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Lilydale Quarry Planning Scheme Amendment

Integrated Water Management Strategy

Reeds Consulting

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Document control

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- Whilst it is acknowledged that by many that global climate is changing, unless otherwise stated, this document has not considered the impacts of climate change.
- **This document is to be read in conjunction with the Stormwater Strategy undertaken for the development**

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Contents

1 Introduction

Reeds Consulting has engaged Incitus to prepare an Integrated Water Management Strategy for the subdivision and development of Lilydale Quarry, the portion of land associated with the Lilydale Quarry Planning Scheme Amendment (Balance Land).

Lilydale Quarry is a former quarry site occupying a site of approximately 163 ha located approximately 34 km east of Melbourne in Lilydale. The site is bounded by Hull Road to the south, Mooroolbark Road to the west, Maroondah Highway to the north and Lillydale Lake to the east. The site is traversed from north to south along the western portion by the Lilydale rail line.

Stage 1, located in the south-west corner, is not part of the Planning Scheme Amendment. This strategy addresses the integrated water management requirements for the balance of the site. It is approximately 144 ha in size. The overall site and Stage 1 are illustrated in **Figure 1.1** below.

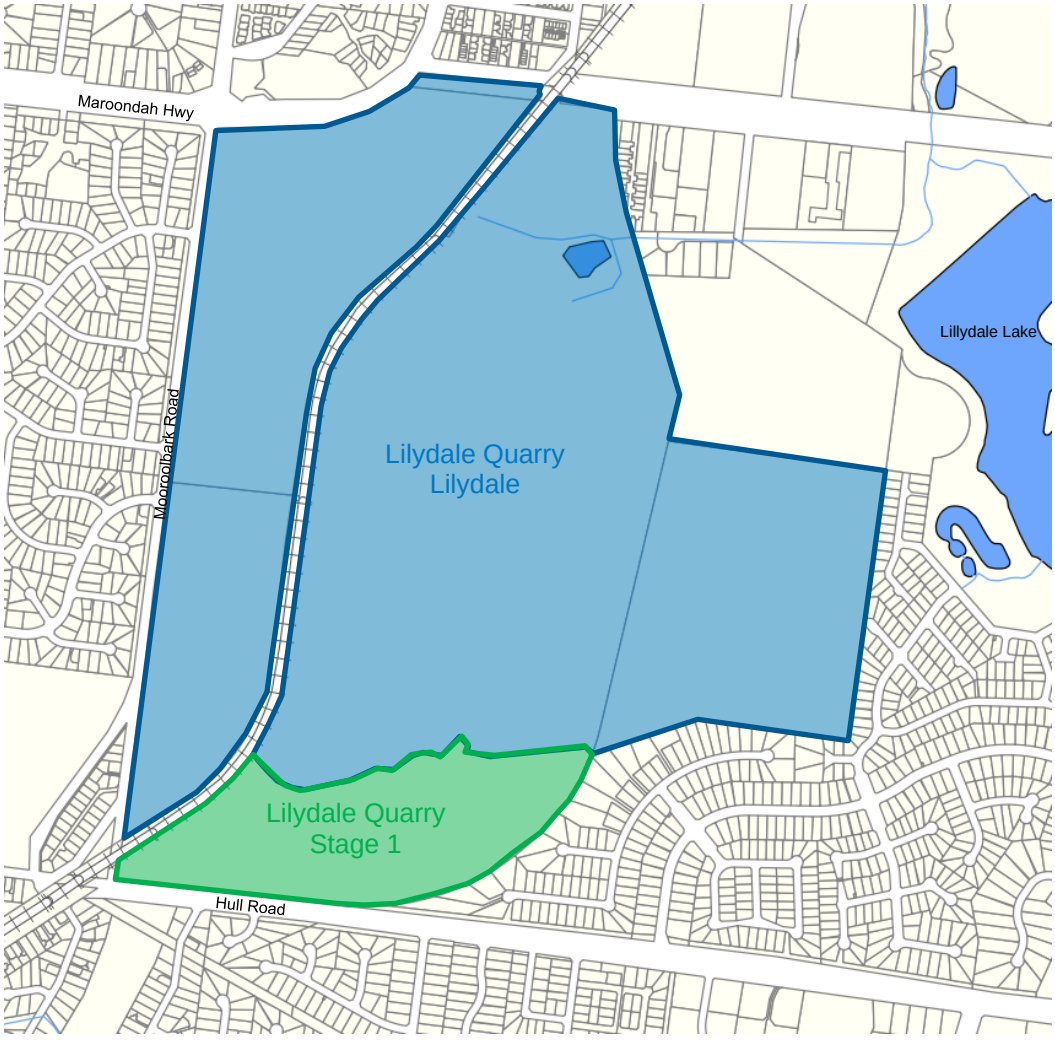

Figure 1.1 Lilydale Quarry, Lilydale

Urbanisation leads to an increase in demand for water supply, an increase in wastewater generated, an increase in stormwater runoff and a subsequent increase in pollutant wash-off. It also has the potential to have detrimental effects on the receiving waterways and increases pressures on drinking water supplies and wastewater treatment plants. In determining the urban structure, it is critical that water management assets are determined early so that an integrated approach can be adopted with respect to the supply of water, the removal of wastewater and the management of stormwater runoff. Adopting an integrated approach to water management will reduce the stress on the natural environment and enhance liveability and resilience for the community.

2 Background

2.1 Integrated Water Management Provisions

In October 2006, the Victorian Government amended the Victorian Planning Provisions (VPP) relating to residential subdivisions, Clause 56. The amendments resulted in the inclusion of Clause 56.07, Integrated Water Management provisions.

The intent of the inclusion of the Integrated Water Management provisions in the planning scheme is to conserve water supplies and ensure the sustainability of the waterways, reducing the stress placed on the water resources and environment by the increase in population.

The intent of Clause 56.07 of the VPPs is to provide sustainable water management options that aim to:

- Integrate use of all water resources including rainwater, stormwater and recycled water
- Conserve the supply and reduce the demand on potable water
- Use alternative water sources to potable water where possible
- Use best practice water sensitive urban design techniques to conserve, recycle and reuse water and to manage the quality of stormwater runoff

To achieve the intent, the provisions include the following objectives:

- Clause 56.07-1 Drinking water supply objectives
- Clause 56.07-2 Reused and recycled water objectives
- Clause 56.07-3 Waste water management objectives
- Clause 56.07-4 Urban run-off management objectives

The objectives for Clause 56.07 are addressed in Section 4.

2.2 Integrated Water Management Elements for the Lilydale Quarry

The Lilydale Quarry redevelopment will incorporate Integrated Water Management. The key elements for Integrated Water Management within the Lilydale Quarry redevelopment include:

- Stormwater quality treatment to best practice pollutant reduction targets prior to discharge to receiving waterways and as outlined in the stormwater strategy, unless otherwise approved by Melbourne Water
- Recycled water supply throughout the development, reducing the overall potable water use through the site
- Incorporation of passive irrigation features where possible and without conflict with other services

The following sections address the integrated water management requirements for the redevelopment of the Lilydale Quarry site.

3 Proposed Development Layout

The proposed development layout for the redevelopment of Lilydale Quarry will be conducive to standard servicing with utilities. The proposed development layout is illustrated in **Figure 3.1**. It should be noted that this development layout is conceptual only, indicative of the general intent for development of the site. It is subject to change throughout the development of each separate Precinct.

Figure 3.1 Development Layout for Lilydale Quarry (Balance Land)

4 Integrated Water Management Provisions

4.1 Drinking Water Supply Objectives

Clause 56.07-1 is regarding drinking water supply. The objectives are:

- To reduce the use of drinking water
- To provide an adequate, cost-effective supply of drinking water

There are several opportunities to reduce the use of drinking water. They include the utilisation of non-potable water sources where appropriate, the incorporation of water efficient fittings and appliances, and increasing community awareness regarding water use.

The redevelopment of the Lilydale Quarry is a mandated recycled water development. Yarra Valley Water will supply the development with a dual pipe supply including potable water supply and recycled water supply in a purple pipeline. The recycled water will be supplied from treated effluent with the intent that the purple pipeline supply may be adopted for outdoor use, laundry use where practical and toilet flushing where practical.

As the site is a mandated recycled water development, the Lilydale Quarry site will provide all allotments with dual water supply including potable water and recycled water. This will reduce the use of drinking water within the development.

Since the revision of the Victorian Planning Provisions, the minimum standards for new residential dwellings has also been amended. The Victorian Building Authority require new dwellings to achieve a minimum of a six star standard. The six star standard applies to the thermal performance of a home, renovation or addition and includes the installation of either a solar hot water system or a rain water tank for toilet flushing. Rain water tanks may be installed on dwellings through the redevelopment for toilet flushing. Utilising harvested rainwater for toilet flushing will reduce the use of drinking water.

Also, since the revision of the Victorian Planning Provisions, the Australian Standard for Plumbing and Drainage AS3500 (2015) has been revised. This standard specifies the maximum flow rate allowable from a kitchen sink, a bathroom sink, a laundry sink and a shower, as 9 L / minute. The restrictions are applied through the adoption of the appropriate fixtures labelled using Water Efficient Labelling and Standards (WELS).

WELS became mandatory from 1 July 2006. At the time, the standard shower head usage was 15 – 25 L / minute. A 3 star WELS rated shower head has a maximum flow of 9 L / minute. This is a 40% saving in water usage on the standard showerhead.

WELS also sets the minimum water efficiency standards for washing machines and toilets. Toilets must not use more than 5.5 L for their average flush consumption. Washing machines must achieve a minimum of a 3 star WELS rating. Exceeding the minimum water efficiency standards will result in a reduction of drinking water use.

The supply of drinking water will be in accordance with the requirements and to the satisfaction of Yarra Valley Water. Drinking water will be provided to the boundary of all lots in the subdivision to the satisfaction of Yarra Valley Water.

The development may incorporate passive irrigation of street trees within the development with stormwater runoff where possible and without conflict with other services. This will reduce the use of drinking water for irrigation within the development.

4.2 Reused and Recycled Water Objectives

Clause 56.07-2 is regarding reused and recycled water. The objectives are:

- To provide for the substitution of drinking water for non-drinking purposes with reused and recycled water

As discussed in the drinking water supply objectives, the development will be reticulated with a dual water supply incorporating a potable water main and a recycled water main.

The dual water supply reticulation will be provided to the boundary of each allotment. The recycled water main will be distinguished from the potable water main as it will be encased in a purple pipe.

It is envisaged that the recycled water will be utilised for non-drinking purposes including outdoor use such as garden watering and car washing. The recycled water can also be plumbed into the dwellings for uses such as toilet flushing and laundry supply, reducing the demand on drinking water.

The recycled water supply system will be designed, constructed and managed in accordance with the requirements and to the satisfaction of Yarra Valley Water, the Environmental Protection Authority and the Department of Health and Human Services.

Also, as discussed in the drinking water supply objectives, the allotments may incorporate rainwater tanks to comply with the Victorian Building Authority's minimum six star ratings. The harvested rainwater from the tank can be utilised for non-drinking purposes such as outdoor use, toilet flushing and laundry supply. All of these uses provide a substitution of drinking water for non-drinking water purposes with reused water.

The development may incorporate passive irrigation of street trees within the development with stormwater runoff where possible and without conflict with other services.

4.3 Waste Water Management Objectives

Clause 56.07-3 is regarding waste water management. The objectives are:

- To provide a waste water system that is adequate for the maintenance of public health and the management of effluent in an environmentally friendly manner.

Adoption of demand management for the development will result in a reduction in waste water generated from the development. A reduction in waste water will contribute to a more environmentally friendly management of the waste water.

A reduction in waste water may result in a reduced pipe size required for conveyance of the waste water. This results in less materials used for construction of the pipe. A reduction in waste water generated will result in a reduced volume for treatment, using less energy and discharging less harmful gases to the environment.

The waste water system will be designed, constructed and managed in accordance with the requirements and to the satisfaction of Yarra Valley Water and the Environmental Protection Authority.

The waste water system will be consistent with any relevant approved domestic waste water management plan.

The reticulated waste water system will be provided to the boundary of all lots in the subdivision to the satisfaction of Yarra Valley Water.

4.4 Urban Run-off Management Objectives

Clause 56.07-4 is regarding urban run-off management. The objectives are:

- To minimise damage to properties and inconvenience to residents from urban runoff
- To ensure that the street operates adequately during major storm events and provides for public safety
- To minimise increases in stormwater runoff and protect the environmental values and physical characteristics of receiving waters from degradation by urban runoff

The stormwater strategy for the redevelopment of Lilydale Quarry, *Lilydale Quarry Planning Scheme Amendment (Balance Land) Stormwater Strategy*, outlines the plan for the stormwater infrastructure required to ensure that the new development within this precinct meets appropriate standards for flood protection, water quality, waterway health and amenity.

The *Lilydale Quarry Planning Scheme Amendment (Balance Land) Stormwater Strategy* has outlined a holistic approach to stormwater management that locates major stormwater assets at the optimum locations for the catchment and the community. This includes the incorporation of multifunctional drainage assets that combine drainage objectives such as retardation and stormwater quality treatment.

These assets are positioned at the optimum locations within the catchment and service larger scale catchments, reducing the overall cost of development whilst enhancing liveability. Providing catchment scale assets removes the ad-hoc approach to stormwater management that would otherwise occur. It allows for ideal assets that provide the best outcomes for the receiving waterways.

Figure 4.3 illustrates the catchment delineation for the Lilydale Quarry redevelopment.

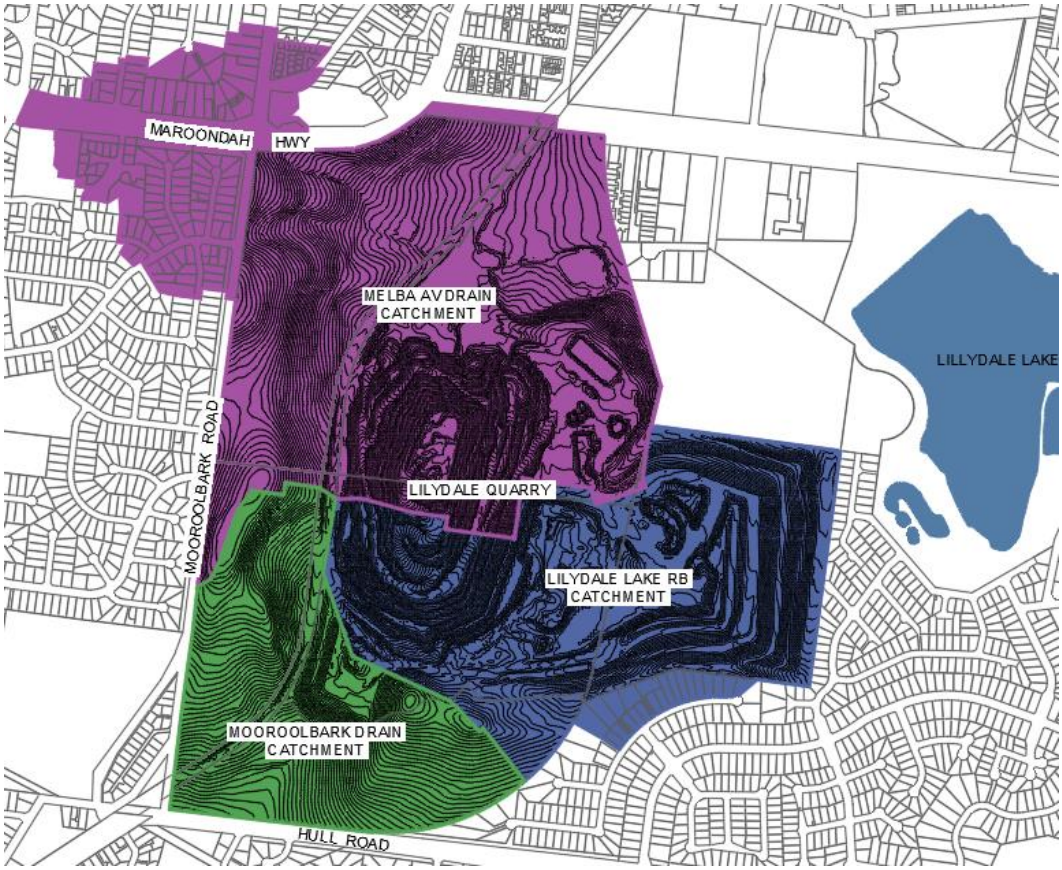

Figure 4.3 Catchment Delineation and Major Stormwater Assets for Lilydale Quarry

The Mooroolbark Drain catchment provides on-site treatment and retardation prior to discharging from the site at Hull Road.

The Lillydale Lake RB catchment will provide on-site treatment in a constructed wetland system located in the north-east corner of the site prior to discharging into the Lillydale Lake. Melbourne Water advised that the stormwater runoff from this catchment can be retarded in the Lillydale Lake Retarding Basin and that no on-site retardation is required for this catchment.

The stormwater runoff from the Melba Avenue Drain catchment will be treated in a proposed constructed wetland system to be located on Council owned land in the overall Lillydale Lake parkland. The runoff from this catchment will not be retarded so that there is no increase in peak 1% AEP design flow in Olinda Creek at Maroondah Highway.

The drainage system for the redevelopment of the Lilydale Quarry site will be designed to prevent property flooding occurring in a 1% Average Exceedance Probability (AEP) storm event and the stormwater runoff can be safely conveyed through the development. To achieve this, the development will adopt a minor / major drainage system philosophy.

The minor drainage system will consist of a subsurface pipe network designed to capture and convey all stormwater runoff generated from the catchment for rainfall events up to and including the 20% Average Exceedance Probability (AEP) design storm for residential catchments; and for rainfall events up to and including the 5% AEP design storm for commercial catchments.

Localised catchments for the minor drainage system with an area less than 60 ha will have the system designed in accordance with the Victorian Planning Authority's Engineering Design and Construction Manual. The design will ensure that ponding does not occur on the roads after cessation of the rainfall event for more than 1 hour. Where the catchment exceeds 60 ha, the system will be designed in accordance with Melbourne Water guidelines.

The primary objective of the major drainage system is to provide flood protection for the allotments based on the 1% AEP storm event and to ensure the overland flow can be safely conveyed through the development. This will be via overland flow paths contained within road reserves. The development will be designed so that the allotments are set a minimum of 150 mm above the overland flow conveyed through the road reserves, or 600 mm above the 1% AEP flood level associated with a drainage reserve; whichever is greater.

It is imperative that the development conveys the overland flows safely along road reserves. This requires ensuring the overland flow along major flow paths complies with floodway safety requirements. The recommended safety limits for residential developments are as follows (from the *Guidelines for Development in Flood Affected Areas* and adapted from Australian Rainfall and Runoff):

At the entrance to lots and access ways:

- V.dmax <= 0.3 m^2/s
- Vmax <= 2.0 m/s
- dmax <= 0.30 m

For small cars and children:

- V.dmax <= 0.3 m^2/s
- Vmax <= 3.0 m/s
- dmax <= 0.30 m

The subsurface drainage network will be provided to the boundary of all lots in the subdivision in accordance with the requirements and to the satisfaction of the Yarra Ranges Shire Council. Where possible, the allotments will be graded to the front with the legal point of discharge in the street drainage. The drainage system will be designed to ensure that the inlet structures account for the effects of obstructions and build-up of debris.

5 Lilydale Quarry Planning Scheme Amendment Integrated Water Management Elements

5.1 Stormwater Quality Treatment

Stormwater quality treatment to best practice pollutant reduction targets prior to discharge to receiving waterways and as outlined in the stormwater strategy, unless otherwise approved by Melbourne Water

The Lilydale Quarry redevelopment has 3 distinct catchments:

- Mooroolbark Drain Catchment
- Lillydale Lake Retarding Basin Catchment
- Melba Av Main Drain Catchment

Each catchment proposes to incorporate stormwater quality treatment to achieve best practice pollutant reduction targets prior to discharging into the receiving waterways.

The final design, location and boundary of stormwater quality treatment infrastructure and associated paths, boardwalks, bridges, and planting must be to the satisfaction of Melbourne Water and the responsible authority. The areas identified in the stormwater strategy may be changed or modified to the satisfaction of Melbourne Water and the responsible authority. Management responsibility for drainage and water quality assets may also be subject to change.

Development staging must provide for the delivery of drainage infrastructure, including stormwater quality treatment. Where this is not possible, development proposals must demonstrate how any interim solution adequately manages and treats stormwater generated from the development and how this will enable delivery of an ultimate drainage solution, all to the satisfaction of Melbourne Water and the responsible authority.

Mooroolbark Drain Catchment

The Stage 1 development of Lilydale Quarry has addressed the stormwater quality treatment requirements for the catchment discharging to Mooroolbark Drain. The stormwater strategy undertaken for Stage 1 should be read in conjunction with this report.

The Mooroolbark Drain catchment of Lilydale Quarry will include a sediment basin and a rain garden to provide treatment to the stormwater runoff generated form the urbanisation of the catchment. The stormwater quality treatments will be located in the drainage reserve assigned for the retarding basin at Hull Road, creating a multifunctional stormwater asset.

Lillydale Lake Retarding Basin Catchment

The Lillydale Lake Retarding Basin catchment will include a constructed wetland system to provide treatment to the stormwater runoff generated form the urbanisation of the catchment. The stormwater quality treatment will be located in the drainage reserve prior to discharging into the Lillydale Lake parklands.

The constructed wetland system, consisting of a sediment pond and macrophyte zone, will have a treatment footprint of 1.15 ha to achieve best practice pollutant reduction targets for the site discharging at this location. The constructed wetland system will be situated in a 2.45 ha drainage reserve and will be designed in accordance with Melbourne Water guidelines for constructed wetlands.

Melba Avenue Main Drain Catchment

The Melba Avenue Main Drain catchment will include a constructed wetland system to provide treatment to the stormwater runoff generated from the urbanisation of the catchment. The stormwater quality treatment will be located in Council owned land within the overall Lillydale Lake parklands.

The constructed wetland system, consisting of a sediment pond and macrophyte zone, will have a treatment footprint of 1.13 ha to achieve best practice pollutant reduction targets for the site discharging at this location. The constructed wetland system will be situated in a 2.3 ha drainage reserve and will be designed in accordance with Melbourne Water guidelines for constructed wetlands.

5.2 Recycled Water Supply

The development will be reticulated with a dual water supply incorporating a potable water main and a recycled water main.

The dual water supply reticulation will be provided to the boundary of each allotment. The recycled water main will be distinguished from the potable water main as it will be encased in a purple pipe.

It is envisaged that the recycled water will be utilised for non-drinking purposes including outdoor use such as garden watering and car washing. The recycled water can also be plumbed into the dwellings for uses such as toilet flushing and laundry supply, reducing the demand on drinking water.

5.3 Passive Irrigation Features

Where possible, the development may incorporate passive irrigation features. Passive irrigation provides irrigation to street trees and garden areas utilising stormwater runoff from surrounding impervious surfaces. Passive irrigation provides the following benefits to the development:

- Irrigation with an alternative water source promoting more sustainable street trees and vegetation;
- Assists with the creation of green links throughout the development;
- Helps to reduce the heat generated in road reserves from the impervious surfaces creating cooler commutes for the community;
- Disconnects impervious surfaces from the stormwater system, reducing the regular stormwater discharging from the development and benefiting the health of the receiving waterways.

5.4 Precinct Integrated Water Management Strategies

The comprehensive development zone schedule requires that an Integrated Water Management Strategy is prepared for each precinct before a permit can be granted by Council. The Integrated Water Management Strategy for each precinct should include (where relevant):

- An assessment of how the objectives of the *Lilydale Quarry Planning Scheme Amendment Integrated Water Management Strategy* have been addressed;
- An assessment of how the objectives of the *Lilydale Quarry Planning Scheme Amendment (Balance Land) Stormwater Strategy* have been addressed;
- Specific approaches to capture, treat and reuse stormwater across the Precinct;
- Details of proposed urban water management, including water supply, wastewater, flood resilience, urban waterway health, and management of public spaces;
- Details of potable water use, wastewater and stormwater capture, reuse and discharge processes in accordance with best practice water sensitive urban design principles;
- Design detail to ensure flooding on and off site and downstream is managed and there is no deterioration in water quality in the area surrounding the land as a result of development.

6 Conclusion

The development of Lilydale Quarry, the portion of land associated with the Lilydale Quarry Planning Scheme Amendment (Balance Land), will adopt an integrated approach to water management. The development will achieve reductions on drinking water through the adoption of water efficient appliances within households, in accordance with AS3500 (2015), WELS and the supply of recycled water to each property boundary.

A reduction in water usage will result in a reduction in waste water generated. In turn, this results in a more environmentally friendly removal and treatment of the waste water.

The development is providing catchment scale treatment and retardation of stormwater runoff in accordance with current best practice stormwater management objectives.

The development will provide pipe drainage infrastructure to convey the 20% AEP design flows for residential areas, pipe drainage infrastructure to convey the 5% AEP design flows for commercial areas; and minimise nuisance flooding occurrences in regular rainfall events. The gap flows, i.e. the difference between the 1% AEP design flows and the pipe flows, will be safely conveyed through the development along road reserve corridors.

The development may incorporate passive irrigation features where possible to disconnect the impervious surfaces and provide irrigation to vegetation with an alternative water source.

The water management infrastructure supplied to the development will be designed and constructed in accordance with and to the satisfaction of the approval authorities.

The integrated water management will be successfully implemented with a suitable development layout.

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