

Annexure E — Arden Precinct Compensatory Flood Storage

1 Purpose and Objective

The Surface Water Impact Assessment undertaken as part of the EES in respect of the Arden precinct, estimated that approximately 1,600m³ of compensatory flood storage would be required during operation and noted that while a number of options had been considered, the proposed location of the storage was yet to be confirmed.

The purpose of this report is to:

- Determine a potentially suitable location and conceptual design for the provision of compensatory storage at Arden.
- Provide details on fencing of the potential compensatory flood storage.
- Provide comment on operational and maintenance aspects of the potential compensatory flood storage.

2 Introduction

The document released by Melbourne Water entitled “Guidelines for development in flood prone areas” provides the minimum design requirements for works undertaken within the floodplain that is managed by Melbourne Water. These Guidelines stipulate that ‘[w]orks or structures must not reduce floodwater storage capacity’ which is assessed upon the 1% Annual Exceedance Probability (**AEP**) flood level for existing climatic conditions. The project has adopted 1% AEP but has also allowed for the influence of climate change projected for the year 2100, which is a more conservative criterion than the minimum design requirement stipulated by Melbourne Water.

Hydraulic modelling of the Moonee Ponds Creek has previously been completed and reported in the EES. The modelling establishes the existing conditions of the creek floodplain within which the proposed Arden station would be located. The modelling has identified the extent of flood inundation in the vicinity of the station and enabled assessment of the volumetric loss of floodplain storage that would result from the construction of the Arden station and supporting infrastructure (including chiller stacks, emergency exits etc) and the impact of the project upon the existing hydraulic regime.

Figure 1 below shows the extent of inundation and the position of above ground infrastructure that would be located within the Moonee Ponds Creek floodplain in the vicinity of the proposed Arden station.

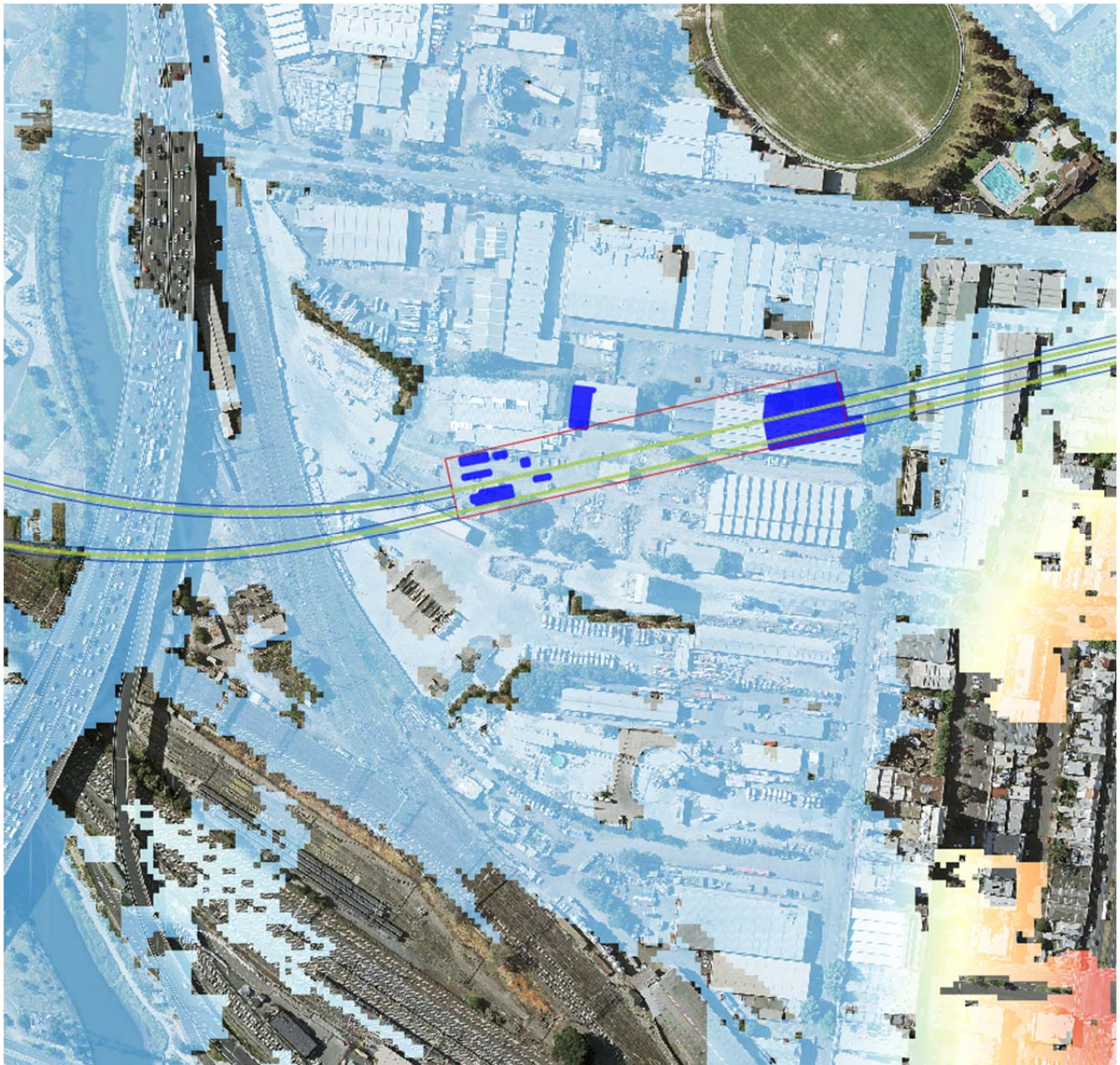


Figure 1 - 1% AEP (incl. climate change) and proposed Arden station

Figure 1 shows the Arden station site bordered by Arden Street to the north, Laurens Street to the east and the Upfield rail corridor to the south and west. Day 1 indicative above ground infrastructure is shown as solid dark blue polygons comprising of:

- the station entrance (nearest Laurens Street); and
- chiller stacks, ventilation, emergency exits etc (to the west of the station entrance).

Also shown is the proposed station box outline (red line), proposed rail tunnel alignment (green / blue line) and the peak water surface elevation for the 1% AEP (including climate change) flood extent (light blue).

The peak water surface elevation shown in the study area for the 1% AEP (including climate change) is approximately 3.35 m AHD.

3 Basis of Design

This assessment has been undertaken on the basis of information provided and the following assumptions and guidelines:

- 1% AEP rainfall event in year 2100 (i.e. including impact of climate change).
- Concept Design for Day 1 operation including indicative location of above ground structures.
- Guidelines for the development in flood prone areas, Melbourne Water (2008).
- Constructed Wetland Design Manual, Melbourne Water.¹
- Site ground levels are the same as supplied Lidar data.
- The structural interaction between the station box and the basin has not been assessed.

4 Day 1 Compensatory Storage Requirements

Hydraulic modelling has been undertaken using TUFLOW 1D / 2D software to establish baseline conditions for the Moonee Ponds Creek in the vicinity of the proposed Arden station. The baseline assessment allows for the comparison of potential impacts resulting from the proposed construction and operational activities on-site.

Based upon modelling output, Melbourne Water requirements and project design standards, the volume of compensatory storage was estimated by subtracting the volume of water located within the footprint of each of the above ground Day 1 structures which effectively is the volume of water that would be displaced by construction of the Concept Design station. As reported in the EES, a volume of 1,600 m³ was calculated as the existing floodplain storage that needs to be compensated.

For the purposes of this investigation, we have undertaken a similar exercise to calculate the compensatory storage requirements of the proposed electrical substation (Langford Street option) and incorporated this into the overall compensatory storage volume. As stated in the EES, compensatory storage of less than 200 m³ is required for the Concept Design substation.

It follows that, based on current information, the total compensatory storage to be provided is 1,800 m³. The final compensatory storage volume to be implemented may vary depending upon the final site configuration and detailed design.

5 Day 1 Compensatory Storage Basin

A feasible compensatory storage strategy based upon the Concept Design has been developed to mitigate potential floodplain storage losses resulting from the works. The compensatory storage basin concept has been based upon the Constructed Wetland Design Manual and Melbourne Water standard drawings². Figure 2 below shows the potential basin configuration plan.

The indicative compensatory storage strategy includes the following characteristics:

- The location is as indicated in Figure 2, which is wholly contained within the project property boundary.
- The storage is not constructed directly above existing infrastructure or the proposed rail infrastructure (including the station box and rail tunnels).
- The basin is positioned 15 m from the adjacent Upfield rail line boundary and a security fence is nominated to prohibit the public from entering the basin.

¹ <http://www.melbournewater.com.au/planning-and-building/standards-and-specifications/design-wsud/pages/constructed-wetlands-design-manual.aspx>

² <http://www.melbournewater.com.au/planning-and-building/guidelines-and-drawings/pages/drawings.aspx>

The potential position of the basin was selected to minimise interaction between the public and the basin and includes a chain wire mesh security fence based upon Melbourne Water standard drawings (7521/8/205 Rev A²).

An access ramp would need to be incorporated into the final design and would need to be consistent with Melbourne Water standard drawing WG110², including bollards, or alternate approved drawings.

A maintenance track with a minimum width of 4.5 m would need to be provided around the periphery of the compensatory storage basin.

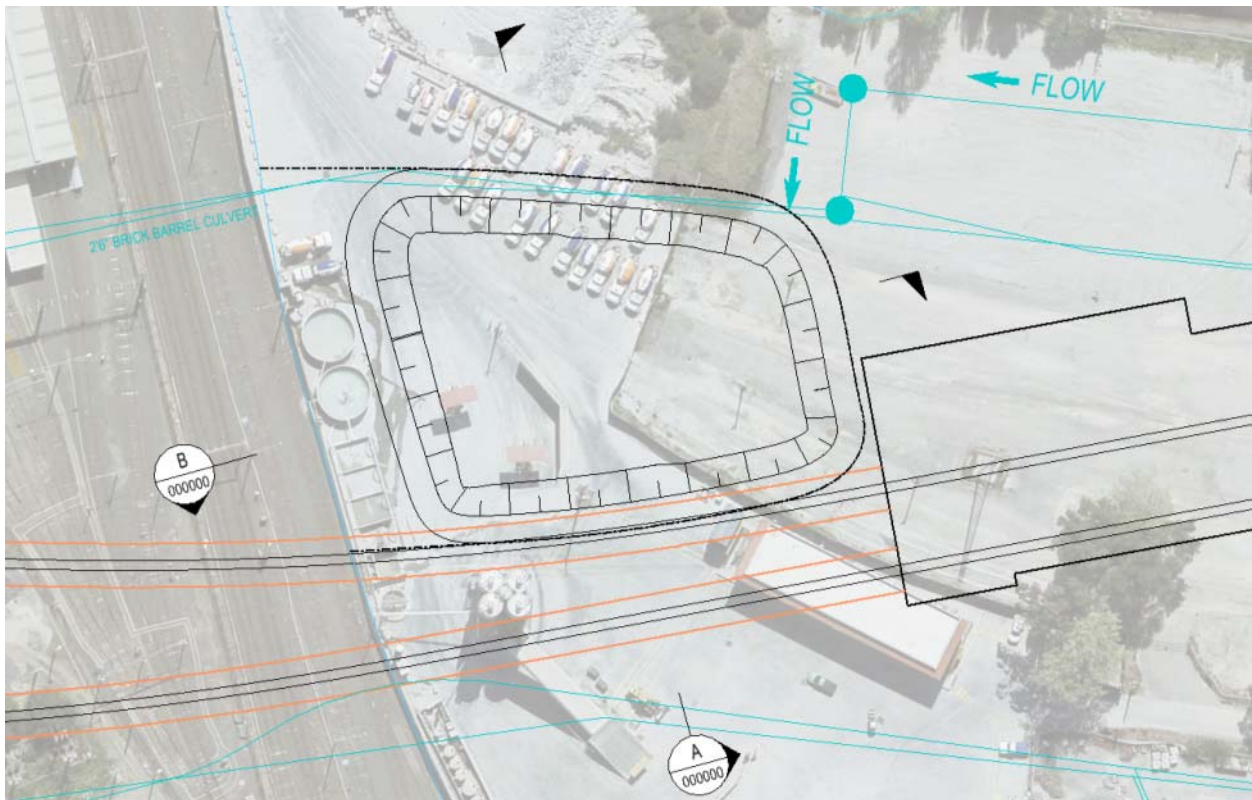


Figure 2 – Arden Day 1 Compensatory Storage Plan

The suggested placement of the basin allows for an outfall to the existing drainage infrastructure located to the north (refer to Attachment A for sketches of the concept basin layout). This configuration may also provide additional benefits by enabling existing drainage infrastructure to surcharge into the basin during small rainfall events, thereby potentially reducing surcharging in Laurens Street.

Figure 3 below shows typical cross sections of the indicative basin.

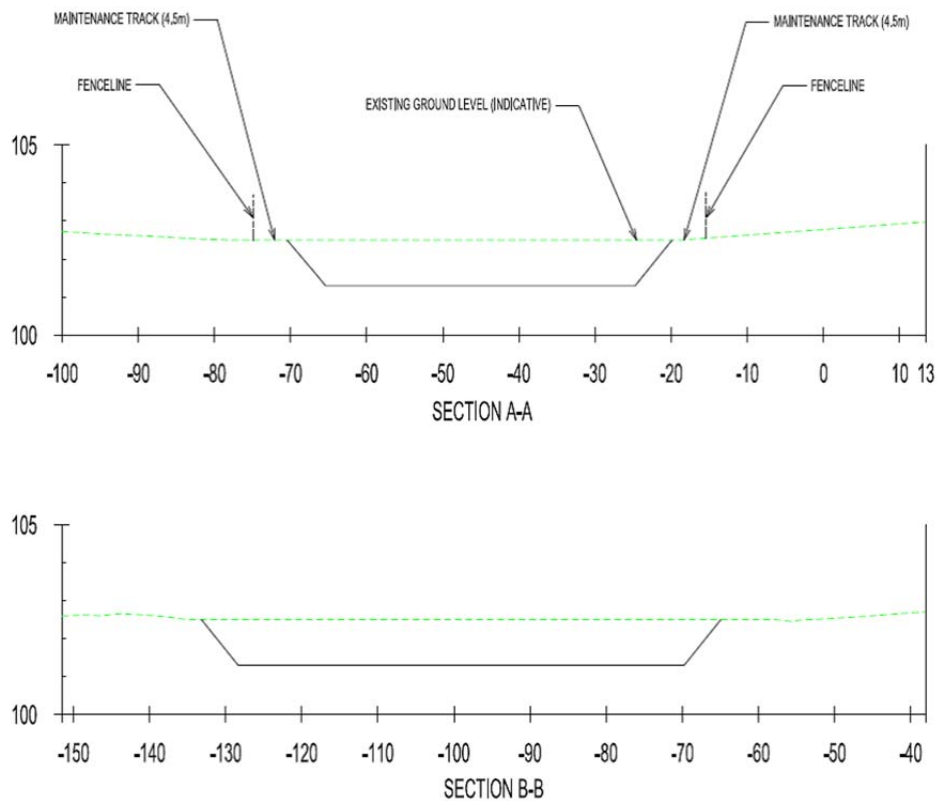


Figure 3 - Typical Arden Basin Cross Sections (refer to Figure 2 for cross section locations)

This potential configuration provides the following compensatory storage characteristics:

- Typical excavation depth 1.28 m (including 0.3 m freeboard).
- Plan area 3,303 m² (measured at top of batter).
- Volume 1,842 m³ (below freeboard).
- Basin invert level 101.3 m Melbourne Metro Height Datum (**MMHD**).
- Existing pit invert level 101.15 m MMHD.

6 Water Quality

The indicative response would accept overland flows from the surrounding floodplain during large rainfall events which may contain gross pollutants. Therefore, a proprietary Gross Pollutant Trap would be required at the outlet from the basin to the existing drainage network.

In the event that local runoff is drained into the compensatory storage basin directly, additional water quality treatment would be required prior to this stormwater discharging into the basin.

It is assumed that the indicative basin could be utilised to augment the existing drainage infrastructure by connecting the basin to the existing drainage system and allowing excess stormwater to surcharge into the basin during rainfall events. This may assist in alleviating existing upstream drainage issues in Laurens Street. In this scenario, the water surcharging into the basin is assumed to be of acceptable quality.

7 Construction Phase Compensatory Storage

It should be noted that an estimated 6,000 m³ of compensatory storage is required during the construction phase of the project. Provision of compensatory storage during construction works will be

dependent upon the construction site layout and operation. The compensatory flood storage volume will need to be provided to the satisfaction of the responsible authorities but Melbourne Water has provided in-principle agreement to the concept. It is currently proposed that the required compensatory flood storage volume be provided by lowering surface levels in the car park at the southern end of the VicTrack land on which the construction site would be located.

8 Conclusion

A feasible concept has been developed for the compensatory flood storage required for Arden based upon Melbourne Water guidelines. This concept may need to be modified to suit the final Day 1 configuration of Arden station following detailed design.

It is noted that the Arden Macaulay precinct is subject to future development in line with Melbourne Planning Authority (**MPA**) aspirations for the area. The development of the broader precinct may necessitate relocation of the basin. MPA and/or the future developer should determine and address as appropriate.

Prior to commencement of works, the project proponent would be required to obtain approval from Melbourne Water and other responsible authorities to confirm the location, size and operation of the compensatory storage basin subject to the final site configuration. Such approvals may include constraints such as acceptable water quality parameters, discharge rates from the basin into the existing drainage infrastructure and basin configuration.

Attachment A — Compensatory Storage Site Plan





NOT FOR CONSTRUCTION

**ARDEN COMPENSATORY STORAGE
GENERAL ARRANGEMENT**