

B. Barham River Catchment (Apollo Bay) Locality Report

1b. Introduction

Barham River (also known informally as 'Paradise') is a rural settlement located in the hinterlands of the Apollo Bay locality on the south-eastern coast of COS. On maps, it is officially within the broader Apollo Bay locality, but it is distinguished by low density, unsewered residential properties primarily extending along Barham River Road and other minor roads. Many properties are rural-residential (including hobby farms). The landform consists of dissected low hills and alluvial terraces abutting rivers and streams at the base of the Otway Ranges. The entire Barham River ('Paradise') Catchment settlement is located within the Barham River DWSC as indicated by the surface water informative map A1, Appendix A.

The settlement of Apollo Bay is sewerred, with approximately 366 and 81 unsewered properties/parcels located within the Apollo Bay locality and Barham River Catchment settlement, respectively. There are 140 DWM system permits that have been inspected by COS to date within the Barham River Catchment settlement/ Apollo Bay locality. The current DWM permits and their associated treatment system and LAA method are summarised as follows:

- 51 AWTS (7 subsurface irrigation, 16 drip irrigation, 8 irrigation, 3 trenches and 17 unknown);
- 2 composting toilets (1 drip irrigation);
- 56 septic tanks (27 trenches and 29 unknown);
- 2 worm farms (2 trenches); and
- 29 unknown (11 trenches, 1 reln drain, 1 subsurface irrigation, and 16 unknown).

2b. Background Documentation

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

- Apollo Bay Structure Plan (April 2007);
- Barham River Confluence Land Management Plan (February 2012);
- COS Planning Scheme; and
- Rural Living Strategy (2011)

3b. Site Assessment Results

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

Characteristic	Description
Land use	The Barham River Catchment settlement comprises a range of land uses, including rural living, small farms, and tourism.
Occupancy rates	2 (as per Apollo Bay Gazetted Locality, ABS Census, 2011).
Typical soils	Sandy clays and clay loams over clay or weathered shallow bedrock as determined during field investigations.
AS/NZS 1547:2012 soil categories	4 (Clay Loams), 5 (Light and Sandy Clays) and 6 (Medium to Heavy Clays).
Existing Systems	<p>Separate Blackwater and Greywater</p> <p>Of the three systems inspected during field investigations, one (33%) was assumed to comprise separate blackwater treatment in a septic tank, with direct greywater diversion within the property/parcel boundary. The septic tank was not accessed, as it could not be found. Time since last pump out was not determined.</p> <p>It was assumed that septic effluent is discharged to conventional absorption trenches; however, the LAA was not identified.</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 8% slope and appeared to be parallel with contours.</p>

4b. Summary of Constraints to DWM

Characteristic	Description
Climate Zone	Zone 3.
Surface waterways & catchments	<p>Approximately half of the broader Apollo Bay locality is within a DWSC. The entirety of the Barham River ('Paradise') Catchment settlement is located in the Barham River DWSC, which is the drinking water supply for connected properties in Apollo Bay. Barham River (east and west branches) is the major watercourse and has tributaries throughout the catchment.</p> <p>Barham River confluences with the Southern Ocean between the</p>

Characteristic	Description
	settlements of Marengo and Apollo Bay.
Groundwater	Proximity to groundwater bores: primarily around semi-rural properties/parcels on the outskirts (west and northwest) of Apollo Bay settlement. No depth to groundwater data.
Land subject to inundation	Along the lower coastal creek reaches, particularly at the Barham River confluence with the Southern Ocean.
Useable lot area Settlement (Locality)	High: 16 (76) Moderate: 8 (24) Low: 56 (260) Compliant: 1 (6)
Minimum lot size compliance with Planning Scheme Zoning	The Barham River ('Paradise') Catchment settlement is primarily zoned Rural Conservation Zone and is located to the west and northwest of the Apollo Bay town, in the foot slopes of the Otway Ranges. Compliance is variable throughout the broader Apollo Bay locality, with a greater density of non-compliant properties/parcels located to the south, west and north of the Apollo Bay settlement. Compliant: 22 (98) Non-compliant: 59 (268)
Slope Settlement (Locality)	High: 76 (285) (particularly around the Otway Ranges foot slopes) Moderate: 3 (41) Low: 2 (40)
Geology	Sedimentary Eumeralla Formation (early Cretaceous), fluvial braided stream deposits, unnamed Quaternary sedimentary (non-marine) colluvium and gully alluvium, and alluvial floodplain deposits. It differs along the coastline near the town of Apollo Bay.
Soil suitability Settlement (Locality)	High: 2 (113) Moderate: 79 (253) Low: 0 (0) Northern region/hinterland region consists of soil landscape unit '61' (moderate rating) which forms in 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 restricted drainage and very acidic soil.

Characteristic	Description
	<p>The western region of the Apollo Bay locality and extending northeast along the coastline towards Skenes Creek consists of soil landscape unit '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.</p> <p>The northern half of the Apollo Bay locality consists of soil landscape unit '62' (high rating) which forms in the alluvium, alluvial terraces, floodplains and coastal plains of the Sedimentary Western Plains and elevated longitudinal coastal dunes at Cape Otway and consists of red-yellow calcareous sand soils to 1.9m depth. The soils consist of apedal loamy sand over weakly structured sandy clay. Limitations include low fertility and coarse fragments.</p> <p>The southern half of the Apollo Bay locality consists of soil landscape unit '91' (high rating) which forms in the deeply dissected and uplifted plains with coastal cliffs and consists of grey sand soils with hardpans to more than 2m depth. The soils consist of weakly structured loamy sand over apedal sand. Limitations include low fertility and coarse fragments.</p> <p>There is a small region in the southwest of the locality that consists of medium clay deep grey gradational soils.</p>
Sensitivity Overlay	<p>No depth to groundwater data</p> <p>Landslip: extensive within the eastern (coastal) section of locality, significant in the foot slopes of the Otway Ranges.</p> <p>Vegetation: Great Otway National Park in the northwest.</p>
Sensitivity Analysis Rating Settlement (Locality)	<p>Very High: 0 (8)</p> <p>High: 22 (122)</p> <p>Moderate: 59 (236)</p> <p>Low: 0 (0)</p>

5b. Sensitivity Analysis (Maps)

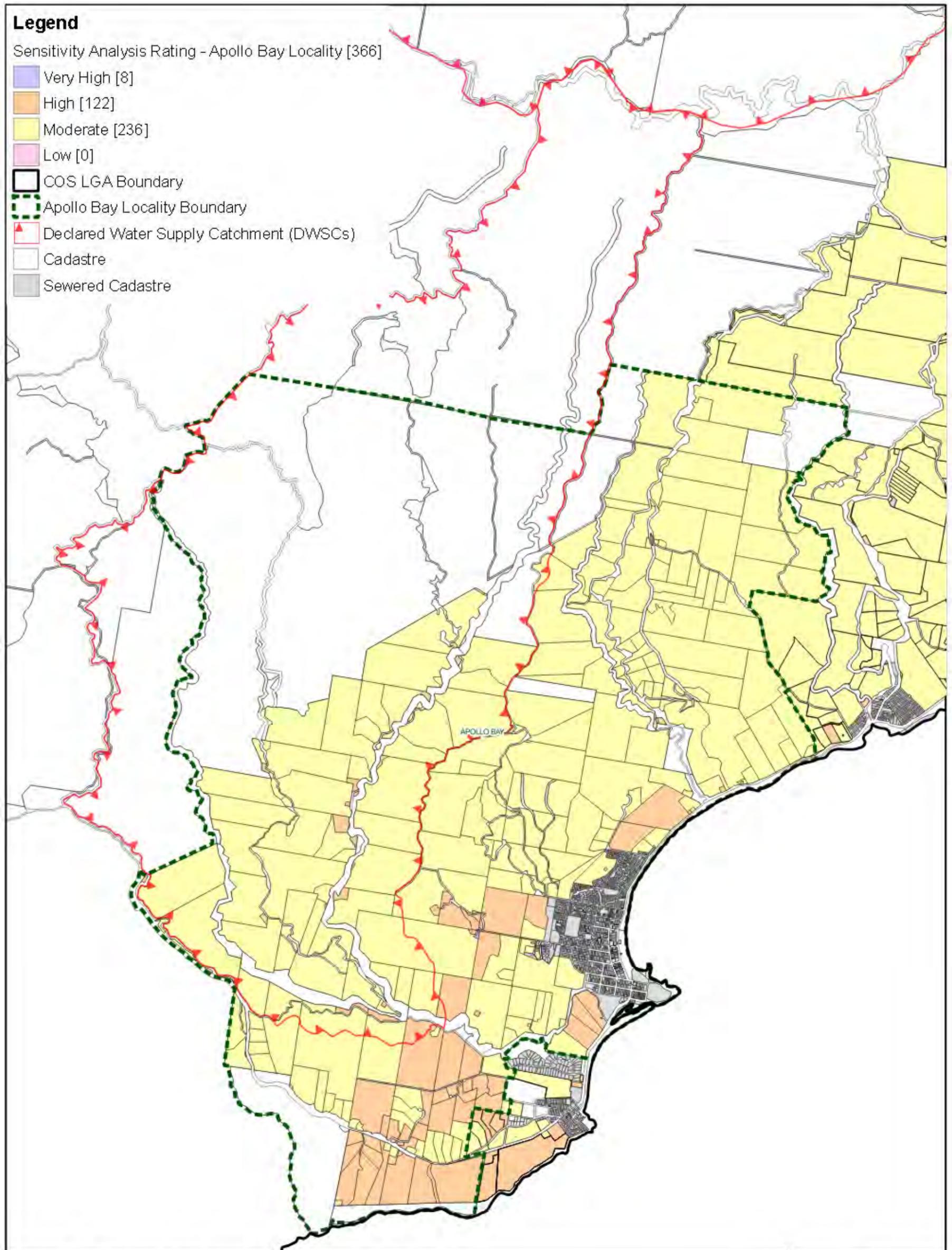
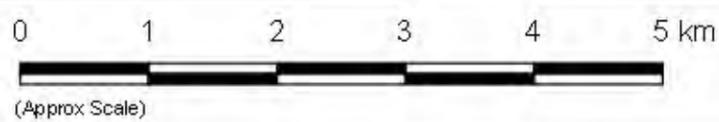


Figure b1: Sensitivity Analysis - Apollo Bay Locality

Colac Otway Shire DWMP Review



Revision	3
Drawn	JK
Approved	MS

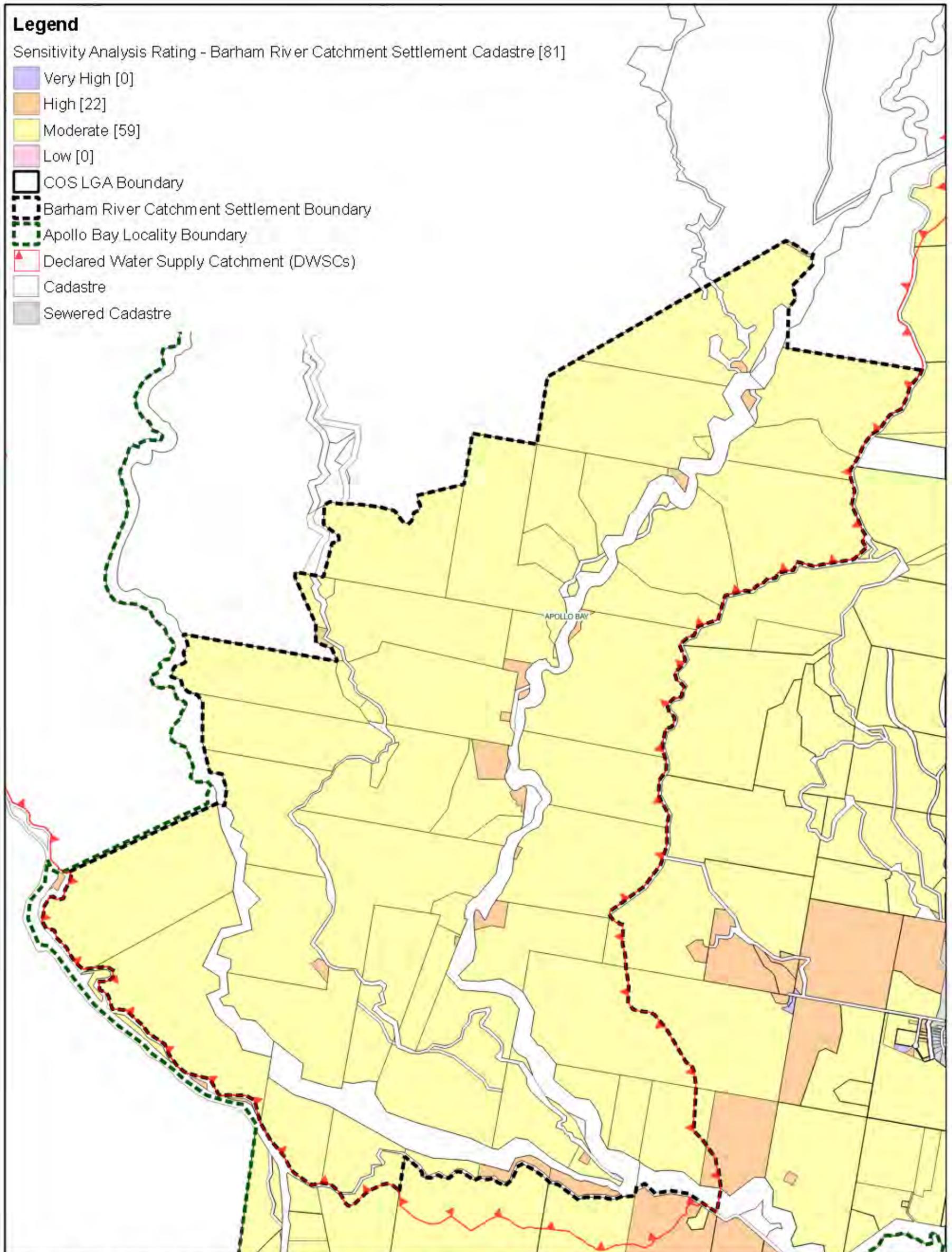
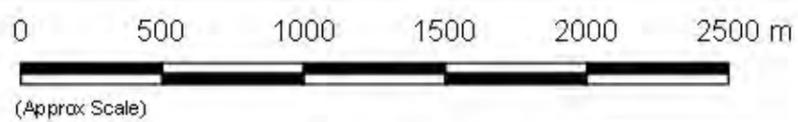


Figure b2: Sensitivity Analysis - Barham River Catchment Settlement

Colac Otway Shire DWMP Review



W Whitehead & Associates
Environmental Consultants



Revision	4
Drawn	JK
Approved	MS

6b. System Selection

Due to the dominance of heavy-textured soils in the Barham River Catchment settlement, 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).

The wet climate of the Barham River Catchment settlement makes it a higher risk for DWM and site-specific, detailed design will be required for unsewered properties/parcels in this area. 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.

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 Sizing Tables (discussed below) are not applicable for the Barham River Catchment settlement.

7b. 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). 70th percentile monthly rainfall exceeds average monthly evapotranspiration in eight months of the year in the Barham River area. As a result, there is a month-to-month surplus of hydraulic inputs and subsequently the monthly water balance does not resolve itself and cannot produce meaningful results for land application area sizing.

Site-specific detailed design is required for the Barham River Catchment settlement.

8b. General Conclusion

The majority of the properties/parcels within the locality have been assigned a Moderate or High Sensitivity Rating to sustainable DWM. Predominantly, both Standard and Detailed LCAs will be required, with site-specific design a necessity due to the higher rainfall associated with this region. System Sizing Tables were not generated and a monthly water balance will need to be generated for system sizing for the Standard LCA. Particular attention needs to be directed towards ensuring that setbacks from surface waterways are maintained and that the systems selected are appropriate for steeper slopes with correct construction.