



Melbourne Metro Rail Project

Inquiry and Advisory Committee

Expert Evidence Submission
Surface Water and Ground Water

Barry Fox – Drainage Engineer
12 August 2016

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List of Reports Referenced

Melbourne Water Flood Risk Assessment Framework (MW-FRAF)

Arden Macaulay Precinct – Arden Government Land Flooding & Drainage Investigation (Engeny, 2016)

Retention Volume Modelling Elizabeth Street and Swanston Street Catchments (GHD, 2015)

Report for Swanston St at Flinders St (GHD, 2012)

Southbank Stormwater Infrastructure Assessment (BMT WBM 2015)

List of Abbreviations

MMRA – Melbourne Metro Rail Authority

MMRP – Melbourne Metro Rail Project

EES – Environmental Effects Statement

PSA – Planning Scheme Amendment

CoM – City of Melbourne

MPA – Metropolitan Planning Authority

MW – Melbourne Water

EMF – Environmental Management Framework

EPR – Environmental Performance Requirement

AEP – Annual Exceedance Probability

ARI – Average Recurrence Interval

SBO – Special Building Overlay

LSIO – Land Subject to Inundation Overlay

MW-FRAF – Melbourne Water Flood Risk Assessment Framework

1. Details of Qualifications

1.1 Name of Expert

Barry Fox

1.2 Qualifications

Bachelor of Engineering (Civil)

Master of Infrastructure Engineering and Management

1.3 Area of expertise

My areas of expertise include:

- Runoff estimation in urban catchments
- Pipeflow hydraulic analysis
- Design of stormwater detention systems
- Stormwater drainage design
- Integrated watercycle management and water sensitive urban design

1.4 Assistance in preparing evidence statement

In preparing this evidence statement assistance was sought from the following City of Melbourne employees:

- Michael Norton – Principal Engineer Infrastructure
- Bandara Rajapakse – Team Leader Infrastructure Design
- Ralf Pfeleiderer – Water Sensitive Urban Design Coordinator

1.5 Instructions

This submission has been prepared in accordance with the attached advice received by Hunt & Hunt Solicitors in letters dated 28 July 2016, 3 August 2016 and 11 August 2016 (Attachment A)

1.6 Details of any external expertise

No external expertise was used in preparing this submission

1.7 Other reference documents

Total Watermark – City as a Catchment (City of Melbourne, 2014)

<https://www.melbourne.vic.gov.au/SiteCollectionDocuments/total-watermark-update-2014.pdf>

Elizabeth Street Catchment Integrated Water Cycle Management Plan (City of Melbourne, 2015)

http://urbanwater.melbourne.vic.gov.au/wp-content/uploads/2015/06/COM_SERVICE_PROD-9175506-v1-FINAL_Elizabeth_St_Catchment_Plan.pdf

Melbourne Water Flood Risk Assessment Framework

http://www.melbournewater.com.au/whatwedo/manageflooding/Documents/Flood_Risk_Assessment_Summary.pdf

Arden Macaulay Precinct – Arden Government Land Flooding & Drainage Investigation (Engeny, 2016)

Retention Volume Modelling Elizabeth Street and Swanston Street Catchments (GHD, 2015)

Report for Swanston St at Flinders St (GHD, 2012)

This evidence statement is informed by City of Melbourne policy documents and strategies. These include:

- Total Watermark – City as a Catchment 2014
- Elizabeth Street Catchment Integrated Water Cycle Management Plan 2015
- Arden Macaulay Structure Plan 2012
- Southbank Structure Plan 2010
- Climate Change Adaptation Strategy
- City North Structure Plan



Barry Fox

Drainage Engineer

2. Executive Summary

2.1 Introduction

The intent of this submission is to provide comment on the options, issues, and deficiencies observed with the Metro Rail EES in the context of surface water and groundwater management.

This submission begins by discussing surface water and groundwater issues common to all project precincts. Further detailed discussion is then advanced on a precinct specific basis, with the exception of the Tunnels, Fawkner Park and Eastern Portal precincts which are either covered in general terms in Section 3, or fall outside the municipal boundary of the City of Melbourne.

2.2 Key points

The following six key points set the context of the discussion and opinions put forward in this submission:

1. That the Environmental Performance Requirement relating to the impact of the MMRP on flood risk (SW2) aspires to improve flood risk within the surrounding catchments rather than maintain flood risk at existing levels.
2. That the predicted effects of climate change are likely to have a significant impact on the extents and depths of flooding within the City of Melbourne, and that these impacts can be somewhat reduced through the inclusion of flood mitigation systems within new development and infrastructure projects, particularly where a demand for alternatively sourced water supply exists.
3. That once operational, the MMRP should leave a lasting environmental legacy to the users of the new rail infrastructure, as well as the City of Melbourne.
4. That the stations are designed to achieve a 5 Star Green Star rating with provisions made for reducing potable water demand through the use of stormwater as an alternative supply source.
5. That Planning Approval for the MMRP include conditions specific to the provision of Integrated Water Cycle Management and Water Sensitive Urban Design Principles as applicable to all private development within the City of Melbourne.
6. That the MMRP is designed to be sensitive of the goals and targets of adopted Council strategies and policy as related to stormwater and drainage.

2.3 Summary of Recommendations

1. It is recommended that EPR SW2 be amended to reduce the effects of flooding in the surrounding catchments, rather than maintaining flooding at existing levels.
2. It is recommended that EPR AE7 be extended to incorporate best practice stormwater quality objectives during the operational phase of all 5 station precincts.

3. It is recommended that the stormwater detention tank required at the Western Portal to allow controlled discharge of runoff from the decline structure to the local drainage network, be located within land controlled by the rail operator.
4. It is recommended that one of the alternative design locations for the proposed electrical substation be adopted in favour of the concept design option, to satisfy the requirement of EPR AE5.
5. With reference to EPR LU3, it is recommended that Arden Station be designed to include a stormwater detention tank to allow temporary storage of stormwater in high intensity rainfall events, reducing the depths and extents of flooding in the surrounding land.
6. It is recommended that a new EPR be established to require the station designs to incorporate stormwater retention and reuse systems that provide an alternative water supply for all non-potable water demands required by the station infrastructure. The following wording for the new EPR is recommended, which is consistent with the condition City of Melbourne include on all new private development approvals:

“For Station Precincts:

Prior to commencement, a stormwater drainage system incorporating integrated water management design principles must be submitted to, and approved, by the Responsible Authority – Engineering Services. This system must be constructed prior to the project’s operational phase and provision made to connect the system to the City of Melbourne’s stormwater drainage system.”

7. It is recommended that a new EPR be created specifying that any Council drainage asset requiring relocation, be upgrade to provide a 20 year ARI capacity with allowances for climate change.
8. It is recommended that structural (protective barriers) and non-structural (emergency management actions) be developed to adequately protect the site at 1-39 Hobsons Road, Kensington during the construction phase of the project in accordance with EPR SW1.
9. It is recommended that a new EPR be created specifying that the station designs maximise opportunities to incorporate permeable surface treatments and vegetation within that station precinct.
10. It is recommended that a new EPR be created specifying that alterations to the existing 1200mm diameter Council drain required to facilitate the construction of the Flinders Street underpass, be extended as far as the drain’s discharge point to the Yarra River.

2.4 EPR Consideration Summary Tables

The following table is a summary of my recommendations about the proposed EPRs in chapter 23 of the EES.

Consideration of proposed EPRs that are relevant from Chapter 23 EES.		
EPR Number	Supported or Disagree	Suggested Changes
AE3	Supported.	
AE5	Supported	
AE6	Supported.	
GW4	Supported	
SW2	Disagree – The MMRP should aspire to improve flood risk within the surrounding catchments rather than maintain flood risk at existing levels	<p>Amended to read:</p> <p>For all precincts:</p> <p>Increase existing flood plain storage capacity to account for the predicted impacts of climate change, to the requirements and satisfaction of the responsible authority</p> <p>Temporary construction works must not increase flood levels that result in an additional flood risk to the requirements and satisfaction of the responsible authority</p> <p>Permanent construction works must reduce flood levels to the requirements and satisfaction of the responsible authority</p> <p>Ensure permanent and associated temporary works do not increase flow velocities that would potentially affect the stability of property, structures or assets, and/or result in erosion during operation or construction, to the requirements and satisfaction of the responsible authority</p> <p>Undertake modelling of the design of permanent and temporary works to demonstrate the resultant flood levels and risk profile to the satisfaction of the responsible authority.</p>

Consideration of proposed EPRs that are relevant from Chapter 23 EES.

AE7	Disagree – The EPR should be extended to include all 5 station precincts	Amend to read: For all precincts: Fully integrate the stormwater treatment system into the design to ensure that stormwater entering a receiving water body complies with SEPP (Waters of Victoria). The best practice performance objectives for achieving compliance with SEPP (Waters of Victoria) during the operations phase are described below:
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Pollutant type	Receiving water objective	Current best practice performance objective ¹
Suspended solids (SS)	Comply with SEPP (not to exceed the 90th percentile of 80 mg/L) ⁽¹⁾⁽⁴⁾	80% retention of the typical urban annual load
Total phosphorus (TP)	Comply with SEPP (base flow concentration not to exceed 0.08 mg/L) ⁽²⁾	45% retention of the typical urban annual load
Total nitrogen (TN)	Comply with SEPP (base flow concentration not to exceed 0.9 mg/L) ⁽²⁾	45% retention of the typical urban annual load
Litter	Comply with SEPP (no litter in waterways) ⁽¹⁾	70% reduction of typical urban annual load ⁽³⁾⁽⁴⁾
Flows	Maintain flows at pre-urbanisation levels	Maintain discharges for the 1.5 year ARI at pre-development levels

The following table is a summary of my recommendations about additional EPRs that need to be considered for inclusion into chapter 23 of the EES.

Suggested New EPRs

EPR Area	Proposed New EPR / Suggested Area for New Additional EPR
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Surface Water	“For Station Precincts:
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Prior to commencement, a stormwater drainage system incorporating integrated water management design principles must be submitted to, and approved, by the Responsible Authority – Engineering Services. This system must be constructed prior to the project’s operational phase and provision made to connect the system to the City of Melbourne’s stormwater drainage system.”

Surface Water	All Council drains requiring relocation as part of the MMRP are to be designed to achieve a 20 year ARI capacity including allowance for climate change.
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Surface Water	All stations should be designed to maximise opportunities to incorporate permeable surface treatments and vegetation to increase catchment permeability.
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Suggested New EPRs

Surface Water The alterations to the existing 1200mm diameter Council drain required to facilitate the construction of the Flinders Street underpass, is to be extended as far as the drain's discharge point to the Yarra River

3. General Overview

3.1 Introduction

This section of the submission describes the issues and deficiencies observed in the Metro Rail EES that apply to multiple precincts.

The development of recommendations provided in this submission is cognisant of the following Council objectives and targets contained within the referenced Council endorsed strategies and plans:

Total Watermark – City as a Catchment 2014

- Water Use Target (Year 2030)
Municipal: 20% of all water use sourced from alternative sources
- Water Quality Target (Year 2030)
30% reduction in Total Nitrogen contributed to the waterways from the municipality of Melbourne's catchment (baseline year 2000)

Elizabeth Street Catchment Integrated Water Cycle Management Plan 2015

- Flooding Target
1:20 Average Recurrence Interval (ARI) (or equivalent) flow capacity of all council drains within the catchment
- Unsealed Soil Target
40% of Elizabeth St Catchment's soil surface is unsealed by 2030 (baseline year 2014)

Furthermore, it's important to note that climate change is likely to have a significant negative impact on flooding, through an 800mm rise in mean sea level, and a 15.5% increase in rainfall intensity predicted by the year 2100. With Melbourne's highly impervious catchments, and the influence of tidal fluctuation at its drainage outlets making the City particularly vulnerable to increased flood risk, it is important that climate change adaptation measures are implemented early to mitigate these effects.

3.2 Options

The common option related to all precincts, as presented in the EES Chapter 17, considers the issue of groundwater disposal during construction and operation of the portals, tunnels and stations.

The following Environmental Performance Requirements relating to groundwater disposal were obtained from Section 23 of the EES:

AE3: During construction, discharge tunnel, station box and portal construction water to sewer.

Where groundwater interception during construction is predicted to occur, dewatering is to be managed so that groundwater is not released to stormwater or sensitive surface water bodies (refer to related GW4).

AE6: *During operation, discharge tunnel drainage water to sewer unless otherwise agreed by EPA and Melbourne Water*

Where groundwater interception during operation is predicted to occur, disposal is to be managed so that contaminated water is not released to stormwater or sensitive surface water bodies (refer to related GW4).

The discharge of station, tunnel and portal water and groundwater to sewer during construction and operation of the Metro Rail Project, as proposed by EPRs AE3 and AE6, is supported.

3.3 Issues

Environmental Performance Requirement SW2 in Section 23 of the EES states that:

SW2: *For all precincts:*

Maintain existing flood plain storage capacity potentially impacted by the project, to the requirements and satisfaction of the responsible authority

Permanent and associated temporary construction works must not increase flood levels that result in an additional flood risk to the requirements and satisfaction of the responsible authority

Ensure permanent and associated temporary works do not increase flow velocities that would potentially affect the stability of property, structures or assets, and/or result in erosion during operation or construction, to the requirements and satisfaction of the responsible authority

Undertake modelling of the design of permanent and temporary works to demonstrate the resultant flood levels and risk profile to the satisfaction of the responsible authority.

All of the 5 Metro Rail Stations are located within catchments that have an either 'High' or 'Extreme' risk of flooding under Melbourne Water's Flood Risk Assessment Framework (MW-FRAF). Through the inclusion of appropriate stormwater detention, retention and reuse systems, described in more detail in later sections, the Melbourne Metro Rail Project provides a once in a hundred year opportunity to provide a flood reduction legacy to both the people of Melbourne, who will ultimately be users of the new rail infrastructure once operational and the City of Melbourne. In this regard it is recommended that SW2 be amended to go beyond simply maintaining flood risk at existing levels, and strive to achieve significant improvements in these flood prone catchments.

3.4 Deficiencies

EPR AE7 relates to the treatment of stormwater quality during the operational phase of the eastern and western portals. The EPR aims to:

AE7: *Fully integrate the stormwater treatment system into the design of the eastern and western portals to ensure that stormwater entering a receiving water body complies with SEPP (Waters of Victoria). The best practice performance objectives for achieving compliance with SEPP (Waters of Victoria) during the operations phase are described below:*

Pollutant type	Receiving water objective	Current best practice performance objective ¹
Suspended solids (SS)	Comply with SEPP (not to exceed the 90th percentile of 80 mg/L) ⁽¹⁾⁽⁴⁾	80% retention of the typical urban annual load
Total phosphorus (TP)	Comply with SEPP (base flow concentration not to exceed 0.08 mg/L) ⁽²⁾	45% retention of the typical urban annual load
Total nitrogen (TN)	Comply with SEPP (base flow concentration not to exceed 0.9 mg/L) ⁽²⁾	45% retention of the typical urban annual load
Litter	Comply with SEPP (no litter in waterways) ⁽¹⁾	70% reduction of typical urban annual load ⁽³⁾⁽⁴⁾
Flows	Maintain flows at pre-urbanisation levels	Maintain discharges for the 1.5 year ARI at pre-development levels

The water quality performance objectives outlined in AE7 is appropriate for the treatment of stormwater from the operational phase of the portals. AE7 however should be extended to include the operational phase of all station precincts.

As described in further detail later in this submission, increasing catchment permeability, and retaining stormwater for reuse within the stations can reduce flooding throughout the catchment. In addition to the benefits of reduced flooding, the reuse of stormwater as an alternative water supply is an effective way of reducing pollutant loads in the stormwater drainage network, thus improving water quality in the receiving waterways. It is likely that by incorporating stormwater reuse systems, the water quality performance objectives outlined in AE7 would be achieved at all stations by default.

3.5 Conclusion / Recommendations / Options

It is recommended that EPR SW2 be amended to reduce the effects of flooding in the surrounding catchments, rather than maintaining flooding at existing levels.

It is recommended that EPR AE7 be amended to incorporate best practice stormwater quality objectives during the operational phase of all 5 station precincts.

4. Western Portal (Kensington)

4.1 Introduction

The Western Portal proposal includes a Concept Design Option and an Alternative Design Option as presented in Figure 1 and Figure 2 below. The proposed tunnel entrance/exit is located next to the existing South Kensington Station entrance in the Concept Design, and is approximately 100m further west in the Alternative Design Option. The Alternative Design Option also includes the proposal of a new railway bridge across Kensington Road.

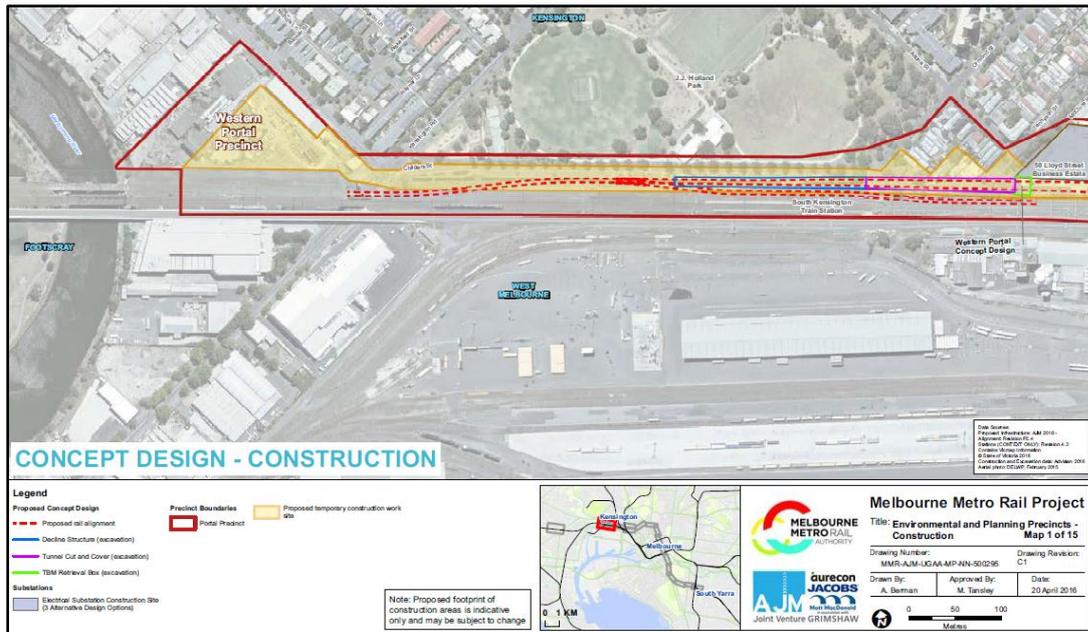


Figure 1 Concept Design Option - Western Portal

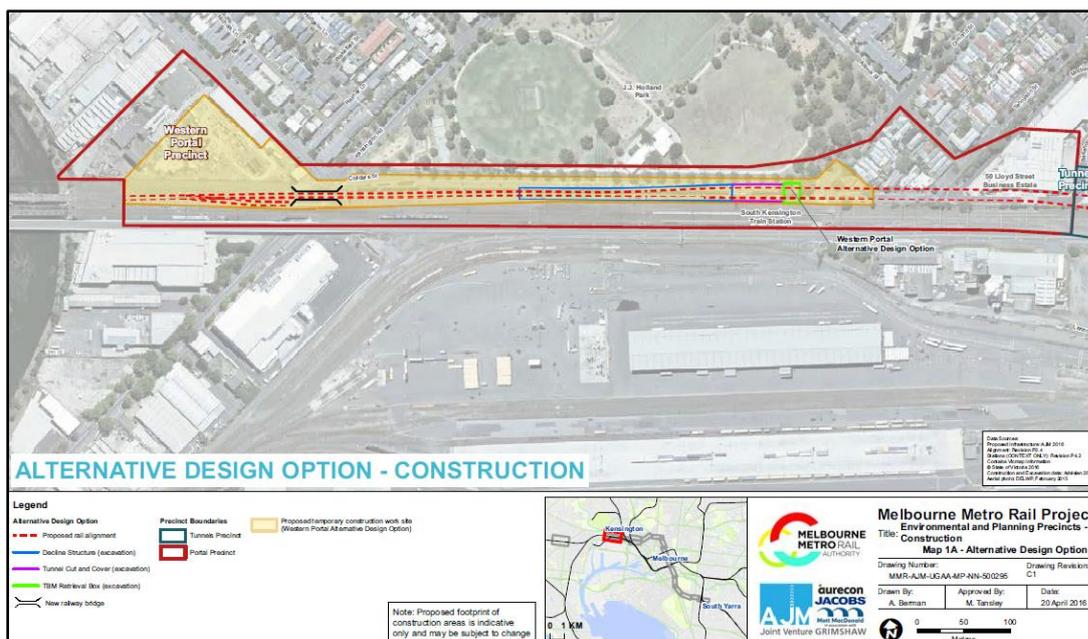


Figure 2 Alternative Design Option - Western Portal

A Land Subject to Inundation Overlay (LSIO) covers large sections of the Western Portal Precinct, including Childers Street and the proposed construction site at 1-39 Hobsons Road, Kensington.

4.2 Options

In terms of stormwater management considerations, the Alternative Design Option appears to have a lower impact on the floodplain as can be seen by the lower compensation storage requirement for this option of 7,000m³ versus 9,000m³ for the Concept Design Option. Both options appear to have similar impacts on the local drainage network and in that regard this submission does not offer a preferred option for the project to implement.

Other design options referenced in the EES that relate to surface water, discuss in general terms the requirement to pump runoff from the decline structure to a storage tank before being released to the local drainage network at a controlled rate.

The EES quotes a storage volume of 180m³. The sizing of such a storage tank is dependent on the capacity of the existing local drainage at the point of connection, which will dictate the allowable rate of discharge into the Council drain. This rate can be provided by the City of Melbourne at detailed design stage. The other factor relevant to the ultimate sizing of the storage tank will be the magnitude of the rainfall event the MMRA deem reasonable to design for (e.g. 50, 100, 200, 1000 year ARI) and whether allowances for increased rainfall intensities due to the predicted effects of climate change are accounted for.

The drainage infrastructure required for the western portal's decline structure, including the detention tank, will remain under the ownership of the rail operator. As such, this infrastructure, insofar as is possible, should be located within land managed by the rail operator, and not Council managed land.

Prior to the discharge of runoff from the decline structure into the local drainage network, treatment of the stormwater is required to meet best practice stormwater quality objectives. It is acknowledged that the EPR AE7 addresses this requirement.

4.3 Issues

Section 17.16 'Early Work' of the EES describes the requirement to divert services such as stormwater drainage assets to facilitate construction works. All Council drains to be relocated to facilitate the Metro Rail works should be designed to meet a 20 year ARI capacity requirement, through pipe upgrade if necessary, including consideration of a 15.5% increase in rainfall intensity due to the predicted effects of climate change.

4.4 Deficiencies

The EES discusses, in general terms, the management of flood risk at the Western Portal during the construction phase by installing retaining walls and barriers to protect the portal, and implementing emergency management actions in response to a forecasted flood peak in the Maribyrnong River. The proposed Western Portal Precinct includes the establishment of a major construction site at 1-39 Hobsons Road which is fully encumbered by a LSIO.

There appears to be a gap in the EES as to how the protection of this construction site from flooding can be managed during the construction phase. The inundation of 1-39 Hobsons Road while occupied by the MMRP contractor would present a significant pollution risk to the Maribyrnong River as well as, economic loss to the project through lost or damaged materials or plant, and disruption to the project timeline. Any protective measures implemented at this site should not come at the expense of increased flooding elsewhere in the catchment.

4.5 Conclusion / Recommendations / Options

It is recommended that the stormwater detention tank required to allow controlled discharge of runoff from the decline structure to the local drainage network, be located within land controlled by the rail operator.

It is acknowledged that the proposed EPR AE7 satisfactorily addresses the stormwater quality treatment objectives prior to discharge to the local drainage network.

Any Council drainage assets requiring relocation should be upgrade to provide a 20 year ARI capacity with allowances for climate change.

It is recommended that structural (protective barriers) and non-structural (emergency management actions) be developed to adequately protect the site at 1-39 Hobsons Road during the construction phase of the project.

5. Arden Station Precinct

5.1 Introduction

The proposed Arden Station is located within a parcel of government land known as Arden Siding. The land falls within the boundary of the Arden Macaulay Growth Area, within which extensive mixed use development is proposed.

The government land surrounding the Arden Station site is being developed by the Metropolitan Planning Authority (MPA). It is noted that EPR LU3 presented in Section 23 of the EES relates to the strategic planning of this urban renewal area. Specifically, LU3 states that:

LU3: *Design and construction of Arden station must consider the ongoing strategic planning of the Arden-Macaulay Urban Renewal Area and include consultation with the Metropolitan Planning Authority, City of Melbourne and any other relevant agencies.*

The majority of this land also sits within a LSIO in the Melbourne Planning Scheme, which designates land subject to flooding during a 1% Annual Exceedance Probability (AEP) flood in Moonee Ponds Creek. A 1% AEP flood is the magnitude of flood event that has a 1% probability of occurring in any given year. The LSIO extents at the Arden Station site are presented in Figure 3.

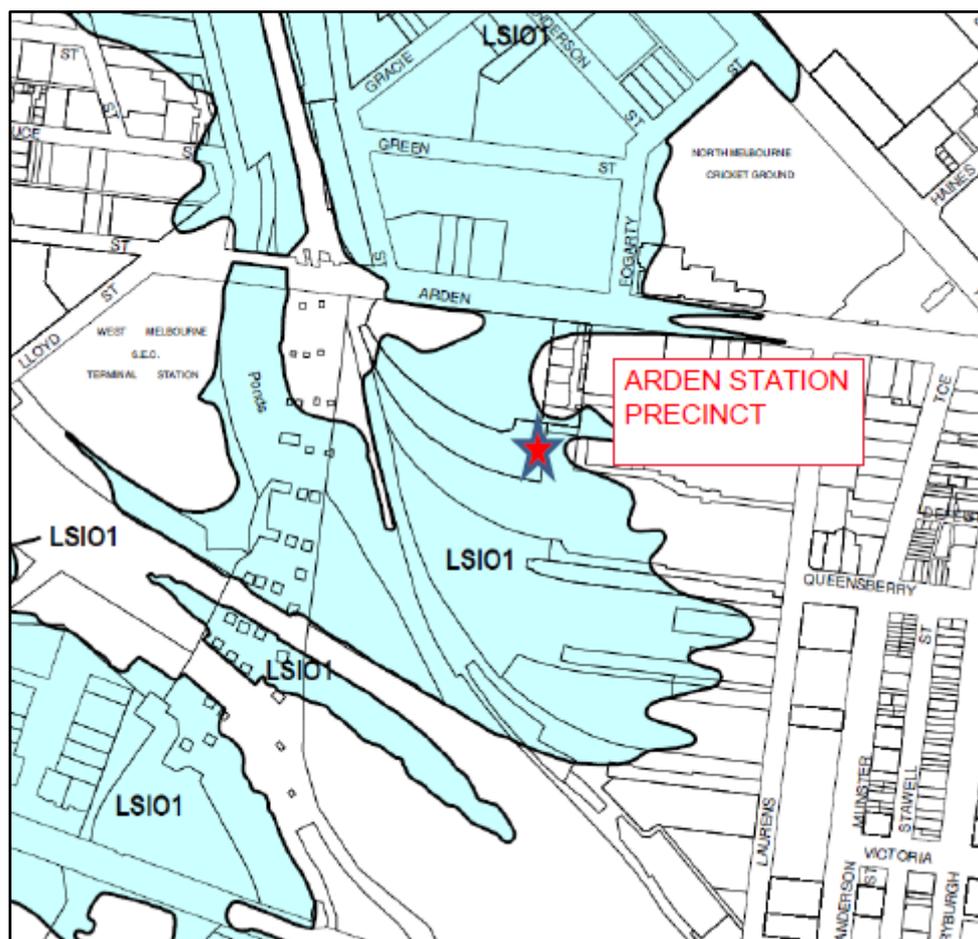


Figure 3 Arden Siding LSIO

A report prepared by Engeny engineering consultants for Melbourne Water and MPA (Engeny, 2015) identifies existing and future flood extents in the Arden Government Land. A number of potential flood mitigation options were proposed and modelled to understand their effectiveness in protecting the future development of this land from inundation. Discussion on how the flood mitigation proposals from the Engeny report could be incorporated into the design of Arden Station is presented in Section 5.4 below.

5.2 Options

The options presented in the EES in the vicinity of the proposed Arden Station Precinct, relate to the concept design, and alternative design options for an electrical substation. EPR AE5 relates to the design of this substation and states that:

AE5: *Design the Arden electrical substation (as per SW1) to provide appropriate protection against floodwaters during operation, to prevent the release of contaminants to Moonee Ponds Creek.*

The flood map presented in Figure 4 below is taken from the Engeny Report. The map presents the 1% AEP flood extents around the Arden Siding site under future climate change conditions which account for predicted rising sea level (+0.8m) and increased rainfall intensity (+15.5%). The preparation of the flood model for this scenario assumes that 'Planning Controls' apply to all new development within the catchment, allowing for inclusion of on-site retention/detention systems as the only flood mitigation option.

It can be seen from the flood map presented that the chosen location of the concept design option for the substation is the most susceptible to significant flooding. Flood depths of approximately 0.6m were modelled at this location. The occupation of this land as intended has the potential to result in inundation of the electrical substation, as well as a loss of floodplain storage that could increase flooding elsewhere in the catchment. In comparison, the alternative design option locations appear to have predicted depths of flooding ranging from 0-0.3m and would therefore be more suitable locations.

Furthermore, the concept design location of the substation adjacent to Langford Street is in close proximity to the City of Melbourne's Langford Street pump station. This pump station has been identified as requiring upgrade, and planning works for this pump station expansion has commenced. One proposal under consideration for flood mitigation in the catchment is to connect Melbourne Water's Arden Street Main Drain to the Langford Street pump station to ensure the drain can discharge into Moonee Ponds Creek when water levels are high. This requirement for pumped discharge into the creek is likely to be exacerbated by predicted sea level rise in the tidal influenced lower reaches of Moonee Ponds Creek. To accommodate this additional flow, preliminary figures indicate that the pump station capacity will need to be increased from 0.7m³/s to 7m³/s. Increasing the pump capacity by a factor of 10 is likely to result in a significant increase in pump station footprint. Proceeding with the concept design option for the Metro Rail substation would likely limit the ability of City of Melbourne and Melbourne Water to undertake the necessary expansion of the pump station required to mitigate flooding in the Arden Catchment.

It is recommended therefore, that one of the alternative substation locations be adopted.

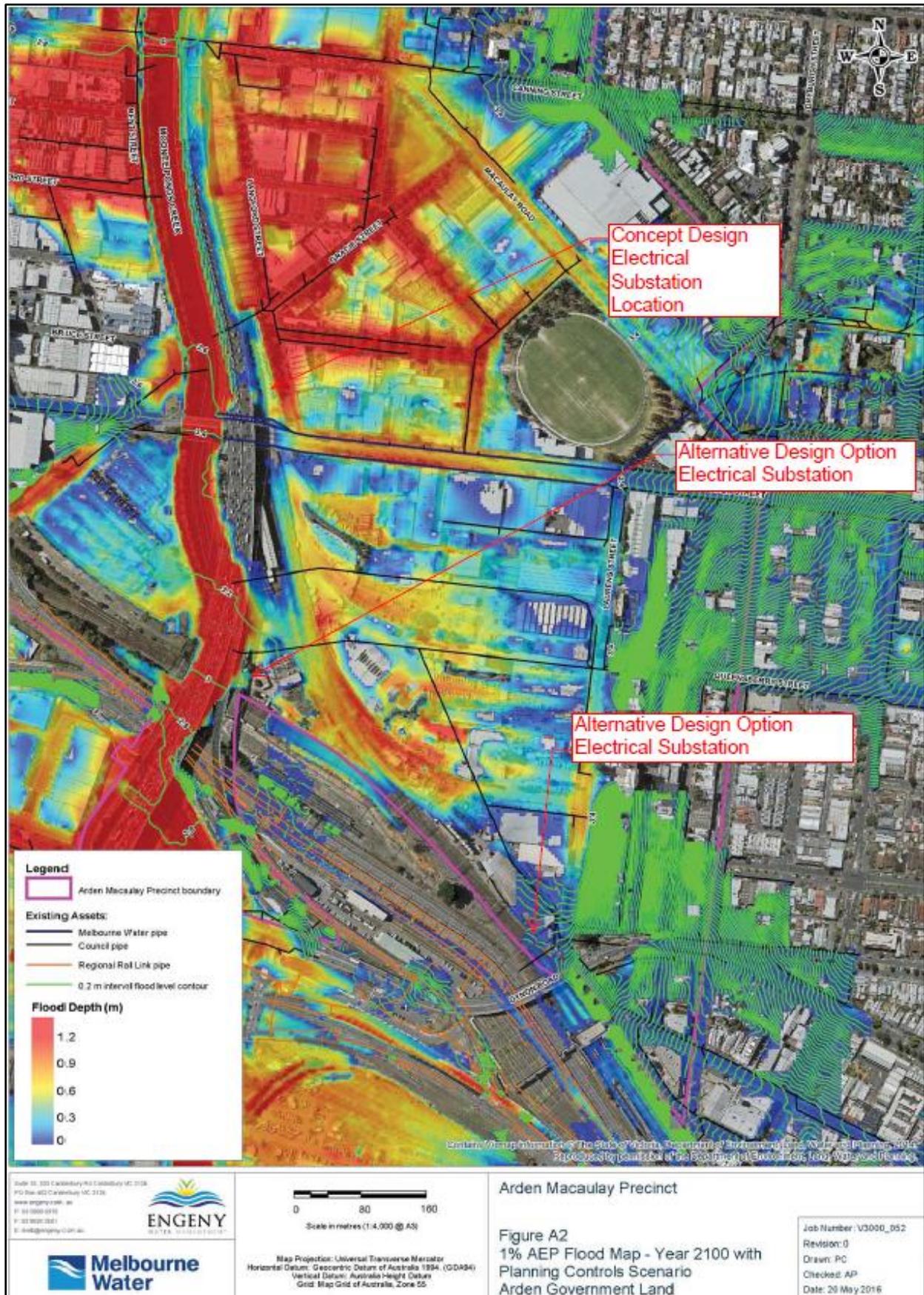


Figure 4 Arden Macaulay Flood Map with Substation Locations

5.3 Issues

Section 17.16 'Early Work' of the EES describes the requirement to divert services such as stormwater drainage assets to facilitate construction works. It is noted that part of these works will require the diversion of a 750mm diameter Council stormwater drain at the northern side of the Arden Siding site. All Council drains to be relocated to facilitate the Metro Rail works should be designed to meet a 20 year ARI capacity requirement, through pipe upgrade if necessary, including consideration of a 15.5% increase in rainfall intensity due to the predicted effects of climate change.

5.4 Deficiencies - Flood Mitigation

Section 17.10 of the EES relates to the stormwater management actions required to protect the station from flooding during construction and operation. In general the approach of setting station entry levels above the 0.1% AEP level with allowance for climate change, or another level as deemed appropriate by a flood immunity risk assessment, is considered a suitable approach to protecting the station. Similarly the erection of protective barriers and the implementation of emergency management measures to protect construction workers during operation is reasonable.

As discussed in Section 3 of this submission, Environmental Performance Requirement SW2 should be revised to provide an improvement to flood risk rather than maintaining the status quo.

The location of the Arden Station at the downstream end of the Arden Catchment provides limited opportunity to implement flood mitigation provisions that benefit the catchment as a whole. Consideration however should be given to how the station design can benefit the proposed development of the surrounding land.

A description of the baseline flood mitigation works in the Engeny Report includes a provision for flood storage on the western side of the site (Section 3.1.1 of the Engeny Report). This flood storage area would be activated during an extreme rainfall event, providing a defined area for the safe and temporary storage of stormwater that exceed the capacity of the underground drainage network. It is envisaged that the development of the Arden Station site could incorporate similar flood mitigation principles by incorporating a stormwater detention tank between surface level and the top of the station box. This detention tank could be designed to temporarily accommodate high flows in a flood event that would otherwise inundate the surrounding land. Once the rainfall event has passed and stormwater levels in the drainage network have receded, the detention tank would release water back into the drainage network.

In addition to the temporary detention of stormwater, the station should provide a stormwater retention system to provide an alternative water supply source for use in toilet flushing, cooling towers, and any other non-potable water demands the station infrastructure may require. The provision of a stormwater harvesting system as an alternative water supply would accord with the City of Melbourne's Total Watermark Strategy which targets 20% of municipal water uses being sourced from alternative supplies by the year 2030.

It is acknowledged that the provision of a stormwater reuse system within the station would require pre-treatment to be undertaken prior to reuse. The degree to which stormwater treatment is required is largely dependent on its end use, but for applications such as toilet flushing and cooling, an acceptable level of pre-treatment can be achieved through the provision of a treatment train approach, including Gross Pollutant Trap followed by secondary and tertiary filters upstream of the storage tank.

5.5 Conclusion / Recommendations / Options

It is recommended that one of the alternative design locations for the proposed electrical substation be adopted in favour of the concept design option.

With reference to EPR LU3, it is recommended that the Arden Station be designed to include a stormwater detention tank to allow temporary storage of stormwater in high intensity rainfall events, reducing the depths and extents of flooding in the surrounding land.

It is recommended that the station design incorporate stormwater retention and reuse system that provides an alternative water supply for all non-potable water demands required by the station infrastructure.

6. Parkville Station Precinct

6.1 Introduction

The Parkville Station Precinct straddles the Elizabeth Street and Arden Street drainage catchments as shown in Figure 5 below. Melbourne Water's Flood Risk Assessment Framework rates the flood risk in the Arden St catchment as 'High' whereas the Elizabeth St catchment is rated 'Extreme' for flood risk. The location of the Parkville Station at the upstream ends of two flood prone catchments, presents an opportunity for flood mitigation provisions to be implemented at one precinct benefiting two separate catchments.

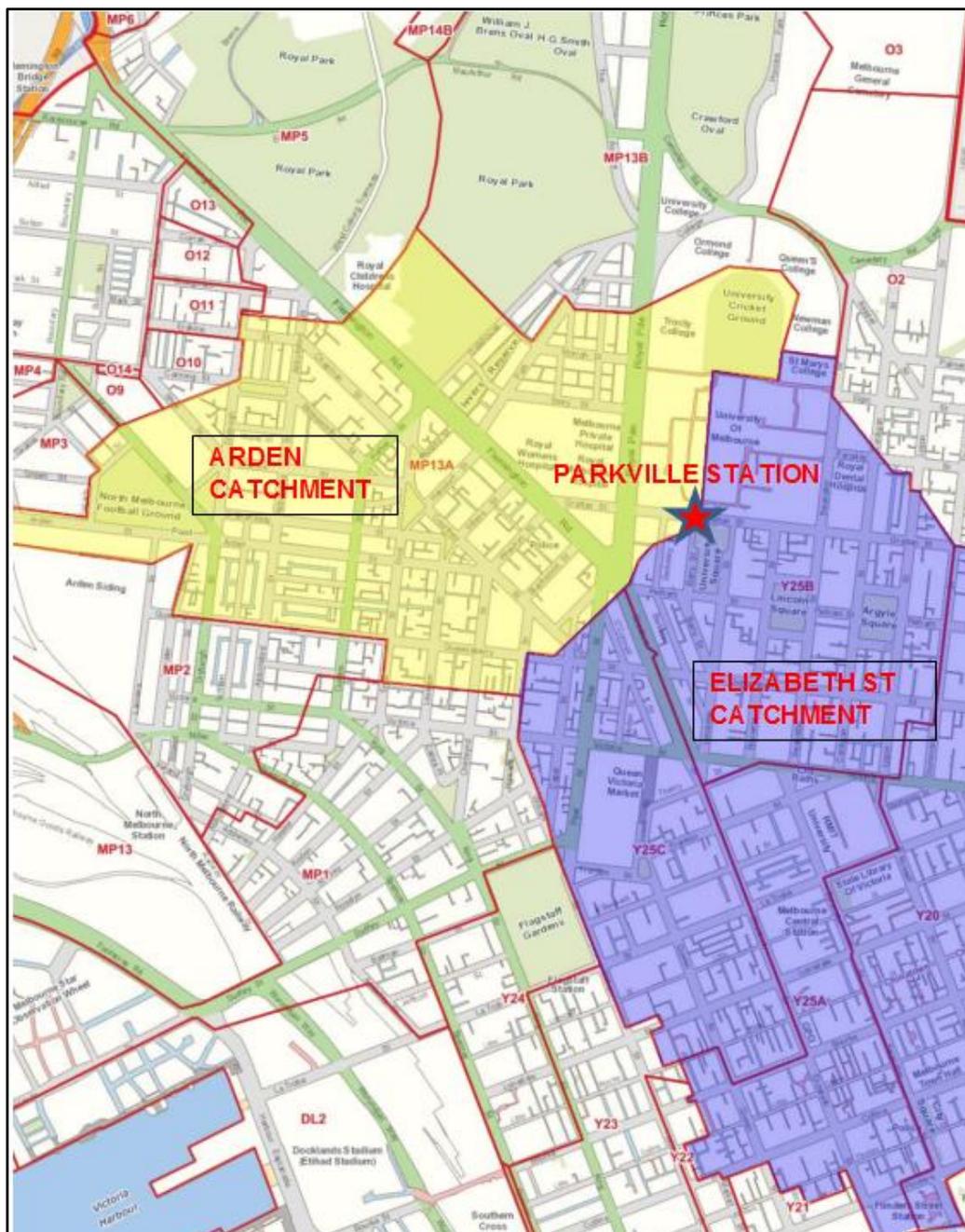


Figure 5 Arden and Elizabeth Street Catchment Map

To guide the development of flood mitigation opportunities in the Elizabeth Street Catchment, the City of Melbourne developed the *'Elizabeth Street Catchment Integrated Water Cycle Management Plan'* which was endorsed by Council in 2015. The objectives of The Elizabeth St Plan are:

1. To reduce the catchment's flood risk rating from Extreme to High.
2. To increase open space, soil moisture and areas of unsealed soil in the Elizabeth Street Catchment.
3. To mimic the natural water cycle by retaining more rainwater in the upper section of the catchment and reducing stormwater runoff.
4. To improve the health of existing vegetation through irrigation from alternative water sources.

The Parkville Station design, as well as the other proposed stations in the Elizabeth Street Catchment, should be sensitive to the objectives of The Elizabeth Street Plan, by incorporating provisions for stormwater retention and reuse, as well as improved land permeability within the footprint of the proposed stations.

6.2 Options

There are no options presented within the EES or CoM Submission that relate to stormwater management within the Parkville Station Precinct. Options regarding the disposal of groundwater during construction and operation are discussed in Section 3.2 of this report.

6.3 Issues

The primary issue with the construction and operation of the proposed Parkville Station is the conflict with existing Council drainage infrastructure. The 675mm diameter brick barrel drain on the eastern side of Royal Parade, and the 2 x 300mm diameter drains on the south side of Grattan St will require temporary and/or permanent relocation to facilitate construction works.

The Elizabeth Street Plan targets a 20 year Average Recurrence Interval (ARI) flow capacity for all Council drains within the catchment. All Council drains to be relocated to facilitate the Metro Rail works should be designed to meet this capacity requirement, through pipe upgrade if necessary. Given the limited space, and likely proximity of other underground services, future upgrade of the drains, once the station is operational, may not be feasible. The relocated stormwater drains should therefore be 'future proofed' by ensuring the sizing of the drains meets the 20 year ARI target capacity, including consideration of a 15.5% increase in rainfall intensity due to the predicted effects of climate change.

It is noted that section 17.16 'Early Works' of the EES broadly addresses the requirement for relocation of stormwater drainage infrastructure, to 'maintain or improve the current level of drainage service'. It is also acknowledged that the MMRP's Early Works team have consulted with City of Melbourne in developing concept designs of drainage relocations that are consistent with the design standards described in this section.

6.4 Deficiencies - Flood Mitigation

Consideration of flood mitigation at Parkville Station, during construction and operation, as described in Section 17.11 of the EES identifies the potential of inundation from minor overland flows which can be routinely mitigated by the provision of small diversion barriers and raised entry points to the station. This approach to flood mitigation is too narrow.

The majority of the land above the proposed Parkville Station drains to the local Council drainage network on Royal Parade and Grattan Street, through Melbourne Water's Arden Street Main Drain and ultimately discharges to Moonee Ponds Creek approximately 2km west of the station. A Special Building Overlay (SBO) in the Melbourne Planning Scheme, designates areas of land prone to overland flooding from the Arden Street Main Drain. The extent of this SBO and proximity to the Parkville Station Precinct is presented in Figure 6 below.

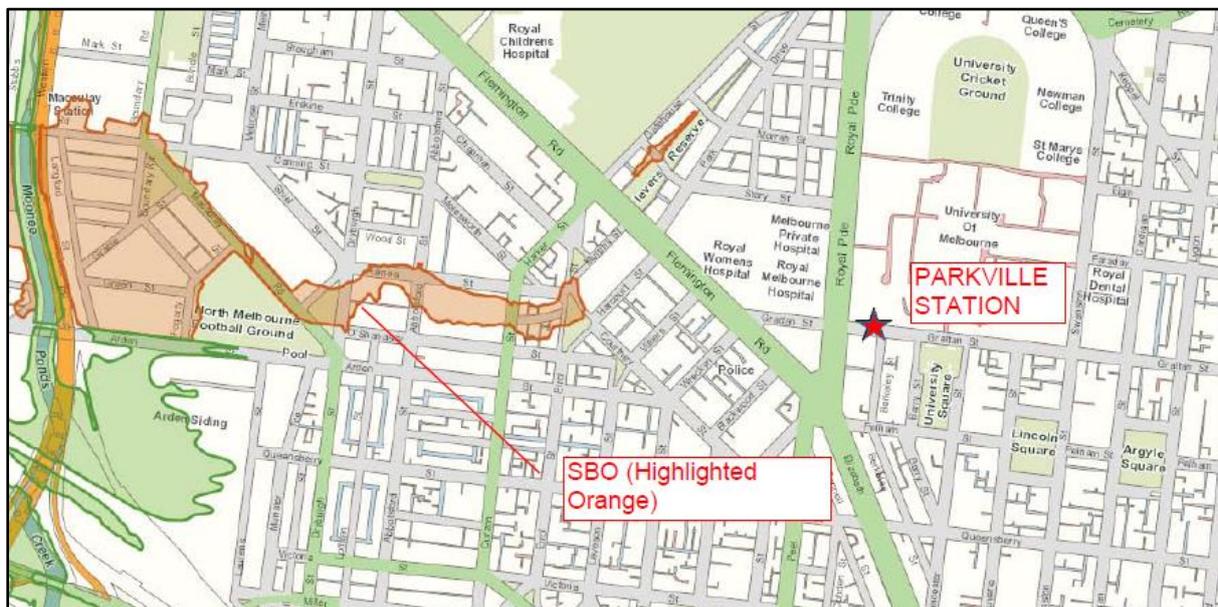


Figure 6 Arden Street Main Drain SBO and Parkville Station

The Arden Street Main Drain is rated by Melbourne Water as being a 'High' flood risk catchment. With the Parkville Station being located towards the upstream end of this catchment, there is an opportunity to achieve a flood risk reduction benefit to the wider locality, which could be considered a legacy of the Metro Rail Project. Retaining runoff in the upper reaches of a catchment mimics the natural water cycle and reduces downstream flood risk.

It is suggested that this flood mitigation benefit would be delivered primarily through the provision of a stormwater retention system, incorporated into the station design to provide an alternative water supply source for use in toilet flushing, cooling towers, and any other non-potable water demands the station infrastructure may require.

The provision of a stormwater harvesting system as an alternative water supply would accord with the City of Melbourne's Total Watermark Strategy which targets 20% of municipal water uses being sourced from alternative supplies by the year 2030.

It is acknowledged that the provision of a stormwater reuse system within the station would require pre-treatment to be undertaken prior to reuse. The degree to which stormwater treatment is required is largely dependent on its end use, but for applications such as toilet flushing and cooling, an

acceptable level of pre-treatment can be achieved through the provision of a treatment train approach, including Gross Pollutant Trap followed by secondary and tertiary filters upstream of the storage tank.

In addition to stormwater retention, flood risk reduction can be achieved through increased catchment permeability. Sealed surfaces such as building roofs, road pavements, and footpaths inhibit rainwater infiltration and instead results in the generation of stormwater runoff. The development of the Parkville Station precinct should consider opportunities to maximise vegetation, and permeable surface treatments, where feasible, in consultation with the City of Melbourne, to reduce runoff and contribute towards a reduction in downstream flood risk.

6.5 Conclusion / Recommendations / Options

It is recommended that the design of the Parkville Station incorporate stormwater retention and reuse system that provides an alternative water supply for all non-potable water demands required by the station infrastructure.

It is also recommended that the station design maximises opportunities to incorporate permeable surface treatments and vegetation within that station precinct.

The relocation of all stormwater drains required to facilitate the construction of the Parkville Station, are to be designed to achieve a 20 year ARI capacity with allowance for climate change.

7. CBD North Station Precinct

7.1 Introduction

The CBD North Precinct is situated in the middle of the Elizabeth Street Catchment, a 308 hectare urban catchment starting at College Crescent in Carlton, and draining to the Yarra River below Flinders St Station. The catchment is categorised by Melbourne Water as being an 'Extreme' flood risk. A catchment map including proposed locations of the Metro Rail stations is presented in Figure 7 below.



Figure 7 Elizabeth Street Catchment and Station Locations

The CBD North Station design, as well as the other proposed stations in the Elizabeth Street Catchment, should be sensitive to the objectives of The Elizabeth Street Plan, as described in Section 6.1 of this submission, by incorporating provisions for stormwater retention and reuse, as well as improved land permeability within the footprint of the proposed stations.

7.2 Options

There are no options presented within the EES or CoM Submission that relate to stormwater management within the Parkville Station Precinct. Options regarding the disposal of groundwater during construction and operation are discussed in Section 3.2 of this report.

7.3 Issues

The primary issue with the construction and operation of the proposed CBD North Station is the conflict with existing Council drainage infrastructure. Existing Council drains on Franklin Street and La Trobe Street will require temporary and/or permanent relocation to facilitate construction works.

The Elizabeth Street Plan targets a 20 year Average Recurrence Interval (ARI) flow capacity for all Council drains within the catchment. All Council drains to be relocated to facilitate the Metro Rail works should be designed to meet this capacity requirement, through pipe upgrade if necessary. Given the limited space, and likely proximity of other underground services, future upgrade of the drains, once the station is operational, may not be feasible. The relocated stormwater drains should therefore be 'future proofed' by ensuring the sizing of the drains meets the 20 year ARI target capacity, including consideration of a 15.5% increase in rainfall intensity due to the predicted effects of climate change.

It is noted that section 17.16 'Early Works' of the EES broadly addresses the requirement for relocation of stormwater drainage infrastructure, to 'maintain or improve the current level of drainage service'. It is also acknowledged that the MMRP's Early Works team have consulted with City of Melbourne in developing concept designs of drainage relocations that are consistent with the design standards described in this section.

7.4 Deficiencies - Flood Mitigation

Consideration of flood mitigation at the proposed CBD North Station, during construction and operation, as described in Section 17.11 of the EES, identifies the potential of inundation from minor overland flows which can be routinely mitigated by the provision of small diversion barriers and raised entry points to the station. This approach to flood mitigation is too narrow.

With the CBD North Station being located towards the upstream end of an Extreme flood risk catchment, there is an opportunity to achieve a significant flood risk reduction benefit to the wider locality, which could be considered a legacy of the Metro Rail Project. While the impact of improved flood mitigation considerations at CBD North would be mostly achieved outside the station precinct, the reduction in flood risk would benefit Metro Rail users, most notably at CBD South.

In 2015, engineering consultants GHD were engaged by the City of Melbourne to undertake a hydraulic and hydrological investigation on the Elizabeth Street catchment (GHD, 2015). The objective of this study was to identify opportunities to achieve a targeted 20 year ARI drainage capacity within the catchment, by means other than upgrading drainage pipes. The methodology involved estimating the 'Retention Volume' required at various locations within the catchment,

necessary to achieve the 20 year ARI drainage capacity within the existing network. Retention volume is stormwater that is removed from the drainage network, typically for reuse as an alternative water supply. The cumulative effects of multiple retention storages can have a significant positive impact flood depths and extents within a catchment.

The GHD Report estimates a total of 24.3ML of retention storage is required to achieve a 20 year ARI capacity in the pipe network. Figure 4 of the GHD report presents a breakdown of the varying retention volumes required at each sub-catchment. It is noted that 0.37ML of retention volume is required within the sub-catchment surrounding CBD North Station.

The City of Melbourne continues to provide significant investment in stormwater retention systems within the Elizabeth St catchment. Of particular note, is the installation of a 2ML (2,000,000 litre) retention storage system in Lincoln Square, Carlton to reduce downstream flood risk from Extreme to High, at a project cost of \$3 million. The major redevelopment of the Queen Victoria Market, also within the Elizabeth St catchment will maximise stormwater retention and reuse within the site, while private redevelopment within the City North growth area is required to make provision for integrated water cycle management and stormwater retention storage as part of the planning approval process. In this regard, the design of the CBD North station should contribute towards reducing the flood risk in the catchment.

Figure 8 below presents the layout of the Elizabeth Street Main Drain SBO as well as the location of significant underground drainage assets on Swanston St and Elizabeth St (discussed further in Section 8.3). The location of significant Council flood mitigation works within the catchment is also included in this figure.

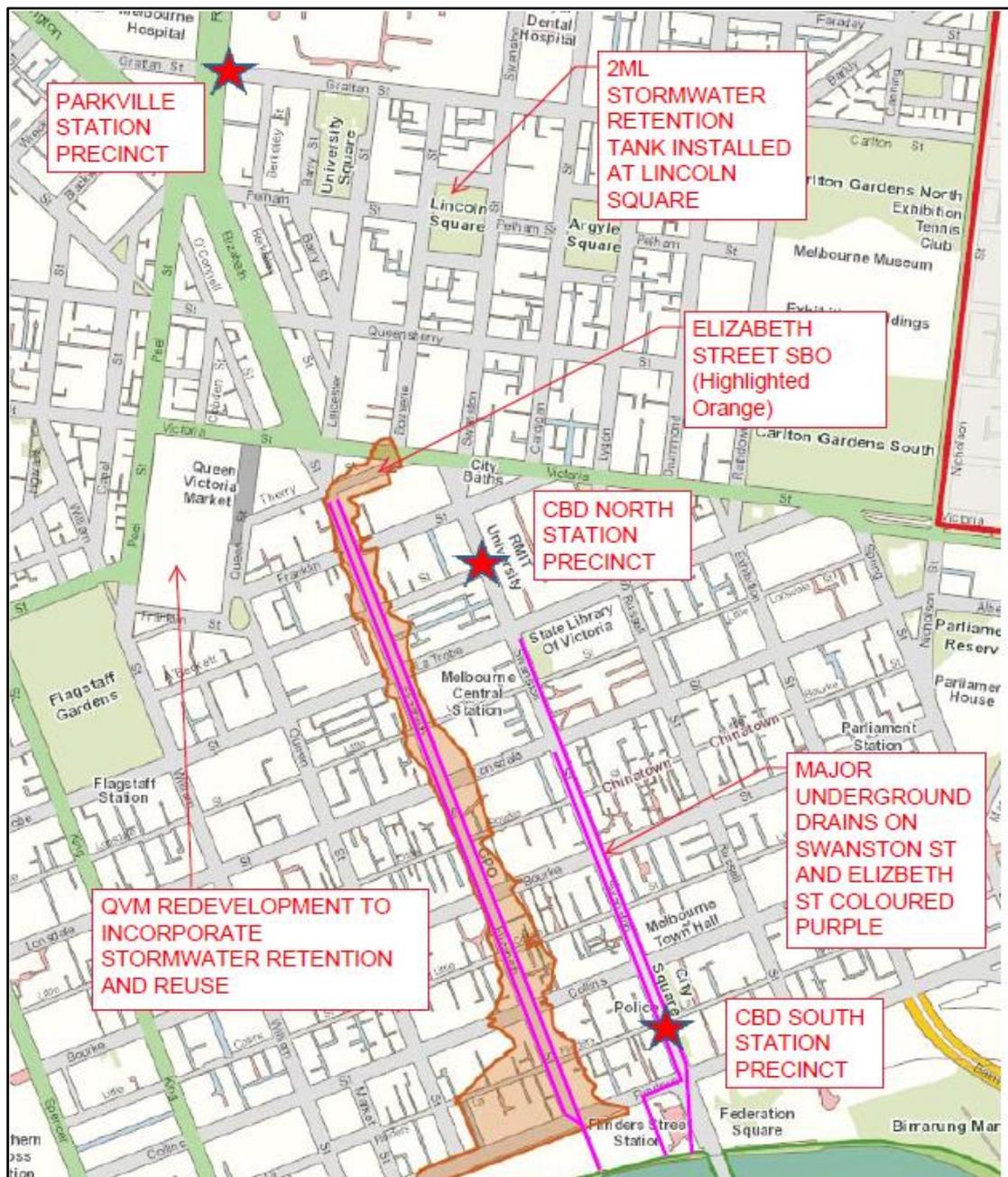


Figure 8 Elizabeth St SBO, Major Drains and Flood Mitigation Works

7.5 Conclusion / Recommendations / Options

It is recommended that the design of the CBD North Station incorporate stormwater retention storage within the station design for reuse, providing an alternative water supply for all non-potable water demands required by the station infrastructure.

It is also recommended that the station design maximises opportunities to incorporate permeable surface treatments and vegetation within that station precinct.

The relocation of all stormwater drains required to facilitate the construction of the CBD North Station, are to be designed to achieve a 20 year ARI capacity with allowance for climate change.

8. CBD South Station Precinct

8.1 Introduction

The CBD South station is located in the lower reaches of the Elizabeth Street catchment and not encumbered by a SBO or LSIO in the Melbourne Planning Scheme

In 2012 a report prepared by GHD engineering consultants on behalf of the City of Melbourne, investigated the capacity of the existing drainage network in Swanston St. The report (GHD, 2012) concluded that in the vicinity of the proposed CBD South Station, the existing drainage had sufficient pipe capacity to convey 100 year ARI flows from the upstream catchment. This determination was based on the diversion of overland flows to Elizabeth Street observed as part of the hydraulic modelling exercise.

Given the available capacity in the existing drainage network as determined by GHD, and the lack of major stormwater flooding in this precinct, the provision of stormwater detention within the footprint of the CBD South Station would provide little benefit in flood reduction. Notwithstanding this, as the station sits within the Elizabeth Street catchment area, the provision of a stormwater retention system to be used as an alternative water supply source for non-potable water demands should be included in the station design as a project legacy. Furthermore, providing an alternative water supply source would accord with the targets and objectives of the Elizabeth Street Catchment Integrated Water Management Plan described in Section 6.1 above, as well as this submission's proposed revision to EPR AE7 to include all stations.

8.2 Options

There are no options presented within the EES or CoM Submission that relate to stormwater management within the CBD South Station Precinct. Options regarding the disposal of groundwater during construction and operation are discussed in Section 3.2 of this report.

8.3 Deficiencies

Section 17.16 of the EES broadly addresses the issue of service relocation, including stormwater drainage, required to facilitate the Early Works component of this project. The proposed new underpass connection between CBD South Station and Flinders Street Station is likely to require alterations to the 1200mm diameter Council stormwater drain. This drain is approximately 100 years old and approaching end of its asset life. Given the MMRP will require significant works to be undertaken on this drain to facilitate the construction of the Flinders Street underpass, the opportunity should be taken to extend the scope of this work as far as the drainage outlet to the Yarra River, ensuring the continued serviceability of this drain for another 100 years.

8.4 Conclusion / Recommendations / Options

It is recommended that the design of the CBD South Station incorporates a stormwater retention and reuse system that provides an alternative water supply for all non-potable water demands required by the station infrastructure.

It is recommended that the alterations to the existing 1200mm diameter Council drain required to facilitate the construction of the Flinders Street underpass, be extended as far as the drain's discharge point to the Yarra River

9. Domain Precinct

9.1 Summary of Key Issues

The proposed Domain Station precinct sits within the Hannah Street Main Drain (HSMD) catchment. A SBO in the Melbourne Planning Scheme delineates the 100 year flood extents from the HSMD. The SBO, presented in Figure 9 below, covers large commercial and residential areas in the Southbank precinct, as well as tram routes and major arterial roads such as Kings Way, City Road and Clarendon Street.

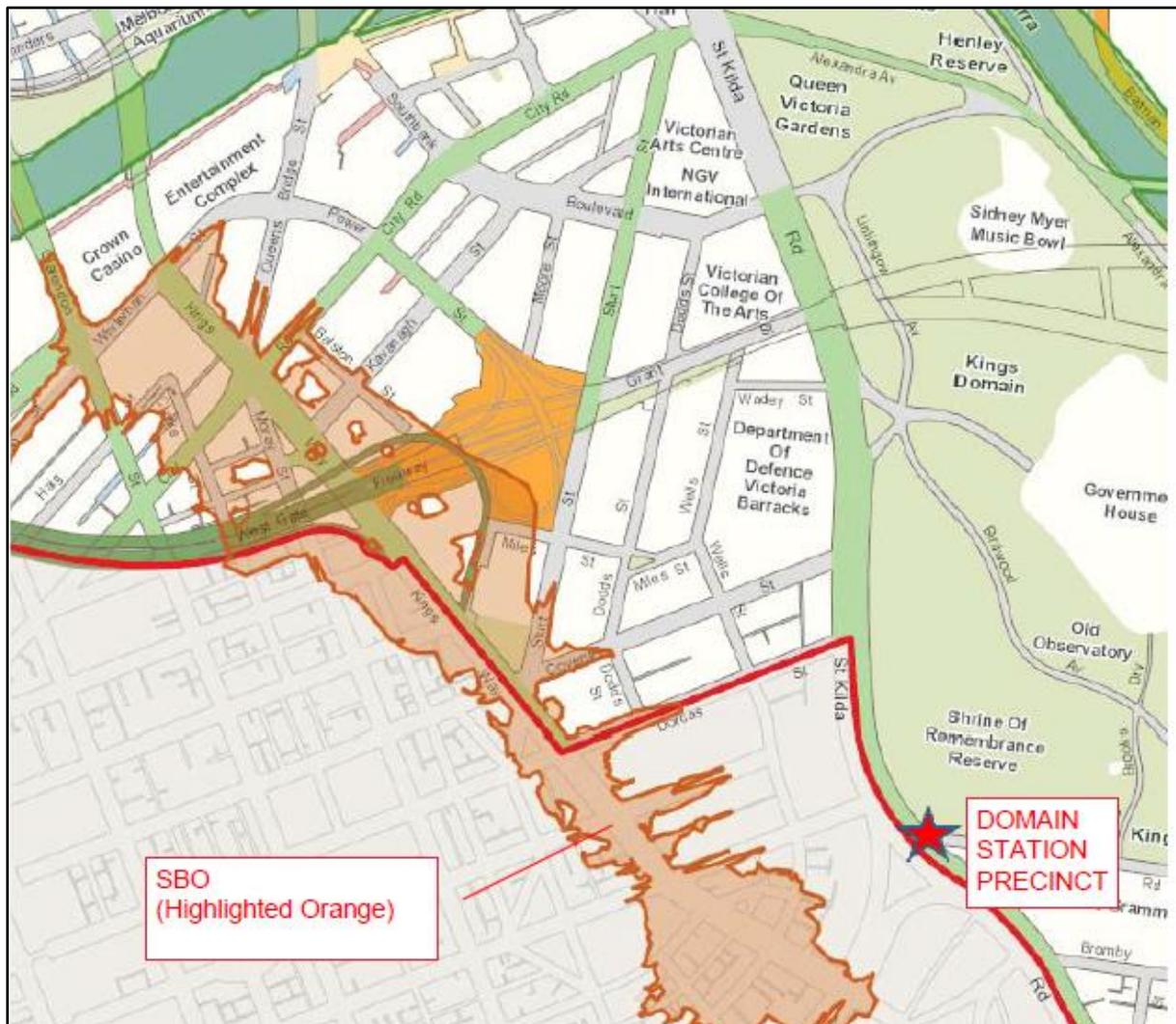


Figure 9 Hannah St Main Drain SBO and Domain Station Precinct

The HSMD catchment is rated as being a ‘High’ flood risk by Melbourne Water’s Flood Risk Assessment Framework. The location of the Domain Station within the HSMD catchment presents an opportunity for the station design to contribute toward reducing the flood risk in Southbank through the provision of stormwater retention and integrated water cycle management systems.

9.2 Options

There are no options presented within the EES or CoM Submission that relate to stormwater management within the Domain Station Precinct. Options regarding the disposal of groundwater during construction and operation are discussed in Section 3.2 of this report.

9.3 Issues

The construction of Domain Station conflicts with existing Council drainage infrastructure on Domain Road and St Kilda Road that will require temporary and/or permanent relocation to facilitate construction works.

All Council drains to be relocated to facilitate the Metro Rail works should be designed to meet a 20 year ARI capacity requirement, through pipe upgrade if necessary. Given the limited space, and likely proximity of other underground services, future upgrade of the drains, once the station is operational, may not be feasible. The relocated stormwater drains should therefore be 'future proofed' by ensuring the sizing of the drains to meet the 20 year ARI target capacity, includes consideration of a 15.5% increase in rainfall intensity due to the predicted effects of climate change.

It is noted that section 17.16 'Early Works' of the EES broadly addresses the requirement for relocation of stormwater drainage infrastructure, to 'maintain or improve the current level of drainage service'. It is also acknowledged that the MMRP's Early Works team have consulted with City of Melbourne in developing concept designs of drainage relocations that are consistent with the design standards described in this section.

9.4 Deficiencies - Flood Mitigation

Consideration of flood mitigation at Domain Station, during construction and operation, as described in Section 17.13 of the EES identifies the potential of inundation from minor overland flows which can be routinely mitigated by the provision of small diversion barriers and raised entry points to the station. This approach to flood mitigation is too narrow.

The Domain Station Precinct drains to the local Council drainage network on St Kilda Road and Domain Road, through Melbourne Water's Hannah Street Main Drain and ultimately discharges to the Yarra River via a pumped outlet at Crown Casino approximately 2km north west of the station. A SBO in the Melbourne Planning Scheme, designates areas of land prone to overland flooding from the Hannah Street Main Drain. The extent of this SBO and proximity to the Domain Station Precinct is presented in Figure 9 above.

The SBO extends through the City of Melbourne's Southbank precinct towards the downstream end of the HSMD. Southbank is a highly urbanised and densely populated precinct. Due to its low lying nature and proximity to the Yarra River, it is highly susceptible to flooding which is exacerbated by the predicted rising sea levels and rainfall intensities associated with climate change.

To better understand the extents of flood prone land in Southbank, taking into account climate change considerations, the City of Melbourne engaged engineering consultants BMT WBM in 2015 to model the catchment. Figure 10 presents the 100 year ARI flood extents for a 'climate change' scenario which includes increased rainfall intensity and sea level rise taken from the report (BMT WBM, 2015).

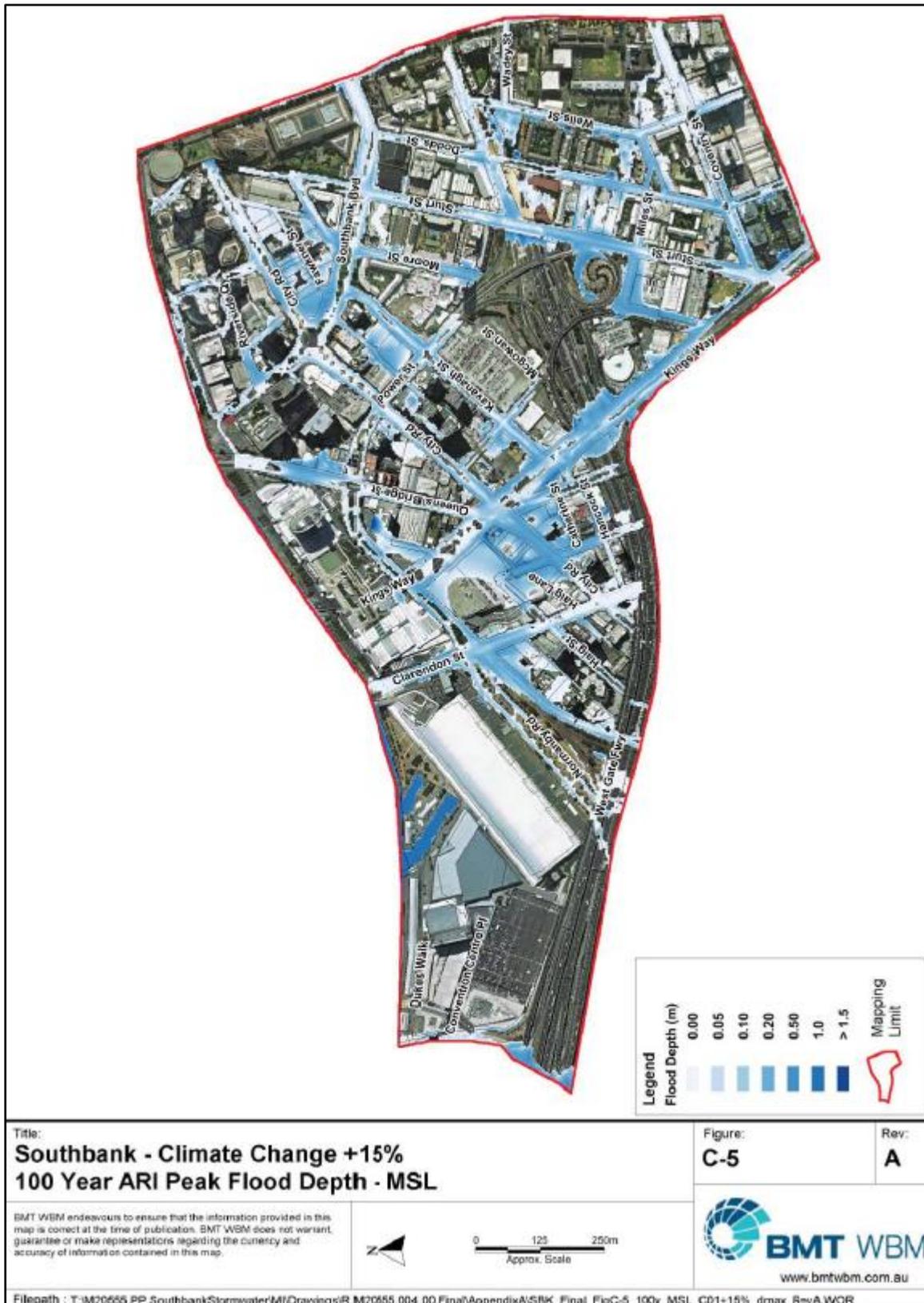


Figure 10 Southbank 100 Year Flood Extents with Climate Change

The City of Melbourne is putting measures in place to mitigate Southbank's vulnerability to the effects of climate change. The Southbank Structure Plan includes requirements for precinct scale stormwater storages and rainwater harvesting schemes. The 'Transforming Southbank Boulevard' project currently being developed by the City of Melbourne is one high profile example of how stormwater storage and reuse may be incorporated at a precinct scale. At building scale, the provision of green roofs in new development along with the implementation of integrated water cycle management systems within buildings, further assist with reducing flood risk in the precinct. Major development sites within the precinct such as 108 Southbank Boulevard, 93-119 Kavanagh St and 1-25 Queens Bridge Street will incorporate these stormwater management provisions into their building design.

With the Domain Station being located towards the upstream end of this catchment, there is an opportunity to achieve a flood risk reduction benefit to the wider locality, which could be considered a legacy of the Metro Rail Project. Retaining runoff in the upper reaches of a catchment mimics the natural water cycle and reduces downstream flood risk.

It is suggested that this flood mitigation benefit would be delivered primarily through the provision of a stormwater retention system, incorporated into the station design to provide an alternative water supply source for use in toilet flushing, cooling towers, and any other non-potable water demands the station infrastructure may require.

The provision of a stormwater harvesting system as an alternative water supply would accord with the City of Melbourne's Total Watermark Strategy which targets 20% of municipal water uses being sourced from alternative supplies by the year 2030.

It is acknowledged that the provision of a stormwater reuse system within the station would require pre-treatment to be undertaken prior to reuse. The degree to which stormwater treatment is required is largely dependent on its end use, but for applications such as toilet flushing and cooling, an acceptable level of pre-treatment can be achieved through the provision of a treatment train approach, including Gross Pollutant Trap followed by secondary and tertiary filters upstream of the storage tank.

9.5 Conclusion / Recommendations / Options

It is recommended that the design of Domain Station incorporates a stormwater retention and reuse system that provides an alternative water supply for all non-potable water demands required by the station infrastructure.

The relocation of all stormwater drains required to facilitate the construction of the Domain Station, are to be designed to achieve a 20 year ARI capacity with allowance for climate change.

10. Conclusion

The Melbourne Metro Rail Project is a marquee infrastructure project, of state significance, located almost entirely within 'High' or 'Extreme' rated flood risk catchments. While the EES satisfactorily addresses how flood risk will be managed during the construction and operation of the MMRP infrastructure, it is generally deficient in how it proposes to contribute towards the overall reduction in flood risk in the surrounding catchments. The MMRP should set the benchmark for how improved stormwater management solutions can be incorporated into building design to reduce flood risk.

The focus of the Environmental Performance Requirements (SW2) within the Surface Water Chapter of the EES on maintaining, or not increasing, flood levels in all precincts should be revised to focus on improving environmental outcomes through a reduction in flood risk. The project should strive to achieve the best possible environmental outcomes for Melburnians, as well as the City of Melbourne, the municipality within which the majority of impacts will be experienced.

Climate change is likely to have a significant negative impact on flooding, through an 800mm rise in mean sea level, and a 15.5% increase in rainfall intensity predicted by the year 2100. With Melbourne's highly impervious catchments, and the influence of tidal fluctuation at its drainage outlets making the City particularly vulnerable to increased flood risk, it is important that climate change adaptation measures are implemented early, to mitigate these effects.

In the context of surface water, this submission concludes that improved environmental outcomes can be achieved at each station precinct primarily through the incorporation of stormwater retention and reuse systems to reduce the cumulative flow of stormwater to areas of known flood risk downstream, as well as by improving catchment permeability, and achieving a targeted 20 year ARI capacity in all drains relocated as part of the early works process, including allowances for climate change.

11. Declaration

I have made all the inquiries that I believe are desirable and appropriate and no matters of significance which I regard as relevant have to my knowledge been withheld from the Inquiry and Advisory Committee.



Barry Fox

Drainage Engineer

Attachment A: Instructions

28 July 2016

Barry Fox
Drainage Engineer
c/- City of Melbourne
90-120 Swanston Street
Melbourne VIC 3000

Our ref: TXR1/NXS
Matter no: 9613710

By email: Barry.Fox@melbourne.vic.gov.au

Dear Mr Fox

**Melbourne Metro Rail Project
Environment Effects Statement Inquiry
Instructions for expert evidence**

We are assisting the City of Melbourne (**CoM**) finalise its submission to the Inquiry on the Environment Effects Statement (**EES**) and the Advisory Committee for the Planning Scheme Amendment (**PSA**), both in respect of the Melbourne Metro Rail Project.

Thank you for agreeing to prepare and present expert evidence at the joint Inquiry and Advisory Committee for CoM.

What is your evidence about?

CoM requires that you prepare and present expert evidence in relation to consideration of surface water / ground water and stormwater associated with:

- flood levels and risk profiles;
- flood migration control / storage and retention systems;
- water cycle management;
- emergency management;
- impact on drainage network;
- water harvesting and storage;
- impact of construction on water quality;
- options for management;
- disposal and treatment of groundwater; and
- contamination risks.

Timeline

The public hearing of the Inquiry will commence on 22 August 2016, running for approximately six weeks. You will be advised of the venue and the time that you will be required to attend the hearing in order to present your evidence, as soon as CoM receive the indicative timetable.

Any expert evidence to be presented at the Inquiry requires the submission of a detailed written report by **12 August 2016**.

CoM currently expects to call approximately 12 experts in 10 different fields (with 9 CoM employees giving evidence). With the tight timeframes for preparation and submission of the evidence, this process requires considerable internal coordination to ensure that the legal team

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has sufficient time to review and comment on all evidence reports before finalisation and submission.

To assist in this process of finalising the evidence reports, we ask you to have your draft evidence report ready for review by **5pm 8 August 2016** and to be available in the following days to finalise your report. Smaller reports are required to be ready first as the larger reports will require more time to prepare.

Your draft report should be emailed in Word format to Karen Snyders Karen.Snyders@melbourne.vic.gov.au and Nick Sissons nsissons@huntvic.com.au as soon as it is ready for review.

Please be assured that you have the support from the CoM Directors and Managers for you to dedicate your time to this process without delay so that a unified approach is presented from the CoM by having all expert evidence reports ready on time.

What is required?

We understand that this may be first time that you are being required to present expert evidence to an Inquiry or Advisory Committee. To assist you in preparing your evidence report we suggest that you review the Planning Panel Victoria's Guide to Expert Evidence (http://www.dtpli.vic.gov.au/data/assets/word_doc/0017/231263/G2-Guide-to-Expert-Evidence-April-2015.DOCX). This guide provides useful information to assist in preparing evidence reports. Other useful guides from Planning Panels Victoria about the general process are also available online (<http://www.dtpli.vic.gov.au/planning/panels-and-committees/planning-panel-guides>).

Please note that whilst you are employed by the CoM, you are being asked to present expert evidence as a professional with suitable experience and qualifications in your field. This means that you must present your professional opinion on the matters that have been advanced by the CoM in its submission on the EES and PSA. You must also ensure that you comment only on matters that are within your field of expertise and matters that are within the EES and PSA. You can reference any existing publicly available material, reports, studies or policy as support or justification for your opinions but you must not reference any confidential information of the CoM.

The joint Inquiry and Advisory Committee requires that CoM provide it with copies of any referenced materials in any expert evidence statements. Accordingly, please provide a copy or external web link to any reports, studies or policy that you have referenced so that we can compile a complete list of reference materials for submission to the joint Inquiry and Advisory Committee.

We also understand that you may have been involved in other aspects of this project whilst performing your role at CoM and you may have previously worked directly with the 'CoM and Melbourne Metro Rail Authority' working group. As part of your evidence that you are being asked to prepare, you are not required to comment on any information, designs or other discussions that are not specifically included within the EES or PSA and CoM submission. Of course, when discussing alternative options or deficiencies, it may be a matter of professional opinion if you believe that the EES or PSA has left out other relevant considerations that should be raised for consideration.

Generally, you have a duty to the joint Inquiry and Advisory Committee to ensure that your report complies with the content and form requirements of Planning Panel Victoria's Guide to Expert Evidence.

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Consistency of format for CoM staff expert evidence reports

You should have regard to the CoM submission on the EES and PSA. We ask that you structure your expert evidence in a manner that uses or aligns with the following precincts or subject areas where possible:

1. Fawkner Park and the Domain.
2. Tunnel Alignment and Emergency Access.
3. Western Portal (Kensington).
4. Arden Station Precinct.
5. Parkville Station Precinct.
6. CBD North Station Precinct.
7. CBD South Station Precinct.
8. Domain Station Precinct.
9. Noise and Vibration.
10. Planning Scheme Amendment.

Within any given precinct, we ask you to provide an opinion on any relevant options, issues or deficiencies that have been raised in the CoM submission. If you intend to stray from the substance of the CoM submission, please only do so after confirming this with Karen or myself.

There may also be an obligation on witnesses to attend a conclave of like-minded experts in order to help draft a statement setting out where the respective witnesses agree and disagree. We will provide you with further information about this as it comes to hand.

This approach will ensure consistency in the CoM evidence and enable Council's legal advocates to focus on a precinct by precinct basis in presentation of the CoM submissions during the Inquiry. It will also assist Council's legal advisors determining if aspects of your evidence has been addressed by other submitters.

We have provided you with an example word template document that can be used to assist you in drafting your expert evidence if you require. However, this is not intended as a one size fits all and you should structure your statement in any manner that assists in providing a clear and concise opinion on the points raised in the CoM Submission.

Presentation to joint Inquiry and Advisory Committee

Generally it should be assumed that the joint Inquiry and Advisory Committee members and all other participants have read your statement.

CoM will be strictly limited in its time allocated to present its submission to the joint Inquiry and Advisory Committee.

Accordingly, we ask that you prepare a short 20 minute presentation of the key issues in your statement. If you believe that you need more than this time please see us as soon possible so that we can discuss requirements with you directly. You may wish to use an example to highlight

any particular concerns. You will also be asked questions, so please keep your presentation short and concise.

If you intend to use PowerPoint to present your key points at the hearing, please discuss this with us. Any PowerPoint presentation you wish to use must be finalised at the same time as your draft statement of evidence as it will need to be submitted with your statement of evidence.

You should attend the hearing with your statement and all copies of any reference material that you have referenced. All documents will need to be tendered electronically in advance of the hearing.

Further information

You will find links to the documents of the EES and PSA as follows:

EES - <http://metro.tunnel.vic.gov.au/ees>

PSA - <http://metro.tunnel.vic.gov.au/ees/planning-scheme-amendment>

Please do not hesitate to contact Karen Snyders Karen.Snyders@melbourne.vic.gov.au or Nick Sissons nsissons@huntvic.com.au if you require any further information about this process.

Yours faithfully
Hunt & Hunt



Nick Sissons
Associate

Contact:
Nick Sissons
D +61 3 8602 9357
E nsissons@huntvic.com.au

3 August 2016

Barry Fox
Drainage Engineer
City of Melbourne

Our ref: TXR1/NXS
Matter no: 9613710

By email: Barry.Fox@melbourne.vic.gov.au

Dear Mr Fox

**Melbourne Metro Rail Project
Environment Effects Statement Inquiry
Expert Evidence – Supplementary Instructions**

We confirm our request for you to provide expert evidence to the forthcoming Inquiry and Advisory Committee (IAC) in relation to the matters addressed in the City of Melbourne Submission to the Environment Effects Statement (**Submission, EES**).

Scope of your evidence

In the preparation of your evidence, please carefully consider the Terms of Reference for the IAC (http://www.dtpli.vic.gov.au/_data/assets/pdf_file/0008/297107/Melb-Metro-ToR.pdf).

Your expert evidence should also have regard to the Environmental Performance Requirements (EPRs). The EPRs are located within each section of the EES (<http://metrotunnel.vic.gov.au/ees/documents>). Your expertise may relate to one or more of the sections of the EES and any number of EPRs. Please consider whether any of the matters addressed in the Submission will be adequately dealt with by the proposed EPRs, making recommendations for changes, where appropriate.

Please note that the MMRA has also started to provide "Technical Documents" to the IAC (<http://www.dtpli.vic.gov.au/planning/panels-and-committees/current-panels-and-committees/melbourne-metropolitan-rail-inquiry>). These might be said to vary the EES so it is important you read them carefully and comment on them as appropriate.

However, as the status of these Technical Documents is unclear, please do not assume that matters addressed in the Technical Documents necessarily resolve matters raised in the Submission.

Circulation of Evidence

We have now been advised that we must print and deliver 20 printed copies of your statement to Planning Panels Victoria Office by 10:00am on 12 August 2016, we will not be able to extend timeframes for circulation of your evidence. **This means that we will need your completed report by COB on 8 August to enable us sufficient time for review, print and circulate your report.**

Please provide your statement in Microsoft Word format for us to convert PDF format for circulation, including an electronic signature.

Hearing dates

The City of Melbourne has been allocated the following dates to present its case:

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 INTERLAW.

1. 5 September 2016 (10:15 am – 1:00pm and 2:00pm – 4:30pm);
2. 6 September 2016 (10:15 am – 1:00pm and 2:00pm – 4:30pm); and
3. 22 September 2016 (10:15am – 12:30pm).

We will provide you with further information as to when you may be required to attend the hearing to present evidence, but to the extent that is possible to do so, please keep these dates clear in your diary. If you have any constraints please contact us immediately.

The hearing will be conducted in the conference room at the Mercure Treasury Gardens, 13 Spring Street, Melbourne.

Expert conclaves

You may also be required to attend a conclave of experts, to be held sometime between 15 August 2016 and before 22 August 2016.

At a conclave, you may be asked to prepare a statement of matters where you agree or disagree with other expert witnesses. Such statements must be tabled at the hearing on the earlier of: 22 August 2016; or one clear business day prior a relevant witness being called.

Please indicate your availability to attend such a meeting in the week commencing 15 August 2016.

These meetings should be arranged by MMRA's experts, however, we will confirm with you if we are advised of any proposed meeting date and time.

Directions relating to expert reports

The Chair of the IAC has directed that expert witness reports should not refer to individual submitters by name, but by submission number. Please follow this direction if you are making reference to any submitter other than the City of Melbourne.

Please note that expert reports will be available to the public via publication on the Melbourne Metro Rail Project website.

Please do not hesitate to contact Karen Snyders Karen.Snyders@melbourne.vic.gov.au or Nick Sissons nsissons@huntvic.com.au if you require any further information.

Yours faithfully

Hunt & Hunt



Nick Sissons
Associate

Contact:
Nick Sissons
D +61 3 8602 9357
E nsissons@huntvic.com.au

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11 August 2016

City of Melbourne Expert Witnesses for
Inquiry and Advisory Committee on
Melbourne Metro Rail Project

Our ref: TXR1/NXS
Matter no: 9613710

By email:

Dear Sir/Madam

**Melbourne Metro Rail Project - Environment Effects Statement Inquiry
Expert Evidence – Second Supplementary Instructions – Request to include an
Environmental Performance Requirement (EPR) Summary Table in your evidence**

Thank you for providing your draft expert evidence report to the forthcoming Inquiry and Advisory Committee (IAC) in relation to the matters addressed in the City of Melbourne Submission to the Environment Effects Statement (Submission, EES) on the Melbourne Metro Rail Project.

All reports have been of a consistently high standard. We appreciate the immense effort that has been dedicated to ensuring that these reports were prepared within a very tight timeframe.

To assist the City of Melbourne present a clear and concise summary of its Submission to the IAC and to assist you in delivering a concise summary when called to give evidence to the IAC, we would appreciate if you could please incorporate a brief summary table of your recommendations relating to the EPRs at end of the executive summary of your report.

We have provided the attached template table (in a word document) as a suggested format to use for the tables.

This table is really only intended to be a brief and concise summary of the recommendations that you have already made in the body of your report.

Where you have recommended that an entirely new EPR is necessary, please try to have a go at formulating a draft EPR (to the best of your ability) or simply state what the new EPR should try to achieve. If you are experiencing difficulty drafting proposed EPR wording, we are available today to help you edit your recommendations for new EPRs.

Please do not hesitate to contact Nick Sissons nsissons@huntvic.com.au if you require any further information.

Yours faithfully
Hunt & Hunt



Nick Sissons
Associate
Contact:
Nick Sissons
D +61 3 8602 9357
E nsissons@huntvic.com.au

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ABN 29 944 936 306 | www.hunthunt.com.au
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