Development of the Special Building Overlay

Technical Report

NA49913512

Prepared for
Manningham City Council

Cardno
Shaping the Future

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1	29/05/2015	DRAFT SBO	AHV, LP	Rob Swan
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1 Background

1.1 Introduction

This document has been prepared at the request of the City of Manningham to provide the background information and methodology used to amend the existing Special Building Overlay (SBO) for the Manningham Planning Scheme and to identify properties flooded within areas under Council's jurisdiction (i.e. local catchment flooding). The review of the overlay is a key aspect of floodplain management in the City and enables the appropriate control of development in areas subject to overland flow.

The amended overlays build on hydraulic modelling undertaken on behalf of Council and Melbourne Water by various consultants over the last five years.

1.2 Flood Modelling Studies

1.2.1 Overview

Flood mapping seeks to identify areas at risk of flooding from various storm event and reduce those risks. It is a vital component of land use planning in the development of the SBO. The flood extents determined from engineering investigations are used to amend the SBO.

The areas included in the amended SBO have been generated as a result of engineering investigations undertaken by Council and Melbourne Water. . The flood extents used to amend the SBO have been developed for flooding that is in excess of 50mm flood depth. The projects identified flood prone areas in the City of Manningham and included consideration of all local and Melbourne Water main drainage lines and major creeks within the five subject catchments.

Separate consideration of the Yarra River and Koonung Creek were outside the scope of the flood mapping projects. Flooding associated with the Yarra River and Koonung Creek would normally be designated under the Flood Zone, Floodway Overlay or Land subject to Inundation Overlay provisions of the Manningham Planning Scheme. The specific areas covered by the overlays are discussed below.

1.2.2 Bulleen North

This project was undertaken as a collaboration project between the City of Manningham and Melbourne Water.

The Bulleen North drainage network is a branched and highly modified network that commences near the corner of High Street and Manningham Road and discharges at the Yarra River near the corner of Templestowe Road and Sheahans Road. It services the suburb of Bulleen. The total catchment area of the highly urbanised catchment is approximately 225 hectares, consisting of medium and high density residential and commercial developments.

The drainage system consists primarily of reinforced concrete pipes that ultimately discharge into the Yarra River. Throughout the entire catchment, a council maintained drainage network exists that flows into the Melbourne Water Main Drain at various locations. The Melbourne Water Drain commences at Rose Avenue and traverses the catchment in a north-west direction, discharging near the Yarra River at Templestowe Road.

1.2.2.1 Properties and Buildings Flooded

In a large storm event, significant flooding occurs throughout the catchment. Numerous properties are inundated and many floors are potentially flooded. Table 1-1 provides an indication of the number of properties affected and floors flooded in the 1% Annual Exceedance Probability (AEP) storm event. These are the combined totals from flooding associated with Council and Melbourne Water drainage systems.

Table 1-1 Properties Flooded, Bulleen North Catchment

Flood Event	Number of Properties Affected	Number of Floors Flooded*
100 year	659	86

** Note 1: the floors flooded have only been counted where surveyed floor level data is available.*

** Note 2: figures in table are taken directly from the flood modelling results. Not all properties will be included in the planning layers.*

1.2.3 Ruffey Creek

This project was undertaken as a collaboration project between the City of Manningham and Melbourne Water. The Ruffey Creek Flood Mapping results were originally developed by AECOM and were reviewed as part of this project to ensure consistency of modelling parameters across the five catchments.

The Ruffey Creek catchment spans areas of Templestowe and Doncaster and consists almost entirely of residential development with some commercial and public land scattered throughout. The catchment boundary extends just east of Blackburn Road, south of Doncaster Road, along Williamsons Road, Manningham Road, High Street and Serpells Road and discharges to the Yarra River at Finns Reserve. The total catchment area of the highly urbanised catchment is approximately 1,049 hectares. Ruffey Lake sits in the centre of the catchment. The average grade of the catchment is 2% with the upper reaches approaching grades of 7%. The dominant flow direction is from south-east to north-west toward the Yarra River.

The drainage system consists primarily of reinforced concrete pipes that ultimately discharge into the Yarra River. Throughout the entire catchment, a council maintained drainage network exists that flows into the Melbourne Water Main Drainage network at various locations. The Melbourne Water drainage network includes the George Street, Roseland Grove, Bonview Road, Greenridge Avenue and Montpellier Crescent main drains, as well as the Lynnwood Parade Retarding Basin. From a flood mitigation perspective, Ruffey Lake is by far the most important infrastructure component, also functioning as a retarding basin.

1.2.3.1 Properties Flooded

Table 1-2 below shows the number of properties that are considered to be flood affected. The total below indicates where a property is intersected by the expected extent of flooding in the 1% AEP flood event.

Table 1-2 Properties Affected by flooding (Ruffey Creek catchment)

Catchment	Land Use	1% AEP Event - Properties Affected*
Ruffey Creek	Residential	3754
	Business	29
	Public	124
	Total	**3907**

** Note 1: figures in table are taken directly from the flood modelling results. Not all properties will be included in the planning layers*

1.2.4 Mullum Mullum Creek, Koonung Creek, Andersons Creek

This project was undertaken by the City of Manningham, with technical review and comment provided by Melbourne Water. The aim of the project was to identify flooding from council owned or controlled assets, however due to the nature of the drainage networks, some areas that are considered Melbourne Water controlled were included.

The Koonung Creek catchment is primarily zoned as 'general residential zone' with an existing extensive underground stormwater pipe network throughout the catchment area. The land has not generally been developed with consideration of major overland flows, which is representative of the development controls at the time the land was urbanised generally in the 1950's and 1960's. There are many examples of overland flow paths traversing private properties.

The Mullum Mullum and Andersons Creek catchments are a mixture of urban and peri urban (large lot) land. Peri urban type uses are more commonly found along the main creek lines of the Mullum Mullum and Andersons Creek catchments. Predominantly, underground drainage is focused in the urban areas, with

rural and occasional urban areas (such as Warrandyte) not as effectively serviced. Most of the flows are carried in open streams and their associated floodplains. Across the catchment the tributary overland flow paths follow the natural drainage lines through properties; however, there are relatively few areas where flood extents appear to encroach on built infrastructure.

1.2.4.1 Properties and Buildings Flooded

Table 1-3 and Table 1-4 below show the number of properties and buildings that are considered to be flood affected in each catchment. The total below indicates where a property or building is intersected by the expected extent of flooding in the 1% AEP flood event.

Table 1-3 Properties Affected by flooding (Mullum, Andersons and Koonung catchments)

		1% AEP Event		
		Responsible Authority		
Catchment	Land Use*	MW	Council	Total
Koonung Creek	Residential	143	1939	2082
	Business	3	36	39
	Public	48	150	198
	Total	**194**	**2125**	**2319**
Mullum Mullum Creek	Residential	245	2219	2464
	Business	0	17	17
	Public	103	203	306
	Total	**348**	**2439**	**2787**
Andersons Creek	Residential	54	460	514
	Business	0	21	21
	Public	49	301	350
	Total	**103**	**782**	**885**

** Note 1: figures in table are taken directly from the flood modelling results. Not all properties will be included in the planning layers*

Table 1-4 Buildings Affected by flooding (Mullum, Andersons and Koonung catchments)

		1% AEP Event		
		Responsible Authority		
Catchment	Land Use*	MW	Council	Total
Koonung Creek	Residential	39	926	965
	Business	3	22	25
	Public	4	39	43
	Total	**46**	**987**	**1033**
Mullum Mullum Creek	Residential	50	791	841
	Business	0	11	11
	Public	11	16	27
	Total	**61**	**818**	**879**
Andersons Creek	Residential	10	113	123
	Business	0	20	20
	Public	6	26	32
	Total	**16**	**159**	**175**

The number of buildings which will be inundated in a major storm event will be a subset of the building numbers shown in Table 1-4. This data is not currently available as floor level surveys have not been undertaken to date for these catchments.

2 Applicable Flood Planning Controls

There are three main planning overlay controls for flooding, the Floodway Overlay (FO), the Land Subject to Inundation Overlay (LSIO) and the Special Building Overlay (SBO). Of these controls, the SBO has been adopted to represent flooding in council areas, noting that this is related to a drainage network that may include pipes and open channels and provides ease of implementation.

2.1 Land Subject to Inundation (LSIO)

The LSIO applies to areas subject to mainstream flooding in both rural and urban areas. These are generally areas surrounding major overland flow paths that become inundated during full flood flows in the 1% AEP flood event (also referred to as the 1 in 100 year ARI event).

The current flood planning controls will remain unchanged for LSIO areas and will continue to adopt the standard planning permit requirements found in Clause 44-04 of the Manningham Planning Scheme.

2.2 Special Building Overlay (SBO)

The SBO applies to areas that are subject to stormwater flooding in urban areas. These are generally areas which are inundated due to the inability of the stormwater infrastructure to convey the full flood flows in the 1% AEP flood event (also referred to as the 1 in 100 year ARI event). This overlay is suitable for areas where stormwater systems were implemented prior to current design standards and there has been substantial development since the infrastructure was completed.

The flood planning controls proposed for the City of Manningham include three control types, designated as SBO1, SBO2 and SBO3. SBO1 and SBO2 are for areas of greater flooding where stricter planning controls are required. These areas adopt the standard planning permit requirements found in Clause 44-05 of the Manningham planning scheme. The 1 and 2 represent the break-up between the area of responsibility for management by Melbourne Water (SBO1) and Council (SBO2) respectively.

The proposed SBO3 is for areas managed by Council that have a known flood issue which requires control, but could be managed without a planning permit. The flood depth in the SBO3 area is usually less than 100 mm. It is proposed to adopt a schedule to the SBO that provides for appropriate flood sensitive development in these areas, without a permit, provided certain conditions are met. This approach should significantly lessen the impact of implementing appropriate flood management controls on both council staff and the wider community.

2.3 Schedule to the SBO (SBO1)

SCHEDULE 1 TO THE SPECIAL BUILDING OVERLAY

Shown on the planning scheme map as SBO1

MELBOURNE WATER MAIN DRAINS

1.0 Referral of applications

An application must be referred to Melbourne Water in accordance with Section 55 of the act unless in the opinion of the responsible authority, the proposal satisfies requirements or conditions previously agreed to in writing between the responsible authority and the floodplain management authority

2.4 Schedule to the SBO (SBO2)

The following schedule is proposed for the areas designated as SBO2.

SCHEDULE 2 TO THE SPECIAL BUILDING OVERLAY

Shown on the planning scheme map as SBO2

MANNINGHAM COUNCIL DRAINS

1.0 Referral of applications

- *No referral authority specified*
- *An application will be considered by the City of Manningham as the authority responsible for local drains.*

2.5 Schedule to the SBO (SBO3)

The following schedule is proposed for the areas designated as SBO3

SCHEDULE 3 TO THE SPECIAL BUILDING OVERLAY

Shown on the planning scheme map as SBO3

MANNINGHAM COUNCIL DRAINS

1.0 Permit requirement

A permit is not required to construct or carry out the following buildings or works:

- *a new dwelling where the floor level is at least 400 mm above the natural surface level and the sub floor does not obstruct the overland flow path.*
- *a replacement dwelling where the floor level is at least 400 mm above the natural surface level, the sub floor does not obstruct the overland flow path and the original building footprint remains the same. The responsible authority may require evidence of the existing building envelope.*
- *a single or multiple dwelling extension where:*
    - *the sub floor level does not obstruct the overland flow path; and*
    - *the floor level of the proposed dwelling extension/s is at least 400 mm above the natural surface level.*
- *an alteration to an existing building where the original building footprint remains the same and floor levels are constructed to at least 400mm above natural surface level.*
- *a replacement building (not including an out-building) where the floor level is at least 400 mm above the natural surface level, the original building footprint remains the same and the sub floor does not obstruct the overland flow path. The responsible authority may require evidence of the existing building envelope.*
- *new fencing with at least 25% openings and with the plinth at least 400 mm above the natural surface level .*

2.0 Referral of applications

- *No referral authority specified*
- *An application will be considered by the City of Manningham as the authority responsible for local drains.*

3 Planning Extent Development

3.1 Overview

Proposed planning extents have been developed for Bulleen North, Ruffey Creek, Mullum Mullum Creek, Andersons Creek and Koonung Creek Catchments. The proposed planning extents have been developed based on the hydraulic modelling outputs for the 100yr ARI storm event.

The extent of the overlay includes areas of flooding relevant to Melbourne Water's assets. Melbourne Water has a number of existing overlays in place as part of the scheme. As agreed with MW, these overlays have been replaced with the results of this study as they have been developed using more up to date modelling outputs.

The aim of the proposed planning extents are to identify areas that require planning controls to ensure appropriate responses to flooding. It is not necessary to have a flood related control in all areas where overland flows occur or are predicted by a flood model. The following section discusses the process used to develop the proposed planning extents.

3.2 Inclusion / Exclusion Criteria

Flood extents from the flood mapping projects for each catchment were used to provide the basis for the proposed planning extents. Four criteria have been adopted to assess if an area should be included in the planning extent. These inclusion and exclusion criteria are explained below.

3.2.1 Criteria 1: Properties adjacent to flooded roads

There are many areas in Manningham where flooding is generally contained within the road reserve, however, due to the flood mapping methodology, the flood extents generated from the flood model results may encroach slightly onto properties. This criteria identifies where this may occur and removes areas from the proposed planning extent on properties where this occurs, as shown in Figure 3-1. The guidelines adopted for this criteria were:

Removed from SBO: If the flooded area of a property was entirely within 5 m of a roadway and the percentage of the property affected was less than 10%.

Retained as part of SBO: If other areas of the property, not within 5m of the roadway, were flood affected.

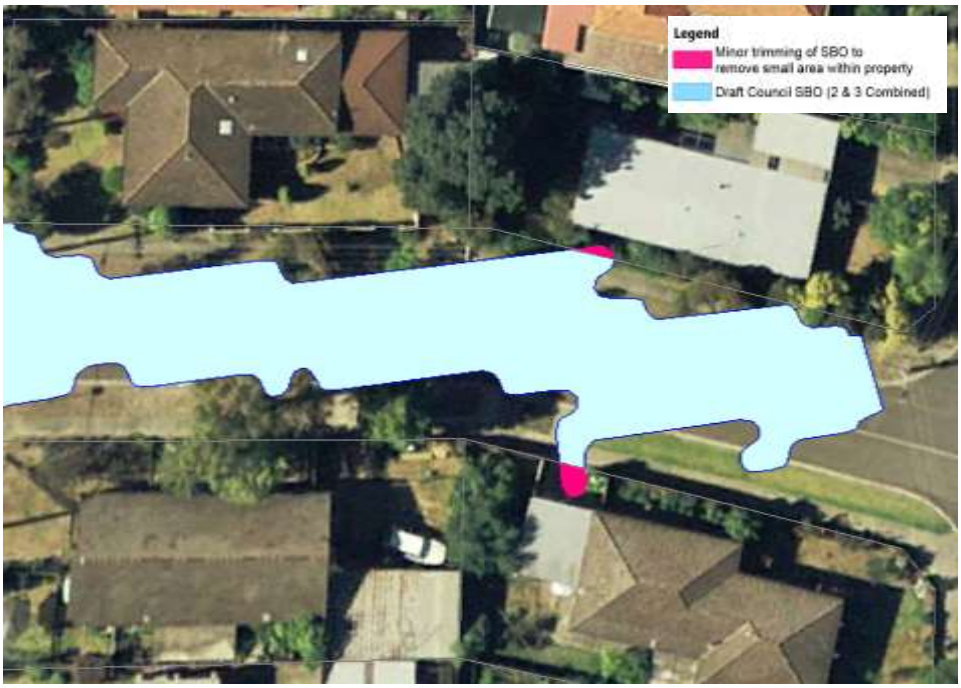

Figure 3-1 Trimming of Flood Extent along Roads

3.2.2 Criteria 2: Isolated ponding

The flood modelling approach used identifies all potential flowpaths in a catchment, including those that may be unrelated to drainage infrastructure. These could be on larger properties, upstream of the drainage network or isolated low points within individual properties. Guidelines were adopted to account for these areas:

Removed from the SBO: If flooded area was less than 500 m^2, fully disconnected from the flood extent and situated away from the underground drainage network.

Removed from the SBO: Either if:

a) The flooded area was disconnected from the flood extent, the drainage network, had a maximum flood depth less than 200 mm and the raw (unfiltered) data did not suggest connection to the neighbouring flood extent. These areas were usually isolated local depressions on the land surface

b) The area was less than 500 m^2, the maximum flood depth was less than 200 mm and the raw (unfiltered) data did not suggest connection to the neighbouring flood extent.

Removed from the SBO: If the flooded area was determined to be a body of water such as a swimming pool, but not an online dam or similar water storage.

As an example, Figure 3-2 shows the areas that were removed for the Bulleen North Catchment.

3.2.3 Criteria 3: Connecting Disconnected Extents

The flood extents produced by the flood mapping projects have been filtered to remove areas that do not meet specified criteria. In some cases this can lead to a visual disconnection in the planning extent that can appear to show flooded areas with no logical connections. This result can be due to the connected flows being less than 50mm in depth such that the connection is not fully mapped. The proposed planning extents have been amended to provide a more continuous flood extent in these cases.

Connections Made: If the flood extent in the raw (unfiltered) model outputs suggested a connection could occur, and no additional properties are impacted by the change.

As an example, Figure 3-3 shows the areas that were connected for the Bulleen North Area

3.2.4 Criteria 4: Differentiating between LSIO and SBO 1

Areas designated as LSIO and SBO 1 are both Melbourne Water controlled. This delineation is applied at a catchment scale so as not to interchange between each scheme along the same flow path. The guidelines for delineation are:

LSIO: If flooding is present along a mainstream flow path (e.g. creek, river, etc.).

SBO 1: If flooding is present along a Melbourne Water underground asset.

3.2.5 Criteria 5: Differentiating between SBO 2 and SBO 3

Council has adopted a floodplain management approach that enables both council and the wider community to easily understand the floodplain risk associated with each property. It is considered that flow paths where the depth of water is generally greater than 100 mm will require detailed assessment by council officers and these areas are designated as SBO2. All other areas that are managed by council are considered SBO3, and may be developed without a permit, subject to certain conditions being met. The guidelines for delineation are:

SBO 2: If a large proportion of the flow path experienced depths of more than 100 mm.

SBO 3: If the flow path was predominantly less than 100 mm in depth.

The method used to identify these areas is shown in Figure 3-4 for the Bulleen North catchment. Once an area became designated as SBO2, it remained SBO2 until meeting the Melbourne Water controlled area (SBO1/LSIO), even if the flow depths became less than 100 mm. This retains continuity in the SBO shapes and indicates that these downstream flowpaths need greater control as

they may be more sensitive to change. The divide between these areas will generally be at the property boundary such that any property will be affected by SBO2 or SBO3.

3.2.6 Smoothing

An automatic smoothing process was performed on the proposed planning extents in order to remove unrealistically sharp edges and provide a pleasing visual presentation. Careful consideration was made as to ensure that no additional properties were included in the extent due to the smoothing process.

3.2.7 Other Minor Amendments

In some instances minor amendments to the edges of the proposed planning extents have been made. This has been done where the proposed planning extent only covers a small area of a property and the flood risk on that property was considered to be negligible. This commonly occurs along drainage reserves where there is a minor overlap of the flood extent into private property. The removal of this small overlap aims to avoid unnecessary queries from properties with negligible flood risk.

3.3 Separating MW and Council Flood Extents

The following guidelines were followed when undertaking the final derivation of the proposed planning extents. The split between SBO 2 and SBO 3 has been determined as part of this analysis. The guidelines are:

- The breaks between proposed planning extents should be along land parcel boundaries unless otherwise advised;
- To avoid ambiguity, a parcel is classified as being within Melbourne Water's (MW) flood extent or Council's. This ensures that when a request for a flood level for a particular parcel is made, only one authority provides the level.
- The Melbourne Water Areas (LSIO and SBO 1) occur where the flood extent is directly associated with a MW asset, including where it breaks away from the asset.
- Council controlled areas (SBO 2 and SBO 3) begin at the top of the catchment and end once they intersect with the MW flood extent.
- Where the flood extent traverses a group of units, the entire extent will be classified as one authority's flood extent based on the downstream control, unless a suitable other delineation exists.
- For large parcels (schools, reserves, golf courses, etc.), the entire extent will be classified as one authority's flood extent. In the event that the parcel is subdivided in the future, both authorities will re-arrange the flood extents if necessary.

3.4 Eastern Golf Course – Doncaster

The site of the former Eastern golf course is currently being developed into residential housing. The development process ensures that flood and overland flow paths must be provided by the developer to ensure that no new properties are effected by flooding. As such, it is reasonable to exclude this land from the proposed planning extent.

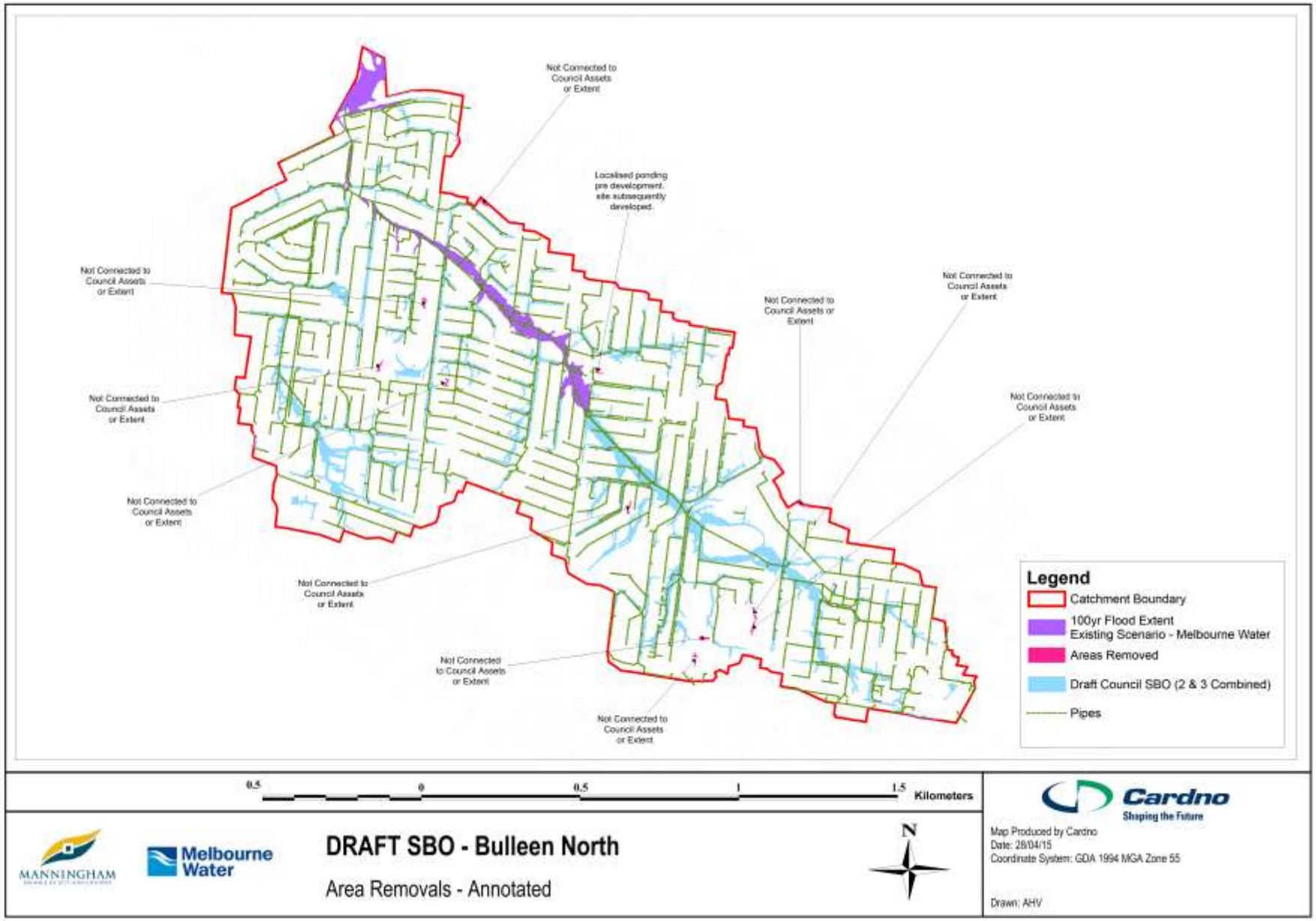

Figure 3-2 SBO Extent Development, Areas Removed

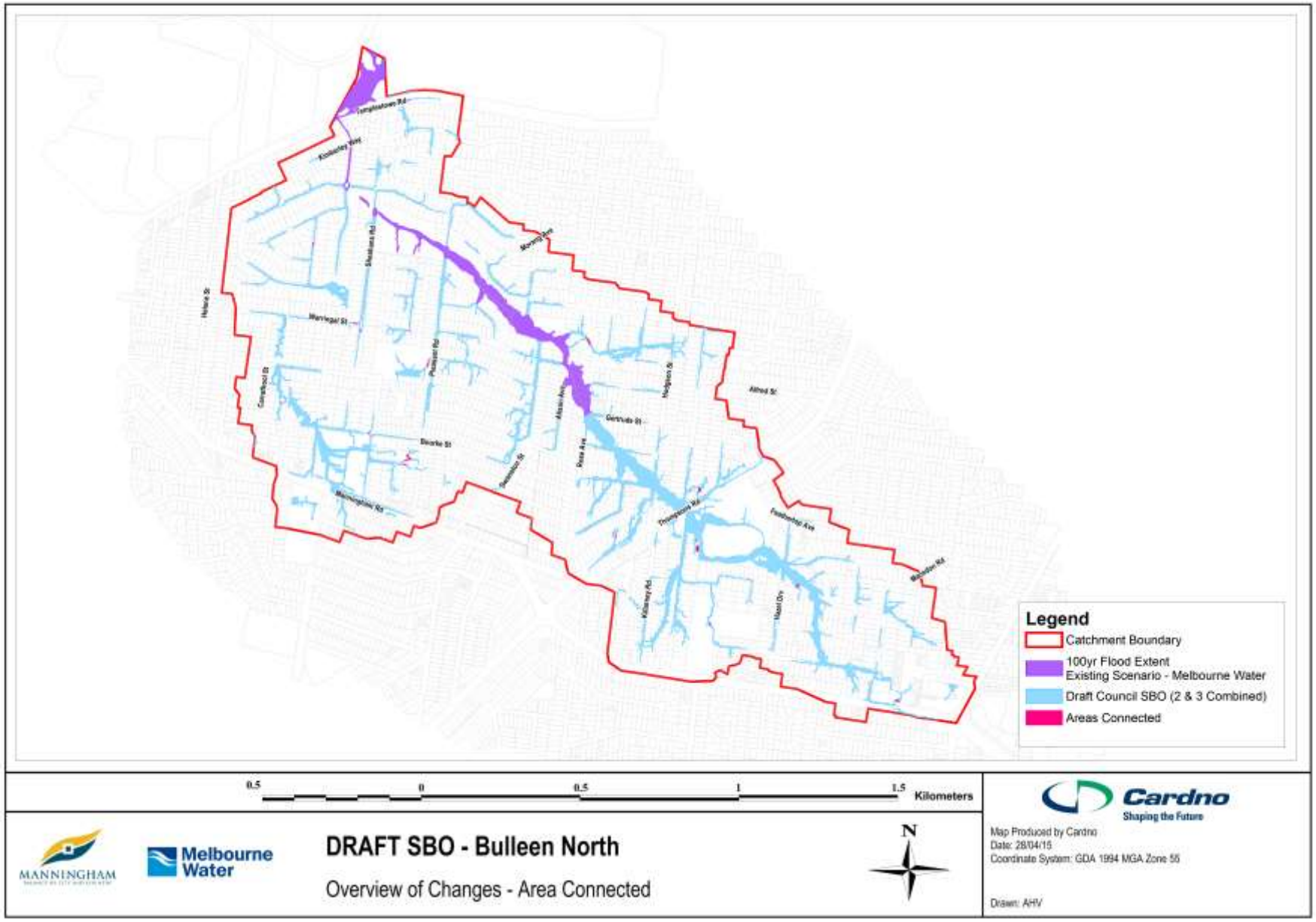

Figure 3-3 SBO Extent Development, Areas Connected

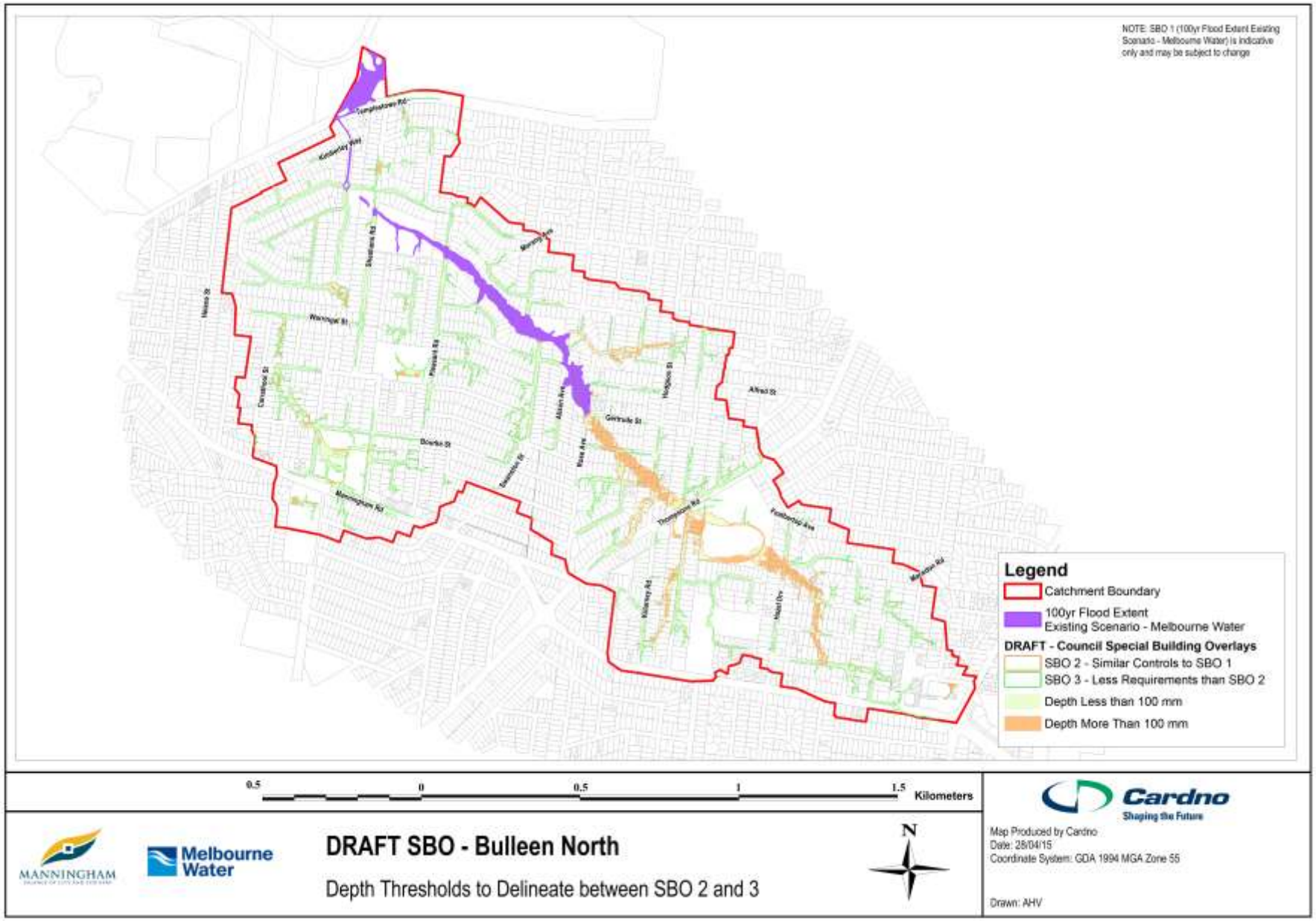

Figure 3-4 SBO Extent Development, SBO2 and SBO3 Delineation

4 Proposed Amendments to Planning Overlays

4.1 Overlays Supplied

Proposed Land Subject to Inundation and Special Building Overlays for each area have been supplied in both map and GIS form.

The draft overlays are provided in the figures attached for:

> Bulleen North Catchment

> Ruffey Creek Catchment

> Andersons Creek Catchment

> Mullum Mullum Creek Catchment

> Koonung Creek Catchment

4.2 Properties included in the Proposed Planning Extents

The number of properties that are included in each of the proposed planning overlays are shown in Table 4-1. This includes consideration of land parcels that have multiple property titles, such as strata developments and shopping centres.

Table 4-1 Properties affected by the flood overlays

	Overlay Type			
Catchment Area	**LSIO**	**SBO 1**	**SBO 2**	**SBO 3**
Bulleen North	0	46	132	379
Ruffey Creek	96	247	1324	1884
Koonung Creek	24	120	989	1474
Mullum Mullum Creek	247	280	1048	1049
Andersons Creek	123	0	456	192

Development of the
Special Building Overlay

FIGURES

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Metres
0 200

N W E S

Map Location

Legend

- Model Areas
- Pipe Network
- Eastern Golf Course
- Council Boundary
- Yarra and Koonung LSIO
- Proposed LSIO (MW)
- Proposed SBO1 (MW)
- Proposed SBO2 (MCC)
- Proposed SBO3 (MCC)

Proposed Special Building Overlay (SBO) and Land Subject to Inundation Overlay (LSIO)

BULLEEN NORTH CATCHMENT

MANNINGHAM
Melbourne Water
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Map Produced by Cardno Victoria
Date: 2015-09-01
Coordinate System: GDA 1994 MGA Zone 56
Project and Map: NA49913512, Bulleen.mxd 01

Metres

0 200 400 600

Legend

- Model Areas
- Pipe Network
- Eastern Golf Course
- Council Boundary
- Yarra and Koonung LSIO
- Proposed LSIO (MW)
- Proposed SBO1 (MW)
- Proposed SBO2 (MCC)
- Proposed SBO3 (MCC)

Map Location

Proposed Special Building Overlay (SBO) and Land Subject to Inundation Overlay (LSIO) with Properties Affected

RUFFEY CREEK CATCHMENT

MANNINGHAM

Melbourne Water

Cardno

Map Produced by Cardno Victoria
Date: 2015-09-16
Coordinate System: GDA 1994 MGA Zone 56
Project and Map: NA49913512, Landscape_PropsAffected_v3.mxd 01

Metres

0 200 400 600

Legend

- Model Areas
- Pipe Network
- Council Boundary
- Yarra and Koonung LSIO
- Proposed LSIO (MW)
- Proposed SBO1 (MW)
- Proposed SBO2 (MCC)
- Proposed SBO3 (MCC)

Map Location

Proposed Special Building Overlay (SBO) and Land Subject to Inundation Overlay (LSIO)

ANDERSONS CREEK

MANNINGHAM

Melbourne Water

Cardno

Map Produced by Cardno Victoria
Date: 2015-09-01
Coordinate System: GDA 1994 MGA Zone 56
Project and Map: NA49913512, Andersons.mxd 01

Metres
0 200 400 600 800

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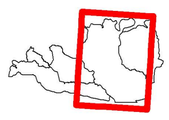
Legend

- Model Areas
- Pipe Network
- Council Boundary
- Yarra and Koonung LSIO
- Proposed LSIO (MW)
- Proposed SBO1 (MW)
- Proposed SBO2 (MCC)
- Proposed SBO3 (MCC)

Map Location



Proposed Special Building Overlay (SBO) and Land Subject to Inundation Overlay (LSIO)

MULLUM MULLUM CREEK

MANNINGHAM
Melbourne Water
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Map Produced by Cardno Victoria
Date: 2015-09-01
Coordinate System: GDA 1994 MGA Zone 56
Project and Map: NA49913512, MullumMullum.mxd 01

Metres
0 200 400

Legend

- Model Areas
- Pipe Network
- Eastern Golf Course
- Council Boundary
- Yarra and Koonung LSIO
- Proposed LSIO (MW)
- Proposed SBO1 (MW)
- Proposed SBO2 (MCC)
- Proposed SBO3 (MCC)

Map Location

Proposed Special Building Overlay (SBO) and Land Subject to Inundation Overlay (LSIO)

KOONUNG CREEK CATCHMENT (MAP 1 OF 3)

MANNINGHAM
Melbourne Water
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Map Produced by Cardno Victoria
Date: 2015-09-01
Coordinate System: GDA 1994 MGA Zone 56
Project and Map: NA49913512, Koonung_Map1.mxd 01

Metres
0 200 400

Map Location

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Proposed Special Building Overlay (SBO) and Land Subject to Inundation Overlay (LSIO)

KOONUNG CREEK CATCHMENT (MAP 2 OF 3)

MANNINGHAM
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Map Produced by Cardno Victoria
Date: 2015-09-01
Coordinate System: GDA 1994 MGA Zone 56
Project and Map: NA49913512, Koonung_Map2.mxd 01

Metres
0 200 400

Map Location

Legend

- Model Areas
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- Eastern Golf Course
- Council Boundary
- Yarra and Koonung LSIO
- Proposed LSIO (MW)
- Proposed SBO1 (MW)
- Proposed SBO2 (MCC)
- Proposed SBO3 (MCC)

Proposed Special Building Overlay (SBO) and Land Subject to Inundation Overlay (LSIO)

KOONUNG CREEK CATCHMENT (MAP 3 OF 3)

MANNINGHAM
Melbourne Water
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Map Produced by Cardno Victoria
Date: 2015-09-01
Coordinate System: GDA 1994 MGA Zone 56
Project and Map: NA49913512, Koonung_Map3.mxd 01