Strategic Prioritisation of WSUD Opportunities

Simon Roberts, Dale Browne

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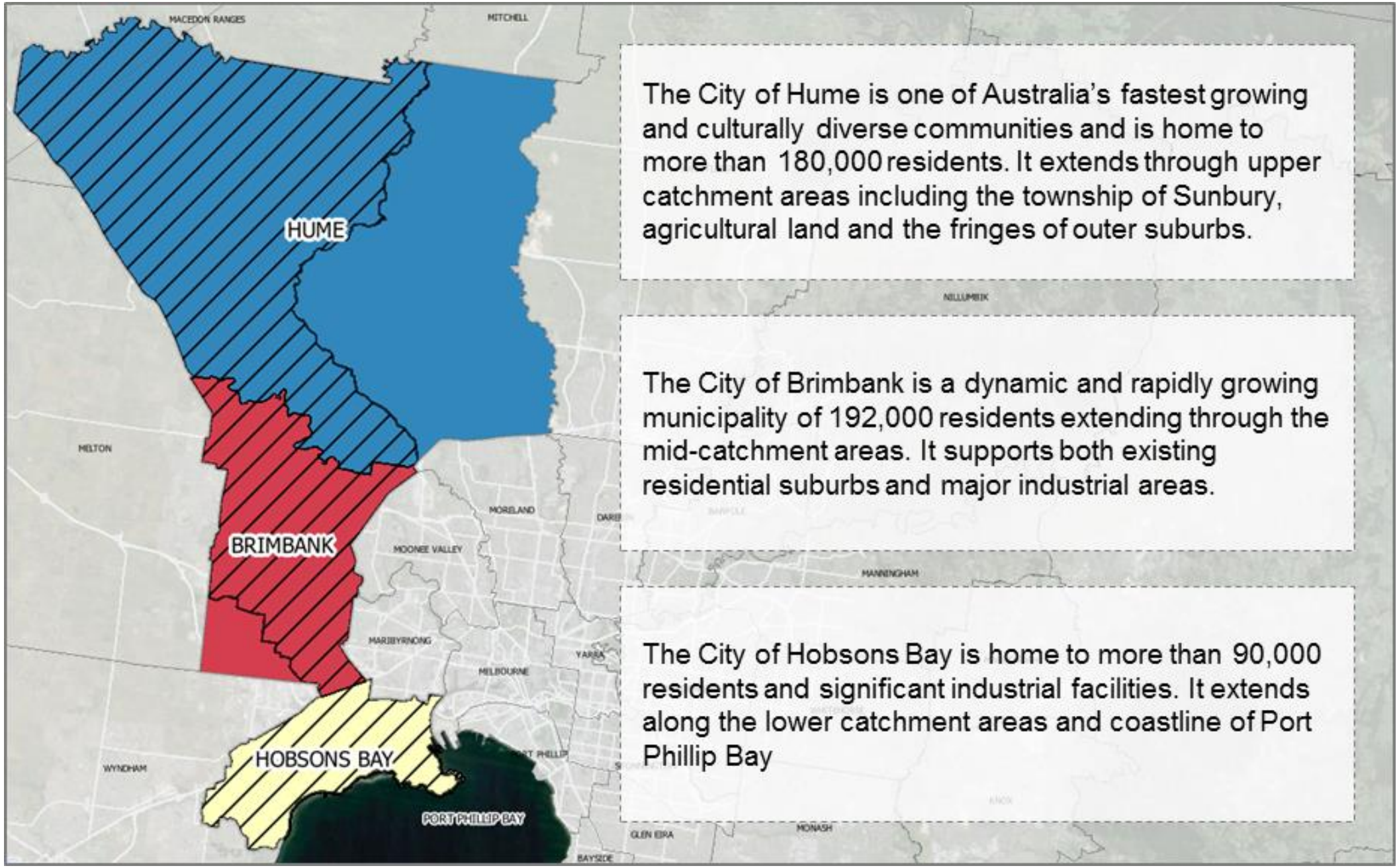

The City of Hume is one of Australia's fastest growing and culturally diverse communities and is home to more than 180,000 residents. It extends through upper catchment areas including the township of Sunbury, agricultural land and the fringes of outer suburbs.

The City of Brimbank is a dynamic and rapidly growing municipality of 192,000 residents extending through the mid-catchment areas. It supports both existing residential suburbs and major industrial areas.

The City of Hobsons Bay is home to more than 90,000 residents and significant industrial facilities. It extends along the lower catchment areas and coastline of Port Phillip Bay

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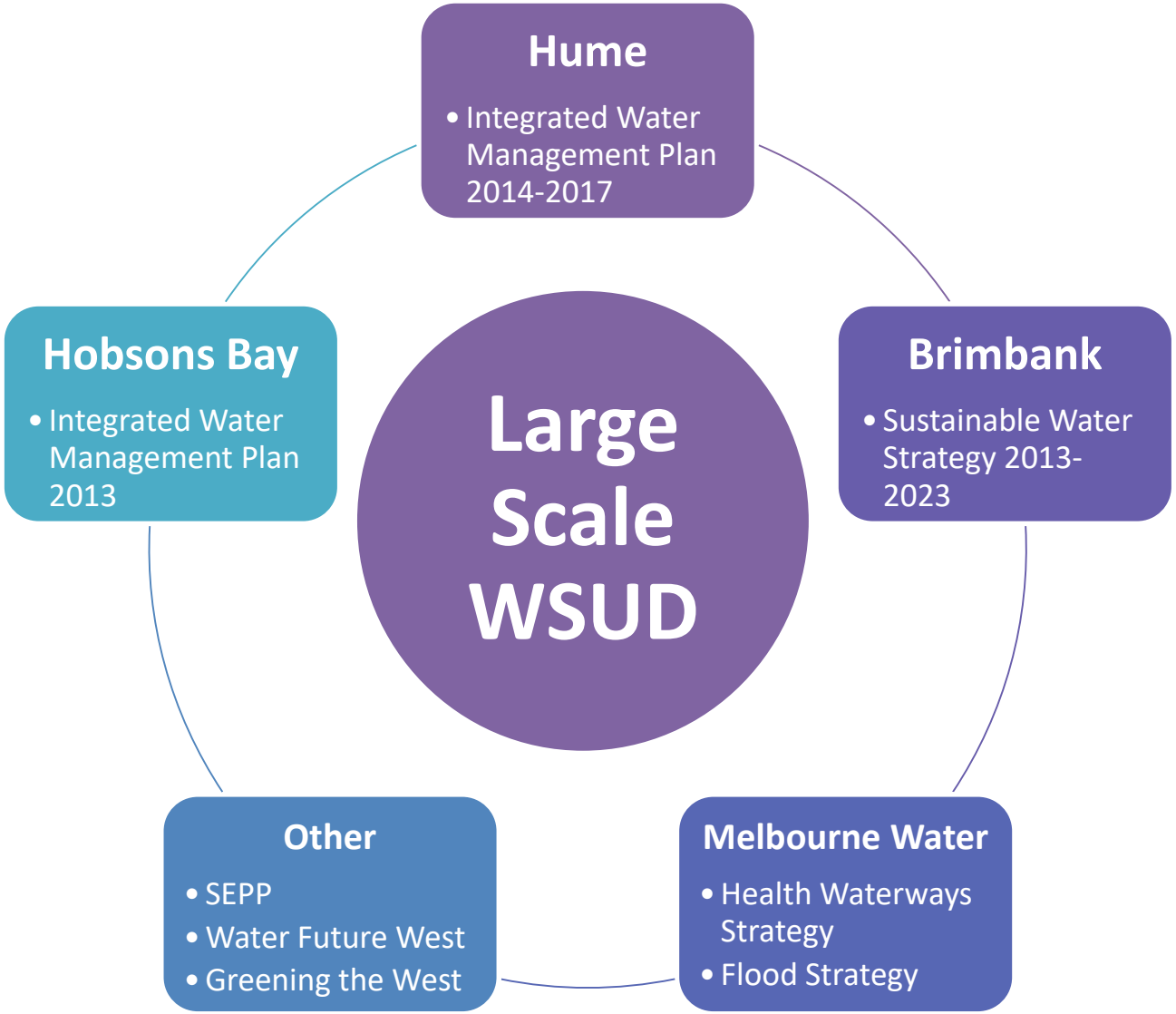
Purpose



Objectives

Blue objectives

- Improve stormwater quality

- Control runoff through retention, retardation and use

- Diversify water supply and maximise use of alternative supplies for resilience

Green objectives

- Increase native vegetation cover for biodiversity and environmental outcomes

- Increase tree canopy cover and soil moisture for human comfort and health

- Improve the quality of recreation spaces

Pink objectives

- Improve amenity and liveability value

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But
how?

Process

Step 1

- Catchment prioritisation

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Process

Step 1

- Catchment prioritisation

Step 2

- WSUD opportunity identification and assessment

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Process

Step 1

- Catchment prioritisation

Step 2

- WSUD opportunity identification and assessment

Step 3

- WSUD concept designs and catchment masterplans

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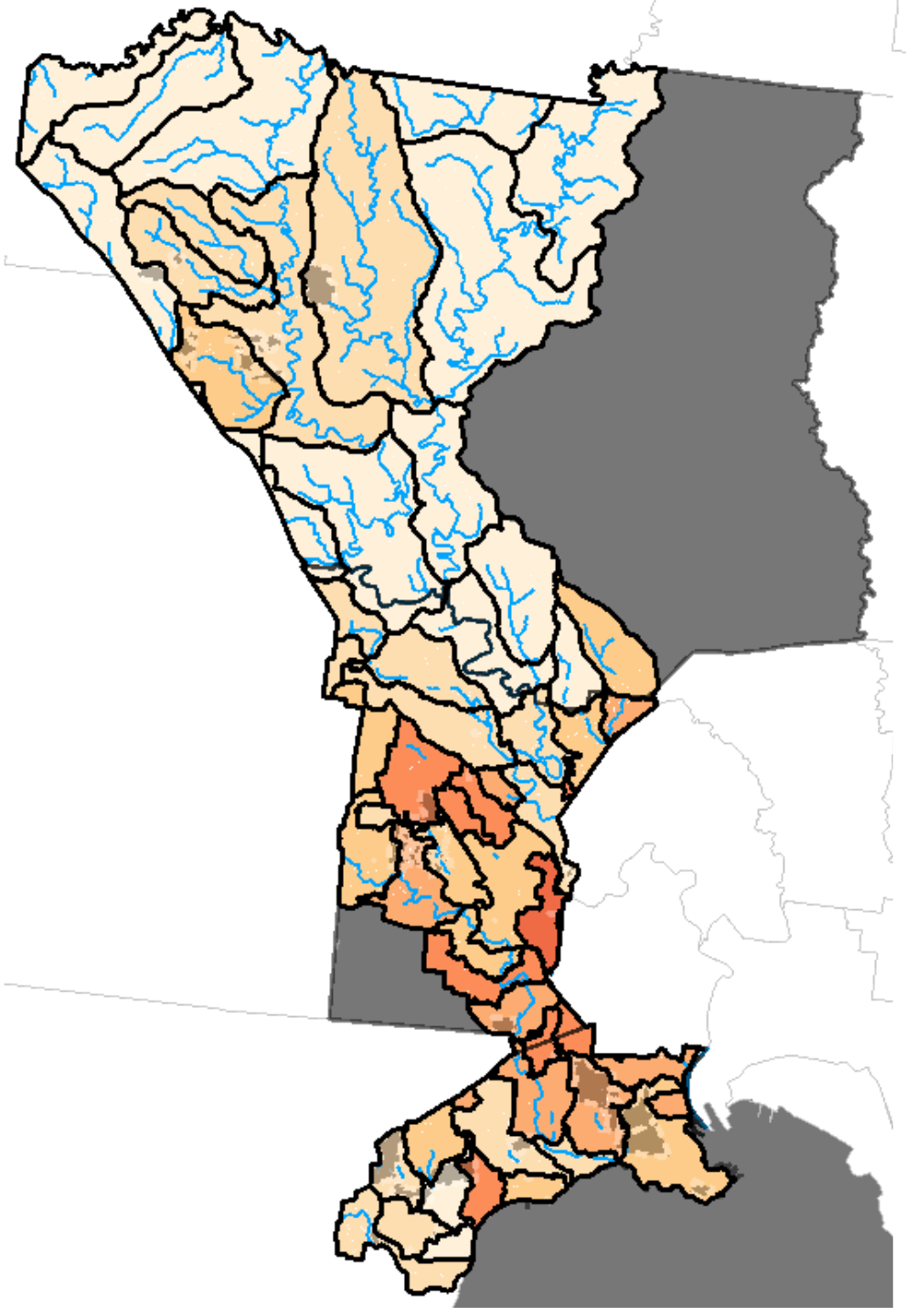
Step 1

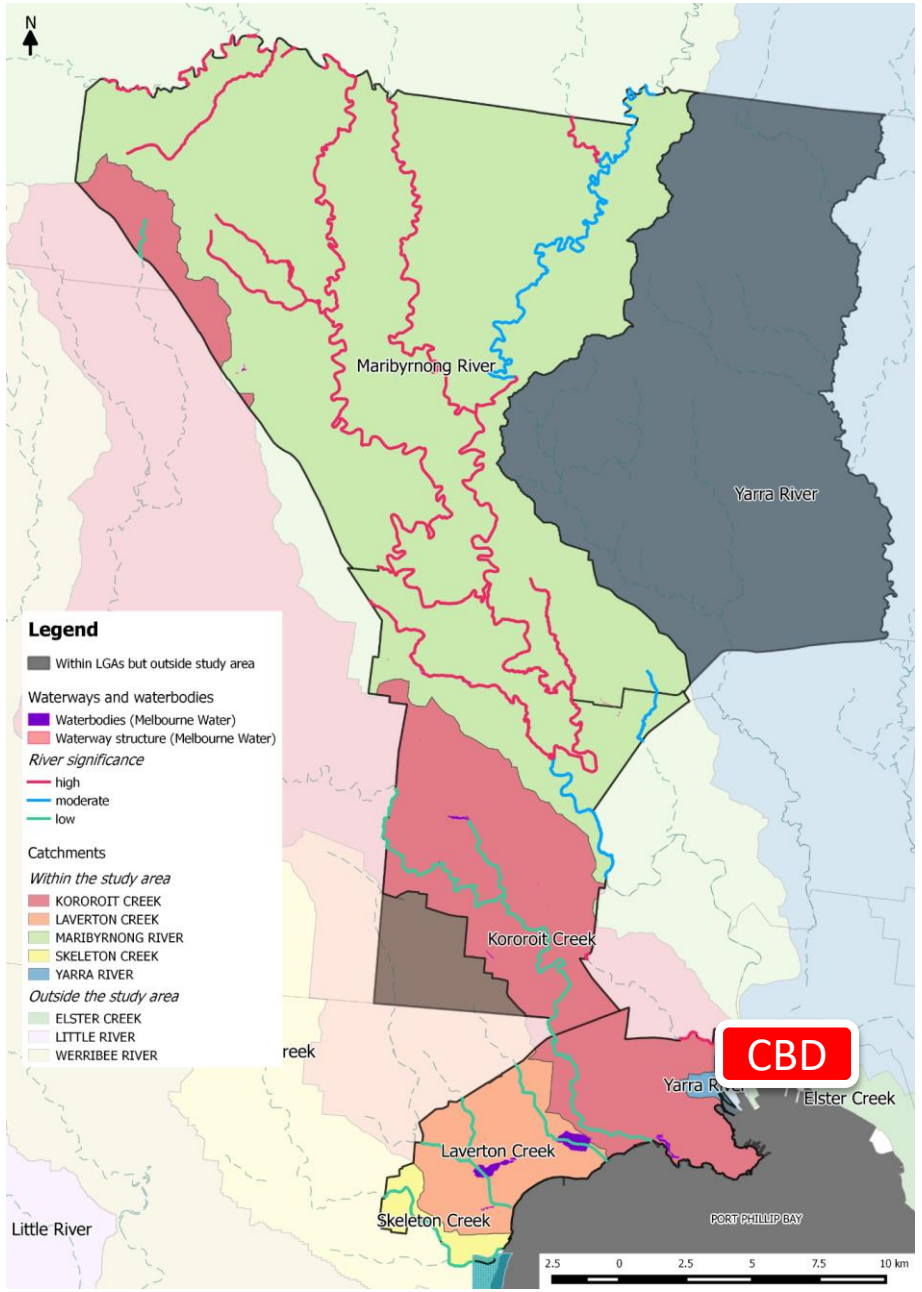
Catchment prioritisation



Catchments

Within the study area

- KORORoIT CREEK
- LAVERTON CREEK
- MARIBYRNONG RIVER
- SKELETON CREEK
- YARRA RIVER



Upper Maribyrnong:
Emu Creek, Blind Creek, Jacksons Creek and Deep Creek

Lower Maribyrnong:
Jacksons Creek, Taylors Creek, Arundel Creek and the Maribyrnong River

Kororoit Creek:
Mid to lower reaches (exc. Sunbury)

Skeleton Creek

Laverton Creek + Cherry Creek

Stony Creek

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Maribyrnong River


Kororoit Creek

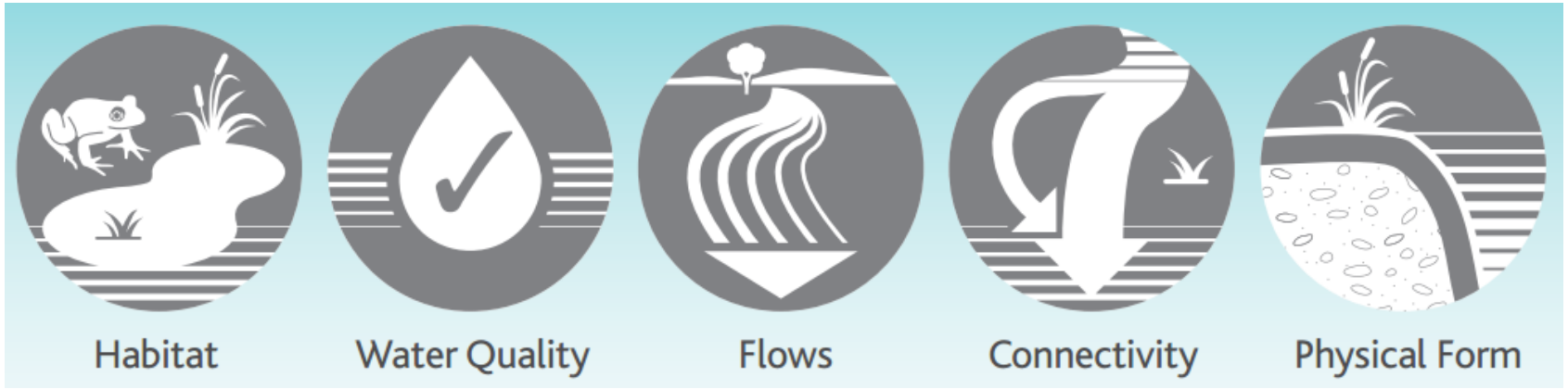

Williamstown
Newport Foreshore


Cheetham wetlands


Jawbone Marine Sanctuary

Catchment prioritisation

Waterway value



Catchment risk



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Catchment prioritisation

- Assess waterway value
  - Management end point

Emu Creek at Gellies Road

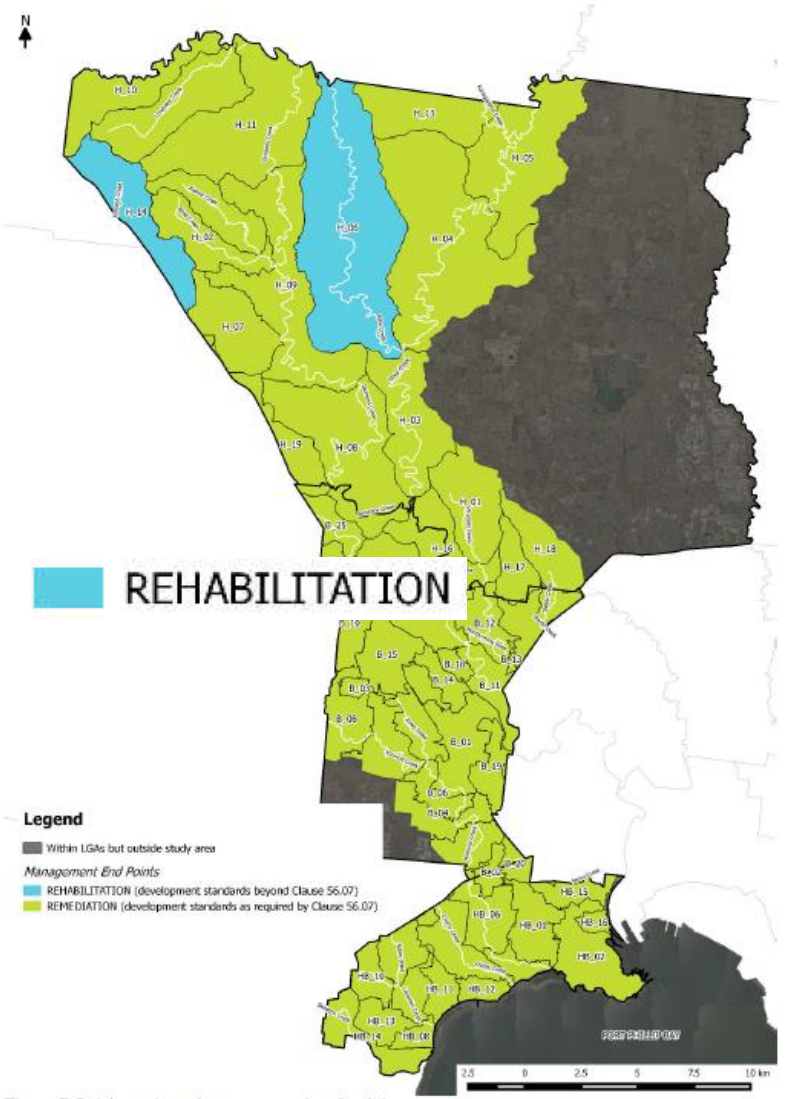

Figure 7 Catchments and management end points

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Catchment prioritisation

- Assess waterway value
  - Management end point
  - RAMSAR sites and key public destinations


Altona Beach


Cheetham wetlands


Jawbone Marine Sanctuary

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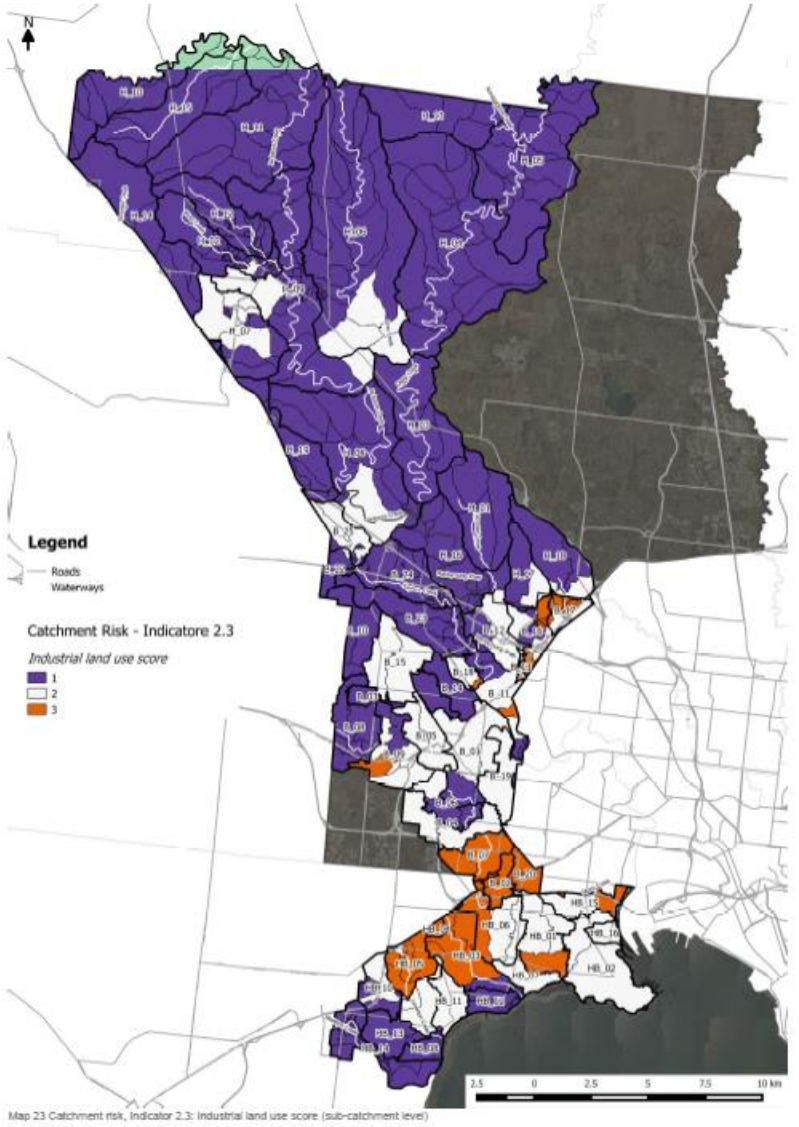
Catchment prioritisation

\ Asses catchment risk

– Industrial land use zones



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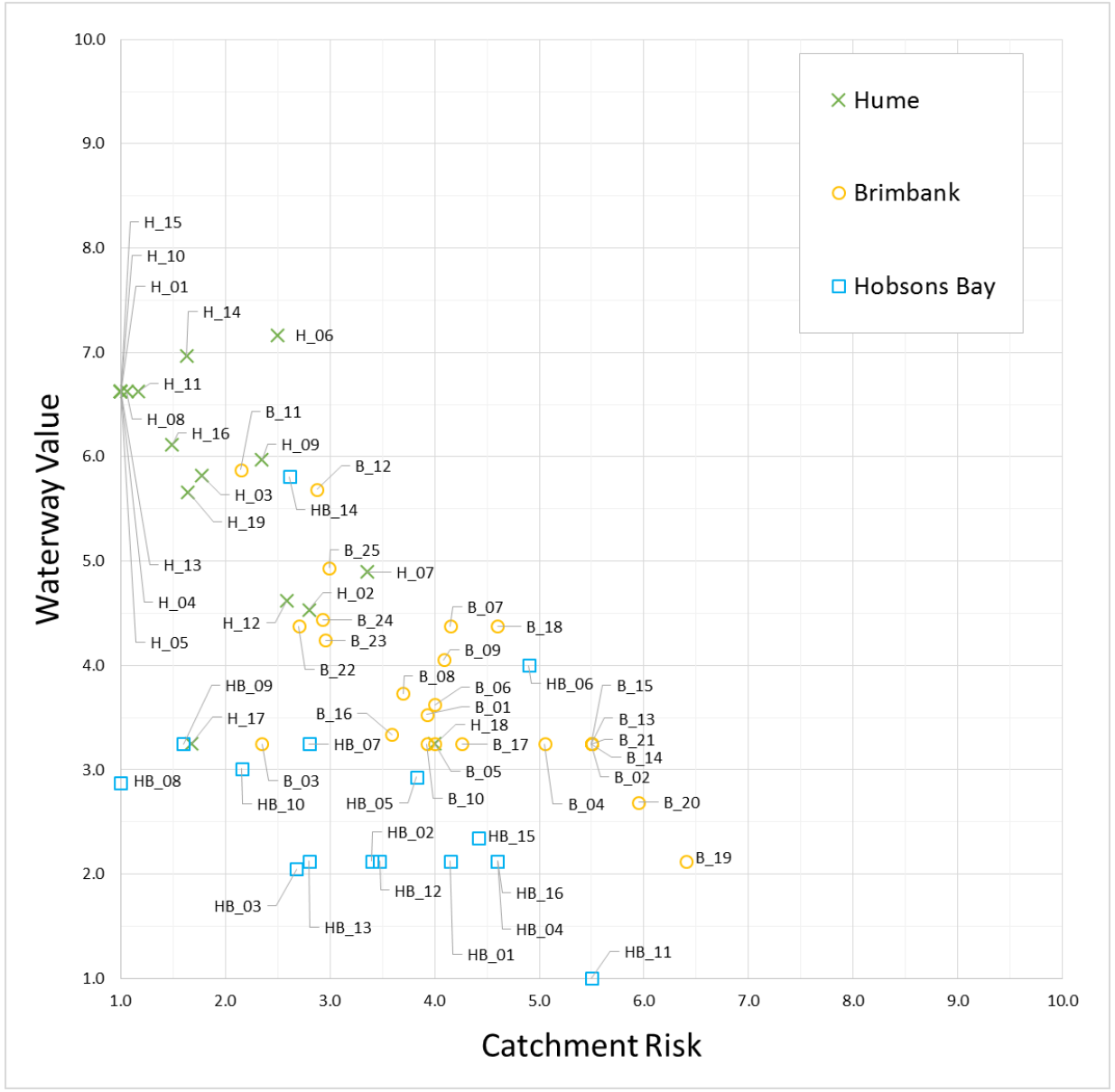
Results

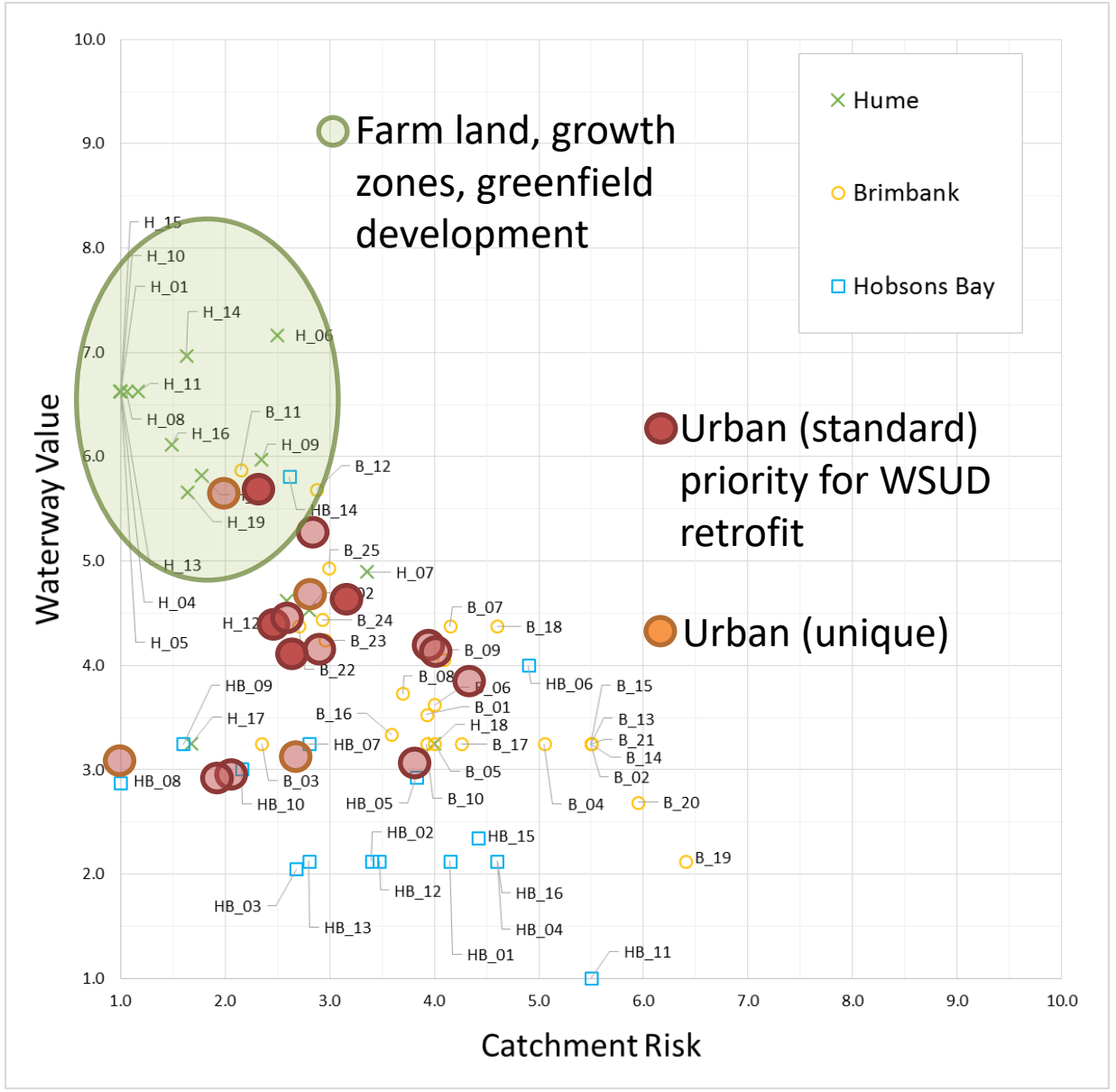

Hume
Brimbank
Hobsons Bay
Waterway Value
Catchment Risk
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
H_15
H_10
H_01
H_14
H_06
H_11
H_08
H_16
B_11
H_09
B_12
H_03
HB_14
H_19
B_25
H_07
H_13
H_02
H_04
B_07
B_18
H_12
B_24
B_23
H_05
B_09
B_22
B_08
HB_06
B_15
HB_09
B_06
B_01
B_16
B_13
H_17
H_18
B_21
HB_07
B_17
B_14
B_05
B_02
HB_08
B_03
HB_10
HB_05
B_10
B_04
B_20
HB_02
HB_15
B_19
HB_12
HB_16
HB_03
HB_13
HB_04
HB_01
HB_11

Results

Catchment management priorities vary based on the ***type of values*** being protected and the ***nature of risks*** encountered.

Key characteristic	Management response
Farm land and green wedge	CMA
Growth zones	Apply BPEM and manage for future development through PSPs etc.
Urban areas (standard)	**Large scale WSUD retrofit and non-structural solutions**
Urban areas (unique e.g. land ownership, land use, existing WSUD)	Small scale WSUD retrofit and non-structural solutions

Results


Farm land, growth zones, greenfield development
Urban (standard) priority for WSUD retrofit
Urban (unique)
Hume
Brimbank
Hobsons Bay
Waterway Value
Catchment Risk
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
H_15
H_10
H_01
H_14
H_06
H_11
H_08
H_16
H_09
B_11
B_12
H_19
HB_14
B_25
H_07
H_13
H_04
H_12
B_24
B_23
B_22
H_05
B_07
B_18
B_09
B_08
B_06
HB_06
B_15
B_01
B_13
B_21
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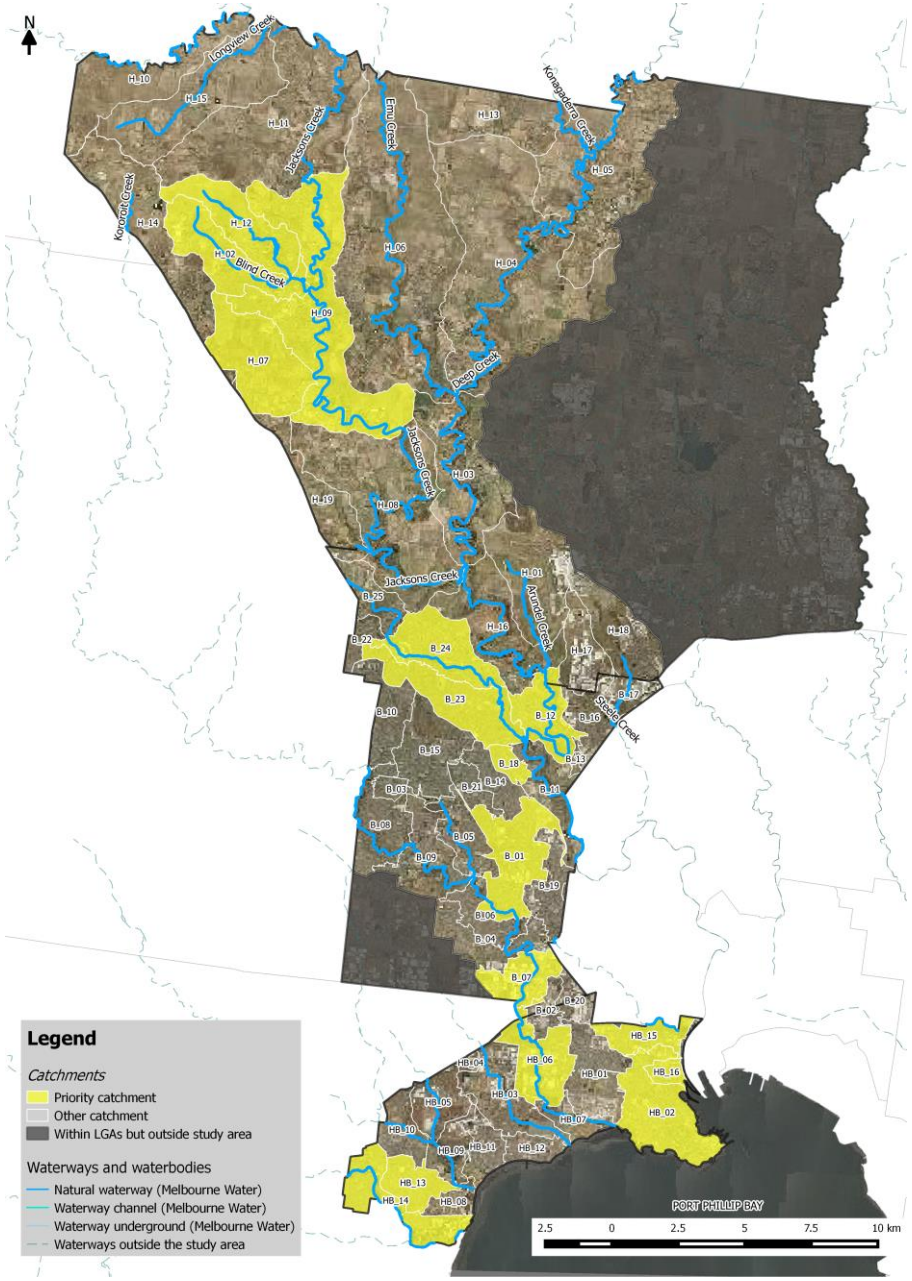


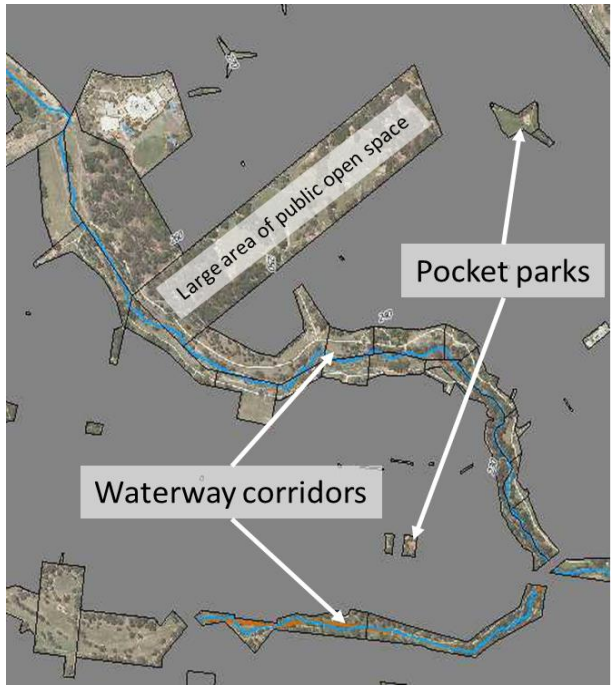
Council	Code	Catchment Name
Hume	H_02	Blind Creek
	H_07	Harpers Creek
	H_09	Jacksons Creek (middle)
	H_12	Kismet Creek
Brimbank	B_01	Anderson Road Drain
	B_07	Kororoit Creek (lower 2)
	B_12	Maribyrnong River (upper 2)
	B_18	Stenson Road Drain
	B_23	Taylors Creek (lower)
	B_24	Taylors Creek (middle)
Hobsons Bay	HB_02	Challis Street Main Drain
	HB_06	Kororoit Creek (lower 3)
	HB_13	Notla Estate Main Drain
	HB_14	Skeleton Creek
	HB_15	Stony Creek (lower 3)
	HB_16	Yarra River

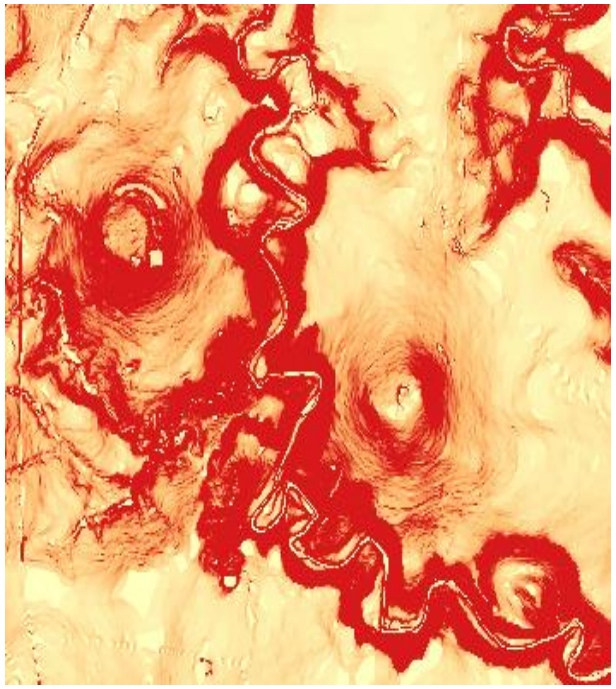
Step 2

WSUD opportunity identification and assessment

WSUD opportunities

- **Step 1: Initial opportunity identification**





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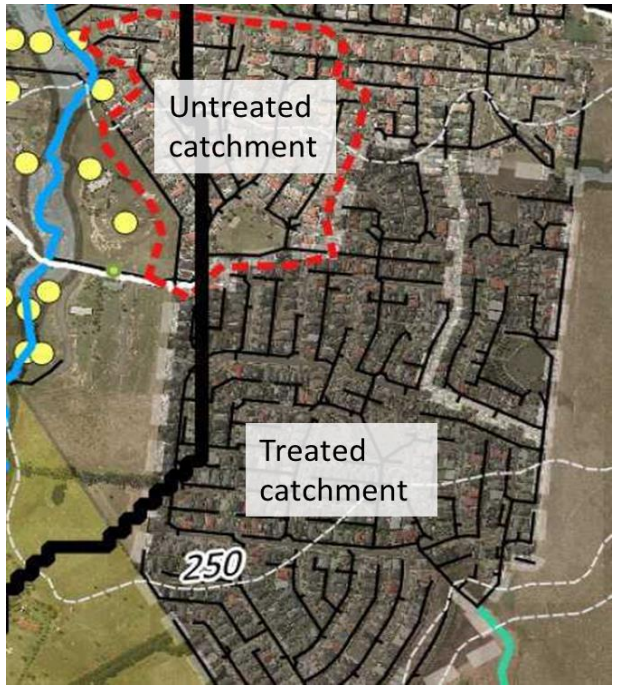
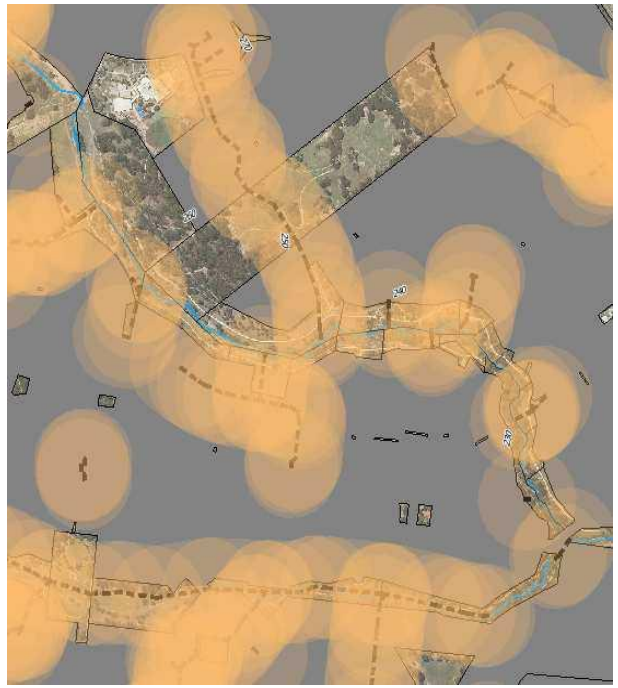
Prioritisation process

- Step 1: Initial opportunity identification
- **Step 2: Detailed opportunity identification**





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Prioritisation process

- Step 1: Initial opportunity identification
- Step 2: Detailed opportunity identification
- **Step 3: Opportunity refinement**

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Prioritisation process

- Step 1: Initial opportunity identification
- Step 2: Detailed opportunity identification
- Step 3: Opportunity refinement
- **Stage 4: Opportunity assessment**

Blue objectives

- Improve stormwater quality
- Control runoff through retention, retardation and use
- Diversify water supply and maximise use of alternative supplies for resilience

Green objectives

- Increase native vegetation cover for biodiversity and environmental outcomes
- Increase tree canopy cover and soil moisture for human comfort and health
- Improve the quality of recreation spaces

Pink objectives

- Improve amenity and liveability value

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Opportunity assessment

Blue

Improve stormwater quality

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Opportunity assessment

Green

Increase native vegetation cover for biodiversity and environmental outcomes

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Opportunity assessment

Pink

Improve amenity and liveability value

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Opportunity assessment

$$$

Upfront and ongoing costs

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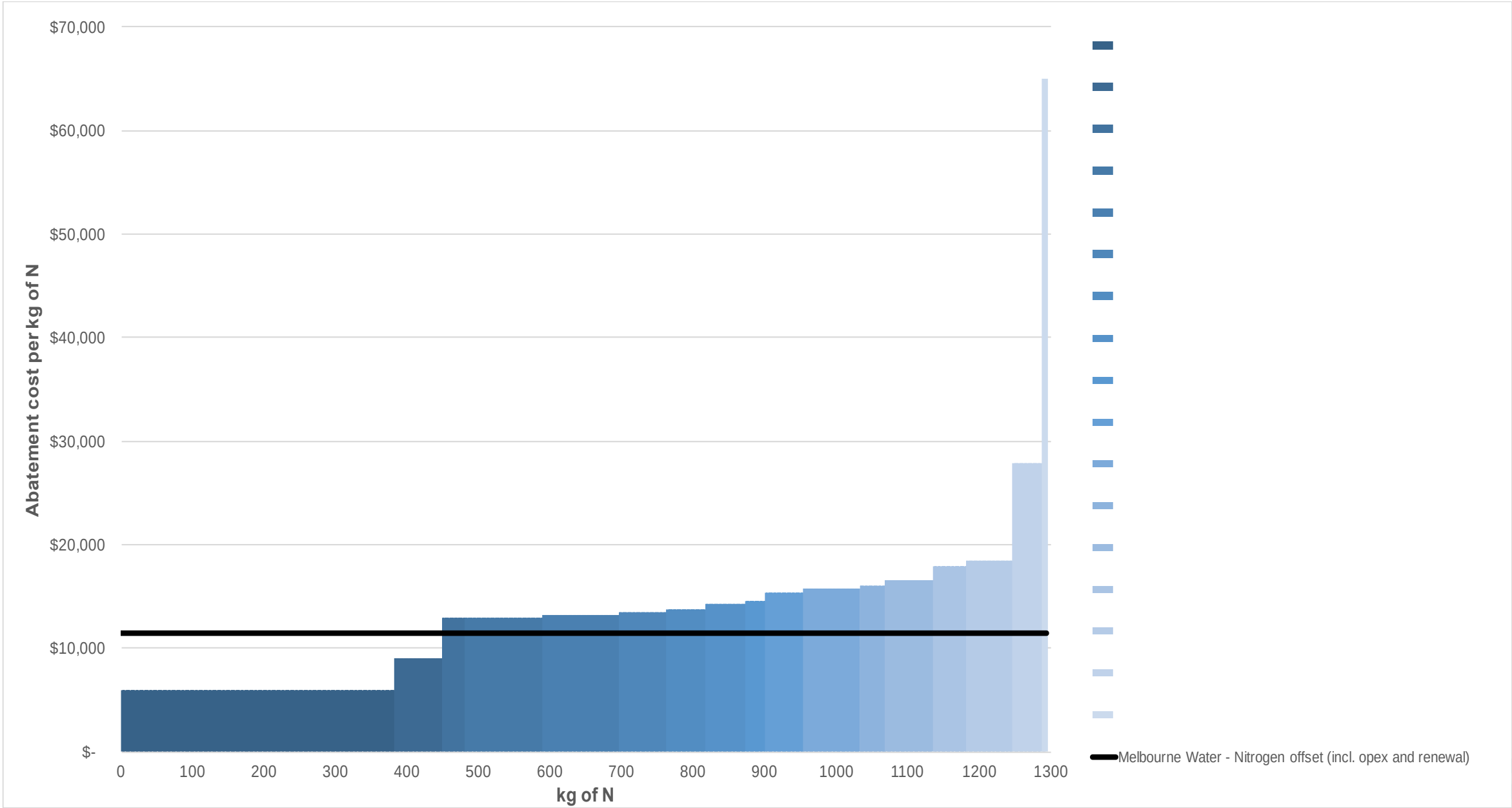
WSUD Opportunity		Treatment		Priority Catchment		Priority Score	WSUD Opportunity Assessment Matrix Scores							
							Costs	BLUE			GREEN			PINK
#	Name	Type	Area (m^2)	Code	Name									
77		Wetland	1,800	H_09	Jacksons Creek (middle)	8.7	1.2	0.3	1.1	0.0	2.0	2.0	1.7	2.0
117		Wetland	2,480	H_09	Jacksons Creek (middle)	7.2	1.3	0.5	0.6	0.1	2.0	2.0	0.6	2.0
73		Wetland	2,660	H_12	Kismet Creek	7.1	1.4	0.5	0.6	0.0	2.0	2.0	0.5	2.0
72		Wetland	1,410	H_12	Kismet Creek	7.0	1.5	0.3	0.5	0.0	2.0	2.0	0.7	2.0
75		Biofilter	510	H_09	Jacksons Creek (middle)	6.7	1.4	0.3	0.4	0.0	2.0	2.0	0.6	2.0
29		Wetland	2,000	H_09	Jacksons Creek (middle)	6.4	1.8	0.4	0.3	0.0	2.0	2.0	0.0	2.0
51		Biofilter	620	H_02	Blind Creek	6.1	1.8	0.4	0.1	0.0	2.0	2.0	0.0	2.0
116		Swale	540	H_09	Jacksons Creek (middle)	6.0	2.0	0.2	0.0	0.0	2.0	2.0	0.0	2.0
19		Swale	360	H_09	Jacksons Creek (middle)	6.0	2.0	0.1	0.0	0.0	2.0	2.0	0.0	2.0
66		Biofilter	440	H_02	Blind Creek	5.9	1.7	0.3	0.1	0.0	2.0	2.0	0.0	2.0
64		Wetland	100	H_09	Jacksons Creek (middle)	5.8	2.0	0.0	0.0	0.0	2.0	2.0	0.0	2.0
48		Wetland	1,680	H_02	Blind Creek	5.3	1.9	0.3	0.3	0.0	2.0	2.0	0.1	1.0
65		Wetland	1,850	H_02	Blind Creek	5.1	1.8	0.4	0.2	0.0	2.0	2.0	0.0	1.0
27		Biofilter	550	H_02	Blind Creek	5.1	1.6	0.3	0.2	0.3	2.0	2.0	0.0	1.0
112		Biofilter	340	H_02	Blind Creek	5.0	1.7	0.2	0.2	0.3	2.0	2.0	0.0	1.0
18		Biofilter	670	H_09	Jacksons Creek (middle)	4.8	1.7	0.4	0.1	0.0	2.0	2.0	0.0	1.0
24		Biofilter	410	H_09	Jacksons Creek (middle)	4.7	1.8	0.2	0.1	0.0	2.0	2.0	0.0	1.0
68		Biofilter	880	H_02	Blind Creek	3.7	1.6	0.5	0.1	0.0	2.0	1.0	0.0	1.0
207		Biofilter	640	H_07	Harpers Creek	3.6	1.7	0.4	0.1	0.0	2.0	1.0	0.0	1.0
23		Biofilter	640	H_12	Kismet Creek	3.6	1.7	0.4	0.1	0.0	2.0	1.0	0.0	1.0
69		Biofilter	250	H_02	Blind Creek	3.4	1.8	0.1	0.0	0.0	2.0	1.0	0.0	1.0
67		Biofilter	170	H_02	Blind Creek	3.4	1.9	0.1	0.0	0.0	2.0	1.0	0.0	1.0
76		Biofilter	240	H_09	Jacksons Creek (middle)	2.2	1.9	0.1	0.0	0.0	2.0	1.0	0.0	0.0
119		Wetland	3,290	H_09	Jacksons Creek (middle)	1.8	1.7	0.6	0.4	0.0	1.0	1.0	0.0	0.0
25		Wetland	1,070	H_09	Jacksons Creek (middle)	1.3	1.9	0.2	0.1	0.0	1.0	1.0	0.0	0.0

Step 2

WSUD concept designs and catchment masterplans


$70,000
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$-
Abatement cost per kg of N
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
kg of N
Melbourne Water - Nitrogen offset (incl. opex and renewal)

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Catchment Masterplan

Taylors Creek (lower)

B_23

Catchment Overview

This catchment is heavily urbanised, consisting of large areas of residential development. The areas waterways have been piped, with two large Melbourne Water drains (the Wanaka Drive Drain and Kealba Park Drain) discharging into Taylors Creek on the eastern edge of the catchment. Flooding along the two Melbourne Water drains occurs during large rainfall events. Open space is limited to several unnamed and typically unirrigated pocket parks, however, a major network of open space and sporting grounds is located at Green Gully Reserve along Taylors Creek.

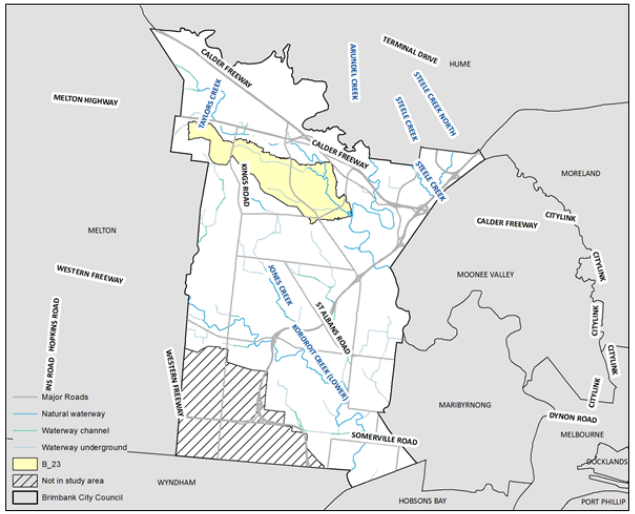
Green Gully Reserve contains a significant Stormwater Harvesting Scheme. The scheme collects water from two drains (including the Kealba Park Drain) before being stored in a holding pond, with a total capacity of 3 million litres (City West Water, 2013). Depending on demand, water is then treated and drawn out for irrigation of the reserves soccer pitches and cricket ovals as needed. The project was officially opened in 2013 and was delivered by City West Water working with Brimbank City Council.

'With seven hectares of public open space under irrigation, the project is expected to result in approximately 41 million litres of water saved each year – the equivalent of 16 Olympic sized swimming pools – and will provide almost three quarters of the reserve's irrigation needs.' (City West Water, 2013)

Potable water is still used at Green Gully Reserve and there are plans to increase the number of sporting grounds at the site. As such, there is potential to improve the performance and capacity of the existing stormwater harvesting scheme or augment it with an alternative supply.

Despite Green Gully being one of the largest stormwater harvesting schemes for sports fields, it still only treats a fraction of the catchments runoff and there is potential for further opportunities to be realised upstream.

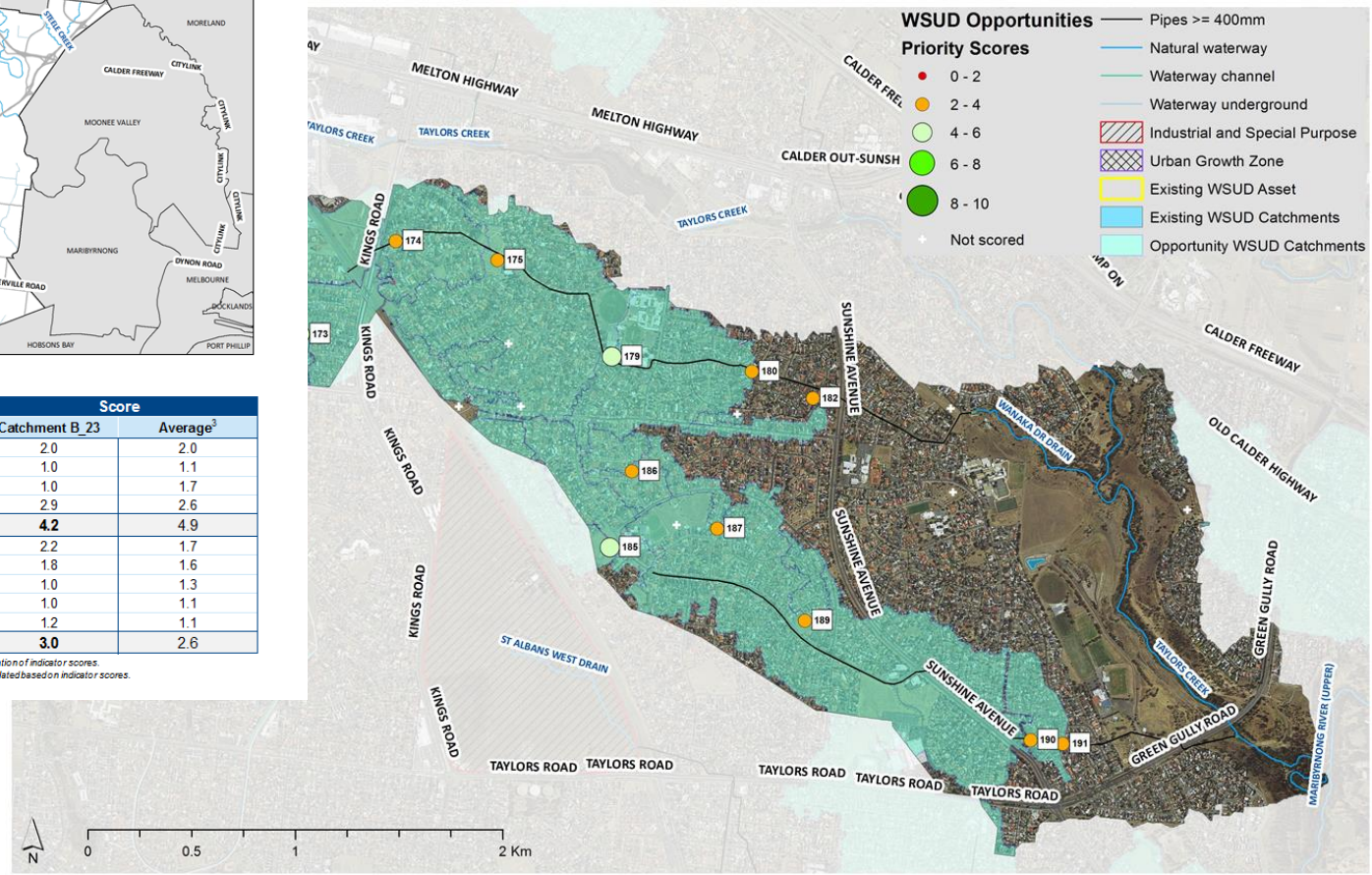
Catchment Location



Catchment Scorecard

Category	Indicator[1]	Score	
		Catchment B_23	Average[3]
Waterway Value	1.1 - Management end point	2.0	2.0
	1.2 - Ramsar site / key public destination	1.0	1.1
	1.3 - DCI threshold	1.0	1.7
	1.4 - Waterway modification	2.9	2.6
	Category score[2]	**4.2**	4.9
Catchment Risk	2.1 - Extent of urban development	2.2	1.7
	2.2 - Road runoff	1.8	1.6
	2.3 - Industrial land use	1.0	1.3
	2.4 - Future urban development	1.0	1.1
	2.5 - Flood affected properties	1.2	1.1
	Category score[2]	**3.0**	2.6

[1] Scores range from 1(low value / risk) to 3 (high value / risk). See report body for explanation of indicator scores.
[2] Scores range from 1(low value / risk) to 10 (high value / risk). Category scores are calculated based on indicator scores.
[3] Average score for all catachments assessed.



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Catchment Masterplan

Taylors Creek (lower)

B_23

Thankyou

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