

EXPERT OPINION AMENDMENT C106 BEVERIDGE NORTH WEST PSP

July 2020

ADDRESS OF PROPERTY: LOT 1 CAMERONS LANE, BEVERIDGE
ON BEHALF OF: BALCON BEVERIDGE PROJECT MANAGEMENT PTY LTD
INSTRUCTED BY: RUSSELL KENNEDY LAWYERS

Contents

Waterway Corridor Widths

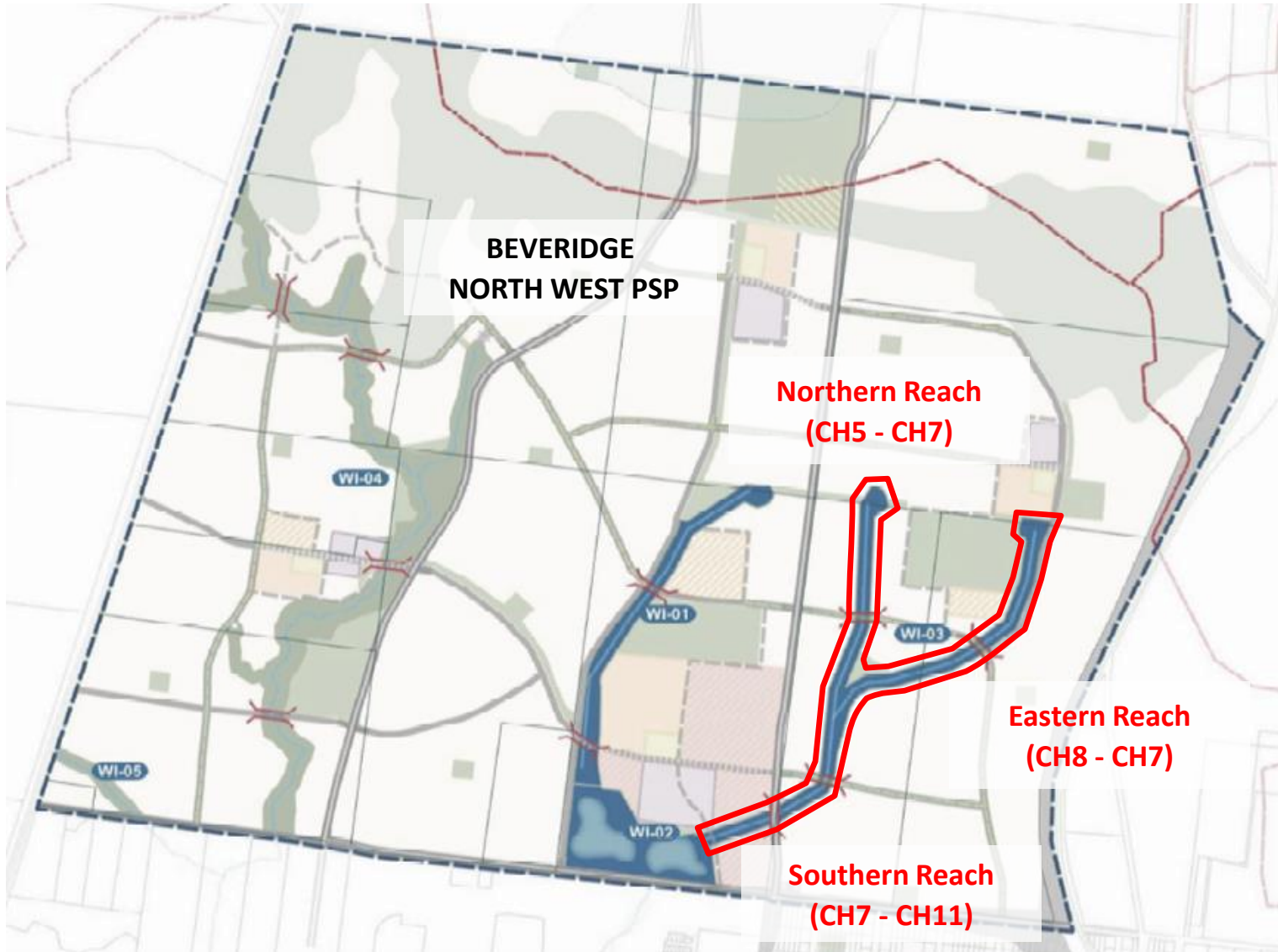
- Overview
- Dispersive Soils
- Hydrology
- Hydraulics
- Sensitivity Testing

South Eastern Retarding Basin

- Overview
- Overland Flows
- Hydrology
- Outcomes

Recommendations

Waterway Corridor Widths: Overview

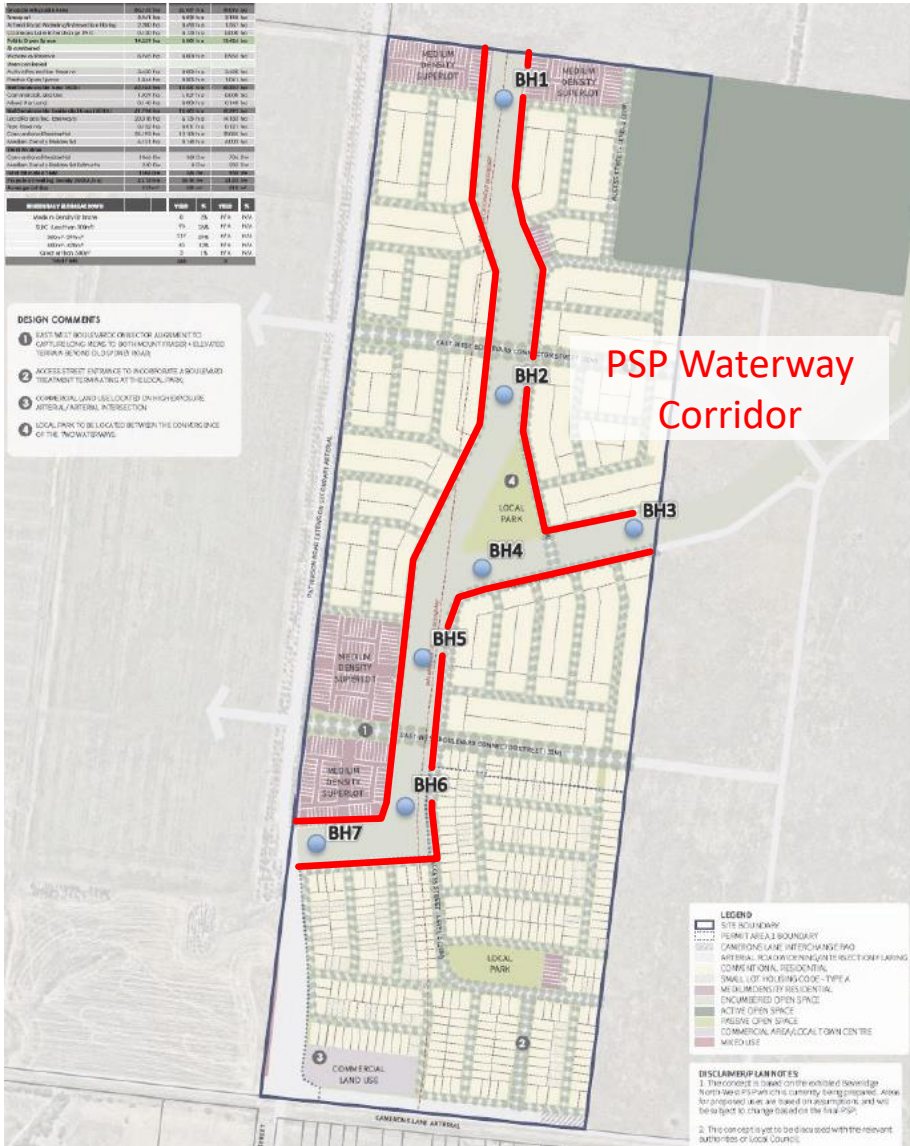


- Proposed reduction in waterway corridor widths within Lot 1, Camerons Lane
- Reductions based on detailed hydrologic and hydraulic modelling

Waterway	PSP Corridor Width	Proposed Corridor Width
Eastern Reach (CH8 - CH7)	50m	37m
Northern Reach (CH5 - CH7)	50m	37m
Southern Reach (CH7 - CH 11)	55m	45m

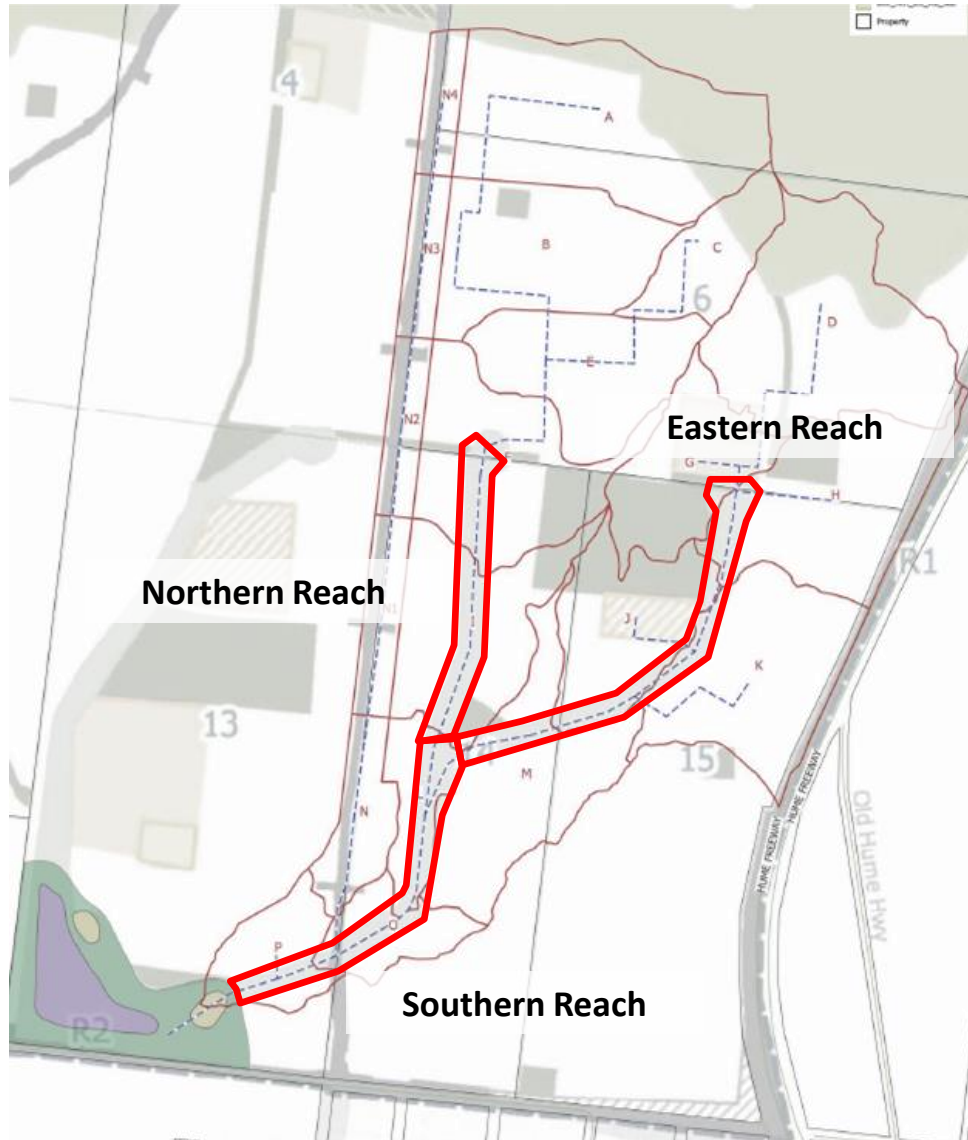
- Waterway corridor widths proposed are conservative, robust, and not sensitive to changes in the land use budget within the upstream catchment

Waterway Corridor Widths: Dispersive Soils



- Geological survey undertaken and assessed by Streamology Pty Ltd on behalf of the Balcon Beveridge Project Management Pty Ltd
- 19 samples taken across 7 boreholes within the waterway corridor proposed within the PSP
- Ground conditions across the sampling were found to be relatively uniform, consisting of shallow, black, self-mulching, medium clays
- Assessment determined that the soils present were primarily Class 3 soils, demonstrating minimal or no dispersion
- Minimal evidence of dispersive soils within the anticipated waterway corridor
- Assessment concluded the waterway corridor consists of non-dispersive soil and therefore dispersion should not factor into waterway width

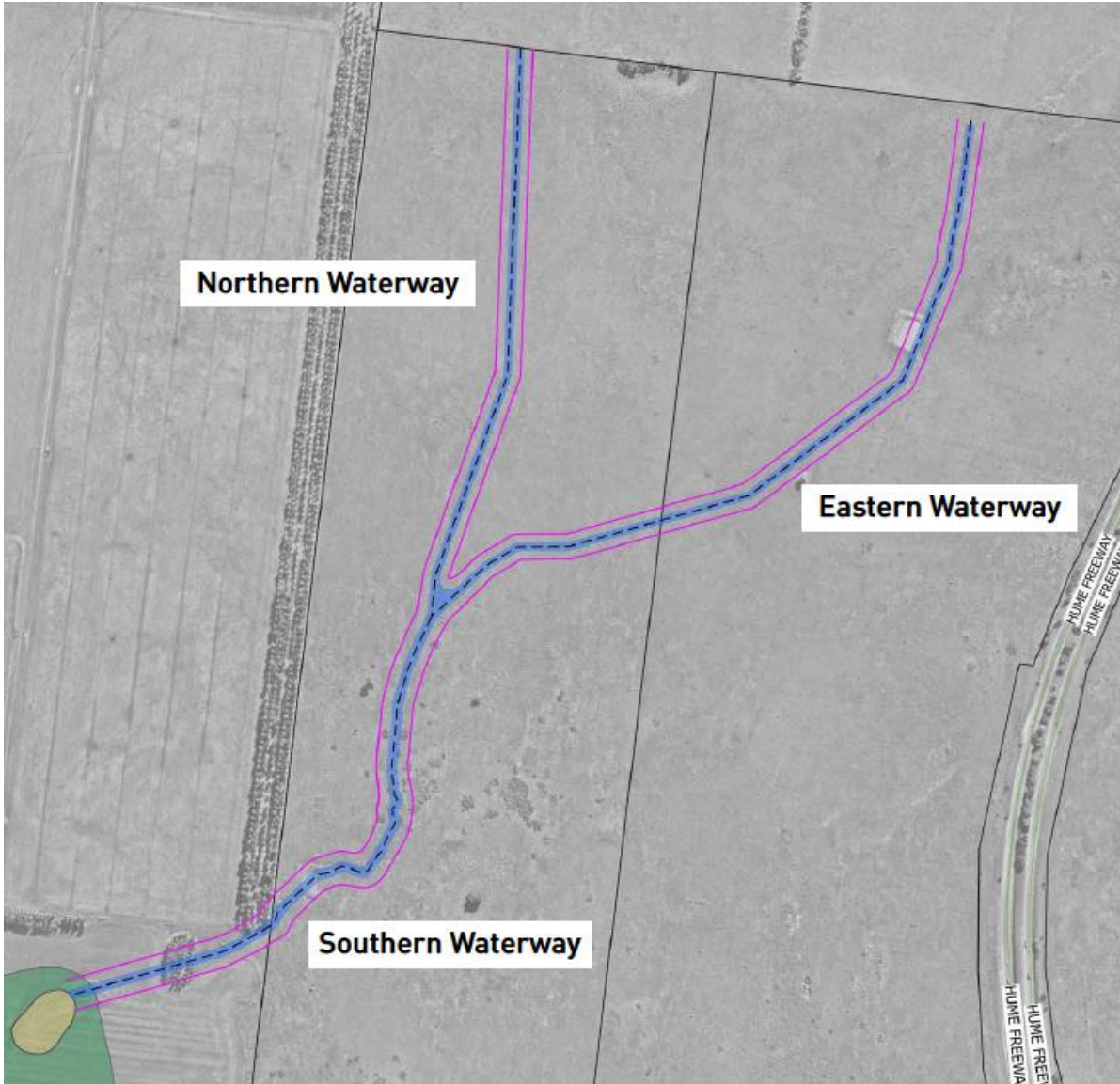
Waterway Corridor Widths: Hydrology



- Melbourne Water Drainage Scheme RORB model reviewed and found to contain some issues, mainly with catchment delineation
- A new RORB model was built by LD Eng for the region using the most up-to-date information and best practice (AR&R 2019) methodologies
- Catchment area reduced by approximately 94.5 Hectares
- Identified 1% AEP peak flow rates were found to be lower across all three reaches

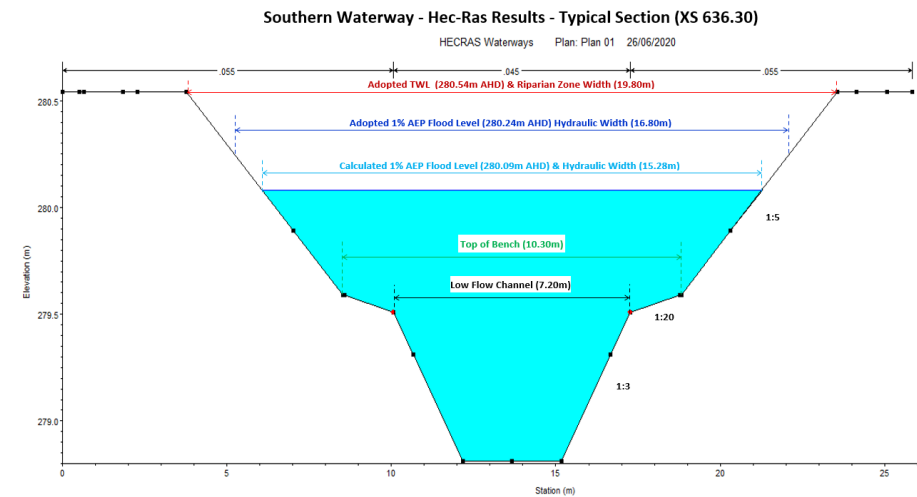
Waterway	Melbourne Water 1% AEP Peak Flow	LD Eng Pty Ltd 1% AEP Peak Flow	Variation
Eastern Reach	15.22 m ³ /s	11.96 m ³ /s	-3.26 m ³ /s
Northern Reach	21.00 m ³ /s	11.36 m ³ /s	-9.64 m ³ /s
Southern Reach	29.98 m ³ /s	25.49 m ³ /s	-4.49 m ³ /s

Waterway Corridor Widths: Hydraulics



- Waterway profiles designed as per MW “Constructed Waterway Design Manual” (2019)
- Waterway profiles modelled within HEC-RAS & 1% AEP flood extent confirmed to be contained
- Results indicate waterway widths are conservative with between 50 and 150mm more freeboard depth than required by MW

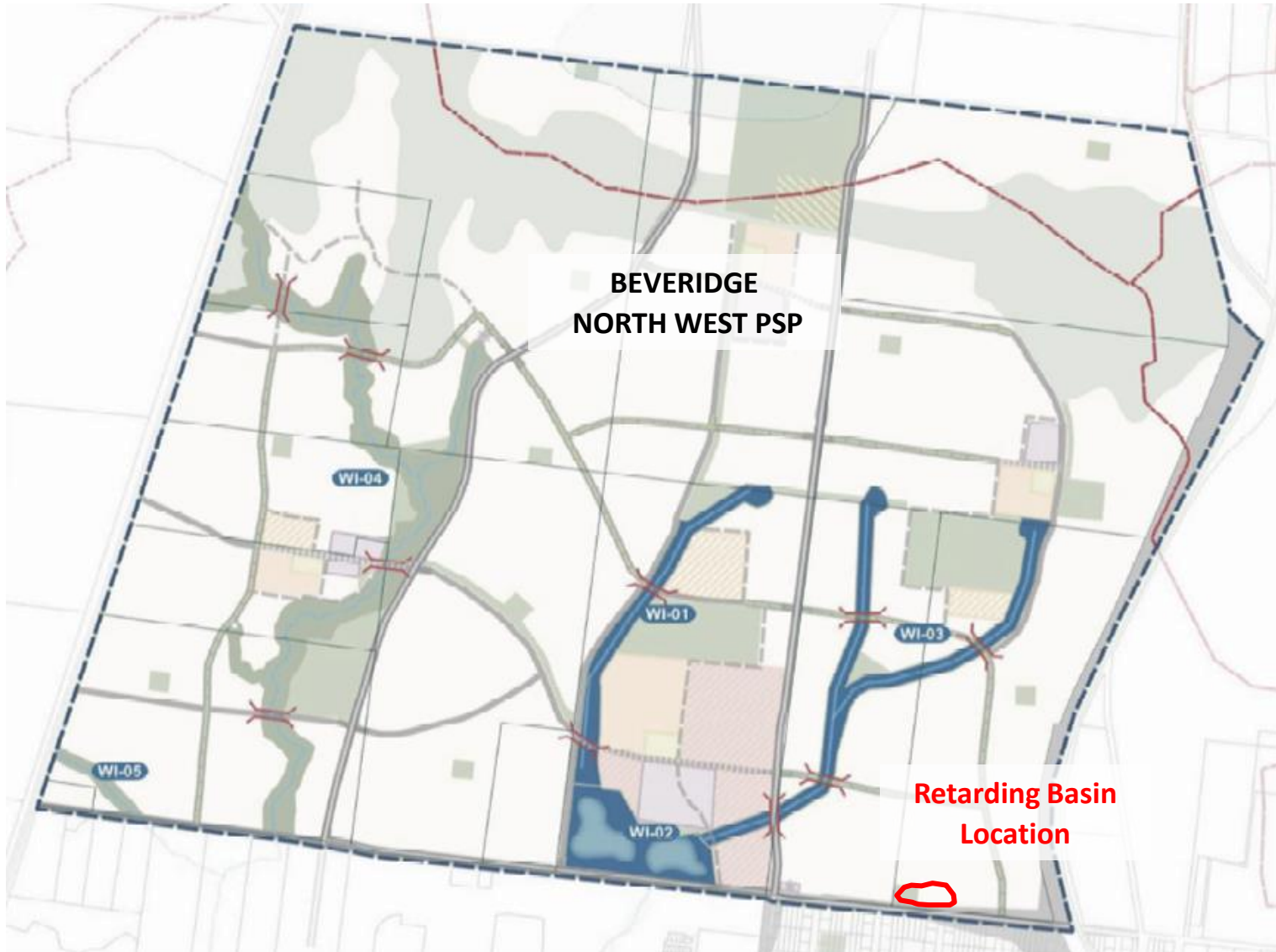
Waterway	Adopted Hydraulic Width	Width incl. Riparian/TWL	Vegetated Offset	Total Corridor Width
Eastern	14.00m	17.00m	20m	37.00m
Northern	14.00m	17.00m	20m	37.00m
Southern	17.00m	20.00m	25m	45.00m



Waterway Corridor Widths: Sensitivity Testing

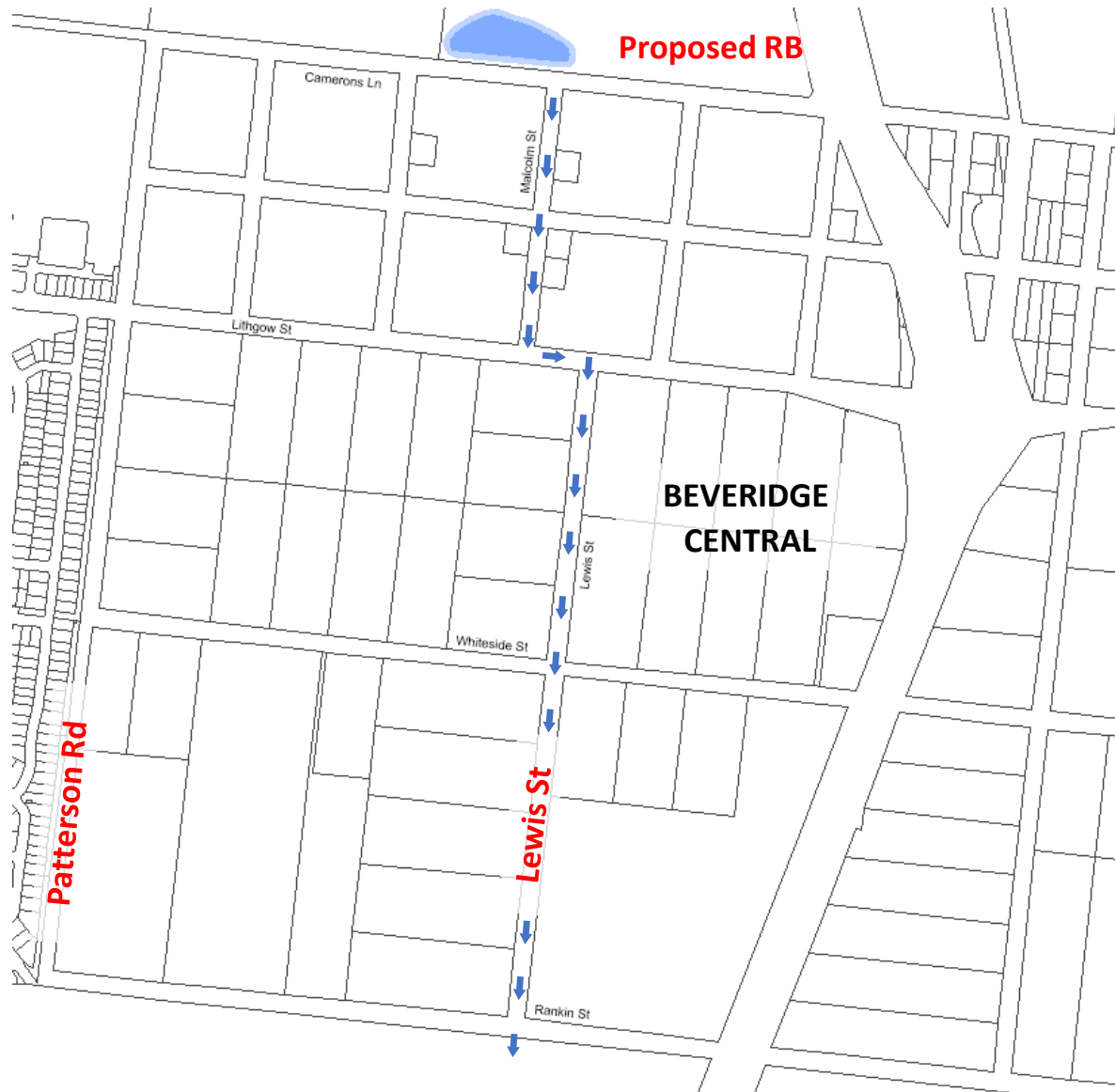
- Additional RORB modelling undertaken to test the sensitivity of the waterway corridor widths proposed to changes in the level and type of development and the land use budget assumed within the PSP
- Fraction Imperviousness (FI) values within the model were increased to 0.65 throughout the catchment - in doing so assuming the region is to be fully developed with no open space or reserves
- As a result water depths within the waterways increased on average by approximately 12.5mm with a maximum increase of 30mm
- Indicates the waterway corridor widths proposed are robust and conservative to a degree where they would not be impacted by any future changes to the Future Urban Structure (FUS) or the assumed Land Use Budget

South Eastern Retarding Basin: Overview



- Inclusion of a 1.5Ha retarding basin north of Camerons Lane
- Basin resides within the BNW PSP boundary & services part of the PSP region
- Reduces 1% AEP peak flows derived from north of Camerons Lane from 15.8m³/s to 1.4m³/s
- Reduces 1% AEP peak flows at outfall of the Beveridge Central region from 34.0m³/s to 14.5m³/s
- This reduction in flow significantly improves the efficiency and viability of the Beveridge Central drainage network

South Eastern Retarding Basin: Overland Flows



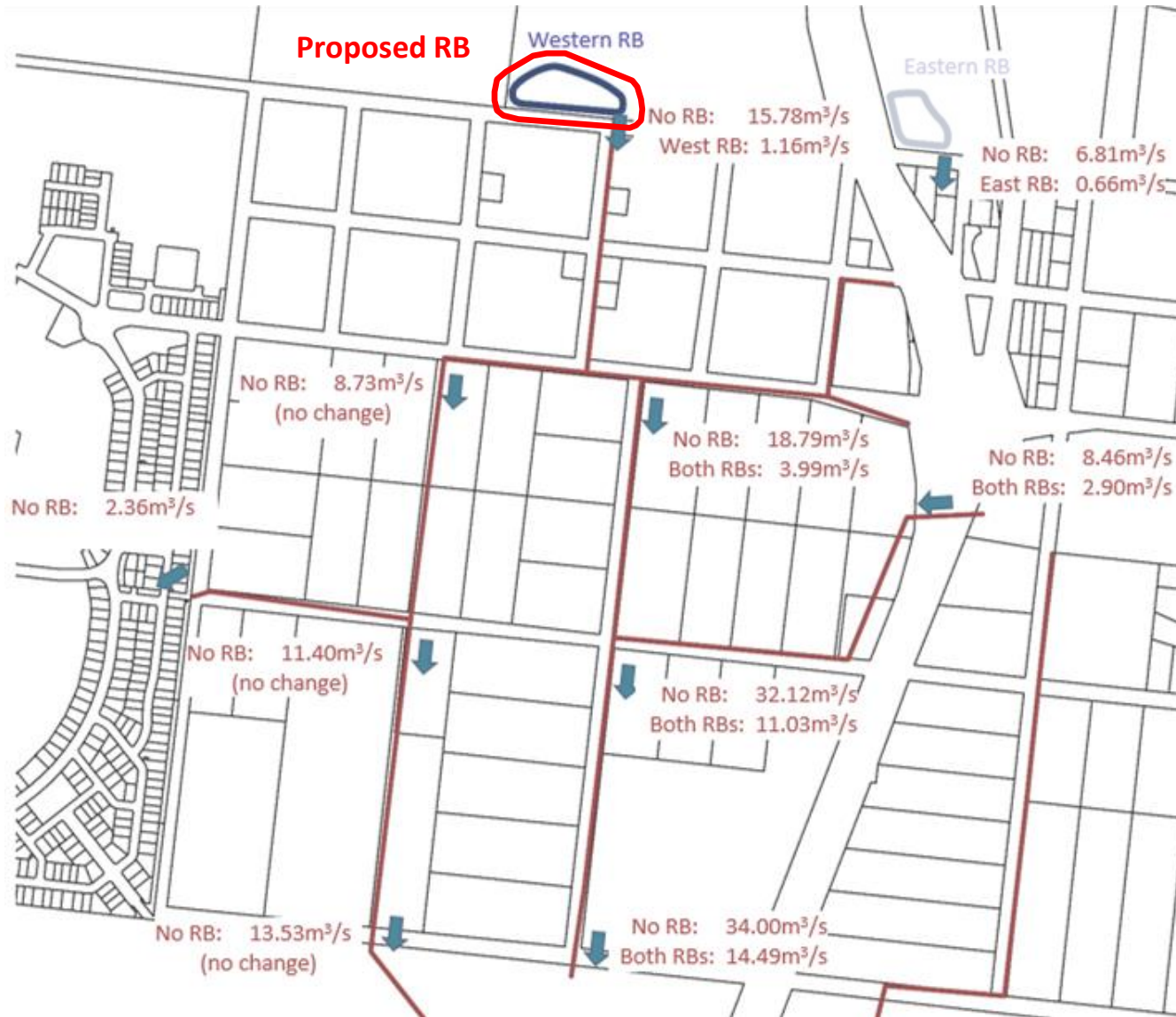
- Region's natural topography is quite flat consisting of longitudinal grades of 0.4-0.6% falling from north-to-south which hinders the ability to convey overland flow effectively
- Dispersing the overland flows from the north through other local roads does not appear to be viable due to lack of width and grade
- Lewis St (nominated as a 16m wide road within the Beveridge Central PSP) is the only continuous north-south road within the region which could potentially convey overland flow
- Longitudinal grade of Lewis St is constrained by the existing Yarra Valley Water (YVW) high pressure 450mm DIA water main causing reverse grade
- As such, relying on Lewis St to convey overland flow during the 1% AEP design rainfall event is not considered feasible

South Eastern Retarding Basin: Hydrology



- A new RORB model was built by LD Eng utilising updated topography data and a method of delineating catchments and reaches via spatial queries within QGIS
- The model utilises updated methodologies as specified within AR&R19
- The model includes a retarding basin with a footprint of approximately 1.5 hectares located in the south-eastern corner of the Beveridge North West PSP
- A total storage volume of approximately 17,000 cubic metres including 500mm of freeboard depth
- Peak 1% AEP outflow to the south of Camerons Lane is reduced from 15.78m³/s to 1.37m³/s

South Eastern Retarding Basin: Outcomes



- The addition of the retarding basin upstream significantly reduced flows at the outfall of Beveridge Central from 34.0m³/s to 14.5m³/s
- This attenuation of flow economises the drainage infrastructure (1% AEP pipe network) required within Beveridge Central
- This reduces the depth of excavation required to accommodate the drainage network overall
- The depth below natural surface at which the pipe network outfalls into the downstream waterway is also reduced
- By raising the outfall the excavation required to accommodate the downstream waterway assets (sediment basin, channel and wetland) is reduced
- By reducing excavation depth the risk associated with encountering large “floating” rock is reduced

Recommendations

1. Reduce the waterway corridor widths of the assets highlighted within the BNW PSP to 37m for the eastern and northern reaches and 45m for the southern reach
2. Include the proposed 1.5ha retarding basin within the south eastern corner of the BNW PSP to ensure a viable and practical drainage solution servicing a portion of Beveridge North West and Beveridge Central PSP areas