



Flood Mitigation Options Assessment – Summary Report

Koornang Main Drain, Ormond and McKinnon

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Background

Melbourne Water is the designated Floodplain Manager for the Port Phillip and Westernport region, where over 200,000 properties are at risk of flooding. Since 2011, in partnership with Glen Eira City Council, Melbourne Water has commissioned a series of studies to investigate the viability of options to reduce the risk of flooding for the Koornang Main Drain, which services an area of around 4 square kilometres in the suburbs of Ormond and McKinnon.

Residents of Cadby Avenue, Murray Road and Station Avenue in Ormond and McKinnon have been impacted by flooding over many decades, but also frequently in recent years. The catchment in this area is very low lying and flat, making it difficult to effectively drain to the bay.

Whilst we can't stop floods from happening, we can work together to plan for and manage the risks, build community preparedness, and reduce the consequences.

When flood mitigation options are assessed, Melbourne Water considers a variety of factors that include:

- Costs
- Construction impacts, and
- How significant the reduction in flooding may be.

Studies into reducing the flood risk were completed by Melbourne Water between 2014 and 2023. These studies focused on a range of options including underground pipes, channels, underground storages and storage basins. The aim of these options was to either store water in the catchment or divert flows elsewhere.

Previously considered options to mitigate flood risk along the Koornang Main Drain have recently been reviewed, specifically around Cadby Avenue, Murray Road and Station Avenue. This document provides a summary of these studies, the main findings and the next steps.

Executive Summary

Two individual studies were undertaken to understand options for reducing flooding in the Ormond and McKinnon areas: a ‘pit’ study in Cadby Avenue and a wider floodplain study.

Pit Study in Cadby Avenue

Options investigated for local works at Cadby Avenue included adjusting the pit height (and included lowering the pit to ground level). Unfortunately, whilst flood depths at Cadby Avenue were decreased by small amounts, more significant increases were experienced downstream which led to greater increases in flood levels and risk for properties.

Options to offset the downstream impacts by increasing upstream storage (for instance, under the road in Cadby Avenue) are currently being reviewed.

Floodplain Study

Mitigating the impacts of flooding in the Elster Creek Catchment, where the Koornang Main Drain is located, has been a focus for Melbourne Water for many decades. Throughout this time, numerous drainage network upgrades have occurred, and flood storages constructed.

In more recent times, since 2011, additional drainage and storage options have been studied. Most options studied in this period have been considered unviable due to not significantly reducing the flood risk, not being cost effective or having a very high impact on community amenity.

In 2022, Melbourne Water, working with Glen Eira City Council, undertook a thorough review of these options, seeking ways to overcome previously encountered barriers. The following was determined:

- Of the possible locations for a retarding basin, a single storage basin was not a viable option. The volumes available would either not provide enough storage to prevent flooding, or would make the open space no longer usable for its current purpose.
- Most drainage options would move the flooding to further downstream, which would then cause increased flood risk to properties.
- A single option for further assessment has been identified which is the construction of a pipe direct to the Port Phillip Bay from the Koornang Main Drain. This option has been previously considered unviable due to the very significant construction costs involved. In light of new understanding of flooding at this location, this option is being re-opened for review.

Assessment Approaches

Cadby Avenue Drainage Pit

A Drainage Pit Analysis undertaken in late 2022 and early 2023 assessed the positive and negative impacts of altering the existing large inlet pit in Cadby Avenue. The analysis included:

- Reviewing the existing flood model
- Survey of the drainage pit and surrounding levels
- Flood modelling for three different scenarios: existing conditions, the pit entry lowered to ground level, and pit entry lowered halfway to ground level
- Preparation of maps showing the predicted changes, to demonstrate the positive and negative impact of the assessed options to reduce the flood risk.

Floodplain Assessment

Melbourne Water and Glen Eira City Council formed a working group to review previously identified options to reduce the flood risk, evaluating their potential, in light of current understanding of the floodplain and community needs.

For each of the options, the review considered:

- Likely ability to reduce flood risk
- Likely impact on the landscape
- Planning considerations and limitations
- Constructability and interaction with existing infrastructure
- Maintenance and operation requirements
- Cost effectiveness.

A 'traffic light' system was used to assess each of the above considerations. The traffic light matrix is represented in Table 1.

Table 1 Traffic Light System

Colour	Meaning
Red	Limiting factors are likely. Proceeding may lead to an unsuccessful outcome.
Amber	Further investigations are required to confirm whether the option is likely to be successful.
Green	Limiting factors are unlikely. Further development of the option is warranted

A summary of the options assessed, key outcomes and a recommendation for whether they should be further investigated is represented in Table 2.

Cost effectiveness for each option was measured by comparing costs for design and construction against expected tangible and intangible flood impacts for the community.

Conclusion

Options investigated for local works to an inlet pit at Cadby Avenue are regarded as unviable as a singular option to reduce the flood risk, due to an increase in flood levels downstream. Options to offset the downstream impacts by increasing upstream storage (for instance, under the road in Cadby Avenue) are currently being reviewed.

The floodplain assessment for reducing the flood risk in the Elster Creek Catchment resulted in one option being identified for further investigation: the construction of a pipe direct to the Bay from the Koornang Main Drain.

This option has been previously considered unviable due to the very significant construction costs involved. In light of new understanding of flooding at this location and new assessment methods, this option is being re-opened for review. As this option involves very large scale drainage works it will take many years of further work before its viability can be assessed.

As a next step Melbourne Water will scope an investigation for this option, which will provide a better understanding of its viability. This is likely to include investigations into cost, construction impacts to businesses and homes, transport and utilities, stakeholder identification along the route, concept hydraulic design and potential changes to flood risk. Initial estimates place project length between 12-24 months.

Melbourne Water will continue to work with Glen Eira City Council and share any findings with the community.

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Table 2 Floodplain Assessment Options

Option	Details	Key outcomes of assessment	Recommendation
Option 1	<p><u>Storage under Cadby Avenue</u></p> <p>Underground water storage. Additional pits would be installed along Cadby Avenue.</p> <p>Side entry pits with gratings in front and behind the kerb are considered the most practical layout.</p>	<ul style="list-style-type: none"> Unlikely to provide sufficient underground capacity at Cadby Avenue to address the volume of expected flooding Unlikely to meet cost effectiveness conditions. 	Not recommended for further investigation.
Option 2	<p><u>Storage (retarding basins and underground storage tanks) in the catchment</u></p> <p>Protection of properties through the installation of retarding basins and storage tanks in the catchment both upstream and locally downstream of the Koornang Main Drain.</p> <p>The following open spaces were identified: Joyce Park, Wattle Park, Duncan MacKinnon Park, Packer Park Velodrome and Oval, and Combination of Duncan Mackinnon Park and Packer Park Velodrome (See Figure 5 for a detailed overview of each identified open space).</p>	<ul style="list-style-type: none"> Retarding basins significantly impact the landscape of the area, which are primarily council-managed reserves Underground storages are unlikely to meet the cost effectiveness conditions. 	Not recommended for further investigation.
Option 3	<p><u>Combination of Option 1 and 2</u></p>	<ul style="list-style-type: none"> Based on the assessments of Option 1 and 2, it is unlikely a combined option will result in an acceptable reduction in flood risk while meeting cost effectiveness conditions. 	Not recommended for further investigation.
Option 4	<p><u>Diversion of pipeline along North Road to Port Phillip Bay</u></p> <p>Protection of properties through diversion of the pipeline along North Road to Port Phillip Bay.</p> <p>Alternative alignments were also assessed, including whether flood risk could be reduced in the downstream Caulfield catchment (see Figure 6 and Figure 7 for the proposed Option 4 diversion alignments).</p>	<ul style="list-style-type: none"> Based on flood mitigation modelling, a suitably sized pipeline will likely result in an acceptable reduction in flood risk in the area of interest May be possible to meet cost effectiveness conditions. Further investigation will be required to establish likelihood Additional modelling is also required to assess possible design options, to determine constructability and consider the impact of each option on the landscape. 	Recommended for further investigation works.

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Option	Details	Key outcomes of assessment	Recommendation
Option 5	<p><u>Combination of Option 2 and 4</u></p> <p>Protection of properties through a diversion of the North Road Pipe to the bay, with storages.</p> <p>This option would require the diversion pipe and an underground storage system, likely in Packer Park, as retarding basins are not considered favourable by key stakeholders.</p>	<ul style="list-style-type: none">• Underground storages may result in localised improvements towards lowering the risk of flooding• High construction costs mean these options together are unlikely to achieve the cost effectiveness conditions.	Not recommended for further investigation.