GREATER DANDENONG
City of Opportunity

SUSTAINABLE STORMWATER STRATEGY 2017-37

CONTENTS

1. INTRODUCTION

In Victoria, the primary objective of a local government, as stated in the Local Government Act 1989, is "to endeavour to achieve the best outcomes for the local community having regard to the long term and cumulative effects of decisions". Council is responsible for the provision, maintenance and renewal of local drainage infrastructure. Council must therefore consider a number of factors – including social, economic, environment and health factors – to meet its drainage responsibilities.

This Sustainable Stormwater Strategy provides a strategic framework and policy direction for the City of Greater Dandenong, having regard to its legislative requirements, the long-term management of its assets and of flood risks. This strategy builds upon the current Council Plan 2013-2017 and existing implementation of policy, whilst providing further targeted directives for consideration in the development of future Council's Annual Plans through the Planning Cycle.

It also aims to continue to develop the City's potential to attract further investment and to improve the civil infrastructure to support projected population growth and future development.

This strategy will be reviewed in 5 years.

INTRODUCTION

Vision

The Greater Dandenong Sustainable Stormwater Strategy has been developed and guided by the following aim and vision:

To develop and manage the drainage and waterways assets to create a clean, attractive, safe, resilient and environmentally sustainable City, where current and future generations enjoy a high quality of life.

Key Objectives

The purpose of the Strategy is to provide direction for Council and its key stakeholders, including its strategic partners, to support the delivery of the following objectives within the City of Greater Dandenong:

1. Understand, manage and reduce flood risks;
2. Understand, manage and mitigate pollution risks;
3. Understand community's need and expectations in respects to stormwater management;
4. Engage with residents and local businesses to improve our asset management; and
5. Manage and enhance our waterways and parks for the benefit of our community.

Structure of the Strategy

The City of Greater Dandenong is one of Melbourne's major growth centres, is a major industrial hub and includes a significant proportion of the Green Wedge. It includes residential areas – new and old – in the suburbs of Dandenong, Springvale, Noble Park, industrial areas in Dandenong South and rural areas in Lyndhurst and Bangholme. As a result, our priorities and the challenge we encounter vary between areas.

The Strategy provides an overview of the challenges we encounter across these different areas and how we aim to tackle them. Figure 1 shows the different areas consider as part of the strategy, each with their own set of objectives and actions:

THE NORTHERN CATCHMENTS – areas predominantly residential where our main priority is to protect our community from flood damages (pgs 12–27)

NEW RESIDENTIAL AREAS – new residential areas where our main priority is to maintain high amenity features (pgs 30-35)

INDUSTRIAL AND COMMERCIAL ZONES – a mix of older commercial/industrial areas and newer ones in Dandenong South where our main priorities are to protect local businesses from flood damages and minimise pollution (pgs 36-41)

GREEN WEDGE – mostly rural areas where our main priorities are to protect and assist our community during floods and to protect existing ecological values (pgs 42-47)

PARKS, RESERVES AND WATERWAYS – Council's role is to provide community spaces, such as parks, sporting facilities and green open-spaces and, in line with the Council Plan, we aim to maintain parks to a high standard (pgs 48-55)

Reporting

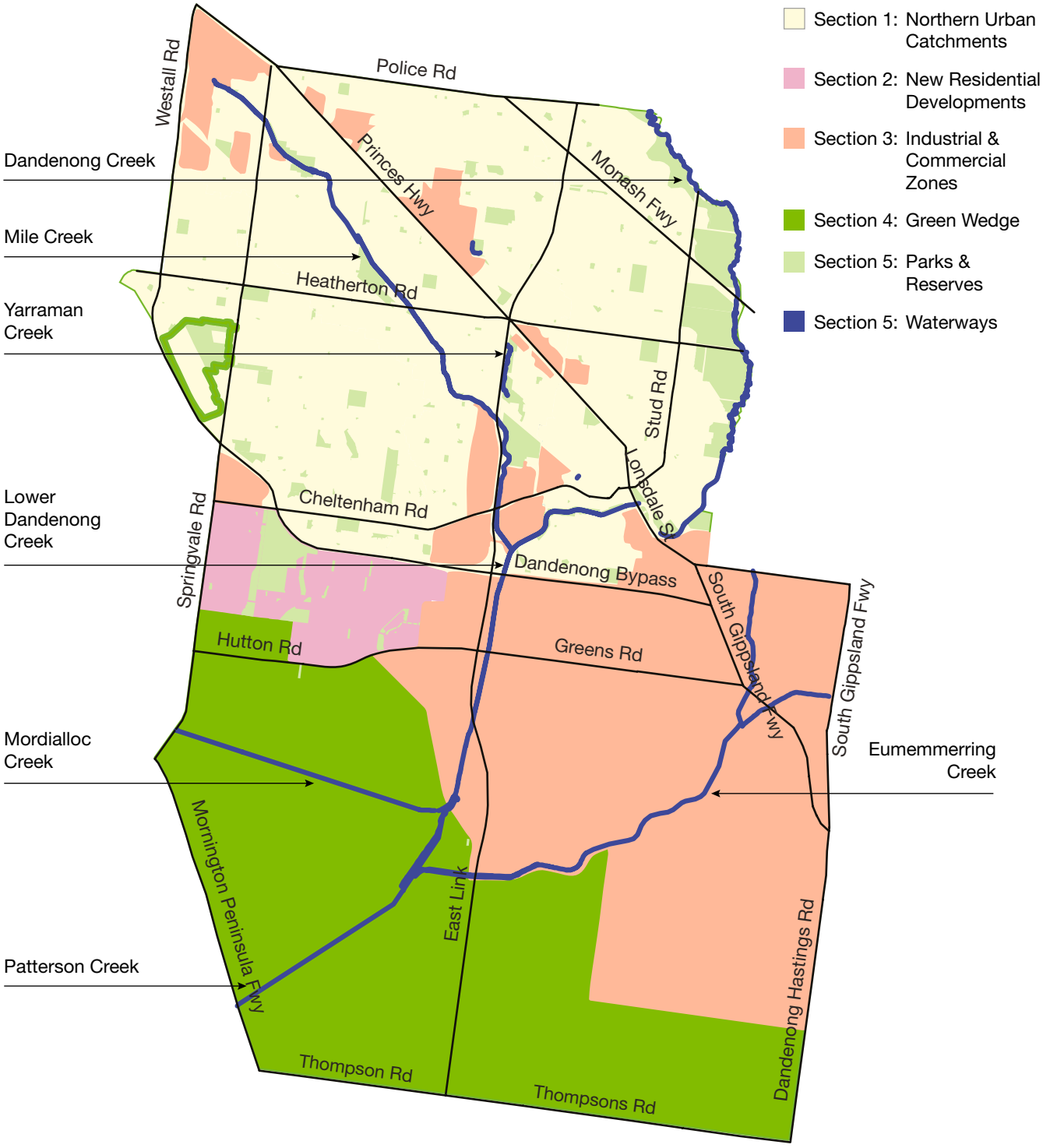
Key documents that will be used to assist in monitoring and reporting on this strategy and its key actions include:

1. Annual Update and Quarterly Reports for the Sustainable Stormwater Strategy
2. Annual Business Plan and Updated Council Plan.

Each of these key documents will review, update and report on:

- Identified indicators;
- Progress of key strategic priorities; and
- Recommended actions for implementation by responsible Business Units.

Figure 1 – Areas of the Strategy



2. BACKGROUND

In order to provide the best outcomes for its community and meet its obligations under the Local Government Act 1989, Council works with a number of stakeholders and must comply with key legislation and documents.

A brief description of the key stakeholders and key legislation are given below.

Key stakeholders

The key stakeholder groups of the community who are users of the stormwater drainage network, are affected by it, or influence its management include:

1. **Council** – Council is responsible for carrying out the management functions on local drainage within catchments smaller than 60ha and excluding assets managed privately and by VicRoads.

   Under the objectives of the *Local Government Act* 1989, Council has a duty of care to provide equitable and appropriate services for the community. Council must also ensure that those services are managed efficiently and effectively. Council responsibilities include advocating to both the Commonwealth and Victorian Government agencies to improve and upgrade drainage assets not owned by Council.

   Council has developed a number of documents to assist in the discharge of the City of Greater Dandenong's stormwater drainage management duties. These are discussed in on page 7.

   As a land use planning authority, Council also needs to ensure appropriate planning controls (e.g. overlays, planning conditions) are placed and enforced, to ensure that all new developments comply with stormwater objectives (quantity and quality management) and/or contributes to a Melbourne Water Drainage Scheme.

2. **Melbourne Water** – Under the "Statement of Obligations" issues by the Minister for Water under the *Water Industry Act 1994*, Melbourne Water's obligations include the provision of a "safe and effective system for dealing with storm runoff, a reduced risk of flooding in priority areas and the prevention of inappropriate development in flood-prone areas". As such, Melbourne Water is responsible for waterway and drainage infrastructures in catchments greater than 60ha. Melbourne Water is also responsible for the development of Drainage Schemes in collaboration with Council.

   Melbourne Water is also responsible for waterway management in municipal areas. In the case of Greater Dandenong, the waterways include Mile Creek and Dandenong Creek.

3. **VicRoads** – VicRoads is the coordinating road authority for State roads (freeways and declared arterial roads). Therefore, it is responsible for carrying out the management functions of pits and pipes associated with freeways and declared arterial roads. Demarcation of responsibilities between VicRoads and Council, is illustrated in Figure 1.1.

4. **Victoria State Emergency Service (VICSES)** – VIC SES is the control agency for flood, storm, tsunami and earthquake events in Victoria. They are responsible for managing responses to these emergencies and helping communities to prepare through planning and education. One of its primary responsibilities is to coordinate emergency preparation and response for flood event. VIC SES work in partnership with local councils through their Floodsafe program (http://www.ses.vic.gov.au/prepare/floodsafe).

5. **The Department of Environment, Land, Water & Planning** (DELWP) – DELWP (formerly the Department of Primary Industries) is responsible, as its name suggests, for water management and the management of a number of reserves across Victoria.

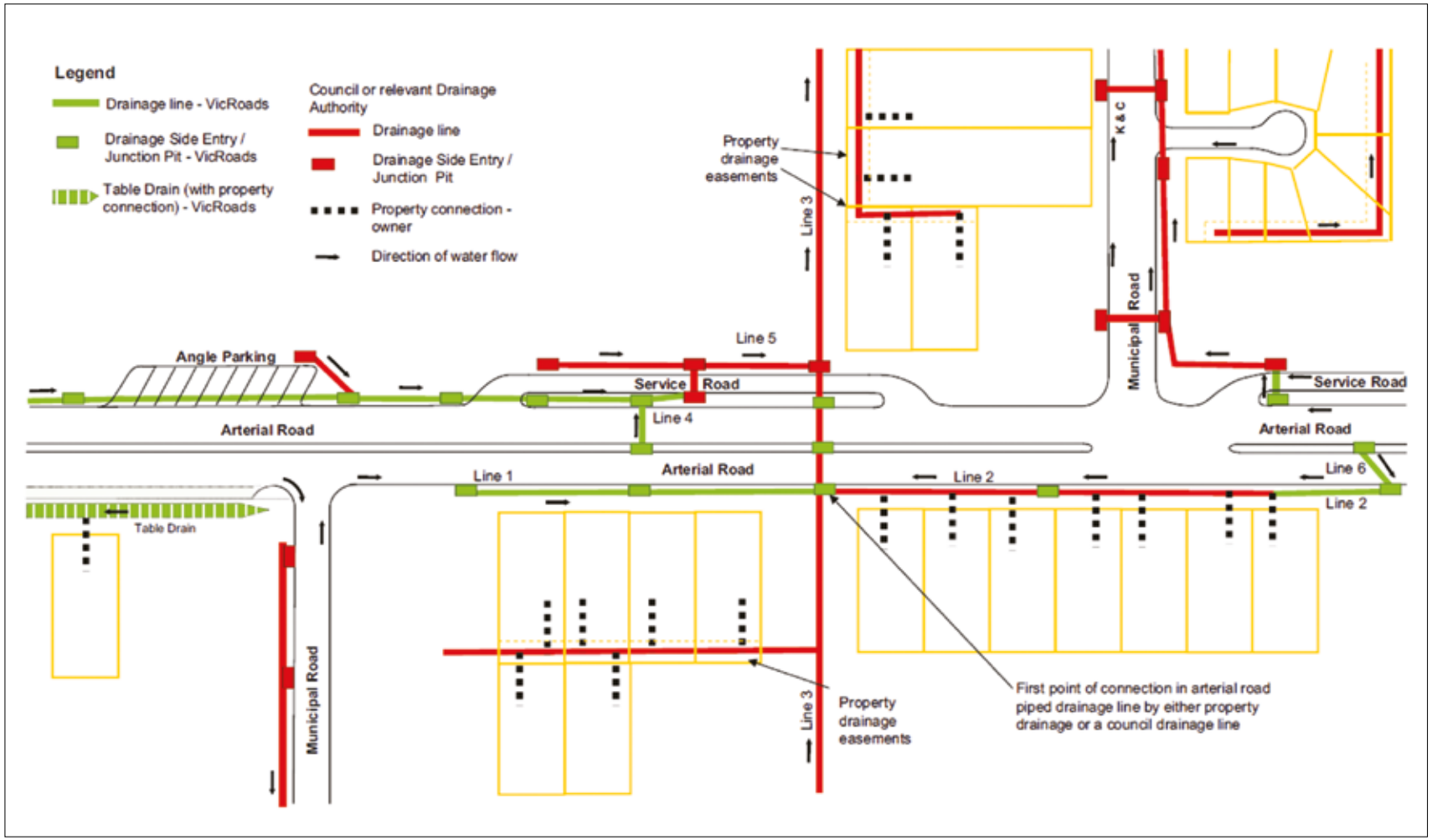
   Importantly, DELWP recently released the Draft Floodplain Management Strategy "in response to the flood emergencies that followed record rainfall across Victoria in 2010–2011". The draft strategy indicates that the Victorian Government will focus on flood alleviation and prevention. As a result, the funding and implementation of local flood studies are initiatives placed forward by the State government. The City of Greater Dandenong generally supports the vision and objectives of the draft strategy, as this document considers a wider range of flood mitigation measures compared to previous strategy, including non-structural measures.

6. **The Environment Protection Authority (EPA)** is an independent authority that reports to DELWP. Its responsibilities include protecting Victoria's waters and therefore regulating pollution through environmental laws, policies and regulatory controls. This agency will respond to pollution incidents and assist the emergency response during flood events. The City of Greater Dandenong regularly works in collaboration with the EPA, to ensure Council's compliance and enforcement activities deliver better outcomes for the community.

7. **Residents** – Private drains should be managed, operated and cared for by private parties. The property owner is responsible for the internal stormwater drains and any section of the private drain outside of their property, until it connects to the legal point of discharge. The property owner is also responsible for the reinstatement of any assets disturbed during the maintenance and repair to private drains, including Council assets such as footpath.

   Whilst these private drains may connect to Council's drainage infrastructures, Council is under no statutory duty to inspect, maintain and repair these private drains.

Figure 1.1 – Drainage Responsibilities[1]



[1] from *VicRoads' Code of practice for operational responsibility for public roads – Consultation Draft* (June 2013). Draft prepared for consultation purposes only

BACKGROUND

Legislation

Through infrastructure provision, Council has to comply with various legislative requirements, Standards and Codes of Practice, which determine Council and other stakeholders' responsibilities relative to stormwater management. These include:

- ***Local Government Act* 1989** – The primary objective of a local government, as stated in the Local Government Act 1989, is "to endeavour to achieve the best outcomes for the local community having regard to the long term and cumulative effects of decisions". As such Council is responsible for the provision, maintenance and renewal of vested drainage infrastructure within catchments smaller than 60ha.
- ***Victorian Building Act* 1993 and Victorian Building *Regulations* 2006** – This Act and associated regulations aim to regulate building work and building standards. Under the regulations (Section 610), Council possesses regulatory power to control private stormwater discharge to the municipal drainage system. The design of every private stormwater drainage system must also be approved by a registered (building practitioner) building surveyor.
- Under the regulations (Section 807), areas liable to flooding are to be incorporated as 'designated special areas' in the municipal district maps. Council may therefore attach conditions, such as minimum finished floor levels, to those areas, to ensure that new developments are considered in light of existing flood risk and overland flowpaths.
- ***Emergency Management Acts*** – The *Victorian Emergency Management Act* 1986 was passed to provide for the organisation of emergency management in Victoria. The City of Greater Dandenong Council must prepare and maintain a municipal emergency management plan under the *Emergency Management Act* 1986. The current Municipal Emergency Management Plan gives due consideration to flood risk and further details are given in on page 7.

- ***Environment Protection Act* 1970** – This act enables the Environment Protection Agency (EPA) to work with the community to protect and improve our environment, including our waterways.
- ***Water Act* 1989** – This legislative document details the responsibility of residents and land owners in respect to water management, including stormwater management. Under the Act (Section 16) residents and property owners are liable for flow of water arising from their land. Additionally, they have a duty of care not to interfere with reasonable[2] flow or by negligent conduct interfere with any flow of water onto any land. Council is not however delegated under this Act, and have therefore limited enforcing power.

  The Victorian Government is currently reviewing, updating and consolidating the *Water Act* 1989 and the *Water Industry Act* 1994. The Exposure draft was released in 2014 and it is aimed that the new Act will come into effect in 2016. Key changes in the Water Bill Exposure Draft that impact on Council include recognition of Council as a drainage authority and the right of Council to extract and re-distribute stormwater from its assets.

***Planning and Environment Act* 1987** – This Act was created to establish a framework for planning the use, development and protection of land in Victoria in the present and long-term interests of all Victorians. The Planning Scheme allows for stronger planning controls in flood-prone areas (e.g. Special Building Overlay, Urban Floodway Zone), to ensure new developments are considered in light of the flood risk and existing overland flow paths.

- **Clause 56 of the Victoria Planning Scheme** – this clause, applicable for residential subdivision only, provides sustainable water management requirements, including the use of best practice water sensitive design techniques to conserve, re-use and recycle water and manage the quality of stormwater runoff. These requirements generally result in the construction of water quality treatment devices – such as raingardens and wetlands – that are ultimately adopted by Council or Melbourne Water. The clause is not however, applicable to a significant proportion of the development currently occurring in Greater Dandenong, such as multi-unit and infill developments.
- **State Environment Protection Policies (SEPP) 2003 (amended in 2006)** – the SEPP sets out environmental quality objectives and indicators to measure whether beneficial uses are being protected. Clause 17 outlines Council's role in 'protecting surface waters through a number of responsibilities, including stormwater, floodplain, drainage and vegetation management [...]'. It may therefore be argued that Council must maintain the function of vested water quality assets – such as Gross Pollutant Traps and raingardens – to meet its SEEP obligations.

[2] Matters to be taken into account into consideration to determine "reasonable flow" are defined in Section 20 of the *Water Act* 1989.

Supporting Council documents

This strategy has been developed based on a review of Council's 2009 Municipal Drainage Strategy. This Sustainable Stormwater Strategy has been developed to account for progress made since and to promote an integrated approach to storm water management.

This Strategy is informed by a number of supporting documents, as detailed below:

1. **Council Plan 2013-2017** – The current Council Plan has been developed to guide the current Council over the four years of its elected term. One of the priorities of the current Plan is for an *effective planning and management of Council's infrastructure to ensure it is responsive to contemporary environmental conditions* (Priority 4.5). Council has developed an Asset Management Policy to achieve this objective.

2. **Asset Management Policy** – Council has developed its Asset Management Policy to ensure comprehensive and effective asset management practices are adopted by Council. This policy should be considered as an extension of Council's commitment "to the identification and management of all risks associated with the performance and delivery of council function and services" (Council Risk Management Policy, adopted in January 2015).

   The Asset Management Policy is supported by the Asset Management Strategy and the Asset Management Plans, which will ultimately improve Council's asset maintenance and renewal procedures. A drainage specific Asset Management Plan has been developed to document the level of service associated with drainage infrastructure.

   The above Asset Management documents consider the life cycle of our assets, life from inception through to disposal. Relevant financial forecasts to maintain the assets in a safe and functional condition subsequently inform Council's long term financial strategy.

3. **Long-Term Financial Strategy** – Council has limited resources, both in terms of personnel and financially. Long Term Financial Strategy plans for the ongoing financial sustainability of the Council and works to ensure Council assets are maintained in the future. This document provides a blueprint for Council to work from.

   The major financial challenge facing Council is funding its asset renewal. Council's assets were largely constructed between the 1960s and 1980s and would need to be replaced over the coming decades. The Long Term Financial Strategy provides a responsible framework that balances the need for more infrastructures funding and sustainable financial management.

4. **Flood Mapping** – In partnership with Melbourne Water, Council has undertaken an extensive modelling exercise to assess flood risks in the northern areas of the municipality. The results of this work are discussed in the Northern Urban Catchments section of this document and are ultimately, intended to be included as an overlay into the Greater Dandenong Planning Scheme.

5. **Flood Operational Documents** – Through the review and development of Greater Dandenong's Risk Register, flooding has been recognised as one of the communities' highest risks that can affect not only residents, but people that work in or travel throughout the municipality. This risk came into reality in February 2011, during which prolonged rainfall resulted in flash flooding across the municipality. During that month alone, Council received over 700 requests from residents regarding drainage and flood issues.

   The **Flood Management Plan** (FMP) has been developed in response to an identified need to improve collaboration between flood management agencies and follows the recommendation of Victoria Auditor General for *Managing stormwater flooding risks in Melbourne*. This operational document facilitates the collaboration of the City of Greater Dandenong, Melbourne Water and the Victorian State Emergency Service (VICSES) at a local level to implement the objectives of MW's Port Phillip and Westernport Region Flood Management and Drainage Strategy (2007). The FMP includes an action plan, which outlines the agreed approach to managing existing, residual and future flood risks within the City of Greater Dandenong.

   The Flood Emergency Management Plan (FEMP) developed collaboratively with VIC SES and Melbourne Water, details flood risks within the municipality. The FEMP falls under the Municipal Emergency Management Plan, which considers a wider range of potential risk, including fire and storm. The FEMP documents how Council in partnership with the control agency and other stakeholders will plan, mitigate, prepare, respond to and provide relief to assist the Greater Dandenong community in recovering from flood events.

   Whilst the FMP and the FEMP are not public documents, the findings and recommendations of these two documents have been used to inform the **Sustainable Stormwater Strategy**.

In partnership with Melbourne Water, Council has undertaken an extensive modelling exercise to assess flood risks in the northern areas of the municipality.

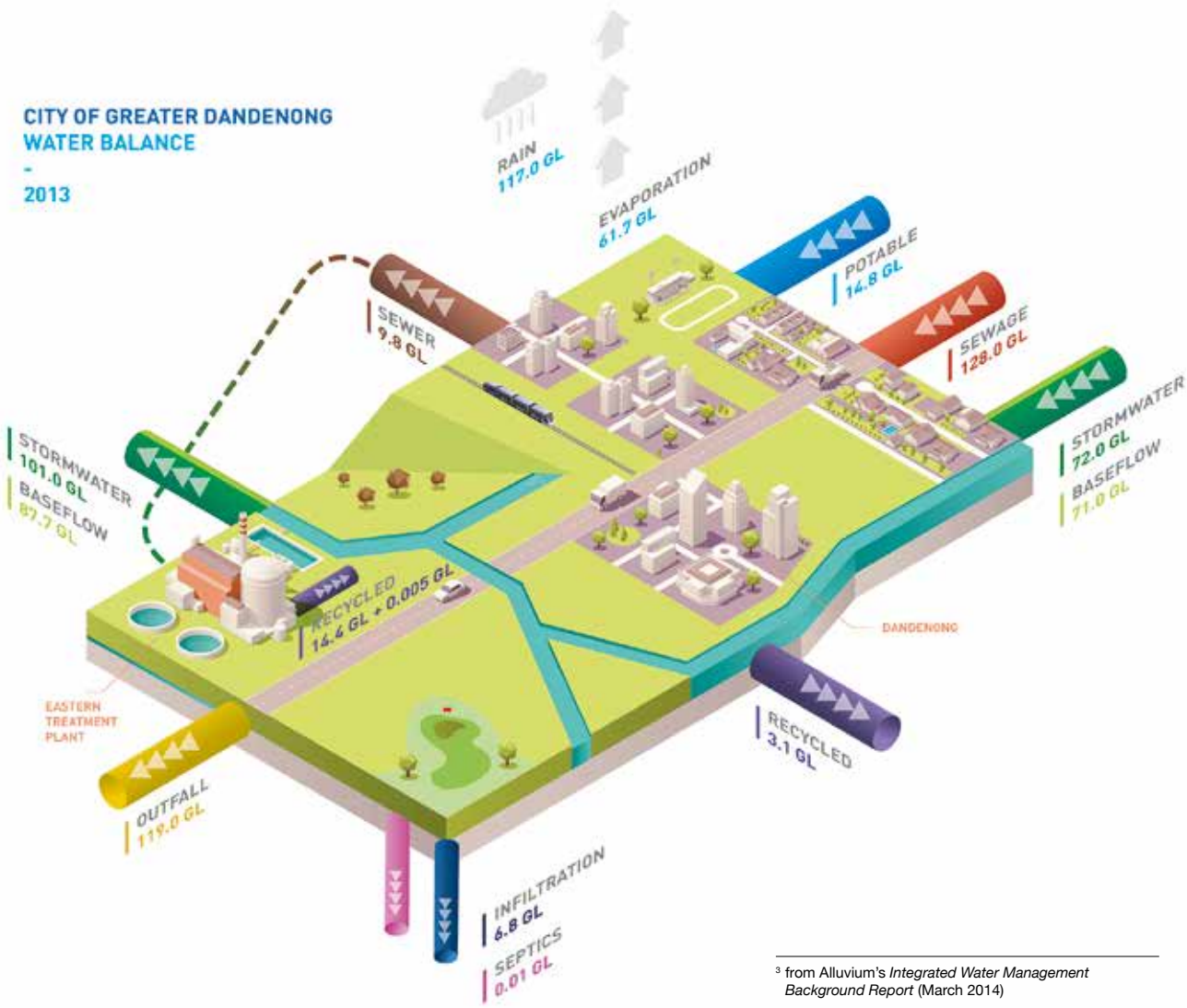
BACKGROUND

6. **Integrated Water Management** – Council encourages a sustainable approach to water management and Council *is committed to the development of an Integrated Water Management Plan* (Council Plan, Priorities 3.2). Whilst it must be recognised that Council is not a Water Corporation (such as South East Water and Melbourne Water), Council is a significant water consumer. Council is therefore well placed to promote a more efficient and sustainable use of drinking water by the community.

With the view of laying the foundation to the Integrated Management Plan, Council has commissioned Alluvium Consulting to undertake a preliminary analysis of the water cycle across the municipality. This project was partially funded by Melbourne Water and overseen by a multi-agency reference group. The resulting water balance is shown in Figure 2 below:

The report also considers the impact of forecast urbanisation and climate change, with future development predicted to be the larger influence on water quality and stormwater infrastructure. The creation of new growth areas and forecast infill development will result in an increase of impervious areas within the municipality, as illustrated in Figure 3. This will increase the total volume of stormwater runoff and pollutants discharging to the waterways, which will result in increased pressure on the existing drainage infrastructure.

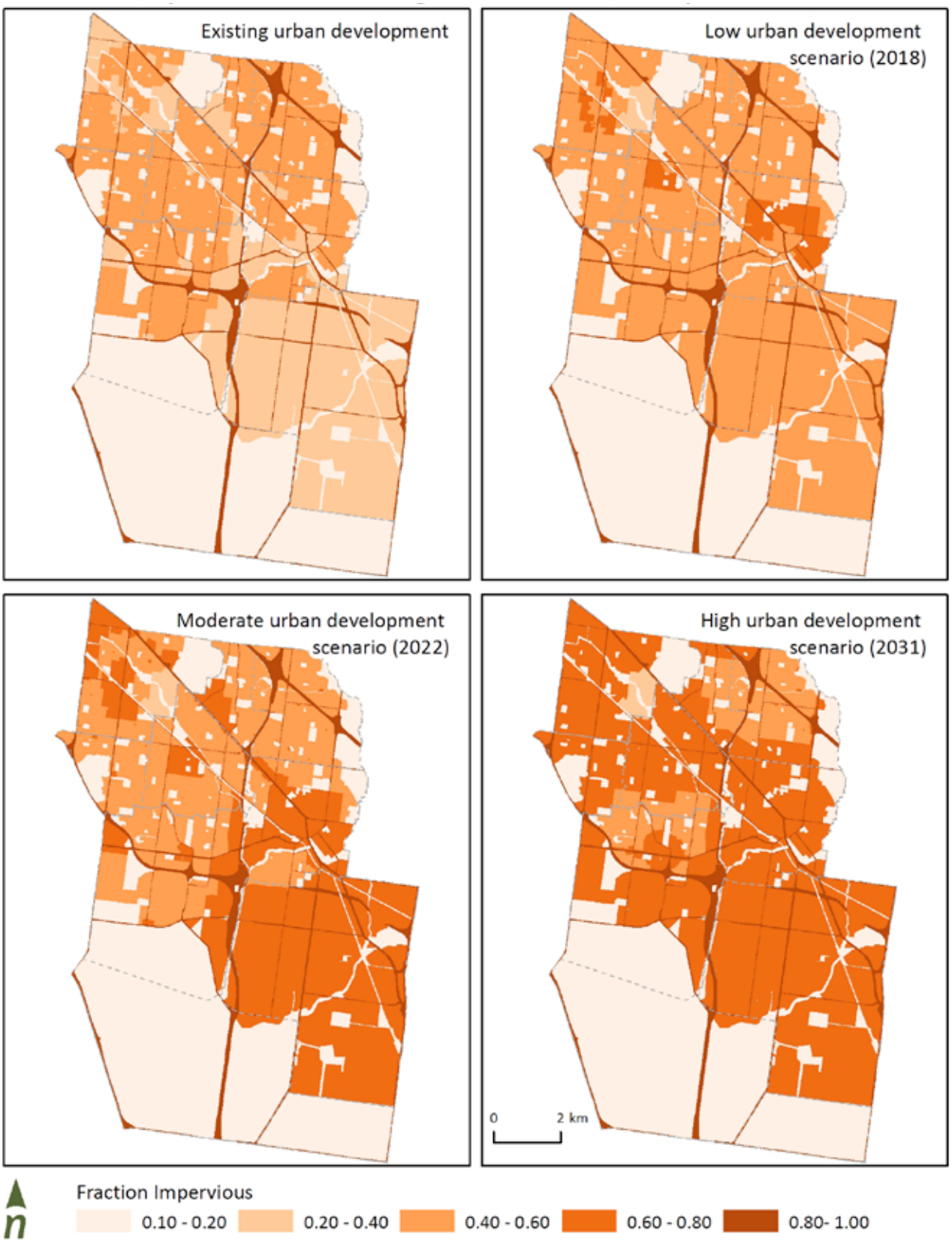
Figure 2. Current water balance for City of Greater Dandenong[3]



[3] from Alluvium's *Integrated Water Management Background Report* (March 2014)

[4] from Alluvium's *Integrated Water Management Background Report* (March 2014)

Figure 3. Future forecasts of imperviousness within Greater Dandenong[4]



BACKGROUND

SPECIAL CHARGE SCHEMES

Section 163 of the *Local Government Act* 1989 allows council to declare a special rate or a special charge to enable councils to provide a service or scheme if the council considers that doing so would have special benefits to those required to pay the rate or charge.

If a property is at risk of flooding, it is reasonably easy to demonstrate a direct benefit.

It would be a much more difficult exercise to demonstrate that the benefits apply to properties upstream of flooding as they are not directly impacted, though they may contribute towards the problem.

A drainage scheme which sought to improve urban aesthetics through the use of streetscape raingardens, may be likely to be capable of establishing a special benefit (i.e. to the property)

Council encourages a sustainable approach to water management…

Given current planning controls available to Council, there is a real challenge in managing urban development. Council will require upgrading its drainage infrastructure (using available resources), stronger planning rules and to advocate for additional investment from Melbourne Water, if it wishes to successfully tackle this pending challenge (Alluvium, 2014). Council may need to consider Local Planning Amendments and/or Special Charge Schemes to ensure stormwater drainage infrastructure is able to maintain the current level of service. These tools, in conjunction with Council Design Standards, would ensure better environmental outcomes.

7. **Council Design Standards** – Council has recently completed the review of council's standard specifications for civil works. These documents are used by land developers and consulting engineers working in the land industry. The standard specification and standard drawings have been updated to account for changes in National Design Standards, changes in legislation and/or to reduce maintenance etc. This covers all civil works aspect, including road and drainage items.

   The Drainage Design Standards have also been updated to include specifications for Water Sensitive Urban Design (WSUD) assets. This will ensure that Council inherits fully functioning WSUD assets at the completion of a development and at handover (i.e. the end of Defect Liability Period). Concurrently, Council is improving its asset management systems, to improve maintenance activities and its long-term financial forecast.

3. NORTHERN URBAN CATCHMENTS

The City of Greater Dandenong is predominantly a residential and industrial area, with sections of rural land in the south. The majority of the residential areas are located in the northern section of the city (Figure 4) and are serviced by underground drainage assets, as illustrated in Figure 5.

Key Strategic challenges for these areas include:

- Managing flood risks; and
- Managing increased demand for new and improved drainage systems.

In 2011 the population of the City of Greater Dandenong was 135,605 (Australian Bureau of Statistics, 2011) and the number of households were 48,986 with an average of 2.8 people per household. It is estimated that the population will increase to over 183,000 residents by 2026 (SGS's Housing Strategy, 2015). The majority of the population growth is likely to occur in the northern catchments, whether as infill development (dual occupancy) or medium density development.

Decreases in allotment size, increases in the size of dwellings and the State Government's desire to increase housing densities in these established areas have resulted in increased urban densities, with a subsequent increase in the impervious areas. The amount of impervious surfaces in the region is forecast to continue to increase. This has a direct impact on the capacity of the existing stormwater drainage system. While each new development or increase in density by itself will only cause a relatively small increase in downstream flow, the cumulative effects of a number of similar developments will be evident in a major storm event, which could result in significant damage and loss.

Additionally, there is legacy of under capacity stormwater network systems in the urban area and roads were not always designed as overland floodways. As a result, other less-defined overland flow paths exist within the municipality which may put properties and/or dwellings at risk.

Under the Building Regulations 2006 (Section 802), The City of Greater Dandenong is given 'legislative' power to designate land liable to flooding from waterways and overland flows. In partnership with Melbourne Water an extensive flood modelling exercise for the urban areas of the city was carried out, in three northern catchments.

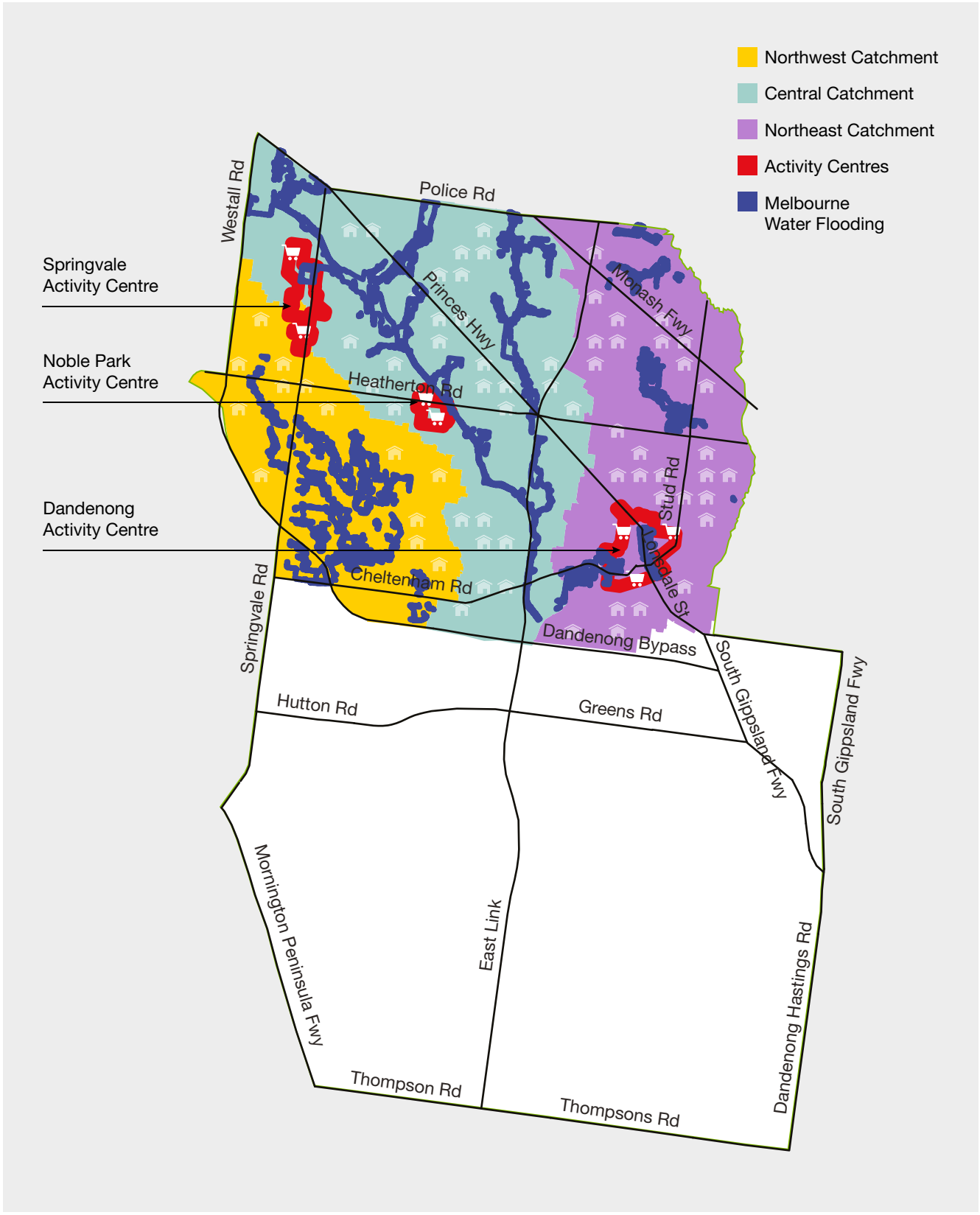
The results from these studies are discussed in the following sections.

FLOOD MAPPING INFORMATION

The 100yr ARI flood mapping information is now used as a planning control overlay by Council. The information is used to inform:

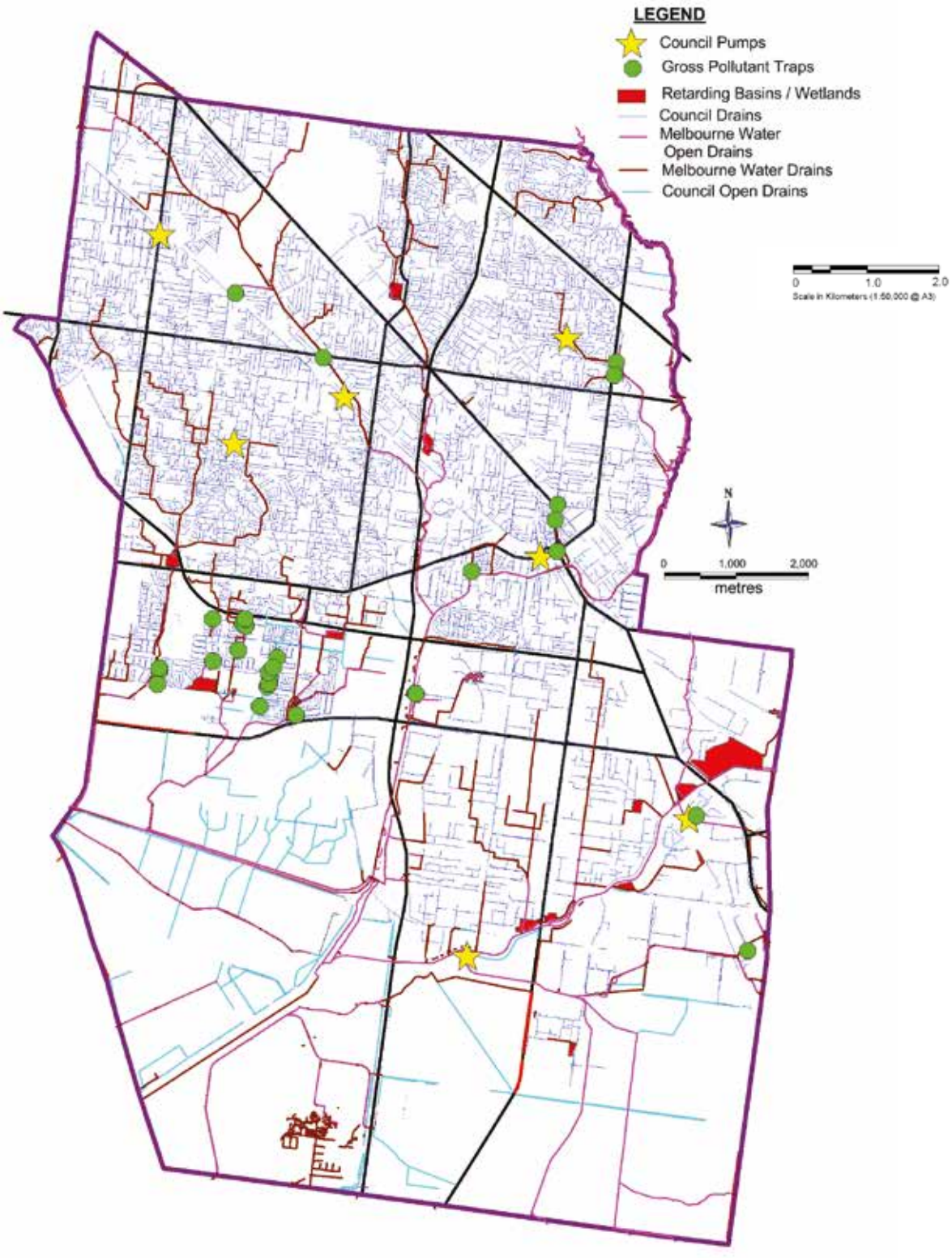
- The Council's planning processes, to ensure new developments are considered in light of the flood risk and existing overland flow paths;
- The Flood Emergency Response and associated plans; and
- Future mitigation works, including where investments are urgently required.

Figure 4. Northern Urban Catchments



NORTHERN URBAN CATCHMENTS

Figure 5. City of Greater Dandenong Drainage and Waterway Assets[5]



[5] from Engeny's *Flood Management Plan* (2012)


VIÑA
VIÑA

4. NORTHWEST CATCHMENT

The northwest catchment discussed in this section covers the area shown in Figure 6. In 2005, Council, in partnership with Melbourne Water, undertook the flood mapping of the Edithvale, Noble Park and Parkmore Main Drains, which covered the majority of this catchment.

This catchment, approximately 13km^2, covers predominantly residential areas. It includes:

- Springvale South;
- The south western area of Noble Park;
- The suburb of Keysborough; and
- Parkmore Keysborough Shopping Centre.

The study shows that the flooding is "largely contained" within the road reserve. It however, indicates that the infrastructure servicing Walnut Crescent, Corrigan Road, Arena Square and adjacent areas are particularly flood prone, including during lower rainfall event (10yr ARI). Council had previously identified those areas as "at risk" due to reported flooding issues. Other areas such as, between Athol Road and Harold Road, are also significantly at risk of flooding during larger flood event (50yr and 100yr ARI).

The overland flow flooding that is described above, occurs when the capacity of the drainage system is exceeded by the volume of stormwater runoff within the catchment. As drainage systems are only designed and constructed up to a certain capacity, the drainage systems are expected to flood over certain storm severity. Recent developments are designed to ensure overland flows for storms up to 1 in 100 years return period are contained within the roads however, this was not always the case. In older suburbs, overland flows may therefore impact on properties, dwellings and other buildings. This is generally what is occurring in this catchment.

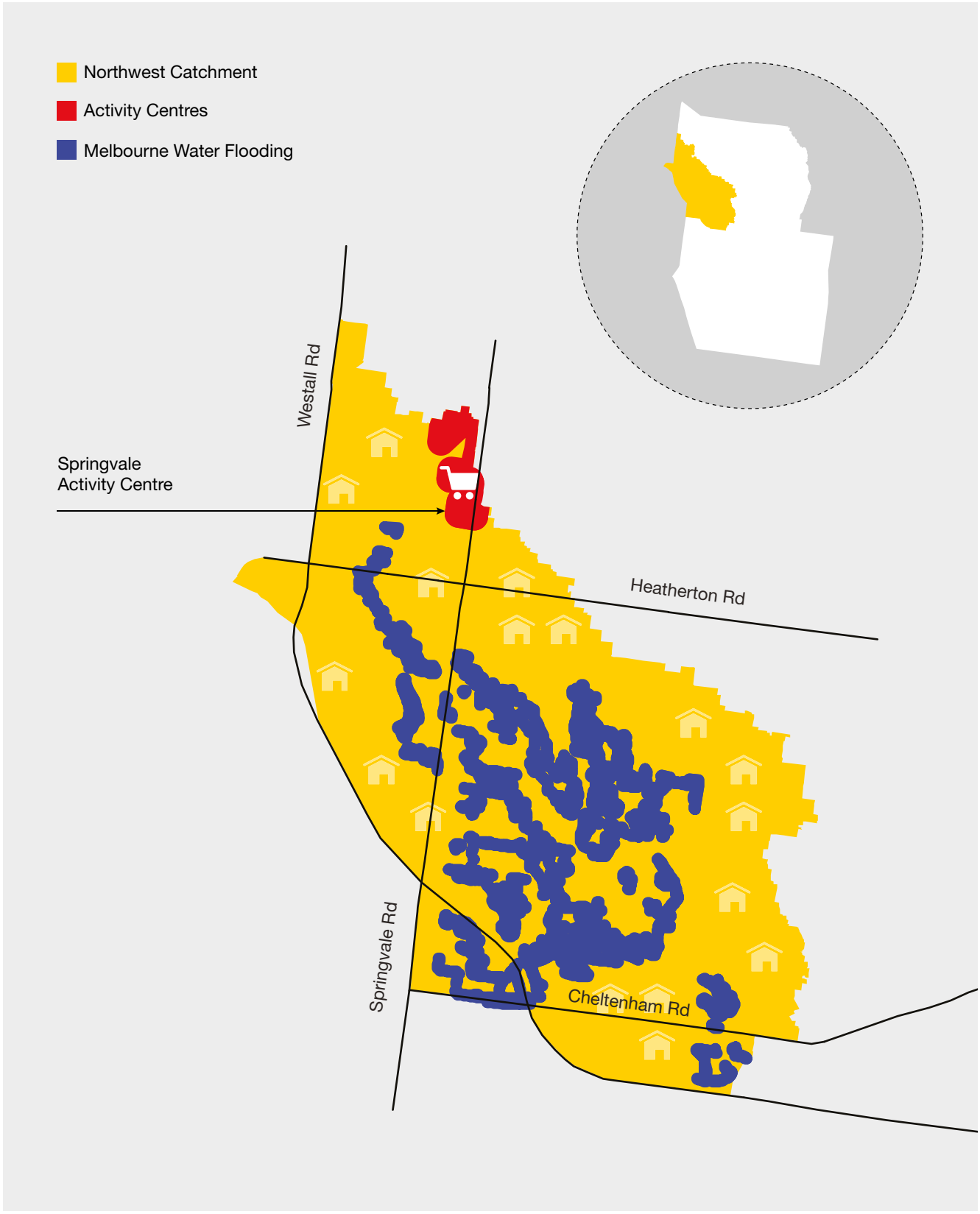
Provided the drainage system was designed in accordance with the relevant standards prevailing at the time, there is no legal obligation on Council to undertake improvements to the existing drainage infrastructure. Council is however, committed to reducing flood risk. Council's ability to mitigate those risks is dependent upon whether the flooding is associated with its infrastructure or with Melbourne Water infrastructure, as discussed in the following sections.

Flooding associated with Council infrastructure

Council is responsible for the care and management of the overland flow for the minor drainage network throughout the Municipality. Council now uses flood mapping information, where available to determine minimum flood levels for new development and buildings located in flood-prone areas (refer to page 13 and figure 6).

The City of Greater Dandenong also recognises that flooding may be a major concern to residents and is committed to identifying flood mitigations that are cost effective and provide the best social and environmental outcomes. It is however, not feasible to provide flood mitigation for every flooded property in the city. Flood mitigation works are being progressively undertaken in the catchment to alleviate flood risk and protect our community. Burden Park is an example of flood mitigation work recently undertaken by Council.

Figure 6


Northwest Catchment
Activity Centres
Melbourne Water Flooding
Westall Rd
Springvale
Activity Centre
Heatherton Rd
Springvale Rd
Cheltenham Rd

The City of Greater Dandenong also recognises that flooding may be a major concern to residents and is committed to identifying flood mitigations that are cost effective and provide the best social and environmental outcomes.

BURDEN PARK RETARDING BASIN

The drainage system within this catchment generally consists of underground pipes. It also includes a number of retarding basins, including those located in Burden Park, Laidlaw Court and Deborah Court.

The retarding basin within Burden Park is situated at the corner of Heatherton Road and Olympic Avenue, in Springvale South. As part of its drainage upgrade program, the existing retarding basin was extended and additional pipes were installed to increase the overall capacity of the system.

This $165,000 approximate investment reduces local flood risk as well as in the downstream reaches of the catchment, south of Burden Park.

Flooding associated with Melbourne Water infrastructure

Melbourne Water is responsible for the care and management of the overland flow for the major drainage network throughout the Municipality. Melbourne Water controls development in these areas using planning controls, such as Special Building Overlay, which can be included into the Greater Dandenong Planning Scheme.

Melbourne Water aims are to minimise "the level of damage" that floods cause to the community. Melbourne Water has developed a Flood Risk Assessment Framework to assess flood risks and identify the benefits of flood risk management measures over time. These risks are assessed based on likelihood and the economic, safety and social consequences. Melbourne Water will invest in necessary flood alleviation measures, when the risk is "intolerable" and linked to Melbourne Water infrastructure[6].

Using the flood modelling information, Melbourne Water will identify and investigate opportunities to address risks and develop a forward capital works program for drainage upgrades based on priority.

SPECIAL BUILDING OVERLAY

Special Building Overlay applies to land affected by flooding from piped system. With the redevelopment of existing urban areas and the proposed development of new areas, there is growing pressure to develop within overland flow path areas.

The purpose of the Special Building Overlay is to set appropriate conditions and building floor levels to address the flood risk and to ensure that flood waters are not obstructed or diverted by development.

Source – Melbourne Water's *Guidelines for Development in Flood-prone Areas* (2008).

5. CENTRAL CATCHMENT

The central catchment discussed in this section covers the area shown in Figure 7. In 2010, Melbourne Water, in partnership with Council, undertook the flood mapping of the Mile Creek catchment, which covers the majority of this catchment.

This catchment, approximately 25km^2, contains predominantly residential areas, as well as industrial and commercial developments. It includes:

- Springvale North, including the majority of Springvale activity centre; and
- Central and northern Noble Park, including its activity centre.

This area also includes iconic sites of Greater Dandenong, including Sandown Racecourse and the Springvale Botanical Cemetery.

The study shows that the flooding is "largely contained" within the road reserve. It however, indicates that the infrastructure has limited capacity in some areas, which may become flood prone, including during lower rainfall event (10yr ARI). These areas include:

- Between Princes Highway and Centre Road;
- Along Wellington Road and Wanda Street;
- Along Browns Road and Jacksons Road

Council had previously identified those areas as "at risk" due to reported flooding issues.

Flows along Mile Creek and Yarraman Creek are generally contained within the channels with overtopping only occurring in isolated locations.

The overland flow flooding that is described above, occurs when the capacity of the drainage system is exceeded by the volume of stormwater runoff within the catchment. As drainage systems are only designed and constructed up to a certain capacity, the drainage systems are expected to flood over certain storm severity. Recent developments are designed to ensure overland flows for storms up to 1 in 100 years return period are contained within the roads however, this was not always the case. In older suburbs, overland flows may therefore impact on properties, dwellings and other buildings. This is generally what is occurring in this catchment.

Provided the drainage system was designed in accordance with the relevant standards prevailing at the time, there is no legal obligation on Council to undertake improvements to the existing drainage infrastructure. Council is however, committed to reducing flood risk. Council's ability to mitigate those risks is dependent upon whether the flooding is associated with its infrastructure or with Melbourne Water infrastructure, as discussed in the following sections.

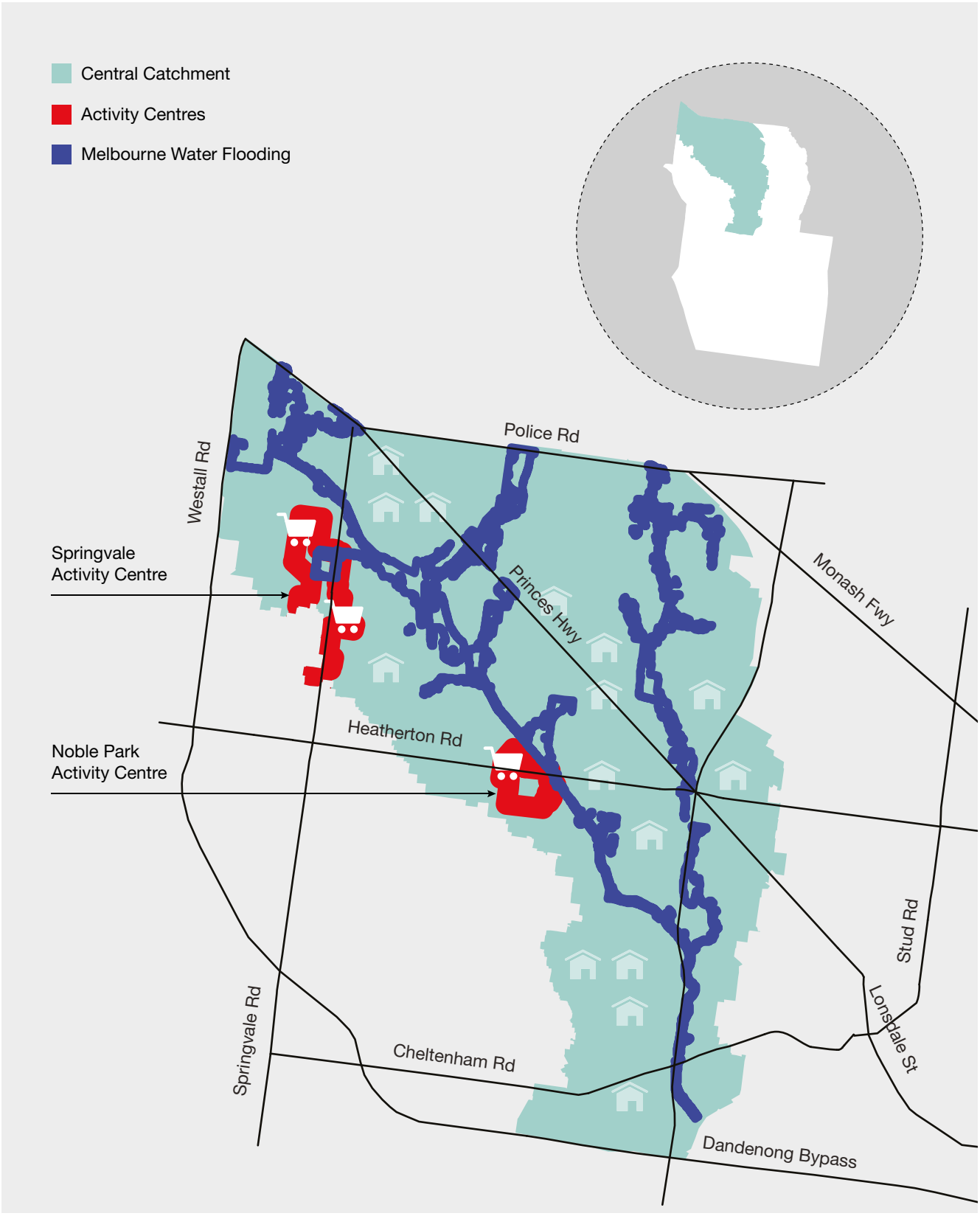
Flooding associated with Council infrastructure

Council is responsible for the care and management of the overland flow for the minor drainage network throughout the Municipality. Council now uses flood mapping information, where available to determine minimum flood levels for new development and buildings located in flood-prone areas (refer to page 13 and figure 7).

The City of Greater Dandenong also recognises that flooding may be a major concern to residents and is committed to identifying flood mitigations that are cost effective and provide the best social and environmental outcomes. It is however, not feasible to provide flood mitigation for every flooded property in the city. Flood mitigation works are being progressively undertaken in the catchment to alleviate flood risk and protect our community. Warner reserve is an example of flood mitigation works recently undertaken by Council.

Flood mitigation works are being progressively undertaken in the catchment to alleviate flood risk and protect our community.

Figure 7


Central Catchment
Activity Centres
Melbourne Water Flooding
Police Rd
Westall Rd
Springvale
Activity Centre
Princes Hwy
Monash Fwy
Heatherton Rd
Noble Park
Activity Centre
Stud Rd
Springvale Rd
Cheltenham Rd
Lonsdale St
Dandenong Bypass

CENTRAL CATCHMENT

WARNER RESERVE OVERLAND FLOWPATH

During the January 2011 flooding event, a number of factories in Bird Street were found to be inundated by flood water. Bird Street initially contains overland flooding, but in the event of heavy rain, water can accumulate at the end of Bird Street as there is no defined overland flow outlet. Stormwater runoff subsequently ponds and ultimately flows into factories located south of Bird Street.

Council consequently constructed an overland flowpath to direct flood waters away from existing buildings and towards Mile Creek. The design and the construction for this open drain along Warner Reserve was completed in December 2014, at a cost of approximately $50,000 to Council. This drainage upgrade will reduce local flood risk.

[7] Melbourne Water's *Flood Risk Assessment* (2010)

Flooding associated with Melbourne Water infrastructure

Melbourne Water is responsible for the care and management of the overland flow for the major drainage network throughout the Municipality. Melbourne Water controls development in these areas using planning controls, such as Special Building Overlay (refer to page 19), which can be included into the Greater Dandenong Planning Scheme.

Melbourne Water aims are to minimise "the level of damage" that floods cause to the community. Melbourne Water has developed a Flood Risk Assessment Framework to assess flood risks and identify the benefits of flood risk management measures over time. These risks are assessed based on likelihood and the economic, safety and social consequences. Melbourne Water will invest in necessary flood alleviation measures when the risk is "intolerable" and linked to Melbourne Water infrastructure[7].

Springvale Activity Centre

The Springvale activity centre is a popular and vibrant multicultural retail and business centre in Melbourne's south east. Springvale Activity Centre Structure Plan was last revised in April 2010. In the current Structure Plan, Council identifies a number of environmental objectives, linked to the drainage infrastructure. These include:

- Constructing a Gross Pollutant Trap (GPT) to intercept solid wastes from the centre prior to entering local waterways; and
- Encouraging new residential development to incorporate WSUD.

Council has initiated the review of the Structure Plan and it has been identified that the stormwater drainage infrastructures may need to be upgraded to cater for increased stormwater discharge, arising from higher density development. Funding will also be sought to build two GPTs within Springvale Shopping Centre.

Noble Park Activity Centre

As part of Melbourne 2030, Noble Park was defined as a Major Activity Centre and its development is guided by a Structure Plan, last revised in June 2009. Noble Park is home to a diverse community and its activity centre includes a number of Council facilities, including the Paddy O'Donoghue Multi Purpose Community Centre and Noble Park Aquatic Centre.

The current Structure Plan identified that a comprehensive plan for the staging and upgrading of all assets across the centre needed to be developed. To promote sustainability, Council was to investigate the implementation of a storm water quality improvement program for Noble Park traders.

Council is planning to review the Structure Plan for Noble Park Activity Centre in 2016/2017, which will provide opportunities to consider drainage infrastructure upgrades, to cater for increased stormwater discharge arising from higher density development.

6. NORTHEAST CATCHMENT

The northeast catchment discussed in this section covers the area shown in Figure 8. In 2010, Council, in partnership with Melbourne Water, undertook the flood mapping of the Dandenong catchment, which covers the majority of this catchment.

This catchment, approximately 18km^2, covers predominantly residential and commercial areas. It includes:

- Dandenong and its activity centre;
- Parts of Dandenong North; and
- The northern parts of Dandenong South.

The mapping shows that flooding is widespread across the catchment, as the catchment comprises older areas where the road reserve was not designed to contain overland flooding. As a result, overland flowpaths occur through properties. This flooding is however relatively shallow, with deeper flooding generally occurring in low lying areas adjacent to Dandenong Creek and in the McFees Road retarding basin.

The overland flow flooding that is described above, occurs when the capacity of the drainage system is exceeded by the volume of stormwater runoff within the catchment. As drainage systems are only designed and constructed up to a certain capacity, the drainage systems are expected to flood over certain storm severity. Recent developments are designed to ensure overland flows for storms up to 1 in 100 years return period are contained within the roads however, this was not always the case. In older suburbs, overland flows may therefore impact on properties, dwellings and other buildings. This is generally what is occurring in this catchment.

Provided the drainage system was designed in accordance with the relevant standards prevailing at the time, there is no legal obligation on Council to undertake improvements to the existing drainage infrastructure. Council is however, committed to reducing flood risk. Council's ability to mitigate those risks is dependent upon whether the flooding is associated with its infrastructure or with Melbourne Water infrastructure, as discussed in the following sections.

Flooding associated with Council infrastructure

Council is responsible for the care and management of the overland flow for the minor drainage network throughout the Municipality. Council now uses flood mapping information, where available. To determine minimum flood levels for new development and buildings located in flood-prone areas (refer to page 13 and figure 8).

The City of Greater Dandenong also recognises that flooding may be a major concern to residents and is committed to identifying flood mitigations that are cost effective and provide the best social and environmental outcomes. It is however, not feasible to provide flood mitigation for every flooded property in the city. Flood mitigation works are being progressively undertaken in the catchment to alleviate flood risk and protect our community.

Flooding associated with Melbourne Water infrastructure

Melbourne Water is responsible for the care and management of the overland flow for the major drainage network throughout the Municipality. Melbourne Water controls development in these areas using planning controls, such as Special Building Overlay (refer to page 19), which can be included into the Greater Dandenong Planning Scheme.

Melbourne Water aims are to minimise "the level of damage" that floods cause to the community. Melbourne Water has developed a Flood Risk Assessment Framework to assess flood risks and identify the benefits of flood risk management measures over time. These risks are assessed based on likelihood and the economic, safety and social consequences. Melbourne Water will invest in necessary flood alleviation measures when the risk is "intolerable" and linked to Melbourne Water infrastructure[8].

Central Dandenong Activity Centre

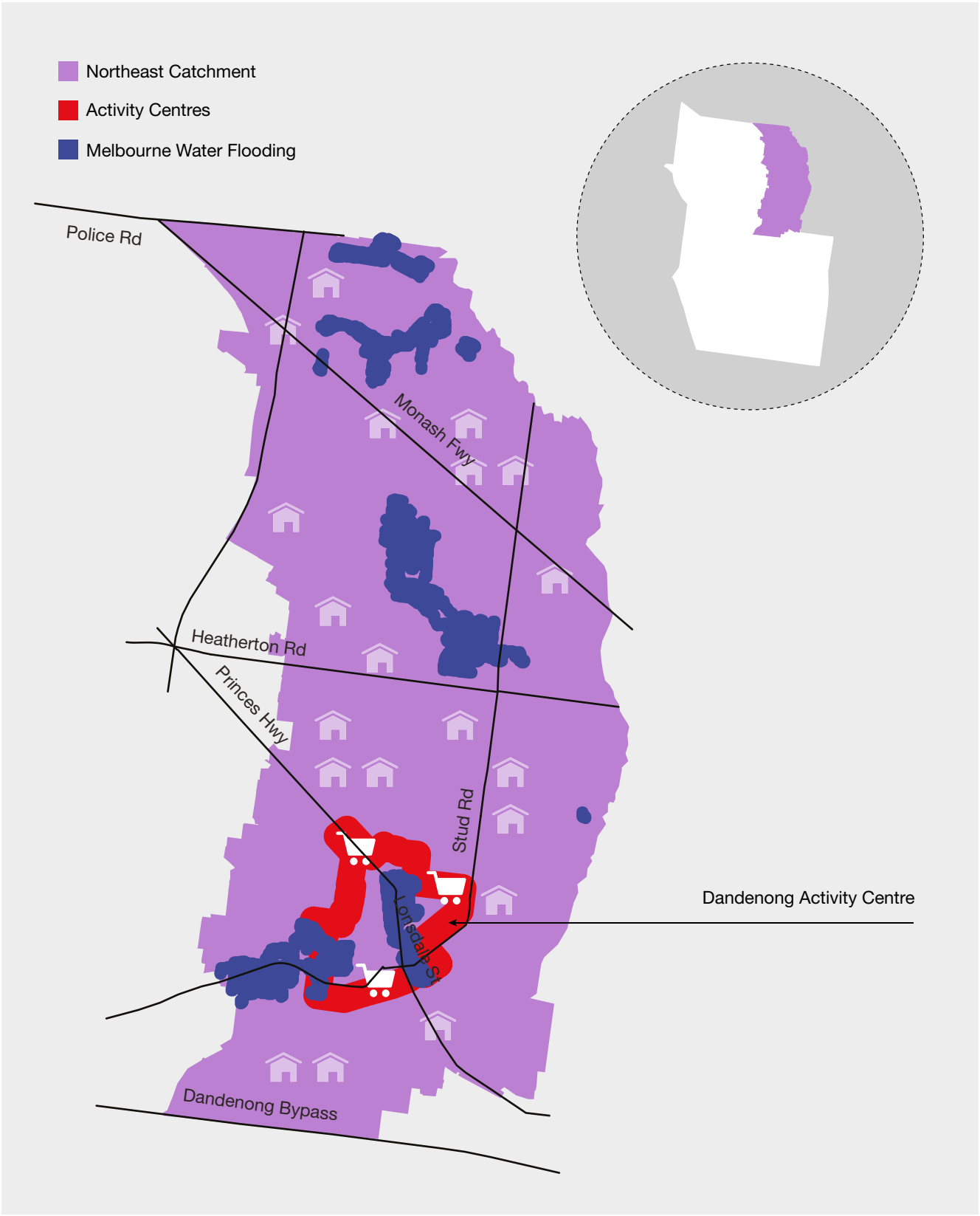
In partnership with the City of Greater Dandenong, Victorian Government, through Places Victoria (formerly VicUrban), is funding the $290 million Revitalising Central Dandenong initiative to rejuvenate the city centre. It includes the delivery of new infrastructure projects, such as Lonsdale Street Boulevard, Halpin Way and Settlers Square, which intercept and recycle stormwater runoff. These stormwater harvesting systems, were built in conjunction with significant pipe upgrades. As a result, flood risk is reduced in the Activity Centre and street amenity is improved.

Alongside the new Municipal Civic Centre, Council also played its part in improving the local character of Central Dandenong. New street-frontage in the Dandenong Station Precinct created a pedestrian friendly environment, with the inclusion of over 90 WSUD tree pits. These WSUD tree pits, treat stormwater from the new roads and this passive irrigation reduces the need to water the plants. Stormwater from roads is a significant pollutant contributor to our waterways and consequently, these tree pits reduce pollution to the Dandenong Creek.

The mapping shows that flooding is widespread across the catchment, as the catchment comprises older areas where the road reserve was not designed to contain overland flooding.

[8] Melbourne Water's *Flood Risk Assessment* (2010)

Figure 8


Northeast Catchment
Activity Centres
Melbourne Water Flooding
Police Rd
Monash Fwy
Heatherton Rd
Princes Hwy
Stud Rd
Lonsdale St
Dandenong Activity Centre
Dandenong Bypass

NORTHEAST CATCHMENT

WATER SENSITIVE URBAN DESIGN

Water Sensitive Urban Design (WSUD) integrates stormwater treatment into the urban landscape and offers an alternative to the traditional approach to stormwater management. It seeks to minimise the extent of impervious surface and minimise alteration to the natural water cycle, by temporarily storing the water close to where it falls and slowly releasing it into the ground or natural waterways, or providing it for 'fit-for-purpose' uses.

WSUD provides numerous stormwater quality and/or flooding benefits if well designed, including:

- protecting the receiving natural water environment
- enhancing stormwater run-off water quality
- reducing run-off and peak flows
- enhancing amenity site value, while minimising development costs
- reintegrating water features within urban landscapes

NORTHEAST CATCHMENT

Action Plan for Northern Urban Catchments

While the actions detailed in the Action Plan are currently considered within Council's sphere of influence, it is important to be clear about Council's role and the role of other stakeholders as well as priorities for action, funding, monitoring and review of the Strategy. Council's resources are determined annually by Council and other stakeholders.

When resources are available, actions will be generally resourced according to their stated priority and timeline as recommended by this plan.

The Action Plan recommends staged timelines for implementation. These recommended timeframes consider the complexity and nature of each action, some of which will require further investigation or collaboration with external parties before they can be implemented. The relevance of some actions, or their timing, may change due to availability of resources.

The recommended timing for these actions is as follows:

- **Immediate actions** – to commence within 18 months (before 2017)
- **Short-term actions** – to commence between 18 months to 5 years (before 2021)
- **Medium-term actions** – to commence within 5–10years (before 2026)
- **Long-term actions** – to commence within 10–20 years (before 2036)

Objective	Strategic Priority	Action	Outcomes / Indicators	Responsibility	Timeframe
Manage & reduce flood risk	**Investigate and identify (collaboratively with Melbourne Water) opportunities to address risks and develop a forward capital works program for drainage upgrades based on priority, risk and cost benefit analysis**	Prioritise catchment based on flood risk	Priority list	**Infrastructure Planning and Services**	Immediate
		Investigate and identify flood mitigation options	Flood capital investment program	**Infrastructure Planning and Services**	Short-term
		Obtain internal and external funding to construct proposed capital works	Funding obtained Flood alleviation scheme constructed	**Infrastructure Planning and Services** City Improvement	Medium-term
Manage demand for new and improved drainage systems	**Investigate planning controls and market-based tools to alleviate impact of urban consolidation and infill development on existing drainage infrastructure**	Undertake flood risks/ planning control investigation study	Cost Benefit Analysis report	**Infrastructure Planning and Services** City Planning, Design & Amenity Corporate Services	Immediate
		Advocate for Melbourne Water to review and update the geographical extent of the Land Subject to Inundation Overlay (LSIO) and Special Building Overlay (SBO)	Greater Dandenong Planning Scheme updated	**Infrastructure Planning and Services** City Planning, Design & Amenity Corporate Services	Medium-term
		Strengthen local planning policy and/or facilitate market-based tools to manage flood risk (where appropriate)		**City Planning, Design & Amenity** Infrastructure Planning and Services	Medium-term
Manage & reduce flood risk (community expectations)	**Develop an awareness program to educate our community on the role of water, our drainage assets and the community's responsibilities in regards to flood risk management**	Develop a community flood education program (muniCity Improvement Programality-wide)	Flood education program (brochures, webpage etc).	**City Planning, Design & Amenity** Corporate Services Infrastructure Planning and Services Community Services	Medium-term
		Implement the above community flood education program through existing program/events	Flood education program implemented	**Community Services** Corporate Services City Planning, Design & Amenity Infrastructure Planning and Services	Medium-term

7. NEW RESIDENTIAL DEVELOPMENTS

New land development projects, such as the Keysborough residential development (Figure 9), are subject to Stormwater Drainage Infrastructure Plans managed by Melbourne Water. These plans and effective collaboration with Council ensure that the local drainage assets are built to Council's standards and specifications. Additionally, the major drainage infrastructure meets Melbourne Water's requirements.

Key Strategic challenges for these areas include:

- Managing the interface between new and old drainage infrastructure; and
- Managing green infrastructure, including WSUD systems.

Keysborough Residential

Keysborough is a predominantly residential and industrial suburb, and also includes market gardens and semi-rural properties. In recent years, the area has seen a number of new residential developments, such as Hidden Grove, and industrial development, such as The Key Industrial Park (discussed in the next section). Development is continuing and ultimately, over 300 hectares of former market garden and farm land will be developed.

The drainage system within these new subdivisions ensures overland flows for storms up to 1 in 100 years return period are contained within the roads. Additionally, these new housing estates have benefited, or are benefiting, from Development Contribution Plans. As a result, both Council and Melbourne Water ultimately inherit a number of WSUD assets, which provide additional amenity benefits to the community and minimise pollutants reaching downstream waterways. The additional maintenance required for the local landscape features, including these WSUD assets, is subject to a maintenance agreement between Council and MW.

DEVELOPMENT CONTRIBUTION PLAN

Council may generate funds for capital works via Development Contribution Plan (DCP). This tool is applicable to a range of assets, including drainage infrastructure. This mechanism is only applicable in new areas of development, and is driven through the Council master and development process.

DCP apply a fixed rate of contribution across a broader area, such as a precinct, and this one-off contribution is in addition to the annual rates charge.

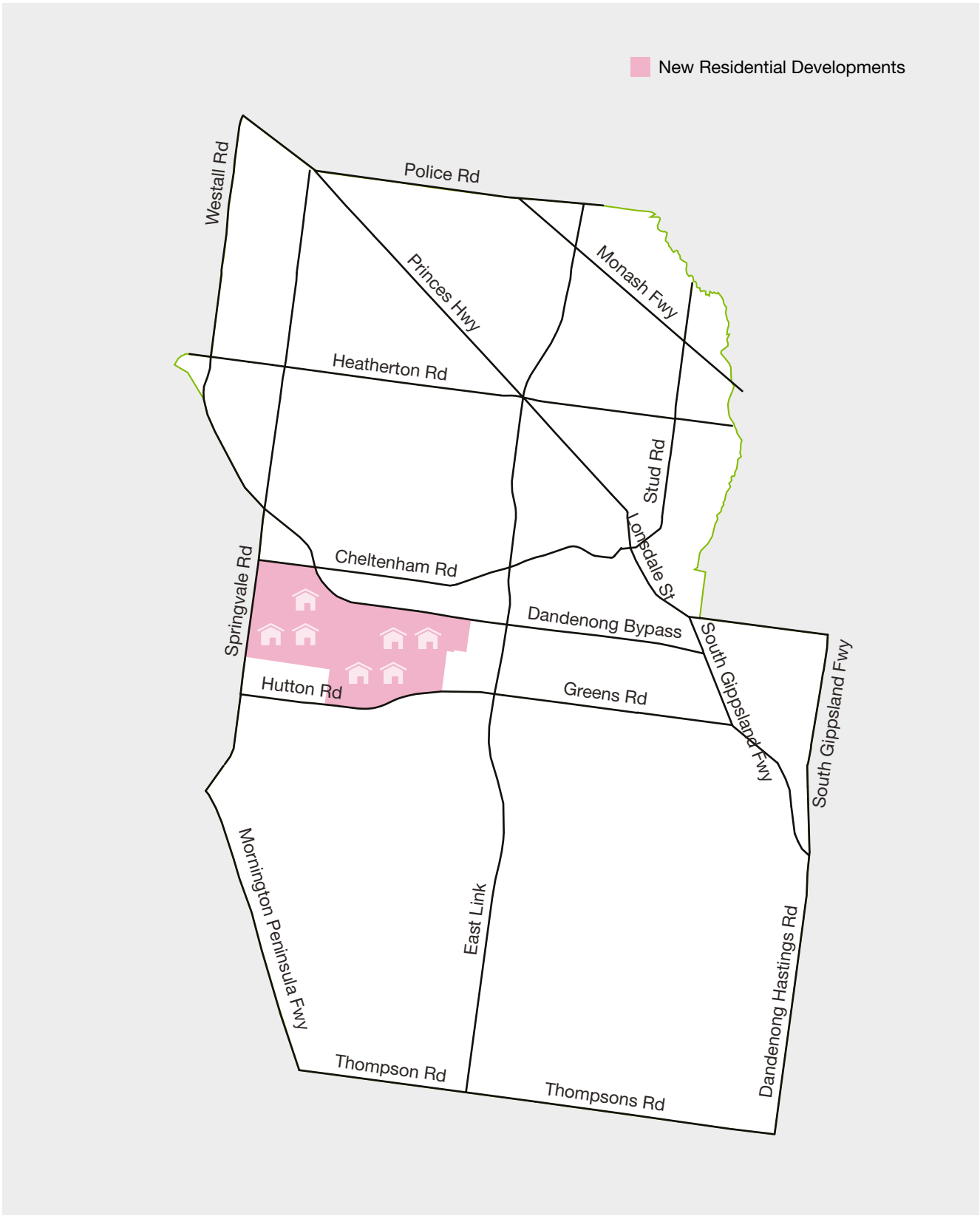
Melbourne Water may also establish Development Services Schemes (DSS) to plan and fund the drainage infrastructure required for new urban developments.

DCP and DSS have been applied in the City of Greater Dandenong for road and drainage infrastructure in inner residential developments in Lyndhurst and Keysborough.

The areas where those new estates are proposed generally include habitat of high conservation and valuable native trees. As an example, over 3.5ha of high or very high conservation significance Plains Grassy Woodland (EVC 55), 11 large old trees and 176 scattered trees were located within 130ha, part of the broader Somerfield Estate (Brett Lane & Associates, July 2011). Loss to native vegetation, whilst inevitable, is minimised during the planning stage. Additionally, off-set targets are set to ensure "like-for-like" replacement.

The road and drainage infrastructure, constructed as part of these new estates, alters the local hydrology and may therefore impact on the long-term health of the remaining vegetation. Increasingly, Council Officers are observing that trees and vegetation become water-stressed following development. Church Road is a recent example where, in partnership with the designers, steps were taken to encourage passive irrigation of streetscape River Red Gum (*Eucalyptus camaldulensis*). Council recognises that a similar proactive approach is required to ensure vegetation is more resilient to altered hydrological conditions and future drought.

Figure 9 – Keysborough new residential developments



CHURCH ROAD – PASSIVE IRRIGATION

Church Road within the new Somerfield development was a typical rural road with no kerb and channel, gravel shoulders and drainage swales that traversed the length of the nature strip with trees (mature Rive Red Gum) planted along the swale edges. Runoff from the road and stormwater drained into the swale and provided a water supply for the existing trees. These trees provide shade and add to the amenity of the road.

With the development of the land on both sides of the road, an upgrade in the road and provision of kerb and channel was required. Traditional design would have prevented road runoff reaching the existing and valuable River Red Gums. Consequently, an innovative kerb design was used and provided at intervals along the road to ensure continued passive irrigation of the trees, as shown below. This will ensure the trees are more resilient during dry periods and add value to neighbouring properties.

NEW RESIDENTIAL DEVELOPMENTS

Action Plan for New Residential Developments

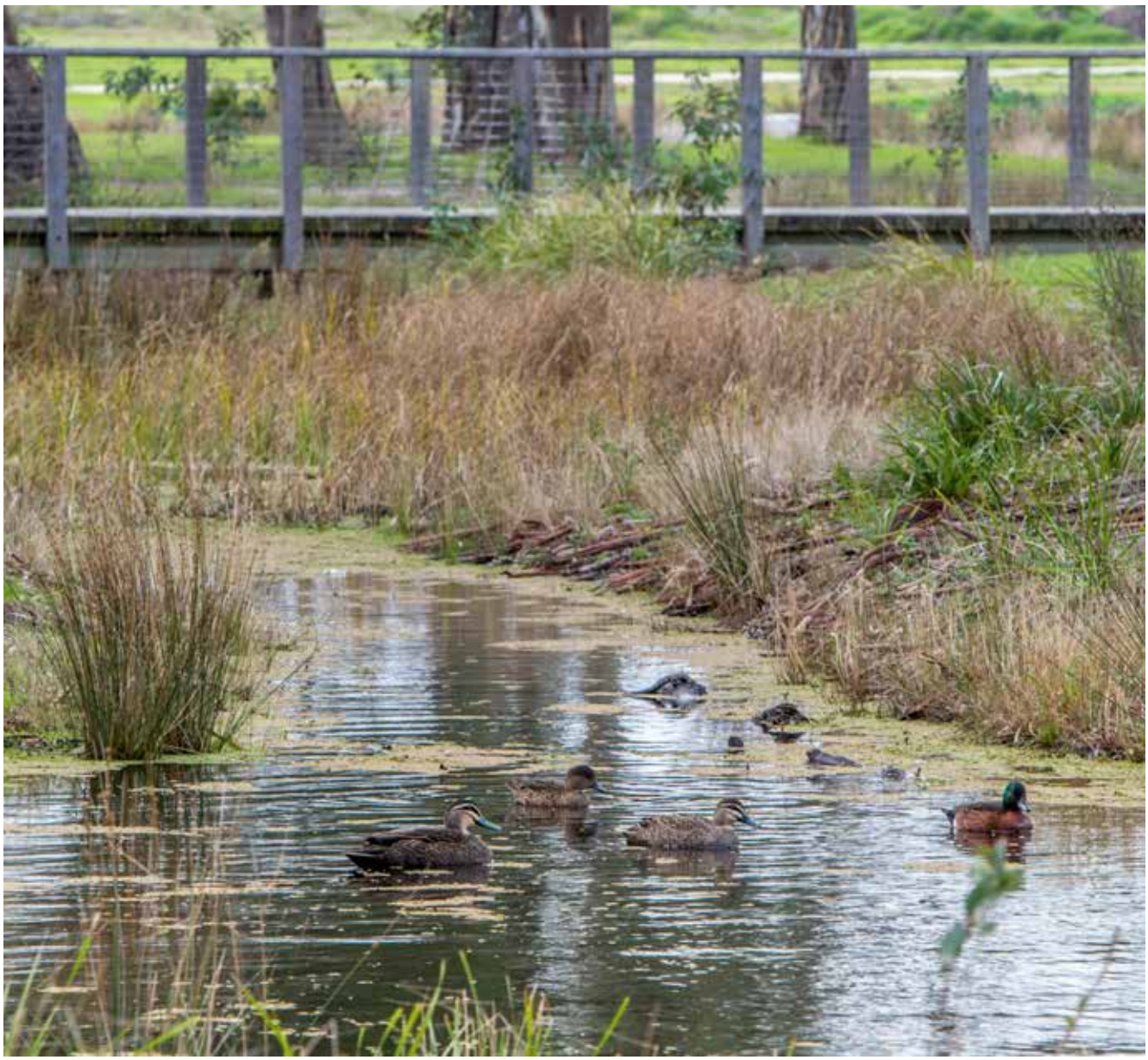
While the actions detailed in the Action Plan are currently considered within Council's sphere of influence, it is important to be clear about Council's role and the role of other stakeholders as well as priorities for action, funding, monitoring and review of the Strategy. Council's resources are determined annually by Council and other stakeholders.

When resources are available, actions will be generally resourced according to their stated priority and timeline as recommended by this plan.

The Action Plan recommends staged timelines for implementation. These recommended timeframes consider the complexity and nature of each action, some of which will require further investigation or collaboration with external parties before they can be implemented. The relevance of some actions, or their timing, may change due to availability of resources.

The recommended timing for these actions is as follows:

- **Immediate actions** – to commence within 18 months (before 2017)
- **Short-term actions** – to commence between 18 months to 5 years (before 2021)
- **Medium-term actions** – to commence within 5–10 years (before 2026)
- **Long-term actions** – to commence within 10–20 years (before 2036)



Objective	Strategic Priority	Action	Outcomes / Indicators	Responsibility	Timeframe
Manage the interface between new and old drainage infrastructure	**Develop improved technical standards and guidelines for the design, construction and management of drainage assets**	Develop Guidelines to assist developers in the preparation of Stormwater Management Plans for new developments	Guidelines prepared and released to the public	**Infrastructure Planning and Services** City Development City Planning, Design & Amenity	Short-term
Manage green infrastructure	**Develop improved technical standards and guidelines for the design, construction and management of green assets**	Develop kerb design to promote passive irrigation, with due consideration of flood risk and safety	Standard drawings prepared and released to the public	**Infrastructure Planning and Services** City Development	Immediate
Manage & reduce flood risk (community expectations)	**Develop an awareness program to educate our community on the role of water, our drainage assets and the community's responsibilities in regards to flood risk management**	Develop a community flood education program (municipality-wide)	Flood education program (brochures, webpage etc).	**City Planning, Design & Amenity** Corporate Services Infrastructure Planning and Services Community Services	Medium-term
		Implement the above community flood education program through existing program/events	Flood education program implemented	**Community Services** Corporate Services City Planning, Design & Amenity Infrastructure Planning and Services	Medium-term

8. INDUSTRIAL AND COMMERCIAL ZONES

Commercial and industrial zones – shown in Figure 10 – are extremely important to the economy of Greater Dandenong. Flooding may impact the community directly though damage to the commercial building and/or indirectly, due to lost trade. Council's priority within these areas is to minimise flood damage and to minimise disruption, such as road closure.

Key Strategic challenges for these areas include:

- Managing flood risks; and
- Managing pollution hotspot areas.

Industrial/Commercial areas in existing urban areas

Industrial and commercial sites in the northern catchments share the same risk as adjacent residential areas. Overland flowpaths may occur through properties, where the road reserve was not designed to contain overland flooding, as discussed on page 12.

Provided the drainage system was designed in accordance with the relevant standards prevailing at the time, there is no legal obligation on Council to undertake improvements to the existing drainage infrastructure. Council will program drainage upgrade works as part of the capital improvement program in priority areas however, individual businesses should also consider non-structural options, such as flood-proofing.

Ultimately, the stormwater runoff from these industrial and commercial areas will discharge into local creeks and this stormwater runoff has been identified as a key risk to river health.

FLOOD-PROOFING OF EXISTING BUILDINGS

Example of measures available to prepare your property to flooding:

- Install purpose-built flood boards
- Raise door threshold
- Use non-return valve to prevent water ingress onto your property

Example of measures available to reduce potential floodwater damage

- Fit water resistant skirting boards
- Raise electrical sockets, controls and wiring above projected flood levels.

The above list is not exhaustive and additional information can be found:

ses.nsw.gov.au

Dandenong South

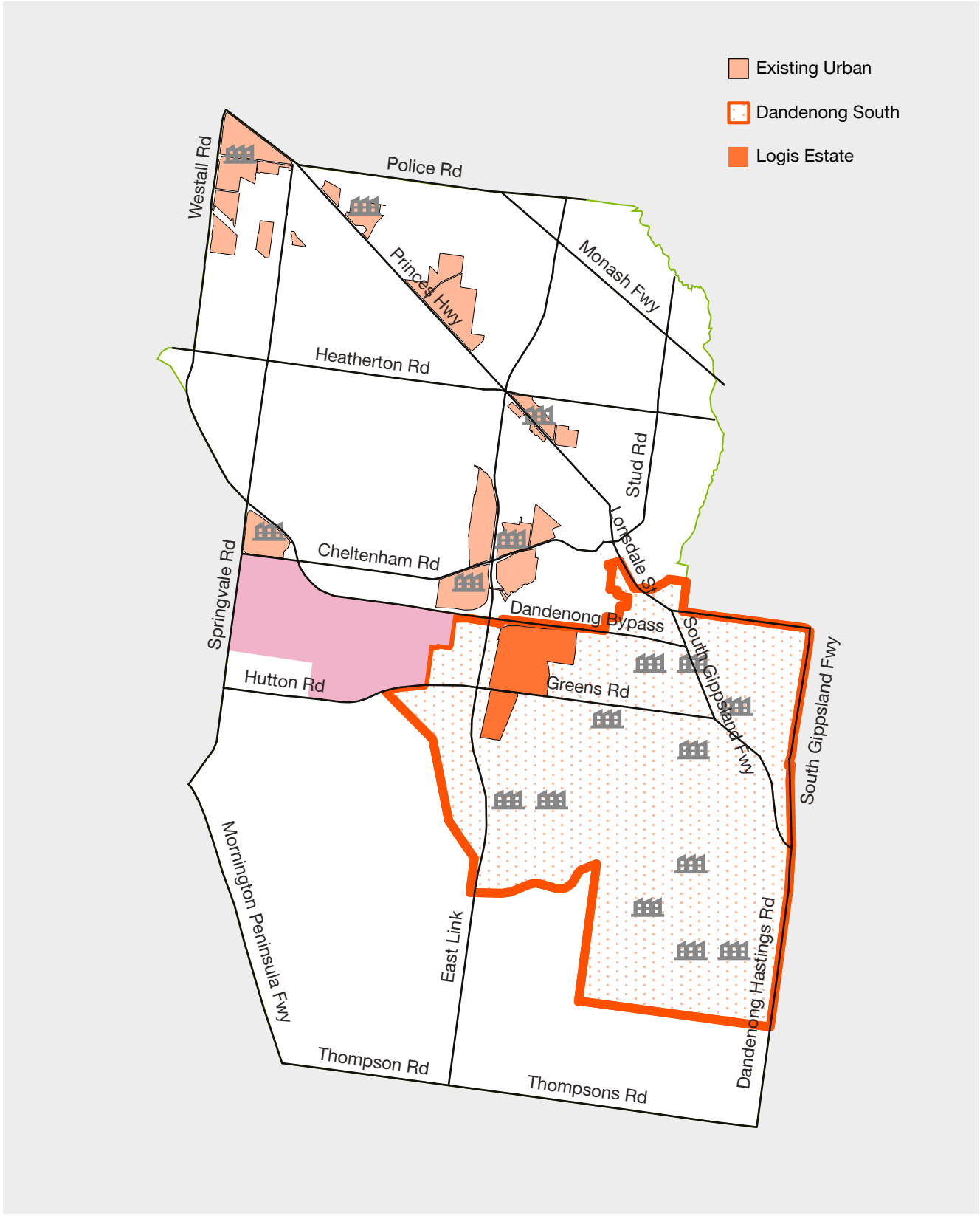
Dandenong South is a predominantly industrialised suburb. It also includes some residential areas, along Kirkham Road and Hammond Road. The development of this suburb is planned to continue, with projects such as Estate One going ahead. A comparison of Melbourne Water's dataset with the 2012 aerial photograph shows that there has been some increase in impervious areas in South Dandenong[9], which is likely to contribute to stormwater run-off and flood risk in the area.

New land development projects, such as the Lyndhurst and the Keysborough industrial developments, are subject to Development Services Schemes managed by Melbourne Water. These schemes and effective collaboration with Council ensure that the local drainage assets are built to Council's standards and specifications. Additionally, the major drainage infrastructure meets Melbourne Water's requirements.

Flooding may impact the community directly though damage to the commercial building and/or indirectly, due to lost trade.

[9] from Alluvium's *Integrated Water Management Background Report* (March 2014)

Figure 10 – Industrial and Commercial Zones



INDUSTRIAL AND COMMERCIAL ZONES

DEVELOPMENT SERVICES SCHEMES

Melbourne Water prepares Development Services Schemes (DSS) to plan and fund the infrastructure required for new urban developments, meeting the appropriate standards for flood protection, water quality, and waterway health.

Schemes comprise of a catchment-based drainage strategy that outlines the functional designs of the relevant infrastructure required to service urban growth, and a pricing arrangement that details how we will recoup the infrastructure costs through financial contributions paid by developers (from Melbourne Water's website).

Council may also generate funds for capital works via Development Contribution Plans (DCP).

DSS and DCP have been applied for road and drainage infrastructure in commercial and industrial developments in Dandenong South.

Council has identified this area as a key catchment where additional flood mapping is required. This would allow Council to have in place controls that consider drainage and flooding issues within this catchment.

A number of industrial catchments discharge into local creeks and stormwater run-off has been identified as a key source of pollution and therefore, a risk to river health. The values associated with creeks within Greater Dandenong are discussed in more detail in on page 48. As a consequence, Melbourne Water engaged the Centre for Aquatic Pollution Identification and Management (CAPIM)[10] to target certain areas of Greater Dandenong stormwater drainage system, to determine whether there was evidence of point source pollution. This monitoring program revealed a number of possible pollution events, leading to heavy metals and hydrocarbons discharging to the receiving waterways. This point source pollution presents a risk to the environmental values associated with our waterways and is associated with the industrial land use in the catchment. Council has recently received additional funding from Melbourne Water to continue monitoring industrial pollution hot spots.

INDUSTRIAL POLLUTION HOT SPOTS – WATER QUALITY MONITORING

The City of Greater Dandenong has recently received funding from Melbourne Water's Living River grant to monitor water quality in stormwater drains. Council will target catchments in Industrial 1 & 2 Zones, where industrial practices may result in point sources pollution.

Council will work with Melbourne Water, the EPA and Centre for Aquatic Pollution Identification and Management (CAPIM) to target pollution hotspots. Council's Planning Compliance team will use the results to proactively identify and engage with local businesses. The aim is to facilitate compliance with permitted land uses and consequently, protect the receiving natural water environment.

Logis Estate Retarding Basin

Located on the former Dandenong Treatment Plant site, this development aims to welcome a range of industries, including manufacturing and warehouses.

Logis Estate

Logis Estate, managed by Places Victoria and in partnership with Melbourne Water, is a 154ha industrial development and aims to be Victoria's first integrated eco-industrial business park. Located on the former Dandenong Treatment Plant site, this development aims to welcome a range of industries, including manufacturing and warehouses.

The drainage infrastructure was designed to ensure that flood depths in the road reserve do not exceed 300mm for 100yr ARI storm events. A retarding basin has been designed and constructed to alleviate existing and future flood risk. This retarding basin will also act as a landscape feature, to provide amenity to the industrial business park. Ultimately, the maintenance of this retarding basin will be Council's responsibility.

[10] A part of Melbourne University

INDUSTRIAL AND COMMERCIAL ZONES

Action Plan for Industrial and Commercial Zones

While the actions detailed in the Action Plan are currently considered within Council's sphere of influence, it is important to be clear about Council's role and the role of other stakeholders as well as priorities for action, funding, monitoring and review of the Strategy. Council's resources are determined annually by Council and other stakeholders. When resources are available, actions will be generally resourced according to their stated priority and timeline as recommended by this plan.

The Action Plan recommends staged timelines for implementation. These recommended timeframes consider the complexity and nature of each action, some of which will require further investigation or collaboration with external parties before they can be implemented. The relevance of some actions, or their timing, may change due to availability of resources.

The recommended timing for these actions is as follows:

- **Immediate actions** – to commence within 18 months (before 2017)
- **Short-term actions** – to commence between 18 months to 5 years (before 2021)
- **Medium-term actions** – to commence within 5–10years (before 2026)
- **Long-term actions** – to commence within 10–20 years (before 2036)

Objective	Strategic Priority	Action	Outcomes / Indicators	Responsibility	Timeframe
Understand flood risk	**Undertake detailed flood inundation mapping in Dandenong South**	Develop a program to undertake flood mapping in Dandenong South	Program prepared	**Infrastructure Planning and Services**	Immediate
		Undertake flood mapping in line with above program	Flood maps	**Infrastructure Planning and Services**	Short-term
Manage & reduce flood risk	**Investigate and identify (collaboratively with Melbourne Water) opportunities to address risks and develop a forward capital works program for drainage upgrades based on priority, risk and cost benefit analysis**	Prioritise catchment based on flood risk	Priority list	**Infrastructure Planning and Services**	Medium-term
		Investigate and identify flood mitigation options	Flood capital investment program	**Infrastructure Planning and Services**	Long-term
		Obtain internal and external funding to construct proposed capital works	Funding obtained Flood alleviation scheme constructed	**Infrastructure Planning and Services** City Improvement	Long-term
Manage pollution hotspot areas	**Engage and work with local businesses to reduce the risk of future pollution incidents**	Implement water quality monitoring program to monitor stormwater pollution in Industrial 1 & 2 Zones in partnership with the Centre for Aquatic Pollution Identification and Management (CAPIM) and the Environment Protection Authority (EPA)	Water quality monitoring program in place	**Regulatory Services** Infrastructure Planning and Services	Immediate
		Interpret and use results from above program to engage with local businesses	Engagement campaign	**Regulatory Services** Infrastructure Planning and Services	Immediate
		Develop information package to support local businesses	Information package	**Regulatory Services** Corporate Services	Short-term
Manage pollution hotspot areas	**Investigate planning controls to facilitate the implementation of environmental management measures on industrial sites**	Reinforce local laws and planning controls (where appropriate) and advocate for stronger environmental management measures on industrial sites	Environmental management plans in place for high risk sites	**City Planning, Design & Amenity** Regulatory Services Environmental Health	Medium-term

9. GREEN WEDGE

Green Wedges are the non-urban areas of metropolitan Melbourne that lie outside the Urban Growth Boundary. The CGD Green Wedge – shown in Figure 11 – is part of the larger South East Green Wedge (SEGW), which spans across the Cities of Kingston, Greater Dandenong, Frankston and Casey.

The Greater Dandenong Green Wedge covers an area of approximately 3,740ha and represents approximately 29% of the total area of the municipality. The majority of the Green Wedge is located at the southern end of the municipality and includes the suburbs of Bangholme, Keysborough South and Lyndhurst. A smaller section, the "Clarke Road Precinct", is located in Springvale South.

Key Strategic challenges for these areas include:

- Managing flood risks; and
- Managing drainage infrastructure given the inherently low lying swampy character of the area.

In 2013–2014 the City of Greater Dandenong developed its Green Wedge Management Plan (GWMP) which is Council's strategy for the future of its portion of the South East Green Wedge. The plan provides a clear vision, objectives and actions for the future of the Green Wedge for the next 15–20 years. The GWMP was adopted by Council in December 2014 and is now Greater Dandenong's adopted policy position regarding its portion of the South East Green Wedge. Additional information can be found on Council's website.

The GWMP has identified a number of priority objectives related to water management, including to:

- Improve flood and inundation management;
- Protect existing ecological values.

A large portion of the Greater Dandenong Green Wedge formed part of the former Carrum Carrum Swamp.

The swamp was drained in 1879, as part of a wider program of land drainage across Victoria, to improve transport links and enable agricultural practices. It is now bisected by a number of waterways, such as Patterson River, Eumemmerring Creek and the Eastern Contour Drains. These waterways are generally separated from the adjoining floodplains by major levees, for flood protection. These levees are managed and maintained by Melbourne Water.

The inherent low lying swampy character of the landscape of the Green Wedge and upstream development present challenges to Council that are different from those incurred in urbanised areas. Open drains generally act as local drainage infrastructure, yet despite these, a significant proportion of the Green Wedge is identified as flood-prone.

The drainage and water management issues associated with the different suburbs/areas of the Green Wedge are discussed in the following sections.

Keysborough South

The suburb of Keysborough South includes the Hutton Road North Precinct and Keys Road Precinct's of the Greater Dandenong Green Wedge. The Keys Road Precinct is identified in the GWMP as having flooding as a key land use constraint.

Keysborough South is located north of Mordialloc Creek. The north levees associated with Mordialloc Creek have been found to restrict flows from the Keysborough South area and Melbourne Water has recently completed significant waterway works along Pillars Road, removing the north levee to improve drainage capacity and the environmental values of the waterway.

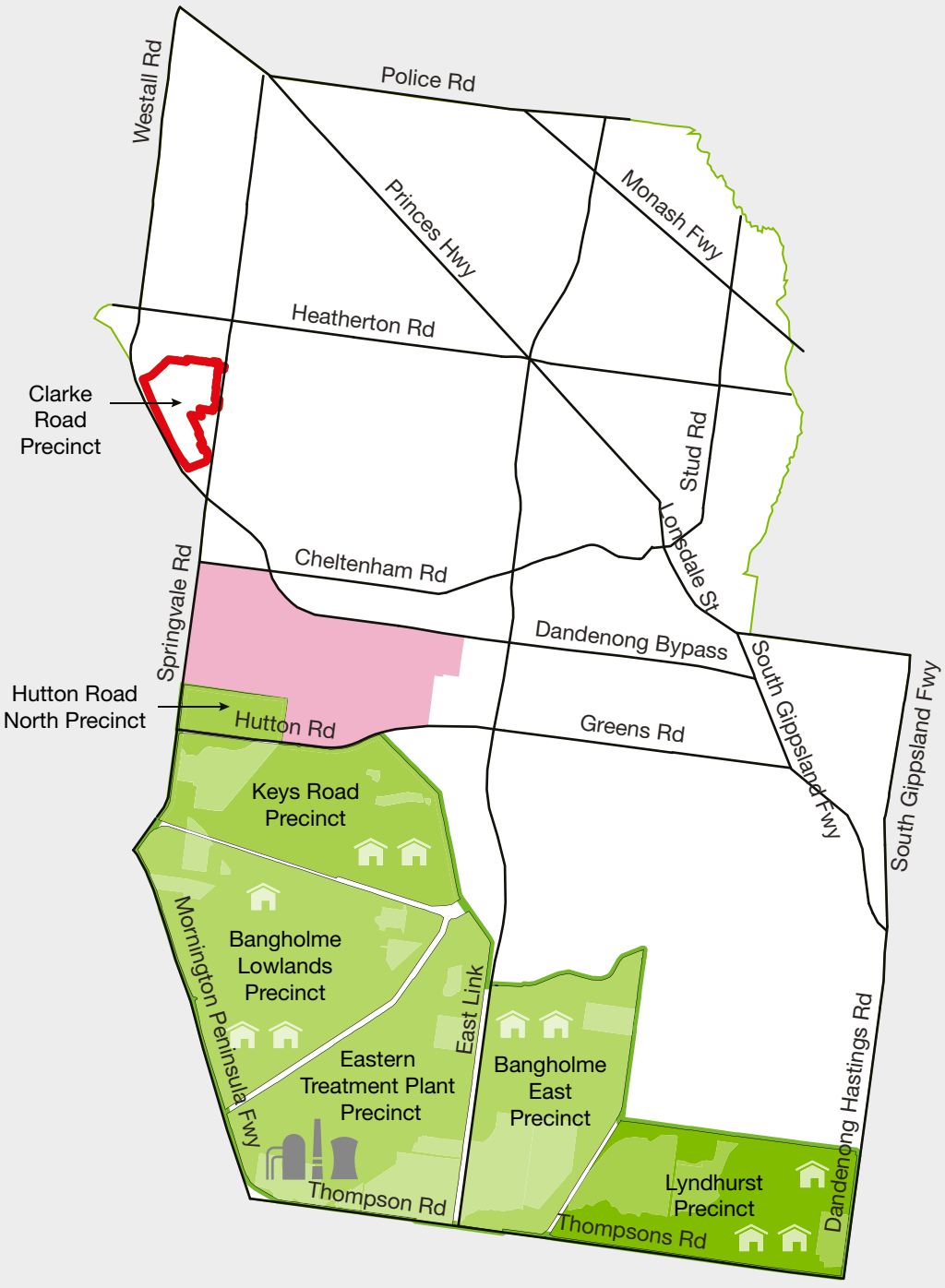
Bangholme

The suburb of Bangholme includes the Bangholme Lowlands Precinct, Bangholme East Precinct and the Eastern Treatment Plant Precinct. All three precincts are identified in the GWMP as having flooding as a key land use constraint.

The Bangholme area was severely impacted by the flooding event of February 2011. "Extreme shallow, but prolonged flooding of the overall area occurred over several days, until effective mitigation works could be put in place by Melbourne Water and the City of Greater Dandenong" (Neil M Craigie Pty Ltd, May 2011). These rainfall events adversely impacted on local residents, their properties and their businesses. Emergency sewage spills also occurred, resulting in additional concerns from a health perspective. Pumping operations continued for a couple of weeks thereafter, Council provided assistance to affected residents and major maintenance operations were undertaken to clean local open drains and waterways.

Drainage upgrades works were also carried out by Melbourne Water, including the construction of a "low flow" pipe under Springvale Road and Soden Road and a flood warning system for Willow Lodge.

Figure 11 – Greater Dandenong Green Wedge



GREEN WEDGE

FLOODING IN BANGHOLME

An important portion of Bangholme is prone to flooding. As a result, the water authority constructed a series of levee to protect properties from fluvial flooding and, in areas, have compensated land owners (when planning for those levees) to allow the use of their properties as flood storage.

Following the 2011 flooding and Neil Craigie report, Melbourne Water and Council have undertaken significant cleanout works. Both agencies also have progressed remedial works to alleviate future flood risks.

Melbourne Water has reprofiled Smythes Drain and Springs Drain to improve capacity and constructed a low flow pipes under Soden Road to further reduce flood risk. Smythes Drain is also no longer connected to Mordialloc Creek, reducing floodwater entering the catchment. Additionally, Council has reprofiled existing open drains and constructed additional open drains to provide additional storage and conveyance capacity in the area. These drainage upgrades will reduce local flood risk.

WILLOW LODGE

Willow Lodge, a retirement village located off the Frankston-Dandenong Highway is vulnerable from flooding from the Eastern Contour Drain and as a result, Council has recently installed a flood warning system for the site.

This autonomous flood alarm solution uses the public mobile phone network to receive commands and send flood warning information to a range of pre-programmed recipients. It is solar powered and requires no external cable connections for its effective operation. This flood warning system will assist Council in responding to flood events. It is also equipped with a flashing warning light which, once activated by high flood levels, may be used by the site manager and local residents.

Eastern Treatment Plant (ETP)

The ETP was opened in 1975 to serve Melbourne's growing population. Located in Bangholme South and operated by Melbourne Water, the site covers approximately 1,100 ha and treats approximately 330 million litres of sewage a day, which represents approximately 40% of Melbourne's sewage (Melbourne Water's website, 2015). The ETP is identified in the GWMP as having flooding as a key land use constraint.

As a result, the ETP is considered to be of state significance and is protected by the Greater Dandenong Planning Scheme and EPA guidance, from the development of any inappropriate use and/or more resident/occupier intensive use nearby. An Environmental Significance Overlay (ESO3) applies over the ETP and acts as a buffer around the site. This overlay is in place to protect the plant's operations, adjacent properties (due to related odour issues) and allow for future expansion of the ETP.

It is of note however, that *Plan Melbourne* recognises that sensitive and incompatible uses are encroaching on the Eastern Treatment Plant.

Lyndhurst

The suburb of Lyndhurst is situated across the municipal boundaries of both the City of Greater Dandenong and the City of Casey. Whilst the area within the Greater Dandenong Green Wedge is semi-rural, it is located downstream of the Lyndhurst residential area in the City of Casey, which is within the Urban Growth Boundary. As a result, the forecast development is likely to result in increased drainage and water quality issues, as well as decline in the condition of infrastructure, local waterways and agricultural productivity.

Clarke Road Precinct

A small portion of the Greater Dandenong Green Wedge is situated in Springvale South. This precinct is centred around Clarke Road. As the precinct does not contain any waterways and has no known issues relating to flooding, current drainage infrastructure is considered adequate.

The Spring Valley Reserve is located within this precinct and is covered by the Special Use Zone (Schedule 2). The 2.2ha site forms part of the buffer zone of the former Clarke Road landfill and consequently, the site is closely monitored by the EPA and Council, in respect to landfill gas and groundwater pollution. The purpose of the planning control is to provide interim use of the land that is compatible with the use and development of nearby land. The past land use reduces future development opportunities within the precinct and currently, a minimum lot size of 4ha applies.

GREEN WEDGE

Action Plan for Green Wedge

While the actions detailed in the Action Plan are currently considered within Council's sphere of influence, it is important to be clear about Council's role and the role of other stakeholders as well as priorities for action, funding, monitoring and review of the Strategy. Council's resources are determined annually by Council and other stakeholders. When resources are available, actions will be generally resourced according to their stated priority and timeline as recommended by this plan.

The Action Plan recommends staged timelines for implementation. These recommended timeframes consider the complexity and nature of each action, some of which will require further investigation or collaboration with external parties before they can be implemented. The relevance of some actions, or their timing, may change due to availability of resources.

The recommended timing for these actions is as follows:

- **Immediate actions** – to commence within 18 months (before 2017)
- **Short-term actions** – to commence between 18 months to 5 years (before 2021)
- **Medium-term actions** – to commence within 5–10years (before 2026)
- **Long-term actions** – to commence within 10–20 years (before 2036)

Objective	Strategic Priority	Action	Outcomes / Indicators	Responsibility	Timeframe
Manage & reduce flood risk	**Undertake detailed flood inundation mapping in the Green Wedge**	Develop a program to undertake flood mapping in the Green Wedge	Program prepared	**Infrastructure Planning and Services**	Immediate
		Undertake flood mapping in line with above program	Flood maps	**Infrastructure Planning and Services**	Short-term
Manage & reduce flood risk	**Investigate and identify (collaboratively with Melbourne Water) opportunities to address risks and develop a forward capital works program for drainage upgrades based on priority, risk and cost benefit analysis**	Develop local stormwater drainage master plans consistent with the land use and development objectives of the Green Wedge (as flood mapping becomes available)	Local stormwater drainage master plans	**Infrastructure Planning and Services** City Planning, Design & Amenity	Short-term
		Obtain internal and external funding to construct proposed capital works	Funding obtained Flood alleviation scheme constructed	**Infrastructure Planning and Services** City Improvement	Medium-term
Manage demand for new and improved drainage systems	**Investigate planning controls to alleviate impact of flood risk in the Greater Dandenong Green Wedge**	Advocate for Melbourne Water to review and update the geographical extent of the Land Subject to Inundation Overlay (LSIO)	Greater Dandenong Planning Scheme updated	**Infrastructure Planning and Services** City Planning, Design & Amenity Corporate Services	Long-term
Protect & enhance existing ecological values	Identify opportunities in the GDGW where new and existing wetlands/billabongs, watercourses and retarding basins could be established and improved specifically to improve fauna habitat (e.g. for native fish and amphibians)	Review existing and proposed wetlands and retarding basin in the Green Wedge and identify opportunities to create and/or enhance habitat	Opportunities identified	**Infrastructure Planning and Services** City Planning, Design & Amenity	Short-term
		Advocate for Melbourne Water to progress opportunities identified	Melbourne funding obtained	**Infrastructure Planning and Services** City Planning, Design & Amenity	Short-term

10. PARKS, RESERVES & WATERWAYS

Council's role is to provide community spaces, such as parks, sporting facilities and green open-spaces. Waterways within the municipalities occasionally form part of these community spaces. The locations of these important municipal features are shown in Figure 12.

Key Strategic challenges for the management of these facilities include:

- Maintaining high quality parks and facilities for residents and visitors to enjoy during droughts, when water restrictions are in place;
- Managing waterway with other stakeholders to reduce flood risk to our community; and
- Managing waterway assets to provide additional amenity benefits.

Parks & Reserves

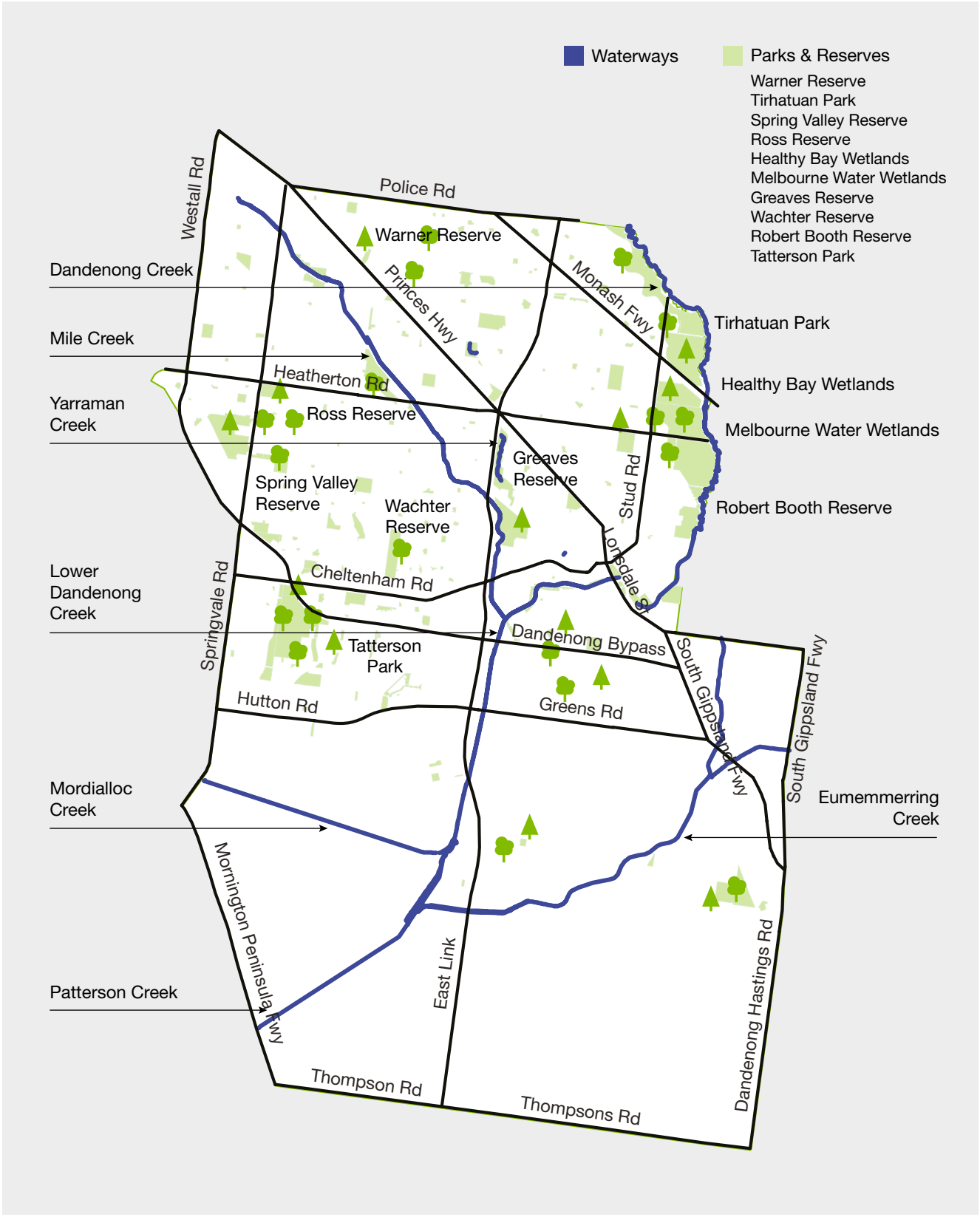
The majority of the water used by Council is to irrigate sporting facilities and open spaces. These parks are generally dependent on irrigation and are vulnerable to drought and water restrictions however, opportunities exist to reduce Council's total water consumption and increase the drought resilience of Council's sport and recreational facilities. Stormwater -if appropriately harvested and treated- can become a valuable resource to support the delivery of these community services. Whilst Council's annual budget allows for the purchase of water from South East Water, irrigation demand is influenced by rainfall.

Importantly, the reliance on drinking water from South East Water makes Council's operations vulnerable to drought conditions. Recent water restrictions have had an adverse impact on the condition of many sporting reserves across Greater Dandenong. Mains water irrigation would not be permitted for 75% of Council's playing fields, during level 3A restrictions, as was the case between April 2007 and August 2010.

Council is looking to reduce its reliance on water mains and increase its resilience to drought conditions. Stormwater run-off represents a source of water which may be used to irrigate those reserves. Council has undertaken and initiated a number of water-related projects implemented across the municipality in recent years, including Lonsdale St and Tatterson Park. Council has also recently inherited another stormwater harvesting system comprising of two tanks along Halpin Way. These tanks provides storage equivalent to 51kL, to irrigate Settlers Park and nearby garden beds. These projects also provide additional environmental benefits including amenity and urban heat reduction benefits.

Stormwater harvesting systems may be used to maintain high quality multi-use sport and recreational facilities for residents and visitors to enjoy during periods of drought. The water from these systems may be used to irrigate playing fields as well as to protect native vegetation reserves during droughts. This more sustainable approach to the management of our water resources will assist to protecting these valuable assets, given the value they bring to our community and to local biodiversity.

Figure 12 – Parks, Reserves & Waterways



PARKS, RESERVES & WATERWAYS

TATTERSON PARK

Tatterson Park is a 48ha park located on Cheltenham Road in Keysborough and includes Springers Leisure Centre. Council's vision is for the park to become a regional, multi-purpose park that provides for a broad range of passive and active recreational uses for our community.

In partnership with Melbourne Water, Council is constructing, in stages, a stormwater harvesting system. This system will ultimately supply up to 20,000kL of stormwater from residential areas for the irrigation of the site's playing fields and surrounds. This system will reduce the consumption of drinking water, assist Council in maintaining this high quality amenity facility, as well as protecting the downstream waterways.

The municipality is located in the Dandenong catchment, in which Dandenong Creek is the major creek and floodway.

Waterways

The municipality is located in the Dandenong catchment, in which Dandenong Creek is the major creek and floodway. It traverses approximately north-east to south-west from the Dandenong Ranges National Park, drains into Patterson River, and ultimately Port Phillip Bay. Tributaries include Eumemmerring Creek, Yarraman Creek and Mile Creek.

The information in this section is informed by Melbourne Water's Index of River Condition (IRC), which is used to assessed the condition of waterways, and *Port Phillip and Westernport Regional River Health Strategy* (Melbourne Water, 2007).

Dandenong Creek

Dandenong Creek is maintained by Melbourne Water and discharges to Mordialloc Creek and Patterson River at the southern end of the municipality, within the Green Wedge. Lower Dandenong Creek has benefited from significant rehabilitation work in recent years, especially along the EastLink trail. Further north, especially along the municipality west boundary, Dandenong Creek is concrete-lined, as shown below.

The concrete-lined channel improves the conveyance of the waterway however, it also significantly reduces the environmental values associated with the waterway. Additionally, higher velocity within the channel increases the safety risk.

Whilst the Dandenong Creek represents an important social value to the community within our boundary, its river health is generally considered poor. As a result of urbanisation and past modification, its environmental value is generally low, but good native fish populations are found in the lower reaches. Additionally, a number of threatened flora and fauna species reside within the catchment, such as the growling grass frog (*Litoria raniformis*).

Dandenong Creek downstream Lonsdale St – concrete-lined channel

PARKS, RESERVES & WATERWAYS

RIVER REHABILITATION

A majority of the waterways within Greater Dandenong have been heavily engineered over the years and are often concrete channels, used for rapid conveyance of stormwater. River rehabilitation consists of removing this concrete channel and replacing it with a more natural and vegetated river bed. It may provide a number of benefits to the community, including:

- High value community open space
- Improved local amenity
- Enhanced ecological values
- Improved flood protection

Importantly, recent research from the University of Western Australia indicates that the improved amenity also benefits house sale prices of adjacent properties (UWA and CRC WSC, 2015).

Mile Creek

Mile Creek begins at the north-west extent of the municipal boundary and traverses south-east until it reaches Dandenong Creek north of Keysborough. Similarly to Dandenong Creek, Mile Creek acts more as a drainage asset than an environmental asset. It is also concrete-lined and is equipped with low flow pipes. As a result, its aesthetics are reduced, as shown on on page 53.

The Noble Park Activity Centre Structure Plan identifies as an action for Council to identify measures to improve water quality and advocate Melbourne Water to remove “channelized sections of Mile Creek” (Noble Park Activity Centre Structure Park, June 2009).

Eumemmerring Creek

The Eumemmerring Creek is a tributary of the Dandenong Creek. Its tributaries include Troups Creek, Ti Tree Creek, Hallam Main Drain and Eastern Contour Drain and it drains areas of Lyndhurst, Hampton Park and Endeavour Hills. The catchment is largely urban and rapidly expanding. This creek, as well as the Eastern Contour Drain, has been engineered over the years. Levees located along the waterway protect adjacent areas, but also reduce the environmental values associated with the waterway, its riparian habitat and its floodplain.

Whilst the Eumemmerring Creek represents an important social value to the community within our boundary, its river health is generally considered poor. Melbourne Water have recently constructed a number of water quality treatment wetlands to reduce pollutants in the waterways (and ultimately entering Port Phillip Bay). Other wetland systems are planned, just as the Glasscocks Road wetland. These will provide an added level of protection to significant native species, such as Growling grass frogs and dwarf galaxias (*Galaxiella pusilla*).

Mile Creek downstream Springvale Road – concrete-lined channel

Yarraman Creek

Yarraman Creek a tributary of Mile Creek, is another significant watercourse located within Greater Dandenong. It is culverted north of Princes Highway and runs along the EastLink south of Princes Highway within Fotheringham Reserve. Fotheringham Reserve is approximately 16 hectares of public open space and is potentially one of Dandenong's most important recreational and environmentally significant areas. The Reserve contains one of the largest intact remnant River Red Gum (*Eucalyptus camaldulensis*) woodlands within the municipality, providing habitat for many native species of plants and animals, and acts as a passive recreation area for residents.

The site contains a zone of Riparian Woodland, adjacent to the Yarraman Creek and billabongs. This billabong system relies on seasonal water from the Creek, but following EastLink construction and the creek realignment, the connectivity has been altered. The altered hydrological and hydraulic conditions impact on the health of the remaining riparian vegetation and facilitate weed invasion. Whilst the billabongs have benefited from a revegetation program funded by Council and Melbourne Water, additional works are required to ensure the riparian vegetation is more resilient to altered creek conditions and future drought.

Similarly to Dandenong Creek, Mile Creek acts more as a drainage asset than an environmental asset. It is also concrete-lined and is equipped with low flow pipes. As a result, its aesthetics are reduced…

PARKS, RESERVES & WATERWAYS

Action Plan for Parks, Reserves & Waterways

While the actions detailed in the Action Plan are currently considered within Council's sphere of influence, it is important to be clear about Council's role and the role of other stakeholders as well as priorities for action, funding, monitoring and review of the Strategy. Council's resources are determined annually by Council and other stakeholders. When resources are available, actions will be generally resourced according to their stated priority and timeline as recommended by this plan.

The Action Plan recommends staged timelines for implementation. These recommended timeframes consider the complexity and nature of each action, some of which will require further investigation or collaboration with external parties before they can be implemented. The relevance of some actions, or their timing, may change due to availability of resources.

The recommended timing for these actions is as follows:

- **Immediate actions** – to commence within 18 months (before 2017)
- **Short-term actions** – to commence between 18 months to 5 years (before 2021)
- **Medium-term actions** – to commence within 5–10years (before 2026)
- **Long-term actions** – to commence within 10–20 years (before 2036)

Objective	Strategic Priority	Action	Outcomes / Indicators	Responsibility	Timeframe
Maintain high quality parks and facilities	**Investigate and identify opportunities to recycle stormwater runoff for the irrigation of parks across the City of Greater Dandenong**	Identify (and prioritise) stormwater harvesting (SWH) options for the irrigation of Council's open space and recreational facilities where flood benefits can also be combined	Stormwater harvesting (SWH) Scoping Study completed	**Infrastructure Planning and Services** City Planning, Design & Amenity Community Services	Immediate
		Progress detailed design of preferred SWH system for the priority site locations identified in SWH Scoping Study	Detailed design	**Infrastructure Planning and Services** City Improvement	Short-term
		Obtain internal and external funding to construct proposed SWH systems	Funding obtained SWH scheme constructed	**Infrastructure Planning and Services** City Improvement	Medium-term
Maintain high quality parks and facilities	**Investigate and identify opportunities to recycle stormwater runoff for the irrigation of native reserves across the City of Greater Dandenong**	Undertake Alex Wilkie water requirement study	Water requirement report prepared	**Infrastructure Planning and Services**	Immediate
		Obtain internal & external funding to construct proposed drainage works	Funding obtained SWH scheme constructed	**Infrastructure Planning and Services** City Improvement	Medium-term

Objective	Strategic Priority	Action	Outcomes / Indicators	Responsibility	Timeframe
Manage and enhance our waterways	**Investigate and identify (collaboratively with Melbourne Water) opportunities to rehabilitate channelized section of waterways within the City of Greater Dandenong**	Investigate the feasibility of improving Mile Creek corridor between Springvale Road and Sandown Racing Track for amenity, recreation, biodiversity and water quality purposes	Hydraulic study and economic assessment prepared	**Infrastructure Planning and Services** City Planning, Design & Amenity Community Services	Short-term
		Work with Melbourne Water and Melbourne Racing Club to carry out improvements to the Mile Creek corridor	Waterway rehabilitated	**Infrastructure Planning and Services**	Medium-term
		Investigate the feasibility of restoring the Fotheringham Reserve billabongs	Report prepared	**Infrastructure Services and Services**	Short-term
		Obtain internal and external funding to rehabilitate billabongs	Funding obtained Billabong scheme constructed	**Infrastructure Planning and Services** City Improvement	Medium-term
		Develop culvert design to promote fish passage in our waterways	Standard drawings prepared and released to the public	**Infrastructure Planning and Services** City Development	Medium-term
Manage & reduce flood risk	**Engage with adjacent Councils and other government stakeholders to promote a more integrated management of Dandenong Creek.**	Facilitate the development of a whole-of-water plan for Dandenong Creek (as previously proposed by and to the Office of Living Victoria)	Whole-of-Water Plan prepared collaboratively with other stakeholders	**Infrastructure Planning and Services** City Planning, Design & Amenity	Medium-term

Phone 8571 1000
Fax 8571 5196
council@cgd.vic.gov.au

TTY: 133 677
Speak and listen: 1300 555 727
Online: relayservice.gov.au

TIS: 13 14 50

Find us online
greaterdandenong.com