

G. Carlisle River Locality Report

1g. Introduction

Carlisle River is, spatially, the largest locality and is located approximately 30km southwest of Colac. The landform consists of dissected hills abutting rivers and streams and alluvial terraces with relatively flat topography in the dissected uplands of the Otway Ranges. Notably, the majority of the locality is located within a DWSC.

There are approximately 250 and 26 unsewered properties/parcels located within Carlisle River locality and town, respectively, with 25 DWM system permits that have been inspected to date by COS. The current DWM permits and their associated treatment system and LAA method within the Carlisle River locality are summarised as follows:

- 17 septic tanks (17 unknown); and
- 8 unknown (3 trenches, 5 unknown).

2g. Background Documentation

Refer to the following documents for additional detail regarding the locality:

- Carlisle River Township Master Plan Report (February, 2004);
- COS Planning Scheme; and
- Rural Living Strategy (2011).

3g. Site Assessment Results

The following table summarises the results from the representative audits conducted by Consultant staff in September 2014.

Characteristic	Description
Land use	Comprises a range of land uses, including dairy, forestry, rural living and tourism.
Occupancy rates	2.3 (Part of Beech Forest State Suburb, ABS Census, 2011).
Typical soils	Duplex soil. Black silt loam with excellent structure to 40cm, very wet below 25cm, abruptly overlies strongly mottled yellow brown and grey light to medium stiff clay to 70+cm. Can include lenses of dark yellow brown and strong brown mottled coffee rock between 40-50cm. Drainage and permeability are variable depending on slope and position.
AS/NZS 1547:2012 soil categories	4 (Clay Loams), 5 (Light Clays) and 6 (Medium to Heavy Clays).
Existing Systems	Separate Blackwater and Greywater Of the three systems inspected during field investigations, one (33%) comprised separate blackwater treatment in a septic tank, with direct greywater diversion to an adjacent paddock. The septic tank was not

Characteristic	Description
	<p>accessible, as it was covered by a concrete slab. It had been pumped out within the last two years.</p> <p>Septic effluent discharged to four conventional absorption trenches of 10m each, on slopes of less than 2%. Drainage was poor.</p> <p>Combined Blackwater and Greywater</p> <p>Two systems (67%) inspected have a combined wastewater treatment system, or were assumed to have based on layout of pipework and age of dwelling. The time since last pump-out was generally unknown (partly due to owner not being home to ascertain).</p> <p>Septic effluent discharged to one or more conventional absorption trenches (or was assumed to if trenches could not be identified). The trench dimensions were generally unclear, and it is likely that they were undersized for the number of bedrooms. The majority of trenches or/and available LAAs were located on land of less than 2% slope and appeared to be parallel with contours.</p>

4g. Summary of Constraints to DWM

Characteristic	Description
Climate Zone	Predominantly within Zone 3.
Surface waterways & catchments	Located entirely within DWSCs, i.e. Gellibrand River and Gellibrand River (South Otway). Two major rivers transverse the locality; Gellibrand River north to south in the western region of the locality and Carlisle River to the north of the town. Other waterways include: Rusty Creek, Sandy Creek, Crinoline Creek, Leahy Creek, Arkins Creek, Boggy Creek, and Charley Creek.
Groundwater	Proximity to groundwater bores: located within the town and along the Gellibrand River and Carlisle River.
Land subject to inundation	Along northern and western boundaries associated with Gellibrand River and lower reaches of the Carlisle River confluence point.
Useable lot area Town (Locality)	High: 10 (41) Moderate: 5 (16) Low: 11 (170) Compliant: 0 (23)
Minimum lot size compliance with Planning Scheme Zoning	The locality is predominantly zoned Farming Zone and Public Conservation and Resource Zone. The town is zoned Township Zone. Compliancy is variable throughout the locality, with all of the

Characteristic	Description
	<p>properties/parcels within the town compliant.</p> <p>Compliant: 26 (99)</p> <p>Non-compliant: 0 (151)</p>
<p>Slope</p> <p>Town (Locality)</p>	<p>High: 0 (121)</p> <p>Moderate: 0 (32)</p> <p>Low: 26 (97)</p>
<p>Geology</p>	<p>Predominately underlain by the Wiridjil Gravel Member of the Pebble Point Formation, which is comprised of fluvial and braided stream deposits.</p> <p>Moomowroong Sand Member of the Pebble Point Formation (marginal marine and beach deposits) is located near the town straddling unnamed alluvial floodplain deposits.</p> <p>East to southeast - Eumeralla Formation of the Otway group which is comprised of fluvial and braided stream deposits.</p>
<p>Soil suitability</p> <p>Town (Locality)</p>	<p>High: 00 (44)</p> <p>Moderate: 26 (206)</p> <p>Low: 0 (0)</p> <p>Variable soil landscapes throughout the locality (7-8 in total).</p> <p>The town consists of soil landscape unit '94' which forms on elevated, and in parts, uplifted and dissected system of ancient cut and depositional terraces of Gellibrand River. The soils consist of grey sand soils with structured clay underneath; strongly structured sandy loam over moderately structured medium clay; to depths of more than 2m. Limitations include low fertility and restricted drainage.</p> <p>The area adjacent to the river consists of soil landscape unit '61' which forms on the deeply dissected hills of the Otway Ranges and consists of brown gradational soils to 1.2m depth. The soils consist of moderately structured silty loam over clay loam. Limitations include acidity and restricted drainage.</p>
<p>Sensitivity Overlay</p>	<p>Depth to Groundwater Compliance: variable compliancy, but generally compliant, except around the Gellibrand River and the confluence of Carlisle River.</p> <p>Landslip: minimal</p> <p>Vegetation: significant Great Otway National Park and Otway Forest Park.</p>
<p>Sensitivity</p>	<p>Very High: 0 (0)</p>

Characteristic	Description
Analysis Rating	High: 0 (38)
Town (Locality)	Moderate: 26 (209) Low: 0 (3)

5g. Sensitivity Analysis (Maps)

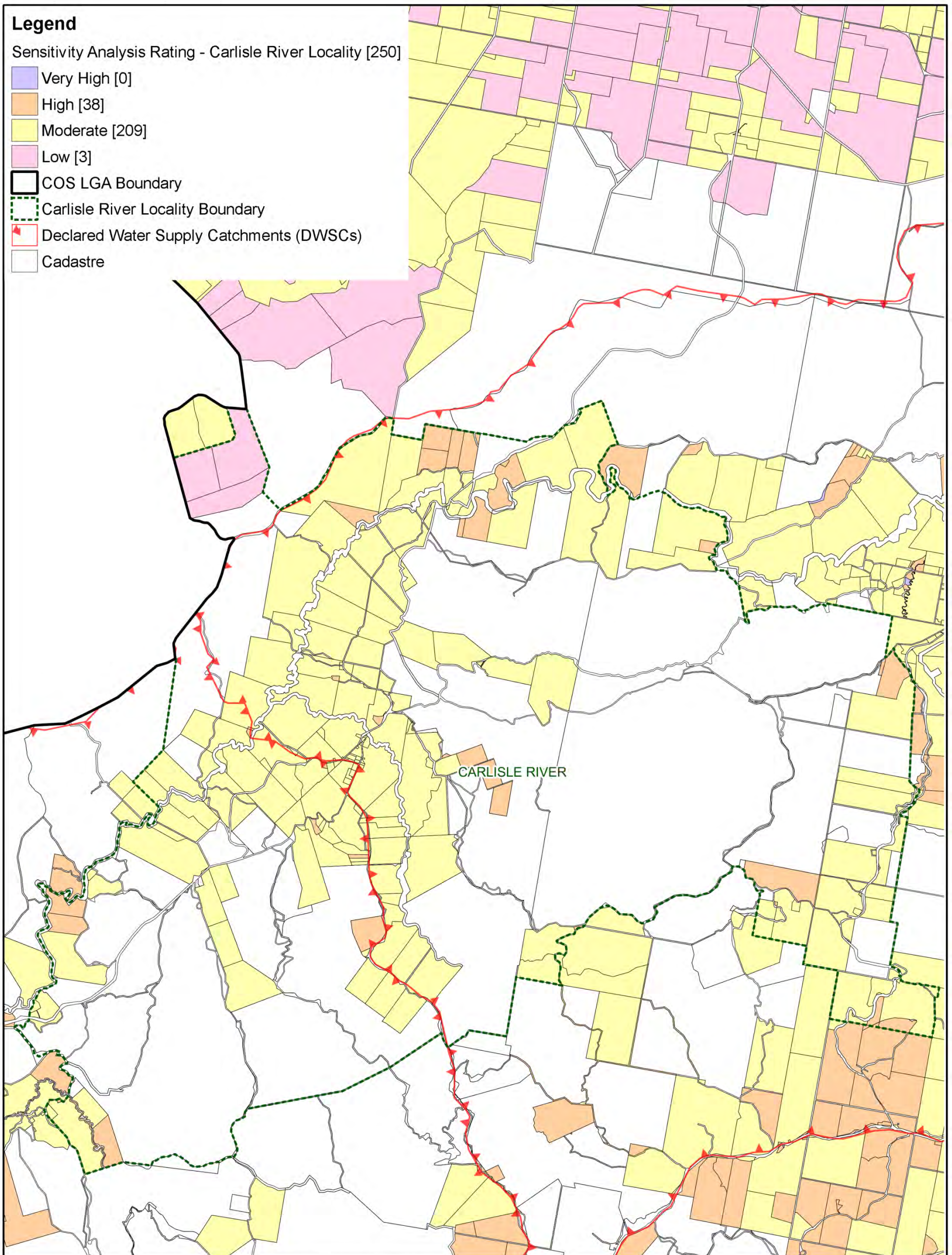
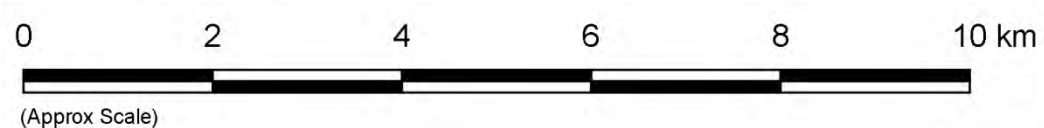


Figure g1: Sensitivity Analysis - Carlisle River Locality

Colac Otway Shire DWMP Review



W Whitehead & Associates
Environmental Consultants



Revision	2
Drawn	JK
Approved	MS

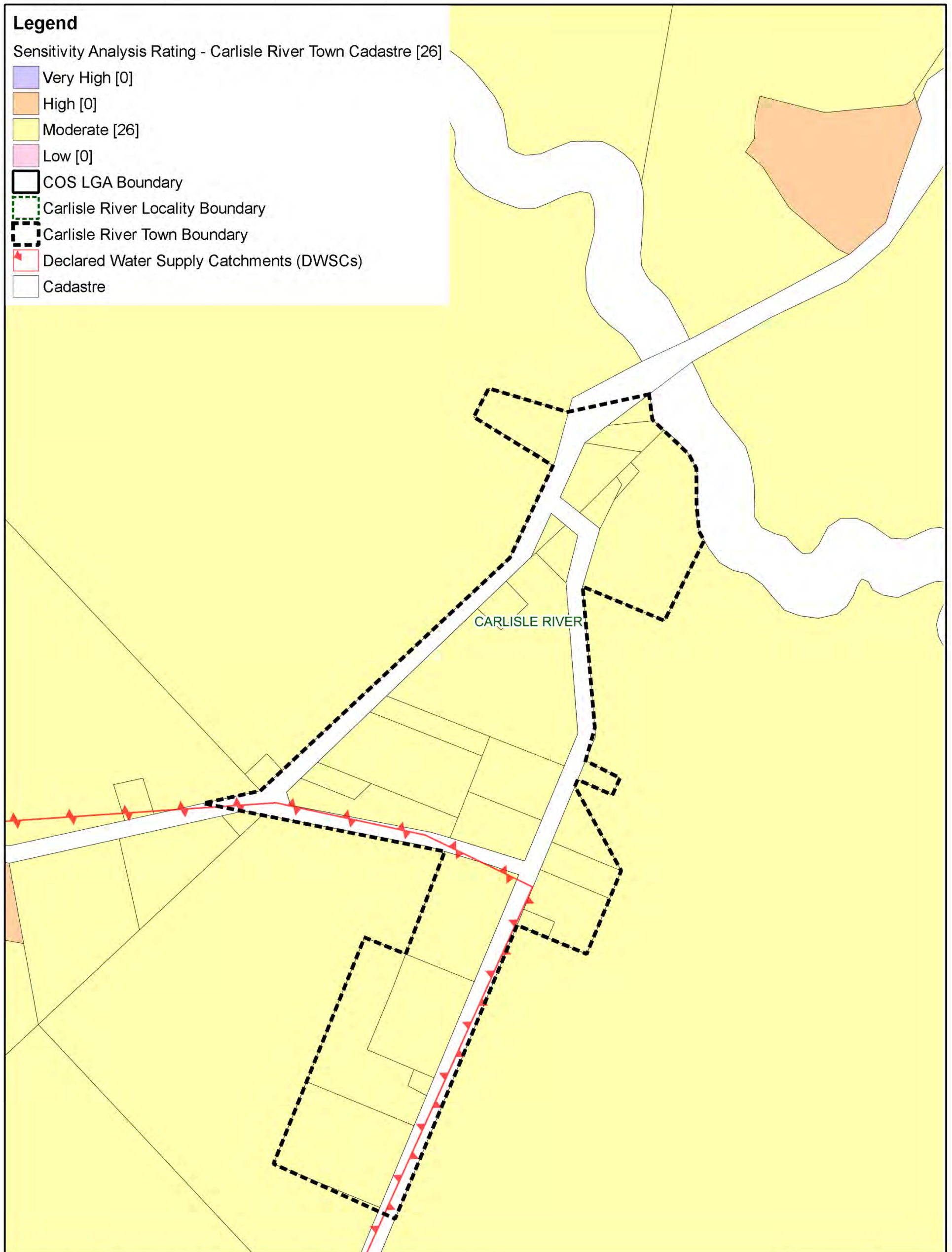
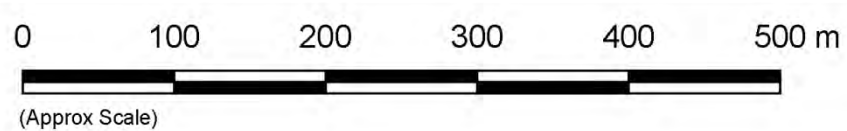


Figure g2: Sensitivity Analysis - Carlisle River Town

Colac Otway Shire DWMP Review



Revision	3
Drawn	JK
Approved	MS

6g. System Selection

Due to the dominance of heavy-textured soils in the Carlisle River locality, conventional absorption trenches and beds are not likely to be feasible and are discouraged. Appendix A of the EPA Code of Practice (2013) prohibits LPED systems on Category 5 and 6 soils (medium to heavy clays).

EPA Code of Practice (2013) (Section 2.2.2) identifies secondary treatment standard (or better) followed by subsurface pressure-compensating irrigation as current best-practice in Victoria for substantially reducing the risk associated with unsewered development. Further, the Code describes a “Wick trench/bed” land application option that may be incorporated with secondary treatment for consideration on sites constrained by climate or lot ‘useable area’, particularly within the DWSCs. Any variation from this best-practice approach must be provided with detailed supporting information to demonstrate suitability.

System Sizing Tables (below) indicate which systems are likely to be the most appropriate for the locality.

7g. System Sizing Tables

Sizing Tables for each system type were created using conservative monthly water balances, following methods described in the MAV Model LCA, 2014. Monthly 70th percentile rainfall and average evapotranspiration data for Carlisle River was sourced from SILO (Scientific Information for Land Owners) climate databases, which are managed by the Queensland Government. The SILO databases use accurate meteorological data collected throughout Australia over long time periods.

The Design Loading Rates (DLRs) and Design Irrigation Rates (DIRs) were taken from the current EPA Code of Practice. Where the Code of Practice has precluded use of a particular type of system on a certain soil type, it is shown as ‘Not Applicable’ for that soil type in the Sizing Tables. Where the evapotranspiration deficit requires unrealistically large land application areas for a particular system on a certain soil type, it is also shown as ‘Not Applicable’ for that soil type in the Sizing Tables. Detailed, site-specific LCAs and system designs would be required to further investigate the feasibility of systems deemed ‘Not Applicable’ in the sizing tables. Mitigation measures (such as importation of topsoil to appropriate depths in the land application area), may be required to sustainably achieve land application of effluent on constrained properties/parcels.

Sizing Tables for the Carlisle River locality are provided below.

8g. General Conclusion

The properties/parcels within Carlisle River, including the town, have predominantly been assigned a Moderate Sensitivity Rating to sustainable DWM. Predominantly, Standard LCAs will be required, with the use of System Sizing Tables deemed appropriate. The Low Sensitivity Rating properties/parcels within a DWSC are required to complete a Standard LCA as per the current EPA Code of Practice’s requirements. Particular attention needs to be directed towards ensuring that appropriate setbacks to surface waterways and groundwater bores are maintained, that the DWM systems are sized based on the limiting soil horizon, and that the degree of slope is taken into consideration when designing the LAA.

Carlisle River										
Drip and Spray Irrigation Systems* - Secondary Treated Effluent only										
	Soil Category	Gravels & Sands (1)	Sandy Loams (2)	Loams (3)	Clay Loams (4)	Light Clays (5)	Medium to Heavy Clays (6)			
	DIR (mm)	5	5	4	3.5					
Development Type	Daily (L/day)	Total min. irrigation area required for zero wet weather effluent storage (m ²)†				N/A (Alternative Land Application System Required)	N/A (Alternative Land Application System Required)			
5 + bedroom residence	1,080	509	960	1,726						
4 bedroom residence	900	424	800	1,439						
1-3 bedroom residence	720	339	640	1,151						
Note: * irrigation system sizes are based on the assumption that the land application area is less than 10% slope. Reductions in DIR apply for slopes above 10% according to Table M2 of AS1547:2012										
† not including spacing or setbacks										
Conventional Absorption Trenches and Beds - Primary Treated Effluent										
	Soil Category	Gravels & Sands (1)	Sandy Loams (2)	Loams (3)	Weak Loams & High/Mod Clay Loams (3 & 4)	Weak Clay Loams (4)	Light Clays (5)	Massive Clay Loams (4)	Medium to Heavy Clays (6)	
	DLR (mm)	Not supported (Alternative Land Application System Required)								
Development Type	Daily (L/day)									
5 + bedroom residence	1,080									
4 bedroom residence	900									
1-3 bedroom residence	720									
Evapotranspiration-Absorption Trenches and Beds - Primary Treated Effluent (Category 1 to 5) and Secondary Treated Effluent only (Category 6)										
	Soil Category	Gravels & Sands (1)	Sandy Loams (2)	Loams (3a)	Weak/Massive Loams (3b)	High/Mod Clay Loams (4a)	Weak Clay Loams (4b) & Strong Light Clays (5a)	Massive Clay Loams (4c) and Mod & Weak Light Clays (5b, 5c)	Medium to Heavy Clays (6) - Secondary Effluent Only	
	DLR (mm)	20*	20*	15	10	12	8			
Development Type	Daily (L/day)	Total min. basal or 'wetted area' required for zero wet weather storage (m ²) not including spacing & setbacks							N/A (Alternative Land Application System Required)	N/A (Alternative Land Application System Required)
5 + bedroom residence	1,080	65	93	162	125	231				
4 bedroom residence	900	54	77	135	104	192				
1-3 bedroom residence	720	44	62	108	83	154				
Note: * Gravels, Sands and sandy loams are unsuitable for conventional absorption trenches and beds if there is a high watertable, including seasonal and perched watertables. Value based on average of conservative rate and maximum rate for Category 2b and 3a soils in AS1547:2012										
LPED Irrigation Systems - Primary or Secondary Treated Effluent										
	Soil Category	Gravels & Sands (1)	Sandy Loams (2)	Loams (3)	Clay Loams (4)	Light Clays (5)	Medium to Heavy Clays (6)			
	DIR (mm)	Not supported (Alternative Land Application System Required)								
Development Type	Daily (L/day)									
5 + bedroom residence	1,080									
4 bedroom residence	900									
1-3 bedroom residence	720									
Wick Trenches and Beds - Secondary Treated Effluent Only										
	Soil Category	Gravels & Sands (1)	Sandy Loams (2) Loams (3) & High/Mod Clay Loams (4a,b)	Weak Clay Loams (4)	Massive Clay Loams (4)	Strong Light Clays (5a)	Moderate Light Clays (5b)	Weak Light Clays (5c)	Medium to Heavy Clays (6)	
	DLR (mm)	25	30	20	10	12	8	8		
Development Type	Daily (L/day)	Total min. basal or 'wetted area' required for zero wet weather storage (m ²) not including spacing & setbacks							N/A (Alternative Land Application System Required)	
5 + bedroom residence	1,080	50	41	65	162	125	231			
4 bedroom residence	900	42	34	54	135	104	192			
1-3 bedroom residence	720	34	27	44	108	83	154			