is likely to fall and cause further damage to the bank.</td>
<td>Retain tree and monitor ground stability. Tree is outside the active slump zone and is not imminently likely to fall unless further slumping occurs.</td>
</tr>
</tbody>
</table>

Note: Ryder Arboriculture have nominated T1 and T2 oppositely to the other reports.
5 Management recommendations

Based on the site inspection, advice from Glenvill and preliminary review of information we are of the opinion that

- The existing trees at the site be photographed as a record of the current riparian vegetation for the site. This record can inform the future vision for the site and ultimate landscape plan.

- Tree T1: We consider T1 is at imminent probability to collapse (this could be at any time within a few months) and should be removed to reduce the future risk to public safety and bank damage.

This tree is within a bank slump which has damaged the informal earthen pedestrian path along the riverbank. This is now an unsafe pathway and has been fenced off preventing pedestrian access. If the tree were to fall it is most likely to fall towards the river and would cause further damage to the path. This would increase the hazard to path users due to damaged ground. The risk to people being struck by the falling tree is unlikely and is mostly to those who are in a boat on the river – more than people on the bank.

Using the Risk Assessment method applied by Ryder Arboriculture we consider the Likely failure to be Imminent with the Likely Impact to be Very Low. With a Consequence of Severe the Risk Rating outcome is Low.

Note: Changing the Likely Failure in the risk matrix has not changed the Risk Rating assessment. This risk is not immediate and with the fencing in place would not be considered an emergency.

- Tree T2: We are less certain of the imminent fate of T2. This tree has not received majority support by Arborists for removal. The tree appears to be outside the zone of the existing tension cracks. We suggest that the tree not be removed until:
  
  o Such time as it is observed to lie within tension cracks, and or
  o Results of contamination land assessment is complete, a remediation plan approved and the necessity for the removal of the tree as part of any such remediation plan is confirmed.

- Monitoring of the slump area and trees is undertaken weekly to determine if the conditions change and increase the likelihood of the trees falling. Installation of photo monitoring posts and tree tilt sensors should be considered.

- Continue to restrict access to the site maintain public safety. Consider signage along the riverbank warning people on the river of the tree hazard.

- If tree removal is undertaken, the stump and root plates must be retained to reduce damage to the bank and to provide ongoing soil stability.

- While we recommend that T1 is removed a tree removal permit will be required to remove either tree (as per Ryder Arboriculture report). Reviewing the risk assessment (likelihood and consequence framework) used by Ryder Arboriculture has not changed the risk assessment finding of Low risk. With pedestrian controls in place this situation (while not ideal) does not constitute an emergency. Therefore, these trees do not meet the Permit exemption conditions of immediate risk as required under the terms of the Victorian Planning Provisions - Significant Landscape Overlay (SLO 42.03-3) and Native Vegetation (VPP 52.17-7). (See excerpts from the Planning Provisions below).

This risk assessment will be reviewed further when the expert panel convenes on Thursday 1st of August.
6 Information requirements

The expert panel seeks access the following additional information, discussed at the site inspection, to enable its investigations.

- Design/construction calculations and drawings of sediment pond.
- Stormwater strategy reports for the development.
- Bore data of existing two groundwater bores on the riverbank (GW1 and GW2) including bore hole coordinates and elevation.
- Yarra River cross-section survey data, and the existing hydraulic model for the Yarra River.

Ross Hardie, David Carew and Advait Madav
Guidance on the use of the exemptions from requiring a planning permit to remove, destroy or lop native vegetation is provided by DELWP.


This guidance document includes the following statement in Section 2.4 - Emergency works.

The second part of the exemption enables the removal any native vegetation that presents an immediate risk of personal injury or damage to property (e.g. a building) without a permit. For the risk to be considered immediate, the only option to manage the risk is by removing native vegetation within a shorter timeframe than it would take to apply for and be issued with a permit for its removal.

This exemption does not apply to native vegetation that has the potential to cause personal injury or property damage in the longer term. If future injury or damage from native vegetation is a concern, a planning permit can be sought to remove it.