M. Kennett River Locality Report

1m. Introduction

Kennett River is a coastal locality along the south-eastern coastline of COS, approximately 20km northeast of Apollo Bay, in the heavily vegetated foothills of the south-eastern section of the Otway Ranges. The locality is not located within a DWSC.

There are 186 and 180 unsewered properties/parcels within the Kennett River locality and town, respectively, and 111 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 Kennett River locality is summarised as follows:

- 31 AWTS (13 drip irrigation, 3 irrigation, 4 subsurface irrigation, 2 trenches and 9 unknown);
- 52 sand filters (50 subsurface irrigation, 1 trench and 1 unknown)
- 9 septic tanks (2 trenches and 7 unknown)
- 19 unknown (5 trenches, 1 subsurface irrigation and 13 unknown).

No field investigations were conducted in Kennett River as part of the 2014 field assessments.

2m. Background Documentation

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

- Colac Otway Shire Coastal Community Revitalisation Project (April 2003);
- Colac Otway Shire, Three Towns Stormwater Management Strategy, Concept Study (October 2004);
- Concept Design for Wye River Separation Creek and Kennett River, (June 2006);
- Kennett River, Wye River and Separation Creek Structure Plans (February 2008);
- COS Planning Scheme; and
- Rural Living Strategy (2011).

3m. Summary of Constraints to DWM

Characteristic	Description
Climate Zone	Zone 2.
Surface waterways & catchments	The locality is not located within a DWSC. Kennett River and its tributaries form the major waterway within this region and confluences with the Southern Ocean. Kennett River east and west branches are located in the top of the catchment before merging. Additional waterways within the Kennett River locality include, Grey River and Carisbrook Creek which flows along the western locality boundary.
Groundwater	Proximity to groundwater bores: none.

Characteristic	Description
Land subject to inundation	Along the confluences of Kennett River around the town.
Useable lot area **Town (Locality)**	High: 173 (175) Moderate: 6 (8) Low: 1 (2) Compliant: 0 (1)
Minimum lot size compliance with Planning Scheme Zoning	The locality is predominantly zoned Public Conservation and Resource Zone, with small sections of Rural Conservation Zone. The town is zoned Township Zone, with Public Use Zone along the foreshore. The majority of the properties/parcels are compliant. There are prescribed minimum lot sizes for subdivisions, as per Design and Development Overlay Schedule 4 (DDO4 – Coastal Towns: Skenes Creek, Kennett River, Wye River and Separation Creek). Compliant: 180 (183) Non-compliant: 0 (3)
Slope **Town (Locality)**	High: 159 (163) Moderate: 15 (15) Low: 6 (8)
Geology	Eumeralla Formation of the Otway Group with alluvial floodplain deposits around the Kennett River confluence.
Soil suitability **Town (Locality)**	High: 0 (0) Moderate: 180 (186) Low: 0 (0) Along the coastline and town consists of soil landscape ‘64’ (moderate rating) which forms in the similar landscape as detailed in ‘61’. It consists of brown texture contrast soils to 0.9m depth. The soils consist of weakly structured clay sand over strongly structured clay loam. The northern half of the locality consists of soil landscapes ’61 and 59’, which are located within the forested regions of the Great Otway National Park.
Sensitivity Overlay	No depth to groundwater data. Landslip: minimal, found along the foreshore and a small section along the eastern boundary to the north of the town. Vegetation: all land surrounding the town is defined as Great Otway National Park and Kennett River Coastal Reserve.

Characteristic	Description
Sensitivity Analysis Rating **Town (Locality)**	Very High: 0 (0) High: 173 (175) Moderate: 7 (11) Low: 0 (0)

4m. Sensitivity Analysis (Maps)

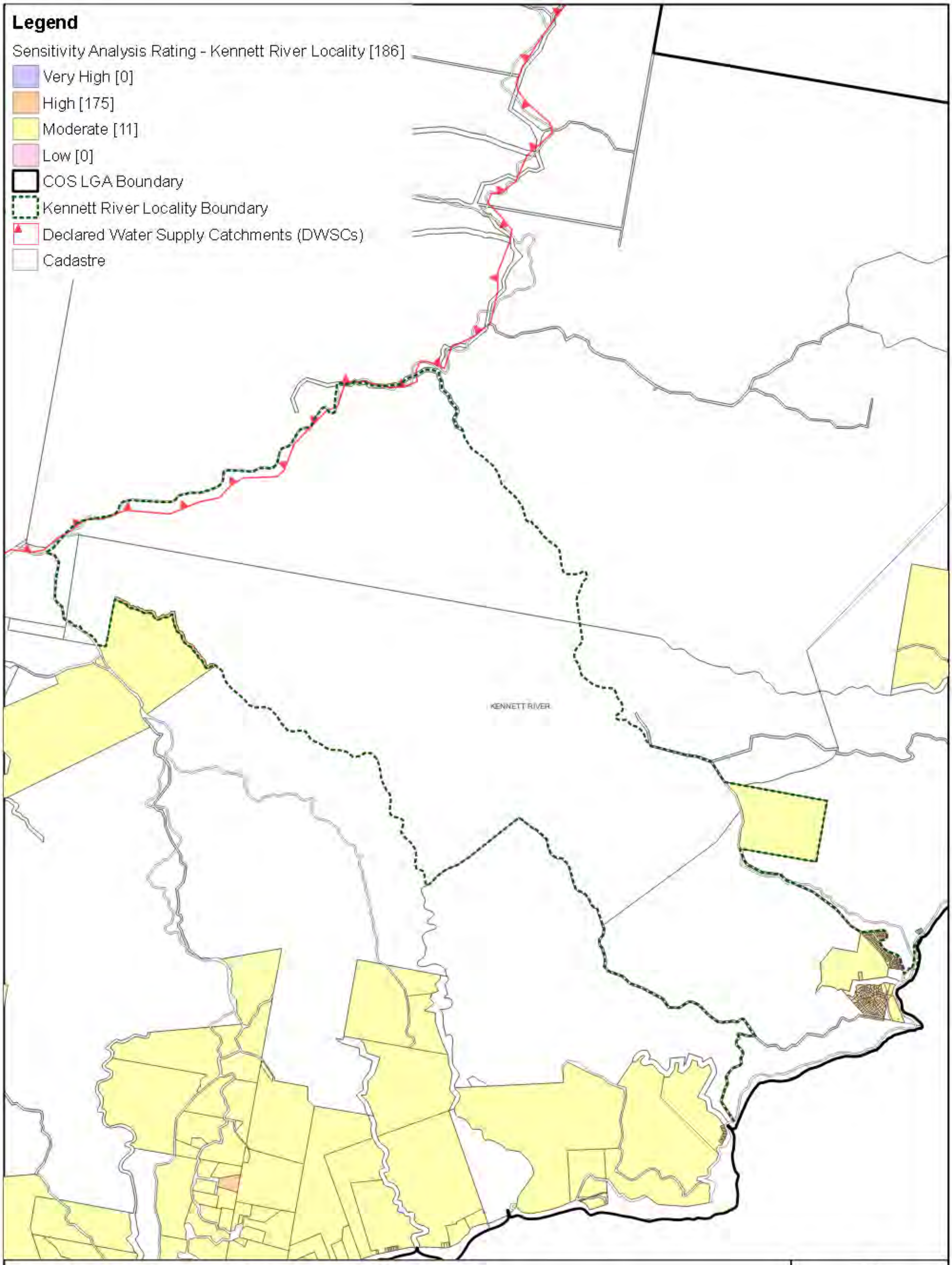


Figure m1: Sensitivity Analysis - Kennett River Locality

Colac Otway Shire DWMP Review

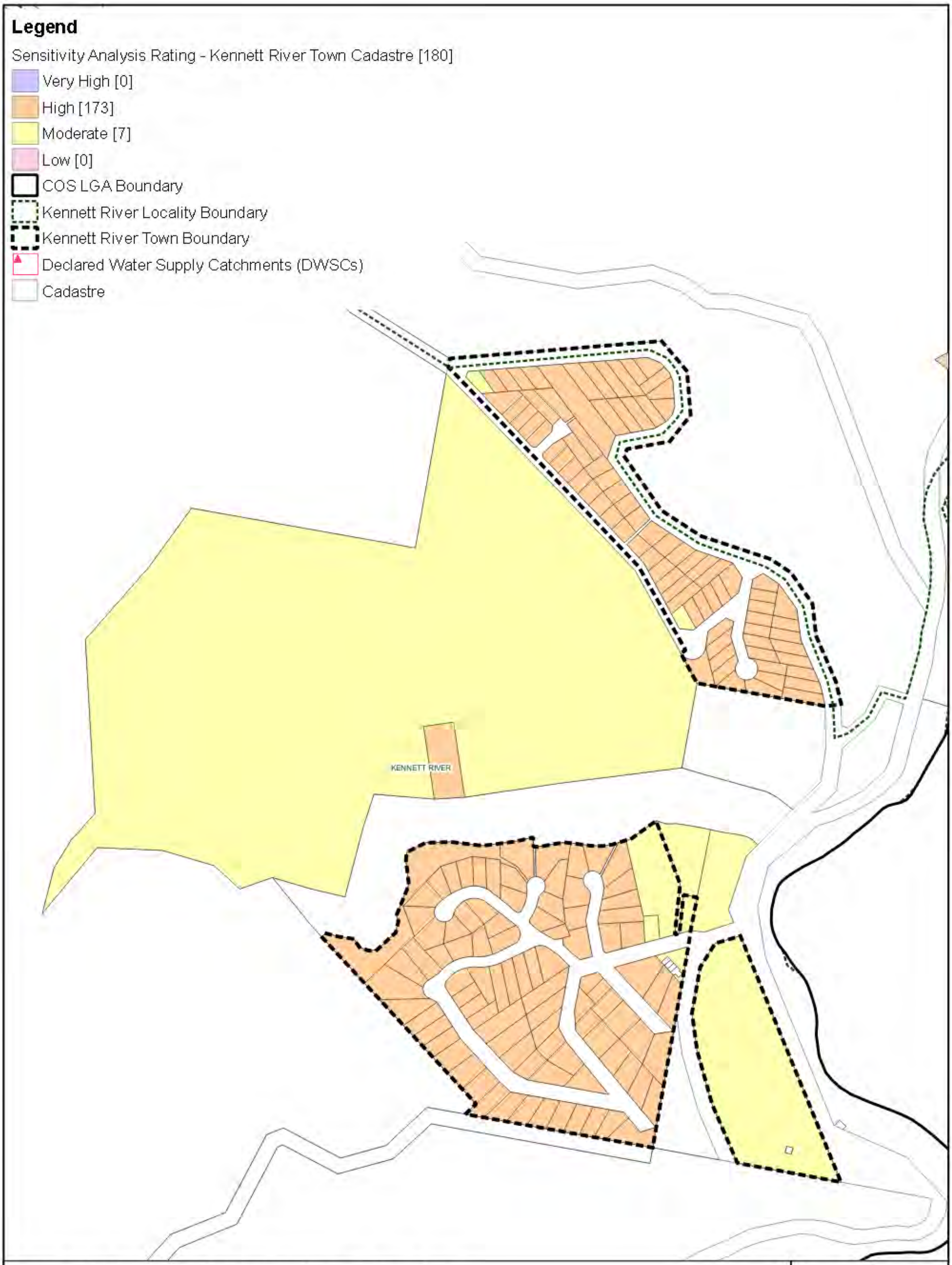
Whitehead & Associates Environmental Consultants

0 1 2 3 4 5 km

(Approx Scale)

N

Revision	2
Drawn	JK
Approved	MS


Legend
Sensitivity Analysis Rating - Kennett River Town Cadastre [180]
Very High [0]
High [173]
Moderate [7]
Low [0]
COS LGA Boundary
Kennett River Locality Boundary
Kennett River Town Boundary
Declared Water Supply Catchments (DWSCs)
Cadastre
KENNETT RIVER
Figure m2: Sensitivity Analysis - Kennett River Town
Colac Otway Shire DWMP Review
Whitehead & Associates
Environmental Consultants
0 100 200 300 400 500 m
(Approx Scale)
N
Revision 1
Drawn JK
Approved MS

5m. System Selection

Soil types vary significantly in the Kennett River area depending on position in the landscape (i.e. sand deltas or hill slopes). Appendix A of the EPA Code of Practice (2013) prohibits conventional and modified trenches and beds as well as LPED systems on Category 1 soils (sands), which preclude these systems on the delta areas. Landslip risks and land gradients are major constraints for DWM on properties/parcels located on the hillslopes in the locality. As such, site-specific LCA investigations and system designs are recommended; however the sizing tables (below) provide some guidance on which systems may be appropriate. Note that the DIR for subsurface irrigation systems has not been reduced to account for slopes above 10% (as is recommended in AS/NZS 1547:2012). Surface irrigation is not recommended on slopes greater than 10%.

6m. 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 the Kennett River and Sugarloaf area 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 Kennett River locality are provided below.

7m. General Conclusion

The properties/parcels within the locality have been assigned a Moderate or High Sensitivity Rating to sustainable DWM, with the majority of the town assigned as High. Both Standard and Detailed LCAs will be required, with the use of System Sizing Tables deemed appropriate for the Standard LCAs. Particular attention needs to be directed towards ensuring that the DWM systems are sized based on the limiting soil horizon, which may be relatively shallow, and that the systems selected are appropriate for steeper slopes with correct construction. The majority of properties/parcels within the region also have less than 1,500m^2 of useable area for DWM, which also does not exclude heavily vegetated areas. This will limit design options and it is imperative that the LCA DWM system design ensure that DWM is contained on-site.

Kennett River (& Sugarloaf)

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	3	N/A (Alternative Land Application System Required)		
Development Type	Daily (L/day)	Total min. irrigation area required for zero wet weather effluent storage (m^2)†							
5 + bedroom residence	1,080	338		491	626	900			
4 bedroom residence	900	282		410	530	750			
1-3 bedroom residence	720	225		328	424	600			

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)	20*	20*	15	10	6	5	4	N/A (Alternative Land Application System Required)
Development Type	Daily (L/day)	Total min. basal or 'wetted area' required for zero wet weather storage (m^2) not including spacing or setbacks							
5 + bedroom residence	1,080	61		85	138	281	379	584	
4 bedroom residence	900	51		71	115	234	316	487	
1-3 bedroom residence	720	41		57	92	187	253	389	

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

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	5	5
Development Type	Daily (L/day)	Total min. basal or 'wetted area' required for zero wet weather storage (m^2) not including spacing & setbacks							
5 + bedroom residence	1,080	61		85	138	110	185	379	
4 bedroom residence	900	51		71	115	92	154	316	
1-3 bedroom residence	720	41		57	92	74	124	253	

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 - Slopes only

	Soil Category	Gravels & Sands (1)	Sandy Loams (2)	Loams (3)	Clay Loams (4)	Light Clays (5)	Medium to Heavy Clays (6)		
	DIR (mm)	N/A (Alternative Land Application System Required)	4	3.5	3	N/A (Alternative Land Application System Required)	N/A (Alternative Land Application System Required)		
Development Type	Daily (L/day)		Total min. basal or 'wetted area'†						
5 + bedroom residence	1,080		584	800	1,269				
4 bedroom residence	900		487	666	1,057				
1-3 bedroom residence	720		389	533	846				

† required for zero wet weather storage (m^2) not including spacing & setbacks

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	5
Development Type	Daily (L/day)	Total min. basal or 'wetted area' required for zero wet weather storage (m^2) not including spacing & setbacks							
5 + bedroom residence	1,080	48	39	61	138	110	185		379
4 bedroom residence	900	40	33	51	115	92	154		316
1-3 bedroom residence	720	32	26	41	92	74	124		253