

K. Gellibrand Locality Report

1k. Introduction

Gellibrand is located approximately 21km south of Colac. It is located on elevated and dissected terraces or deeply dissected hills, abutting the Gellibrand River. Gellibrand is located on relatively flat land gently slopes in a northerly direction to the convergence of Charleys Creek and Lardner Creek. Notably, the entire locality is located within the Gellibrand River DWSC.

There are approximately 276 and 71 unsewered properties/parcels located within the Gellibrand locality and town, respectively, with 104 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 Gellibrand locality are summarised as follows:

- 9 AWTs (5 drip irrigation, 1 trenches, 1 irrigation and 1 unknown);
- 1 constructed reed beds wetland (1 trench);
- 35 sand filters (1 drip irrigation and 34 subsurface irrigation);
- 34 septic tanks (12 trenches, 1 subsurface irrigation and 21 unknown); and
- 25 unknown (10 trenches and 15 unknown).

2k. Background Documentation

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

- Gellibrand River Township Master Plan Report (October, 2005); and
- Colac Otway Domestic Wastewater Management Plan (2007);
- COS Planning Scheme; and
- Rural Living Strategy (2011).

3k. 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 of a range of land uses, including dairy, forestry, rural living and tourism.
Occupancy rates	2.3 (Gellibrand State Suburb, ABS Census, 2011).
Typical soils	Duplex profile. Very dark grey brown sandy clay loam surface soil overlying abruptly at 35cm a strongly mottled yellow brown, grey, strong brown silty clay, overlying a stratum of white and yellow coarse gravelly sand with rounded quartz pebbles between 140-170cm, overlying strongly mottled clay to at least 200cm. Drainage and permeability are variable depending on slope and position.
AS/NZS 1547:2012	5 (Light Clays)

Characteristic	Description
soil categories	
Existing Systems	<p>Separate Blackwater and Greywater</p> <p>Of the seven systems inspected during field investigations, three systems (43%) comprised separate blackwater treatment in a septic tank, with direct greywater diversion to either an adjacent paddock or street drain. Where discharged to paddocks or neighbouring vacant properties/parcels, greywater was typically ponded near the diversion outlet pipe, and often in areas trampled by livestock (cattle and sheep).</p> <p>The blackwater septic tanks were typically 40+ years old and less than half had been pumped out within the last ten years. Septic effluent discharged to one or more conventional absorption trenches, some of which could not be identified without the owner present. The majority of trenches were located on land of less than 8% slope and appeared to be parallel with contours (i.e. running across slope, not down it). There was evidence of blackwater effluent surcharging to the surface on one property (of three with separate blackwater and greywater systems). Soils were typically soft or boggy, mainly due to recent high rainfall.</p> <p>Combined Blackwater and Greywater</p> <p>Four of the seven systems (57%) inspected had combined wastewater treatment systems or were assumed to have combined systems, based on layout of pipework. It is likely that the proportion of combined systems in Gellibrand is likely to be less than this; however, this should be confirmed by ongoing inspections by Council.</p> <p>Septic effluent discharged to one or more conventional absorption trenches. At least one of the four properties had undersized trenches for the number of bedrooms; and on one property the LAA could not be identified and there was inadequate suitable space for an appropriately sized LAA.</p>

4k. Summary of Constraints to DWM

Characteristic	Description
Climate Zone	Zone 3.
Surface waterways & catchments	The locality is located entirely within the Gellibrand River DWSC. There is an extensive drainage network surrounding the town; including Gellibrand River transversing southeast to northwest, Love Creek, Charleys Creek, Lardner Creek and Asplin Creek.
Groundwater	Proximity to groundwater bores: significantly dense distribution throughout the town and along the river, similar to Kewarra. Groundwater depth: 1.5 – 2m below surface.

Characteristic	Description
Land subject to inundation	Extensive along Gellibrand River, Charleys Creek, Lardner Creek and Love Creek; envelopes the town.
Useable lot area Town (Locality)	High: 19 (58) Moderate: 33 (46) Low: 19 (158) Compliant: 0 (14)
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, Public Park and Recreation Zone and Public Use Zone. Compliance is variable throughout the locality, with the majority of the properties/parcels within the town compliant. Compliant: 67 (110) Non-compliant: 4 (166)
Slope Town (Locality)	High: 0 (92) Moderate: 0 (25) Low: 71 (159)
Geology	Various underlying geology. Majority of town is a river terrace with clay and sand which is moderately sorted and poorly consolidated. Northern tip is alluvial floodplain with silt, sand, and gravel deposits which are also moderately sorted and poorly consolidated. South – Eumeralla Formation of the Otway Group. Dilwyn Formation of Wangeripp Group is directly south of town. Older Volcanic Group (volcanic plugs, sills, dykes, pillow and pyroclastic deposits) to the east and north of town. Wiridjil Gravel Member of Pebble Point Formation to west of town towards Carlisle River. South eastern edge is a shallow marine deposit with sand, clay and silt.
Soil suitability Town (Locality)	High: 64 (125) Moderate: 7 (151) Low: 0 (0) The majority of the town is classified as having a high soil suitability constraint. The dominant soil landscape unit of the town consists of '67' which

Characteristic	Description
	<p>forms on deeply dissected hills abutting the Gellibrand River to the west of Love Creek. The soils consist of brown gradational soils, strongly structured sandy clay loam over weakly structured light clay, to 0.9m depth. Limitations include acidity.</p> <p>The western and southern regions of the town consist 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 northern region of the locality consists of soil landscape unit '90' which forms on the rolling hills in the northern upper reaches of the Gellibrand catchment and consists of mottled gradational soil to more than 2m depth. The soil consists of apedal fine sandy loam over weakly structured silty clay loam. Limitations include low p-sorb, low fertility and restricted drainage.</p> <p>The southern half of the locality consists of soil landscape unit '61' which forms on the deeply dissected hills of the Otway Ranges and consist 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>Predominant soil is yellow sandy gravel fill over brown clayey sandy silt overlying dark brown silty fine sand.</p> <p>Soil capacity for good drainage but waterlogged during wetter months.</p>
Sensitivity Overlay	<p>Depth to Groundwater Compliance: variable throughout locality. Non-compliant particularly to the southeast of the locality around Gellibrand River and Lardner Creek.</p> <p>Landslip: excessive, particularly to northwest of town.</p> <p>Vegetation: Otway Forest Park in southeast corner.</p>
Sensitivity Analysis Rating Town (Locality)	<p>Very High: 0 (2)</p> <p>High: 19 (60)</p> <p>Moderate: 52 (214)</p> <p>Low: 0 (0)</p>

5k. Sensitivity Analysis (Maps)

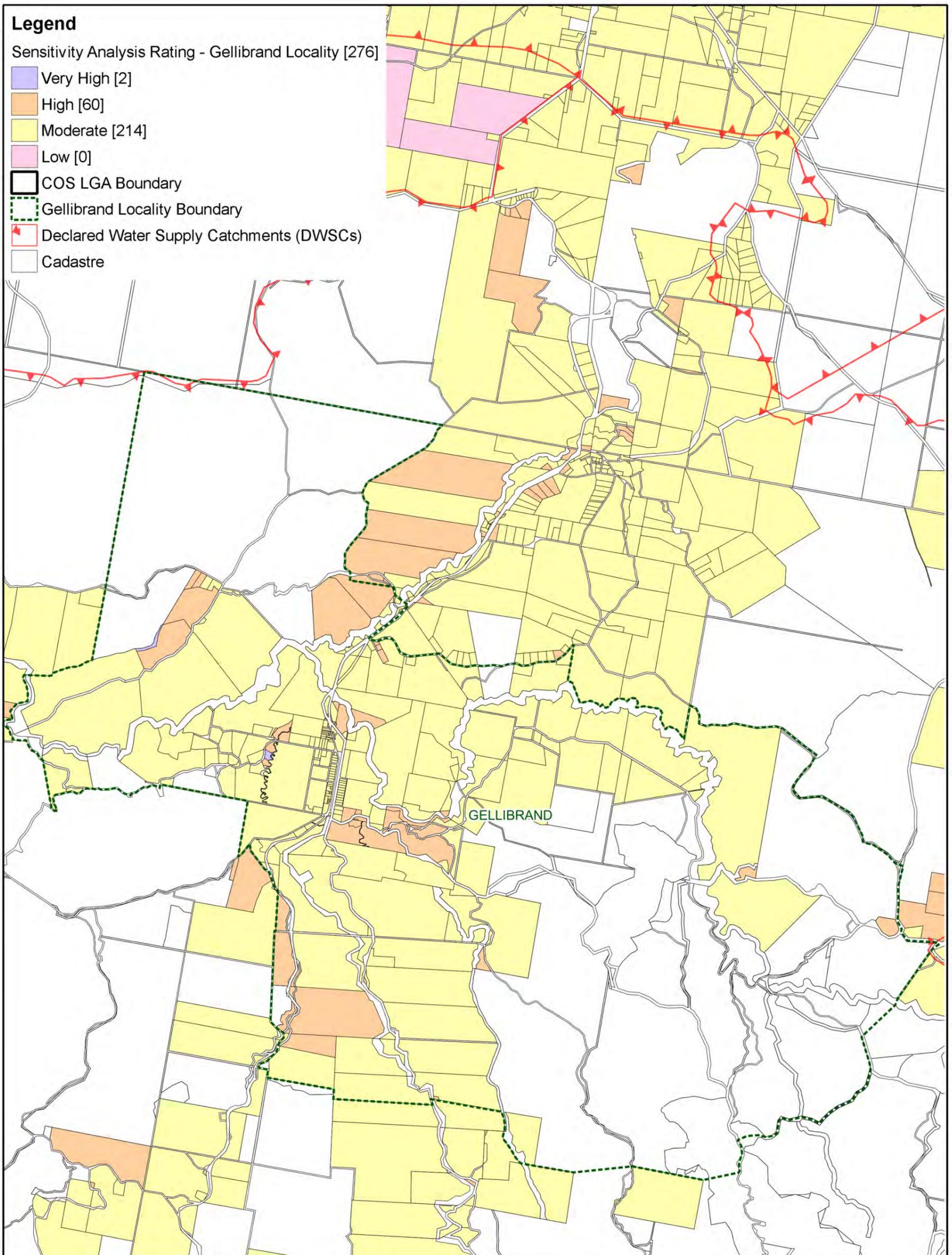


Figure k1: Sensitivity Analysis - Gellibrand Locality

Colac Otway Shire DWMP Review

Whitehead & Associates Environmental Consultants

0 1.5 3 4.5 6 7.5 km
 (Approx Scale)

Revision	3
Drawn	JK
Approved	MS

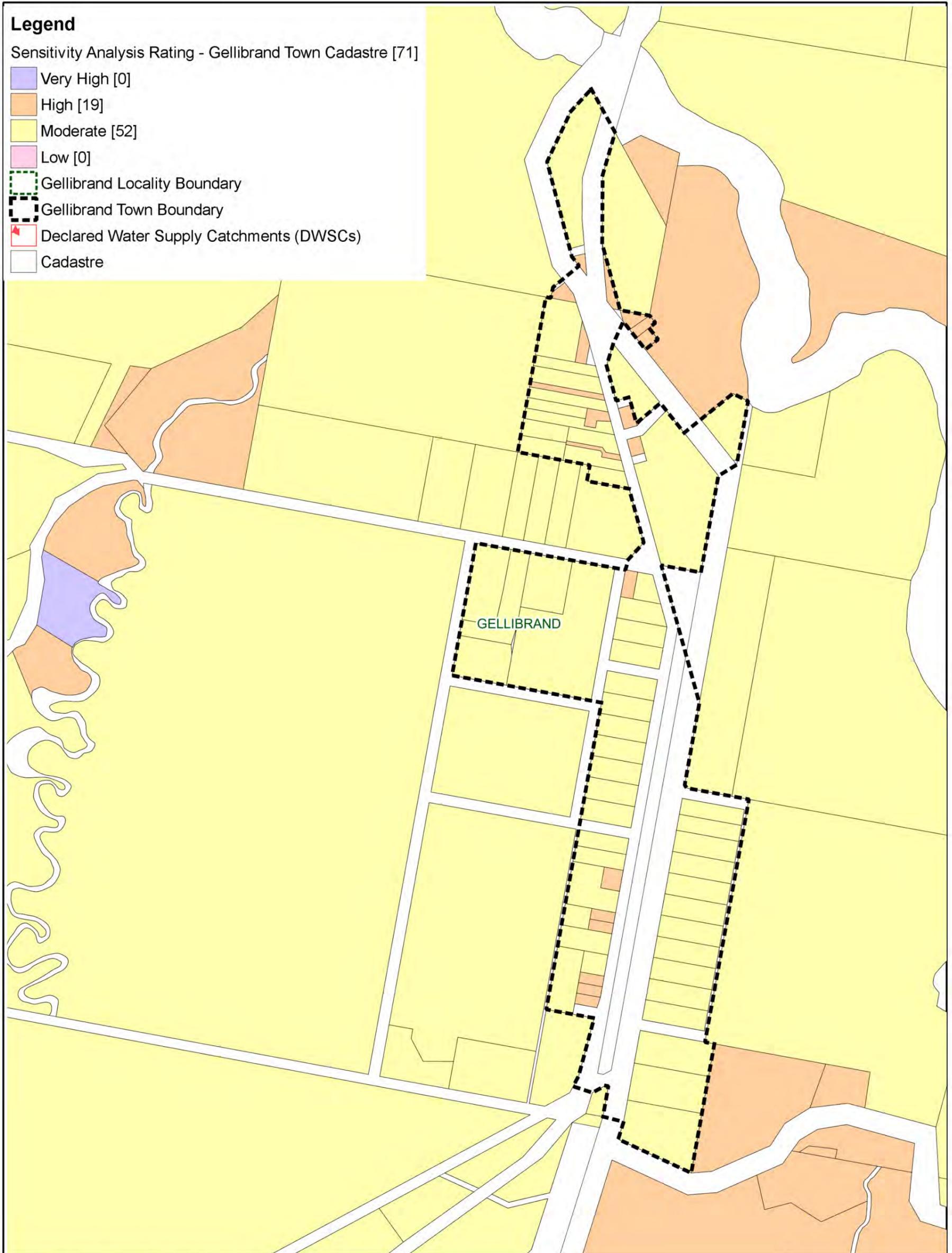


Figure k2: Sensitivity Analysis - Gellibrand Town

Colac Otway Shire DWMP Review



W Whitehead & Associates
Environmental Consultants

0 150 300 450 600 750 m



(Approx Scale)

Revision	3
Drawn	JK
Approved	MS

6k. System Selection

Due to the dominance of heavy-textured soils in the Gellibrand 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. The System Sizing Tables (below) indicate which systems are likely to be the most appropriate for the locality.

7k. 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 Gellibrand 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 Gellibrand locality are provided below.

8k. General Conclusion

The Rural Living Strategy (2011) identified Gellibrand as having ‘deferred’ growth potential, dependent on water catchment constraints and bushfire hazard being satisfactorily addressed. The Sensitivity Analysis concludes that development is feasible given its predominantly Moderate Sensitivity to DWM, particular within the town. Particular attention needs to be directed towards ensuring that appropriate setbacks to surface waterways, groundwater bores and flood prone areas are maintained, that the DWM systems are sized based on the limiting soil horizon and that the depth to groundwater during site-specific LCAs is ascertained. It is imperative that there is sufficient useable area to sustainably manage wastewater on-site. Some areas within the locality are considered to be extensively prone to landslip; a geotechnical report by a suitably qualified person will need to be conducted to address this constraint. Predominantly, Standard and Detailed LCAs will be required, with the use of System Sizing Tables deemed appropriate for the properties/parcels assigned a Moderate Sensitivity Rating.

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.

Gellibrand & Kwararren										
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	2			
Development Type	Daily (L/day)	Total min. irrigation area required for zero wet weather effluent storage (m ²)†								
5 + bedroom residence	1,080	379		584	800	1,269	2,329			
4 bedroom residence	900	316		487	667	1,058	1,941			
1-3 bedroom residence	720	253		389	533	846	1,553			
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	5	5	
Development Type	Daily (L/day)	Total min. basal or 'wetter area' required for zero wet weather storage (m ²) not including spacing & setbacks								
5 + bedroom residence	1,080	62		87	145	114	197		433	
4 bedroom residence	900	52		73	121	95	164		361	
1-3 bedroom residence	720	42		58	97	76	132		289	
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)	N/A (Alternative Land Application System Required)	4	3.5	N/A (Alternative Land Application System Required)	N/A (Alternative Land Application System Required)	N/A (Alternative Land Application System Required)			
Development Type	Daily (L/day)		Total min. basal or 'wetter area'†							
5 + bedroom residence	1,080		723	1,086						
4 bedroom residence	900		603	905						
1-3 bedroom residence	720	482	724							
† 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	N/A (Alternative Land Application System Required)	
Development Type	Daily (L/day)	Total min. basal or 'wetter area' required for zero wet weather storage (m ²) not including spacing & setbacks								
5 + bedroom residence	1,080	49	40	62	145	114	197			
4 bedroom residence	900	41	33	52	121	95	164			
1-3 bedroom residence	720	33	27	42	97	76	132			