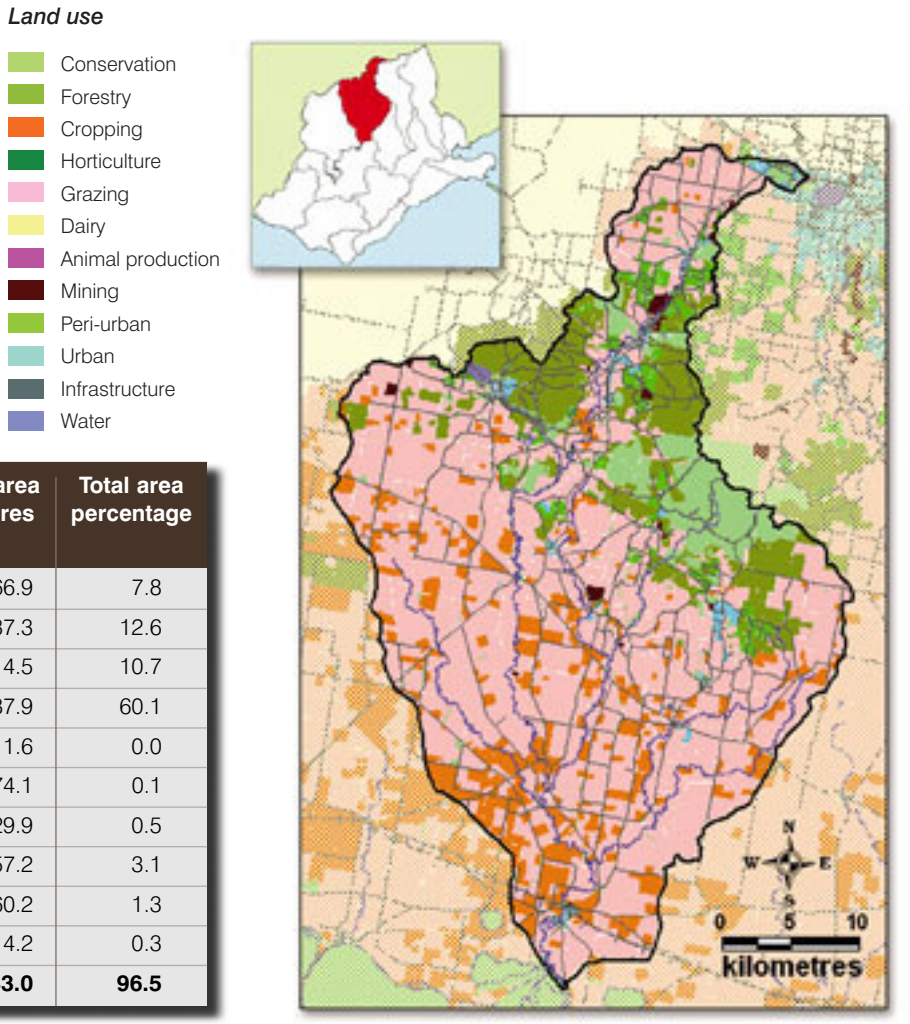
Appendix C: Land use, assets, threats and Relative Risk Values for landscape zones

C.1 Woady Yaloak

- **122,943 hectares or 9.2% of Corangamite CMA region**
- **11.3% public land**



Land use	Number of polygons mapped	Total area hectares	Total area percentage
Conservation	415	9566.9	7.8
Cropping	260	15437.3	12.6
Forestry	201	13214.5	10.7
Grazing	830	73887.9	60.1
Horticulture	1	1.6	0.0
Infrastructure	30	74.1	0.1
Mining	36	629.9	0.5
Peri-urban	143	3757.2	3.1
Urban	274	1560.2	1.3
Water	22	414.2	0.3
Total	**2212**	**118543.0**	**96.5**

Figure C1: Land use in the Woady Yaloak Landscape Zone in 2000-2002

Assets

- 2,117 km of waterways including the Woady Yaloak River, Naringhil Creek, Misery and Moonlight creeks, Kuruc-a-ruc Creek and Ferrars Creek.
- 91 wetlands (0.8% of area)
- Native vegetation conservation significance potential: 5.5% of total landscape zone is very high, 6.7% of total landscape zone is high.
- 1,000 km of roads, excluding the more recently subdivided areas west of Ballarat.

Threats

To public assets

- *Erosion by water.* There are 320 (637 ha) gully erosion sites and 166 (526 ha) sheet/rill erosion sites within 50 m of waterways, with Mount Misery Creek, Moonlight Creek and the Woady Yaloak River recording the most. Thirty-two mapped gully erosion sites (69 ha) and 25 mapped sheet/rill erosion sites (50 ha) intersect with native vegetation of very high conservation significance, and 34 gully erosion (82 ha) and 20 sheet/rill erosion sites (64 ha) intersect with native vegetation of high conservation significance potential.

The vast majority of these intersections occur along the waterways and drainage lines along a broad zone from Mount Mercer to Pittong. There are 48 gully erosion sites and 32 sheet/rill erosion sites within 50 m of roads, mostly on minor rural roads north of the Rokewood – Skipton Road. Ninety-seven gully erosion sites (330 ha) and 79 sheet/rill erosion sites (329 ha) are mapped on public land.

- *Salinity.* Secondary salinity occurs along waterways and drainage lines contributing salt loads to the Woady Yaloak River, with 1,237 ha of secondary salinity mapped in the landscape zone. Sixty-four hectares of secondary salinity occurs on public land, 702 ha within 50 m of waterways, 60 ha within 50 m of roads, and 171 ha within 50 m of wetlands. Over 170 ha of very high and 150 ha of high conservation significance potential native vegetation are also intersected. Although secondary salinity is widespread, there are much larger areas in the granitic landscapes south of Pittong and on the sand soils from Mt Mercer to Cape Clear.

To private assets

- *Susceptibility to soil structure decline.* About 52% (7,992 ha) of cropping land, 98% (13,000 ha) of forestry land and 67% (49,626 ha) of grazing land is highly susceptible to soil structure decline. This constitutes almost all the north and east sections of the landscape zone.
- *Susceptibility to soil waterlogging.* Around 14% (2,133 ha) of cropping land and 10% (7,298 ha) of grazing land has a very high susceptibility to waterlogging in the southern portion of the landscape zone along the Woady Yaloak River floodplain and in the Rokewood area. Another 42% (6,441 ha) of cropping land and 50% (37,293 ha) of grazing land has a high susceptibility to waterlogging. This constitutes almost all of the volcanic landscapes in the southern half of the landscape zone and the area around Haddon.
- *Susceptibility to soil nutrient decline.* Soils of the granitic landscapes south of Pittong and in the Mount Kinross locality are very highly susceptible to soil nutrient decline. These include 4,156 ha of grazing land, 804 ha of forestry land and 459 ha of cropping land. Another 21,347 ha of grazing land, 9,478 ha of forest land and 2,030 ha of cropping land are highly susceptible to soil nutrient decline. This includes the majority of the highlands from Rokewood to Pittong and north to Haddon.
- *Susceptibility to soil acidification.* The same area that is susceptible to soil nutrient decline is also susceptible to soil acidification, with 3,985 ha of grazing land, 746 ha of forestry land and 459 ha of cropping land very highly susceptible. Another 21,518 ha of grazing country, 9,536 ha of forestry country and 2,030 ha of cropping country are highly susceptible.
- *Susceptibility to soil erosion by wind.* About 9,820 ha of grazing land and 1,018 ha of cropping land are highly susceptible to wind erosion in the Mt Mercer – Cape Clear area.

Relative Risk to Assets

According to the relative risk to assets analysis, results indicate *(Fig. C2)*:

- gully/tunnel erosion and sheet/rill erosion pose the greatest risk in the Woady Yaloak, and overall were ranked 4 and 5 respectively in the Corangamite region
- secondary salinity also poses very high risk to assets, being ranked number 10 in the Corangamite region
- other soil threatening processes that pose a potential risk to assets in the Woady Yaloak include acid sulphate soils, waterlogging and soil structure decline
- soil-related threatening processes not posing significant risk to assets in the area include soil nutrient decline, soil acidification and wind erosion
- no landslides are present in the Woady Yaloak Landscape Zone.

Soil threatening process	Rank across entire region	Relative risk values
1. Gully/tunnel erosion	4	2501
2. Sheet/rill erosion	5	2317
3. Secondary salinity	10	1646
4. Acid sulphate soils	45	246
5. Waterlogging	=50	232
6. Soil structure decline	54	227
7. Soil nutrient decline	87	131
8. Soil acidification	=88	130
9. Wind erosion	96	109
10. Landslides	=143	0

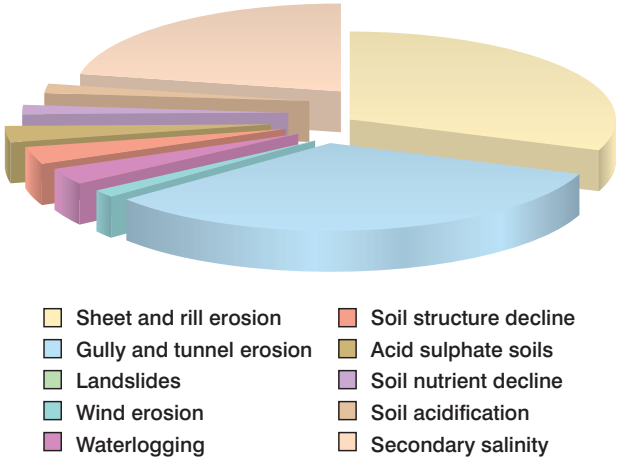


Figure C2: The rank and Relative Risk Values for soil-threatening processes in the Woady Yaloak Landscape Zone

C.2 Gellibrand

- **122,943 hectares or 9.2% of Corangamite CMA region**
- **50.2% public land**

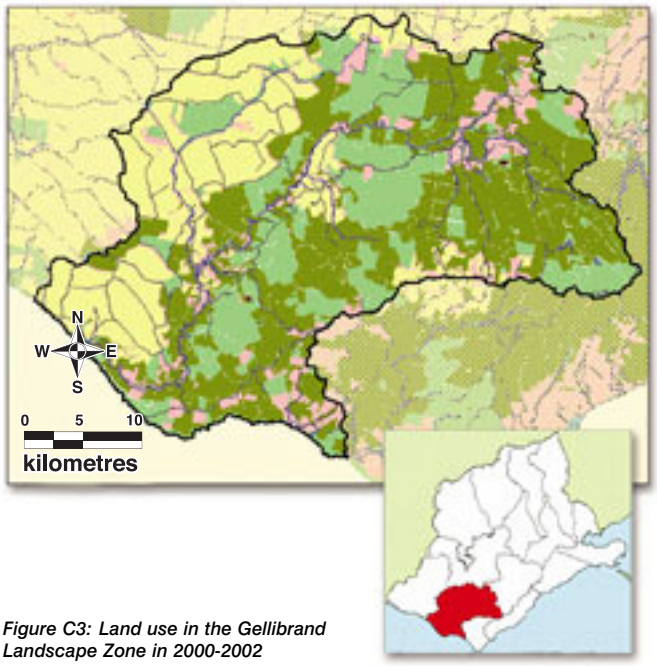


Figure C3: Land use in the Gellibrand Landscape Zone in 2000-2002

Land use

- Conservation
- Forestry
- Cropping
- Horticulture
- Grazing
- Dairy
- Animal production
- Mining
- Peri-urban
- Urban
- Infrastructure
- Water

Land use	Number of polygons mapped	Total area hectares	Total area percentage
Conservation	476	31704.5	25.8
Dairy	181	29229.3	23.8
Forestry	585	47038.1	38.3
Grazing	460	11750.1	9.6
Infrastructure	6	2.0	0.0
Mining	10	64.6	0.1
Urban	38	86.9	0.1
Water	1	0.7	0.0
Total	**1757**	**119876.2**	**97.7**

Assets

- 3,107 km of waterways including the Gellibrand River and coastal wetlands.
- 47 wetlands (0.3% of area) with the coastal wetlands of the Lower Gellibrand River as significant assets.
- Native vegetation conservation significance potential: 11.0% of total landscape zone is very high, 17.1% of total landscape zone is high. Many of these are included in national parks and state parks.
- 548 km of roads, including part of the Great Ocean Road.
- Coastal assets include beaches, coastal cliffs, sea stacks (i.e. the Twelve Apostles), marine parks and sanctuary, cultural and heritage assets, including Aboriginal archaeological sites, shipwrecks and buildings.

Threats

To public assets

- *Landslides*. There are 392 intersections (at least 3308 ha) of mapped landslides within 50 m of waterways, especially the Lower Gellibrand River tributaries (LaTrobe Creek, Boggy Creek), Johanna River and Stafford Creek, and the headwaters of the Kennedy Creek system. Roads are known to be at risk (e.g. Princetown – Simpson Road) and considerable efforts have been made for stabilisation. There are 242 landslides mapped on public land.
- *Soil erosion by water.* Three gullies and 26 sheet/rill erosion sites are mapped within 50 m of a waterway, as relatively small-sized incidences in the tributaries to Kennedys Creek and the Gellibrand River. Sediment and nutrient export to the Kennedys Creek system and the Lower Gellibrand River tributaries (LaTrobe Creek, Boggy Creek) is of some concern, with the likely sources being run-off from fertilised pastures and farm tracks and dairy effluent.

- *Potential acid sulphate soils.* Potential coastal and inland sites are mapped on 172 ha of public land, and intersect around 350 ha of native vegetation with very high or high conservation significance potential, 220 ha of wetlands, 28 km of waterways and 20 km of roads. The vast majority occur along the Lower Gellibrand River and associated coastal wetlands.
- *Secondary salinity.* Secondary salinity affects 35 ha of public land in the Lower Gellibrand River, and 103 ha of native vegetation with very high or high conservation significance potential, 105 ha of wetlands, 114 ha within 50 m of a waterway and 6.6 ha within 50 m of a road. The majority occurs along the Lower Gellibrand River, north of Princetown and as small outbreaks in the Kennedys Creek catchment.

To private assets

- *Susceptibility to soil structure decline.* Approximately 86% (25,066 ha) of dairy land and 63% (7,370 ha) of grazing land is highly susceptible to soil structure decline, mostly by soil pugging of wet soils in the Heytesbury Settlement.
- *Susceptibility to soil waterlogging.* Around 37% (10,920 ha) of dairy land is very highly susceptible to waterlogging, and 30% (8,792 ha) is highly susceptible to waterlogging; 16% (1,891 ha) of grazing land is very highly susceptible to waterlogging, and 15% (1,761 ha) is highly susceptible to waterlogging. The most severe threats are in the areas east of Simpson, north of Kennedys Creek and around Princetown.
- *Landslides.* On land used for dairying, 129 landslides have been mapped, up to 200 ha in size. Most occur east of Simpson around Kennedys Creek and in the Princetown area. One dairy farm (house, dairy, sheds) is known to have been destroyed by a landslide. There are 80 landslides mapped on grazing land.
- *Soil erosion by water.* A few gully erosion sites and 11 sheet/rill sites have been mapped on dairy land, and 21 sheet/rill sites on grazing land. Although they cover a relatively small total area (~ 100 ha), they may be underestimated by the mapping techniques.
- *Secondary salinity.* Approximately 60 ha of dairy and 60 ha of grazing land are affected on the eastern side of the landscape zone, bordering the Heytesbury Settlement.

Relative Risk to Assets

According to the relative risk to assets analysis, results indicate *(Fig. C4):*

- landslides poses the greatest risk to assets in the Gellibrand Landscape Zone and is ranked number one for all soil-related threatening processes in the Corangamite region
- secondary salinity, acid sulphate soils, sheet/rill erosion, soil structure decline, waterlogging and nutrient decline all pose moderate to high risk to assets in the Gellibrand Landscape Zone
- wind erosion, soil acidification and gully/tunnel erosion pose little risk in the Gellibrand Landscape Zone.

Soil threatening process	Rank across entire region	Relative risk values
1. Landslides	1	3167
2. Secondary salinity	28	424
3. Acid sulphate soils	32	398
4. Sheet/rill erosion	33	336
5. Soil structure decline	37	273
6. Waterlogging	=38	270
7. Soil nutrient decline	=38	270
8. Wind erosion	99	102
9. Soil acidification	=108	81
10. Gully/tunnel erosion	128	31

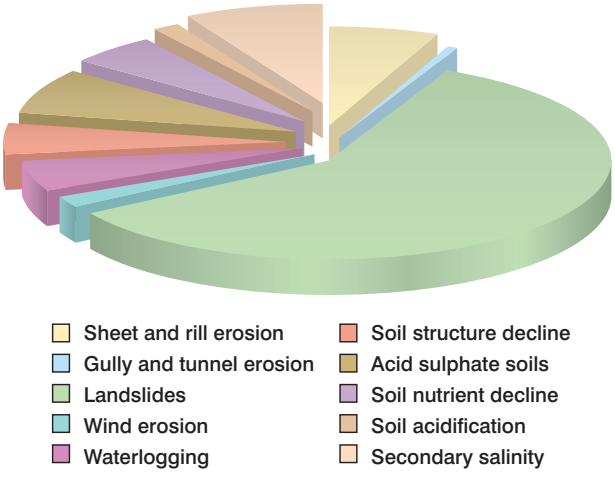
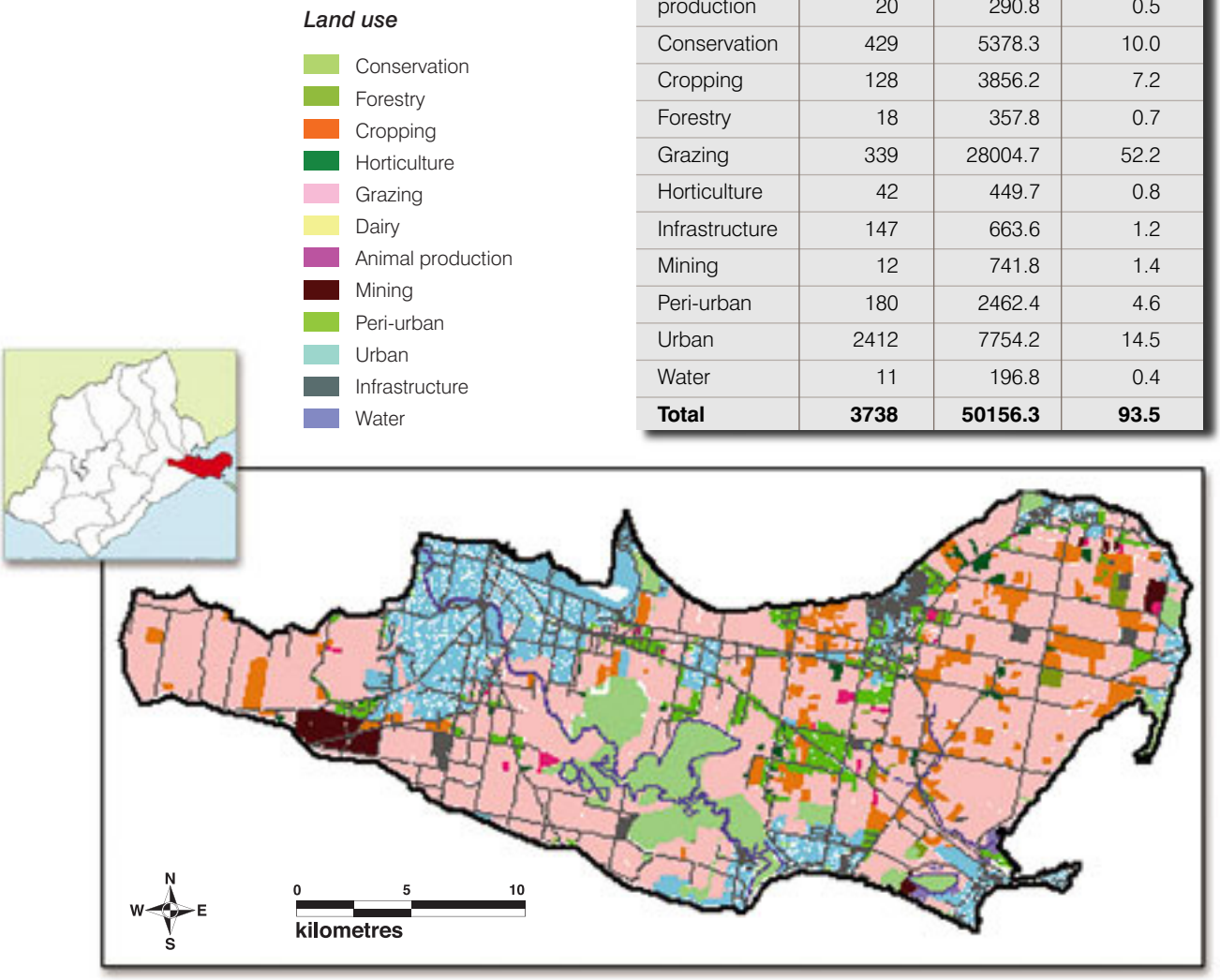


Figure C4: The rank and Relative Risk Values for soil-threatening processes in the Gellibrand Landscape Zone

C.3 Bellarine

- **53,625 hectares or 4.0% of Corangamite CMA region**
- **11% public land**



Land use	Number of polygons mapped	Total area hectares	Total area percentage
Animal production	20	290.8	0.5
Conservation	429	5378.3	10.0
Cropping	128	3856.2	7.2
Forestry	18	357.8	0.7
Grazing	339	28004.7	52.2
Horticulture	42	449.7	0.8
Infrastructure	147	663.6	1.2
Mining	12	741.8	1.4
Peri-urban	180	2462.4	4.6
Urban	2412	7754.2	14.5
Water	11	196.8	0.4
Total	**3738**	**50156.3**	**93.5**

Figure C5: Land use in the Bellarine Landscape Zone in 2000-2002

Assets

- 425 km of waterways, including the Lower Barwon River in Geelong.
- 139 wetlands (9.6% of area), including wetlands of international, national, State and local significance. The Lake Connewarre State Game Reserve is highly ranked.
- Native vegetation conservation significance potential: 9% of total landscape zone is rated as very high, 14% of total landscape zone is rated as high.
- At least 1,243 km of roads, not including many of the urban roads in more recent subdivisions.
- City of Greater Geelong, including industrial and port facilities.
- Cultural and heritage assets include many Aboriginal archaeological sites and Victoria's early pastoral settlement history. Coastline and marine parks.

Threats

To public assets

- *Landslides.* Nine landslide intersections with waterways and five landslides occur on public land. Infrastructure and coastal assets are threatened along the northern coast of the Bellarine Peninsula east of Point Henry (i.e. the Curlewis Monocline), especially at Clifton Springs. Landslides also threaten infrastructure and waterways at Waurn Ponds, and rockfalls are prevalent along the coast at Point Lonsdale and Barwon Heads.
- *Soil erosion by water.* Sediments and nutrients are contributed to Lake Connewarre and Lower Barwon River wetlands by stormwater run-off and erosion in the higher catchment areas. Twenty-seven gullies (76.4 ha) and seven sheet erosion sites (26 ha) occur within a 50 m buffer of waterways.

- *Secondary salinity.* Approximately 300 ha of secondary salinity have been mapped. Secondary salinity threatens 42 ha of native vegetation with very high conservation significance potential and 119 ha of native vegetation with high conservation significance potential, as well as 3 km of waterways and 2.5 km of roads. The majority of the secondary salinity fringes the primary salinity sites, especially the wetlands.
- *Potential acid sulphate soils.* Sixty-eight polygons of potential acid sulphate soils have been mapped, totalling 4,112 ha (7.7% of area), mostly in coastal and estuarine wetlands of the Lower Barwon River and estuary. Potential for disturbance is highest in the Point Henry environs. Over 2,000 ha of native vegetation with high or very high conservation significance potential are intersected, along with 2,170 ha of wetlands, 46.5 km of waterways (465 ha within a 50 m buffer) and 57 km of roads (571 ha within a 50 m buffer).

To private assets

- *Susceptibility to soil erosion by wind.* Over 10,000 ha of the landscape zone are highly susceptible to wind erosion, mostly in the Wallington, Drysdale, Bellarine, Indented Head and St Leonards areas. Coastal dune movement is prevalent in the Queenscliff, Point Lonsdale, Ocean Grove and Barwon Heads areas.
- *Susceptibility to soil nutrient decline.* Over 8,000 ha of grazing land and 1,400 ha of cropping land with sandy soils (developed on the marine sands of Pliocene age) on the Bellarine Peninsula (Bellarine Horst) are highly susceptible to nutrient decline under agricultural production.
- *Susceptibility to soil acidification.* The same sandy soils that are susceptible to soil nutrient decline are also susceptible to soil acidification.
- *Contaminants.* At least 41 known sites scattered across the Bellarine Peninsula, east of an arc through Point Henry – Moolap – Barwon Heads.
- *Susceptibility to soil structure decline.* Nearly all of the land used for agriculture is highly susceptible to soil structure decline (23,000 ha), with the exception of the soils developed on the elevated volcanic landscapes around Mount Drysdale.
- *Susceptibility to soil waterlogging.* Approximately 1,435 ha of agricultural land are very highly susceptible and 18,875 ha are highly susceptible to soil waterlogging. The vast majority are the grazing lands in the low elevation landscapes of the Moolap Sunkland, along the Lower Barwon River estuary.
- *Soil erosion by water.* Twenty-seven gullies (76 ha) and seven sheet erosion sites (24 ha) occur on agricultural land, almost all of which are on the grazing land on the edges of the elevated part of the Bellarine Peninsula (i.e. the Bellarine Horst).

Relative Risk to Assets

According to the relative risk to assets analysis, results indicate *(Fig. C6):*

- acid sulphate soils pose the greatest potential risk to assets in the Bellarine Landscape Zone and the third greatest of all soil threatening processes in the Corangamite region
- secondary salinity and gully/tunnel erosion also pose a high risk to assets in the Bellarine Landscape Zone
- soil structure decline, soil acidification, waterlogging, wind erosion, sheet/rill erosion, landslides and soil nutrient decline all pose low to moderate risk to assets.

Soil threatening process	Rank across entire region	Relative risk values
1. Acid sulphate soils	3	2748
2. Secondary salinity	25	485
3. Gully/tunnel erosion	34	317
4. Soil structure decline	=70	167
5. Soil acidification	=70	167
6. Waterlogging	=74	160
7. Wind erosion	=78	145
8. Sheet/rill erosion	91	120
9. Landslides	92	119
10. Soil nutrient decline	=94	113

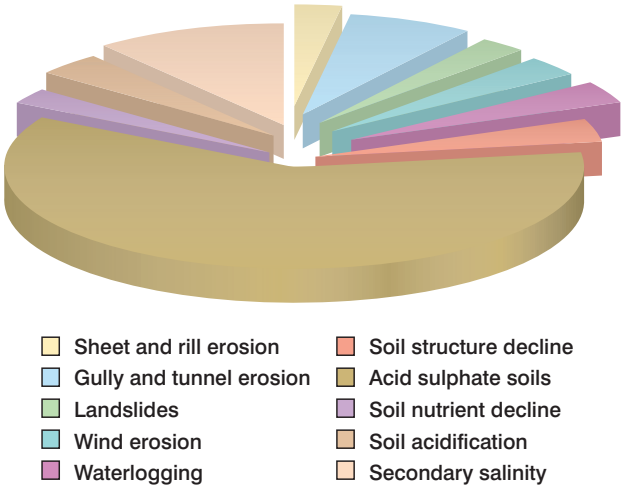
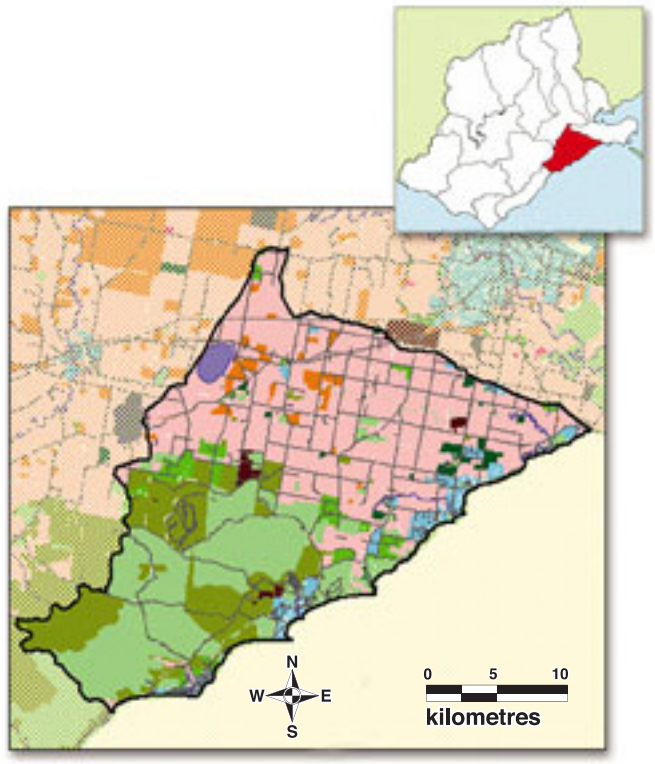


Figure C6: The rank and Relative Risk Values for soil-threatening processes in the Bellarine Landscape Zone

C.4 Thompsons

- **62,626 hectares or 4.7% of Corangamite CMA region**
- **33.3% public land**



Land use

- Conservation
- Forestry
- Cropping
- Horticulture
- Grazing
- Dairy
- Animal production
- Mining
- Peri-urban
- Urban
- Infrastructure
- Water

Land use	Number of polygons mapped	Total area hectares	Total area percentage
Conservation	174	16334.9	26.1
Cropping	41	1326.0	2.1
Forestry	68	9348.2	14.9
Grazing	185	27499.9	43.9
Horticulture	27	771.3	1.2
Infrastructure	29	182.0	0.3
Mining	7	455.8	0.7
Peri-urban	59	2049.2	3.3
Urban	381	2258.2	3.6
Water	1	532.6	0.9
Total	**972**	**60758.1**	**97.0**

Figure C7: Land use in the Thompsons Landscape Zone in 2000-2002

Assets

- 1,048 km of waterways and 56 wetlands (1.9% of area).
- Native vegetation conservation significance potential: 4.6% of total is very high and 25.6% of total is high in the landscape zone.
- 713 km of roads, not including the more recently subdivided areas of Torquay and other coastal towns.
- Coastal assets including beaches, cliffs and shore platforms, which are highly valued as tourist assets. Cultural and heritage assets including Aboriginal archaeological sites are associated with the coast.

Threats

To public assets

- *Potential acid sulphate soils.* In both inland and coastal locations, the mapped potential for acid sulphate soils intersects with nearly 36 km of waterways and 13 km of roads. About 470 ha of native vegetation with high or very high conservation significance potential is intersected, along with 277 ha of public land and 243 ha of wetlands. The largest sites are the Breamlea wetlands and Lower Thompson Creek, followed by the wetlands of Marshy Creek and Salt Creek (Lower Anglesea River), and Lower Painkalac Creek.
- *Landslides.* There are 17 intersections of landslides and waterways, and 129 landslides on public land. Almost all occur along the coastline south of Jan Juc, with Point Addis and Eastern View areas recording the most.

- *Erosion by water.* Nine gully erosion sites (10 ha) and 46 (34 ha) sheet/rill erosion sites occur within 50 m of waterways, with Thompson Creek and Spring Creek recording the most. Approximately 25 ha of native vegetation of very high and high conservation significance is threatened by erosion, along the coast and along waterways. There are 11 intersections of roads with erosion, mostly sheet/rill erosion (57 ha) and 51 sheet/rill erosion sites (1,075 ha) are mapped on public land.

To private assets

- *Susceptibility to soil waterlogging.* Alluvial soils in the low-lying poorly-drained landscape positions are very highly susceptible to waterlogging and include 1,037 ha of grazing land. Around 76% (20,948 ha) of grazing land, 47% (4,400 ha) of forest land and 73% (973 ha) of cropping land is highly susceptible. These occur in widespread areas across the northern portion of the landscape zone.
- *Susceptibility to soil structure decline.* Almost all of the agricultural land (95%) is highly susceptible to soil structure decline. This includes 26,061 ha of grazing land and 1,127 ha of cropping land. Similarly, 77% (7,168 ha) of forest land is highly susceptible to soil structure decline.
- *Susceptibility to soil nutrient decline.* Around 4,100 ha of forest country and 755 ha of grazing country is very highly susceptible to soil nutrient decline. This includes the sandy and gravelly soils of the Anglesea hinterland in the southern portion of the landscape zone. The sandy soils of the northern portion (i.e. north of Point Addis to Moriac) include 14,268 ha of grazing country, 2,595 ha of forest country and 495 ha of cropping country which are highly susceptible to soil nutrient decline.
- *Susceptibility to soil acidification.* The areas described above as susceptible to nutrient deficiency are also susceptible to soil acidification. These include around 15,000 ha of grazing land, 6,700 ha of forest land and 500 ha of cropping land.
- *Susceptibility to soil erosion by wind.* The soils of around 4,365 ha of grazing land east of Paraparap and in the area west of Mt Moriac are highly susceptible to wind erosion.
- *Erosion by water.* There are 28 sheet/rill erosion sites (28 ha) and eight gully erosion sites (10 ha) mapped on grazing land, mostly south of Connewarre and north of Torquay.

Relative Risk to Assets

According to the relative risk to assets analysis, results indicate *(Fig. C8):*

- Sheet/rill erosion poses the greatest risk to assets in the Thompsons Landscape Zone, which is the ninth highest risk to assets across all soil-threatening processes in the Corangamite region
- acid sulphate soils pose the second greatest risk to assets in the Thompsons Landscape Zone, which is ranked number 19 out of all soil-threatening processes in the Corangamite region
- landslides also pose a high risk to assets in the Thompsons Landscape Zone
- secondary salinity, wind erosion, soil structure decline, soil nutrient decline and waterlogging pose a moderate risk to assets in the Thompsons Landscape Zone
- soil acidification and gully/tunnel erosion pose a low risk to assets in the Thompsons Landscape Zone.

Soil threatening process	Rank across entire region	Relative risk values
1. Sheet/rill erosion	9	1804
2. Acid sulphate soils	19	557
3. Landslides	22	518
4. Secondary salinity	49	233
5. Wind erosion	64	195
6. Soil structure decline	=66	184
7. Soil nutrient decline	73	164
8. Waterlogging	=74	160
9. Soil acidification	90	127
10. Gully/tunnel erosion	129	28

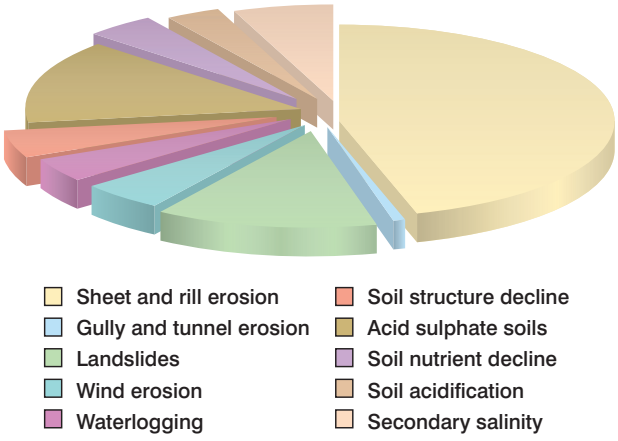
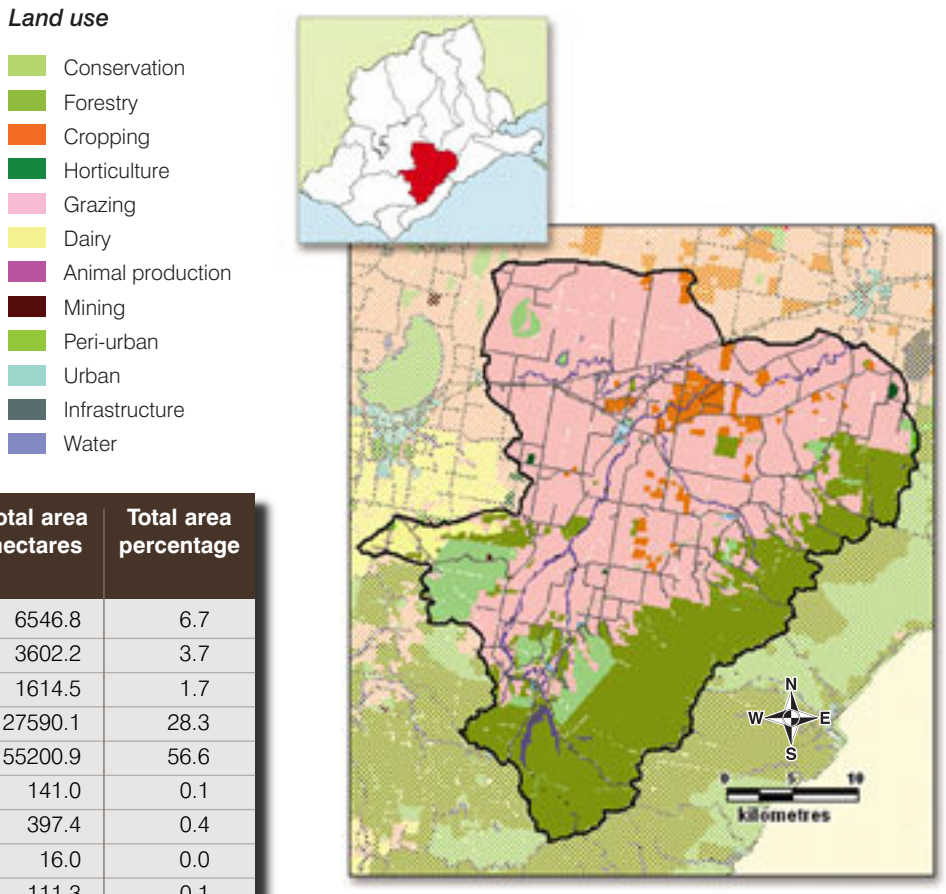


Figure C8: The rank and Relative Risk Values for soil-threatening processes in the Thompsons Landscape Zone

C.5 Upper Barwon

- 97,590 hectares or 7.3% of Corangamite CMA region
- 28.1% public land.



Land use	Number of polygons mapped	Total area hectares	Total area percentage
Conservation	212	6546.8	6.7
Cropping	59	3602.2	3.7
Dairy	24	1614.5	1.7
Forestry	248	27590.1	28.3
Grazing	369	55200.9	56.6
Horticulture	6	141.0	0.1
Infrastructure	24	397.4	0.4
Mining	4	16.0	0.0
Peri-urban	5	111.3	0.1
Urban	68	253.1	0.3
Water	3	22.6	0.0
Total	**1022**	**95495.9**	**97.9**

Figure C9: Land use in the Upper Barwon Landscape Zone in 2000-2002

Assets

- 1,822 km of waterways including the Barwon River.
- 53 wetlands (1.0% of area) including The Sanctuary (Lake Thurrumbong).
- Native vegetation conservation significance potential: 3.2% of total landscape zone is very high, 15.9% of total landscape zone is high. Most are included in the Otway Ranges.
- 533 km of roads and rural infrastructure. Birregurra is the main urban centre.

Threats

To public assets

- *Erosion by water.* There are 28 (124 ha) gully erosion sites and 40 (141 ha) sheet/rill erosion sites mapped within 50 m of waterways, with Wormbete Creek, Yan Yan Gurt Creek and the Barwon River recording the most. Approximately 43 ha of native vegetation of high conservation significance are threatened by erosion, mostly along the waterways. There are 10 intersections of roads with erosion, with gully sites and sheet/rill sites covering approximately 43 ha each. Examples occur along Cape Otway Road and Coalmine Road. Eight erosion sites (163 ha) are mapped on public land.

- *Landslides.* There are 148 landslides mapped within 50 m of a waterway, including several larger slides which have occurred along the western flanks of the Barwon River valley, south of Birregurra. Around 34 landslides intersect with high-value native vegetation and 56 occur on public land, and almost all are on the flanks of the Otway Ranges.
- *Secondary salinity.* Around 265 ha of secondary salinity have been mapped within 50 m of a waterway and 46 ha within 50 m of a road. Most occurs in a widespread distribution along drainage lines and landscape depressions from Gerangamete in the south to Warncoort in the west to near Bambra in the east.

To private assets

- *Susceptibility to soil waterlogging.* Around 9% (4,755 ha) of grazing land has a very high susceptibility to waterlogging, mostly occurring in the Gerangamete – Barwon Downs area. Approximately 60% (33,256 ha) of grazing land, 84% (3,035 ha) of cropping land and 39% (623 ha) of dairy land has a high susceptibility to waterlogging. This constitutes almost all of the landscapes north of the Otway Ranges to Birregurra Creek and the Barwon River.
- *Erosion by water.* There are 23 gully erosion sites (68 ha) and 42 sheet/rill erosion sites (99 ha) mapped on grazing land, mostly in the Bambra, Wensleydale and Wormbete areas. Some relatively small-scale sheet/rill erosion sites are mapped on cropping land and dairy land.
- *Susceptibility to soil structure decline.* Nearly 83% (45,617 ha) of grazing land, 89% (24,577 ha) of forest land, 84% (3,013 ha) of cropping land and 39% (622.8 ha) of dairy land is highly susceptible to soil structure decline.
- *Susceptibility to soil nutrient decline.* About 20% (11,284 ha) of grazing land, 68% (1,095 ha) of dairy land and 13% (3,537 ha) of forestry land is very highly susceptible to soil nutrient decline. The area occurs as a broad band of sandy soils from north of the West Barwon Reservoir to Barongarook and across to Whoorel, excluding the river flats of the Barwon River valley. Smaller scattered areas of sandy soil (4,856 ha grazing, 596 ha forest, 272 ha cropping) are highly susceptible.
- *Susceptibility to soil acidification.* The soils susceptible to nutrient deficiency are also highly susceptible to acidification. These include 16,139 ha of grazing land, 4,132 ha of forestry land and 1,095 ha of dairy land.
- *Susceptibility to soil erosion by wind.* Around 5,400 ha of grazing land and 973 ha of dairy land are highly susceptible to wind erosion. These areas are north-west of Warncoort and include the general area from Yeodene to Barongarook.

Relative Risk to Assets

According to the relative risk to assets analysis, results indicate *(Fig. C10):*

- landslides, sheet/rill erosion and gully/tunnel erosion pose the greatest risk to assets in the Upper Barwon Landscape Zone, being ranked 14, 16 and 17 respectively
- secondary salinity also poses a high risk to assets in the Upper Barwon Landscape Zone
- soil structure decline, waterlogging and soil nutrient decline pose a moderate risk to assets, while acid sulphate soils, soil acidification and wind erosion pose the lowest risk to assets in the Upper Barwon Landscape Zone.

Soil threatening process	Rank across entire region	Relative risk values
1. Landslides	14	917
2. Sheet/rill erosion	16	752
3. Gully/tunnel erosion	17	743
4. Secondary salinity	21	525
5. Soil structure decline	=40	268
6. Waterlogging	=50	232
7. Soil nutrient decline	59	217
8. Acid sulphate soils	=94	113
9. Soil acidification	=101	99
10. Wind erosion	=113	72

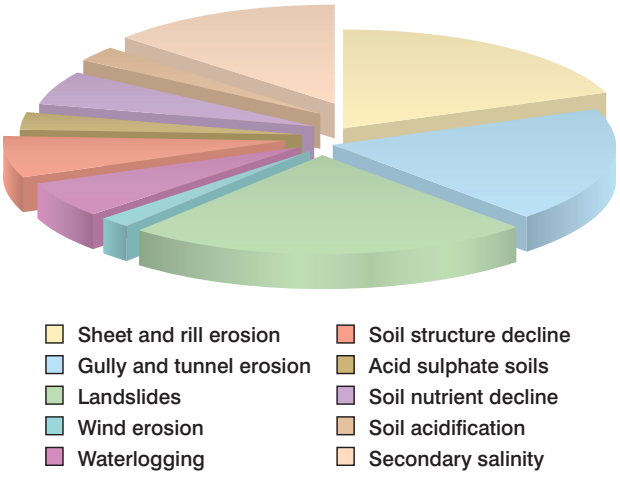
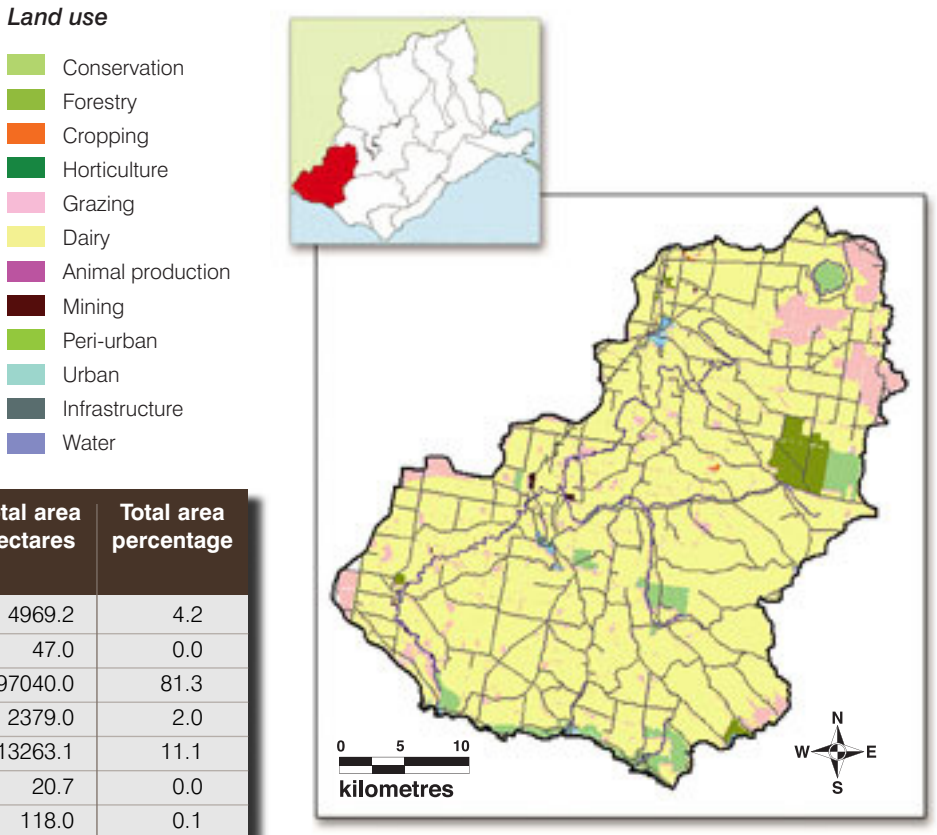


Figure C10: The rank and Relative Risk Values for soil-threatening processes in the Upper Barwon Landscape Zone

C.6 Curdies

- 119,393 hectares or 9.0% of the Corangamite CMA region
- 6.6% public land



Land use	Number of polygons mapped	Total area hectares	Total area percentage
Conservation	144	4969.2	4.2
Cropping	7	47.0	0.0
Dairy	449	97040.0	81.3
Forestry	13	2379.0	2.0
Grazing	586	13263.1	11.1
Infrastructure	4	20.7	0.0
Mining	12	118.0	0.1
Urban	150	437.8	0.4
Water	1	2.0	0.0
Total	**1366**	**118276.8**	**99.1**

Figure C11: Land use in the Curdies Landscape Zone in 2000-2002

Assets

- 1,891 km of waterways including the Curdies River and estuary.
- 93 wetlands (1.3% of area) including Lake Purrumbete.
- Native vegetation conservation significance potential: 6.6% of total landscape zone is rated as very high, 10.2% of total landscape zone is rated as high.
- 876 km roads, including a section of the Great Ocean Road.
- Coastline including beaches, coastal cliffs and sea stacks (e.g. Bay of Islands), marine sanctuary and marine parks which include significant cultural and heritage assets.

Threats

To public assets

- *Landslides.* At least 287 landslides occur within a 50 m buffer of waterways, especially along Scotts Creek, Curdies River, Cowley Creek and Port Campbell Creek (at least 4,895 ha). Roads are known to be at risk (e.g. Port Campbell – Cobden Road, Williams Road) and 46 landslides are mapped on public land. Rockfalls and landslides threaten coastal assets including the sea cliffs and areas of high scenic and recreational value.

- *Soil erosion by water.* There are 13 intersections of mapped gullies within 50 m of a waterway, especially in tributaries of the upper catchment of the Curdies River and Scotts Creek. Sediment and nutrient export to the Curdies Inlet is of concern, with dairy effluent and run-off from fertilised pastures and farm tracks being targeted as the most likely sources. Stream erosion forms deeply incised gullies along the coastal cliffs near Port Campbell.
- *Potential acid sulphate soils.* These intersect with 68 ha of native vegetation with very high and high conservation significance potential, 32 ha of wetlands, 22 km of waterways (219 ha within a 50 m buffer) and 1.6 km of roads. Most intersections are along the Lower Curdies River and estuary.
- *Secondary salinity.* This affects 4.7 ha of public land near Scotts Creek, 31 ha of native vegetation with very high and high conservation significance potential, 119 ha within 50 m of a waterway and 24 ha within 50 m of a road.

To private assets

- *Susceptibility to soil structure decline.* Nearly 80% (77,087 ha) of dairy land and 49% (6,500 ha) of grazing land is highly susceptible to soil structure decline. Soil pugging (or poaching) by animals is the primary cause of soil structure decline, with the clay soils (Gellibrand Marl) of the Heytesbury Settlement worst affected.
- *Susceptibility to soil waterlogging.* About 12% (11,520 ha) of dairy land is very highly susceptible to waterlogging and 75% (73,049 ha) is highly susceptible to waterlogging. The most severe threat is in the area around Waarre, Cooriemungle and Simpson. Of the grazing lands, 5% (642 ha) is very highly susceptible to waterlogging and 52% (6,861 ha) is highly susceptible to waterlogging.
- *Landslides.* At least 429 landslides have been mapped on dairy land (4,665 ha), ranging up to 150 ha in size. Most occur west of Simpson around Scotts Creek and Cowleys Creek, also Cooriemungle, Newfield and Port Campbell. Eighteen are mapped on grazing land.
- *Susceptibility to soil nutrient decline.* Of the land used for dairy farming, around 300 ha are very highly susceptible and over 30,000 ha are highly susceptible to nutrient decline under agricultural production. These are mostly the sandy loams and coffee-rock soils around Simpson, Jancourt, Timboon, Nirranda, Peterborough and Curdie Vale.
- *Secondary salinity.* This affects around 330 ha of dairy land and 30 ha of grazing land, mostly as small outbreaks in the lower slopes of the Heytesbury Settlement.

Relative Risk to Assets

According to the relative risk to assets analysis, results indicate *(Fig. C12):*

- landslides pose the greatest risk to assets in the Curdies Landscape Zone, being ranked the 7th highest risk to assets amongst all soil-related threatening processes in the Corangamite region
- waterlogging, soil structure decline and secondary salinity also pose a high risk to assets in the Curdies Landscape Zone
- soil nutrient decline, soil acidification and acid sulphate soils pose a moderate risk to assets in the Curdies Landscape Zone
- wind erosion, sheet/rill erosion and gully/tunnel erosion pose a low risk to assets in the Curdies Landscape Zone.

Soil threatening process	Rank across entire region	Relative risk values
1. Landslides	7	1903
2. Waterlogging	26	482
3. Soil Structure Decline	29	416
4. Secondary Salinity	31	399
5. Soil Nutrient Decline	68	175
6. Soil Acidification	69	173
7. Acid Sulphate Soils	81	141
8. Wind Erosion	117	65
9. Gully/tunnel erosion	119	54
10. Sheet/rill erosion	138	13

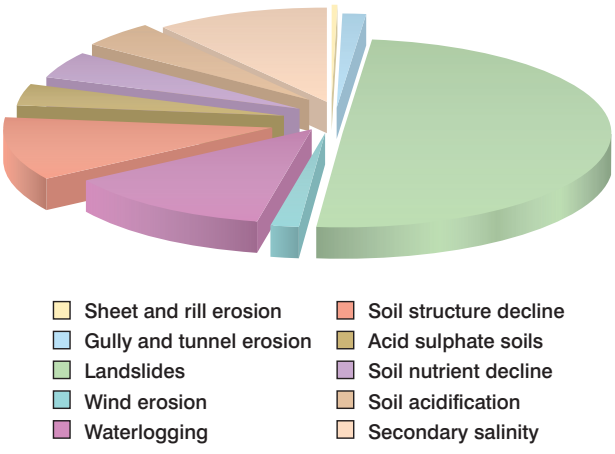
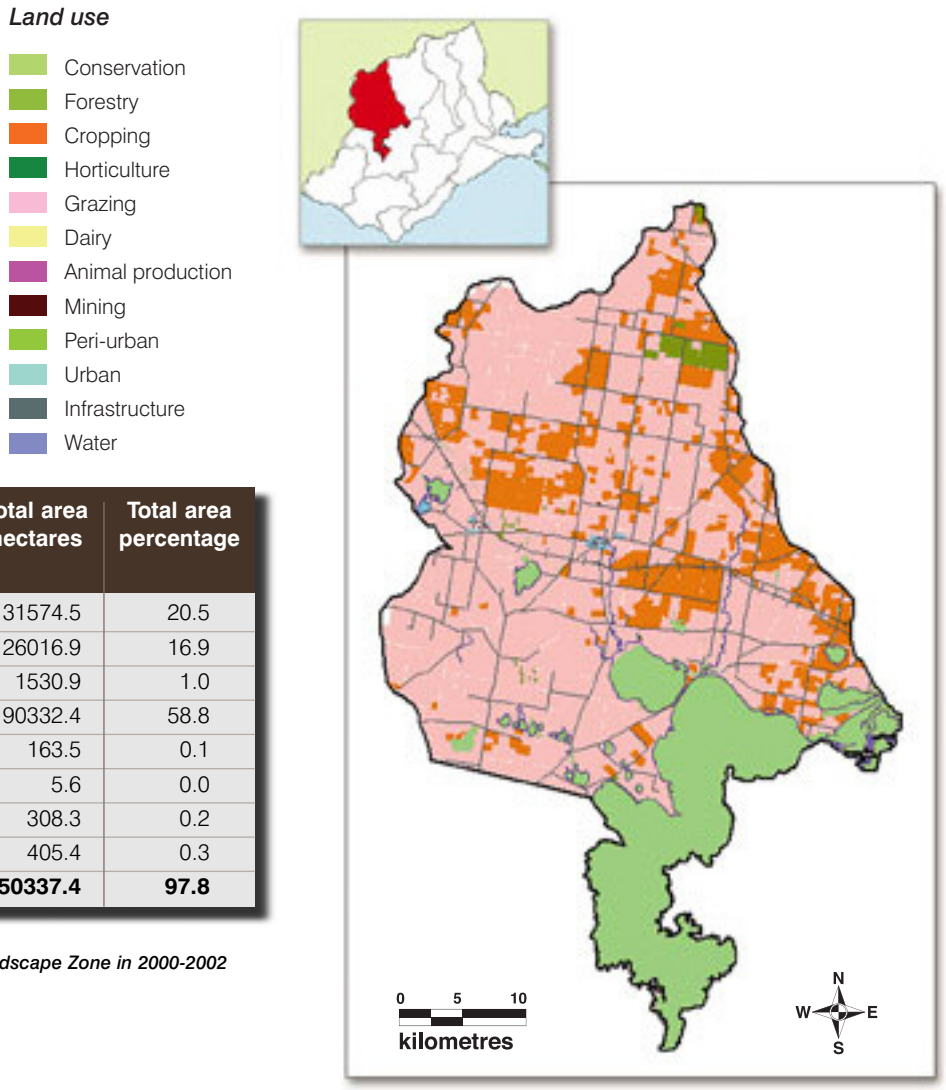


Figure C12: The rank and Relative Risk Values for soil-threatening processes in the Curdies Landscape Zone

C.7 Lismore

- **153,742 hectares or 11.5% of Corangamite CMA region**
- **20.9% public land**



Land use	Number of polygons mapped	Total area hectares	Total area percentage
Conservation	88	31574.5	20.5
Cropping	229	26016.9	16.9
Forestry	24	1530.9	1.0
Grazing	402	90332.4	58.8
Infrastructure	23	163.5	0.1
Mining	1	5.6	0.0
Urban	55	308.3	0.2
Water	2	405.4	0.3
Total	**824**	**150337.4**	**97.8**

Figure C13: Land use in the Lismore Landscape Zone in 2000-2002

Assets

- 736 km of waterways and 187 wetlands (22.5% of area), including Ramsar and significant wetlands, such as Lake Corangamite.
- Native vegetation conservation significance potential: 0.9% of total landscape zone is very high, 3.9% of total landscape zone is high.
- 622 km of roads, including highways. Other infrastructure includes significant railway and power lines.
- Cultural and heritage assets, especially Aboriginal archaeological sites associated with the lakes, waterways and wetlands.

Threats

To public assets

- *Secondary salinity.* Eighty-six sites totalling 1,973 ha of secondary salinity are mapped in the landscape zone. About 580 ha of secondary salinity occur on public land, almost all of which is around Lake Martin. More than 100 ha of native vegetation with very high and 160 ha with high conservation significance potential intersect with secondary salinity, with a scattered distribution. More than 345 ha of land within 50 m of a waterway and 43.5 ha of land within 50 m of a road are affected by secondary salinity.

- *Potential acid sulphate soils.* Potential inland acid sulphate soils intersect 100 ha of high-value native vegetation, 215 ha of wetlands, 18 km of waterways, and 2 km of roads. All areas are associated with the margins of the wetlands in the southern portion of the landscape zone.

To private assets

- *Secondary salinity.* About 983 ha of grazing land and 85 ha of cropping land are affected by secondary salinity. Many areas fringing primary saline areas, including wetlands, are affected, especially around Lake Martin and Derrinallum.
- *Susceptibility to soil structure decline.* About 10% (2,723 ha) of cropping land and 24% (21,750 ha) of grazing land is highly susceptible to soil structure decline, especially around Leslie Manor, Lismore and Derrinallum.
- *Susceptibility to soil waterlogging.* Around 5% (1,379 ha) of cropping land and 12% (11,056 ha) of grazing land is very highly susceptible to waterlogging, mostly south of Lismore, Derrinallum and Cressy. Approximately 69% (17,980 ha) of cropping land and 59% (53,210 ha) of grazing land is highly susceptible to waterlogging, in widespread locations north-west of Berrybank and west of Leslie Manor.
- *Susceptibility to soil nutrient decline.* Approximately 1,133 ha of grazing country, 715 ha of cropping country and 100 ha of forest country are very highly susceptible to soil nutrient decline, being almost all the granitic landscapes around Lismore and north-west of Lismore. The sandy soils around Leslie Manor and Lake Gnarpurt are highly susceptible, including 13,640 ha of grazing land and 2,158 ha of cropping land.
- *Susceptibility to soil acidification.* The soils susceptible to soil nutrient decline are also susceptible to soil acidification, with the same regions and statistics as above.
- *Susceptibility to soil erosion by wind.* The soils of 14,466 ha of grazing country and 1,084 ha of cropping country are highly susceptible to wind erosion. These include the sandy soil plains around Leslie Manor and the alluvial clay pans associated with low-lying poorly-drained areas such as ephemeral wetlands.

Relative Risk to Assets

According to the relative risk to assets analysis, results indicate *(Fig. C14):*

- secondary salinity poses the greatest risk to assets in the Lismore Landscape Zone, which was ranked the second-greatest relative risk amongst all soil-related threatening processes across the Corangamite region
- waterlogging, acid sulphate soils and soil structure decline all pose a moderate risk to assets in the Lismore Landscape Zone
- wind erosion, soil nutrient decline, soil acidification, gully/tunnel erosion and sheet/rill erosion pose a low risk to assets in the Lismore Landscape Zone
- no landslides are found in the Lismore Landscape Zone.

Soil threatening process	Rank across entire region	Relative risk values
1. Secondary Salinity	2	2886
2. Waterlogging	53	228
3. Acid Sulphate Soils	=55	225
4. Soil Structure Decline	72	165
5. Wind Erosion	112	78
6. Soil Nutrient Decline	=120	49
7. Soil Acidification	=120	49
8. Gully/tunnel erosion	130	27
9. Sheet/rill erosion	132	24
10. Landslides	=143	0

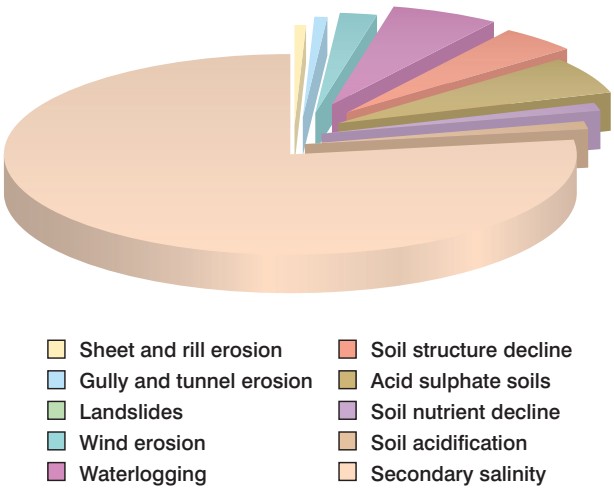
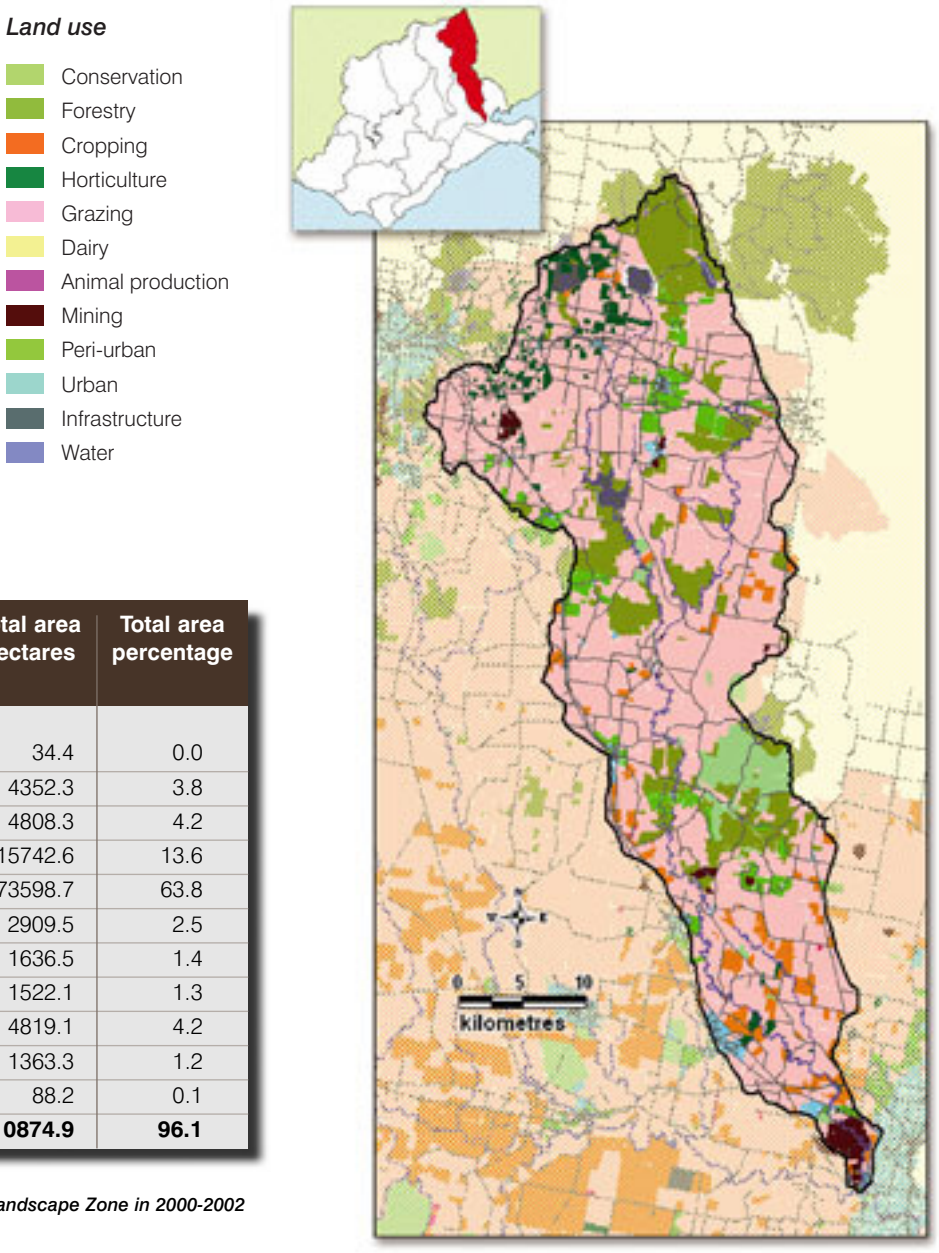


Figure C14: The rank and Relative Risk Values for soil-threatening processes in the Lismore Landscape Zone

C.8 Moorabool

- **115,407 hectares or 8.7% of Corangamite CMA region**
- **13.9% public land**



Land use	Number of polygons mapped	Total area hectares	Total area percentage
Animal production	5	34.4	0.0
Conservation	152	4352.3	3.8
Cropping	97	4808.3	4.2
Forestry	138	15742.6	13.6
Grazing	783	73598.7	63.8
Horticulture	136	2909.5	2.5
Infrastructure	44	1636.5	1.4
Mining	16	1522.1	1.3
Peri-urban	148	4819.1	4.2
Urban	288	1363.3	1.2
Water	4	88.2	0.1
Total	**1811**	**110874.9**	**96.1**

Figure C15: Land use in the Moorabool Landscape Zone in 2000-2002

Assets

- Urban water supply catchments for the City of Ballarat, City of Greater Geelong and other urban centres (e.g. Meredith & Bannockburn).
- 2,151 km of waterways, including the Moorabool River and tributaries. 132 wetlands (1.1% of area). High-value groundwater resources (Bungaree Groundwater Management Area).
- Native vegetation conservation significance potential: 9.3% of total landscape zone is very high, 16.6% of total landscape zone is high.
- 978 km of roads, excluding the more recently constructed urban and peri-urban roads of newer subdivisions around Geelong and Ballarat. Extensive peri-urban development.

Threats

To public assets

- *Soil erosion due to water.* Waterways intersect with 145 mapped gully sites (226 ha) and 169 mapped sheet/rill sites (272 ha). Most severe are Eclipse Creek, Tea Tree Creek, Anakie Creek and Deadman Gully. There are nine intersections (24 ha) of mapped gully erosion with native vegetation of very high conservation significance potential, and 40 intersections (48 ha) with native vegetation of high conservation significance potential. Similarly, there are 18 intersections (22 ha) of mapped sheet/rill erosion with native vegetation of very high conservation significance potential, and 48 intersections (94 ha) with native vegetation of high conservation significance potential. The vast majority of these are associated with drainage lines in the area between Morrisons and Gheringhap. There are 15 intersections of roads with gully erosion and 24 intersections with sheet/rill erosion sites.
- *Landslides.* Eighteen landslides intersect with waterways, mostly along the Moorabool River. Recently, remediation has been necessary to protect a main water supply pipeline.

To private assets

- *Soil erosion due to water.* Around 138 gullies, totalling 216 ha, have been mapped on grazing land, along with 180 sheet/rill erosion sites (206 ha). There are some minor (< 10 ha) occurrences on cropping land and approximately 50 ha of forestry land. The vast majority of the land is in the Morrisons, Durdidwarrah, Sheoaks, Steiglitz, Maude and Anakie areas.
- *Susceptibility to soil waterlogging.* Extensive areas of river flats are very highly susceptible to soil waterlogging, which includes 12,330 ha of grazing land, 1,134 ha of cropping land, 1,358 ha of forestry land and 232 ha of horticultural land. Widespread areas that include 38,137 ha of soils used for grazing, 2,580 ha of soils used for cropping and 2,600 ha of soils used for forestry are highly susceptible to waterlogging.
- *Susceptibility to soil structure decline.* Almost all of the soils with the exception of the volcanic soils (krasnozems) east of Ballarat are highly susceptible to soil structure decline. This includes 50,290 ha of soils used for grazing, 2,568 ha of soils used for cropping, 14,130 ha of soils used for forestry and 400 ha of soils used for horticulture.
- *Susceptibility to soil nutrient decline.* Approximately 4,250 ha of grazing land on soils developed on granitic rocks, and soils developed on sands and gravel caps are very highly susceptible to soil nutrient decline. Widespread areas of non-volcanic soils which includes 21,670 ha of grazing land and 12,480 ha of forestry land are highly susceptible to soil nutrient decline.
- *Susceptibility to soil acidification.* Similar areas to those mentioned above (soil nutrient decline) are susceptible to soil acidification. Around 3,340 ha of grazing land in the granitic soil landscapes are very highly susceptible and 22,585 ha of grazing land on the non-volcanic soils are highly susceptible to soil acidification.

Relative Risk to Assets

According to the relative risk to assets analysis, results indicate *(Fig. C16):*

- sheet/rill erosion and gully/tunnel erosion pose the greatest risk to assets in the Moorabool Landscape Zone, and according to relative risk were ranked 11th and 15th respectively out of all soil threatening processes in the Corangamite region
- waterlogging and soil structure decline pose a moderate to high risk to assets in the Moorabool Landscape Zone
- landslides, soil nutrient decline, soil acidification, acid sulphate soils, secondary salinity and wind erosion pose a relatively low risk to assets in the Moorabool Landscape Zone.

Soil threatening process	Rank across entire region	Relative risk values
1. Sheet/rill erosion	11	1154
2. Gully/tunnel erosion	15	893
3. Waterlogging	52	230
4. Soil structure decline	57	219
5. Landslides	82	136
6. Soil nutrient decline	83	135
7. Soil acidification	86	132
8. Acid sulphate soils	=88	130
9. Secondary salinity	100	101
10. Wind erosion	111	79

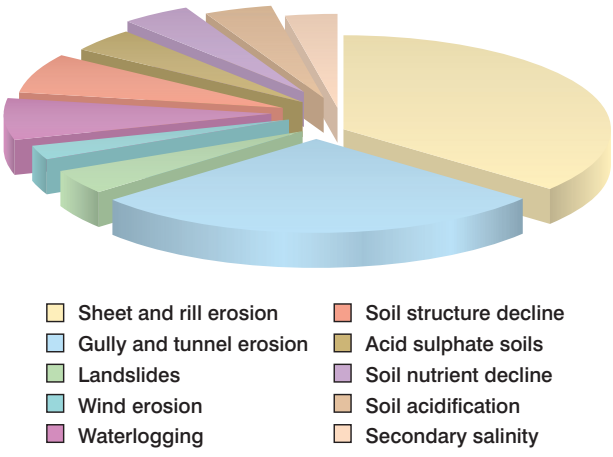
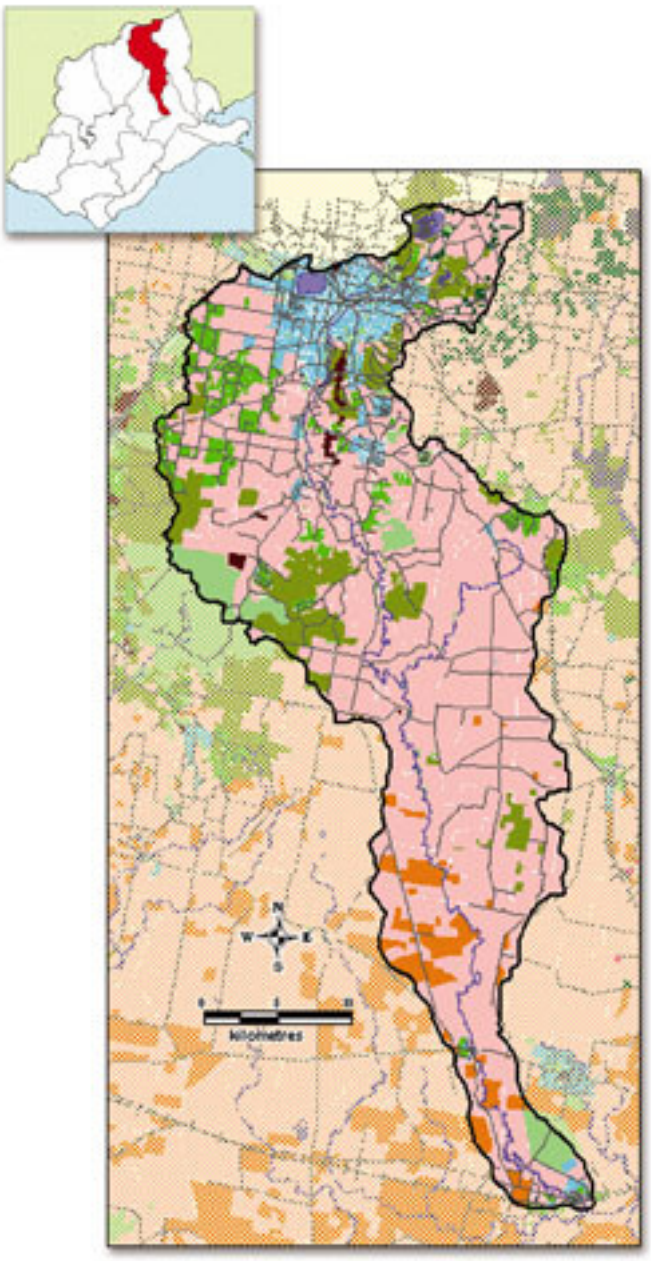


Figure C16: The rank and Relative Risk Values for soil-threatening processes in the Moorabool Landscape Zone

C.9 Leigh

- **88,765 hectares or 6.7% of Corangamite CMA region**
- **16.7% public land**



Land use	Number of polygons mapped	Total area hectares	Total area percentage
Conservation	352	4685.8	5.3
Cropping	52	3559.5	4.0
Forestry	115	7726.7	8.7
Grazing	779	57326.0	64.6
Horticulture	37	354.0	0.4
Infrastructure	132	517.2	0.6
Mining	29	506.9	0.6
Peri-urban	162	4358.2	4.9
Urban	1276	4779.9	5.4
Water	13	382.1	0.4
Total	**2947**	**84196.2**	**94.9**

Figure C17: Land use in the Leigh Landscape Zone in 2000-2002

Assets

- 1,689 km of waterways, including the Leigh River and Leigh River Gorge.
- 74 wetlands (0.8% of area), including Lake Wendouree which has high recreational value.
- Native vegetation conservation significance potential: 5.2% of total landscape zone is very high, 11.7% of total landscape zone is high.
- 1,224 km of roads, not including the more recently constructed urban roads in Ballarat.
- A portion of the City of Ballarat, which includes significant educational facilities, industry, mining, transport corridors and heritage assets.

Threats

To public assets

- *Soil erosion by water.* There are 178 mapped gullies (260 ha) and 128 mapped sheet/rill erosion sites (197 ha) that intersect with waterways (50 m buffer). The most extensive occurrences are along Woodbourne Creek, Lower Williamson Creek, the Yarrowee River downstream of Grenville and the Leigh River. Fifty-five mapped gully sites (85 ha) and 47 mapped sheet/rill sites (59 ha) intersect with native vegetation with very high and high conservation significance potential.

Thirteen road intersections with gullies (15 ha) and 10 with sheet/rill (12 ha) include the Mount Mercer – Meredith Road at Woodbourne Creek, Bamganie Road and minor rural roads in the Grenville, Bamganie and Woodbourne districts. Fifteen gullies (77 ha) and 27 sheet/rill sites (69 ha) are mapped on public land.

- *Secondary salinity.* Secondary salinity has been mapped on 3.8 ha of public land on or near the Buninyong Dredge Reserve. Nearly 300 ha of land is within 50 m of a waterway, 31 ha of land within 50 m of a road and 66 ha of native vegetation with very high and high conservation significance potential intersect with the mapped secondary salinity.
- *Potential acid sulphate soils.* Potential acid sulphate soils intersect with 9 km of waterways, 2 km of road and 42 ha of high-value native vegetation, mostly along the Yarrowee River.

To private assets

- *Soil erosion by water.* There are 162 gullies (240 ha) mapped on grazing land along with 127 mapped sheet/rill sites (203 ha). Almost all are in the Garabaldi, Grenville, Woodbourne and Bamganie districts. Other land uses (e.g. cropping, peri-urban, urban) record minor incidences (< 5 ha total).
- *Susceptibility to soil waterlogging.* Approximately 3,100 ha of grazing land and 600 ha of cropping land are very highly susceptible to soil waterlogging, all of which occur in the river flats of the Lower Leigh River valley. Approximately 3,600 ha of grazing land, 4,500 ha of forestry land and 650 ha of cropping land are highly susceptible to soil waterlogging.
- *Susceptibility to soil nutrient decline.* The granitic landscapes north of Warrenheip include over 200 ha of grazing land and 145 ha of forestry land which is very highly susceptible to soil nutrient decline. The sedimentary hills and gravel caps in the northern and central eastern parts of the landscape zone comprise over 25,000 ha of grazing land, 8,500 ha of forestry land and 285 ha of cropping land which is highly susceptible to soil nutrient decline.
- *Susceptibility to soil acidification.* Much of the same country which is susceptible to soil nutrient decline is also susceptible to soil acidification. The only variation is that about half the area of soil (181 ha) is very highly susceptible, but the same area is highly susceptible.
- *Susceptibility to soil structure decline.* Nearly all of the agricultural land in the landscape zone – over 42,000 ha of grazing country, 7,000 ha of forest land and 1,000 ha of cropping country – is highly susceptible to soil structure decline.
- *Susceptibility to soil erosion by wind.* About 11,000 ha of grazing land on the sandier soils in the middle of the landscape zone are highly susceptible to wind erosion.

Relative Risk to Assets

According to the relative risk to assets analysis results indicate *(Fig. C18):*

- gully/tunnel erosion and sheet/rill erosion pose the greatest risk to assets in the Leigh Landscape Zone, which were, according to relative risk, ranked 13th and 18th respectively out of all soil-threatening processes in the Corangamite region
- secondary salinity also poses a relatively high risk to assets in the Leigh Landscape Zone
- waterlogging, soil structure decline, soil acidification and soil nutrient decline pose a moderate risk to assets in the Leigh Landscape Zone
- wind erosion, acid sulphate soils and landslides pose a relatively low risk to assets in the Leigh Landscape Zone.

Soil threatening process	Rank across entire region	Relative risk values
1. Gully/tunnel erosion	13	938
2. Sheet/rill erosion	18	734
3. Secondary Salinity	24	502
4. Waterlogging	=62	196
5. Soil Structure Decline	65	192
6. Soil Acidification	84	134
7. Soil Nutrient Decline	85	133
8. Wind Erosion	=101	99
9. Acid Sulphate Soils	115	70
10. Landslides	=133	20

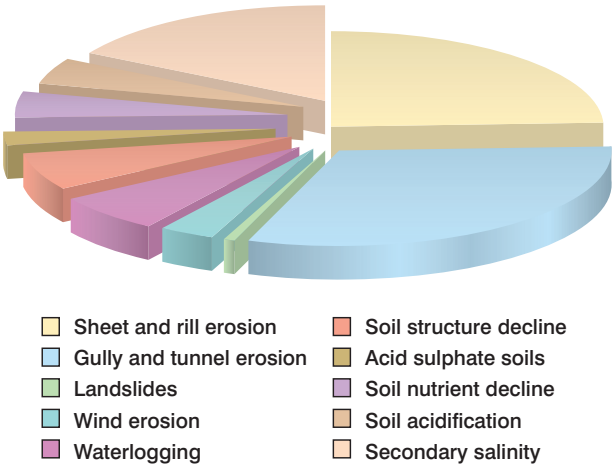
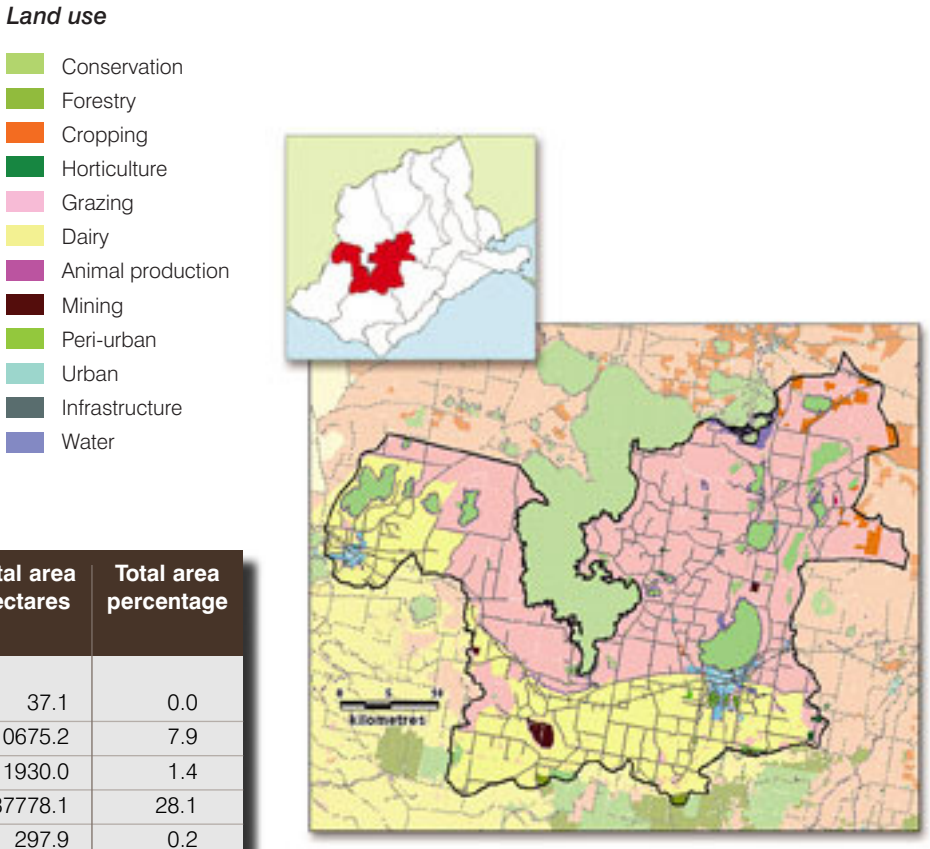


Figure C18: The rank and Relative Risk Values for soil-threatening processes in the Leigh Landscape Zone

C.10 Stony Rises

- **134,466 hectares or 10.1% of Corangamite CMA region**
- **8.6% public land**



Land use	Number of polygons mapped	Total area hectares	Total area percentage
Animal production	1	37.1	0.0
Conservation	215	10675.2	7.9
Cropping	24	1930.0	1.4
Dairy	209	37778.1	28.1
Forestry	10	297.9	0.2
Grazing	587	77078.1	57.3
Horticulture	8	155.7	0.1
Infrastructure	44	143.3	0.1
Mining	13	684.2	0.5
Peri-urban	37	436.4	0.3
Urban	363	1684.3	1.3
Water	9	803.7	0.6
Total	**1520**	**131704.1**	**97.9**

Figure C19: Land use in the Stony Rises Landscape Zone in 2000-2002

Assets

- 946 km of waterways and 535 wetlands (9.2% of area), including Ramsar and significant wetlands such as Lake Beeac and Lake Cundare.
- Native vegetation conservation significance potential: 6.4% of total landscape zone is very high, 10.0% of total landscape zone is high.
- 1,054 km of roads, excluding the more recently subdivided areas around Colac and Camperdown.
- Cultural and heritage assets include Aboriginal archaeological sites and buildings associated with the early pastoral settlement.
- Urban centres of Colac and Camperdown, including manufacturing and service industries.

Threats

To public assets

- *Secondary salinity.* Around 1,544 ha of secondary salinity have been mapped in the landscape zone, which includes 235 ha on public land. Within a 50 m buffer of waterways there are 81 sites amounting to 300 ha, within 50 m of wetlands there are nearly 1000 ha, and around 39 ha in 57 sites mapped within 50 m of a road. Although widely scattered, the largest areas are around Lake Martin, The Sanctuary and the upper reaches of Barongarook Creek.
- *Potential acid sulphate soils.* Potential acid sulphate soils have been mapped at 118 sites (124 ha) within 50 m of a waterway and 35 sites (20 ha) within 50 m of a road. About 35 ha of high-value native vegetation and 40 ha of wetlands are also intersected. The sites are very fragmented and scattered, with the majority in low-lying and poorly-drained areas of the volcanic landscapes.

To private assets

- *Susceptibility to soil structure decline.* Around 7% (2,728 ha) of dairy land is very highly susceptible to soil structure decline in the Swan Marsh, Pirron Yallock and Larpent areas. A further 58% (21,951 ha) of dairy land, 34% (651 ha) of cropping land and 60% (46,321 ha) of grazing land is highly susceptible to soil structure decline. The dairy land around Bungador, Swan Marsh and Barongarook; the cropping land around Barpinba; and the grazing land in the Eurack, Lough Calvert, Beeac, Dreeite and Wool Wool areas are mapped in this category.
- *Susceptibility to soil waterlogging.* Soils very highly susceptible to soil waterlogging include 12% (4,609 ha) of dairy land, 32% (623 ha) of cropping land and 25% (18,885 ha) of grazing land. The largest areas are the grazing lands north of Lake Colac through Lough Calvert to Eurack. Around 54% (20,585 ha) of dairy land, and 37% (28,439 ha) of grazing land is highly susceptible to waterlogging, including nearly all the land between the Colac – Cressy Road and Lake Corangamite.
- *Secondary salinity.* Secondary salinity has been mapped on 52 ha of dairy land and 402 ha of grazing land. The largest extents of salt-affected grazing lands are those fringing Lake Martin.
- *Susceptibility to soil nutrient decline.* Soils very highly susceptible to nutrient decline include 13,460 ha of dairy land and 3,876 ha of grazing land. A further 10,829 ha of dairy country, 2,900 ha of grazing country and 292 ha of forestry country are highly susceptible to soil nutrient decline. These include all of the soils developed on the undulating sandy landscapes in the southern section of the landscape zone (i.e. south of the volcanic plains).
- *Susceptibility to soil acidification.* Around 24,289 ha of dairy country, 6,777 ha of grazing country and 300 ha of forest country in the same areas as described above are highly susceptible to soil acidification.

Relative Risk to Assets

According to the relative risk to assets analysis, results indicate *(Fig. C20):*

- secondary salinity poses the greatest risk to assets in the Stony Rises Landscape Zone, which was ranked the sixth-greatest relative risk amongst all soil-related threatening process across the Corangamite region
- soil structure decline, waterlogging, soil nutrient decline and soil acidification pose a relatively moderate risk to assets in the Stony Rises Landscape Zone
- wind erosion, acid sulphate soils, landslides, sheet/rill erosion and gully/tunnel erosion pose relatively low risk to assets in the Stony Rises Landscape Zone.

Soil threatening process	Rank across entire region	Relative risk values
1. Secondary salinity	6	1925
2. Soil structure decline	43	256
3. Waterlogging	44	254
4. Soil nutrient decline	60	211
5. Soil acidification	80	144
6. Wind erosion	98	105
7. Acid sulphate soils	107	88
8. Landslides	137	16
9. Sheet/rill erosion	140	10
10. Gully/tunnel erosion	141	6

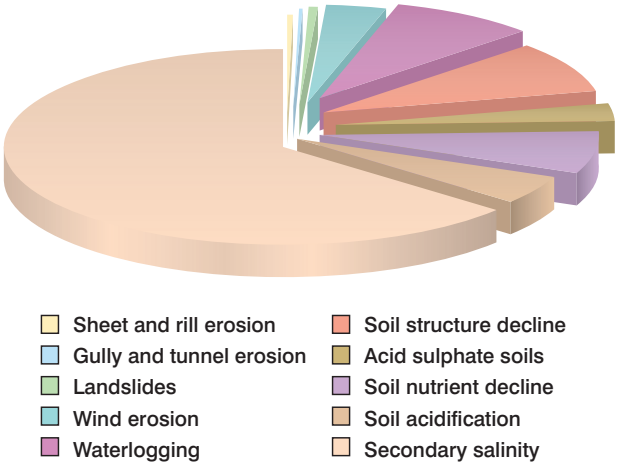
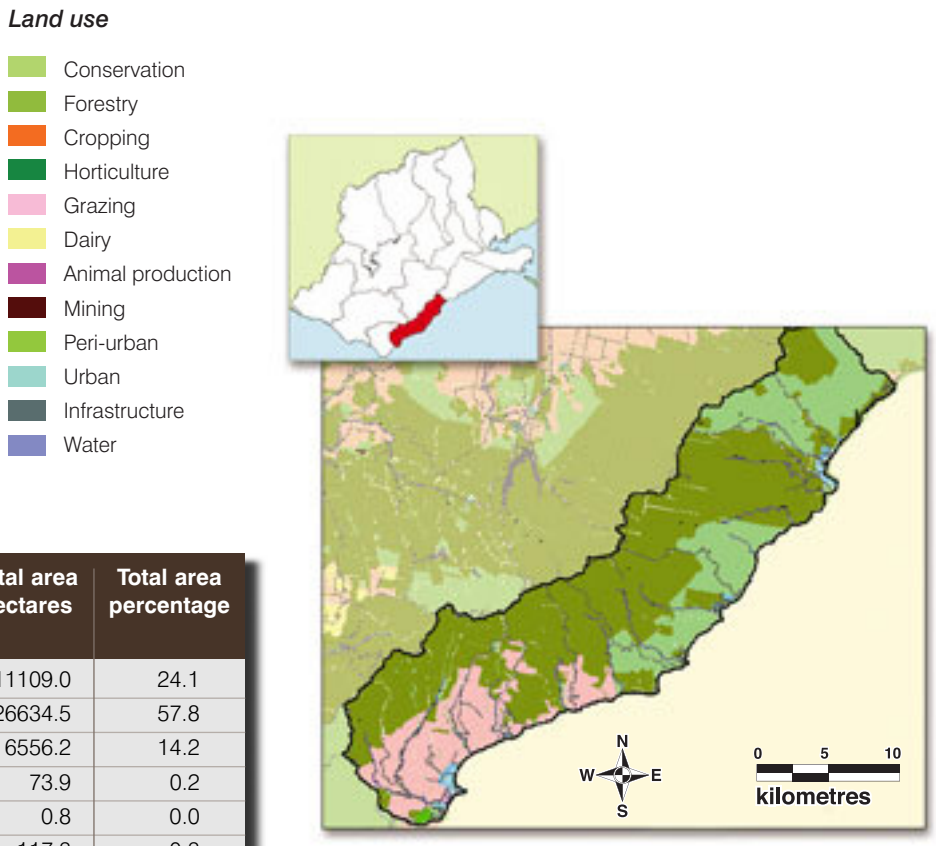


Figure C20: The rank and Relative Risk Values for soil-threatening processes in the Stony Rises Landscape Zone

C.11 Otway Coast

- **46,091 hectares or 3.5% of the Corangamite CMA region**
- **33.5% public land**



Land use	Number of polygons mapped	Total area hectares	Total area percentage
Conservation	168	11109.0	24.1
Forestry	98	26634.5	57.8
Grazing	81	6556.2	14.2
Infrastructure	8	73.9	0.2
Mining	1	0.8	0.0
Peri-urban	2	117.3	0.3
Urban	146	481.5	1.0
Total	**504**	**44973.3**	**97.6**

Figure C21: Land use in the Otway Coast Landscape Zone in 2000-2002

Assets

- 1,282 km of waterways, mostly mountain streams. Barham River is the largest catchment.
- 3 wetlands (<0.1% area).
- Native vegetation conservation significance potential: 7.8% of total landscape zone is very high, 2.5% of total landscape zone is high. A significant proportion of the native vegetation is in the Great Otway National Park.
- 284 km of roads including the Great Ocean Road.
- Cultural and heritage assets, and high-value tourism sites.

Threats

To public assets

- *Landslides.* There are 280 landslide intersections mapped within a 50 m buffer of waterways, with Wild Dog Creek, Barham River and Smythe Creek recording the most. Around 109 landslides are mapped on public land, affecting at least 205 ha. Landslides threaten roads, utilities and urban infrastructure of small coastal towns, especially Wye River, Separation Creek, Kennett River, Lorne and the hinterland of Apollo Bay. Landslides have periodically closed the Great Ocean Road, Turtons Track, Wild Dog Road and other scenic tourist routes in recent years.

- *Susceptibility to soil waterlogging.* Waterlogged soils result from high rainfall combined with septic tank effluent disposal in shallow stony soils within coastal towns. The resultant run-off of poorly-treated effluent threatens the ecological integrity of waterways, estuarine and coastal environments.
- *Potential acid sulphate soils.* Approximately 8 km of waterways and 5 km of roads intersect with potential acid sulphate soils. Around 22 ha of high-value native vegetation and 49 ha of public land are also intersected. The most extensive areas are in the coastal plains around Apollo Bay.

To private assets

- *Landslides.* There are 232 landslides mapped on grazing land and 65 on land used for forestry. The areas most affected are Wongarra, Wild Dog Creek valley, Tanybryn, Barham River valley and Paradise.
- *Susceptibility to soil structure decline.* Around 83% (22,000 ha) of land used for forestry and 95% (6,200 ha) of land used for grazing is highly susceptible to soil structure decline. This covers the entire landscape zone with the exception of the gently undulating landscapes near the crest of the Otway Ranges.
- *Susceptibility to soil waterlogging.* Nearly 177 ha of grazing country in the Lower Barham River valley are highly susceptible to soil waterlogging.
- *Susceptibility to soil nutrient decline.* Nearly 200 ha of land used for forestry and over 300 ha of land used for grazing are very highly susceptible to soil nutrient decline, in the area around Lorne.
- *Susceptibility to soil acidification.* The same area as above (i.e. very high nutrient decline) is highly susceptible to soil acidification.
- *Susceptibility to soil erosion by wind.* Around 300 ha of grazing land near Apollo Bay have been identified as highly susceptible to wind erosion.

Relative Risk to Assets

According to the relative risk to assets analysis, results indicate *(Fig. C22):*

- landslides pose the greatest risk in the Otway Coast, which was ranked eighth-highest relative risk of all soil-related threatening processes across the Corangamite region
- soil structure decline, soil nutrient decline and waterlogging pose a relatively moderate risk to assets in the Otway Coast Landscape Zone
- acid sulphate soils, sheet/rill erosion, wind erosion and soil acidification all pose a relatively low risk to assets in the Otway Coast Landscape Zone
- gully/tunnel erosion and secondary salinity sites have not been located in the Otway Coast Landscape Zone and therefore pose no known risk.

Soil threatening process	Rank across entire region	Relative risk values
1. Landslides	8	1872
2. Soil Structure Decline	=55	225
3. Soil Nutrient Decline	61	197
4. Waterlogging	76	149
5. Acid Sulphate Soils	=108	81
6. Sheet/rill erosion	=122	43
7. Wind Erosion	139	12
8. Soil Acidification	142	3
9. Gully/tunnel erosion	=143	0
10. Secondary Salinity	=143	0

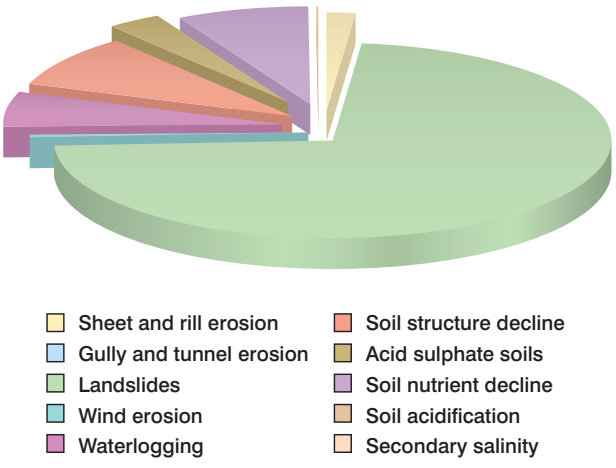


Figure C22: The rank and Relative Risk Values for soil-threatening processes in the Otway Coast Landscape Zone

C.12 Hovells

- **36,480 hectares or 2.7% of Corangamite CMA region**
- **9.6% public land**

Land use

Conservation
Forestry
Cropping
Horticulture
Grazing
Dairy
Animal production
Mining
Peri-urban
Urban
Infrastructure
Water

Land use	Number of polygons mapped	Total area hectares	Total area percentage
Animal production	5	63.5	0.2
Conservation	202	3088.4	8.5
Cropping	49	2448.5	6.7
Forestry	2	0.0	0.0
Grazing	145	18442.0	50.6
Horticulture	10	176.4	0.5
Infrastructure	31	1815.3	5.0
Mining	8	972.5	2.7
Peri-urban	98	2730.0	7.5
Urban	1236	4493.0	12.3
Total	**1786**	**34229.6**	**93.8**

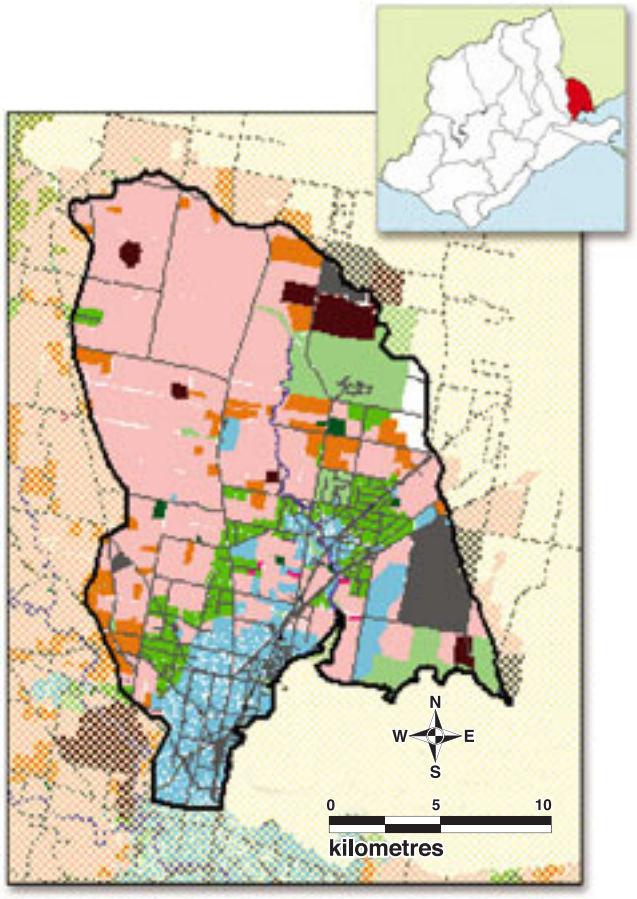


Figure C23: Land use in the Hovells Landscape Zone in 2000-2002

Assets

- 251 km of waterways, with Hovells Creek and Limeburners Bay being the most significant.
- 44 wetlands (3.0% of area), includes Ramsar and significant wetlands around Point Lillias and Point Wilson.
- Native vegetation conservation significance potential: 16.1% of total landscape zone is very high, 10.4% of total landscape zone is high.
- At least 694 km of roads, not including many of the more recent suburban roads in Lara and Geelong.
- Portions of the City of Greater Geelong, including significant urban and industrial infrastructure.
- Cultural and heritage assets include Aboriginal archaeological sites and historical sites associated with the early pastoral settlement of Victoria.

Threats

To public assets

- *Soil erosion by water.* There are 15 intersections (51 ha) of mapped gullies with waterways and 41 intersections (72 ha) of mapped sheet/rill erosion and waterways, all in the headwaters of Hovells Creek, especially on the flanks of the You Yang Ranges. These have the potential for sediment and nutrient export to Limeburners Bay, especially when added to the lower water quality associated with the urban development of Lara (flooding and stormwater disposal). There are eight intersections of mapped gully erosion (22 ha) and 31 intersections of mapped sheet/rill erosion (29 ha) with native vegetation of very high conservation status and two gully intersections and 12 sheet/rill intersections with native vegetation of high conservation status potential. Most occur along the flanks of the You Yang Ranges and along the creeklines of tributaries to Hovells Creek. Roads intersect with seven mapped gully erosion sites and 17 mapped sheet erosion sites with the largest along Sandy Creek Road and Granite Road. Seven sheet erosion sites (6 ha) have been mapped on public land.

- *Secondary salinity.* Secondary salinity has been mapped on 16 ha of public land (Avalon Airport and Serendip Sanctuary). Secondary salinity also intersects with nearly 40 ha of native vegetation with high and very high conservation significance potential, and 46 ha of wetlands. Around 31 ha occur within 50 m of a waterway and 19 ha within 50 m of a road.
- *Potential acid sulphate soils.* Potential acid sulphate soils have been mapped on 202 ha of public land, the vast majority occurring in the coastal and estuarine wetlands around Limeburners Bay, Point Lillias and Point Wilson. Many of these are Ramsar and significant wetlands and rare species habitat (e.g. orange-bellied parrot). Approximately 250 ha of native vegetation with high and very high conservation significance potential, 535 ha of wetlands, 12 km of waterways and 15 km of roads also intersect with potential acid sulphate soils.

To private assets

- *Soil erosion by water.* There are 44 incidences (38 ha) of sheet/rill erosion which have been mapped on grazing land along with five gullies (7 ha). There are 19 ha of gully erosion at five sites threatening cropping land. Eroded mining/quarry land amounts to 29 ha.
- *Susceptibility to soil nutrient decline.* More than 370 ha of grazing land and 125 ha of cropping land are very highly susceptible and nearly 1600 ha of grazing land and 240 ha of cropping land are highly susceptible to soil nutrient decline. Most occurs along the sandy slopes of the granitic landscapes adjacent to the You Yang Ranges, and the sandy coastal plain on the edge of Corio Bay.
- *Susceptibility to soil acidification.* Soils of the sandy slopes of the granitic landscapes adjacent to the You Yang Ranges, and the sandy coastal plain on the edge of Corio Bay are also susceptible to soil acidification.
- *Susceptibility to soil waterlogging.* Approximately 15,846 ha of grazing land, 2,190 ha of cropping land and 164 ha of land used for horticulture are highly susceptible to soil waterlogging. This is nearly all of the volcanic soils in the landscape zone.
- *Susceptibility to soil structure decline.* Around 3,900 ha of grazing land, 1,040 ha of cropping land and 104 ha of land used for horticulture are highly susceptible to soil structure decline. The majority of the land is along the Hovells Creek valley from the You Yang Ranges to Limeburners Bay.

Relative Risk to Assets

According to the relative risk to assets analysis, results indicate *(Fig C24):*

- acid sulphate soils and sheet/rill erosion pose a relatively high risk to assets in the Hovells Landscape Zone
- soil structure decline, secondary salinity, gully/tunnel erosion and waterlogging pose a relatively moderate risk to assets in the Hovells Landscape Zone
- wind erosion, soil nutrient decline, soil acidification and landslides pose a relatively low risk to assets in the Hovells Landscape Zone.

Soil threatening process	Rank across entire region	Relative risk values
1. Acid sulphate soils	23	506
2. Sheet/rill erosion	27	444
3. Soil structure decline	46	244
4. Secondary salinity	47	243
5. Gully/tunnel erosion	48	240
6. Waterlogging	77	146
7. Wind erosion	=122	43
8. Soil nutrient decline	=122	43
9. Soil acidification	=122	43
10. Landslides	=133	20

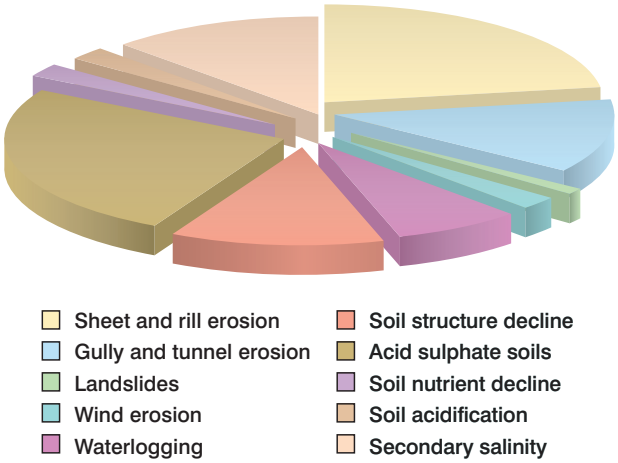
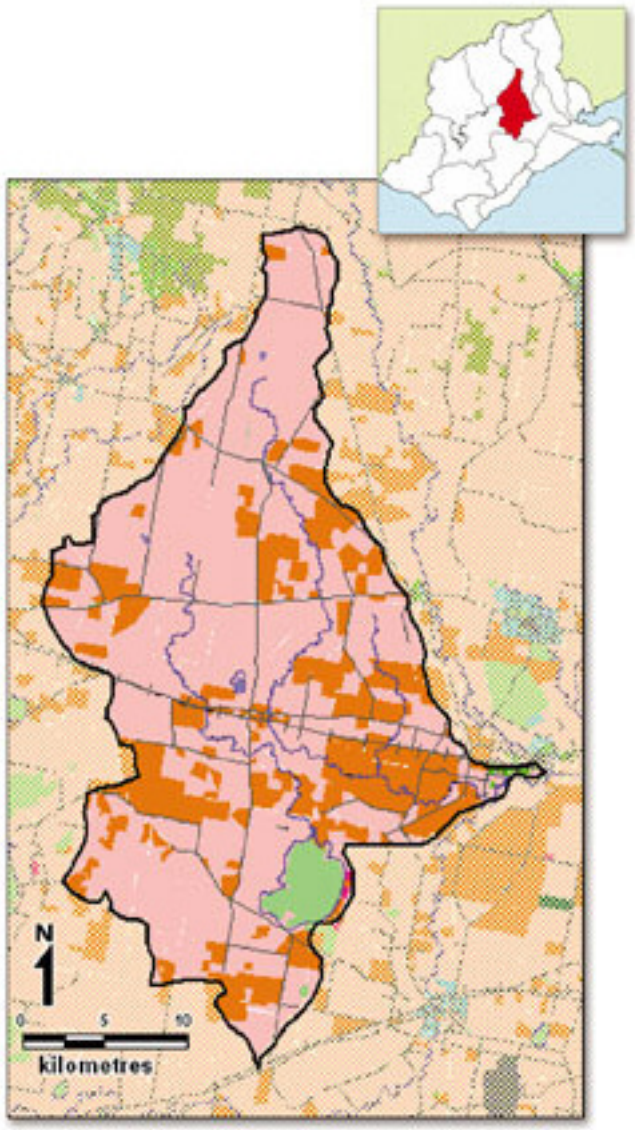


Figure C24: The rank and Relative Risk Values for soil-threatening processes in the Hovells Landscape Zone

C.13 Murdeduke

- **68,316 hectares or 5.1% of Corangamite CMA region**
- **2.8% public land**



Land use	Number of polygons mapped	Total area hectares	Total area percentage
Animal production	3	53.7	0.1
Conservation	14	1717.5	2.5
Cropping	118	16968.2	24.8
Grazing	139	48110.4	70.4
Infrastructure	14	81.7	0.1
Peri-urban	8	114.5	0.2
Urban	5	5.8	0.0
Water	3	71.0	0.1
Total	**304**	**67122.8**	**98.3**

Figure C25: Land use in the Murdeduke Landscape Zone in 2000-2002

Assets

- 460 km of waterways, including Warrambine Creek and Mia Mia Creek.
- 65 wetlands (4.1% of area), including Ramsar and significant wetlands (Lake Murdeduke).
- Native vegetation conservation significance potential: 9.1% of total landscape zone is very high, 6.9% of total landscape zone is high.
- 236 km of roads, rail line and minor rural infrastructure.
- Cultural and heritage assets including Aboriginal archaeological sites.

Threats

To public assets

- *Secondary salinity.* Secondary salinity intersects with over 375 ha of native vegetation with very high and high conservation significance potential, and 235 ha of wetlands. These intersects occur along Mia Mia Creek, along Warrambine Creek north of Wingeel Swamp, and in groups of small wetlands east of Eurack near Hesse Road and north-east of Lake Murdeduke near McIntyre Road and Flemings Road. There are 32 intersections (~300 ha) within 50 m of a waterway and nine sites mapped within 50 m of a road (8 ha).

- *Potential acid sulphate soils.* Seventy potential acid sulphate soils are mapped within a 50 m buffer of a waterway (77.5 ha), and 11 within a 50 m buffer of roads (8 km). Around 85 ha of high value native vegetation and 9 ha of public land are also intersected. The sites are scattered, with a widespread distribution along low-lying poorly-drained areas.
- *Soil erosion due to water.* Small incidences (17 in number) of sheet/rill erosion amounting to approximately 16 ha total (0.02% of total area) includes 12 intersections with waterways (4.5 ha), three intersections with roads (0.3 ha) and eight intersections with high-value native vegetation (7 ha).

To private assets

- *Susceptibility to soil structure decline.* Around 7% (1,127 ha) of cropping land and 6% (2,734 ha) of grazing land is highly susceptible to soil structure decline, especially east of Eurack, south of Inverleigh and south-east of Wingeel.
- *Susceptibility to soil waterlogging.* Similarly, 7% (1,127 ha) of cropping land and 5% (2,618 ha) of grazing land is very highly susceptible to waterlogging, mostly east of Eurack, south of Inverleigh and south-east of Wingeel. About 17% (2,885 ha) of cropping land and 6% (2,695 ha) of grazing land is highly susceptible to waterlogging, all in one soil-landform unit north of Warrambine Creek, from Inverleigh to Wingeel.
- *Susceptibility to soil erosion by wind.* Over 2250 ha of grazing land and nearly 950 ha of cropping land is highly susceptible to wind erosion. These are mostly scattered alluvial soils associated with low-lying poorly-drained areas which are subject to wind erosion when dried.
- *Susceptibility to soil nutrient decline.* Very little area (~560 ha or <1% of the total area) is highly susceptible to soil nutrient decline.
- *Susceptibility to soil acidification.* Similarly to nutrient decline, less than <1% of the total area is highly susceptible to soil acidification.

Relative Risk to Assets

According to the relative risk to assets analysis, results indicate *(Fig. C26):*

- secondary salinity poses the greatest risk to assets in the Murdeduke Landscape Zone, which was ranked the 12th-highest relative risk amongst all soil-related threatening process across the Corangamite region
- waterlogging and soil structure decline pose a relatively moderate risk to assets in the Murdeduke Landscape Zone
- wind erosion, acid sulphate soils, sheet/rill erosion, soil nutrient decline and soil acidification pose a relatively low risk to assets in the Murdeduke Landscape Zone
- landslides and gully/tunnel erosion were found to have no risk in the Murdeduke Landscape Zone.

Soil threatening process	Rank across entire region	Relative risk values
1. Secondary Salinity	12	1090
2. Waterlogging	58	218
3. Soil Structure Decline	=62	196
4. Wind Erosion	=104	93
5. Acid Sulphate Soils	=104	93
6. Sheet/rill erosion	127	35
7. Soil Nutrient Decline	=135	19
8. Soil Acidification	=135	19
9. Landslides	=143	0
10. Gully/tunnel erosion	=143	0

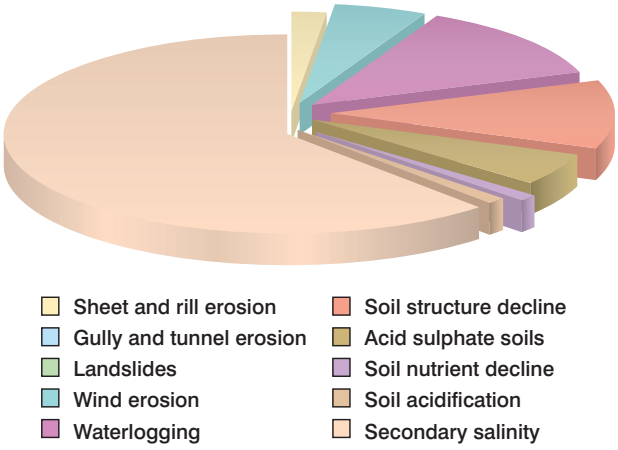
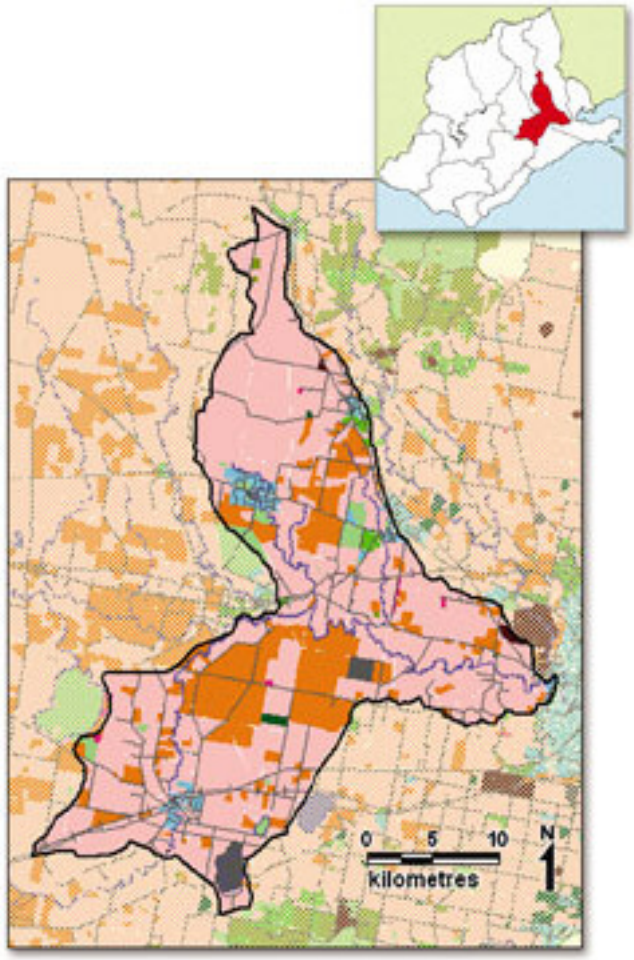


Figure C26: The rank and Relative Risk Values for soil-threatening processes in the Murdeduke Landscape Zone

C.14 Middle Barwon

- **70,618 hectares or 5.3% of the Corangamite CMA region**
- **2.4% public land**



Land use	Number of polygons mapped	Total area hectares	Total area percentage
Animal production	7	167.2	0.2
Conservation	87	1483.4	2.1
Cropping	144	13979.8	19.8
Forestry	3	93.5	0.1
Grazing	238	49431.6	70.0
Horticulture	3	168.4	0.2
Infrastructure	57	1203.2	1.7
Mining	3	170.9	0.2
Peri-urban	28	444.0	0.6
Urban	189	1692.1	2.4
Total	**759**	**68834.1**	**97.5**

Figure C27: Land use in the Middle Barwon Landscape Zone in 2000-2002

Assets

- 703 km of waterways including the Barwon River.
- 104 wetlands (1.8% of area), mostly very small (Wurdee Boluc Reservoir and Lake Gherang are exceptions).
- Native vegetation conservation significance potential: 14.8% of total landscape zone is very high, 9.2% of total landscape zone is high.
- Infrastructure assets including 458 km roads, along with main railway and power lines. Parts of the City of Greater Geelong and peri-urban fringe.

Threats

To public assets

- *Soil erosion by water.* Waterways intersect with 14 mapped gully sites (24 ha) and 52 mapped sheet/rill sites (61 ha). There are 23 intersections of mapped erosion with native vegetation of very high and high conservation significance potential, the vast majority being small patches of sheet/rill erosion along drainage lines. Roads intersect with two gully erosion sites and four sheet/rill erosion sites.
- *Landslides.* There were 13 landslides mapped within 50 m of a waterway, almost all along the Barwon River east of Inverleigh. They are mapped on public land and eight intersect with native vegetation with very high or high conservation significance potential.

- *Secondary salinity.* Nearly 122 ha of secondary salinity sites are mapped within 50 m of a waterway, and 11.5 ha within 50 m of a road. Most occur on the volcanic landscapes north and west of Winchelsea, with some in the valleys of the Barrabool Hills. Secondary salinity intersects with 35 ha of native vegetation with very high conservation significance potential and 57 ha of high conservation significance potential.
- *Potential acid sulphate soils.* Approximately 11 km of waterways and 74 ha of high-value native vegetation intersect with potential inland acid sulphate soils, in scattered locations on the volcanic plains east of Lake Murdeduke and north of Winchelsea.

To private assets

- *Susceptibility to soil waterlogging.* Around 4% (561 ha) of cropping land and 6% (3,133 ha) of grazing land is very highly susceptible to waterlogging, mostly along the floodplain of the Barwon River. About 61% (8,453 ha) of cropping land and 64% (31,524 ha) of grazing land is highly susceptible to waterlogging in widespread locations. Cropping land is most threatened in the Winchelsea – Inverleigh district, and grazing land north of Teesdale to Meredith.
- *Susceptibility to soil structure decline.* Nearly 18,500 ha of grazing land and 5,250 ha of cropping land are highly susceptible to soil structure decline.
- *Susceptibility to soil nutrient decline.* The sandy soils just south of Wurdee Boluc Reservoir include 550 ha of soils used for grazing and 18 ha of soils used for cropping which are very highly susceptible to nutrient decline. Approximately 7,200 ha of grazing land and 2,900 ha of cropping land are highly susceptible to soil nutrient decline. These include the sandy soils south of Winchelsea, west and north of Lake Modewarre and a large area south of Lethbridge to Murgheboluc.
- *Susceptibility to soil acidification.* In general, the same soils that are susceptible to soil nutrient decline are also susceptible to soil acidification. These are described above.
- *Susceptibility to soil erosion by wind.* The soils of 3,100 ha of grazing land and 2,000 ha of cropping land are susceptible to wind erosion. These include the sandy and alluvial soils of the area west and north of Lake Modewarre, and the Sandy Creek catchment east of Teesdale.

Relative Risk to Assets

According to the relative risk to assets analysis, results indicate *(Fig. C28):*

- secondary salinity, sheet/rill erosion, soil structure decline and waterlogging all pose a relatively moderate risk to assets in the Middle Barwon Landscape Zone
- landslides, acid sulphate soils, wind erosion, soil nutrient decline, soil acidification and gully/tunnel erosion pose a relatively low risk to assets in the Middle Barwon Landscape Zone.

Soil threatening process	Rank across entire region	Relative risk values
1. Secondary salinity	35	296
2. Sheet/rill erosion	36	294
3. Soil structure decline	=40	268
4. Waterlogging	42	257
5. Landslides	97	107
6. Acid sulphate soils	103	95
7. Wind erosion	=104	93
8. Soil nutrient decline	110	80
9. Soil acidification	=113	72
10. Gully/tunnel erosion	116	66

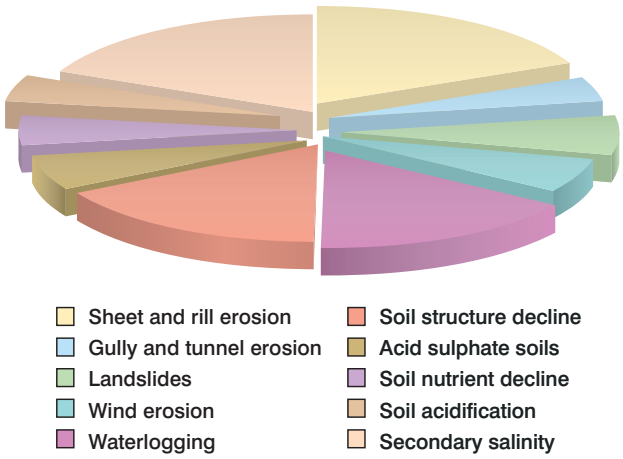


Figure C28: The rank and Relative Risk Values for soil-threatening processes in the Middle Barwon Landscape Zone

C.15 Aire

- **35,319 hectares or 2.6% of Corangamite CMA region**
- **60% public land**

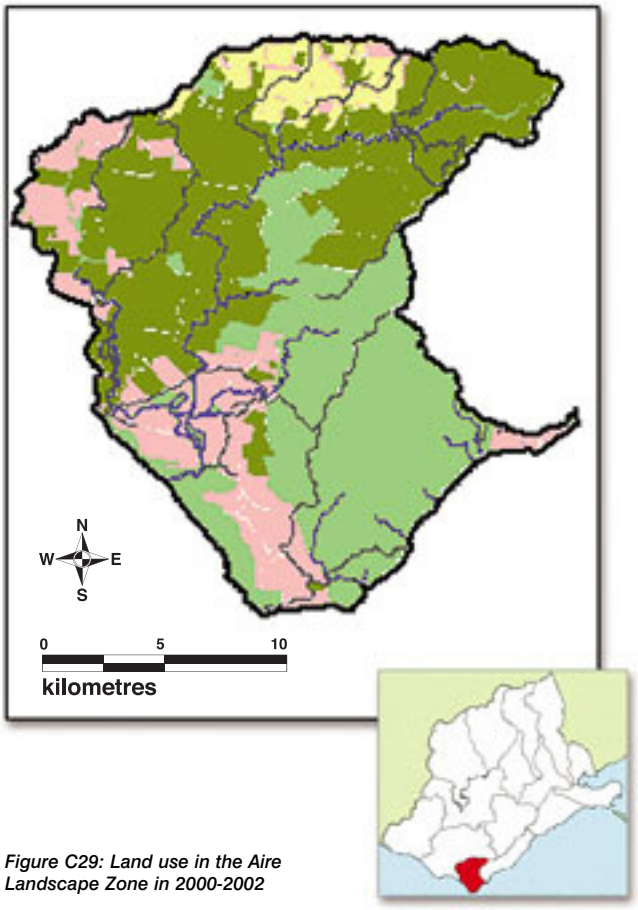


Figure C29: Land use in the Aire Landscape Zone in 2000-2002

Land use

- Conservation
- Forestry
- Cropping
- Horticulture
- Grazing
- Dairy
- Animal production
- Mining
- Peri-urban
- Urban
- Infrastructure
- Water

Land use	Number of polygons mapped	Total area hectares	Total area percentage
Conservation	138	13017.9	36.9
Forestry	92	14005.0	39.7
Dairy	37	1773.5	5.0
Grazing	151	5780.0	16.4
Peri-Urban	2	1.1	0.0
Urban	6	11.5	0.0
Total	**426**	**34589.0**	**97.9**

Assets

- Many of the 989 km of waterways are high-value assets because of their pristine condition. In particular, the Aire River estuary is a high-value environmental asset.
- 4 wetlands (0.2% of area).
- Native vegetation conservation significance potential: 17.8% of total landscape zone is rated as very high, 5.4% of total landscape zone is rated as high.
- 152 km of roads.
- Great Otway National Park.
- Cape Otway coastline and associated marine parks.

Threats

To public assets

- *Landslides.* Eighty-three landslides occur within 50 m of a waterway in the upper Aire River valley, the west branch of the Ford River, and the Lower Aire River in the Hordern Vale district.
- *Soil erosion by water.* Five sheet/rill erosion sites are mapped within 50 m of a waterway, and one intersection with native vegetation of high conservation significance potential. The risk of sediment input through erosion of the upper Aire River is considered high. The high turbidity following rainfall events may contribute nutrients and degrade water quality.
- *Potential acid sulphate soils.* Approximately 465 ha of native vegetation with very high conservation significance value intersects with potential acid sulphate soils in the coastal region, as do five wetlands (60 ha). Potential acid sulphate soils have been mapped within a 50 metre buffer of nearly 300 km of waterways and 7 km of roads.

To private assets

- *Susceptibility to soil structure decline.* There are 98 ha of dairy land highly susceptible to soil structure decline in the Little Aire Creek valley, and 3,016 ha of grazing land highly susceptible to structural decline in the Hordern Vale, Glen Aire and Johanna Heights area.
- *Susceptibility to soil waterlogging.* About 1187 ha of grazing land is highly susceptible to soil waterlogging in the Cape Otway, Hordern Vale, and Glen Aire areas.
- *Landslides.* There are 17 landslides mapped in dairy land mostly in the Weeaproinah – Wyelangta area, and 43 landslides are mapped on grazing land mostly in the Hordern Vale – Glen Aire district and the Johanna Heights – Lavers Hill district.
- *Soil erosion by water.* The occurrences are relatively minor when compared to other landscape zones. Six sheet/rill erosion sites are mapped on dairy land and 14 sheet/rill erosion sites are mapped on grazing land.

Relative Risk to Assets

According to the relative risk to assets analysis, results indicate *(Fig. C30):*

- landslides pose the greatest risk in the Aire Landscape Zone, ranked 20th-highest relative risk of all soil-related threatening processes across the Corangamite region
- acid sulphate soils also pose a relatively high risk to assets in the Aire Landscape Zone
- soil nutrient decline and soil structure decline pose a relatively moderate risk to assets in the Aire Landscape Zone
- wind erosion, waterlogging, soil acidification and sheet/rill erosion pose a relatively low risk to assets in the Aire Landscape Zone
- no known gully/tunnel erosion or secondary salinity is found in the Aire Landscape Zone, and therefore pose no risk to assets.

Soil threatening process	Rank across entire region	Relative risk values
1. Landslides	20	548
2. Acid Sulphate Soils	30	402
3. Soil Nutrient Decline	=66	184
4. Soil Structure Decline	=78	145
5. Wind Erosion	93	118
6. Waterlogging	118	58
7. Soil Acidification	126	38
8. Sheet/rill erosion	131	26
9. Gully/tunnel erosion	=143	0
10. Secondary Salinity	=143	0

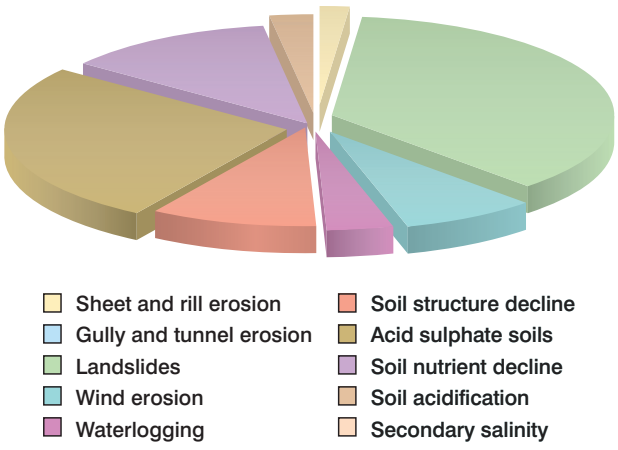


Figure C30: The rank and Relative Risk Values for soil-threatening processes in the Aire Landscape Zone