

# Annexure D — Western Portal Compensatory Flood Storage

## 1 Purpose and Objective

The Surface Water Impact Assessment undertaken as part of the EES in respect of the Western Portal estimated that approximately 9,000 m<sup>3</sup> of compensatory flood storage is required during construction and that while a number of options had been considered, the proposed location of the storage was yet to be confirmed.

The IAC has requested further information as to where the Western Portal compensatory flood storage might be located in the general surrounding area (Request #57 in IAC's "Preliminary Matters and Further Information Request" of 25 July 2016).

This report has been prepared to respond to IAC request #57 and to:

- confirm the compensatory storage volume required for the Western Portal Concept Design (Option A) and Alternative Design Option (Option B);
- estimate the impact of the flood inundation area should compensatory storage not be provided;
- determine a potentially suitable location for the provision of the compensatory storage.

## 2 Introduction

Currently two alignments for the Western Portal are being assessed and both options would result in the loss of a floodplain storage volume due to the construction of an earth retaining wall and associated embankments to the north of the existing rail embankment. Encroachment into the available Maribyrnong River floodplain would reduce floodplain storage.

Hydraulic modelling of the Maribyrnong River has been previously completed and reported in the EES. The EES also reports on the existing and resulting flooding conditions of the Maribyrnong River floodplain in the vicinity of the proposed Western Portal.

The document released by Melbourne Water Corporation (**MWC**) entitled "Guidelines for development in flood prone areas" provides the minimum design requirements for works undertaken in a floodplain managed by MWC. This guideline promulgates that "works or structures must not reduce floodwater storage capacity" and is assessed upon the 1% Annual Exceedance Probability (**AEP**) flood level for existing climatic conditions. However, the Melbourne Metro Rail Authority (**MMRA**) has adopted, for assessment purposes, the 1% AEP including the influence of climatic change projected for the year 2100. This is a more conservative criterion than the minimum design requirements stipulated by MWC.

On the basis of the above, the Maribyrnong River hydraulic modelling predicts a peak water surface elevation of 4.7 m AHD in the vicinity of the Western Portal and this has been adopted as the design flood level along Childers Street (i.e. the location of the proposed infrastructure works). Figure 1 below illustrates the 1% AEP (including climate change) extent of flooding upstream of the Sunbury line rail crossing. The red colour represents the footprint of the floodplain removed as a result of the Metro Tunnel, effectively reducing available floodplain storage, and the teal colour represents the peak water surface elevation for the 1% AEP (including climate change).



**Figure 1 - 1% AEP (including climate change) Extent of Flooding**

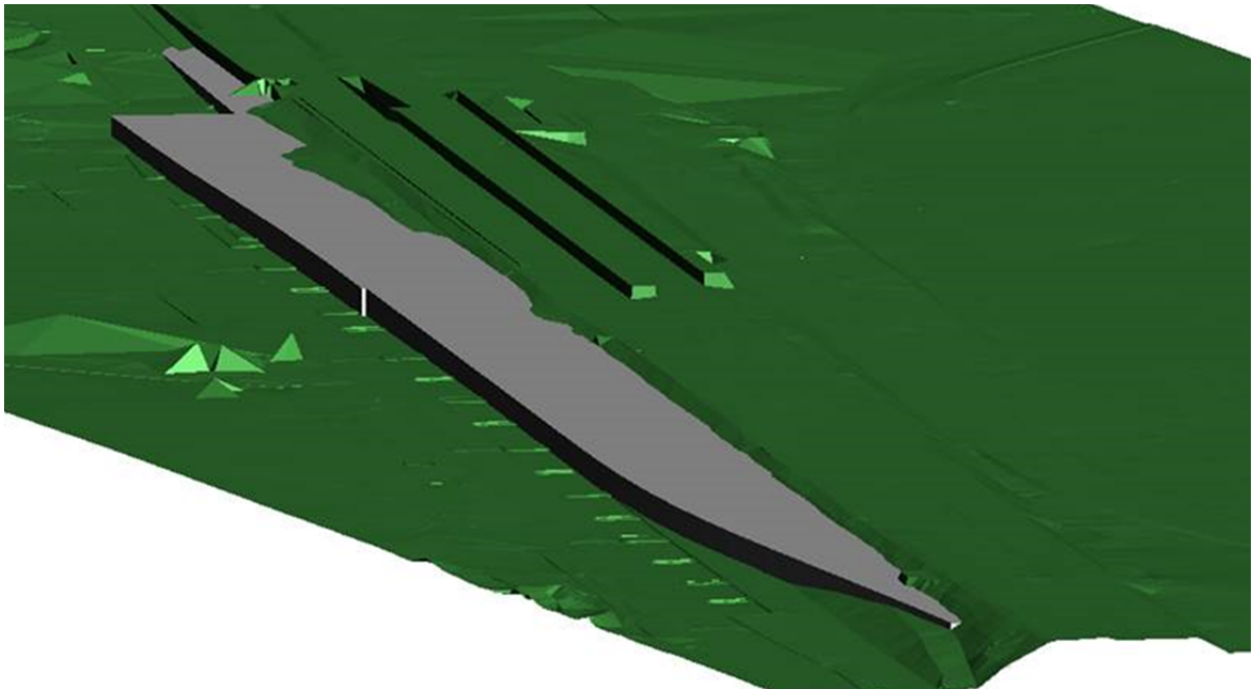
It should be noted that the approximate existing ground level along the Sunbury rail alignment is 5.3 m AHD at the lowest point (approximate Metro Tunnel chainage 94.820 – 95.060 km). Available flood immunity along the existing rail embankment level is provided for events up to the predicted 1% AEP event (including climate change) peak water surface elevation plus an allowance for freeboard of 600 mm. This level is 5.3 m AHD.

### **2.1 Concept Design (Option A)**

This option comprises approximately 750 m of new track that connects the existing surface level Sunbury line tracks to the Metro Tunnel driven tunnels in Kensington. The Metro Tunnel tracks diverge from the existing Sunbury line tracks and would be located north of and immediately adjacent to the existing Sunbury line tracks. The horizontal alignment near South Kensington station would be controlled by the location of the existing station. The associated rail and earth retaining wall would tie back into the existing rail embankment immediately to the east of Kensington Road, as shown in Figure 2 below.



**Figure 2 - Plan View of Concept Design Footprint**



**Figure 3 – Perspective View of Concept Design and Consequential Reduction in Floodplain Storage Volume**

Based upon the above, for the 1% AEP flood event (including climate change), an area of approximately 6,600 m<sup>2</sup> of the floodplain is impacted and 9,000 m<sup>3</sup> of floodplain storage is displaced.

## **2.2 Alternative Design Option (Option B)**

This option varies from the Concept Design by moving the proposed portal location approximately 150 m to the west. This results in the proposed rail and earth retaining wall tying back into the existing rail embankment approximately 150 m west of Kensington Road, as shown in Figure 4 below.



**Figure 4 - Plan view of Alternative Design Option Rail Corridor**

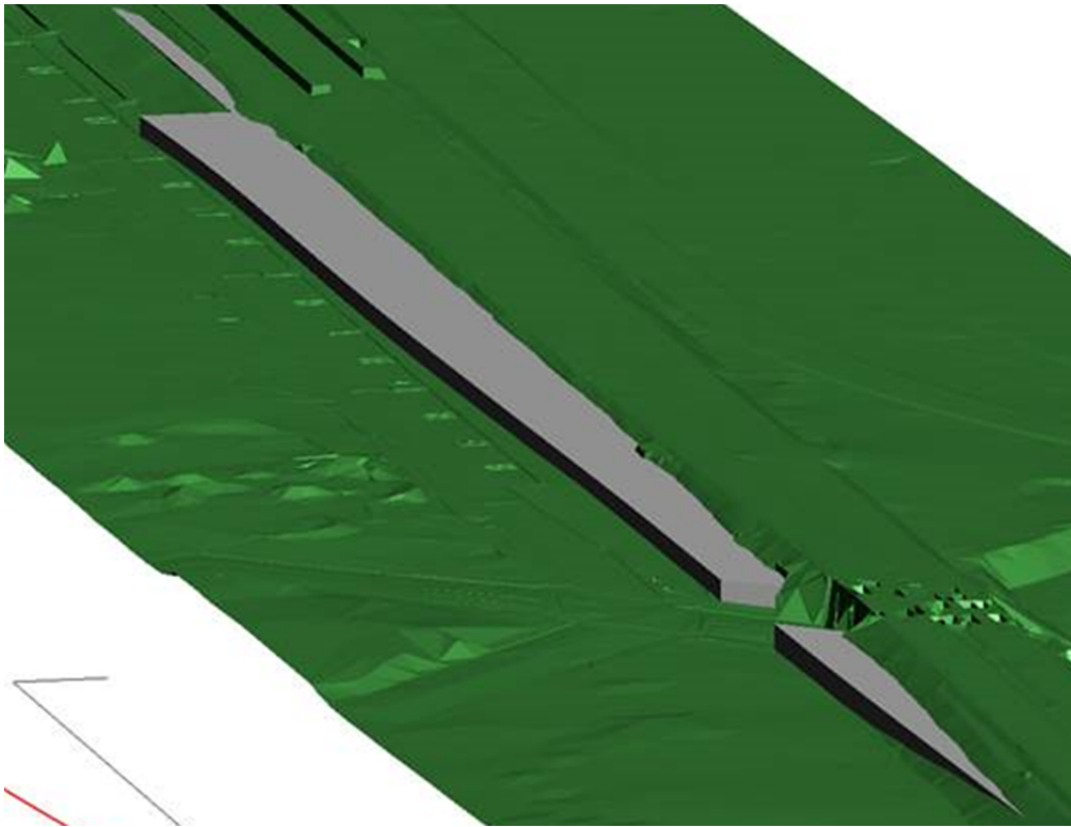


Figure 5 – Perspective View of Concept Design and Consequential Reduction in Floodplain Storage Volume

Based upon the above, for the 1% AEP flood event (including climate change), approximately 5,900 m<sup>2</sup> of the floodplain is impacted and 7,000 m<sup>3</sup> of floodplain storage is displaced.

### 3 Summary of Compensatory Storage Requirements

Based upon a peak water surface elevation of 4.7 m AHD (the 1% AEP plus climate change level), the approximate compensatory storage requirements are tabulated below:

Table 1 – Summary of Compensatory Storage Requirements

Option	Compensatory Storage Volume (m <sup>3</sup> )
Concept Design (Option A)	9,000
Alternative Design Option (Option B)	7,000

### 4 Impacts of proposed development

In order to evaluate the impacts of the proposal in the absence of compensatory flood storage, results from Hec-Ras were extracted and a three dimensional surface of the peak water surface elevation was created. This surface was then compared to available Lidar data and modified ensuring that the peak water surface intersected the ground surface.

In order to quantify the influence of the lost flood storage upon the existing flooding regime, a volumetric assessment was undertaken. Figure 6 below maps the extent of flood water (shown in light blue) and the extent of the compensatory storage (shown in dark blue), that is, the zone in which compensatory storage

is required. Figure 7 below shows the eastern extent of compensatory storage at a larger scale (shown in dark blue).

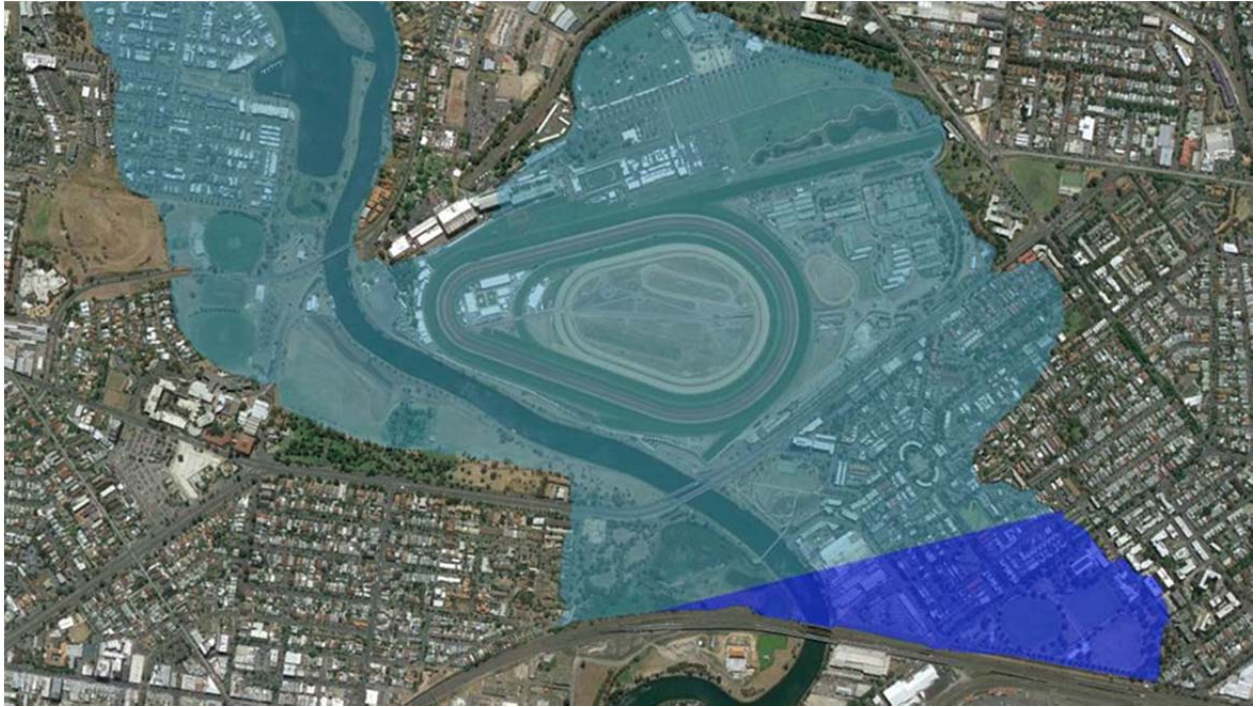


Figure 6 - Footprint of Resulting Compensatory Storage (9,000m<sup>3</sup>)



Figure 7 - Eastern Extent of Compensatory Storage Volume Inundation Footprint (9,000 m<sup>3</sup>)

Figure 8 below shows the increase in flood extent (magenta) resulting from not providing compensatory storage.



Figure 8 - Increase in Flood Extent as a Consequence of not Providing Compensatory Storage (9,000 m<sup>3</sup>)

Based upon the volumetric assessment and available information, the impact of not providing compensatory storage (dark blue) results in:

- Increased water depth ranging from approximately 34 mm immediately adjacent to the rail alignment and reducing to 0 mm in the upstream direction.
- Approximately 0.5 m widening of the flood extent to the east. This does not result in an impact upon any additional properties.

## 5 Flood Compensatory Storage Options (Consultation with Melbourne Water)

Two meetings were held with MWC to discuss the compensatory storage requirements and identify potentially acceptable strategies to provide the required storage. The meetings were held on Tuesday 19 January and Wednesday 3 February 2016.

During consultation with MWC and the MMRA, a number of options were considered for the provision of compensatory storage, as listed below:

- Modification of JJ Holland Park.
- Lowering of Childers Street.
- Provision of additional flood storage in Newell's Paddock located on the western bank of the Maribyrnong River.
- Use of VicTrack rail reserve (TP964846B) located on the eastern bank of the Maribyrnong River.
- Lowering of Riverside Park.

Following an initial feasibility assessment, it was determined that Newell's Paddock was a potentially suitable location and that provision of such storage could potentially be integrated with the *Footscray River Edge Master Plan 2014* that the City of Maribyrnong has adopted for the rejuvenation of the Maribyrnong River waterfront in Footscray. Attachment A is a copy of the Master Plan sourced from the City of Maribyrnong website.

The Master Plan includes the Newell's Paddock site and proposes that the wetlands in the area be upgraded and expanded.

An indicative conceptual compensatory storage strategy has been developed that is capable of integration with the Master Plan (see Figure 9 below). This conceptual strategy would provide in excess of the approximately 9,000 m<sup>3</sup> of compensatory storage required and would be comprised of approximately:

1. 4,800 m<sup>3</sup>: Western pond.
2. 2,000 m<sup>3</sup>: Eastern pond.
3. 4,200 m<sup>3</sup>: Expansion of existing pond at the eastern edge of the Newell's Paddock.

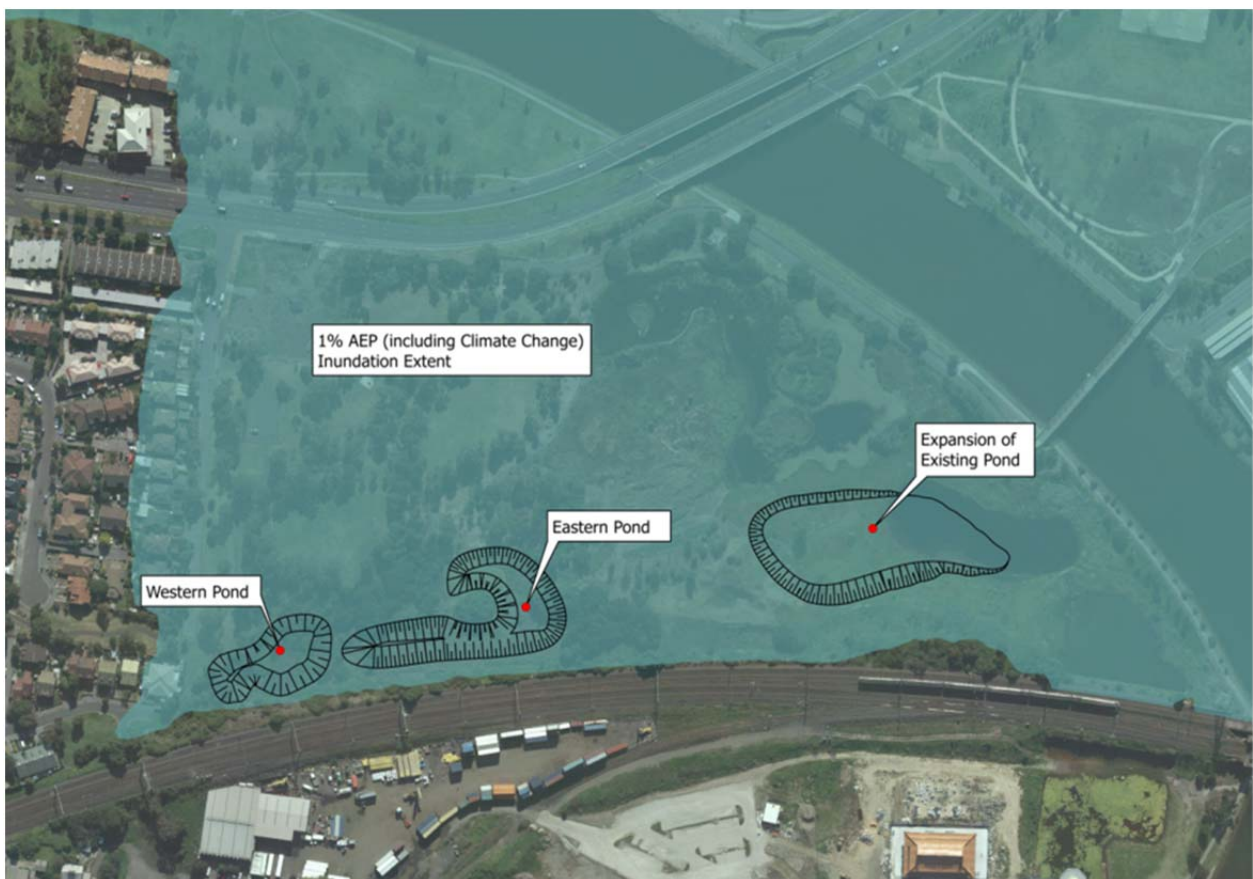


Figure 9 - Conceptual Newell's Paddock Compensatory Storage Strategy

Attachment B contains concept drawings for the indicative compensatory storage earthworks.

## 6 Conclusion

This investigation confirms a feasible compensatory storage strategy can be implemented in the vicinity of the Western Portal to mitigate the influence of floodplain storage loss resulting from its construction and operation, in accordance with EPR SW2.

The Western Portal compensatory storage requirements are based upon the Concept Design. The ultimate level of compensatory flood storage would need to be determined following detailed design of the project.

The indicative location of Newell's Paddock has been checked for clashes with known significant utilities. A comprehensive check for service clashes with proposed compensatory storage works has not been considered as part of this investigation and would need to be considered in greater detail during later design stages. The final design and location would also be subject to all necessary assessment and approval.



**Attachment A**  
Newell's Paddock Master Plan  
(City of Maribyrnong)

## Attachment B

Newell's Paddock Compensatory Storage  
(General Arrangement and Sections)