Arden Precinct Flood Management Policy

June 2022

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1. Introduction

The Victorian Government has identified the Arden Precinct (**Arden**) as a key urban renewal area. Arden is to be transformed from a primarily industrial area into a high-density mixed-use zone, with the future Arden Station to be located within Arden as part of the Metro Tunnel project.

Some areas within Arden have a recognised history of flooding and the severity of flooding is not compatible with development. Prior to the development of Melbourne there was a significant natural swamp / floodplain along this section of Moonee Ponds Creek, which flows through Arden. Despite the construction of levee banks, drains and pump stations around the middle of the 20th century there has been a history of flooding that has contributed to a relative lack of development for an area so close to central Melbourne.

Without intervention, flooding poses an unacceptable risk to the safety of the community and will continue to lead to extensive property damage, with some areas experiencing flood depths of up to two metres. If Arden is to develop into a high-use urban area, then this will require planning controls to manage development areas and floor levels, drainage works will need to be implemented to reduce the risk and severity of flooding.

Melbourne Water is responsible under the *Water Act 1989* (Vic) for regional drainage, floodplain and waterway management and for contributing to the protection and improvement of waterway health across greater Melbourne. Melbourne Water is also responsible for ensuring that drainage and flood protection standards for new development are achieved.

This Arden Precinct Flood Management Policy (**Policy**) outlines how Melbourne Water will respond to the re-development of Arden to promote public safety, flood resilience and liveability.

2. Strategic risk

Melbourne Water has carried out flood modelling across a majority of the catchments it is responsible for to understand where flooding occurs, and what risk the flooding represents. A prioritised program of flood mitigation works is delivered each year by Melbourne Water. The program assesses the cost of the works versus the risk reduction benefits the works provide. This ensures that the maximum value in risk reduction due to flooding can be obtained from Melbourne Water's investment in flood mitigation works[1].

The majority of Arden is currently zoned for industrial use. The level of risk due to flooding, based on the current land use patterns in Arden, does not justify Melbourne Water carrying out works to reduce that risk based on the current prioritised program of flood mitigation works.

The rezoning of Arden will facilitate a shift to intensive residential, commercial and employment land use patterns. The re-zoning of Arden is the catalyst for increased employment-related and residential development. In the absence of flood mitigation and management solutions, these changes to existing land use patterns would result in an unacceptable increase in risks to public safety and the environment due to flood levels in Arden.

The drainage system that currently services Arden can be separated into two key components:

- Moonee Ponds Creek, which conveys runoff from the Moonee Ponds Creek catchment, which covers an approximate area of 139 square kilometres; and

[1] *Flood Management Strategy Port Phillip and Westernport*, Melbourne Water October 2015

- The local drainage system, which conveys runoff from Arden and the smaller (compared to the Moonee Ponds Creek catchment) local catchments that drain through Arden into Moonee Ponds Creek.

In large storm events, there is interaction between Moonee Ponds Creek and the local drainage system, with creek flows influencing flooding within Arden. The following sections of this Policy provide an overview of key details of the drainage systems influencing Arden.

3. Strategic response

The nature of flood risk combined with the scale and nature of planned re-development means that a site-by-site approach to flood protection, such as raising floor levels, is not practicable in Arden. Precinct-scale flood mitigation infrastructure (**Infrastructure**) is needed to enable the planned re-development of Arden with an acceptable level of risk due to flooding.

Flood modelling has been used as a key tool to develop an understanding of flood behaviour relating to Arden (including the influence of Moonee Ponds Creek) and to guide the development of the Arden working drainage strategy. The working drainage strategy has been used as a key input to the development of the Arden Structure Plan. The flood modelling allows for representation of existing drainage infrastructure, topography and proposed drainage assets and provides a range of flooding outputs based on the simulation of storm events.

The Arden flood modelling is based on a RORB hydrological model and a TUFLOW hydraulic model. The extent of the TUFLOW model covers Moonee Ponds Creek from just north of Mt Alexander Road until the confluence with the Yarra River. The model also covers the local drainage catchments that contribute runoff to this reach of Moonee Ponds Creek, including Arden. The model uses dynamic flows in Moonee Ponds Creek so that the impact of the rising and falling tail water level in the creek is accounted for in the local drainage system and so that the impact of creek flows on Arden is represented.

The design rainfall event refers to the storm event for which development must meet appropriate flood protection standards. Based on *Guidelines for Development in Flood Prone Areas* (The State of Victoria Department of Environment, Land, Water and Planning, 2019) the 1% annual exceedance probability (AEP) flood, also known as the 1 in 100 year flood, is the current flood protection standard, which is used in providing flood level advice, in delineating land affected by flooding and setting requirements for most developments.

The predicted flooding relating to two scenarios of the 1% AEP flood event have been analysed and are addressed below.

Existing conditions assumptions

- Existing development conditions in both the local catchments draining through Arden and the greater Moonee Ponds Creek catchment.
- Current design rainfall intensities.
- A static tail water level in Port Phillip Bay of 1.4 metres AHD.

Year 2100 conditions assumptions

- Imperviousness kept at existing levels, which reflects efforts within the local and greater Moonee Ponds Creek catchments to manage runoff through planning and development controls.
- An 18.5% increase in rainfall intensity due to climate change.

- 0.8 metres sea level rise in Port Phillip Bay. In the hydraulic modelling of the year 2100 scenario, a cyclical tide has been adopted as a boundary condition in order to represent the dynamic impact of the Port Phillip Bay tide level on flooding in the lower reach of Moonee Ponds Creek. The boundary condition is based on a 10 % AEP tide, with an allowance of 0.8 metres of sea level rise. The peak of the cyclical tide is 1.975 m AHD.

Existing Infrastructure and Conditions Modelling Assessment

The results of the flood modelling assessment based on existing climate conditions predict that large areas of Arden are significantly impacted by flooding in a 1% AEP event. Figure 3.9 provides a flood depth map representing the flood model's predicted flooding in a 1% AEP event for existing climate conditions.

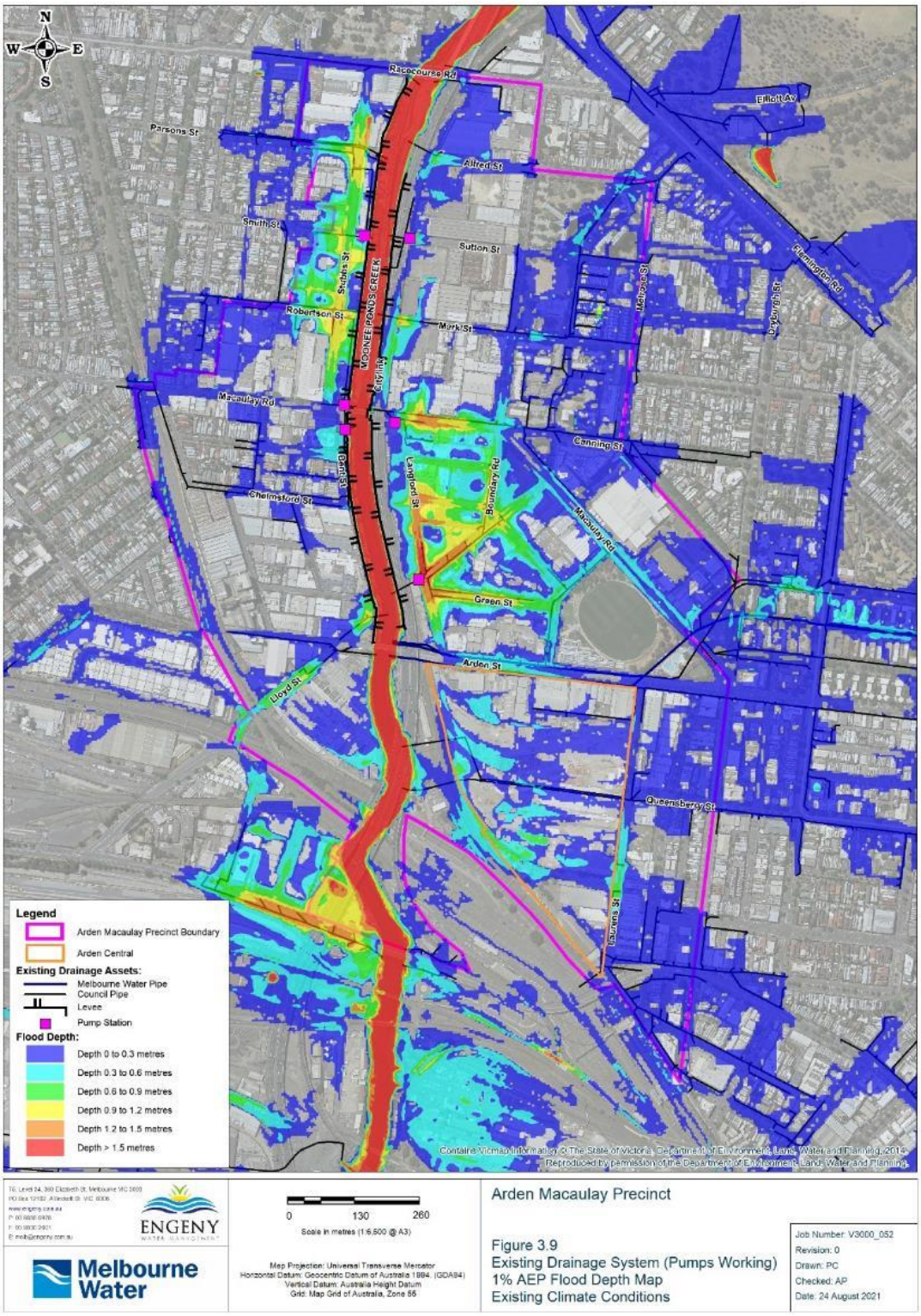
A key constraint that leads to the severity of flooding is the topography of Arden, with significant areas adjacent to Moonee Ponds Creek below the flood level in the creek. While the creek's levees provide some protection to these surrounding areas, the flood modelling shows that the levees are overtopped in the 1% AEP event in the following areas:

- Flow is predicted to break out from Moonee Ponds Creek at the Racecourse Road bridge and then flow behind the eastern levee into the eastern side of Arden.
- Between Mark Street and Macaulay Road (eastern side of Moonee Ponds Creek), levee just overtopped by approximately 0.01 metres.
- Moonee Ponds Creek also overflows into Arden Central, south of Arden Street. There is no formal levee structure at this location.

The levees are not predicted to be overtopped in the 5% AEP event.

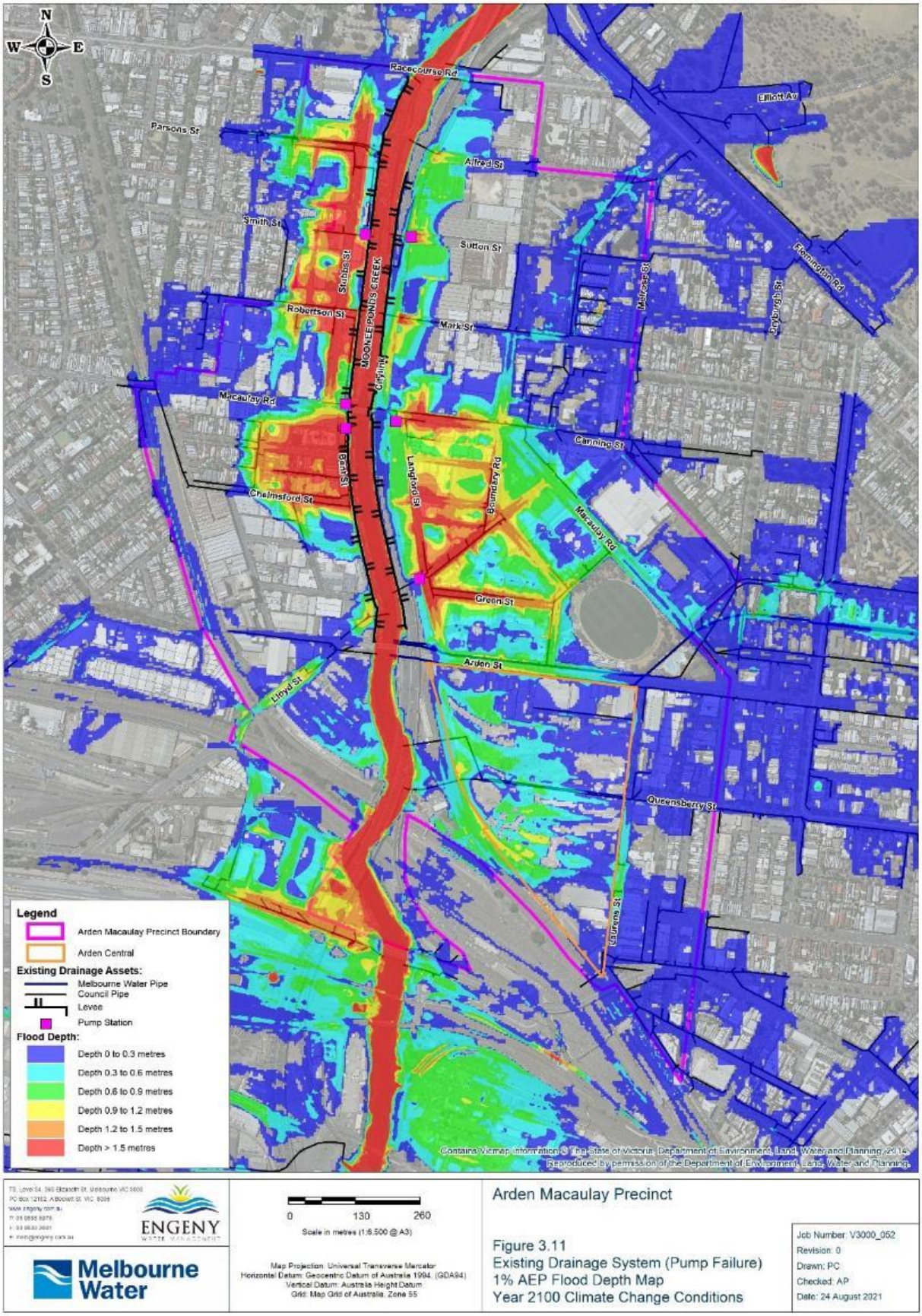
Overall, flooding within Arden for existing conditions can be attributed to the following factors:

- High flood levels in Moonee Ponds Creek overtopping the levees and flowing into low lying areas. The high flood levels in the creek are caused by a combination of flows from the upstream catchment, downstream tidal levels and the hydraulic restriction of bridges.
- Local flows from within Arden and upstream local catchments draining to low lying areas, once runoff is in the low lying areas the drainage system is dependent on the operation and capacity of the pump stations to convey flow into Moonee Ponds Creek when the water level in the creek is higher than the water level in the local catchment. While the existing flood mitigation measures, such as the levees reduce the severity of flooding in the local catchment, it also raises the flood level in the creek, increasing the constraint of the tail water level on the local drainage system.
- Effective drainage of some areas of Arden is limited as not all sections of the drainage system are directly connected to a pump station or are connected by only very small pipes. This includes Melbourne Water's Arden Street Main Drain, which is not directly connected to a pump station. When the flood level in Moonee Ponds Creek at the Arden Street Main Drain outfall is high, the drain is unable to effectively discharge flow, which contributes to the significant inundation predicted around the Langford Street area.



Existing infrastructure under year 2100 Conditions

The results of the flood modelling of the 1% AEP for the year 2100 conditions (but with the existing drainage system retained) predict that the forecast increases in rainfall intensity and sea level rise will have a significant impact on flooding of Arden. Figure 3.11 below provides a flood depth map representing the flood model's predicted flooding in a 1% AEP event for year 2100 climate conditions.



ENGENY WATER MANAGEMENT

Melbourne Water

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Scale in metres (1:6,500 @ A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994, (GDA94)
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55

Arden Macaulay Precinct

Figure 3.11
Existing Drainage System (Pump Failure)
1% AEP Flood Depth Map
Year 2100 Climate Change Conditions

Job Number: V3000_052
Revision: 0
Drawn: PC
Checked: AP
Date: 24 August 2021

The increase in flooding is most evident in the low-lying areas of Arden adjacent to Moonee Ponds Creek. Flooding in these areas increases significantly due to:

- The increased rainfall intensity results in increase flows in Moonee Ponds Creek, while the capacity of Moonee Ponds Creek to convey flows is reduced due to sea level rise. This results in higher flood levels within Moonee Ponds Creek, increasing the flow that overtops the creek's levees in the 1% AEP event and causing more severe flooding of Arden. In the year 2100 scenario the levee on the western side of Moonee Ponds Creek is overtopped along essentially the entire length of the levee downstream of Racecourse Road. The eastern levee is also extensively overtopped, but to a lesser severity than the western levee. There is also an increase in the flow breaking out from Moonee Ponds Creek at the Racecourse Road bridge and flowing behind the eastern levee into the eastern side of Arden due to the higher creek flows in the year 2100 scenario. The levees are not predicted to be overtopped in the year 2100 5% AEP event.
- Runoff generated in the local catchments of Arden also increases due to the increased rainfall intensity in the year 2100 scenario. Drainage from the local catchment into Moonee Ponds Creek is also more constrained due to the high flood levels in Moonee Ponds Creek, which make it harder for the local drainage system to convey flow into the creek. These factors increase flooding in potentially developable areas of Arden.

If Arden is to develop in a high-density residential and innovation precinct, then flood management infrastructure is required to adequately address the flood risk, as the existing infrastructure poses an unacceptable risk to the safety of property and people.

4. Scheme overview

The Infrastructure that is proposed will enable intensive development of Arden, while achieving an appropriate level of service for drainage and appropriate flood protection standards in the year 2100 climate conditions scenario. The planning for the Infrastructure is at a concept level and is subject to revision and refinement as further information becomes available and further investigations are undertaken. The Infrastructure includes the following key components;

- Raised and extended levees for Moonee Ponds Creek;
- Above ground flood storages (retarding basins);
- An underground flood storage tank beneath the Arden Street Oval;
- Upgrades to the three pump stations within Arden;
- Gravity pipe upgrades, including new gravity pipes and upgrades of existing gravity pipes;
- Pressure pipe upgrades, including pressurising part of Melbourne Water's Arden Street Main Drain; and
- Site specific works for Arden Central, including a new pump station, gravity pipes, pressure pipes and swales to convey overland flows.

Annexure 1 provides a layout plan showing the proposed locations and key details of the Infrastructure.

The planning of the Infrastructure has been developed through the investigation of a broad range of potential measures. Some measures that were originally investigated have not been included as they may have been less effective at managing flooding, or were not feasible.

A decision has been taken to adopt a user pays model, whereby developers who obtain the benefit of precinct-wide re-development fund the Infrastructure.

The Urban Renewal Cost Recovery Scheme (**URCRS**) is a cost-recovery mechanism through which developer charges will fund the Infrastructure. It is relevant to note that although Melbourne Water is not funded to pay for this infrastructure from of its present revenues, Melbourne Water will

manage and coordinate the collection of contributions and delivery of critical precinct-scale infrastructure, including the timing of works and who will deliver them, in a cost effective and adaptive manner. URCRS payments are needed, therefore, to provide the necessary Infrastructure that allows Arden to be delivered.

Melbourne Water will develop and manage a scheme for the collection of URCRS in Arden. Arden and Macaulay are separate (but adjacent) planning precincts and have been combined for flood management purposes. The Arden-Macaulay scheme will be structured to maximise cost recovery. Contributions collected by Melbourne Water will equal the planned expenditure on infrastructure works over the expected life of that scheme, initially estimated at 30 years, using a discounted cash flow methodology.

5. Principles for the application of URCRS

The collection of URCRS will be guided by the principles as set out below:

1. Provide an equitable means of sharing the costs of the Infrastructure within Arden;

2. Design Infrastructure to current industry standards, ensuring it is fit for purpose and optimises whole of life costs;

3. Deliver efficient solutions by timing the delivery of the Infrastructure to coincide with the priority needs of Arden as development occurs to provide the maximum benefit.

4. Develop a scheme that is transparent to all stakeholders;

5. Ensure that the view of relevant stakeholders are considered in connection with the planning and development of the Infrastructure;

6. Adopt a user pays approach whereby developers fully fund the Infrastructure; and

7. Ensure fairness and efficiency by regularly reviewing key variables such as growth rates, Infrastructure timing and costs.

6. Which areas are subject to an URCRS charge?

To ensure equity and fairness in how the charge will be levied, and to ensure Melbourne Water capture the maximum amount of contributions, the URCRS will be charged to all development in Arden, including Government land and Government projects, irrespective of whether the development is in an area subject to increased flooding. All re-development in Arden will receive at least one of the following specific benefits from the Infrastructure that will be funded by the URCRS:

- Protection of land from flooding;

- Preservation of access for other properties across land that would otherwise be subject to flooding; or

- Preservation of access to public land, including public open space within Arden.

More broadly, all re-development sites within Arden will benefit from the Infrastructure, as the primary purpose of the Infrastructure is to sufficiently reduce flood risk within Arden to allow for its re-development as a whole. Developments that are not affected by flooding still gain the benefits of being able to develop within Arden, due to the Infrastructure being in place. Melbourne Water

would not support the re-development of Arden without funding of the Infrastructure being provided by the developers through URCRS.

Accordingly, the URCRS will be charged to owners of land subject to re-development across Arden.

7. How will URCRS be collected?

URCRS charges will be collected through the development application process to ensure early notification and transparency of the charge.

Specifically, it will be collected through the planning permit process for approval for subdivisions and buildings and works. Planning permit applications will be referred to Melbourne Water under Section 55 of the *Planning and Environment Act* 1987 (Vic). When Melbourne Water receives this referral it will assess the application and determine whether a developer charge is required under the *Water Act* 1989 (Vic). If it is, Melbourne Water will direct the responsible authority to apply a condition on the permit, should one be issued, that requires the permit holder to enter into an agreement with Melbourne Water for any necessary stormwater, drainage and flood mitigation arrangements, plus the payment of any charges assessed by Melbourne Water under the *Water Act*. Developers will then apply to Melbourne Water for a notice that will outline the relevant URCRS amount, to be issued to the landowner under the *Water Act*. The timing for the payment of URCRS contributions may vary, but it will generally be payable at a definable part of the development process, such as prior to occupancy, which is consistent with the timing of other development charges.

The Infrastructure will include stormwater quality management where it is least cost for the community to do so. Separate to the precinct-scale Infrastructure funded by the URCRS addition to URCRS, developers may still be separately required to provide some onsite stormwater quality treatment to achieve stormwater quality targets set out in applicable planning schemes.

An initial URCRS rate will be set for each scheme. The initial URCRS rate is designed to provide an indicative rate range for developers to consider in their costings at the earliest possible opportunity. An updated URCRS rate will be communicated once more detailed work has been done on the engineering design, financial modelling and stakeholder consultation. Developers will be advised of their calculated URCRS contribution at the permit referral stage or when they seek advice from Melbourne Water for the URCRS rate for their development.

Once the contribution notice is issued and the outstanding amount paid, no further payments will be required even if the URCRS contribution rate is adjusted in later years.

8. Methodology for the calculation of URCRS

The URCRS contribution is calculated based on the gross floor area increase of each particular development. The basis for this approach is that the gross floor area represents the corresponding benefit each user gains from the Infrastructure.

A discounted cash flow methodology is used to calculate URCRS so that the income Melbourne Water receives is equal to the planned expenditure over the expected life of the scheme.

To ensure Melbourne Water is suitably resourced to manage, review and execute the URCRS scheme, a 9% administration fee will be included within the charge . This is consistent with the rate applied to similar existing schemes Melbourne Water currently manages. This charge caters for administration of the charge and regular financial and engineering reviews and updates to URCRS.

Melbourne Water will consult with the development industry on appropriate reporting for these charges, to ensure transparency in the execution of the URCRS.

9. Scope and delivery of the Infrastructure

The Infrastructure is limited to flood mitigation infrastructure that is necessary for the safe use of Arden. Other items such as local stormwater quality solutions, land acquisition, minor drainage works and kerb and channel works associated with road upgrades are not part of the URCRS funded Infrastructure. Any requirements on developers in relation to those items will be managed separately by the relevant authority.

Melbourne Water will manage and coordinate the delivery of critical precinct-scale infrastructure, including the timing of works and determining the most appropriate part to deliver the works. The majority of the Infrastructure will be delivered by Melbourne Water. Subject to approval, Melbourne Water may deliver some work on assets (within the precinct-scale flood management infrastructure plan) that will ultimately be owned by Council; similarly, where agreed, Council may deliver URCRS works which will be reimbursed by Melbourne Water from URCRS contributions. Developers will not be permitted to deliver Infrastructure in lieu of making an URCRS payment.

10. URCRS review

The URCRS will include a process for Melbourne Water to regularly review key variables such as growth and contribution rates, infrastructure delivery timing and costs, to provide transparency, enable updates of the URCRS charge rate and to achieve cost-recovery over the life of the scheme.

The Arden URCRS will be financially reviewed annually and engineering reviews will be undertaken as required. Given that Melbourne Water plans to deliver a significant proportion of the Infrastructure early on in redevelopment of a precinct, engineering reviews are proposed once every 1-2 years for the first 15 years, with 5 yearly reviews thereafter. The URCRS rate will be updated based on these reviews. It is currently proposed that increases in the charge are capped at a maximum of 25% per year, however this should be revisited with any review of the rate for other schemes (such as the Development Services Scheme).

11. Disclaimer

Whilst every effort has been taken in collecting, validating and providing any attached data, Melbourne Water Corporation makes no representations or guarantees as to the accuracy or completeness of the data. The flood modelling and infrastructure maps provided within this Policy are indicative only and have been developed and used for the purposes of the Arden Structure Plan only. Information provided within this Policy should not be taken as flood information advice from Melbourne Water.

Any person or group that uses the data does so at its own risk and should make their own assessment and investigations as to the suitability and/or application of the data. Melbourne Water Corporation shall not be liable in any way to any person or group for loss of any kind including damages, costs, interest, loss of profits or special loss or damage, arising from any use, error, inaccuracy, incompleteness or other defect in the data.

Annexure 1 – Infrastructure Plan for Arden URCRS