

Glenelg Strategic Land Use Study

Volume Two



August 2010

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1 Executive Summary

2 Executive Summary Volume 2

Volume 2

2.1 Introduction

Volume two of the Glenelg Sustainable Land Use Study focuses on Glenelg Shire's residential zones (i.e. Residential1, Township, Low Density Residential, Rural Conservation, Farm Zone and Rural Living).

The residential analysis examines current land use; physical impediments; land fragmentation; subdivision and building permit activity; forecast demand and supply of land; soil characteristics and challenges and options for each respective zone.

Residential 1 Zone

Portland, Heywood and Casterton each have R1Z zoning

Challenges

- The future demography of Glenelg is aging
- Glenelg has a low forecast population growth
- For Portland, Casterton and Heywood the preliminary analysis indicates there is sufficient Residential 1 zone land to accommodate the current and proposed future growth for the next 20 years
- Should growth rates increase over 2% per annum in the next decade a case can be made to subdivide more land in Portland
- Residential Land is constrained because of natural impediments and industrial development
- Large residential 1 areas partially developed

Options

- Encourage Residential 1 infill
- Define future residential growth corridors for Portland

Township Zone

Challenges

- No sustained residential development in the 6 township areas (Dartmoor, Digby, Merino, Sandford, Narrawong and Nelson)
- Coastal township areas will be impacted by sea level rise
- Potential township of Cape Bridgewater
- Reverting to the original township boundaries for Digby and Dartmoor to increase the size of both townships.
- Infrastructure issues (waste water Nelson and Narrawong)

Options

- Options are limited
- Possibly establish township boundary for Cape Bridgewater
- Possibly expansion of Nelson

Rural Conservation Zone 1 & 2

Challenges

- Has become a hobby farm zone by default
- To preserve the agricultural and environmental values of the zone
- Is this zone relevant

Options

- Areas which have been developed or have lost their agricultural / horticultural or environmental significance could be rezoned to other residential zones

Rural Living Zone

Challenges

- Relevance and DPO 7 associated issues

Options

- Identify potential new areas for zone or reflect rural living purposes

Low Density Residential Zone

Challenges

- Is this zone relevant?

Options

- Identify areas which are more consistent with low level residential purposes

Farm zone

Challenges

- Keeping the right to farm
- Land degradation
- Excision of dwellings
- Climate Change
- Declining population
- Aggregation of farming operations
- New state wide farming zones

Options

- Retain subdivision sizes
- Review right to excise lots
- Possible introduction of new State wide farming zones

3 Volume Two Glenelg Sustainable Land Use Study

4 Residential Zones

4.1 Introduction

There are six residential zones used in Glenelg. They are

- Residential 1,
- Low Density Residential,
- Township,
- Rural Living,
- Rural Conservation Zone and
- Farming zone

5 Residential 1 Zone

5.1 Purpose

The Residential 1 zone has three basic purposes:

- To provide for residential development at a range of densities with a variety of dwellings to meet the housing needs of all households.
- To encourage residential development that respects the neighbourhood character.
- In appropriate locations, to allow educational, recreational, religious, community and a limited range of other non-residential uses to serve local community needs

Each of the residential zones has certain restrains or requirements relating to lot size and activities that are permitted under its respective zone. The Residential 1 zone exists in Portland, Casterton and Heywood. Table 1 shows that there are 6904 R1Z parcels in the shire.

Table 1 Residential 1 Parcels in Glenelg by location

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid CASTERTON	1042	15.1	15.1	15.1
HEYWOOD	666	9.6	9.6	24.7
PORTLAND	4954	71.8	71.8	96.5
PORTLAND NORTH	242	3.5	3.5	100.0
Total	6904	100.0	100.0	

Source: Glenelg Shire

5.2 Land Use

There are 26 separate categories of Residential 1 zoned land in Glenelg Shire as shown in Table 2.

Casterton has 5 categories

- *C –commercial / industrial built;*
- *C-commercial land;*
- *C – non rateable;*
- *C- Residential Built;*
- *C residential land.*

Heywood has 4 categories

- *H – commercial built;*
- *H non rateable;*
- *H Residential built; and*
- *H residential land.*

Portland has 8 categories

- *P-commercial / industrial built;*
- *P-commercial / industrial land;*
- *P- culture / recreation;*
- *P – historical;*
- *P - non rateable;*
- *P- residential built;*
- *P- residential land;*
- *P- rural / residential land).*

The B categories (areas outside Portland, Casterton and Heywood) the Residential 1 zone has 9 categories

- *B-commercial – industrial built;*
- *B commercial industrial land;*
- *B farm land; B non rateable;*
- *B recreation built / land;*
- *B residential built;*
- *B residential land;*
- *B rural / residential built;*
- *B rural / residential land*

Table 2 illustrates the various property descriptions by location (Casterton, Heywood, Portland and north Portland). Rows coloured red represent levy codes for built infrastructure, blue is vacant land and green represents non rate parcels.

Table 2 RZ1 Property levy totals by Location

	CASTERTON	HEYWOOD	PORTLAND	N Portland	Total
Levy_	10	5	42	1	58
Desc					
B-Comm/Indust Built	8	3	0	0	11
B-Comm/Indust Land	1	0	0	0	1
B-Farm Land	2	2	0	0	4
B-Non Rateable	0	2	0	0	2
B-Recreation Built/land	1	6	0	0	7
B-Residential Built	190	59	0	0	249
B-Residential Land	9	6	0	0	15
B-Rural/Resid Built	18	2	0	0	20
B-Rural/Resid Land	8	2	0	0	10
C-Comm/Indust Built	25	0	0	0	25
C-Comm/Indust Land	3	0	0	0	3
C-Non Rateable	21	0	0	0	21
C-Residential Built	622	0	0	0	622
C-Residential Land	118	0	0	0	118
H-Comm/Indust Built	0	8	0	0	8
H-Non Rateable	0	24	0	0	24
H-Residential Built	0	492	0	0	492
H-Residential Land	0	53	0	0	53
P-Comm/Indust Built	0	0	73	1	74
P-Comm/Indust Land	0	0	3	0	3
P-Culture/Recreation	0	0	2	0	2
P-Historical	0	0	1	0	1
P-Non Rateable	6	2	146	7	161
P-Residential Built	0	0	4185	135	4320
P-Residential Land	0	0	501	98	599
P-Rural/Resid Land	0	0	1	0	1
Total	1042	666	4954	242	6904

Certain Land Use activities in the Residential 1 zone may or may not be regulated through the use or application of a planning overlay. Generally, overlays apply to a single issue or related set of issues (such as heritage, an environmental concern or flooding). Where more than one issue applies to land, multiple overlays can be used. Overlays must have a strategic justification. Many overlays have schedules to specify local objectives and requirements. Generally overlays may only make requirements about development not use. Overlays do not change the intent of the zone. In the residential 1 zone there are 8 currently listed overlays. These overlays include Development Overlays (DPO1 and DPO3); Environment Audit Overlay's (EAO), Environment Significant Overlay's (ESO); Heritage Overlay's (HO); Land subject to Inundation Overlays (LSIO) and Registered Flood Overlay (RFO).

Table 3 highlights the level and concentration of Overlays in the Residential 1 zone by location across Glenelg.

Table 3 R1Z Level and concentration of Overlays by Location

	locality				Total
	CASTERTON	HEYWOOD	PORTLAND	PORTLAND NORTH	
Overlay	782	559	4295	241	5877
DPO1	0	107	346	0	453
DPO3	75	0	14	0	89
EAO	2	0	0	0	2
ESO2	0	0	1	0	1
HO	13	0	298	1	312
LSIO	52	0	0	0	52
RFO	118	0	0	0	118
Total	1042	666	4954	242	6904

Source: Glenelg Shire

The respective 8 overlays interact with the 26 respective levy categories is shown in Tables 4 and 5.

Table 4 R1Z Levy Description impacted by Respective Overlay

		DPO1	DPO3	EAO	ESO2
Levy_Desc	45	4	1	0	0
B-Comm/Indust Built	7	3	1	0	0
B-Comm/Indust Land	0	0	1	0	0
B-Farm Land	0	2	2	0	0
B-Non Rateable	0	2	0	0	0
B-Recreation Built/land	1	5	0	0	0
B-Residential Built	155	56	33	0	0
B-Residential Land	5	6	2	2	0
B-Rural/Resid Built	5	2	9	0	0
B-Rural/Resid Land	0	2	8	0	0
C-Comm/Indust Built	16	0	0	0	0
C-Comm/Indust Land	3	0	0	0	0
C-Non Rateable	18	0	0	0	0
C-Residential Built	498	0	17	0	0
C-Residential Land	69	0	1	0	0
H-Comm/Indust Built	5	3	0	0	0
H-Non Rateable	23	1	0	0	0
H-Residential Built	471	21	0	0	0
H-Residential Land	49	4	0	0	0
P-Comm/Indust Built	57	1	0	0	0
P-Comm/Indust Land	2	0	0	0	0
P-Culture/Recreation	1	0	0	0	0
P-Historical	1	0	0	0	0
P-Non Rateable	132	10	0	0	0
P-Residential Built	3860	202	11	0	1
P-Residential Land	454	128	3	0	0
P-Rural/Resid Land	0	1	0	0	0
Total	5877	453	89	2	1

Source: Glenelg Shire

Table 5 R1Z Levy description impacted by Respective Overlay

	HO	LSIO	RFO	Total
Levy_Desc	2	5	1	58
B-Comm/Indust Built	0	0	0	11
B-Comm/Indust Land	0	0	0	1
B-Farm Land	0	0	0	4
B-Non Rateable	0	0	0	2
B-Recreation Built/land	1	0	0	7
B-Residential Built	0	5	0	249
B-Residential Land	0	0	0	15
B-Rural/Resid Built	0	1	3	20
B-Rural/Resid Land	0	0	0	10
C-Comm/Indust Built	0	1	8	25
C-Comm/Indust Land	0	0	0	3
C-Non Rateable	0	2	1	21
C-Residential Built	12	32	63	622
C-Residential Land	0	6	42	118
H-Comm/Indust Built	0	0	0	8
H-Non Rateable	0	0	0	24
H-Residential Built	0	0	0	492
H-Residential Land	0	0	0	53
P-Comm/Indust Built	16	0	0	74
P-Comm/Indust Land	1	0	0	3
P-Culture/Recreation	1	0	0	2
P-Historical	0	0	0	1
P-Non Rateable	19	0	0	161
P-Residential Built	246	0	0	4320
P-Residential Land	14	0	0	599
P-Rural/Resid Land	0	0	0	1
Total	312	52	118	6904

Source: Glenelg Shire

5.3 Current Land Use Analysis

The current R1Z zone contains 6904 parcels which have been segmented into 26 categories of property levy codes. As highlighted by Table 4 there are 10 major categories of property descriptions

- *Commercial- Industrial built;*
- *Commercial Industrial land;*
- *Farm land;*
- *Non rateable land;*
- *Recreation built land;*
- *Residential Built;*
- *Residential Land;*
- *Rural Residential built;*
- *Rural residential land and*
- *Historic.*

Table 2 (i.e. red shaded areas) illustrates that approximately 85 % of the all R1 zoned land (5830 out of 6904 parcels) has some sort of built structure on it. Only 11.7 % of R1Z (814 or the 6904 parcels) as indicated by the light blue shading is vacant land. Property that is non-rated has been colored light green and represents approximately 3% of the total R1Z zone (208 out of 6904 parcels). As indicated in Table 105 the Glenelg Residential 1 zone has been partially influenced through the allowing of industrial activities in to a residential zone. The inclusion has taken two forms. The first is allowing the construction of commercial and industrial buildings and facilities. The second inclusion is the designation of selected vacant parcels in the residential 1 zone as having the status of commercial industrial land. The Portland area has 74 designated commercial / industrial facilities in the Residential 1 zone. Map 1 shows the residential parcels in red and the 74 industrial operations located in the R1Z in blue.

Map 1 R1Z Commercial- Industrial Operations located in Portland



Source: Glenelg Shire

As indicated by Map 1 the 74 built facilities are scattered throughout the residential area. They range from maintenance depots and works yards through to offices and retail outlets. Map 2 shows the location of a maintenance depot in the center of a residential area.

Map 2 R1Z Maintenance Depot in North Portland Residential Zone 1



Source: Glenelg Shire

5.4 Residential 1 Parcel Size

The size of individual lots in the residential zone varies widely. Six lot size categories were developed to better classify and understand the dispersion of lot sizes across Glenelg

The class sizes range from 100 sq meter parcels up to parcels with over 50,000 square meters in area. The lot size area category which was most numerous was between 0 sq meters and 2000 square meters. Table 6 illustrates the frequency of the various lot size categories across Glenelg.

Table 6 R1Z Frequency of Parcel Area in Glenelg

	locality				Total
	CASTERTON	HEYWOOD	PORTLAND	PORTLAND NORTH	
new_ <2000.00	866	555	4612	230	6263
area 2000><4000	103	70	178	8	359
4000><6000.	39	15	76	2	132
6000><8000.	6	6	19	0	31
8000><10000.	11	4	8	0	23
> 10,000	15	16	58	2	91
Total	1040	666	4951	242	6899

Source: Glenelg Shire

5.5 Subdivision Permit Activity

For the period 2000 - 2010 there were 106 subdivision applications submitted for the Residential 1 Zone (R1Z). Table 7 shows the year and the number of subdivisions permits received by Glenelg Shire.

Table 7 R1Z Subdivision permits by year

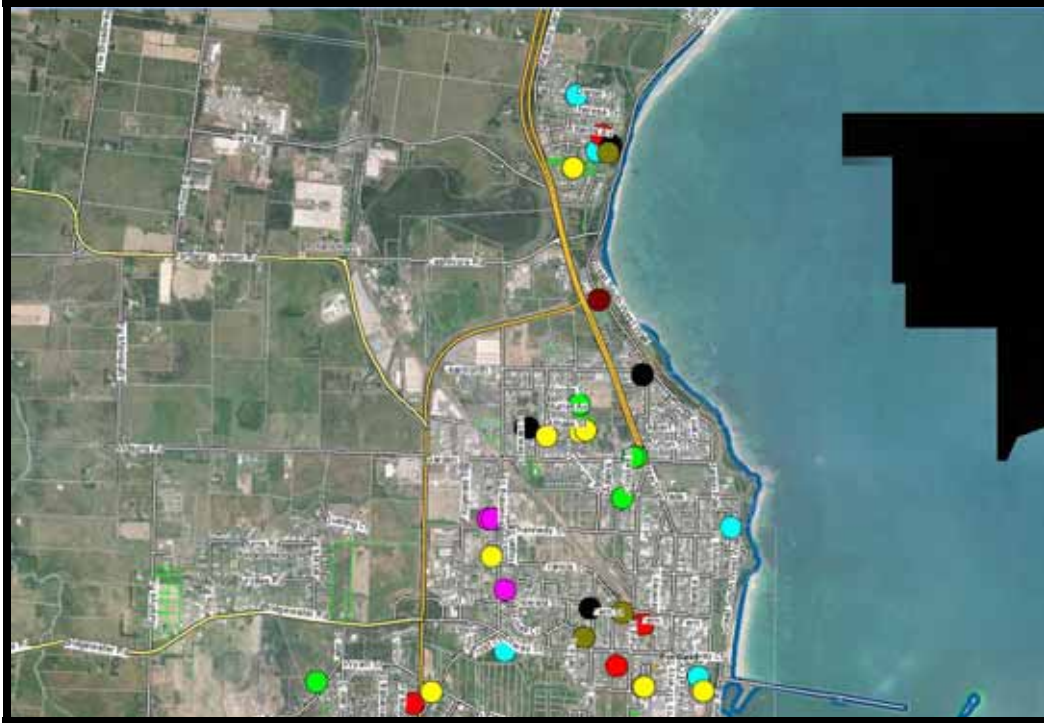
		Application Date			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2002	7	6.6	6.7	6.7
	2003	8	7.5	7.6	14.3
	2004	2	1.9	1.9	16.2
	2005	8	7.5	7.6	23.8
	2006	20	18.9	19.0	42.9
	2007	17	16.0	16.2	59.0
	2008	15	14.2	14.3	73.3
	2009	18	17.0	17.1	90.5
	2010	10	9.4	9.5	100.0
	Total	105	99.1	100.0	
Missing	System	1	.9		
	Total	106	100.0		

Source: Glenelg Shire

Subdivision development in the R1 zone has occurred through the entire time period. This development has occurred in Portland Casterton and Heywood. Maps 3 and 4 indicate the subdivision development in Portland. Map 5 and 6 represent R1Z subdivision development for Heywood and Casterton respectively.

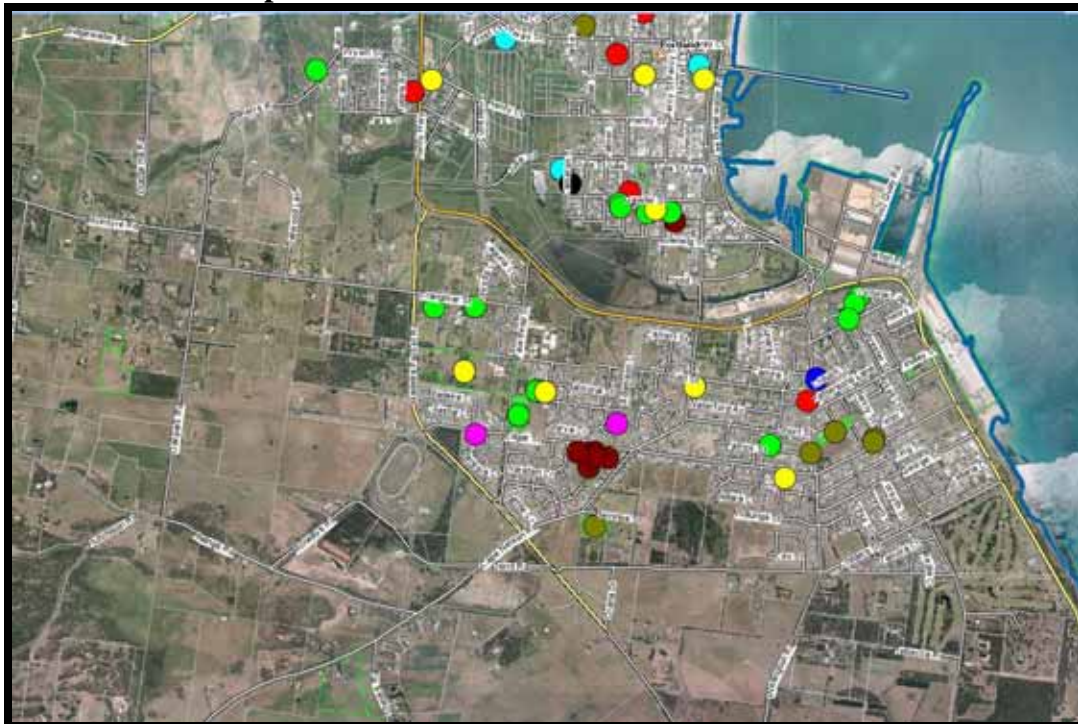
The colour key for the respective maps are Black 2010, yellow 2009, Red 2008, Dark Gold 2007; Light green 2006; light blue 2005; Dark blue 2004; Pink 2003; Brown 2002; forest Green 2001 and Teal 2000.

Map 3 R1Z Subdivision Permits North Portland



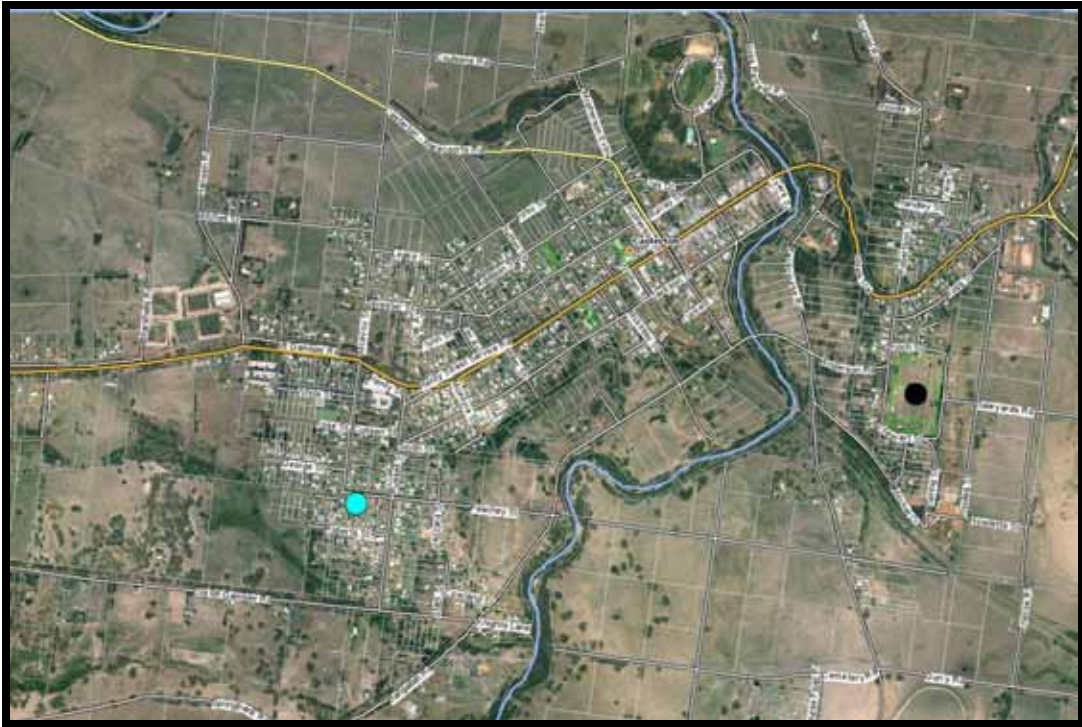
Source: Glenelg Shire

Map 4 R1Z Subdivision Permits South Portland



Source: Glenelg Shire

Map 5 R1 Subdivisions Casterton



Source: Glenelg Shire

Map 6 R1 Subdivisions Heywood



Source: Glenelg Shire

The 106 subdivision plans with their respective locations are highlighted in Table 8.

Table 8 R1 Subdivision Permits by Location

		town			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Casterton	2	1.9	1.9	1.9
	Heywood	11	10.4	10.4	12.3
	Portland	93	87.7	87.7	100.0
	Total	106	100.0	100.0	

Source: Glenelg Shire

As indicated by the Table 9 the breadth of subdivision proposals ranges from actual subdivisions through certifications, consolidations and removal of easements.

Table 9 R1Z Subdivision proposal by location

Proposal1 * town Crosstabulation

Count		town			
		Casterton	Heywood	Portland	Total
Proposal1	Certification	1	10	58	69
	Certification and SOC	0	0	3	3
	Consolidation	0	0	3	3
	Creation of an Easement	0	0	1	1
	Removal of an Easement	0	0	1	1
	Subdivision	1	1	27	29
	Total	2	11	93	106

Source: Glenelg Shire

The 106 proposals are at various stages of completion. Table 10 shows the year in which the subdivision permit was applied for and its progress through the Glenelg Planning Department.

As indicated by the Table 10 75 applications have been processed through the planning department. Twenty nine applications dating back to 2006 (2 in 2006; 1 in 2007; 3 in 2008; 13 in 2009; 10 in 2010) are still being process. One application lapsed in 2004 which accounts for the total 30 applications that are still being process by the Glenelg Planning Department

Table 10 R1Z Subdivision Permit Progress through the Glenelg Planning Department

		Application Date									
		2002	2003	2004	2005	2006	2007	2008	2009	S010	Total
Decision	Allocated to Planner	0	0	0	0	0	0	0	0	3	3
	Certified and SOC Issued	0	0	0	8	18	14	10	4	0	54
	Certified Only	1	1	0	0	0	2	2	1	0	7
	Further Info Requested	0	0	0	0	0	0	0	1	0	1
	Lapsed	0	0	1	0	0	0	0	0	0	1
	Outstanding Requirements	0	0	0	0	0	0	0	1	0	1
	Permit Approved	6	7	1	0	0	0	0	0	0	14
	Referral	0	0	0	0	1	1	3	11	5	21
	Report Writing	0	0	0	0	0	0	0	0	2	2
	Withdrawn	0	0	0	0	1	0	0	0	0	1
	Total	7	8	2	8	20	17	15	18	10	105

Source: Glenelg Shire

5.6 Building Permit Activity

An analysis of residential building permits for R1Z zone indicates multiple permits were issued for the same parcel(s). For the 10 year period 2000-2009 4,016 multiple permits were issued for the residential zone. When the duplicate permits for the relevant parcels were removed only 2690 unique parcels were issued with building permits. This reduction represents 32% of the total volume of permits issued for the 10 year period.

Table 11 R1 Z Total Building Permit Activity 2000-09

Glenelg Shire			
Year	Multiple Building Permits	Actual Building Permits	Duplicates
2000	378	265	113
2001	365	249	106
2002	423	304	119
2003	444	321	123
2004	377	262	115
2005	386	364	122
2006	287	208	79
2007	399	213	186
2008	307	216	91
2009	652	421	231
Total	4016	2690	1326

Source: Glenelg Shire

5.6.1 Rationalized Building Permits

The actual number of building permits that that was generated in Glenelg Shire from 2000 through 2009 is indicated in Table 12. This Table shows that there were 2690 permit sites over the 10 year period with a combined construction value of \$162 million.

Table 12 R1Z Total Rationalized Building permits for Portland, Casterton and Heywood

Casterton			Heywood			Portland		
Year	Number	Value	Year	Number	Value	Year	Number	Value
2000	41	\$411,896	2000	28	\$686,554	2000	193	\$3,672,223
2001	30	\$628,740	2001	19	\$308,104	2001	197	\$7,159,501
2002	24	\$493,370	2002	24	\$405,200	2002	250	\$11,425,400
2003	31	\$1,453,604	2003	22	\$509,571	2003	265	\$14,867,250
2004	38	\$1,056,737	2004	16	\$586,771	2004	206	\$11,645,579
2005	23	\$441,370.3	2005	26	\$1,369,828	2005	211	\$11,334,673
2006	26	\$649,428.7	2006	14	\$2,225,110	2006	165	\$12,179,103
2007	17	\$756,056	2007	16	\$986,901	2007	178	\$19,013,770
2008	19	\$869,898	2008	20	\$1,124,475	2008	175	\$16,800,249
2009	31	\$1,163,768	2009	32	\$1,550,034	2009	353	\$36,291,995
Total	280	\$7,924,868	Total	217	\$9,752,548	Total	2193	\$144,389,745

Source: Glenelg Shire

The rationalized building permits were then further segmented to determine the number of houses that were constructed in Portland, Casterton and Heywood during the period 2000 through 2009. The number of houses that were constructed during that period provides a barometer as to the demand for vacant or serviced residential land in the three towns

During the ten year period 2000 - 2009 a total of 416 houses / dwellings was constructed in Portland, Casterton and Heywood. The total value of this construction was estimated to be \$ 63.6

million. As indicated by Table 13 Portland had the largest share of the construction activity accounting for 85.5 % followed by Casterton with 7.4 % and Heywood with 6.9%.

Table 13 R1Z Number and value of House Permits 2000-2009

Casterton			Heywood			Portland		
Year	Number	Value	Year	Number	Value	Year	Number	Value
2000	10	\$37,850	2000	5	\$410,414	2000	51	\$1,369,537
2001	4	\$20,000	2001	1	\$330,800	2001	16	\$930,597
2002	3	\$52,500	2002	2	\$148,665	2002	29	\$1,127,474
2003	1	\$87,157	2003	2	\$349,925	2003	50	\$8,520,440
2004	2	\$210,091	2004	3	\$217,740	2004	37	\$6,584,945
2005	2	\$218,748	2005	2	\$394,550	2005	28	\$5,125,202
2006	1	\$150,899	2006	3	\$1,026,310	2006	42	\$8,211,008
2007	2	\$394,429	2007	4	\$695,381	2007	58	\$12,769,969
2008	3	\$613,420	2008	3	\$761,800	2008	9	\$2,147,765
2009	3	\$601,092	2009	4	\$862,420	2009	36	\$9,266,889
Total	31	\$2,386,186	Total	29	\$5,198,005	Total	356	\$56,053,826

Source: Glenelg Shire

5.7 Current R1 Z Portland

Map 7 illustrates the extent of the R1Z in the greater Portland Area. The Residential R1 zone is highlighted in red.

Map 7 Residential R1 Zone in the Greater Portland Area



Source: Glenelg Shire

As indicated by Tables 14 the vast majority of R1 zoned parcels are located within a five km radius of the major centers.

Table 14 Residential 1 Zone Parcels within a 5 km radius of Portland

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1708	24.7	24.7	24.7
Yes	5196	75.3	75.3	100.0
Total	6904	100.0	100.0	

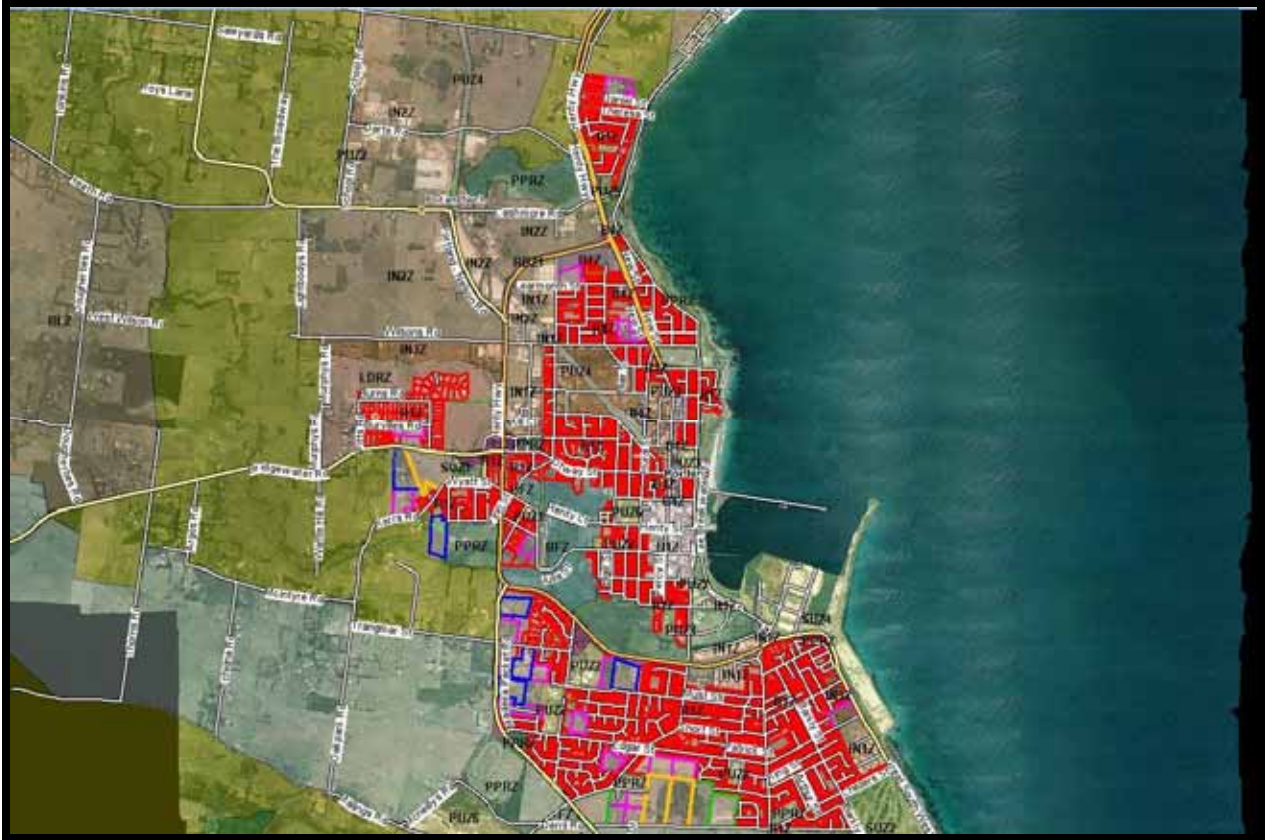
Source: Glenelg Shire

5.7.1 Portland Lot Sizes

The 93% (4842 out of 5193) of the lots in greater Portland are less than 2,000 square meters in size (red parcels). The percentage distribution for other lot sizes is 3.6 % (186 out of 5193) for lots greater than 2,000 square meters and less than 4,000 square meters; 1.5 % (80 out of 5193) for lots greater than 4,000 and less than 6,000 square meters; 0.37% (19 out of 5193) for lots greater than 6,000 and less than 8,000 square meters; 0.15 % (8 out of 5193) for lots greater than 8,000 and less than 10,000 square meters and 1.16% (60 out of 5193) for lots greater than 10,000 square meters

Map 8 illustrates the various lot sizes in the R1 residential zone. Lots fewer than 2,000 square meters are coloured red; greater than 2,000 and less than 4,000 square meters are pink; greater than 4,000 and less than 6,000 square meters are green; greater than 6,000 and less than 8,000 are gold and lots greater than 10,000 square meters are brown

Map 8 R1Z Portland Lots Size distribution



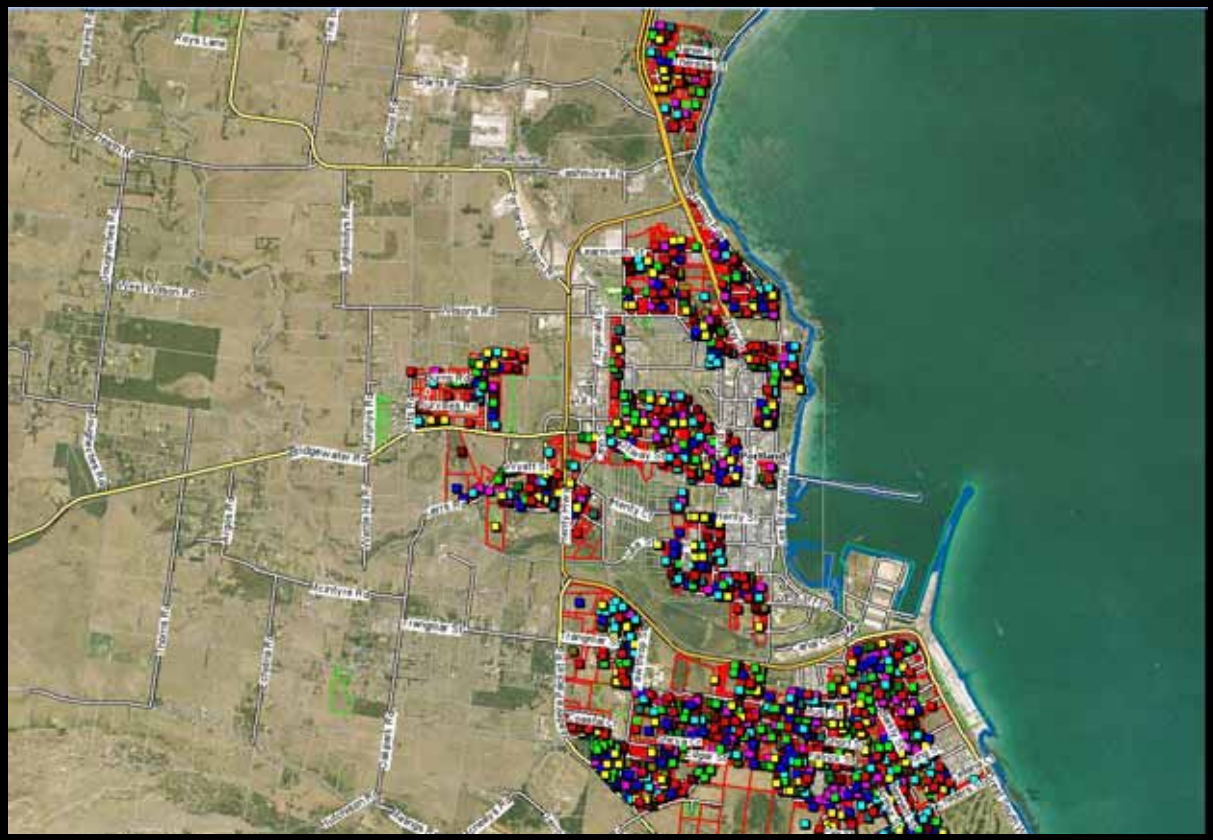
Source: Glenelg Shire

5.7.2 Portland Building Permit Activity

The distribution of total permits covers the entire R1Zone of Portland. Each year of building permits is represented by a different colour (the colour key is Yellow 2009; Red 2008; Dark Gold 2007; Light Green 2006; Light Blue 2005; Dark Blue 2004; Pink 2003; Brown 2002; forest Green 2001 and Teal 2000) Map 83 is a representation of the 2,193 total permits issued from 2000 through 2009.

As indicated in Table 12 2009 had the most permits generated followed by 2003, 2002 and 2005.

Map 9 R1Z Portland Total Building Permit Activity 2000-09



Source: Glenelg Shire

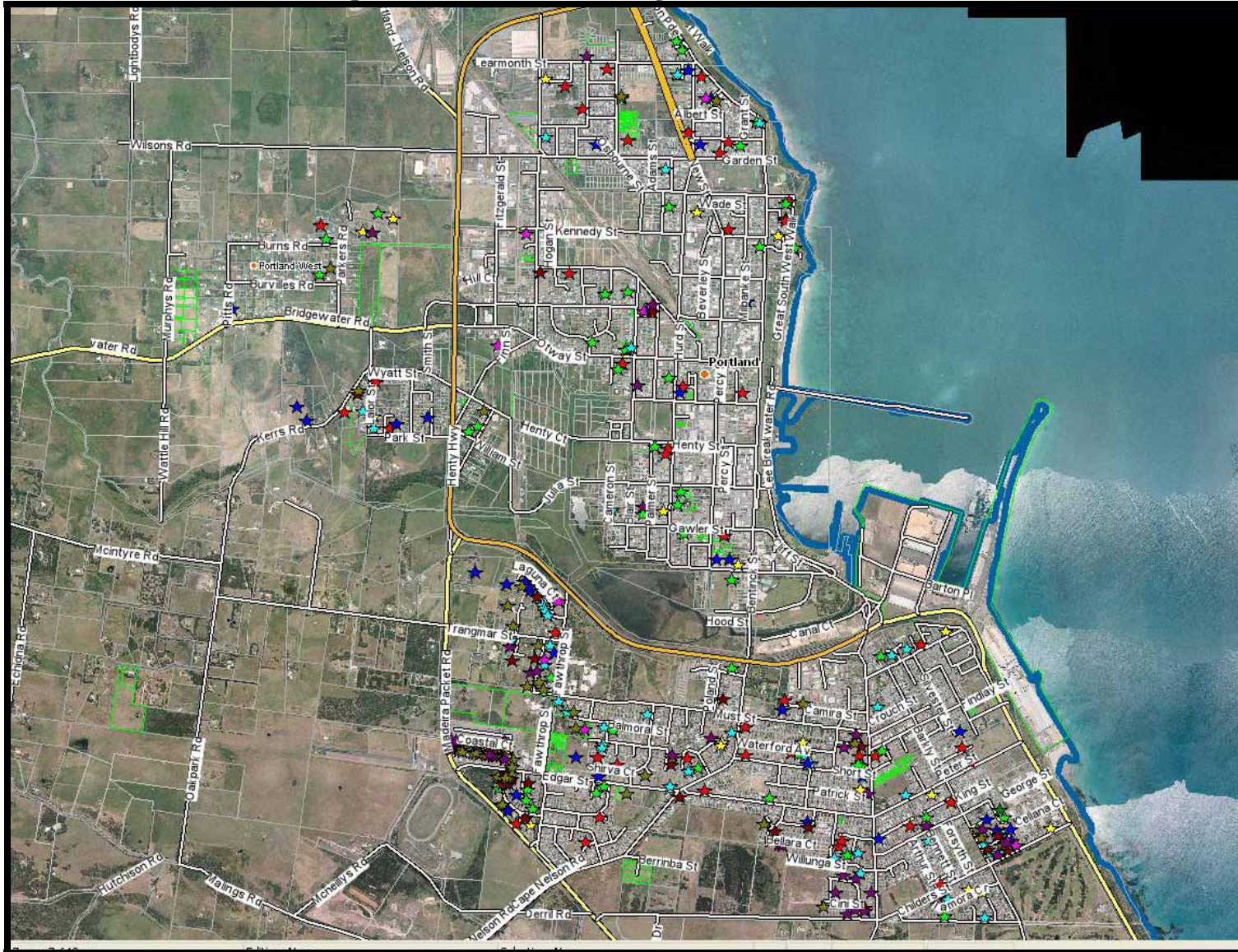
5.7.3 Portland House Permits

For the ten year period (2000 – 2009), the Glenelg building permit records indicate 356 dwellings / houses were constructed in Portland. This figure may include alterations and or extension to existing houses. When analyzing building permit records for the years 2000, 2001, 2002, 2003 and 2004 alterations and extensions were not separately classified and were lumped into a single category that also included newly constructed dwellings. Newly constructed homes impacted on a municipality’s land reserves whilst alterations and extensions have marginal if any impact of municipal land reserves.

Map 10 illustrated the 10 year building pattern of houses in the greater Portland area. The color key for Map 11 is Yellow 2009; Red 2008; Dark Gold 2007; Light Green 2006; Light Blue 2005; Dark Blue 2004; Pink 2003; Brown 2002; Forest Green 2001; Teal 2000.

The spatial pattern for housing development in Portland (i.e. 2000 – 2004) is diffused. During this time period there was no specific direction or growth corridor for new housing construction. In later year years 2005 – 2009 specific areas in the South Portland became focal points for new housing construction.

Map 10 R1Z Portland Dwellings constructed 2000-2009



Source: Glenelg Shire

5.7.4 Fire proneness of the Zone

This area does not represent a high fire risk area.

5.7.5 Land Use Impediments

The Portland R1 zone encounters various natural land use impediments. These impediments include: flooding, sink holes, heritage buildings and overlays, lack of physical infrastructure in certain areas, industrial build up in residential areas and the impact of industrial buffers to protect residential areas from industrial development.

5.7.6 Forecast demand and available Residential 1 Land Stocks

The following tables identify the amount of conventional residential zoned land (Residential 1 Zone) that may be required in Portland for future residential development under a range of potential town growth scenarios. Table 15 indicates that another 824 residential lots will be required over the next twenty years if the rate of residential lot take up experienced over the last 5 years (2004-2008) continues. While there is currently sufficient Residential 1 zoned land to accommodate this growth, a significant proportion of the residential zoned area may be constrained and unable to support conventional residential development. Should the current uptake of residential land increase to the rates identified in Table 16 additional land may be required to be rezoned

Table 15 R1Z Portland Residential Land Supply and Demand

Available Land and Demand	
Vacant residential lots (based on analysis of aerial photography in 2009)	600
House construction over 5 years (2004-2008)	206
Average annual lot take up (2004-2008)	41.2
Estimated current supply of Residential 1 zoned land (ha)	350*
20 Year Supply Requirement at current take up rate (ha)	82.4

* Significant area subject to constraints

Source: Glenelg Shire

Table 16 R1Z Portland Growth Scenarios and Land Requirements

Growth Scenarios	Low	Medium	High
	2%	4%	6%
Annual demand for Lots	100	200	300
Required land to meet 20 year Scenario	200 ha	400 ha	600 ha
Annual land required	10 ha	20 ha	30 ha

Source: Glenelg Shire

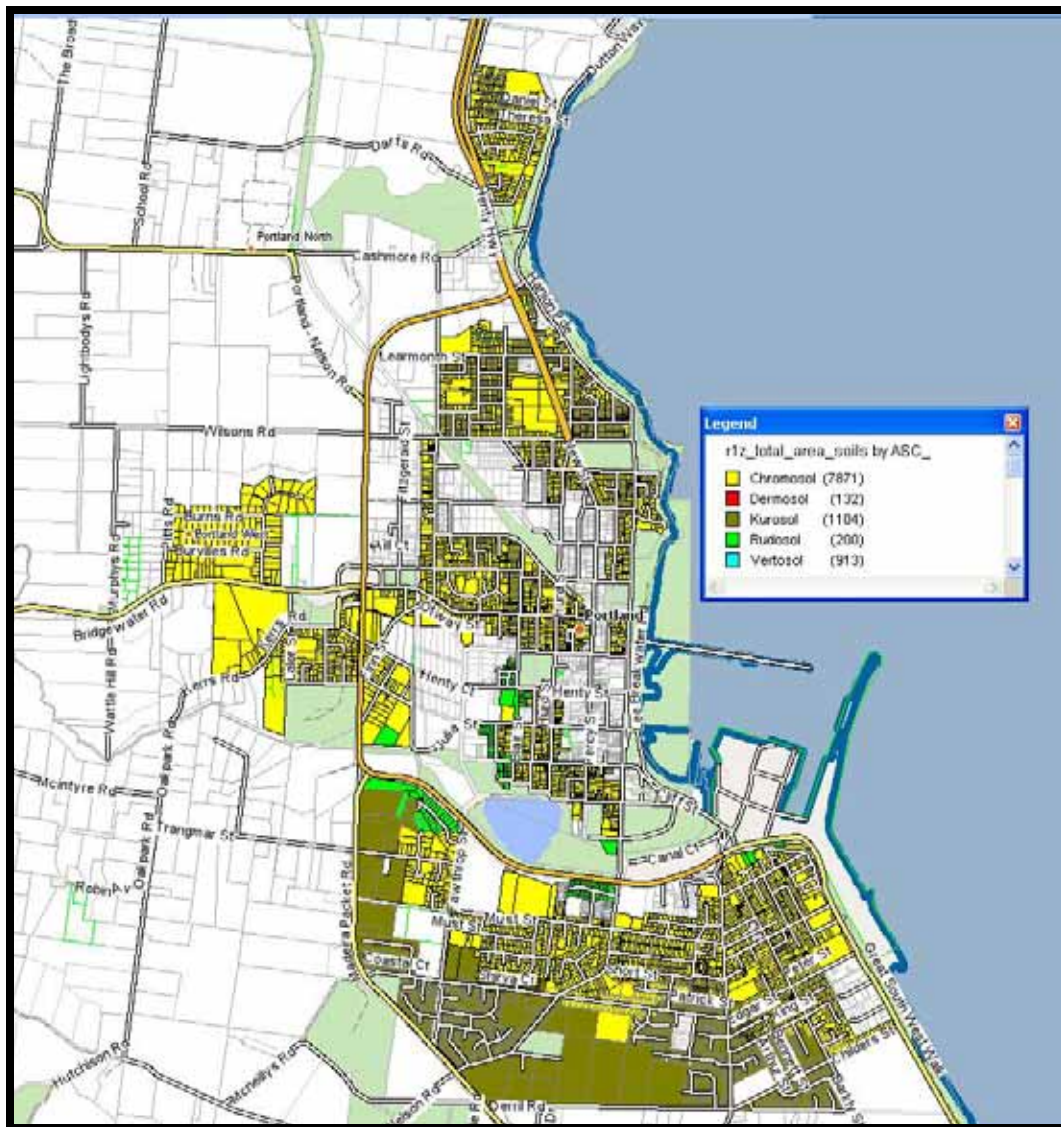
5.7.7 Levels of Fragmentation

There is a high level of fragmentation in the R1 zone mainly caused by the impact of industrial activities in the R1 zone.

5.7.8 Current R1 Soil Characteristics

The Portland R1 zone has the following soil characteristics as indentified by the Victorian Department of Primary industry (DPI) and the Department of Sustainability and Environment (DSE). As indicated by the Portland Soil Map there is three major soil categories

Map 11 R1Z Portland Soil Map



Source: Glenelg Shire

Table 17 R1Z Portland Chromosol Soil Profile

Soil Condition	Level
Acidification	Moderate
Dispersive Behaviour	Low
Land Instability	Low
Nutrient Decline	Low
Salinity	Low
Soil structure Decline	Low
Water Logging	Low
Water Erosion	Low
Wind Erosion	Low
pH	7.0
Impeding	<200
Drainage	Impervious
Topsoil	80-200

Source: Glenelg Shire

Table 18 R1Z Portland Rudosol Soil Profile

Soil Condition	Level
Acidification	Low
Dispersive Behaviour	Low
Land Instability	Low
Nutrient Decline	Low
Salinity	Low
Soil structure Decline	Moderate
Water Logging	Moderate
Water Erosion	Low
Wind Erosion	Low
pH	7.0
Impeding	>300
Drainage	Rapid
Topsoil	210

Source: Glenelg Shire

Table 19 R1Z Portland Kursol Soil Profile

Soil Condition	Level
Acidification	Moderate
Dispersive Behaviour	Low
Land Instability	Low
Nutrient Decline	Moderate
Salinity	Low
Soil structure Decline	Low
Water Logging	Low
Water Erosion	Moderate
Wind Erosion	Low
pH	7.10
Impeding	>300
Drainage	Moderate well drained
Topsoil	200

Source: Glenelg Shire

5.8 Current R1Z Casterton

Map 12 illustrates the extent of the R1Z in the greater Casterton Area. The Residential R1 zone is highlighted in red.

Map 12 R1 Zone in the Greater Casterton Area

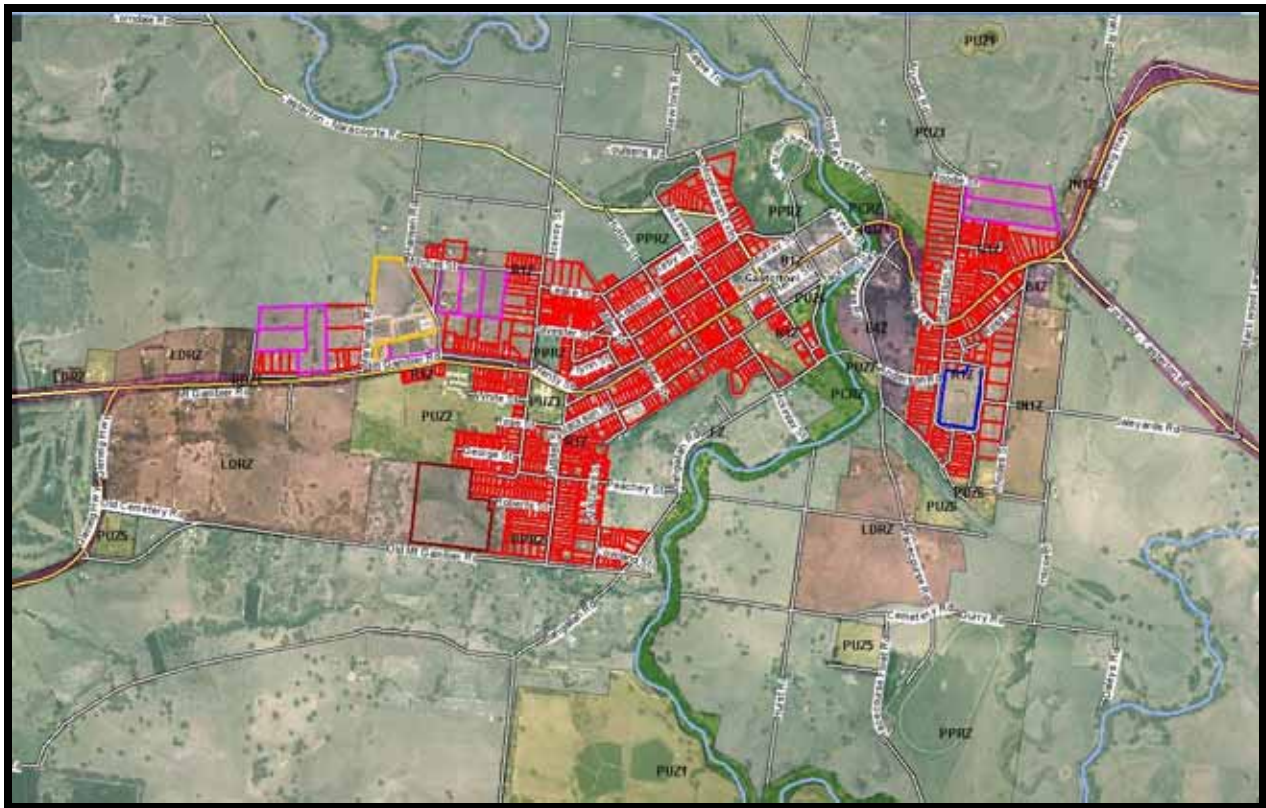


Source: Glenelg Shire

5.8.1 Casterton Lot sizes

The 83% (866 out of 1040) of the lots in greater Casterton are less than 2,000 square meters in size (red parcels). The percentage distribution for other lots sizes is 0.9 % (103 out of 1040) for lots greater 2,000 meters and less than 4,000 square meters; .03 % (39 out of 1040) for lots greater than 4,000 and less than 6,000 square meters; 0.005% (6 out of 1040) for lots greater than 6,000 and less than 8,000 square meters; 0.011 % (11 out of 1040) for lots greater than 8,000 and less than 10,000 square meters and 0.014% (15 out of 1040) for lots greater than 10,000 square meters

Map 13 R1Z Casterton Lot size distributions



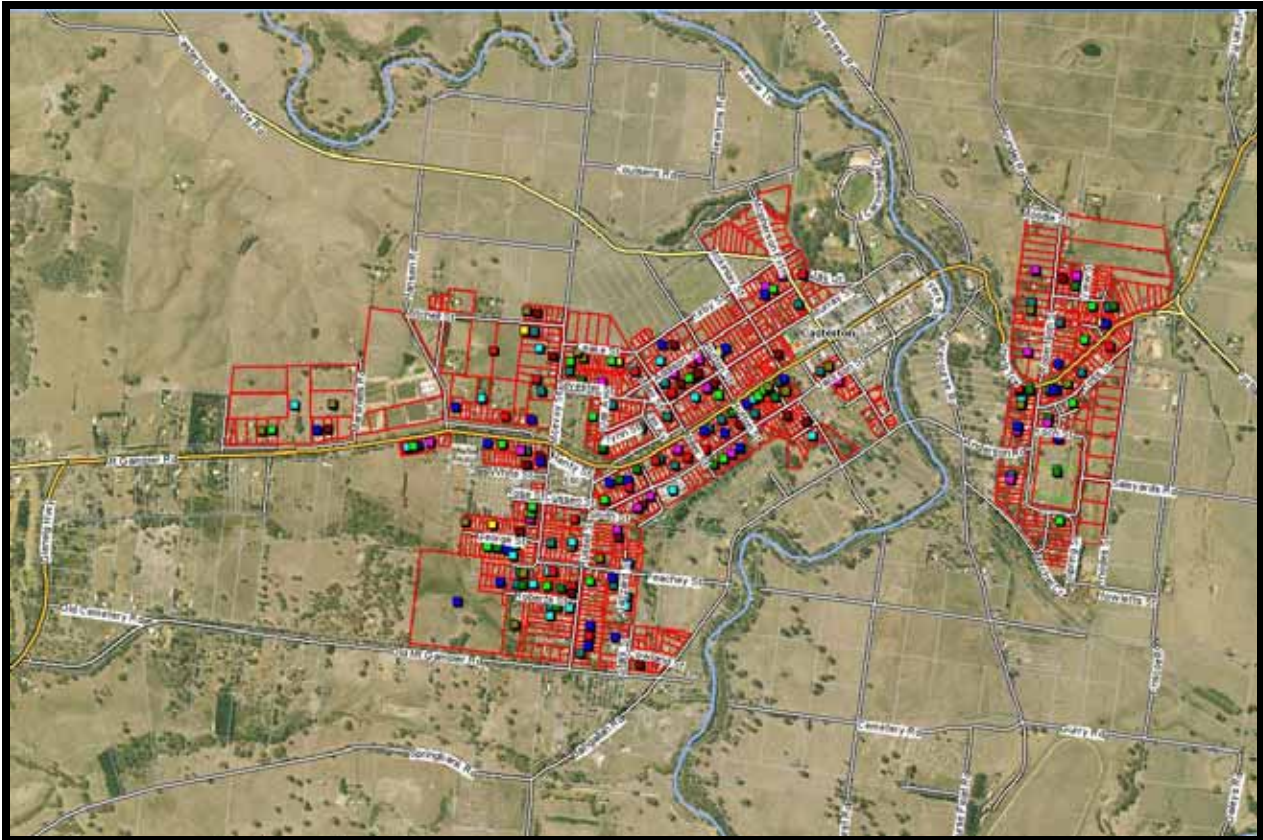
Source: Glenelg Shire

5.8.2 Casterton Building Permit Activity

The distribution of total permits covers the entire R1Zone of Casterton. Each year of building permits is represented by a different colour (the colour key is Yellow 2009; Red 2008; Dark Gold 2007; Light Green 2006; Light Blue 2005; Dark Blue 2004; Pink 2003; Brown 2002; forest Green 2001 and Teal 2000) Map 14 is a representation of the 280 total permits issued from 2000 through 2009.

Casterton generated the most building permits in 2000. For the period 2007 through 2009 there has been a near doubling in permit generation and the total value which the permits represent.

Map 14 R1Z Casterton Total Building permit Activity in 2000-09

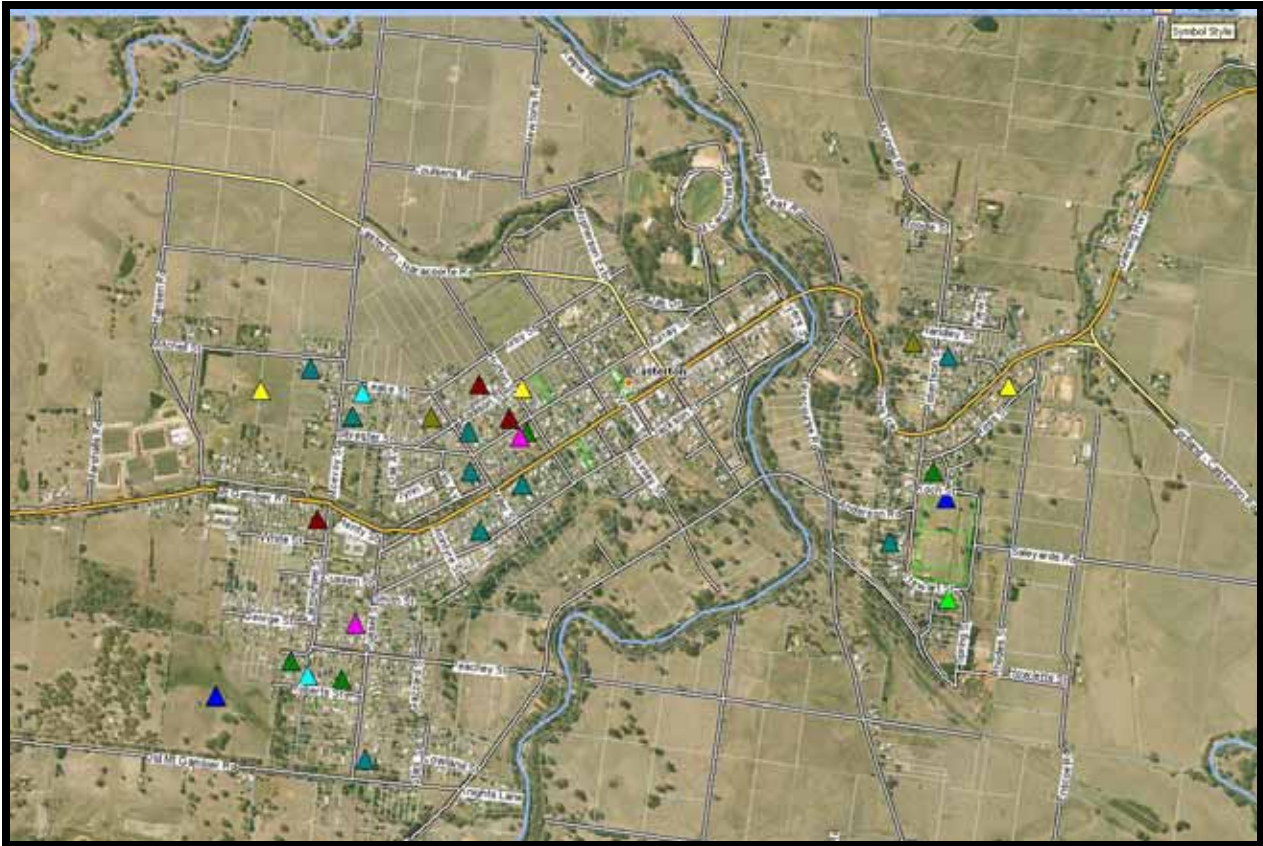


Source: Glenelg Shire

5.8.3 Casterton Houses Permits

There is no clear pattern of concentration of dwelling construction in Casterton. Thirty one houses were built over the 10 year period (2000-2009) Map 15 is slightly distorted as some of the symbols are obscuring other symbols. The color key for Map 15 is Yellow 2009; Red 2008; Dark Gold 2007; Light Green 2006; Light Blue 2005; Dark Blue 2004; Pink 2003; Brown 2002; Forest Green 2001; Teal 2000.

Map 15 R1Z Casterton Home Construction 2000-2009



Source: Glenelg Shire

5.8.4 Fire proneness of the Zone

This area does not represent a high fire risk area.

5.8.5 Land Use Impediments

Casterton faces similar land use impediments to that of Portland.

5.8.6 Forecast Demand and Available Residential 1 Land stocks

The following tables identify the amount of conventional residential zoned land (Residential 1 Zone) that may be required in Casterton for future residential development under a range of potential town growth scenarios. Table 20 indicates that another 72 residential lots will be required over the next twenty years if the rate of residential lot take up experienced over the last 5 years (2004-2008) continues. A desktop analysis of residential land supply and demand found that there is sufficient zoned land within Casterton to cater for future housing development over the next twenty years. However, this analysis did not take into account constraints on the ability to develop the land due to steep slopes and flood prone areas. A detailed audit of the undeveloped residential zoned areas in Casterton is needed to determine the availability of this land given known constraints.

Table 20 R1Z Casterton Residential Land Supply and Demand

Available Land and Demand	
Vacant residential lots (based on analysis of aerial photography in 2009)	118
House construction over 5 years (2004-2008)	18
Average annual lot take up (2004-2008)	3.6
Estimated current supply of Residential 1 zoned land (ha)*	56
20 Year Supply Requirement at current take up rate (ha)	6

Source: Glenelg Shire

Table 21 R1Z Casterton Growth Scenarios and Land Requirements

Growth Scenarios	Low	Medium	High
	2%	4%	6%
Annual demand for Lots	15	30	60
Required land to meet 20 year Scenario	30	60	90
Annual land required	1.5 (Ha)	3 (HA)	4.5 (HA)

Source: Glenelg Shire

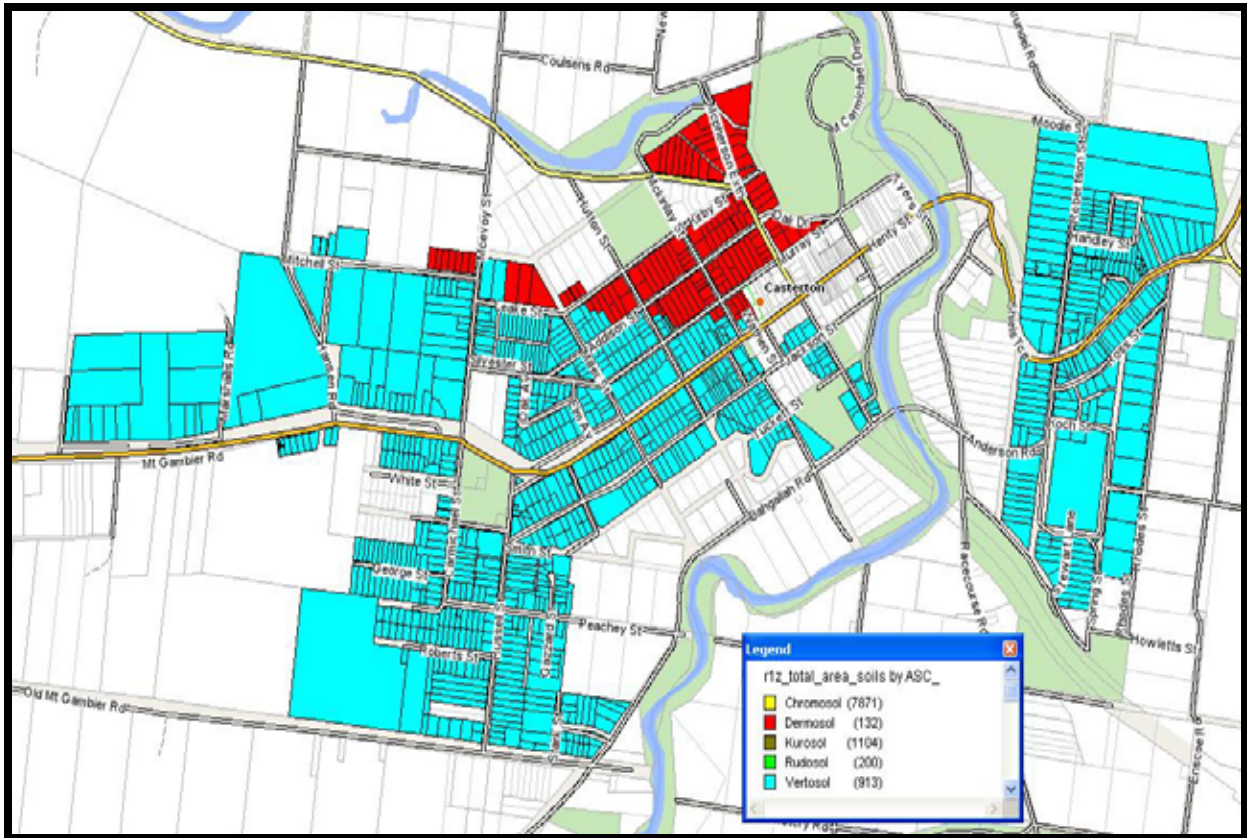
5.8.7 Levels of Fragmentation

Casterton has a low level of fragmentation.

5.8.8 Current R1 Soil Characteristics

The Casterton R1 zone has the following soil characteristics as identified by the Victorian Department of Primary industry (DPI) and the Department of Sustainability and Environment (DSE).

Map 16 R1Z Casterton Soil Map



Source: Glenelg Shire

Table 22 R1Z Casterton Vertrosol Soil Profile

Soil Condition	Level
Acidification	High
Dispersive Behaviour	High
Land Instability	High
Nutrient Decline	Moderate
Salinity	Low
Soil structure Decline	Moderate
Water Logging	Low
Water Erosion	High
Wind Erosion	Low
pH	7.0
Impeding	200-300
Drainage	Impervious
Topsoil	130

Source: Glenelg Shire

Table 23 R1Z Casterton Dermosol Soil Profile

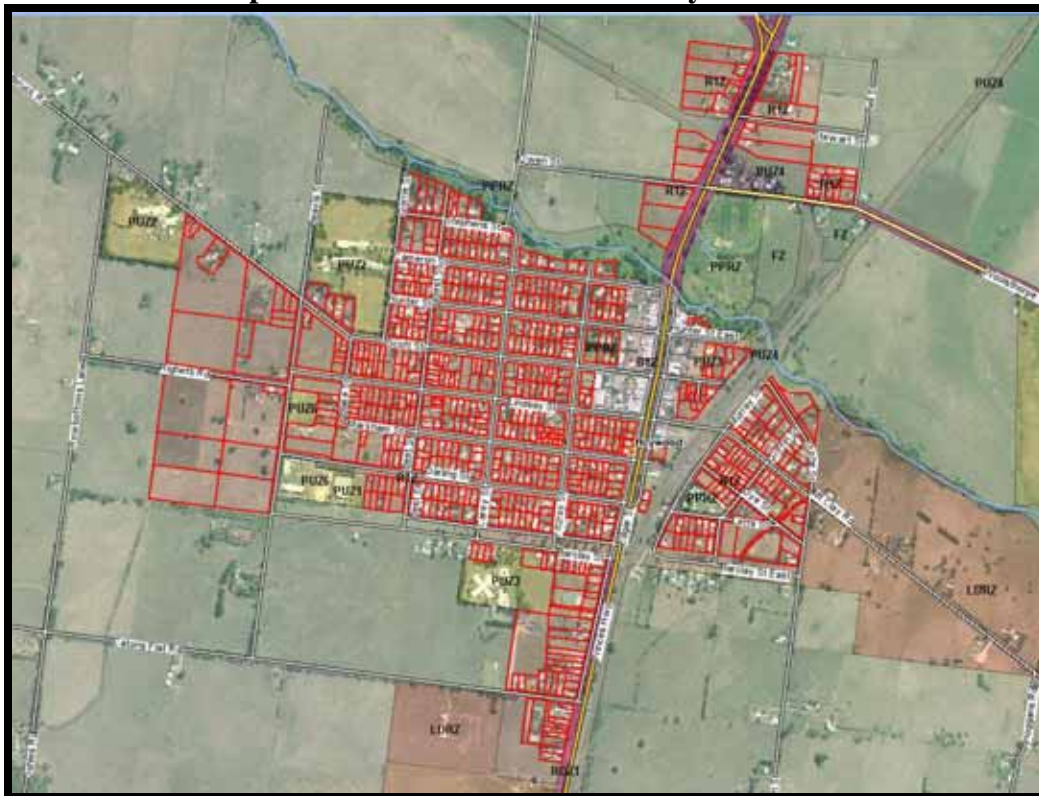
Soil Condition	Level
Acidification	Moderate
Dispersive Behaviour	Low
Land Instability	Low
Nutrient Decline	Low
Salinity	Low
Soil structure Decline	Low
Water Logging	Low
Water Erosion	Low
Wind Erosion	Low
pH	5.9
Impeding	>300
Drainage	Impervious
Topsoil	215

Source: Glenelg Shire

5.9 Current R1Z Heywood

Map 17 illustrates the extent of the R1Z in the greater Heywood Area. The Residential R1 zone is highlighted in red.

Map 17 R1 Zone in the Greater Heywood Area



Source: Glenelg Shire

Table 24 R1Z 1 Parcels within a 5 Km radius of Heywood

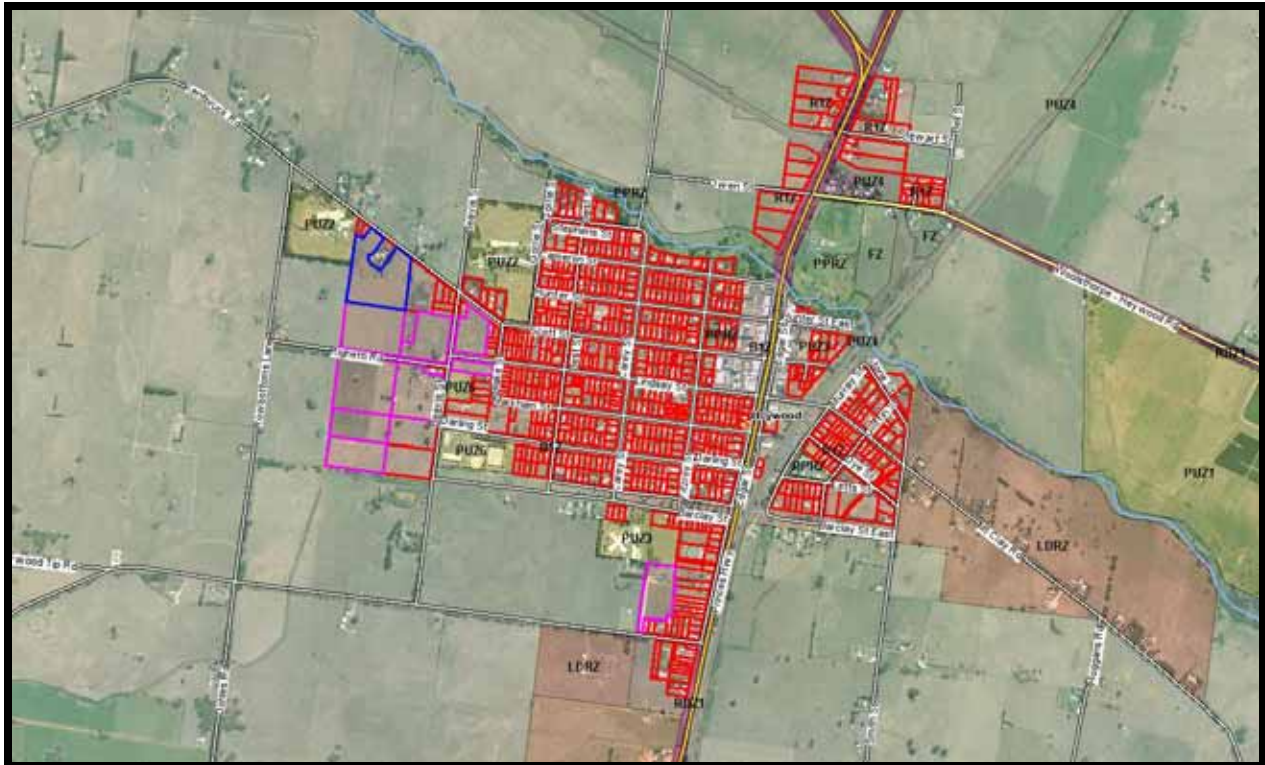
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	6238	90.4	90.4	90.4
Yes	666	9.6	9.6	100.0
Total	6904	100.0	100.0	

Source: Glenelg Shire

5.9.1 Heywood Lot sizes

The 83.3% (555 out of 666) of the lots in greater Heywood are less than 2,000 square meters in size (red parcels). The percentage distribution for other lots sizes is 10.5 % (70 out of 666) for lots greater 2,000 meters and less than 4,000 square meters; 0.23 % (15 out of 666) for lots greater than 4,000 and less than 6,000 square meters; 0.009% (6 out of 666) for lots greater than 6,000 and less than 8,000 square meters; 0.006 % (4 out of 666) for lots greater than 8,000 and less than 10,000 square meters and 0.024% (16 out of 666) for lots greater than 10,000 square meters

Map 18 R1Z Heywood Lot Size Distributions



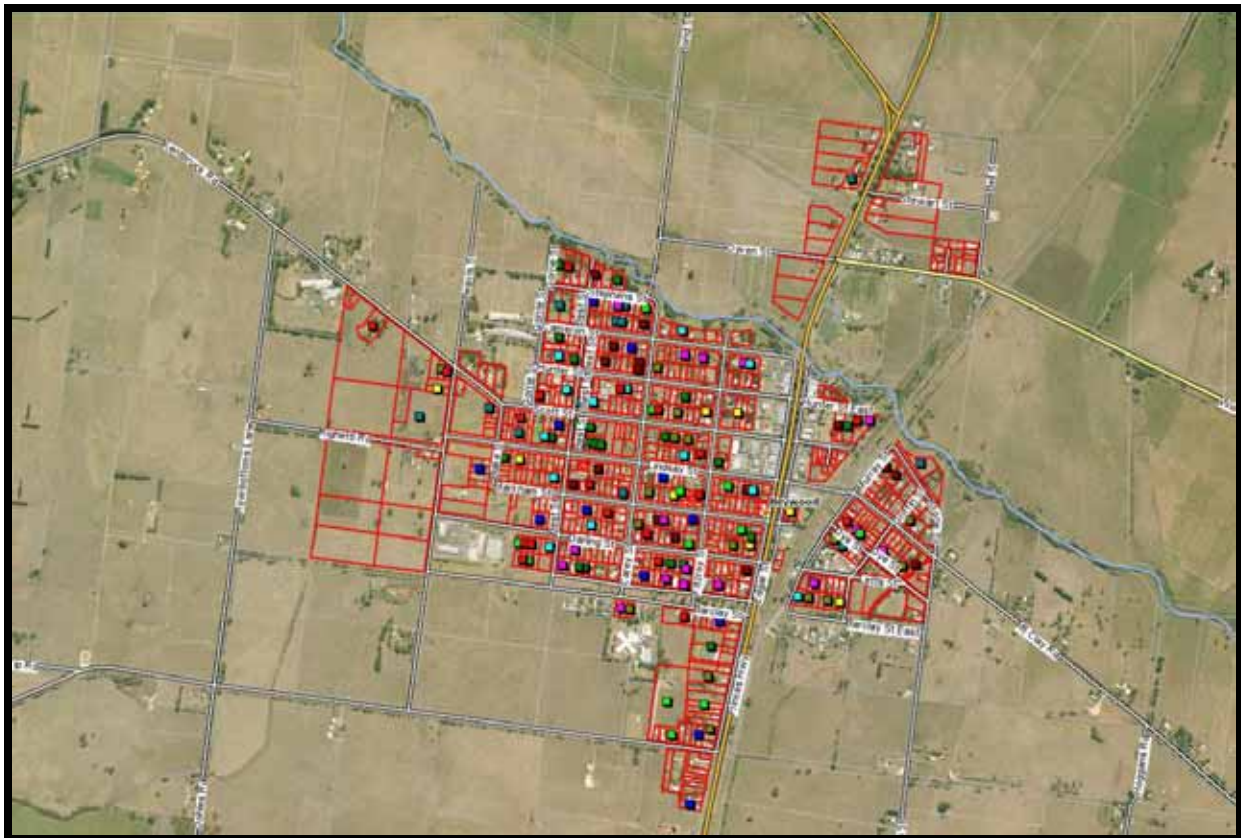
Source: Glenelg Shire

5.9.2 Heywood Building Permit Activity

Building Permit Activity in Heywood is mainly situated in the central corridor of the town. As with Portland and Casterton each year of building permits is represented by a different colour. (The colour key is Yellow 2009; Red 2008; Dark Gold 2007; Light Green 2006; Light Blue 2005; Dark Blue 2004; Pink 2003; Brown 2002; forest Green 2001 and Teal 2000)

Table 12 shows that 2009 was the year that generated the greatest number of building permits for the 2000-2009 period for the Heywood area. For the past 3 years (2007 - 2009) there has been a 100% increase in the number of building permits.

Map 19 R1Z Heywood Total Building Permit Activity 2000-09



Source: Glenelg Shire

5.9.3 Heywood Houses Permits

The spatial pattern for new housing construction in Heywood is pointing in a westerly direction. Twenty nine dwellings were built between 2000 and 2009 for an estimated value of \$5.1 million. The majority of construction was bounded on the north by Lindsay Street on the south by Barclay Street and the west by Blake Street. The color key for Map 20 is Yellow 2009; Red 2008; Dark Gold 2007; Light Green 2006; Light Blue 2005; Dark Blue 2004; Pink 2003; Brown 2002; Forest Green 2001; Teal 2000. Map 20 is slightly distorted as some of the symbols are obscuring other symbols

Map 20 R1Z Heywood Constructed Dwellings 2000-2009



Source: Glenelg Shire

5.9.4 Fire proneness of the Zone

This area does not represent a high fire risk area.

5.9.5 Land Use Impediments

Heywood faces similar land use impediments to that of Portland.

5.9.6 Forecast Demand and Available Residential 1 Land stocks

The following tables identify the amount of conventional residential zoned land (Residential 1 Zone) that may be required in Heywood for future residential development under a range of potential town growth scenarios. Table 25 indicates that another 124 residential lots will be required over the next twenty years if the rate of residential lot take up experienced over the last 5 years (2004-2008) continues. The residential land demand and availability analysis indicates that to cater for this demand an additional 8 hectares of land will need to be rezoned for residential purposes. However, there is no need to rezone land for residential purposes in the short term.

Table 25 R1Z Heywood Residential Land Supply and Demand

Available Land and Demand	
Vacant residential lots (based on analysis of aerial photography in 2009)	53
House construction over 5 years (2004-2008)	31
Average annual lot take up (2004-2008)	6.2
Estimated current supply of Residential 1 zoned land (ha)*	56
20 Year Supply Requirement at current take up rate (ha)	12.4

Source: Glenelg Shire

Table 26 R1Z Casterton Growth Scenarios and Land Requirements

Growth Scenarios	Low	Medium	High
	2%	4%	6%
Annual demand for Lots	12	24	36
Required land to meet 20 year Scenario	24	48	72
Annual land required	1.2 (HA)	2.4 (HA)	3.6 (HA)

Source: Glenelg Shire

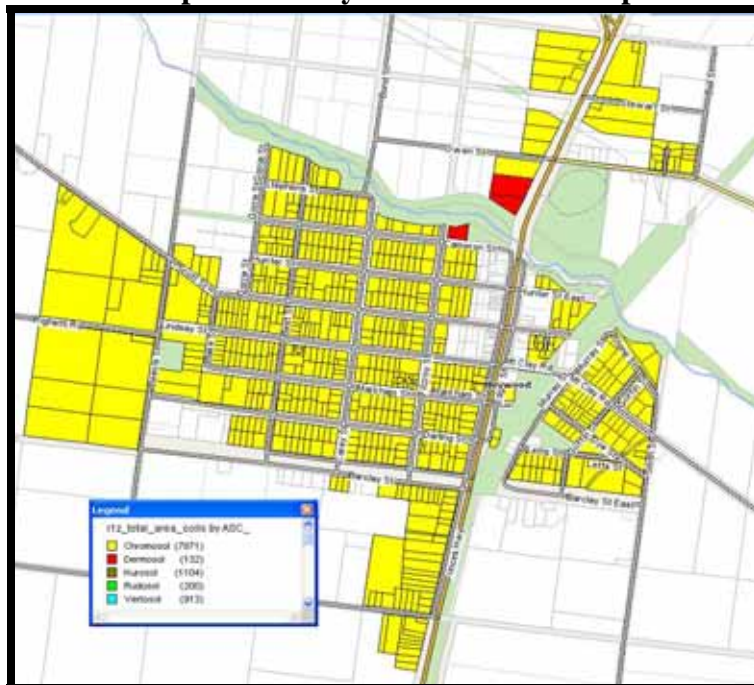
5.9.7 Levels of Fragmentation

Heywood has a low level of fragmentation

5.9.8 Current R1 Soil Characteristics

The Heywood R1 zone has the following soil characteristics as indentified by the Victorian Department of Primary industry (DPI) and the Department of Sustainability and Environment (DSE).

Map 21 R1 Heywood Zone Soil Map



Source: Glenelg Shire

Table 27 Heywood R 1 Chromosol Soil Profile

Soil Condition	Level
Acidification	Low
Dispersive Behaviour	Low
Land Instability	Low
Nutrient Decline	Low
Salinity	Low
Soil structure Decline	Moderate
Water Logging	Moderate
Water Erosion	Low
Wind Erosion	Low
pH	7.0
Impeding	<200
Drainage	Impervious
Topsoil	80

Source: Glenelg Shire

Table 28 Heywood R1 Dermosol Soil Profile

Soil Condition	Level
Acidification	High
Dispersive Behaviour	Low
Land Instability	Low
Nutrient Decline	Low
Salinity	Low
Soil structure Decline	Moderate
Water Logging	Moderate
Water Erosion	Low
Wind Erosion	Low
pH	5.20
Impeding	>300
Drainage	Impervious
Topsoil	215 mm

Source: Glenelg Shire

5.10 Challenges and options

5.11 R1Z Issues

- Slow growth- Casterton & Heywood-No requirement for additional Residential land
- Portland - Available land
- Physical constraints-flooding, sink holes
- Industrial contamination (buffer zones)
- No designated growth corridor
- Growth rates-future
- Infill questions
- Drainage & infrastructure(sewerage)

5.12 R1Z Options

Heywood & Casterton

- No expansion needed currently
- Need to identify potential new residential areas
 - Which comply with
 - Infrastructure
 - No impediments

Portland

- Identify growth corridors (SW Portland)
 - Which has no physical or industrial impediments

5.12.1.1 Infill is a priority

- Derril Rd-Vidic Drive subdivision and west of the site
- Must Street West
- Land opposite Kyema corner Lalor and Bridgewater Road (West Portland sewerage scheme)
- North Portland caravan park-Richardson Street

5.12.1.2 Get industry out of R1Z

- Identify business/industrial which can be relocated
- What would be their requirements to move?
- Identify an area for them to move to
- Develop the industrial precinct
- Develop a needs package to make them relocate
- Develop reclamation of industrial land to residential

6 Rural Conservation Zone

6.1 Rationale

The Rural Conservation Zone since its inception has experienced fragmentation and residential development. This occurrence was in large part due to its location close to Portland. The zone was developed to enhance the natural environment and provide for agricultural use consistent with conservation of the environment. Currently over 60% of all parcels in the RCZ1 are less than 1 hectare. This fact questions the rationale of where or not the zone in its currently configuration fulfills its established purpose of enhancing the environment and conserving the significance and character of open rural landscapes.

6.2 Purpose

The Rural Conservation Zone has five purposes which include:

- To protect and enhance the natural environment and natural processes for their historic, archaeological and scientific interest, landscape, faunal habitat and cultural values.

- To protect and enhance natural resources and the biodiversity of the area.
- To encourage development and use of land which is consistent with sustainable land management and land capability practices and which takes into account the conservation values and environmental sensitivity of the locality.
- To provide for agricultural use consistent with the conservation of environmental and landscape values of the area.
- To conserve and enhance the cultural significance and character of open rural and scenic non urban landscapes.

6.3 RCZ1

The purpose of RCZ 1 is to conserve the environment, landscape and vegetation qualities of the area by encouraging sound management practices and land capability principles which recognise the environmental sensitivity and biodiversity of the locality.

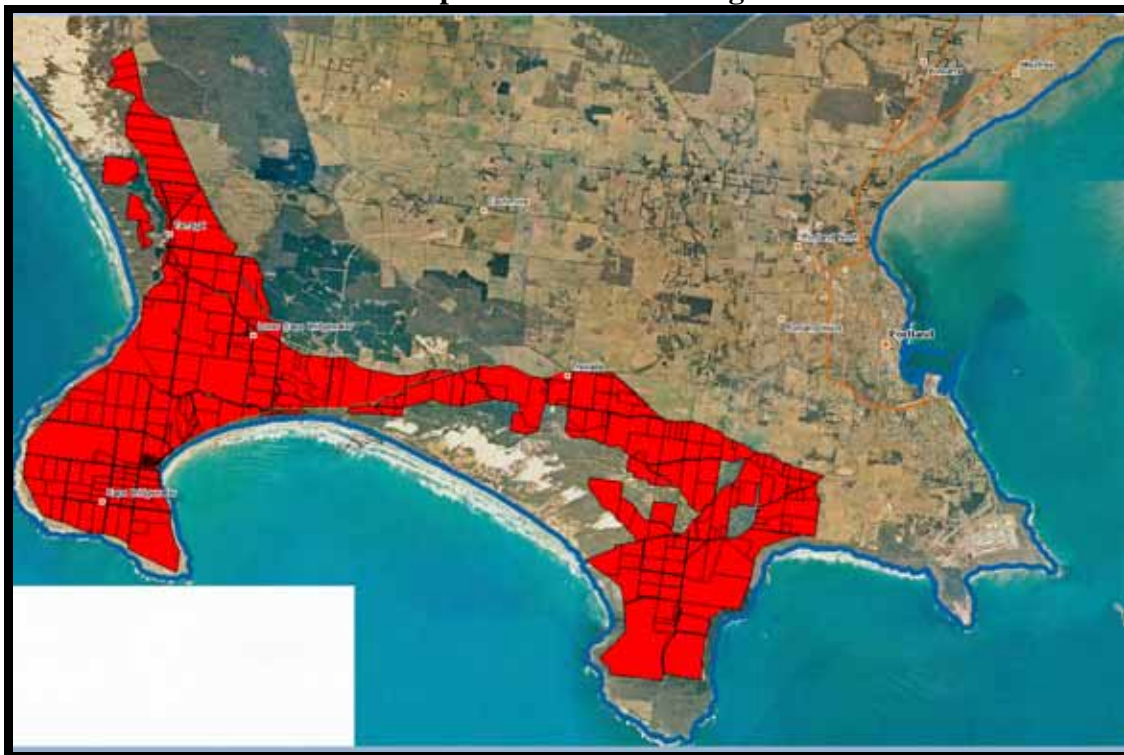
The Rural Conservation Zone has 408 parcels in the greater Portland area.

Table 29 RCZ1 Summary in Glenelg

Location	Number of Parcels	Hectares
Cape Bridgewater	279	3343.07
Portland West	129	2491.05
Total	408	5834.12

Source: Shire of Glenelg

Map 22 RCZ 1 in Glenelg



Source: Glenelg Shire

6.4 Land Use

There are eight categories of Rural Conservation Zone 1 in Glenelg as shown in Table 30. The categories are

- *B-Commercial / industrial Built;*
- *B- Farm Built;*
- *B Farm Land;*
- *B non- Rateable;*
- *B- Rural / Residential Built;*
- *B – Rural/Residential Land;*
- *B-Timber'*
- *P –Non Rateable*

all of which are in the greater Portland area.

Table 31 illustrates the various lot sizes in the RCZ1. As indicated by the table approximately 25% of all allotments in the zone are less than 1HA in size. The RCZ1 area is fragmented with small lots, as nearly 50% of total allotments in the zone are less than 5 HA in total area

Over 60% of the lots under < 1 HA in size have some sort of structure on them. In the category of less than 5 hectares (<1 and 1-5 HA) again 60% of the parcels have some form of structure on them.

The current high percentage of built structures in the zone is in direct conflict with one of the stated objectives of the zone, namely:

- *To provide for agricultural use consistent with the conservation of environmental and landscape values of the area*

Table 30 RCZ1 Levy Descriptions by Location

	locality		Total
	CAPE BRIDGEWATER	PORTLAND WEST	
Levy_	12	8	20
Desc			
B-Comm/Indust Built	16	1	17
B-Farm Built	77	62	139
B-Farm Land	20	9	29
B-Non Rateable	11	3	14
B-Rural/Resid Built	81	39	120
B-Rural/Resid Land	48	5	53
B-Timber	13	2	15
P-Non Rateable	1	0	1
Total	279	129	408

Source: Glenelg Shire

Only 20% (82 parcels) of the total parcels in the RCZ1 has been designated as vacant farm land. This result impacts on two of the prescribed purposes of the zone:

- To protect and enhance natural resources and the biodiversity of the area.
- To conserve and enhance the cultural significance and character of open rural and scenic non urban landscapes.

Table 31 RCZ1 lot Sizes by Location

Lot Size	Cape Bridgewater	West Portland	Total
<1 HA	94	9	103
1-5 HA	57	25	82
5 -10 HA	24	18	42
10-15 HA	14	13	27
15- 20 HA	23	21	44
20 – 40 HA	51	29	80
40- 100 HA	13	12	25
	276	127	403

Source: Glenelg Shire

Table 32 RCZ1 Parcel Areas by Levy Codes

Levy Description	Area							Total
	<1 HA	1-5 HA	5-10 HA	10 – 15 HA	15-20 HA	20-40 HA	40-100 HA	
Not Classified	6	7	2	0	1	4	0	20
B-Comm/Indust Built	13	4	0	0	0	0	0	17
B-Farm Built	6	17	12	8	29	45	18	135
B-Farm Land	1	4	5	3	4	9	3	29
B-Non Rateable	8	4	0	0	0	1	1	14
B-Rural/Resid Built	43	30	14	9	9	15	0	120
B-Rural/Resid Land	25	9	8	5	1	5	0	53
B-Timber	0	7	1	2	0	1	3	14
P-Non Rateable	1	0	0	0	0	0	0	1
Total	103	82	42	27	44	80	25	403

Source: Glenelg Shire

6.5 Subdivision Activity

From 2000 through 2010 the RCZ 1 zone had 7 subdivision permits as indicated by Table 33.

Table 33 RCZ 1 Subdivision Activity 2000-2009

Year	Frequency
2000	0
2001	0
2002	0
2003	0
2004	1
2005	2
2006	0
2007	2
2008	0
2009	0
2009	0
2010	2

Source: Glenelg Shire

As indicated by Table 34 the breadth of subdivision proposals ranges from small lot subdivisions to certification of plans for consolidation.

Table 34 RCZ1 Classes of subdivision activity

Type	Frequency
6 Lot Subdivision	2
3 Lot subdivision	1
Certification of Plan of Consolidation	2
Certification of Subdivision	2

Source: Glenelg Shire

6.6 Building Permits

The number of building permits that was generated in Glenelg Shire from 2000 to 2009 is indicated in Table 35. This table shows that there were 77 permits over the 10 year period. Data relating to the value of the construction in the RCZ1 zone for this period is incomplete and does not provide an accurate value of construction activities during the period 2000-2009.

Table 35 RCZ 1 Building Permit Activity

		Date			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2000	15	19.5	19.5	19.5
	2001	12	15.6	15.6	35.1
	2002	8	10.4	10.4	45.5
	2003	7	9.1	9.1	54.5
	2004	11	14.3	14.3	68.8
	2005	8	10.4	10.4	79.2
	2006	3	3.9	3.9	83.1
	2007	10	13.0	13.0	96.1
	2008	2	2.6	2.6	98.7
	2009	1	1.3	1.3	100.0
	Total	77	100.0	100.0	

Source: Glenelg Shire

Construction activities in the RCZ1 zone ranged from additions and alterations to the construction of 21 dwelling during the period 2000 to 2009. The construction of three radio masts to improve mobile telecommunications in Glenelg occurred in West Portland during 2000 - 2009.

Table 36 RCZ1 Type of Construction Activity by Location

	locality		Total
	CAPE BRIDGEWATER	PORTLAND WEST	
desc_	1	5	6
type			
Addition	2	2	4
Alteration	1	0	1
Detached-Studio	1	0	1
Dwelling	21	5	26
Extension	4	2	6
Fuel Heater	1	3	4
Mast	0	3	3
Misc	0	2	2
Shed	8	9	17
Verandah	1	4	5
Weather Tower	1	1	2
Total	41	36	77

Source: Glenelg Shire

6.7 Fire proneness of the Zone

This area is subject to bush fires.

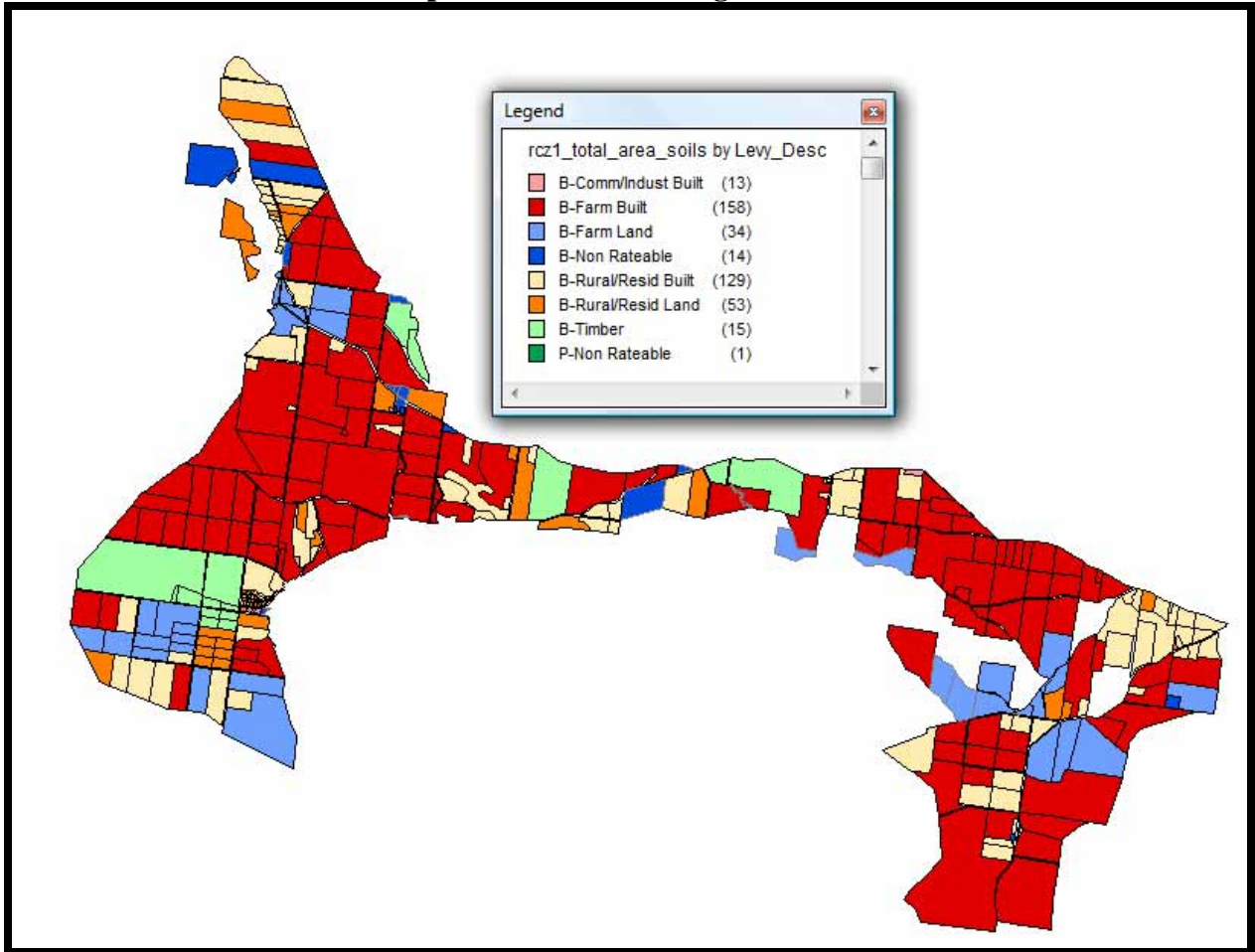
6.8 Land Use Impediments

The zone is subject to a series of impediments that include; sink holes; drainage issues, Wild Fire Management Overlays; Environmental Significance Overlays; coastal erosion; acid sulfate soils infrastructure constraints (sewage and waste water management) and current zoning. The Cape Bridgewater area has the additional impediment of not being recognized by the state government as an actual settlement. The lack of recognition restricts the development of the Bridgewater settlement by restricting the type of zoning which can be applied to the settlement area.

6.9 Land Fragmentation

The land is highly fragmented with over 50% of all parcels in the zone less than 5 HA in size. The zone currently has 82 parcels (20% of the zone) designated as vacant land. Map 23 highlights the fragmentation of the RCZ 1 zone.

Map 23 RCZ1 Land Fragmentation



Source: Glenelg Shire

6.10 Forecast demand and available Land Stocks

The structure of the current zoning has led to the notion that the RCZ 1 zone is a defacto hobby farming zone. The current expectation is that the RCZ1 zone will allow a country lifestyle on small blocks close to Portland. This view is directly opposite to the original objectives set out for the zone by the state government. The objectives of:

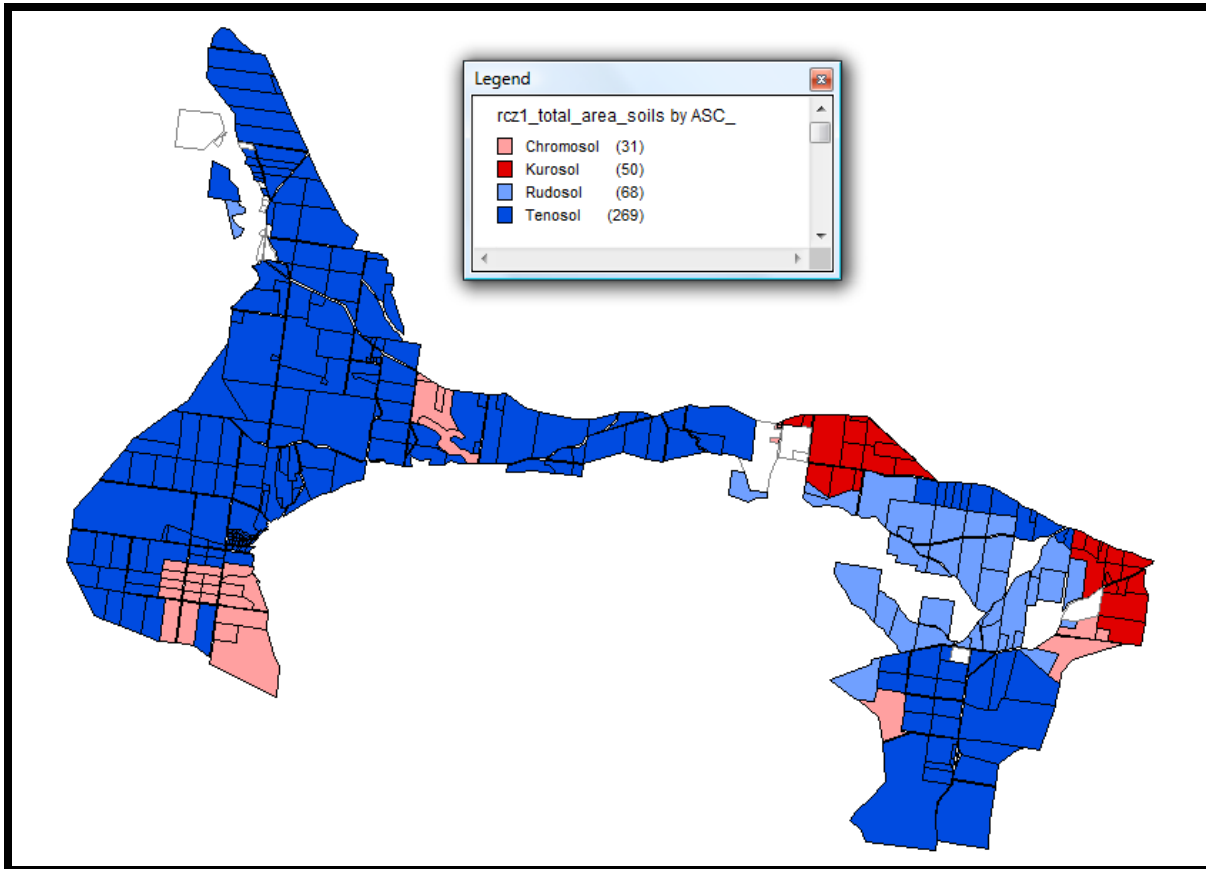
- Protecting and enhancing the natural environment; and
- Enhancing the biodiversity, cultural significance, character or open rural and scenic non urban landscape of the area

These two objectives have been lost in the current composition of the RCZ1 zone in Glenelg.

6.11 Soils in the RCZ 1Zone

There are four soils categories (Chromosol, Kurosol, Rudosol and Tenosol) situated throughout the Glenelg RCZ1 Zone.

Map 24 RCZ1 Soil Types



Source: Glenelg Shire

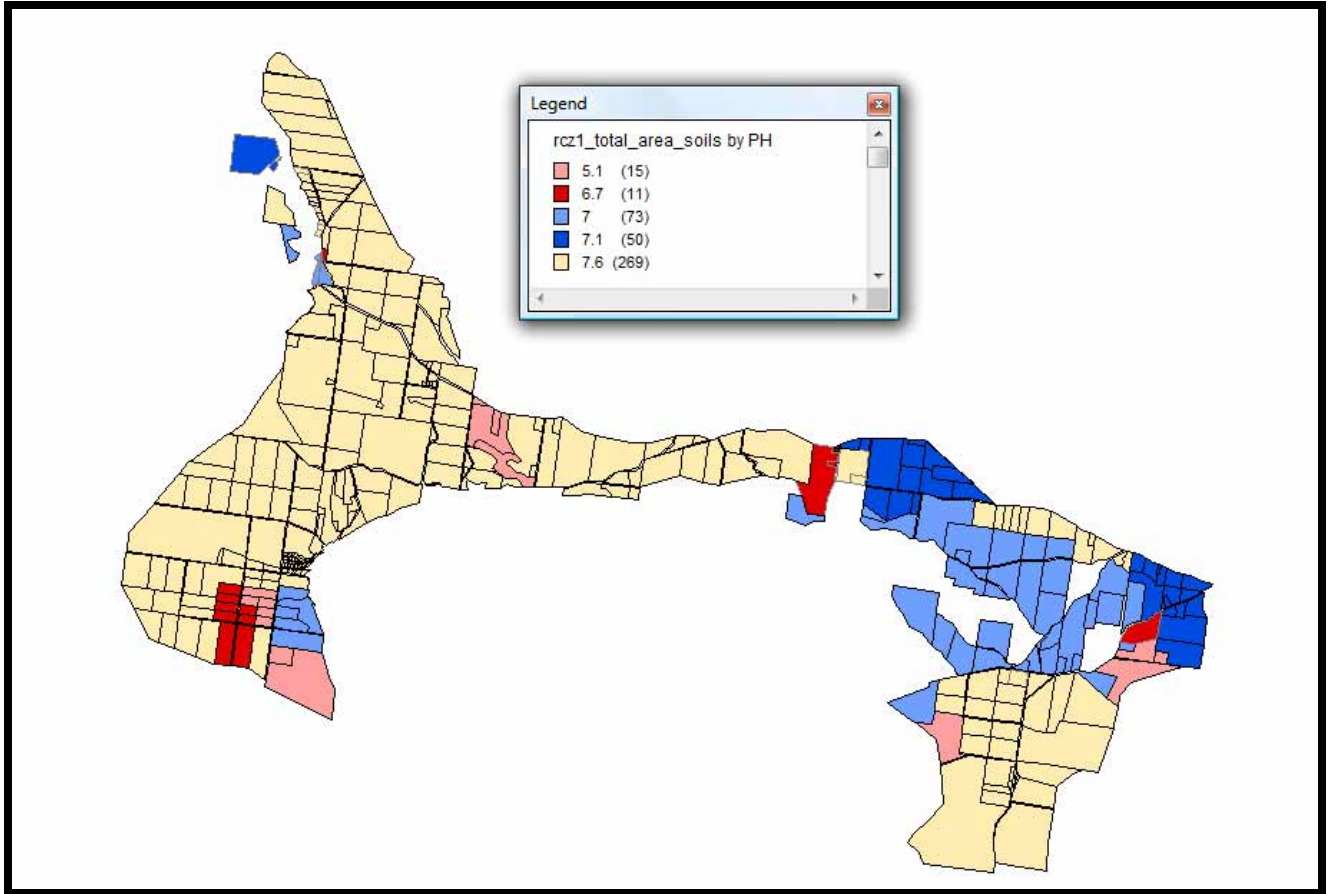
The soils in the RCZ1 zone range from acidic to neutral (i.e. pH 7) to slightly alkali (readings over pH 7). As indicated by Map 4 the acidic soils in Cape Bridgewater are situated south of the established settlement. The vast majority of the soils in the Cape Bridgewater area are either neutral or slightly basic in nature as highlighted by Map 25 and Table 37. The western section of Portland has more neutral characteristics than what are displayed in the Bridgewater area.

Table 37 RCZ1 pH

	locality			Total
	CAPE BRIDGEWATER	PORTLAND WEST		
PH	.0	12	8	20
	5.1	11	4	15
	6.7	8	3	11
	7.0	6	67	73
	7.1	0	50	50
	7.6	220	49	269
Total		257	181	438

Source: Glenelg Shire

Map 25 RCZ1 Soil pH



Source: Glenelg Shire

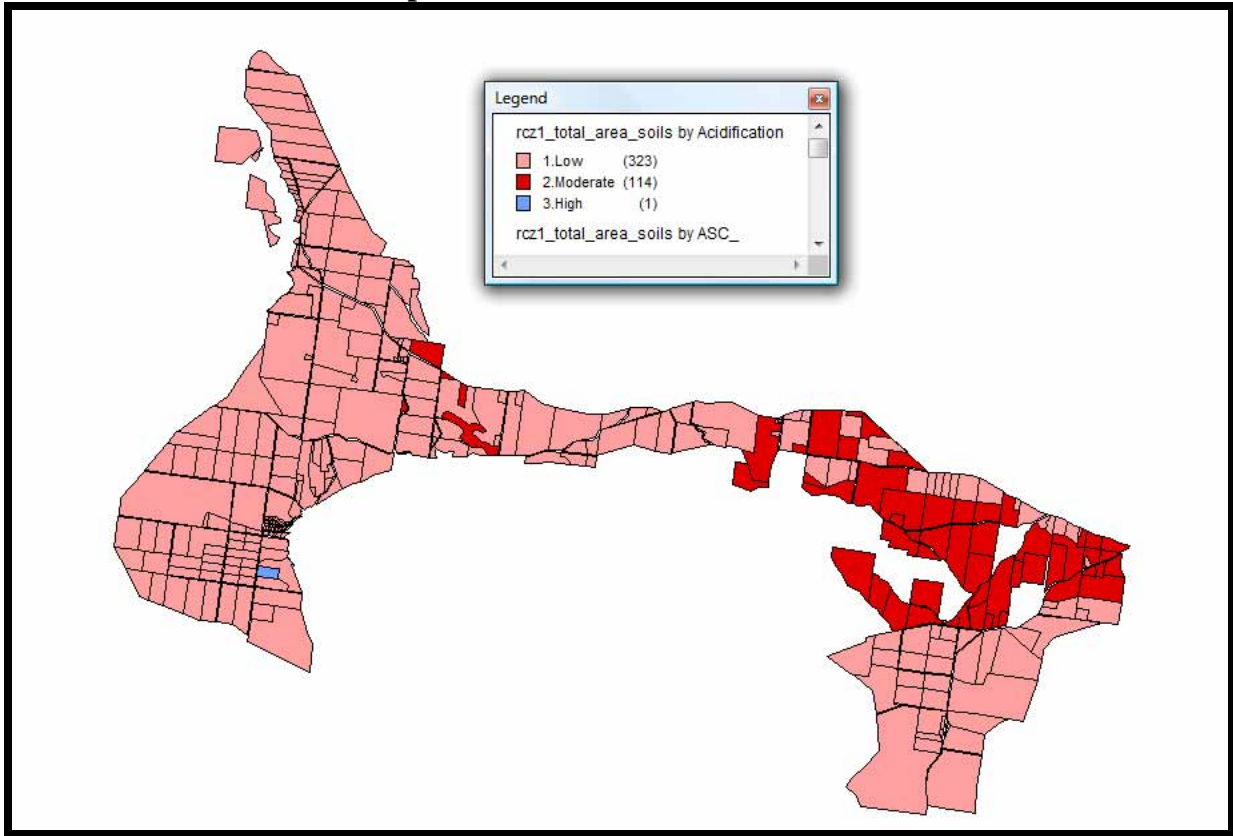
Soil acidification is a reflective index which indicates whether or not a particular soil is becoming either acidic or alkali in nature. As highlighted by Map 26 and Table 38 acidification is occurring in the west Portland area. The acidification trend will impact eventually on agricultural potential of the soils in the west Portland area. The reduction in agricultural potential will evolve over time.

Table 38 RCZ1 Soils Acidification

	locality		Total	
	CAPE BRIDGEWATER	PORTLAND WEST		
Acidification	1.Low	249	74	323
	2.Moderate	7	107	114
	3.High	1	0	1
Total	257	181	438	

Source: Glenelg Shire

Map 26 RCZ 1 Levels of Acidification



Source: Glenelg Shire

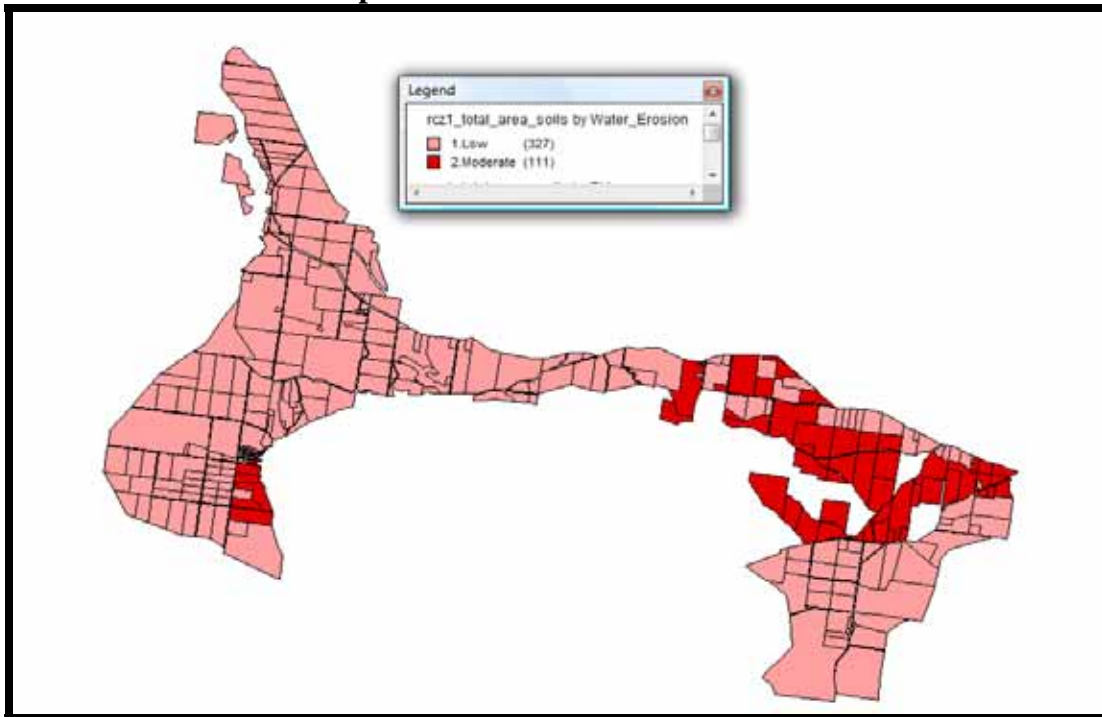
Water Erosion affects approximately 25% of all parcels in the RCZ1. West Portland is the most susceptible to this impediment as shown in Table 39 and Map 27.

Table 39 RCZ 1 Water Erosion Areas

	locality		Total
	CAPE BRIDGEWATER	PORTLAND WEST	
Water_Erosion 1.Low	250	77	327
2.Moderate	7	104	111
Total	257	181	438

Source: Glenelg Shire

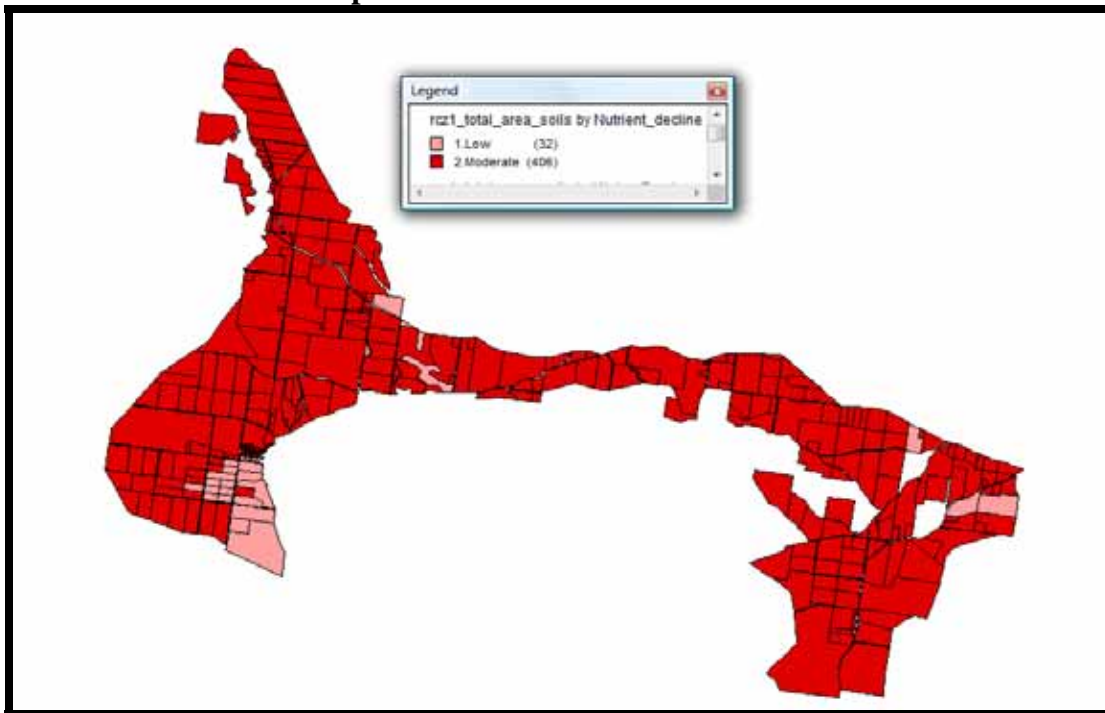
Map 27 RCZ 1 Water Erosion Areas



Source: Glenelg Shire

The ability of the RCZ1 zone to be high quality agricultural zone is constrained by two factors. The first is the decline of nutrients in the soil across the zone. As illustrated by Table 40 and Map 28 there is an overall decline in nutrients across the zone.

Map 28 RCZ 1 Nutrient Decline Area



Source: Glenelg Shire

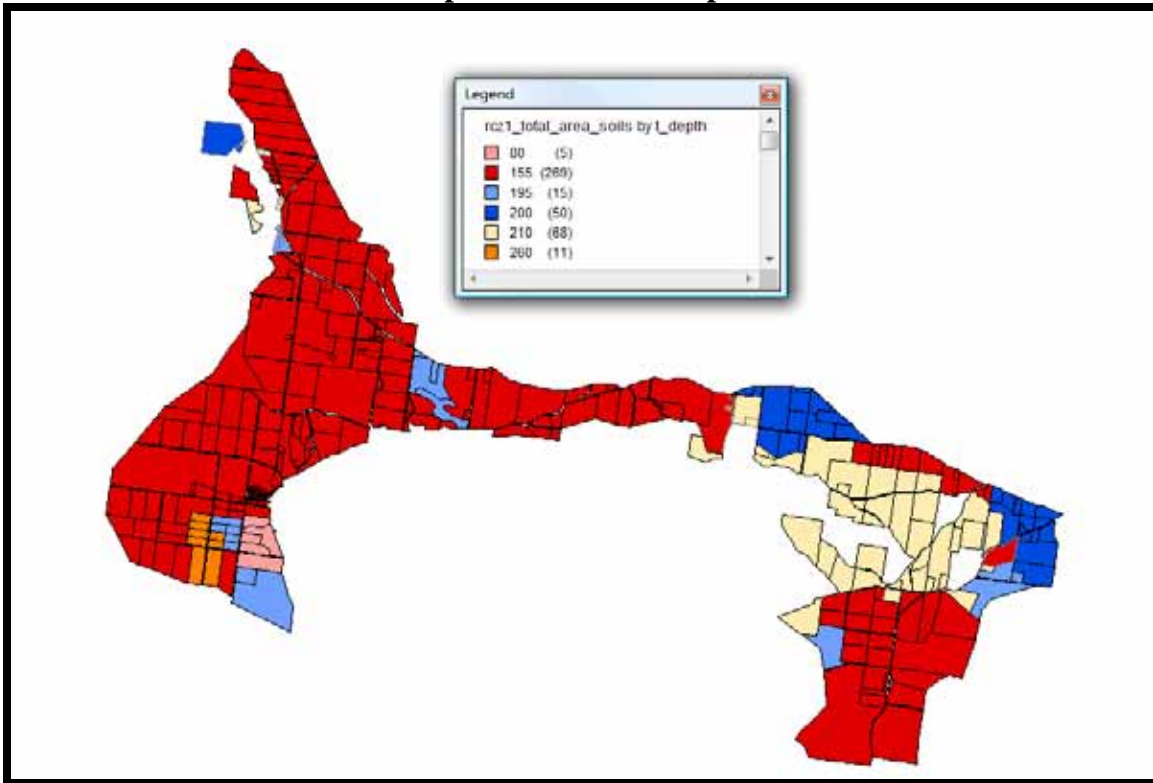
Table 40 RCZ 1 Number of Parcels experiencing Nutrient Decline

		locality		Total
		CAPE BRIDGEWATER	PORTLAND WEST	
Nutrient_decline	1.Low	29	3	32
	2.Moderate	228	178	406
Total		257	181	438

Source: Glenelg Shire

The second factor which impacts on agricultural production is the total depth of soil available for plants to grow. The greater the soil depth in conjunction with other factors such as soil structure and nutrients improves the potential for larger yielding crops. The average soil depth in the RCZ1 zone is only 155 mm before reaching impervious layers of rock and gravel.

Map 29 RCZ 1 Soil Depths



Source: Glenelg Shire

Table 41 RCZ 1 Soil Depth

	locality		Total
	CAPE BRIDGEWATER	PORTLAND WEST	
t_depth 0	12	8	20
80	5	0	5
155	220	49	269
195	11	4	15
200	0	50	50
210	1	67	68
260	8	3	11
Total	257	181	438

Source: Glenelg Shire

6.12 RCZ1 Issues

- Min subdivision 40 ha
- 80-90% of zone under 40ha
- What is actual purpose of the zone?
 - To conserve the environment, landscape and vegetation qualities of the area by encouraging sound management practices and land capability principles which recognize the environmental sensitivity and biodiversity of the locality.
- Actual zone has become defacto farm/mixed use rural living (people who want country living without being farmers)
- Agricultural potential / sustainability of areas in the zone
- Soil potential
- Water
- Ph
- Acid sulphate soils
- What agricultural use and what potential?
- Wildfire

Other impediments

- Wind farms

6.13 Options

- Is it possible to reclassify parcels under < 2ha? (specified size)
- Taking into consideration agricultural potential/ecological values
- Is this zone appropriate for the remaining allotments?
- What will be the impact of ESO overlays?
- What will be the impact of the SLO (Bridgewater)?
- If not appropriate, which zone best suits the current RCZ1-RLZ< LDRZ< or introduce RAZ

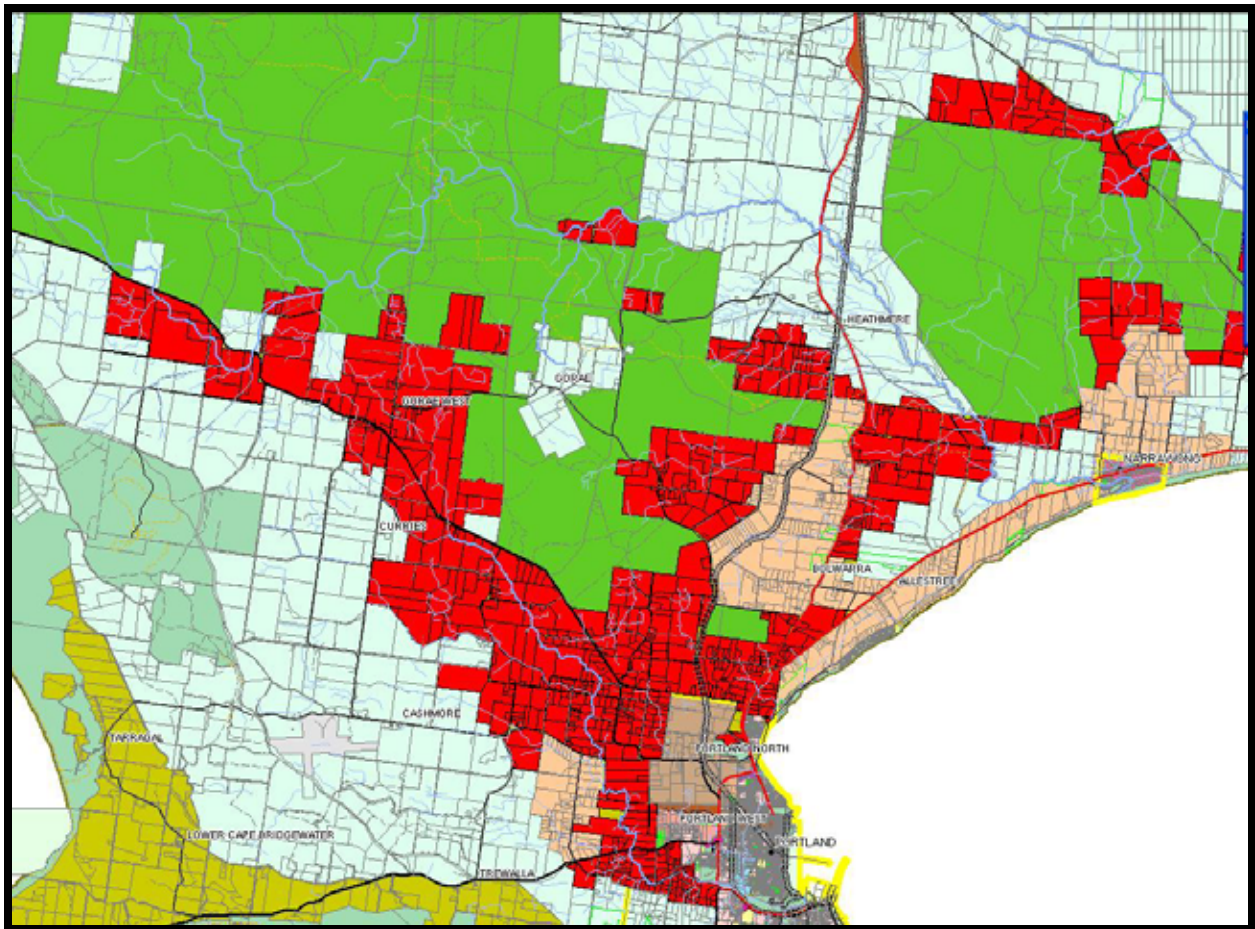
6.14 RCZ 2

6.15 Purpose

The purpose of RCZ 2 is to support sustainable agricultural and horticultural uses based on the productive capabilities of the soil and to discourage the location of non soil based activities which would result in the loss or under use of agricultural land.

The Rural Conservation Zone 2 has 802 parcels in the greater Portland area as illustrated in Table 42 and Map 30.

Map 30 RCZ 2 Parcels in Glenelg



Source: Glenelg Shire

Table 42 RCZ2 parcels in Glenelg

Location	Number of Parcels	Hectares
Bolwarra	103	784.45
Cashmore	83	913.96
Gorae	62	1288.22
Gorae West	148	3128.8
Heathmere	69	929.84
Heywood	29	729.29
Mount Richmond	5	172.39
Narrawong	26	629.96
Portland	30	64.78
Portland North	142	1199.09
Portland West	104	579.57
Tyrendarra	19	395.04
Total	820	10815.39

Source: Glenelg Shire

6.16 Land Use

Table 43 illustrates the various lots sizes in the RCZ2. As indicated by the table approximately 20% of all allotments in the zone are under 2 HA. The RCZ2 area is fragmented with small lots (under 5 HA) representing just over 50% of all total. Over 65% of all lots under < 2HA in size have some sort of structure on them. In the Category of 2 – 5 HA nearly 75% of all parcels have some form of structure on them.

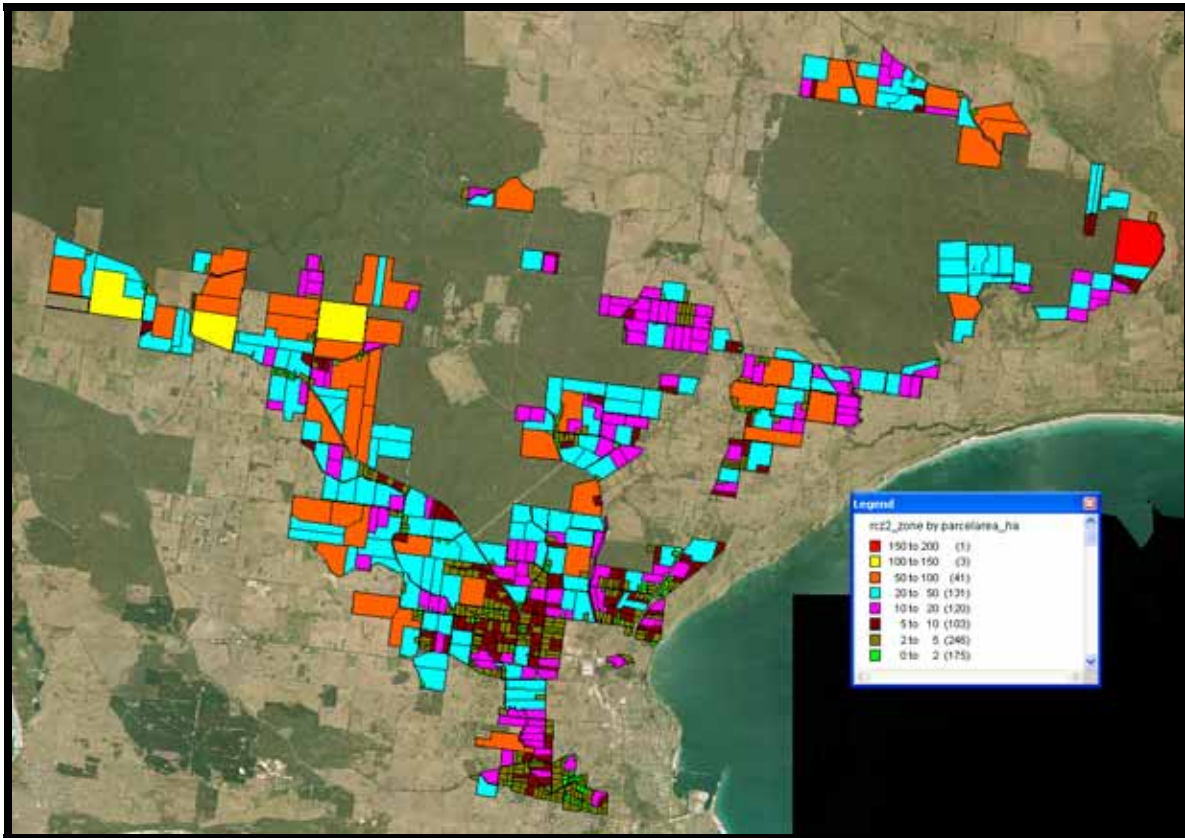
Table 43 RCZ2 Parcel Areas

Area HA	Frequency	Percent	Valid Percent	Cumulative Percent
<2.00	178	21.7	21.7	21.7
2.00-5.00	244	29.8	29.8	51.5
5.00-10.00	102	12.4	12.4	63.9
10.00-20.00	120	14.6	14.6	78.5
20.00-50.00	131	16.0	16.0	94.5
50.00-100.00	41	5.0	5.0	99.5
100.00-150.00	3	.4	.4	99.9
150.00-200.00	1	.1	.1	100.0
Total	820	100.0	100.0	

Source: Glenelg Shire

Map 31 shows the dispersion of lots sizes across the RCZ2 zone. The smaller lots (i.e. < 5 HA dark gold and lime green in colour) are situated in close proximity to north and west of Portland. The distribution of parcels which are greater than 5 HA in size is random throughout the zone with no particular area in the zone having a greater concentration of one particular lot size.

Map 31 RCZ 2 Parcel Size



Source: Glenelg Shire

There are 15 classes or categories for Rural Conservation Zone 2 in Glenelg as shown in Table 44. The categories are

B-Commercial / Industrial;

B-Culture/Recreation;

B- Farm Built;

B-Farm Land;

B-Non Rateable;

B-Residential Built;

B-Rural/Residential Built;

B-Rural / Residential Land ;

B-Timber;

P- Commercial /Industrial Land;

P-Non Rateable;

P- Residential Built;

P- Residential Land;

P- Rural / Residential Land

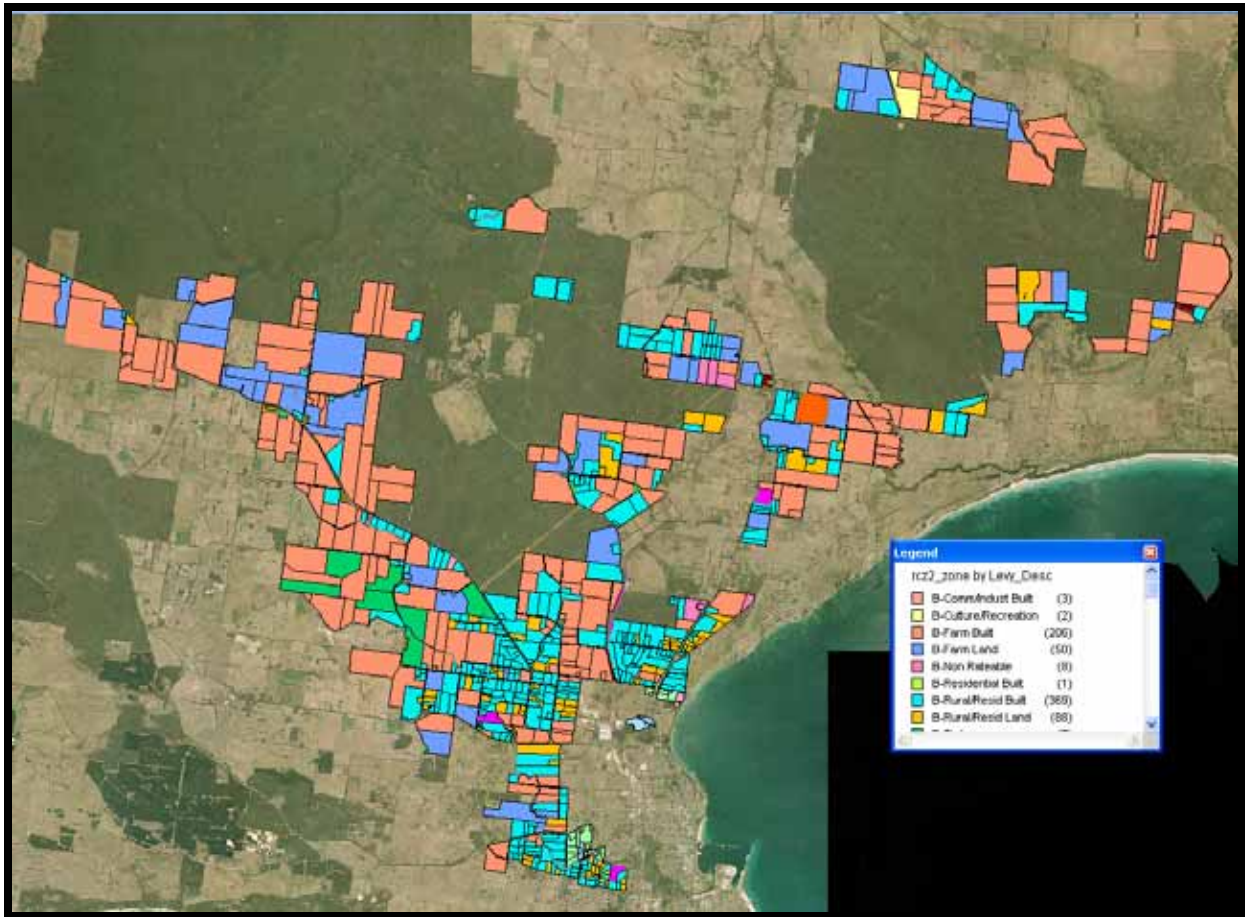
Table 44 RCZ2 Levy Descriptions by Location

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	43	5.2	5.2	5.2
B-Comm/Indust Built	3	.4	.4	5.6
B-Culture/Recreation	2	.2	.2	5.9
B-Farm Built	206	25.1	25.1	31.0
B-Farm Land	50	6.1	6.1	37.1
B-Non Rateable	8	1.0	1.0	38.0
B-Residential Built	1	.1	.1	38.2
B-Rural/Resid Built	369	45.0	45.0	83.2
B-Rural/Resid Land	88	10.7	10.7	93.9
B-Timber	7	.9	.9	94.8
P-Comm/Indust Land	1	.1	.1	94.9
P-Non Rateable	7	.9	.9	95.7
P-Residential Built	2	.2	.2	96.0
P-Residential Land	1	.1	.1	96.1
P-Rural/Resid Built	23	2.8	2.8	98.9
P-Rural/Resid Land	9	1.1	1.1	100.0
Total	820	100.0	100.0	

Source: Glenelg Shire

The distribution of the of levy codes is area specific. The Rural Residential Built category (i.e. light blue) is situated to the west and north or Portland. The Farm Built class (i.e. orange in colour) is spread through the zone with the majority of parcels in the west and northern reaches of the zone.

Map 32 RCZ 2 Parcels by Levy Description



Source: Glenelg Shire

The current high percentage of built structures in the zone is in direct conflict with two of the stated objectives of the zone, namely:

- To protect and enhance the natural resources and the biodiversity of the area; and
- To provide for agricultural use consistent with the conservation of environmental and landscape values of the area.

Table 45 RCZ 2 Levy Descriptions by Area

	new_area								Total
	2.00	5.00	10.00	20.00	50.00	100.00	150.00	200.00	
	19	14	5	4	0	1	0	0	43
B-Comm/Indust Built	2	0	1	0	0	0	0	0	3
B-Culture/Recreation	0	1	0	0	0	1	0	0	2
B-Farm Built	11	19	20	53	71	29	2	1	206
B-Farm Land	2	3	3	9	23	9	1	0	50
B-Non Rateable	3	0	1	3	1	0	0	0	8
B-Residential Built	1	0	0	0	0	0	0	0	1
B-Rural/Resid Built	92	152	58	43	24	0	0	0	369
B-Rural/Resid Land	22	41	13	6	6	0	0	0	88
B-Timber	0	0	0	0	6	1	0	0	7
P-Comm/Indust Land	0	0	0	1	0	0	0	0	1
P-Non Rateable	6	1	0	0	0	0	0	0	7
P-Residential Built	2	0	0	0	0	0	0	0	2
P-Residential Land	1	0	0	0	0	0	0	0	1
P-Rural/Resid Built	10	11	1	1	0	0	0	0	23
P-Rural/Resid Land	7	2	0	0	0	0	0	0	9
Total	178	244	102	120	131	41	3	1	820

Source: Glenelg Shire

6.17 Subdivision Activity

From 2000 through 2010 the RCZ2 zone had 32 subdivisions as indicated by Table 46. They ranged from 2 and 3 lot subdivisions to certifications and statements of compliance. Table 47 indicates the progress of the 32 subdivision. As the table indicates 6 proposals are either waiting for additional information, referrals or have been rejected by VCAT.

Table 46 RCZ2 Subdivision Activity 2000-2010

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 2000	2	6.3	6.3	6.3
2002	1	3.1	3.1	9.4
2004	2	6.3	6.3	15.6
2005	8	25.0	25.0	40.6
2006	8	25.0	25.0	65.6
2007	2	6.3	6.3	71.9
2008	4	12.5	12.5	84.4
2009	4	12.5	12.5	96.9
2010	1	3.1	3.1	100.0
Total	32	100.0	100.0	

Source: Glenelg Shire

Table 47 RCZ2 Decisions on Subdivision Applications 2000-2010

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Certified and SOC Issued	23	71.9	71.9	71.9
Certified Only	3	9.4	9.4	81.3
Outstanding Requirements	4	12.5	12.5	93.8
Referral	1	3.1	3.1	96.9
VCAT Refusal	1	3.1	3.1	100.0
Total	32	100.0	100.0	

Source: Glenelg Shire

6.18 Building Permits

The number of building permits that was generated in the RCZ2 in Glenelg Shire from 2000 to 2009 is 310 indicated by Table 48.

Table 48 RCZ 2 Number of Building Permits 2000-2009

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	14	4.5	4.5	4.5
Addition	5	1.6	1.6	6.1
Barn	1	.3	.3	6.5
Carport	2	.6	.6	7.1
Covered Area	1	.3	.3	7.4
Demolition	1	.3	.3	7.7
Dwelling	89	28.7	28.7	36.5
Ensuite	1	.3	.3	36.8
Extension	34	11.0	11.0	47.7
Garage	35	11.3	11.3	59.0
Gazebo	1	.3	.3	59.4
Heater	4	1.3	1.3	60.6
Misc	3	1.0	1.0	61.6
New Patio	1	.3	.3	61.9
Pergola	3	1.0	1.0	62.9
Pool Enclosure	1	.3	.3	63.2
Radio Tower	1	.3	.3	63.5
Removal	1	.3	.3	63.9
Removal - Granny Flat	1	.3	.3	64.2
Restump	6	1.9	1.9	66.1
Shed	91	29.4	29.4	95.5
Shop	1	.3	.3	95.8
Swimming Pool	5	1.6	1.6	97.4
Telecommunications Tower	1	.3	.3	97.7
Unit	2	.6	.6	98.4
Veranda	1	.3	.3	98.7
Verandah	4	1.3	1.3	100.0
Total	310	100.0	100.0	

Source: Glenelg Shire

The largest category of building activity was sheds followed by dwellings, garages then extensions.

The dwelling category represents not only newly completed dwellings but improperly identified extensions and additions to dwellings. The dwelling category has been artificially inflated and does not represent the true number of new residential dwelling that were constructed in the RCZ2.

Building Permit activity was focused on the Portland area with 41 % of all building situated in the greater Portland area.

Table 49 RCZ2 Building Permit Activity by Location

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	13	4.2	4.2	4.2
BOLWARRA	42	13.5	13.5	17.7
CASHMORE	30	9.7	9.7	27.4
GORAE	25	8.1	8.1	35.5
GORAE WEST	36	11.6	11.6	47.1
HEATHMERE	24	7.7	7.7	54.8
HEYWOOD	5	1.6	1.6	56.5
MOUNT RICHMOND	2	.6	.6	57.1
NARRAWONG	3	1.0	1.0	58.1
PORTLAND	17	5.5	5.5	63.5
PORTLAND NORTH	55	17.7	17.7	81.3
PORTLAND WEST	56	18.1	18.1	99.4
TYRENDARRA	2	.6	.6	100.0
Total	310	100.0	100.0	

Source: Glenelg Shire

The total value of construction in the RCZ2 Zone was approximately \$21,815,000. The vast majority of building activity in the RCZ2 zone was under \$10,000 per project (77%). Only 10 % of the building permits had a value in excess of \$100,000.

Table 50 RCZ 2 Value of construction in RCZ2 2000-2009

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	10000.00	229	73.9	77.1	77.1
	20000.00	17	5.5	5.7	82.8
	50000.00	20	6.5	6.7	89.6
	100000.00	11	3.5	3.7	93.3
	200000.00	1	.3	.3	93.6
	300000.00	11	3.5	3.7	97.3
	500000.00	7	2.3	2.4	99.7
	1000000.00	1	.3	.3	100.0
	Total	297	95.8	100.0	
Missing	System	13	4.2		
	Total	310	100.0		

Source: Glenelg Shire

6.19 Fire Proneness of the Zone

This area is subject to bush fires.

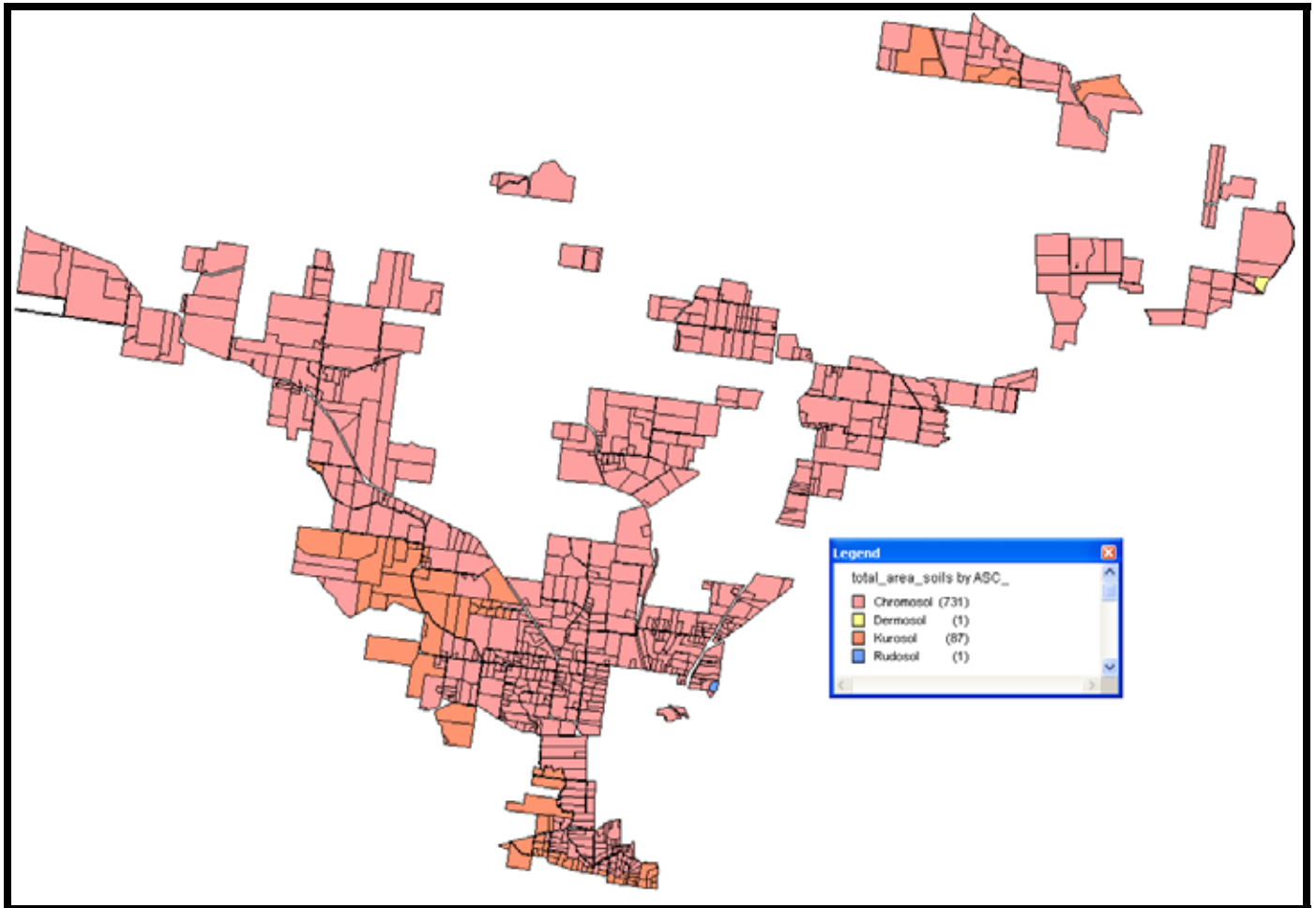
6.20 Land Use Impediments

The zone is subject to a series of impediments that include: sink holes, drainage issues, soil degradation, infrastructure issues, coastal erosion and sea level rise issues.

6.21 Soils in the RCZ2 Zone

There are four soils types (Chromosols, Dermosols; Kurosols; and Rudosols) in the RCZ2 zone. Each soil has specific qualities which are suited for various agricultural endeavors. Chromosols, Dermosols and Kurosols are typically used for broadacre cropping applications while Rudosols are used in conservation and broad acre farming.

Map 33 RCZ2 Soil types by location



Source: Glenelg Shire

The major soil type in the RCZ2 is the Chromosol variety. This soil type as shown by Map 33 is evenly dispersed through the RCZ2 zone. The second largest soil category (Kurosol) is predominately to the west of Portland.

Table 51 RCZ 2 Soil type by location

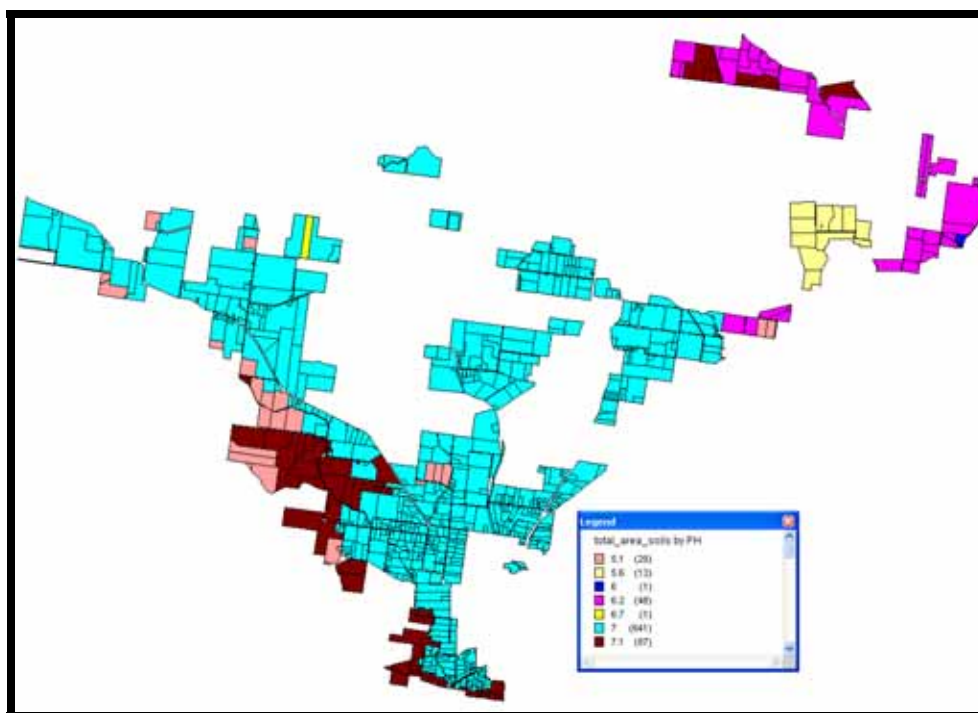
		ASC_				Total
		Chromosol	Dermosol	Kurosol	Rudosol	
locality	BOLWARRA	103	0	0	0	103
	CASHMORE	69	0	14	0	83
	GORAE	62	0	0	0	62
	GORAE WEST	122	0	26	0	148
	HEATHMERE	69	0	0	0	69
	HEYWOOD	21	0	8	0	29
	MOUNT RICHMOND	5	0	0	0	5
	NARRAWONG	26	0	0	0	26
	PORTLAND	30	0	0	0	30
	PORTLAND NORTH	141	0	0	1	142
	PORTLAND WEST	65	0	39	0	104
	TYRENDARRA	18	1	0	0	19
	Total	731	1	87	1	820

Source: Glenelg Shire

The soils in the RCZ2 zone range from pH 5.1 which is acidic through to 7.1 which is neutral. As indicated by Map 34 the acidic soils are in the western and north eastern portion of the RCZ2 zone. Soils which are neutral (light blue) comprise the majority of the zone and are situated to the west of Portland.

The neutral soils of the RCZ2 zone are gradually becoming or have the potential to become more acidic. As highlighted in Map 34 the level of acidification in the zone is increasing at an alarming rate.

Map 34 RCZ2 Soil pH



Source: Glenelg Shire

Table 52 RCZ 2 Soil pH by Location

Location	PH							Total
	5.1	5.6	6.0	6.2	6.7	7.0	7.1	
BOLWARRA	0	0	0	0	0	103	0	103
CASHMORE	6	0	0	0	0	63	14	83
GORAE	0	0	0	0	1	61	0	62
GORAE WEST	15	0	0	0	0	107	26	148
HEATHMERE	0	0	0	0	0	69	0	69
HEYWOOD	0	0	0	21	0	0	8	29
MOUNT RICHMOND	1	0	0	0	0	4	0	5
NARRAWONG	3	13	0	9	0	1	0	26
PORTLAND	0	0	0	0	0	30	0	30
PORTLAND NORTH	4	0	0	0	0	138	0	142
PORTLAND WEST	0	0	0	0	0	65	39	104
TYRENDARRA	0	0	1	18	0	0	0	19
Total	29	13	1	48	1	641	87	820

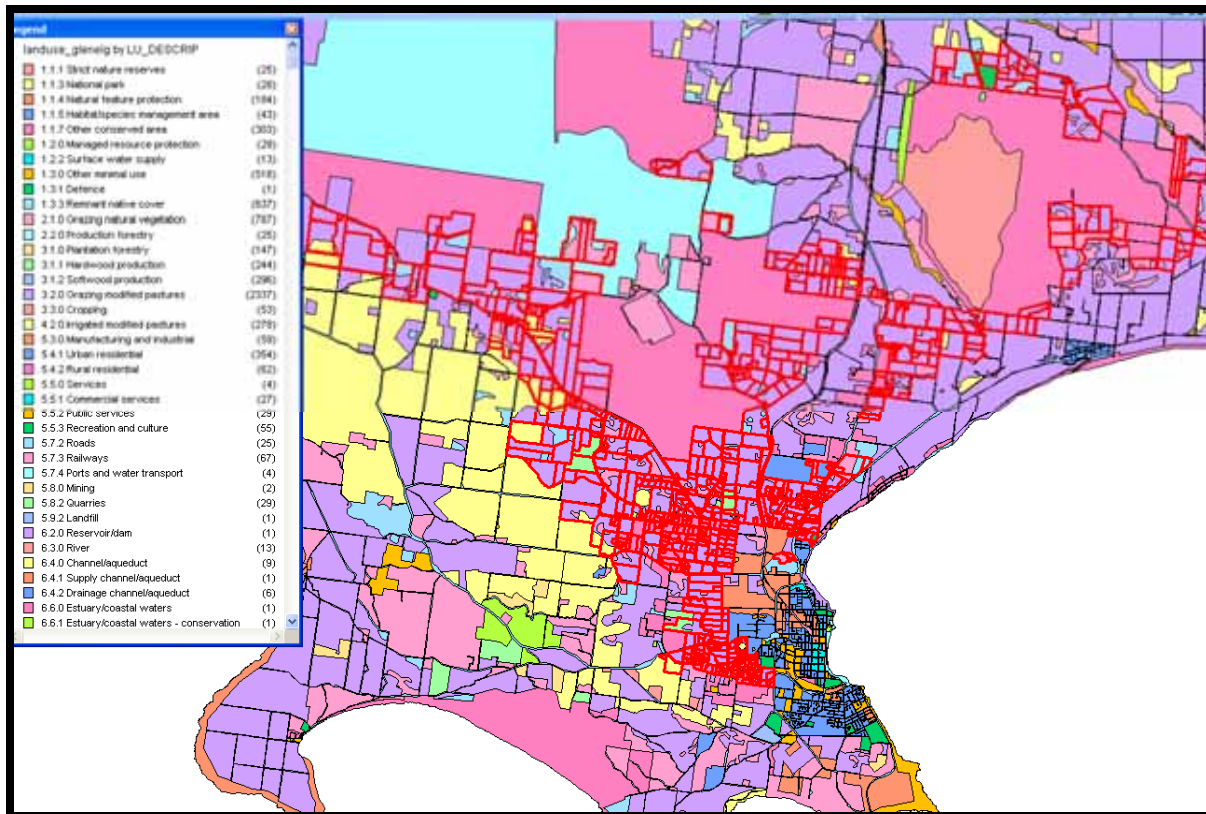
Source: Glenelg Shire

Soil acidification is a reflective index which indicates whether or not a particular soil is becoming either acidic or alkali in nature. As highlighted by Map 36 soils throughout this zone are becoming or have the potential to become acidic.

The areas which have the greatest potential to become more acidic in order are Portland North; Gorae West; Portland West and Bolwarra. Three of these areas are in the north of the RCZ2 zone (Portland North, Gorae West and Bolwarra).

Grazing Modified Pastures (i.e. areas which are coloured purple; RCZ2 parcels have red boundaries) are the land class that has been identified as having the greatest potential to become more acidic. As illustrated by Map 35 the vast majority of the RCZ2 zone is designated as grazing modified pasture.

Map 35 RCZ 2 Land Classes that the Greatest Potential to become more Acidic



Source: Glenelg Shire

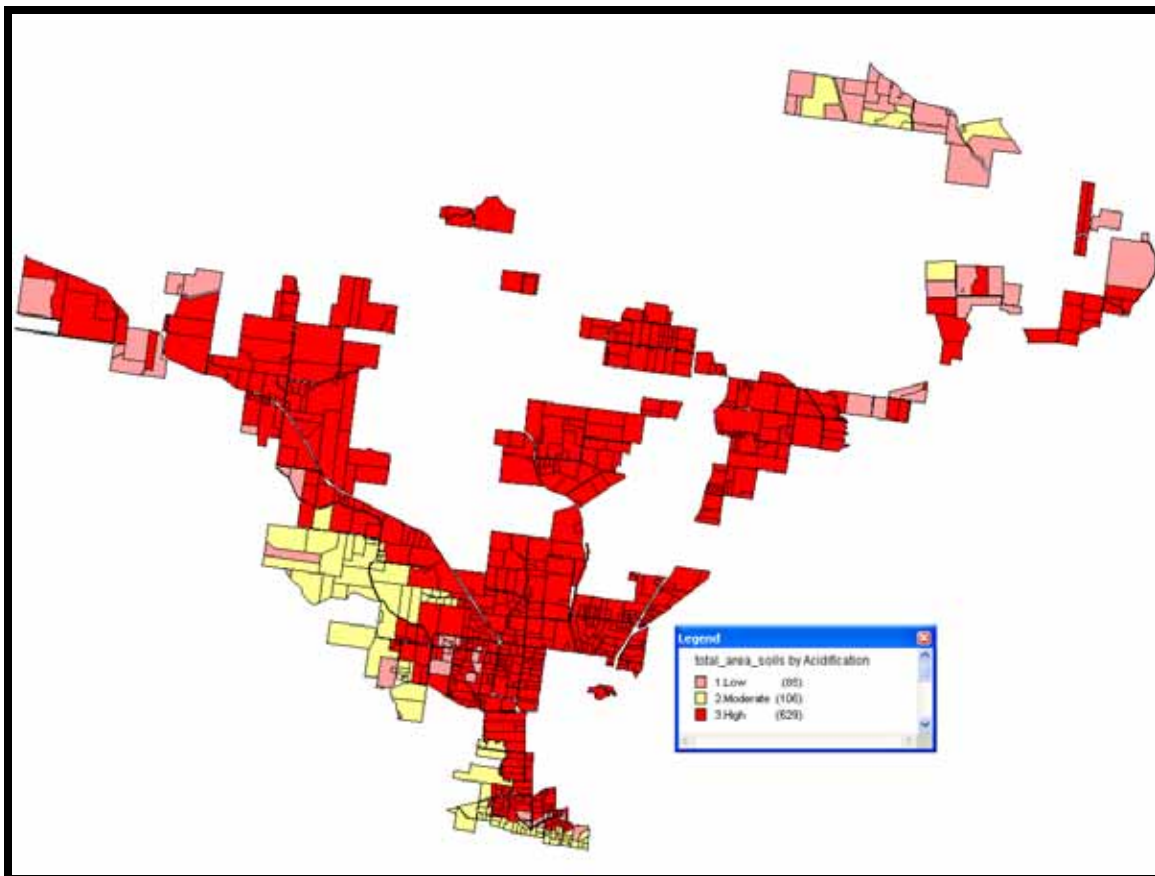
Accelerated soil acidification is recognised globally as a serious soil degradation problem that is reducing agricultural production. Soil acidification is a natural process. It begins when rocks are first colonised by algae and lichens. Acids (or protons) produced mainly from the carbon and nitrogen cycles begin to dissolve the rocks and soil minerals to form the parent soil. In natural ecosystems, soils gradually become more acidic with time so that older and more weathered soils are usually more acidic than younger soils.

Induced acidification in soils arises from:

- Leaching of soil nitrate-nitrate is very soluble in water and leaches below the root zone before the plant can take it up, leaving acidity in the soil; soil nitrate can come from legumes or nitrogen fertiliser. Application of ammonium fertilisers, which when converted to nitrate produce acidity;
- Addition of organic acids;
- Removal of alkalinity through removal (off take) of crop and livestock products-removal of legume hay is a particularly acidifying practice; and
- Transfer of excreta to localised stock camps leaving surrounding land more acidic.

Soil acidification is an insidious soil process, developing slowly with subtle symptoms. If not corrected, the process can continue until irreparable damage occurs.

Map 36 RCZ 2 Level of Acidification



Source: Glenelg Shire

Table 53 RCZ 2 Acidification of soils

		Acidification			Total
		1.Low	2.Moderate	3.High	
locality	BOLWARRA	0	0	103	103
	CASHMORE	14	20	49	83
	GORAE	0	0	62	62
	GORAE WEST	14	26	108	148
	HEATHMERE	0	0	69	69
	HEYWOOD	19	10	0	29
	MOUNT RICHMOND	2	0	3	5
	NARRAWONG	12	1	13	26
	PORTLAND	10	0	20	30
	PORTLAND NORTH	2	0	140	142
	PORTLAND WEST	7	48	49	104
	TYRENDARRA	5	1	13	19
	Total	85	106	629	820

Source: Glenelg Shire

Water Erosion affects approximately 17% of all parcels in the RCZ2 zone. Areas of water erosion are concentrated in the southern, southern western and northern portions of the zone. Soil erosion is a natural process-occurring more in landscapes with high rainfall intensity or steep slopes. The shallow stony soils that cover much of the coastal ranges and the steeper semi-arid lands have been naturally eroded. Where the protective vegetation cover is removed or degraded by clearing, tillage or overgrazing, risks of sheet wash erosion are increased and rill and gully erosion occur. Associated degradation of riparian vegetation has also accelerated erosion of creek and river banks. In arid and semi-arid landscapes, reduced vegetation cover also accelerates wind-borne erosion.

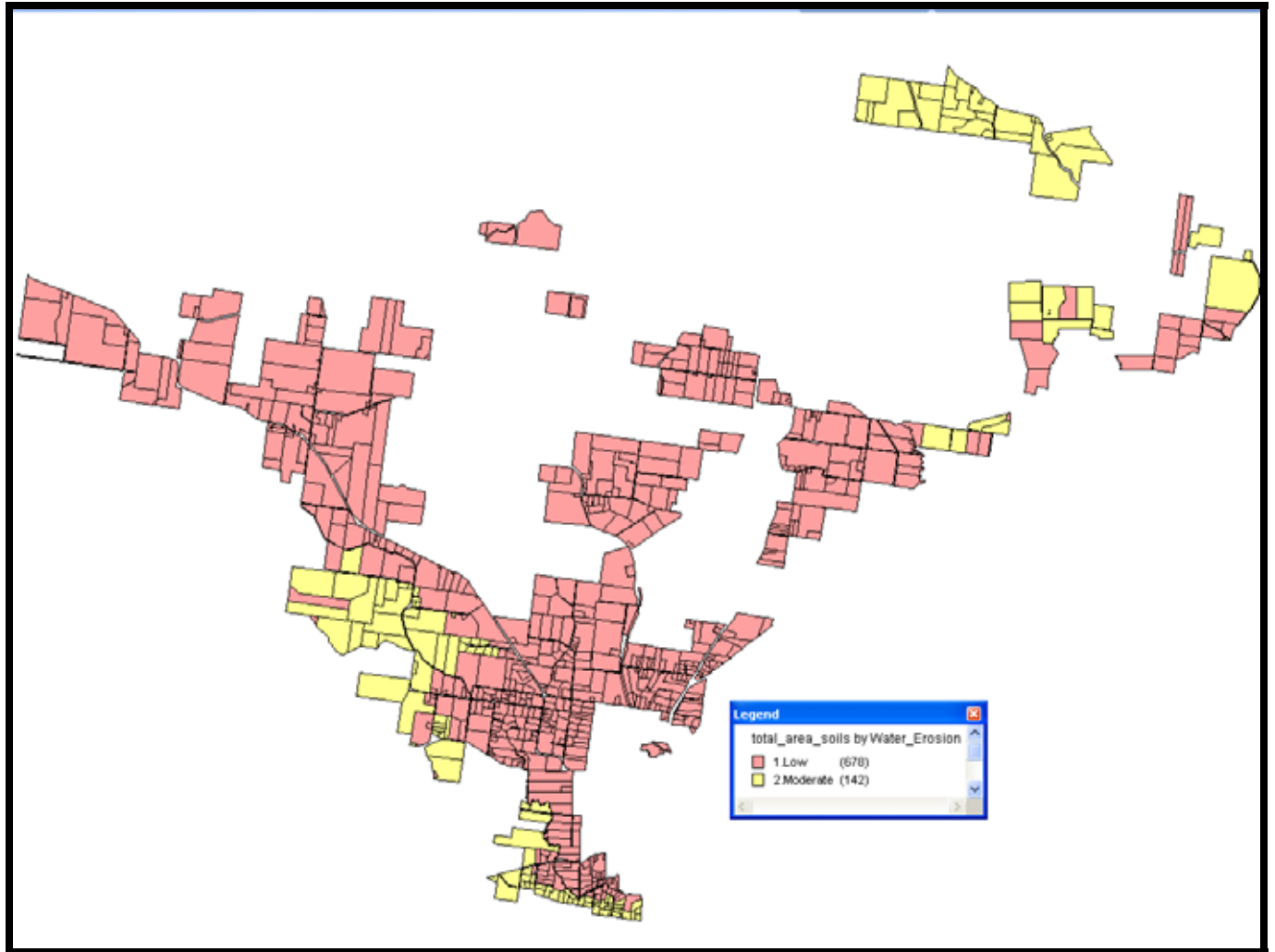
Soil erosion can reduce on-site productivity through loss of fertile topsoil, and associated water-holding capacity and nutrients. Intense erosion also leads to soil structural decline and poor plant growth.

Soil erosion also has the potential for downstream impacts on creeks, rivers, reservoirs, lakes, and estuarine and marine environments. Water-borne erosion increases the supply of sediment to rivers. High concentrations of suspended sediments in rivers can:

- reduce stream clarity;
- inhibit respiration and feeding of stream biota;
- diminish light needed for plant photosynthesis;

- require treatment of water for human use;
- smother the stream bed; and
- Increase land flooding.

Map 37 RCZ 2 Water Erosion Areas



Source: Glenelg Shire

Table 54 RCZ 2 Areas prone to Water Soil Erosion

		Water Erosion		Total
		1.Low	2.Moderate	
locality	BOLWARRA	103	0	103
	CASHMORE	63	20	83
	GORAE	62	0	62
	GORAE WEST	122	26	148
	HEATHMERE	69	0	69
	HEYWOOD	0	29	29
	MOUNT RICHMOND	5	0	5
	NARRAWONG	13	13	26
	PORTLAND	30	0	30
	PORTLAND NORTH	142	0	142
	PORTLAND WEST	56	48	104
	TYRENDARRA	13	6	19
	Total	678	142	820

Source: Glenelg Shire

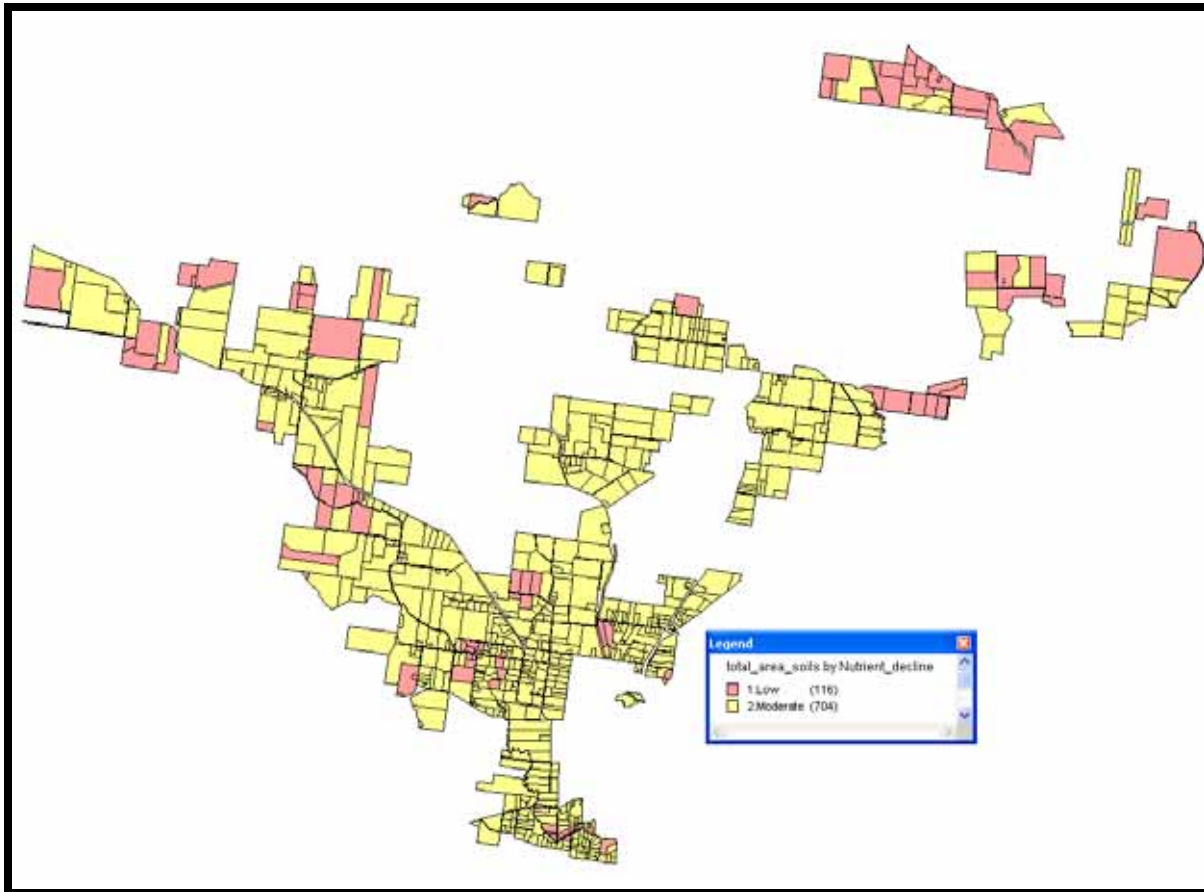
Nutrient Decline is taking planning across all of the RCZ2 zone. Nutrient decline can be traced back to:

- Changes in biogeochemical cycles and components of the hydrological cycle
- Soil erosion by wind and water
- Nutrient exports in harvested farm products

Nutrient decline can be identified through a series of occurrences which include:

- Alteration of vegetation, particularly perennality, leaf area index, root depth and total biomass production; harvesting of produce and export beyond the farm and catchment
- Increased removal of vegetation and exposure of surface soil (exposes soil to the energy of rainfall impact and wind; loss of roots and other soil organic matter reduces cohesion of soil aggregates); increased soil disturbance through cultivation and pressure on soils (primarily from vehicles and implements, sheep and cattle)

Map 38 RCZ 2 Nutrient Decline



Source: Glenelg Shire

Soil depth defines the zone available for growth of plant roots and determines the size of the soil water store. Available water capacity is a function of the depth of soil.

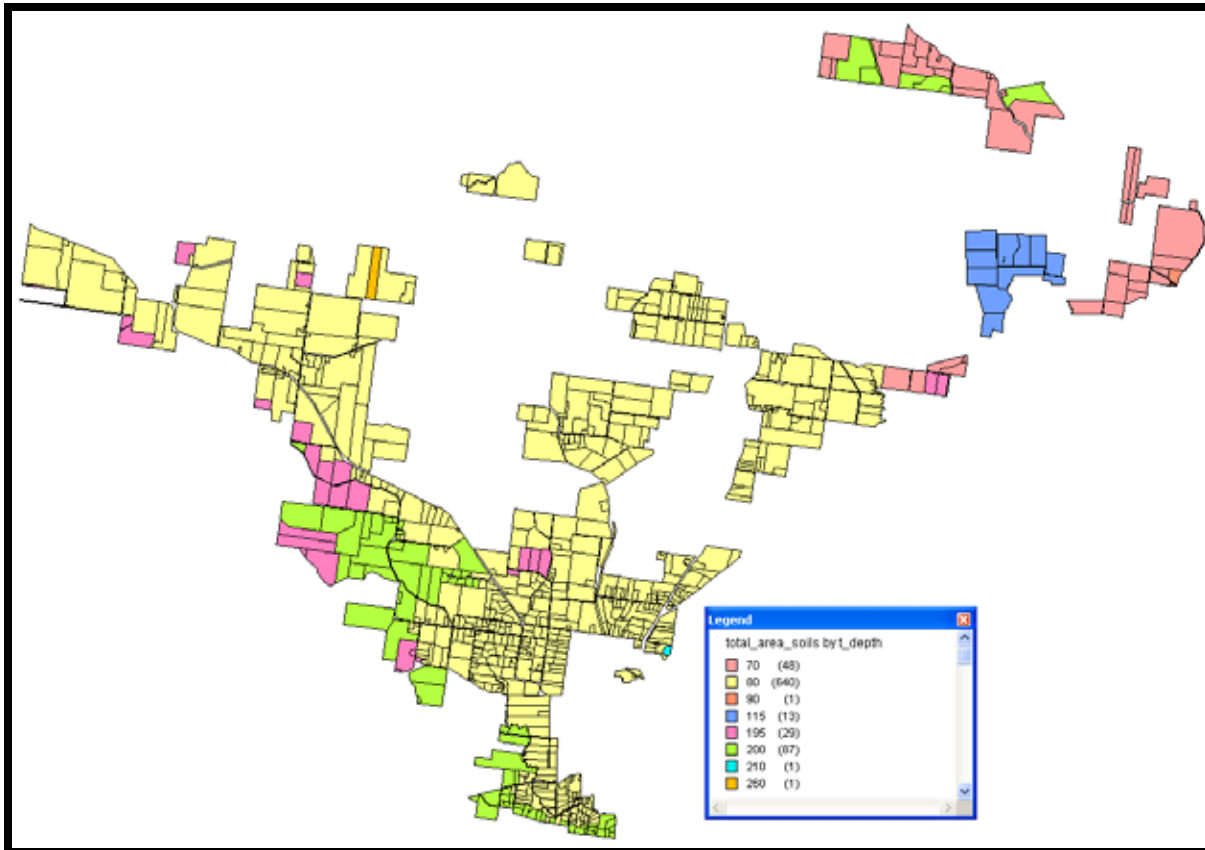
The depth of soil required varies for different crops, but in general shallow soils are less suitable for agriculture. Deep soils provide a much larger store of water.

The depth of topsoil is important because, with their higher organic matter content, topsoils generally have more suitable properties for agriculture, including higher permeability and higher levels of soil nutrients.

Soil depth depends on:

- type of parent material;
- rate of weathering (related to climate); and
- whether weathered material is being transport either into or out of the area

Map 39 RCZ 2 Soils Depths



Source: Glenelg Shire

The most common soil depth in the RCZ2 zone is 80 mm. the Australian Soil classification system defines Australian soils by the following depth chart.

Table 55 Australian Soil Depth Chart

Class	Soil depth (m)
Very shallow	< 0.25
Shallow	0.25 - < 0.5
Moderate	0.5 - < 1.0
Deep	1.0 - < 1.5
Very deep	1.5 - 5
Giant	> 5

Source: Australian Natural Soils Atlas

Using the soil depth chart RCZ2 soils can be defined as being moderately deep. Thirty seven percent of all cropping soils and fifty five percent of all modified grazing pastures have this depth across Australia.

Table 56 RCZ 2 Soil depths by Location

	Total Depth in mm								Total
	70	80	90	115	195	200	210	260	
BOLWARRA	0	103	0	0	0	0	0	0	103
CASHMORE	0	63	0	0	6	14	0	0	83
GORAE	0	61	0	0	0	0	0	1	62
GORAE WEST	0	107	0	0	15	26	0	0	148
HEATHMERE	0	69	0	0	0	0	0	0	69
HEYWOOD	21	0	0	0	0	8	0	0	29
MOUNT RICHMOND	0	4	0	0	1	0	0	0	5
NARRAWONG	9	1	0	13	3	0	0	0	26
PORTLAND	0	30	0	0	0	0	0	0	30
PORTLAND NORTH	0	137	0	0	4	0	1	0	142
PORTLAND WEST	0	65	0	0	0	39	0	0	104
TYRENDARRA	18	0	1	0	0	0	0	0	19
Total	48	640	1	13	29	87	1	1	820

Source: Australian Natural Resource Atlas

7 RCZ2 Issues

Purpose

To establish sustainable agricultural and horticultural uses based on the productive capabilities of the soil and to discourage the location of non soil-based activities which would result in the loss or under-use of agricultural land.

Intensive agricultural & horticultural activities

- Min 2 ha
- Scattered 20-40ha lots
- Majority under 10ha
- Proximity to residential and industrial areas (greater Portland)
- Zone contamination by housing so has become de facto rural living zone
- Does this zone actualise its agricultural /horticultural potential or is there a better use-soil, ph water, drainage (characteristics)?
- Where is the good horticultural land?
- Use fragmentation
- Wildfire

Issues

- What use designated where?
- Can designations be worked through schedules?
- Flooding/ physical constraints

Options

- Rezone fragmented (built areas)-RLZ, RAZ, FZ
- Change min subdivision size and schedules
- Use overlay to identify environmental sensitive areas
- Identify areas for intensive agriculture (2) separate identification for intensive horticultural
- Potential other areas of RLZ and FZ to be changed to RCZ

8 Township Zone

8.1 Purpose

The Township Zone has two main purposes which are:

- To provide for residential development and a range of commercial, industrial and other uses in small towns.
- To encourage residential development that respects the neighbourhood character

Six small areas (Dartmoor, Digby, Merino, Narrawong, Nelson and Sandford) have township zoning.

The township zone has 1172 parcels situated throughout the zone (i.e. Table 57) and is illustrated in a series of maps 40 through 45.

Table 57 Township lots by Location

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid DARTMOOR	218	18.6	18.6	18.6
DIGBY	109	9.3	9.3	27.9
MERINO	216	18.4	18.4	46.3
NARRAWONG	202	17.2	17.2	63.6
NELSON	322	27.5	27.5	91.0
SANDFORD	105	9.0	9.0	100.0
Total	1172	100.0	100.0	

Source: Glenelg Shire

Map 40 Dartmoor Township Zone



Source: Glenelg Shire

Map 41 Digby Township Zone



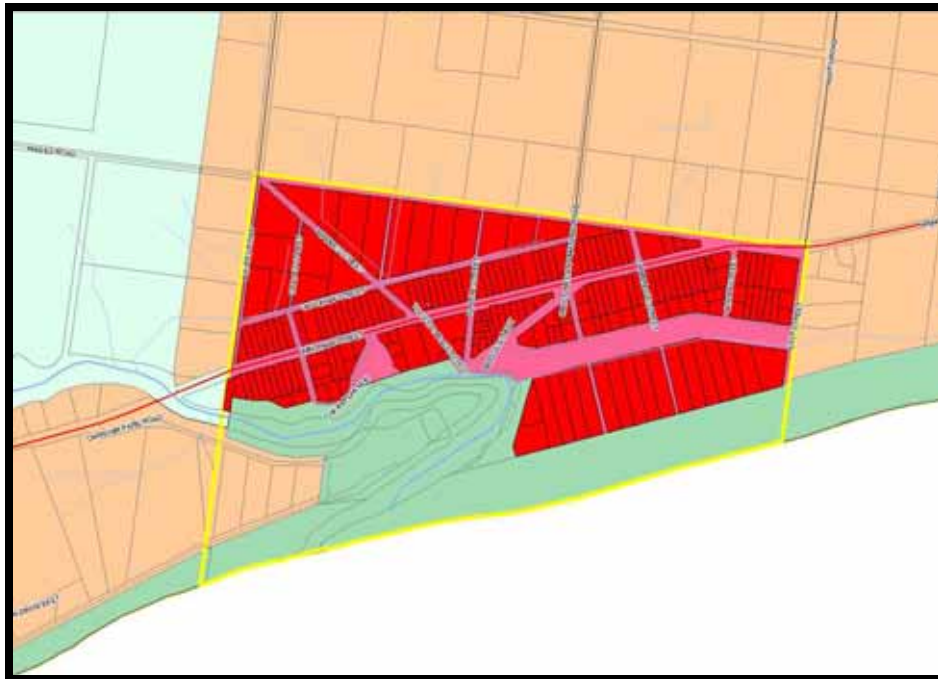
Source: Glenelg Shire

Map 42 Merino Township Zone



Source: Glenelg Shire

Map 43 Narrawong Township Zone



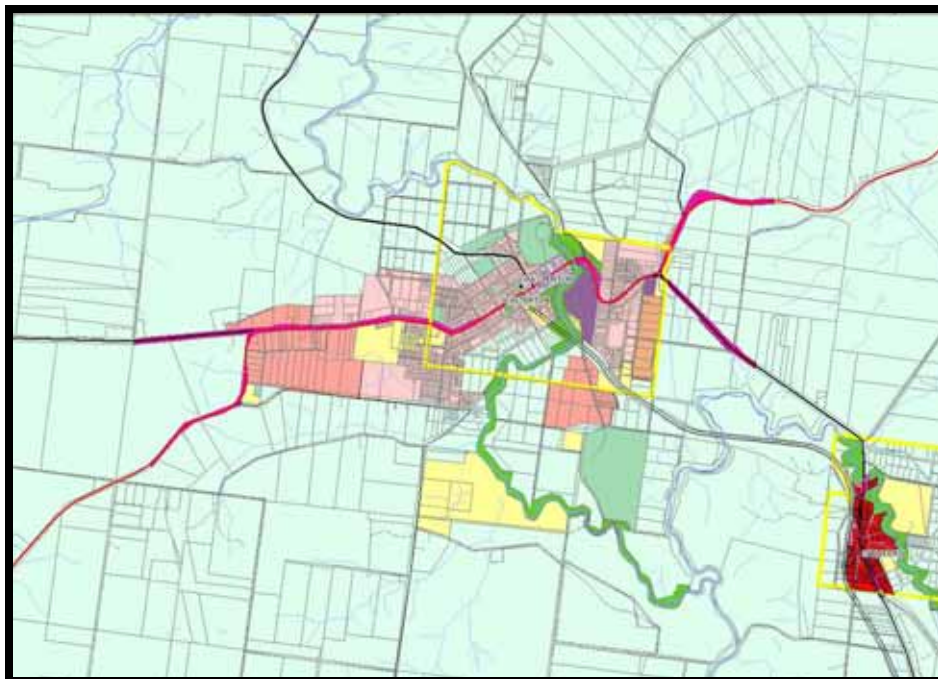
Source: Glenelg Shire

Map 44 Nelson Township Zone



Source: Glenelg Shire

Map 45 Sandford Township Zone



Source: Glenelg Shire

8.2 Land Use

Table 58 illustrates the various lot sizes in the Township Zone. As indicated by the table 90% of all allotments in the zone are under 1 HA. The township zone is fragmented with small lots being the dominate category.

Table 58 Township Zone Parcel Sizes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.20	843	71.9	72.1	72.1
	.50	235	20.1	20.1	92.2
	1.00	64	5.5	5.5	97.7
	1.50	18	1.5	1.5	99.2
	5.00	9	.8	.8	100.0
	Total	1169	99.7	100.0	
Missing	System	3	.3		
	Total	1172	100.0		

Source: Glenelg Shire

The location, size and number of parcels for each of the six townships are illustrated in Table 59. Nelson has the largest number parcels of any of the Glenelg townships. As indicated by Table 3, 87% of the parcels in Nelson are less than .20 of a hectare. Only 91 parcels in the entire township zone are 1 hectare or greater.

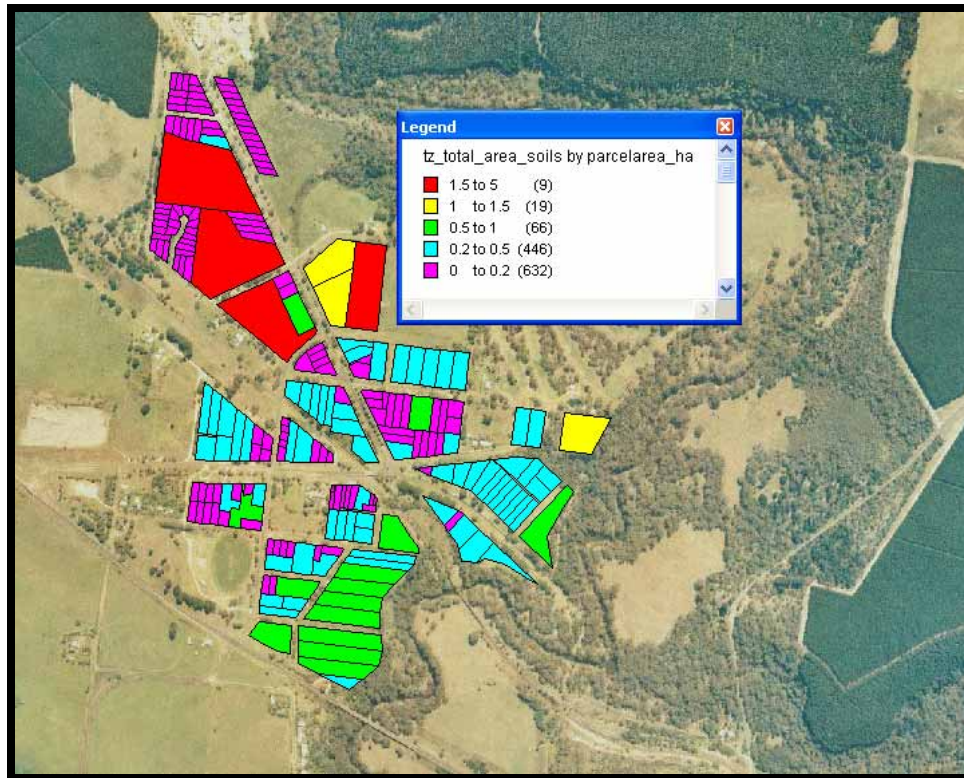
Table 59 Township Zone Parcel Size and Location

		new_area					Total
		.20	.50	1.00	1.50	5.00	
locality	DARTMOOR	144	53	14	2	4	217
	DIGBY	83	23	3	0	0	109
	MERINO	162	49	4	0	0	215
	NARRAWONG	113	49	29	9	2	202
	NELSON	279	27	10	4	1	321
	SANDFORD	62	34	4	3	2	105
	Total	843	235	64	18	9	1169

Source: Glenelg Shire

Map 46 illustrates the lot size and the spatial distribution in Dartmoor. As the map shows it is predominately comprise of lots under 0.5 of an HA. The small lot pattern in Dartmoor can be traced back to the original settlement plan.

Map 46 Dartmoor Parcel Sizes

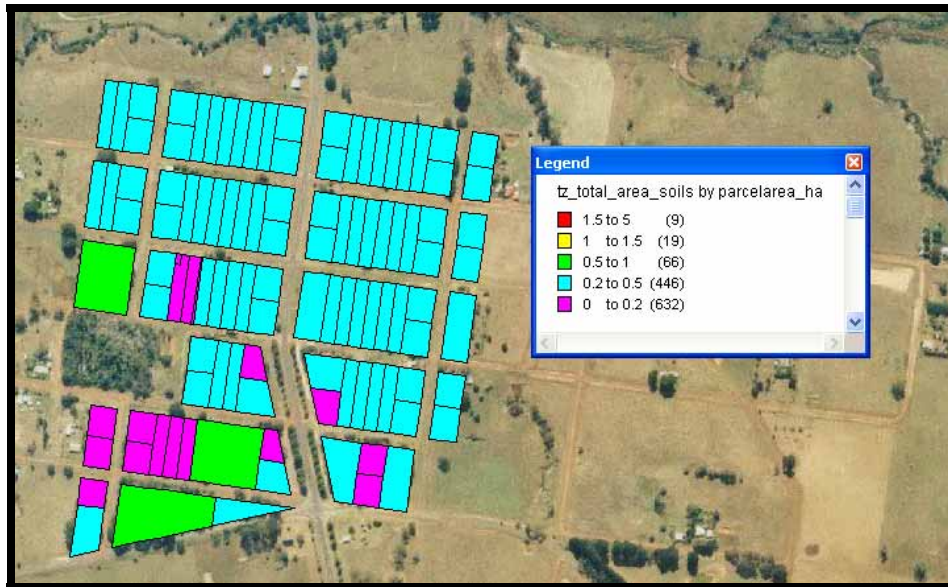


Source: Glenelg Shire

The surrounding area around Dartmoor is dominated by the plantation forestry industry. The plantations are comprised of hundreds of 1 HA blocks.

Map 47 illustrates the lot size and the spatial distribution in Digby. Digby is predominately comprised of lots with a size between 0.2 and 0.5 of a HA. The distribution of lot size is uniform across the Digby Township. This pattern again reflects the historic old township pattern on the late 1800's.

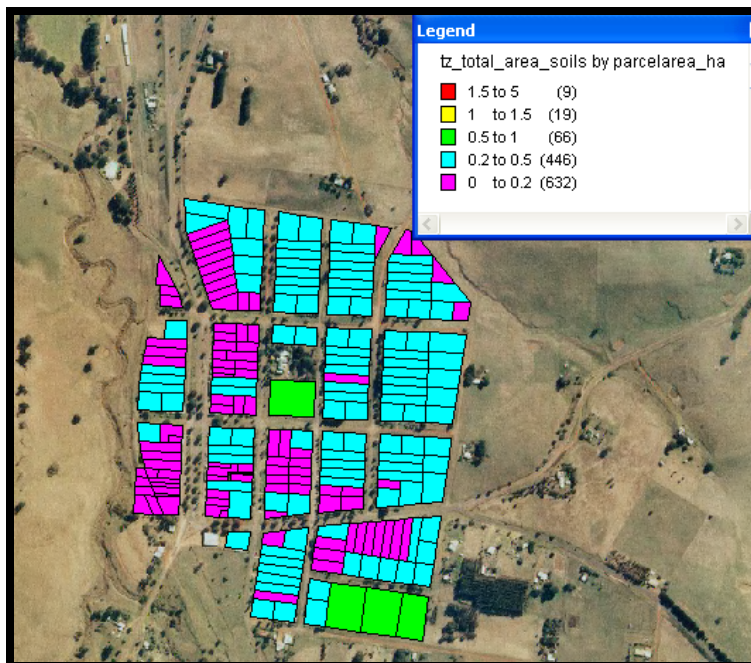
Map 47 Digby Parcel sizes



Source: Glenelg Shire

Map 48 illustrates the lot size and the spatial distribution in Merino. The smaller lot sizes in Merino are located to the west of the township.

Map 48 Merino Parcel Sizes

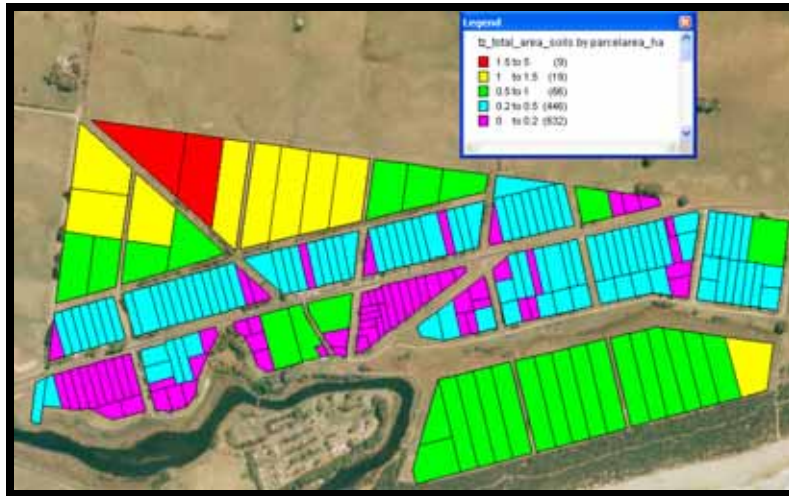


Source: Glenelg Shire

Map 49 illustrates the lot size and the spatial distribution in Narrawong. The spatial distribution of small lots in Narrawong illustrates how fragmented the grid pattern is. With the advent of sea

level rise and global warming the larger lots which abut the coastline are expected to be impacted adversely with the respective parcels losing area or being submerged by rising sea levels.

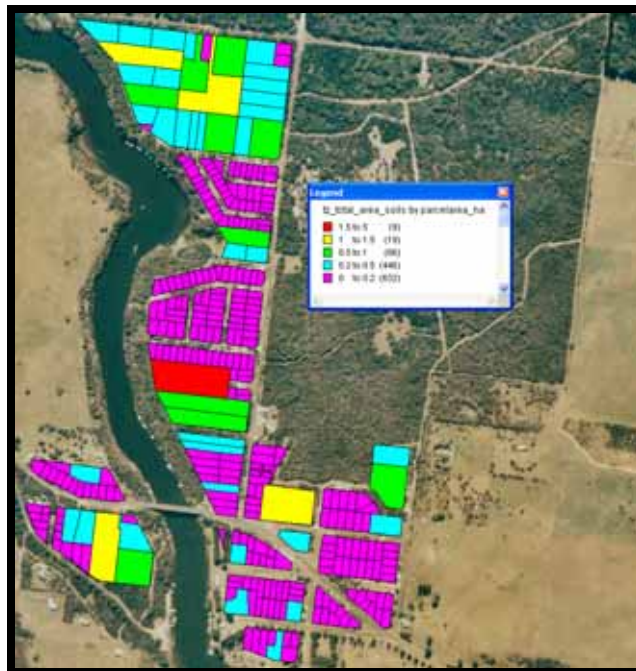
Map 49 Narrawong Parcel Sizes



Source: Glenelg Shire

Map 50 illustrates the lot size and the spatial distribution in Nelson. Nelson is mainly comprised of lots in the 0 to 0.2 HA category. Any future expansion of the Nelson Township will be impacted by a series of factors including sea level rise, the lack of suitable water and waste water infrastructure and the current and forecast future demand for housing in the Nelson area.

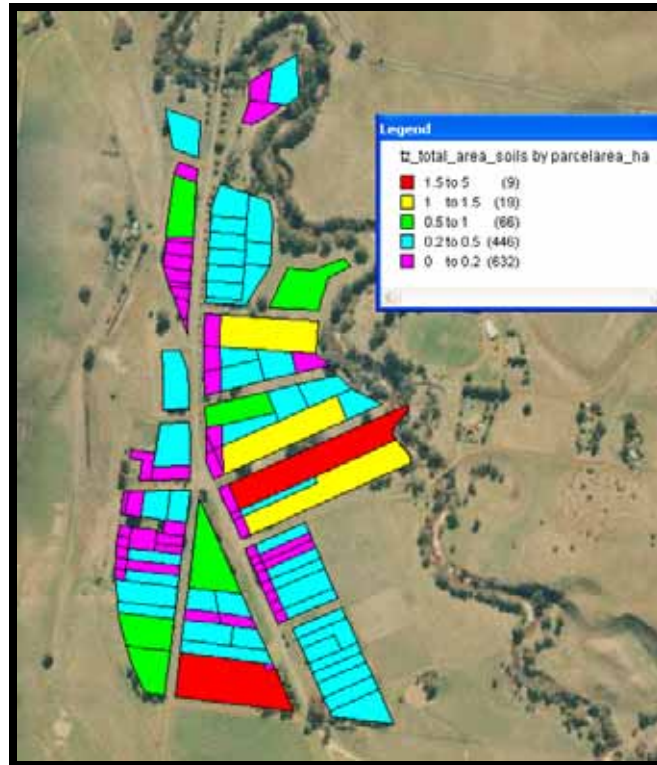
Map 50 Nelson Parcel Sizes



Source: Glenelg Shire

Map 51 illustrates the lot size and the spatial distribution in Sandford. Sandford again reflects the old historic settlement pattern of 1800's with small blocks

Map 51 Sandford Lot Sizes



Source: Glenelg Shire

Levy Descriptions is part of the rating system that Glenelg Shire uses to assess and rate properties. The system is based on a series of land or land use categories.

There are 12 classes or categories of levy descriptions for the Township Zone in Glenelg as illustrated in Table 60.

Table 60 Township Zone Levy Descriptions

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	38	3.2	3.2	3.2
B-Comm/Indust Built	48	4.1	4.1	7.3
B-Comm/Indust Land	3	.3	.3	7.6
B-Culture/Recreation	2	.2	.2	7.8
B-Farm Land	9	.8	.8	8.5
B-Non Rateable	61	5.2	5.2	13.7
B-Recreation Built/land	4	.3	.3	14.1
B-Residential Built	730	62.3	62.3	76.4
B-Residential Land	252	21.5	21.5	97.9
B-Rural/Resid Built	8	.7	.7	98.5
B-Rural/Resid Land	15	1.3	1.3	99.8
H-Non Rateable	1	.1	.1	99.9
P-Non Rateable	1	.1	.1	100.0
Total	1172	100.0	100.0	

Source: Glenelg Shire

As would be expected the category with the largest frequency is the Residential Built category. As indicated by Table 4 there is still land in the township zone available for housing. Over twenty percent of the zone is comprised of vacant land. This figure represents the total of number of vacant lots which may or may not be eligible to construct a dwelling or structure upon. This total figure of vacant land does not take inconsideration impediments such flood ways, and other natural impediments.

Table 61 analyses the levy description by each township. The key levy descriptor is residential land. As indicated by the table there is 252 vacant parcels in the six townships.

Table 61 Township Levy Descriptions by location

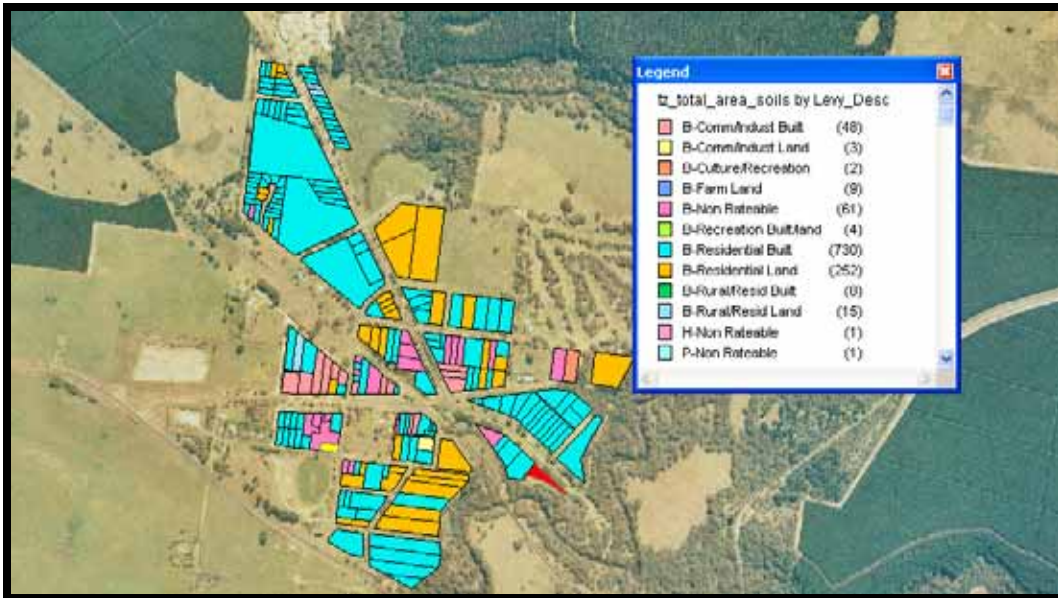
Levy Des	DARTMOOR	DIGBY	MERINO	NARRAWONG	NELSON	SANDFORD	Total
	3	20	8	3	4	0	38
B-Comm/Indust Built	14	4	8	0	20	2	48
B-Comm/Indust Land	1	0	2	0	0	0	3
B- Culture/Recreation	1	0	0	0	1	0	2
B-Farm Land	0	0	0	9	0	0	9
B-Non Rateable	21	6	22	2	5	5	61
B-Recreation Built/land	0	0	2	0	2	0	4
B-Residential Built	139	51	124	126	226	64	730
B-Residential Land	36	18	44	61	62	31	252
B-Rural/Resid Built	0	3	2	0	1	2	8
B-Rural/Resid Land	3	7	4	0	0	1	15
H-Non Rateable	0	0	0	1	0	0	1
P-Non Rateable	0	0	0	0	1	0	1
Total	218	109	216	202	322	105	1172

Source: Glenelg Shire

The distribution of the levy codes for each township location is highlighted in maps 52 through 57.

The vacant land for Dartmoor is mainly situated in the southern half of the township. Dartmoor has 36 vacant parcels of land. The township has only a partial reticulated water service (no sewer).

Map 52 Dartmoor Parcel Levy Descriptions



Source: Glenelg Shire

Digby has only 18 vacant lots in the existing township boundary. These lots are in the northern portion of the township. The township has only a partial reticulated water service (no sewer).

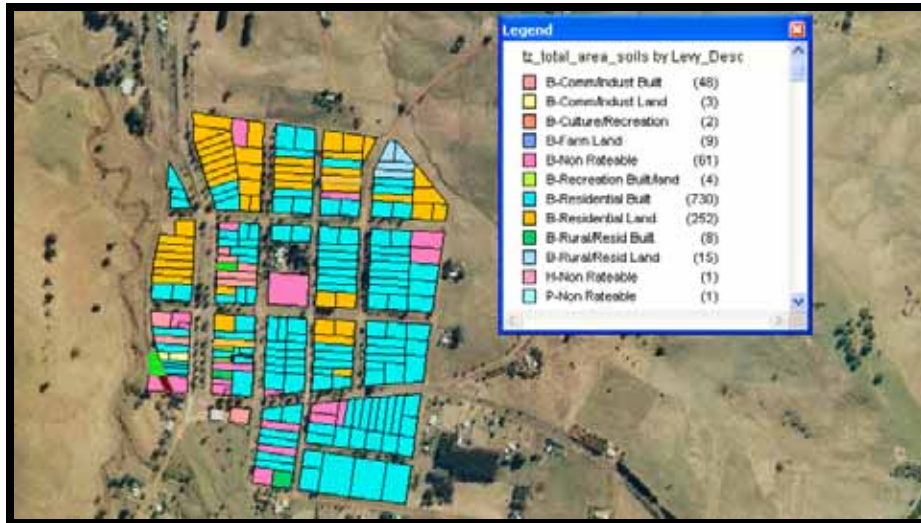
Map 53 Digby Parcel Levy Descriptions



Source: Glenelg Shire

The majority of Merino vacant land is in the northern portion of the township. This land does have a partial reticulated water service (no sewer)

Map 54 Merino Parcel Levy Descriptions



Source: Glenelg Shire

Narrawong has the largest amount of available land of any township. The problem with this land is that it is on the coastline and is subject to various impediments that make it unsuitable for development.

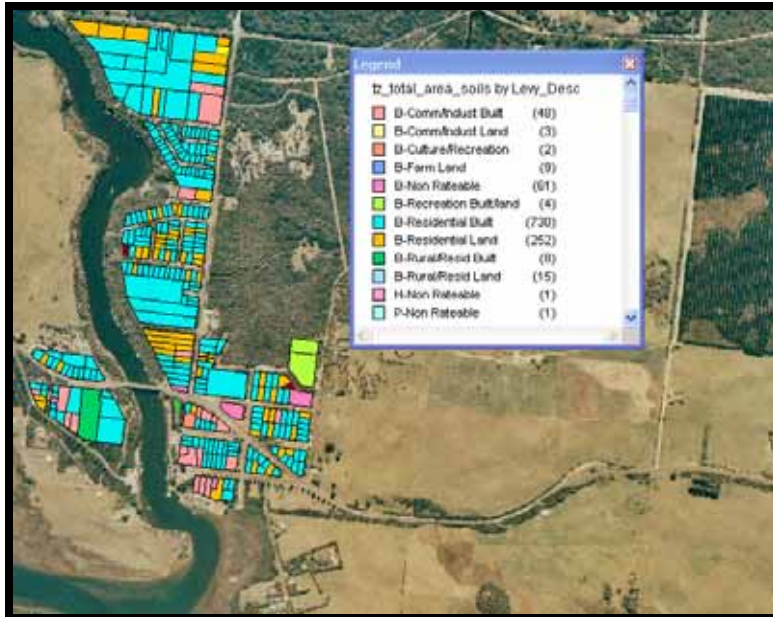
Map 55 Narrawong Parcel Levy Descriptions



Source: Glenelg Shire

Nelson's vacant residential land is situated to the north of Portland Nelson road. Nelson is surrounded by Farm zone with minimum allotments for subdivision of 40 HA.

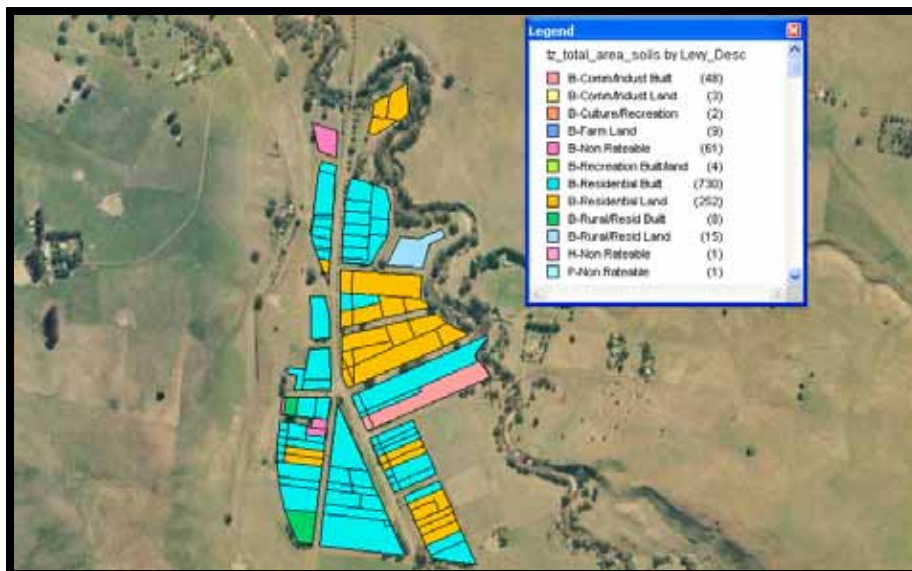
Map 56 Nelson Parcel Levy Descriptions



Source: Glenelg Shire

Sanford is totally immersed in a floodway zone and has no vacant land which is suitable for development.

Map 57 Sanford Parcel Levy Descriptions



Source: Glenelg Shire

8.3 Subdivision Activity

For the period 2000-2010 only 6 subdivision applications (4 Narrawong, 2 Nelson) were received for the six townships. From the six applications only two dealt with the creation of an actual subdivision (one 4 lot; one 2 lot).

8.4 Building Permits

As indicated by Table 62 239 building permits were issued between 2000 and 2010. Over 50% of the permits were for the Nelson Township (Table 63)

Table 62 Township Zone Building Permit Activity

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 2000	25	10.5	10.5	10.5
2001	35	14.6	14.6	25.1
2002	25	10.5	10.5	35.6
2003	33	13.8	13.8	49.4
2004	21	8.8	8.8	58.2
2005	26	10.9	10.9	69.0
2006	22	9.2	9.2	78.2
2007	15	6.3	6.3	84.5
2008	21	8.8	8.8	93.3
2009	16	6.7	6.7	100.0
Total	239	100.0	100.0	

Source: Glenelg Shire

Coastal communities such as Narrawong and Nelson were major centers for building permit activity accounting for 74 % of building permits.

Table 63 Building Permit Activity by Location

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DARTMOOR	42	17.6	17.6	17.6
	DIGBY	5	2.1	2.1	19.7
	MERINO	10	4.2	4.2	23.8
	NARRAWONG	53	22.2	22.2	46.0
	NELSON	123	51.5	51.5	97.5
	SANDFORD	6	2.5	2.5	100.0
	Total	239	100.0	100.0	

Source: Glenelg Shire

In the Township zone over 84% (201 out of 239) of all building permits were for residential construction. The most numerous construction activities were Garages (48 permits), Shed (35 permits) and Carport (17 permits). In the ten year span i.e. 2000 -2010 only 30 dwellings were constructed in the six townships

Table 64 Township Building Permits by Rating Levy

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.4	.4	.4
B-Comm/Indust Built	12	5.0	5.0	5.4
B-Comm/Indust Land	2	.8	.8	6.3
B-Non Rateable	5	2.1	2.1	8.4
B-Recreation Built/land	1	.4	.4	8.8
B-Residential Built	201	84.1	84.1	92.9
B-Residential Land	16	6.7	6.7	99.6
H-Non Rateable	1	.4	.4	100.0
Total	239	100.0	100.0	

Source: Glenelg Shire

Table 65 Township Zone Building Permits

Permit Activity	Frequency	Percent	Valid Percent	Cumulative Percent
	40	16.7	16.7	16.7
Ablution Block	1	.4	.4	17.2
Addition	1	.4	.4	17.6
Alteration	1	.4	.4	18.0
Bathroom	1	.4	.4	18.4
Butchers Shop	1	.4	.4	18.8
Carport	17	7.1	7.1	25.9
Carport, Garage	1	.4	.4	26.4
Change of Use	1	.4	.4	26.8
Change of Use	1	.4	.4	27.2
Change of Use & Alterations	1	.4	.4	27.6
Covered Deck	1	.4	.4	28.0
Demolition	2	.8	.8	28.9
Dwelling	30	12.6	12.6	41.4
Dwelling - Lock up to Completion	1	.4	.4	41.8
Dwelling - Stage 1 Foundations	1	.4	.4	42.3
Dwelling - Unit 1, Attached Carport	1	.4	.4	42.7
Dwelling to Lock	1	.4	.4	43.1
Extension	20	8.4	8.4	51.5
Garage	48	20.1	20.1	71.5
Garage, Fence	1	.4	.4	72.0
Garage/Carport	1	.4	.4	72.4
Gazebo	1	.4	.4	72.8
Heater	4	1.7	1.7	74.5
Pergola	1	.4	.4	74.9
Re-erected Dwelling	1	.4	.4	75.3
Re-locate Dwelling & Extension	1	.4	.4	75.7
Recladding Dwelling	1	.4	.4	76.2

Permit Activity	Valid			
	Frequency	Percent	Percent	Cumulative Percent
Recreation Area, Carport	1	.4	.4	76.6
Relocate Dwelling	1	.4	.4	77.0
Relocate Dwelling, New Garage	1	.4	.4	77.4
Relocation of Dwelling	2	.8	.8	78.2
Restump	2	.8	.8	79.1
Retaining Wall	1	.4	.4	79.5
Shed	35	14.6	14.6	94.1
Shop	1	.4	.4	94.6
Verandah	13	5.4	5.4	100.0
Total	239	100.0	100.0	

Source: Glenelg Shire

8.5 Fire Proneness of the Zone

This area is subject to bush fires.

8.6 Land Use Impediments

The zone is subject to a series of impediments that include: infrastructure issues (waste water), drainage issues, coastal erosion, sea level rise, soil degradation and small lot land fragmentation.

8.7 Soils in the Township Zone

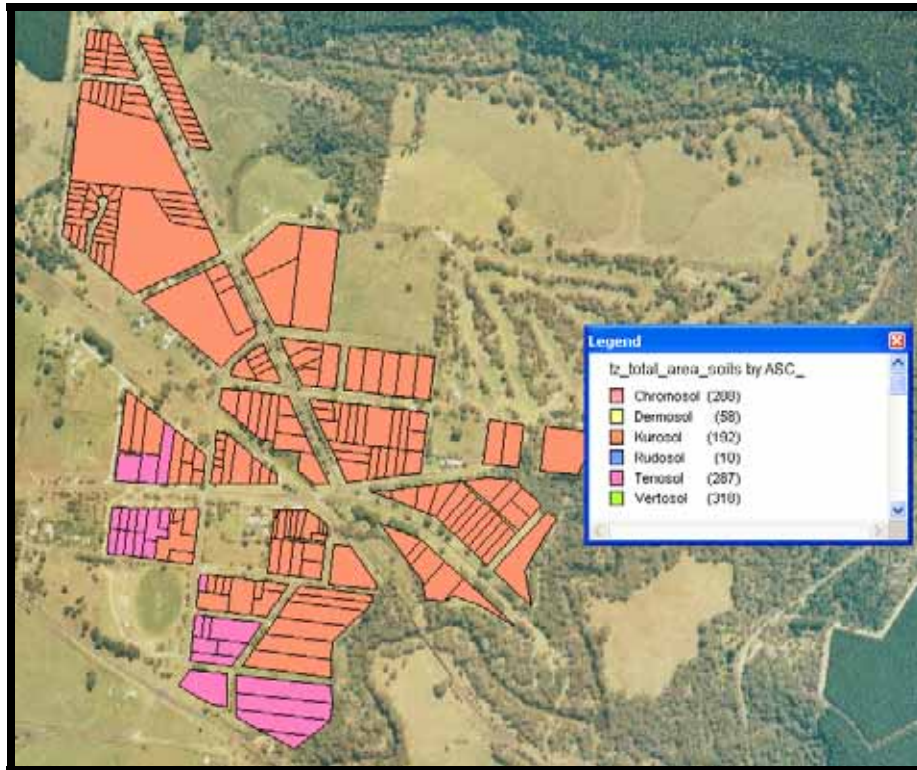
There are six soils types (Chromosol, Dermosol, Kurosol (Broad Acre farming) Rudosol, Tenosol (Conservation and Broad Acre) and Vertosol (grain and dry acre farming)

Because of the geographic spread of the six townships each township will have their own individual discussion relating to soil type; pH levels; levels of acidification; water erosion; nutrient decline and soil depth.

8.7.1 Dartmoor

In the Dartmoor Township there are two major soil types (Chromosol and Tenosol) this soil type is shown in Map 58. Chromosols are the major soil category for the Dartmoor area.

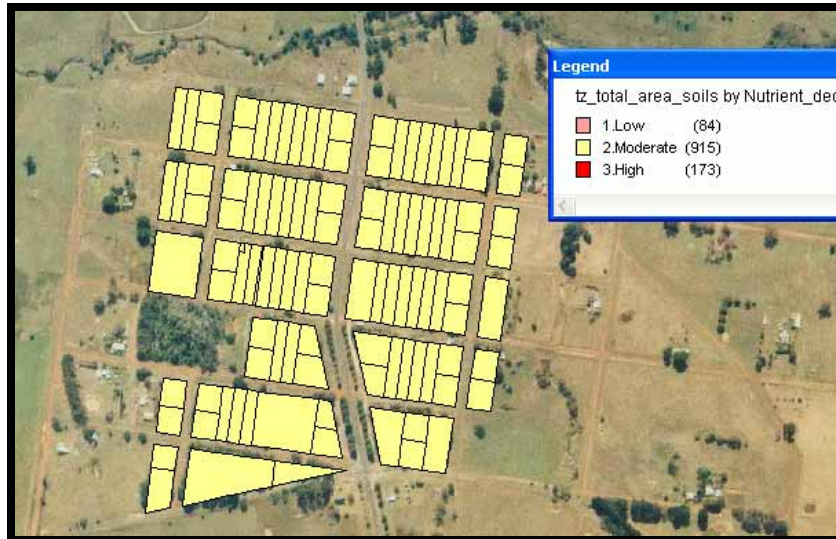
Map 58 Dartmoor Soil Categories



Source: Glenelg Shire

Soils in the Dartmoor area experiencing a moderate level of nutrient decline as indicated by Map 59.

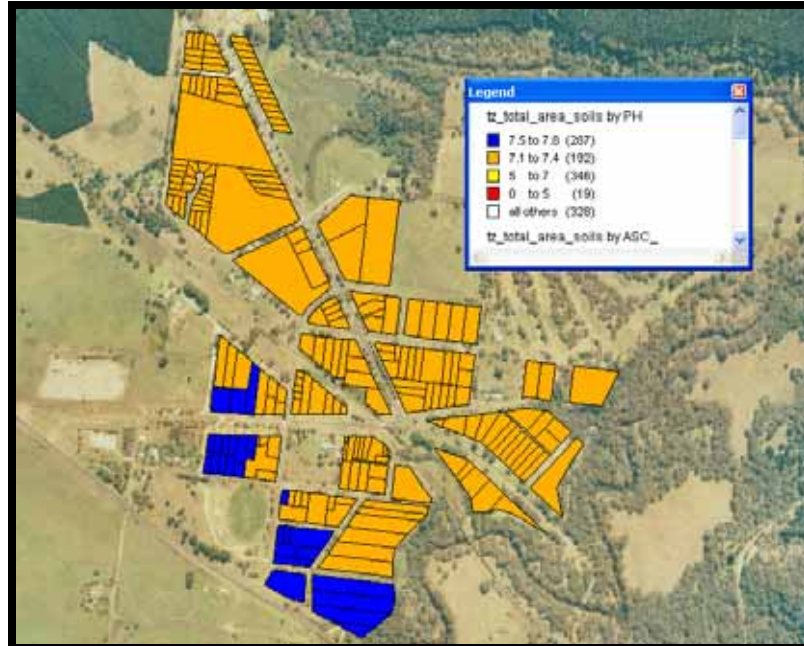
Map 59 Dartmoor Soils Nutrient Decline



Source: Glenelg Shire

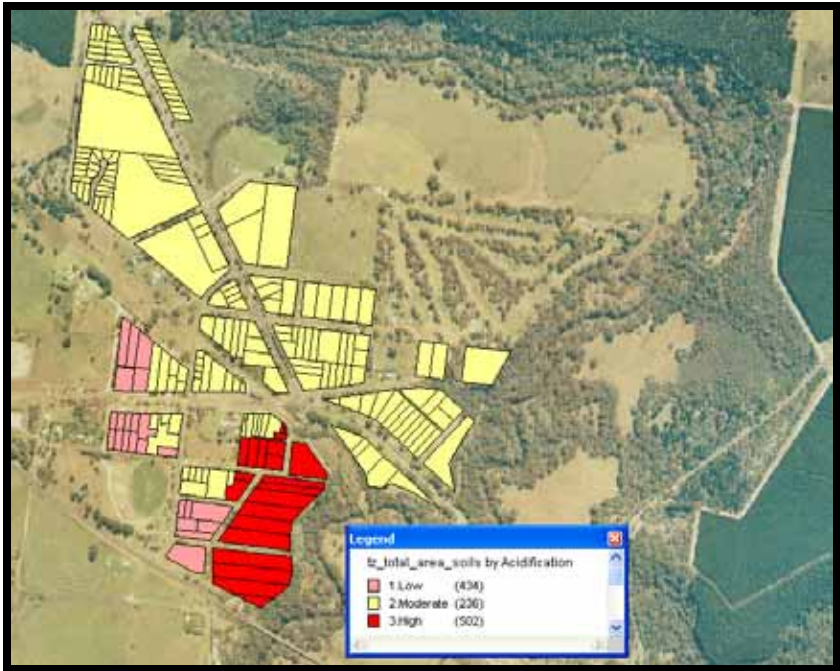
Soils in the Dartmoor area are either neutral or slightly alkali. Map 60 indicates that the lots in the southern portion of the township are becoming acidic.

Map 60 Dartmoor Soil pH



Source: Glenelg Shire

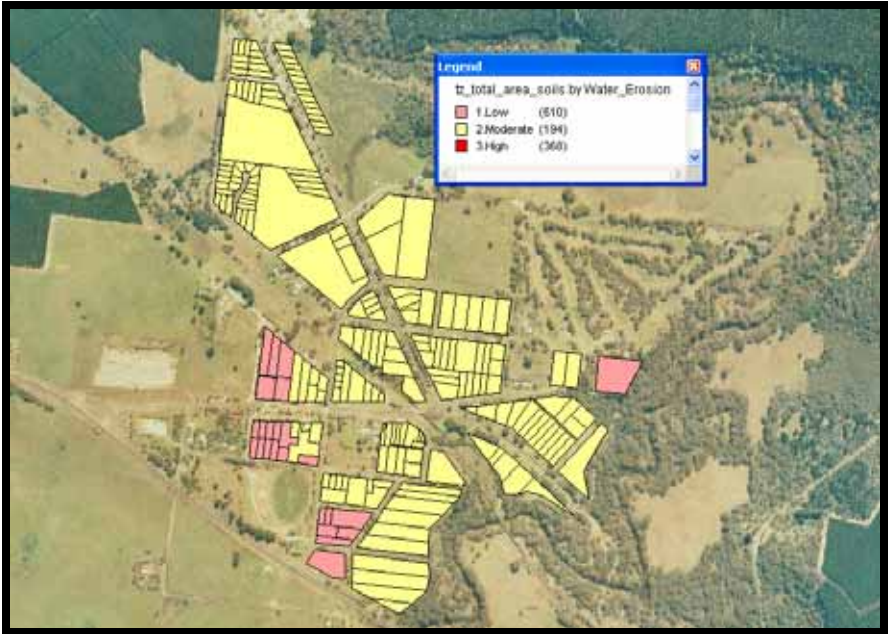
Map 61 Level of Dartmoor Soil Acidity



Source: Glenelg Shire

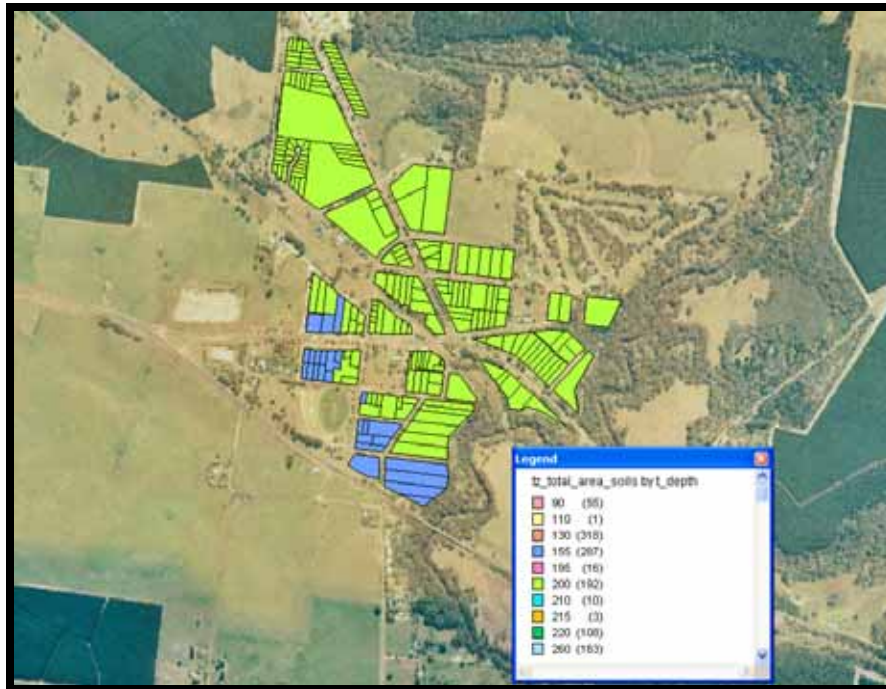
The Dartmoor township area is subject to moderate water erosion. The level of erosion is forecast to increase over time. The average soil depth in Dartmoor is approximately 200 mm before reaching gravel or bedrock.

Map 62 Dartmoor Water Erosion



Source: Glenelg Shire

Map 63 Dartmoor Soil Depth



Source: Glenelg Shire

8.7.2 Digby

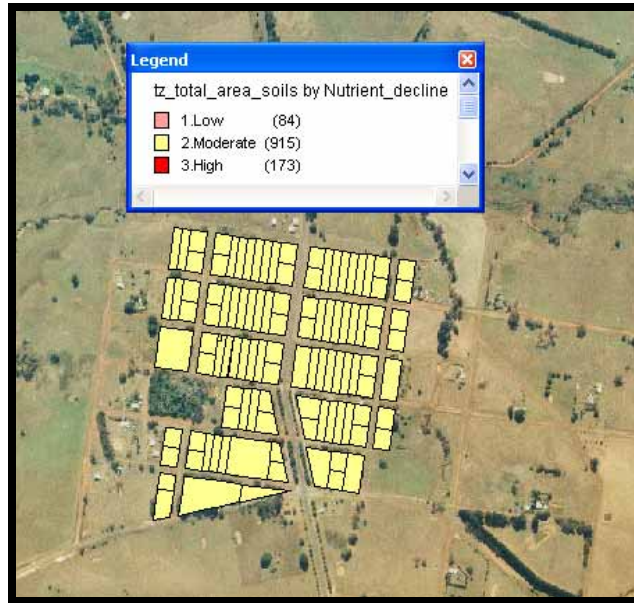
Chromosol is the only soil type in the Digby Township. The Digby soils are experiencing a moderate level of nutrient decline

Map 64 Digby Soil Type



Source: Glenelg Shire

Map 65 Digby Soils Nutrient Decline



Source: Glenelg Shire

The soils in the Digby area are currently acidic (i.e. pH 5 through 7) and are increasing in acidity levels as indicated by Map 67.

The increased level of soil acidity may in part be due to the plantation forestry located in the Digby area.

Map 66 Digby Soil pH



Source: Glenelg Shire

Map 67 Levels of Acidity in Digby Soils



Source: Glenelg Shire

The Dartmoor soils are prone to a high level of water erosion. The entire township area is a high level risk area.

Map 68 Level of Water Erosion in Dartmoor Soils



Source: Glenelg Shire

The soils in the Digby Township have a uniform depth of 220 mm before reaching bedrock or gravel.

Map 69 Digby Soil Depths



Source: Glenelg Shire

8.7.3 Merino

Merino has a single soil type through the township (Vertosol) which currently has a low level of nutrient decline.

Map 70 Merino Soil categories



Source: Glenelg Shire

Map 71 Nutrient Decline Merino soils



Source: Glenelg Shire

The Merino soils are highly acidic with the entire township registering a pH of 5.4. All parcels in Merino show high levels of acidity.

Map 72 Merino soil pH



Source: Glenelg Shire

Map 73 Level of soil Acidification Merino soils



Source: Glenelg Shire

Merino soils are subject to a high level of water erosion. As indicated in Map 74 the entire township has this rating. Soil depth for Merino has been estimated to be approximately 130 mm before reaching gravel.

Map 74 Merino soils subject to Water Erosion



Source: Glenelg Shire

Map 75 Merino Soil depths



Source: Glenelg Shire

8.7.4 Narrawong

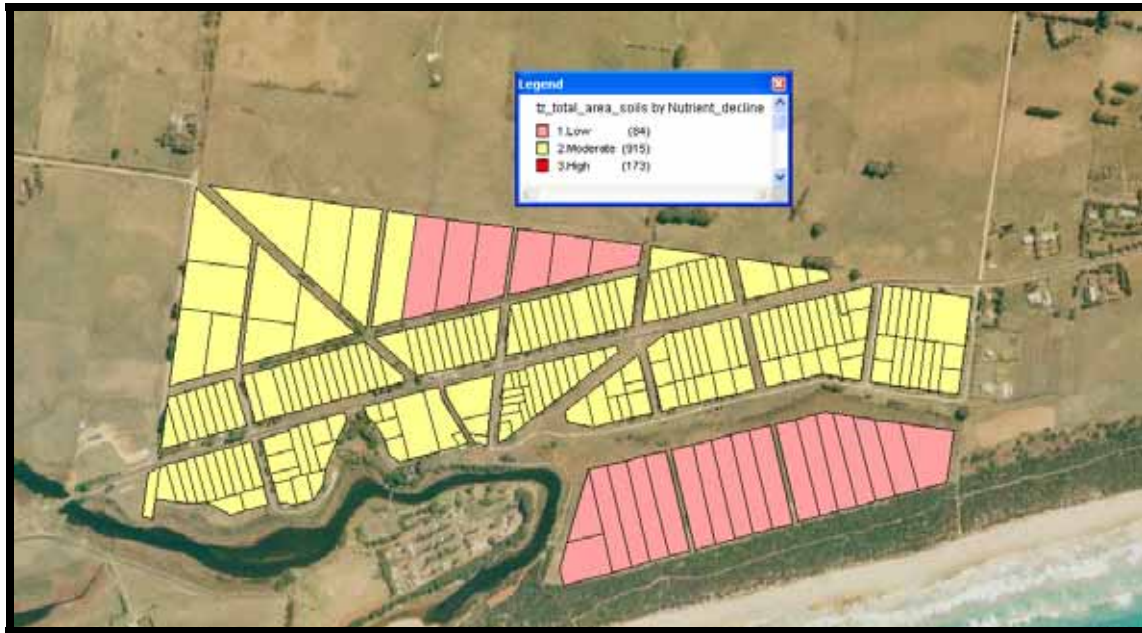
Narrawong has three types of soils (Dermosol, Chromosol and Rudosol). The level of nutrient decline ranges from low (along the coastline) to medium for the parcels fronting the Princess Highway.

Map 76 Narrawong Soil Types



Source: Glenelg Shire

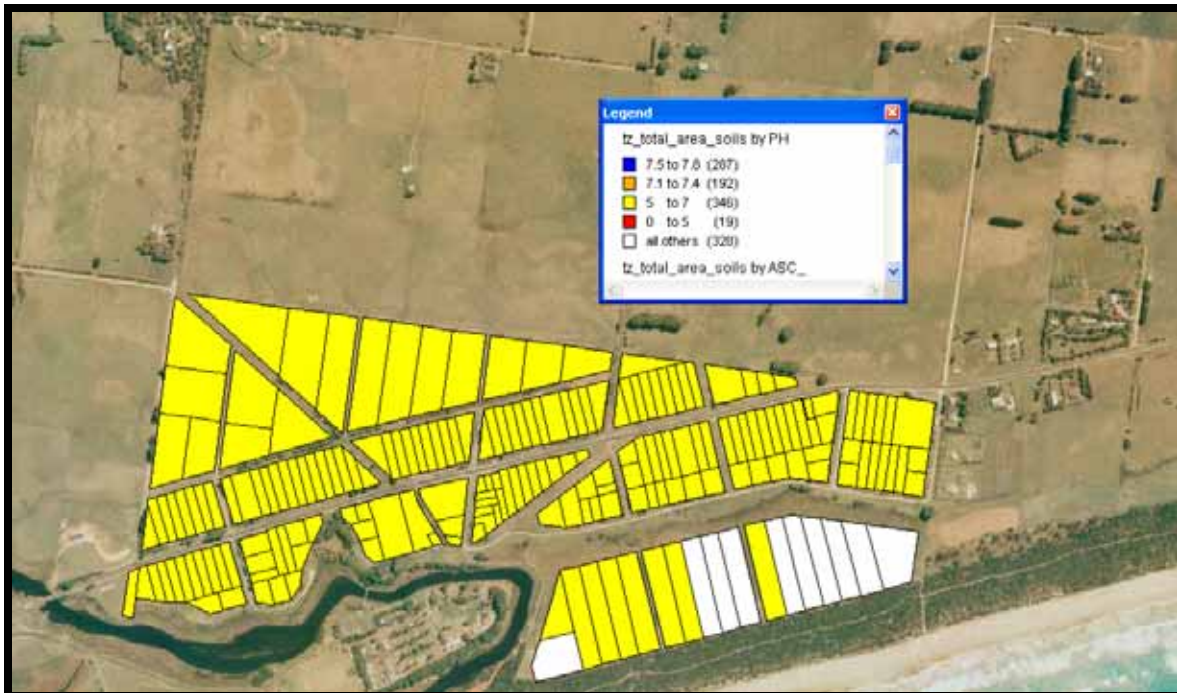
Map 77 Nutrient Decline Narrawong Soils



Source: Glenelg Shire

Narrawong’s soils are highly acidic, ranging from pH 5 through 7. The probability that any other soils in the Narrawong area will become acidic has been ranked by the DSE as low as indicated by Map 79.

Map 78 Narrawong Soils pH



Source: Glenelg Shire

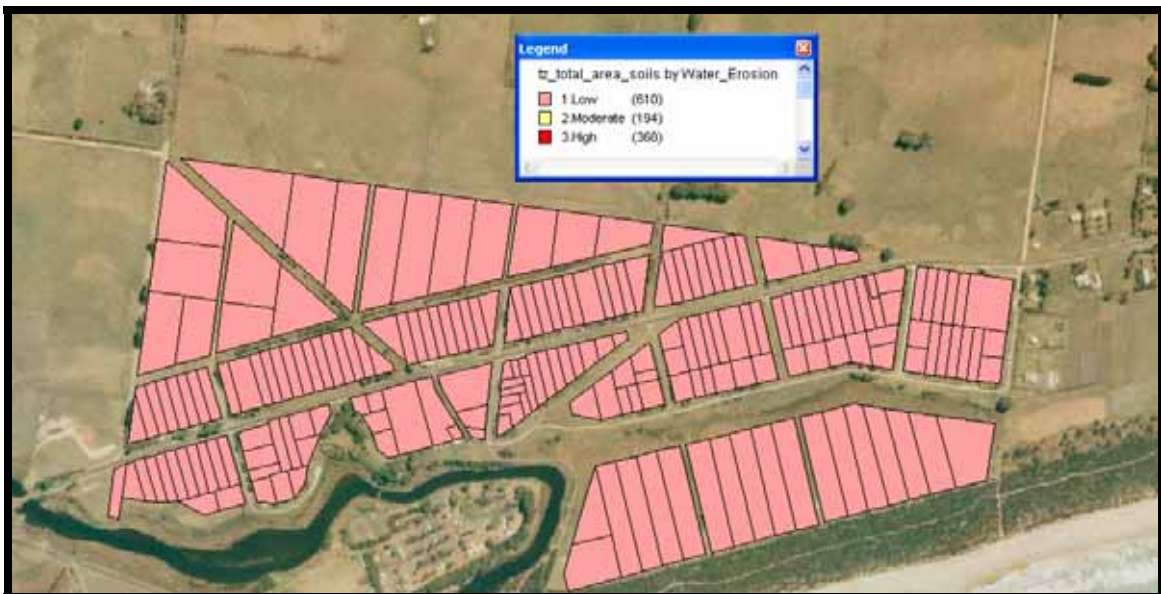
Map 79 Levels of Acidification Narrawong Soils



Source: Glenelg Shire

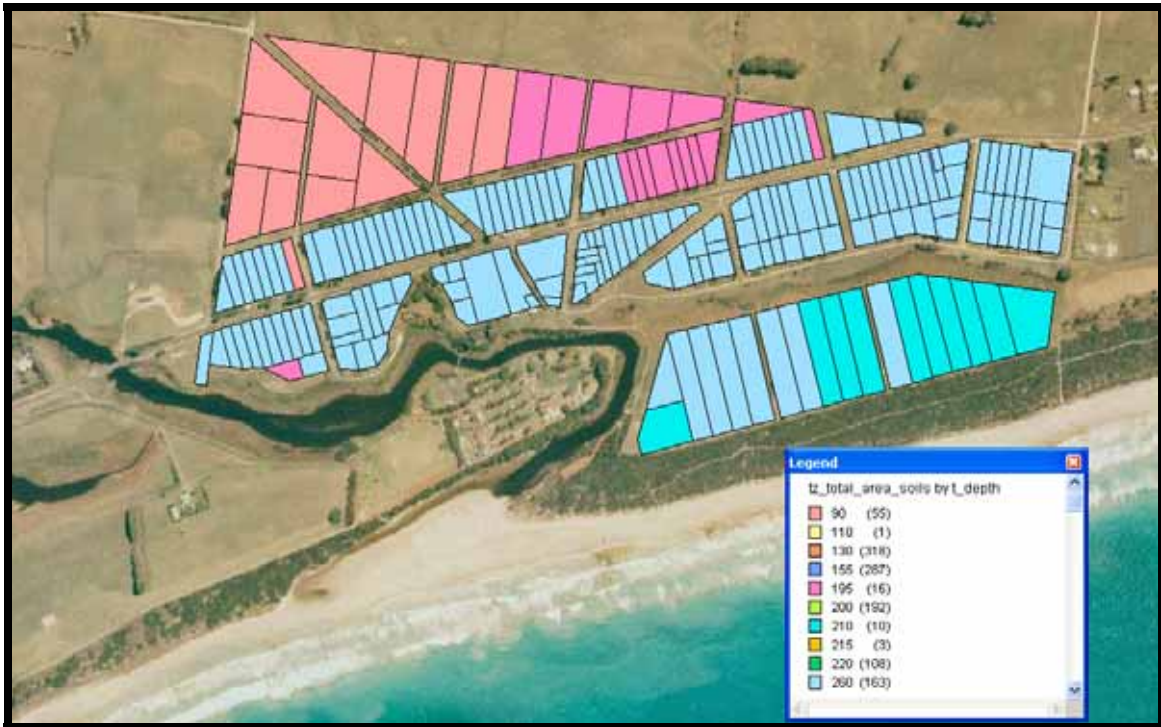
Soils in Narrawong have a low probability for water erosion. There are four soil depths ranging from 130 mm through 260 mm. the major of parcels have a depth of 210 mm.

Map 80 Water Erosion Narrawong Soils



Source: Glenelg Shire

Map 81 Soil Depth Narrawong Soils

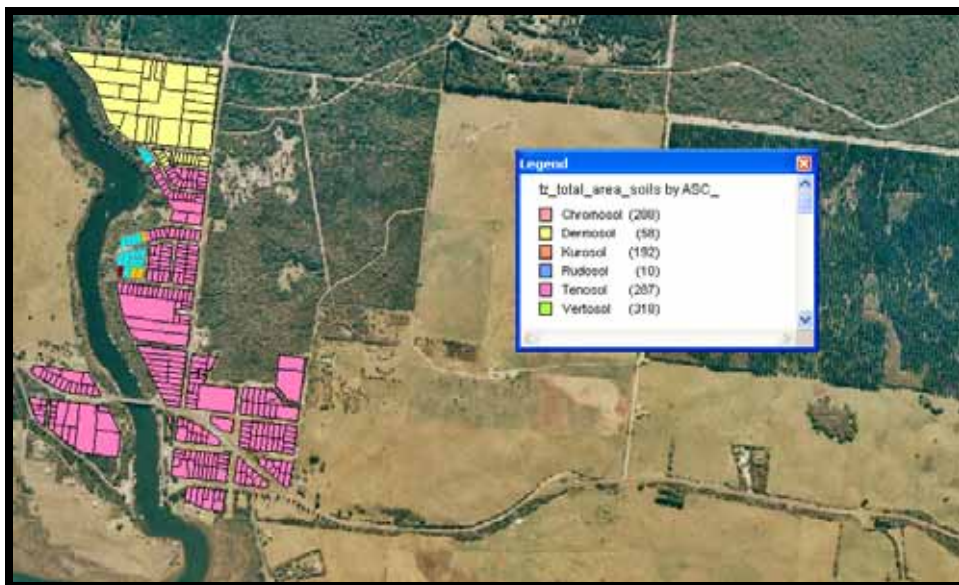


Source: Glenelg Shire

8.7.5 Nelson

Nelson has five out of the six soil categories Chromosol, Dermosol, Kurosol, Rudosol and Tenosol) which occur in the township zone. The soils in the Nelson area have a low level of nutrient decline.

Map 82 Nelson Soil Types



Source: Glenelg Shire

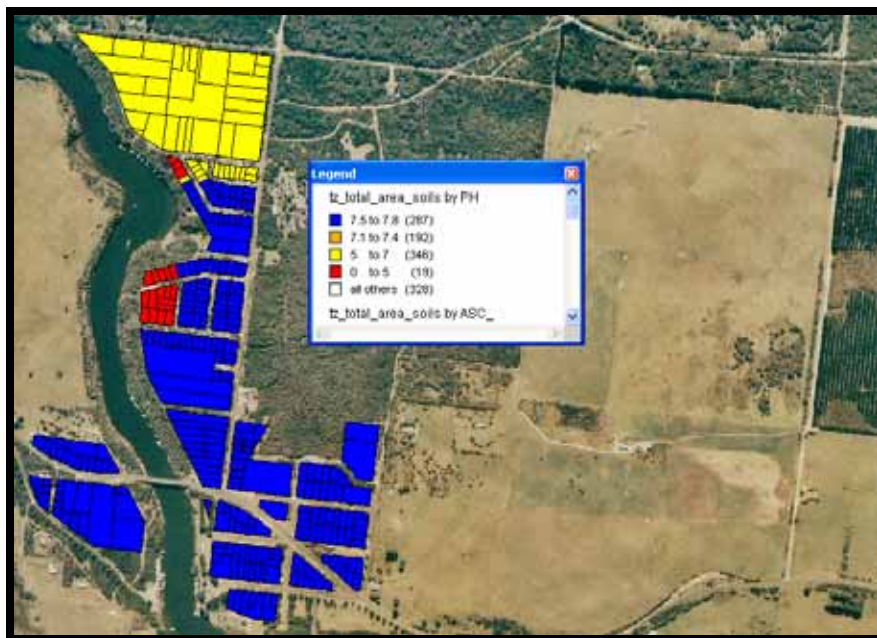
Map 83 Nutrient Decline Nelson soils



Source: Glenelg Shire

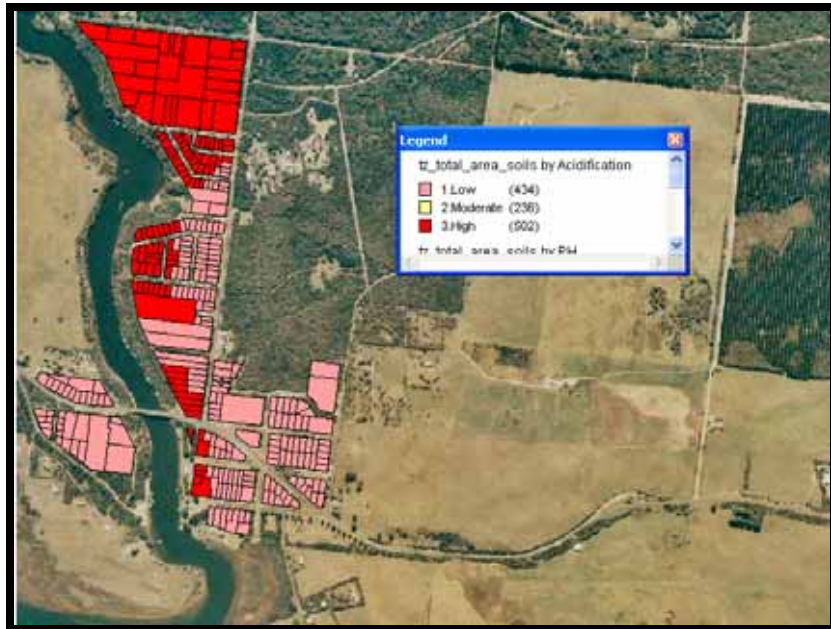
Soils in the Nelson Township range from highly acidic to being slightly alkali. The acidic soils are located at the upper end of the Glenelg River. The northern section of the Nelson Township is prone to high levels of soil acidification.

Map 84 Nelson Soil pH



Source: Glenelg Shire

Map 85 Level of Acidification Nelson Soils



Source: Glenelg Shire

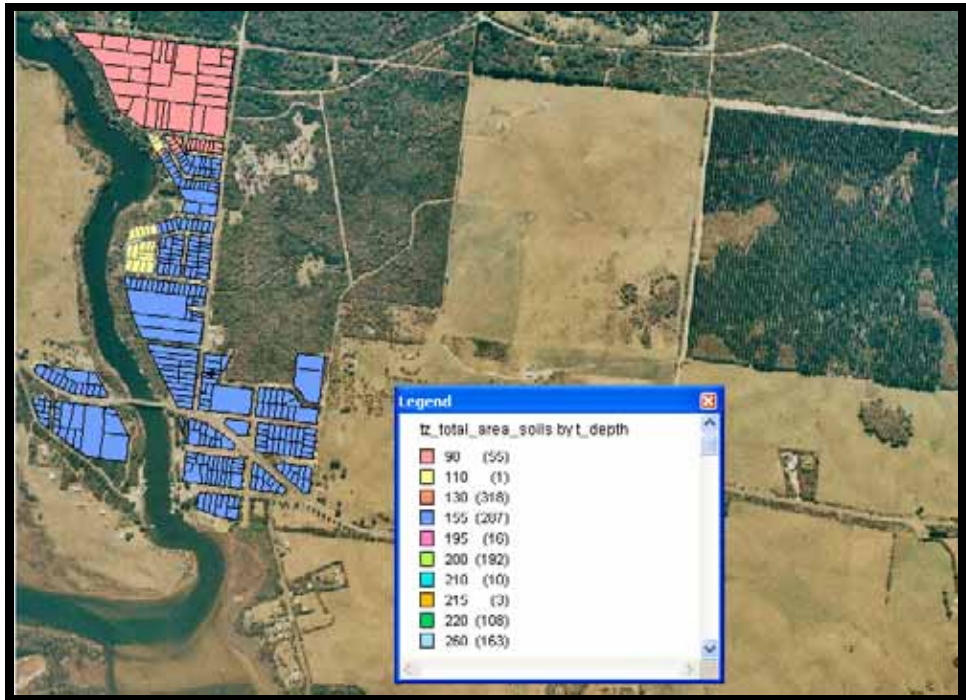
Water erosion represents a low level impact on the Nelson soil basis. Nelson has three primary soil depths ranging from 110 mm through to 155 mm. Soils in the southern portion of the township have the greatest depths.

Map 86 Water Erosion Impact on Nelson soils



Source: Glenelg Shire

Map 87 Nelson Total Soil Depth

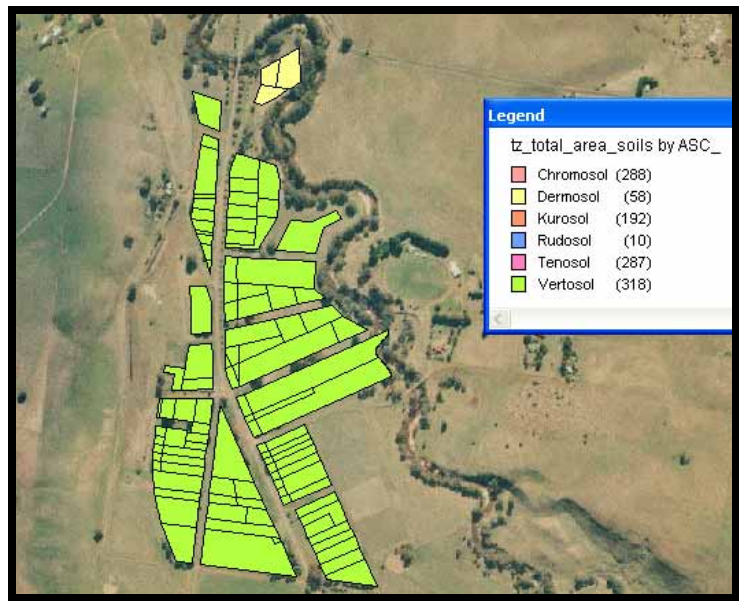


Source: Glenelg Shire

8.7.6 Sandford

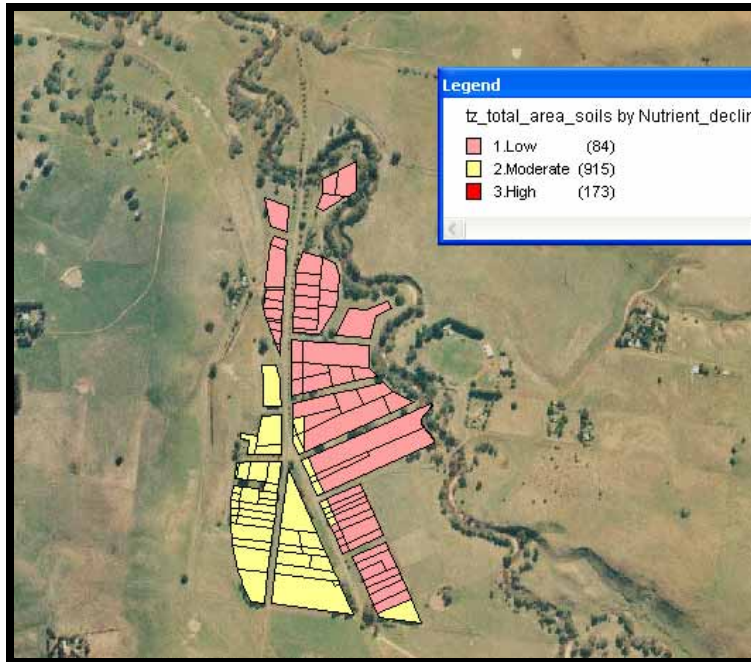
Sandford has one dominate soil type (Vertosol). The soils in Sandford are experiencing a low to moderate level of nutrient decline.

Map 88 Sandford Soil Types



Source: Glenelg Shire

Map 89 Nutrient Decline in Sandford Soils



Source: Glenelg Shire

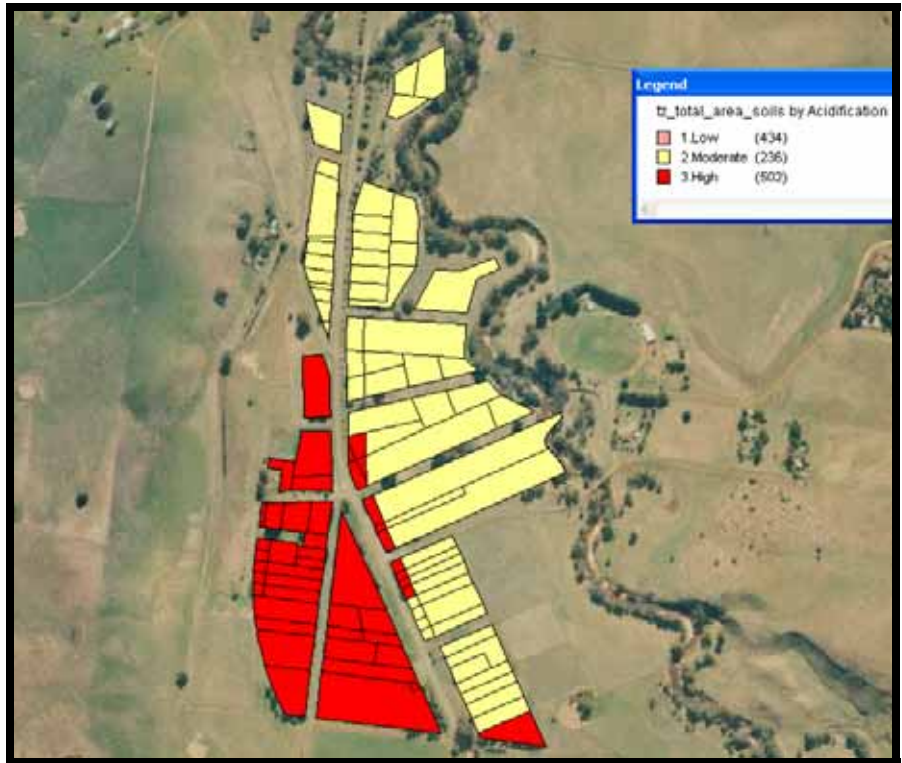
Soils in Sandford Township have a neutral pH of 7. Parcels in the western portion of Sandford have a high level of soil acidity or have the probability to become more acidic

Map 90 Sandford Soil pH



Source: Glenelg Shire

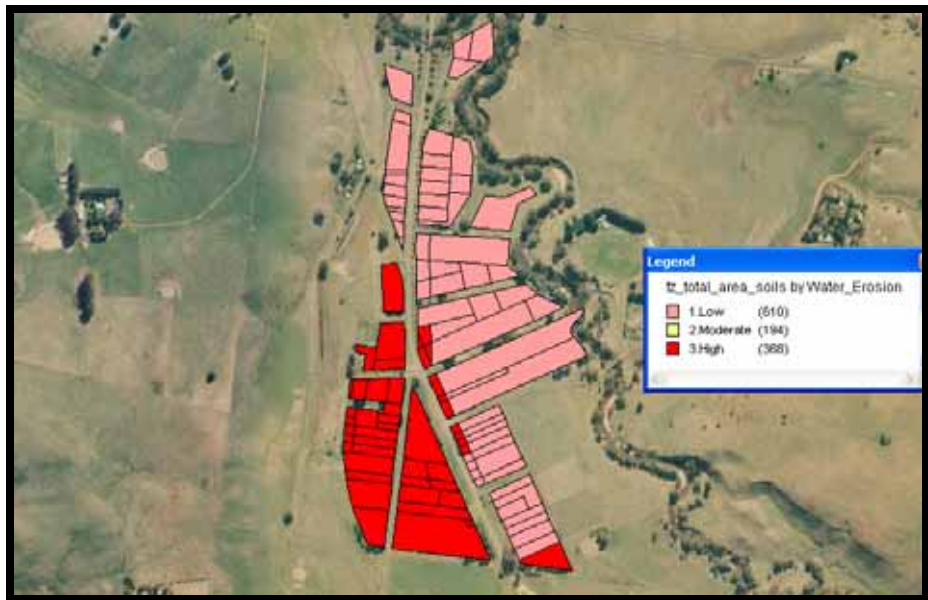
Map 91 Levels of Soil Acidification in Sandford



Source: Glenelg Shire

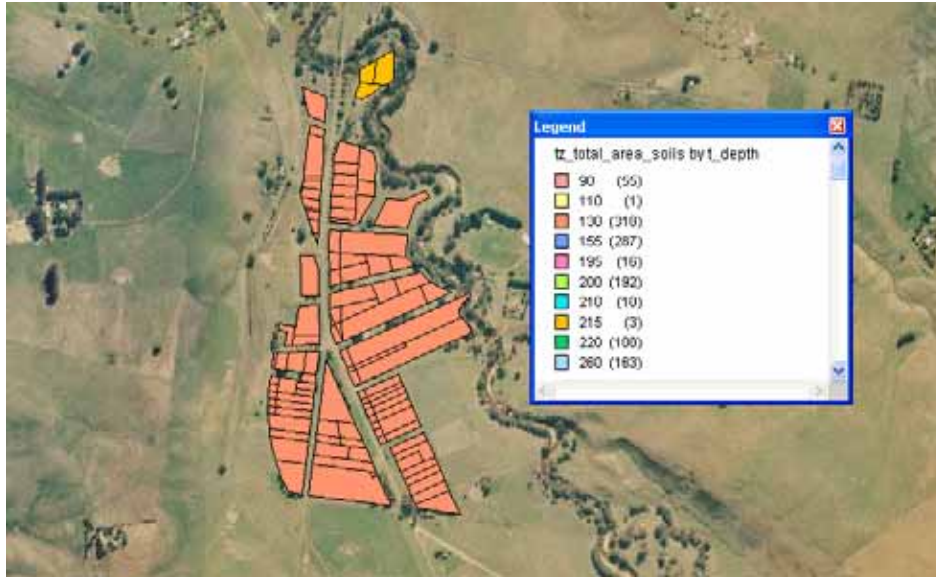
Sandford soils have a low to high rating in relation to water erosion. Soils which are the most susceptible are in the western portion of the Sandford Township

Map 92 Water Erosion impact on Sandford Soils



Source: Glenelg Shire

Map 93 Soil Depth Sandford



Source: Glenelg Shire

8.8 Challenges and Options

8.8.1 Farm Zone Issues

- No growth
- Aging Population
- Lack of Infrastructure
- Small population in each center

9 Rural Living

9.1 Rationale for Inclusion in the Study

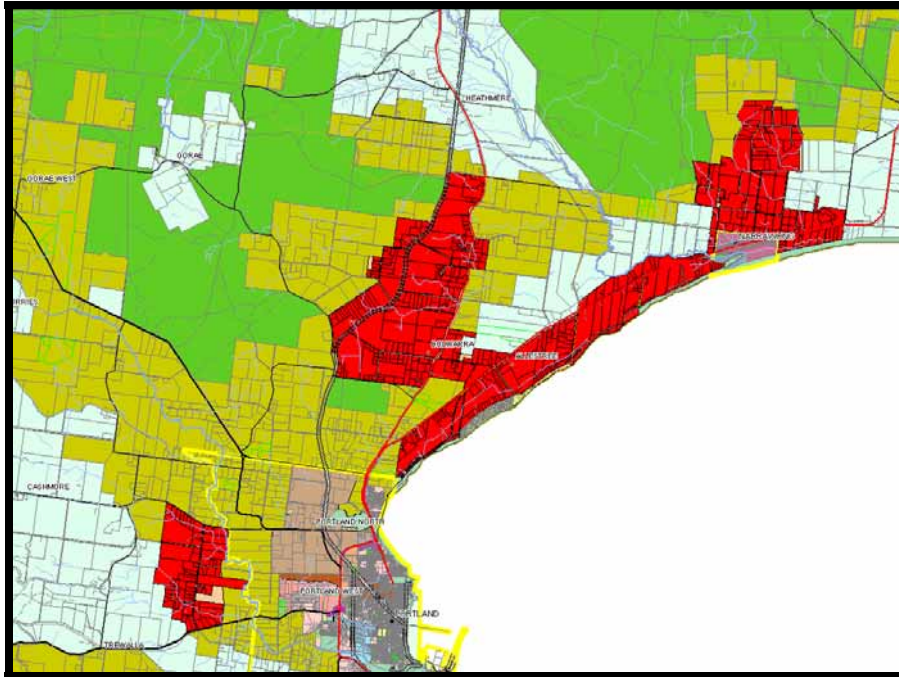
The rationale for including the Rural Living Zone in the Sustainable Land Use Study is based on the fact that the zone has the potential to become a future growth area for Glenelg.

9.2 Purpose

The Rural Living Zone serves four purposes namely:

- To provide for residential use in a rural environment.
- To provide for agricultural land uses which do not adversely affect the amenity of surrounding land uses.
- To protect and enhance the natural resources, biodiversity and landscape and heritage values of the area.
- To encourage use and development of land based on comprehensive and sustainable land management practices and infrastructure provision

Map 94 Rural Living Zone



Source: Glenelg Shire

Table 66 Rural Living Zone Summary

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ALLESTREE	103	15.3	15.3	15.3
	BOLWARRA	301	44.8	44.8	60.1
	CASHMORE	7	1.0	1.0	61.2
	DUTTON WAY	2	.3	.3	61.5
	GORAE	45	6.7	6.7	68.2
	HEATHMERE	11	1.6	1.6	69.8
	NARRAWONG	139	20.7	20.7	90.5
	PORTLAND WEST	64	9.5	9.5	100.0
	Total	672	100.0	100.0	

Source: Glenelg Shire

9.3 Land Use

There are nine separate classes or categories of Rural Living zoned land in Glenelg Shire as shown in Table 67

Table 67 Rural Living Zone by Land Use Code

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		15	2.2	2.2	2.2
	B-Comm/Indust Built	19	2.8	2.8	5.1
	B-Farm Built	73	10.9	10.9	15.9
	B-Farm Land	19	2.8	2.8	18.8
	B-Non Rateable	6	.9	.9	19.6
	B-Recreation Built/land	2	.3	.3	19.9
	B-Residential Land	1	.1	.1	20.1
	B-Rural/Resid Built	416	61.9	61.9	82.0
	B-Rural/Resid Land	118	17.6	17.6	99.6
	P-Non Rateable	3	.4	.4	100.0
	Total	672	100.0	100.0	

Source: Glenelg Shire

As indicated by Table 67 the major category in the Rural Living Zone is the Rural / Residential Built category with 416 parcels (i.e. 62%) out of a total of 672.

Parcel size varies across the zone as illustrated in Table 68. Smaller lots under 5.3 HA represent 80 % all parcels in the zone.

Table 68 Rural Living Zone Parcel Sizes

		new_area (HA)					Total
		<.40	.4 -1.50	1.5 -3.20	3.2-5.30	5.3-59.40	
locality	ALLESTREE	19	35	13	12	24	103
	BOLWARRA	118	58	39	52	34	301
	CASHMORE	0	0	3	3	1	7
	DUTTON WAY	1	1	0	0	0	2
	GORAE	0	2	20	14	9	45
	HEATHMERE	1	1	4	1	4	11
	NARRAWONG	5	31	25	32	46	139
	PORTLAND WEST	1	9	26	15	13	64
	Total	145	137	130	129	131	672

Source: Glenelg Shire

Table 69 illustrates parcel size by land use activity. As indicated by the table certain assumptions can be made:

- Commercial and Industrial operations in the RLZ are situated on the smaller lots sizes.
- The B Farm land category will be comprised of larger parcels
- The B Rural /Residential land category 67% of the category is under 3.2 HA
- The B Rural / Residential Built category just under 65% of the category is under 3.2 HA in size

Table 69 Rural Living Zone Parcel Size by Land Description

	Parcel Sizes					
Levy Desc	0 -.40	.40 -1.50	1.50 -3.20	3.20 -5.30	5.30 -59.40	Total
Not identified	1	6	2	0	6	15
B-Comm/Indust Built	11	4	3	1	0	19
B-Farm Built	0	12	16	10	35	73
B-Farm Land	0	1	2	6	10	19
B-Non Rateable	1	2	2	0	1	6
B-Recreation Built/land	0	1	1	0	0	2
B-Residential Land	0	0	1	0	0	1
B-Rural/Resid Built	90	85	89	92	60	416
B-Rural/Resid Land	42	24	13	20	19	118
P-Non Rateable	0	2	1	0	0	3
Total	145	137	130	129	131	672

Source: Glenelg Shire

9.4 Subdivision Permit Activity

For the period 2000-2010 there were 23 subdivision applications for the Rural Living Zone. Table 70 and Map 95 show the year and the respective number of subdivisions permits received by Glenelg Shire. Permit activity varied from 10 lot subdivisions to certifications. Subdivision

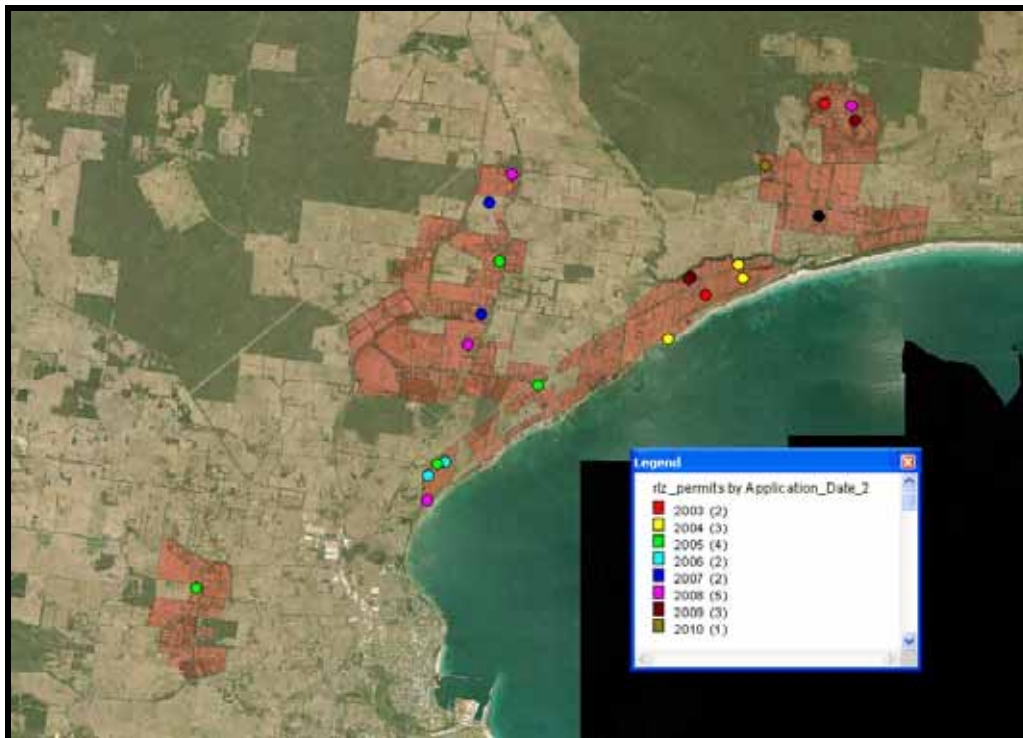
activity along the coastal strip in future years will be impacted by the effect of sea level rise and climate change. The Victorian State Government is preparing new legislation that will increase the level of difficulty in obtaining a subdivision permit for coastal areas.

Table 70 Rural Living Subdivision Permit Applications by Year

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2003	1	4.3	4.3	4.3
	2004	3	13.0	13.0	17.4
	2005	5	21.7	21.7	39.1
	2006	3	13.0	13.0	52.2
	2007	2	8.7	8.7	60.9
	2008	5	21.7	21.7	82.6
	2009	3	13.0	13.0	95.7
	2010	1	4.3	4.3	100.0
	Total	23	100.0	100.0	

Source: Glenelg Shire

Map 95 Rural Living Subdivision Permit Applications by Year



Source: Glenelg Shire

Table 71 Rural Living Zone Subdivision Application type by Year

Proposal	2003	2004	2005	2006	2007	2008	2009	2010	Total
10 Lot Subdivision	0	1	0	0	0	0	0	0	1
2 Lot Subdivision	0	1	4	0	0	0	0	0	5
6 lot Subdivision	1	0	0	0	0	0	0	0	1
6 Lot Subdivision	0	1	0	0	0	0	0	0	1
7 Lot Subdivision	0	0	0	1	0	0	0	0	1
Certification Two (2) Lot Subdivision	0	0	0	0	0	0	1	0	1
Certification Boundary Re-Alignment	0	0	0	0	0	0	2	0	2
Certification Four (4) Lot Subdivision	0	0	0	0	0	0	0	1	1
Certification of Variation of Restrictions on Titles.	0	0	0	0	0	2	0	0	2
Certification Three (3) Lot Subdivision	0	0	0	0	0	1	0	0	1
Certification Two (2) Lot Subdivision	0	0	0	0	1	2	0	0	3
Subdivision and statement of compliance PS514487C	0	0	0	1	0	0	0	0	1
Subdivision Certification (2 lots)	0	0	1	0	0	0	0	0	1
Two (2) Lot Subdivision	0	0	0	0	1	0	0	0	1
Two lot resubdivision	0	0	0	1	0	0	0	0	1
Total	1	3	5	3	2	5	3	1	23

Source: Glenelg Shire

Table 72 highlights the level of coastal development of the 10 year period with Narrawong and Allestree (Yellow Border) accounting for half of all subdivision permits for the ten year time period (2000-2010).

Table 72 Rural Living Zone Subdivision Permits by Year and Location

Location	2003	2004	2005	2006	2007	2008	2009	2010	Total
Blackers Road, Narrawong Parish	0	0	1	0	0	0	0	0	1
Boyers Road, Narrawong	0	0	0	0	0	0	0	1	1
Devlins Rd, Narrawong	0	0	0	0	0	1	0	0	1
Dougherties Road, Portland West	0	0	1	0	0	0	0	0	1
Goodes Road, Narrawong	0	0	0	1	0	0	0	0	1
Matheson St, Bolwarra	0	0	0	0	0	1	0	0	1
Nashs Rd, Bolwarra	0	0	0	0	1	0	0	0	1
Ocean View Avenue, Bolwarra	0	0	0	1	0	0	0	0	1
Princes Highway, Allestree	0	1	1	0	0	0	0	0	2
Princes Highway, Bolwarra	0	0	1	0	0	1	0	0	2
Princes Highway, Narrawong	0	2	0	0	0	0	0	0	2
Princes Hwy, Allestree	1	0	0	0	0	0	2	0	3
Princes Hwy, Heathmere	0	0	0	0	1	1	0	0	2
Schwarz Rd, Narrawong	0	0	0	0	0	0	1	0	1
Wilkens Lane, Bolwarra	0	0	1	1	0	1	0	0	3
Total	1	3	5	3	2	5	3	1	23

Source: Glenelg Shire

9.5 Building Permit Activity

The number of building permits (i.e. 238) generated in Glenelg Shire from 2000 to 2009 is indicated in Table 73 with their respective location highlighted in Table 74 and Map 96.

Table 73 Rural Living Building Permit Activity

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 2000	28	11.8	11.8	11.8
2001	24	10.1	10.1	21.8
2002	42	17.6	17.6	39.5
2003	36	15.1	15.1	54.6
2004	32	13.4	13.4	68.1
2005	13	5.5	5.5	73.5
2006	18	7.6	7.6	81.1
2007	13	5.5	5.5	86.6
2008	15	6.3	6.3	92.9
2009	17	7.1	7.1	100.0
Total	238	100.0	100.0	

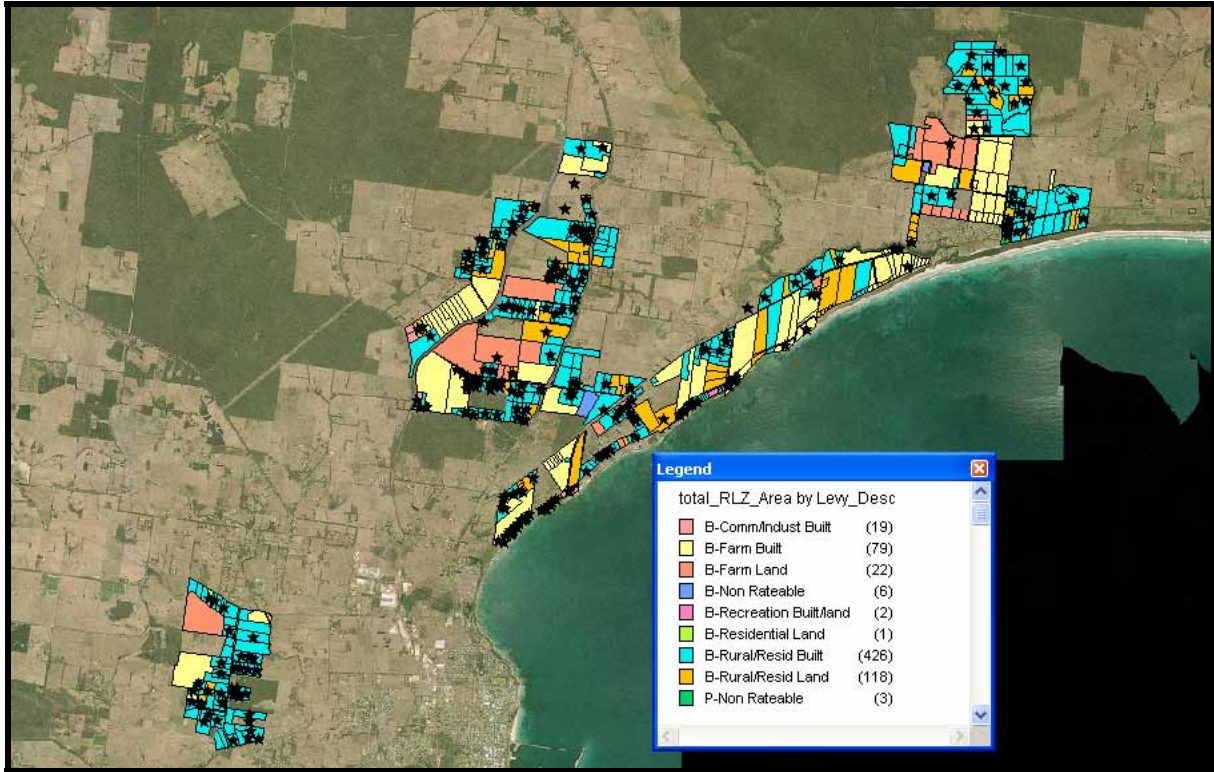
Source: Glenelg Shire

Table 74 Rural Living Zone Building Permit Locations

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid ALLESTREE	33	13.9	13.9	13.9
BOLWARRA	112	47.1	47.1	60.9
CASHMORE	4	1.7	1.7	62.6
GORAE	19	8.0	8.0	70.6
HEATHMERE	6	2.5	2.5	73.1
NARRAWONG	39	16.4	16.4	89.5
PORTLAND WEST	25	10.5	10.5	100.0
Total	238	100.0	100.0	

Source: Glenelg Shire

Map 96 Rural Living Zone Building Permit Activities



Source: Glenelg Shire

9.6 Building Permit Activity

As indicated by Table 10 there were 238 building permits issued for the Rural Living zone during the 2000-2009 period. The major construction activities were:

- Dwellings 54 permits
- Sheds 40 permits
- Unidentified construction 39 permits
- Garages 20 permits
- Extensions 21 permits
- Fuel Heaters 10 permits
- Additions 9 permits

Table 75 Rural Living Zone Building Permit Activity by Year

Permit	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
	0	1	1	4	1	1	7	0	7	17	39
Additions	4	1	1	1	0	1	1	0	0	0	9
Alterations	0	1	0	1	3	0	0	0	0	0	5
Amenities Building	0	0	0	0	0	1	0	0	0	0	1
Barn	0	0	0	0	2	0	0	0	0	0	2
Caravan Shelters	0	0	0	0	0	0	1	0	0	0	1
Carport	0	0	1	1	1	0	0	0	0	0	3
Classroom	1	0	0	0	0	0	1	0	0	0	2
Cool Store	1	0	0	0	0	0	0	0	0	0	1
Decking	0	0	1	1	0	0	0	0	0	0	2
Demolition of Dwelling	0	0	0	1	0	0	0	0	0	0	1
Dependant Persons Unit	0	0	1	0	0	0	0	0	0	0	1
Dwellings	11	8	11	4	8	3	2	3	4	0	54
Extensions	0	0	3	9	3	4	1	1	0	0	21
Front Fence	0	0	1	0	0	0	0	0	0	0	1
Fuel Heater	0	2	5	1	2	0	0	0	0	0	10
Garages	4	6	6	6	1	1	0	2	3	0	29
Granny Flat	0	0	0	0	1	0	0	0	0	0	1
Outdoor Covered Area	0	0	0	0	0	0	1	0	0	0	1
Pergola	0	1	0	1	0	0	0	0	0	0	2
Relocate Dwelling	0	0	0	0	0	0	0	1	0	0	1
Relocation of Dwelling	0	0	0	0	1	0	0	0	0	0	1
Shade House	1	0	0	0	0	0	0	0	0	0	1
Sheds	4	3	9	5	8	2	3	5	1	0	40
Stables	0	0	0	0	0	0	0	1	0	0	1
Stables, Shed	0	0	1	0	0	0	0	0	0	0	1
Swimming Pool	0	0	0	1	0	0	0	0	0	0	1
Timber outbuilding	1	0	0	0	0	0	0	0	0	0	1
Verandah	1	1	1	0	0	0	1	0	0	0	4
Warehouse	0	0	0	0	1	0	0	0	0	0	1
Total	28	24	42	36	32	13	18	13	15	17	238

Source: Glenelg Shire

Table 76 Rural Living Zone Building Activity by Location

Permit	ALLESTREE	BOLWARRA	CASHMORE	GORAE	HEATHMERE	NARRAWONG	W PORTLAND	Total
	4	15	1	5	1	8	5	39
Additions	2	3	0	0	0	2	2	9
Alterations	1	3	0	0	0	1	0	5
Amenities Building	0	1	0	0	0	0	0	1
Barn	0	0	1	0	0	1	0	2
Caravan Shelters	0	1	0	0	0	0	0	1
Carports	1	0	0	1	0	1	0	3
Classroom	0	2	0	0	0	0	0	2
Cool Store	0	1	0	0	0	0	0	1
Decking	0	1	0	0	0	0	1	2
Demolition of Dwelling	1	0	0	0	0	0	0	1
Dependant Persons Unit	0	1	0	0	0	0	0	1
Dwellings	7	28	0	3	3	6	7	54
Extensions	4	8	0	3	0	3	3	21
Front Fence	0	0	0	0	0	1	0	1
Fuel Heater	0	8	0	1	0	0	1	10
Garages	2	19	2	2	0	3	1	29
Granny Flat	0	1	0	0	0	0	0	1
Outdoor Covered Area	0	1	0	0	0	0	0	1
Pergola	0	1	0	0	0	1	0	2
Relocate Dwelling	0	0	0	0	0	2	0	2
Shade House	1	0	0	0	0	0	0	1
Sheds	9	14	0	4	2	8	3	40
Stables	0	0	0	0	0	1	0	1
Stables, Shed	0	0	0	0	0	1	0	1
Swimming Pool	0	1	0	0	0	0	0	1
Timber outbuilding	1	0	0	0	0	0	0	1
Verandah	0	2	0	0	0	0	2	4
Warehouse	0	1	0	0	0	0	0	1
Total	33	112	4	19	6	39	25	238

Source: Glenelg Shire

The value of construction for the 10 year periods is \$14.3 million.

9.7 Fire proneness of the Zone

Sections of the Rural Living zone are prone to bush fire and have been include in the Glenelg Wild Fire Management Overlay.

9.8 Land Use Impediments

There are a series of impediments across the Rural Living Zone including flooding, coast erosion, sea level rise, sink hole and impediments. The Rural Living Zone has a series of planning overlays which can impact development. Those overlays are shown in Table 77.

Table 77 Rural Living Zone Overlays

		Overlay				Total
		DPO5	DPO7	ESO1	ESO2	
locality	ALLESTREE	0	24	4	5	33
	BOLWARRA	77	25	10	0	112
	CASHMORE	4	0	0	0	4
	GORAE	19	0	0	0	19
	HEATHMERE	6	0	0	0	6
	NARRAWONG	22	1	0	16	39
	PORTLAND WEST	25	0	0	0	25
Total		153	50	14	21	238

Source: Glenelg Shire

9.9 Forecast Demand and Available Land Stocks

The following tables (Allestree, Bolwarra, Cashmore, Gorae, Heathmere, Narrawong and Portland West) identify the amount of conventional land in the Rural Living Zone that may be required in the seven centers for future residential development under a range of potential town scenarios.

Table 78 Allestree Rural Living Zone Land Supply and Demand

Available Land and Development	
1. Vacant Residential Lots (130.63 HA) ⁽¹⁾	260
2. House construction over 10 years (2000-2009)	7
3. Average Annual lot take up 2000-2009 ⁽²⁾	< 1
4. Estimated Current supply of LDRZ zone land (HA)	130.63 HA (260 lots)
5. 20 Year Supply Requirement at current take up rate ⁽³⁾	20 lots
6. Surplus /Deficiency of lots ⁽⁴⁾	240 (120 HA)

⁽¹⁾130.63 HA (1306500 sq meters) individual lot size is 4,000 sq calculations 1,306,500 /4000 = 260

200 sq meters for services and roads etc

⁽²⁾ 2 lots per HA

⁽³⁾ Point 3 x Point 5 (1*20)

⁽⁴⁾ 240 lots (240 lots / 2 lots per HA = 120 HA)

Table 79 Allestree Rural Living Zone growth Scenarios and Land Requirements

Growth Scenarios	Low	Medium	High
	2%	4%	6%
Annual Demand for Lots ⁽¹⁾	1.4	1.8	2.2
Required Land to meet 20 yr Scenario (lots) (HA) ⁽²⁾	28 lots (14 HA)	36 Lots (18 HA)	44 lots (22 HA)
Current Land Supply ⁽³⁾	260 Lots (130 HA)	260 Lots (130 HA)	260 Lots (130 HA)
20 year Surplus /Shortage ⁽⁴⁾	232 lots	224 Lots	216 Lots
Annual land required ⁽⁵⁾	None	None	None

1. Current 2 lots per year current usage of times the various respective growth rates then continually summated to give final total

2. Point 1 time 20 year span giving total

3. Current available land as indicated in Table 67

4. Require land minus Current Land Supply

5. Point 4 divided by 20 time span

Table 80 Bolwarra Rural Living Zone Land Supply and Demand

Available Land and Development	
1. Vacant Residential Lots (121.12 HA) ⁽¹⁾	242
2. House construction over 10 years (2000-2009)	28
3. Average Annual lot take up 2000-2009 ⁽²⁾	3
4. Estimated Current supply of LDRZ zone land (HA)	121.2 HA (242 lots)
5. 20 Year Supply Requirement at current take up rate ⁽³⁾	60 lots
6. Surplus /Deficiency of lots ⁽⁴⁾	182 lots(91 HA)

⁽¹⁾121.12 HA (1211200 sq meters) individual lot size is 4,000 sq calculations 1211200 /4000 = 242

200 sq meters for services and roads etc

⁽²⁾ 2 lots per HA

⁽³⁾ Point 3 x Point 5 (2*20)

⁽⁴⁾ 182 lots (182 lots / 2 lots per HA = 91 HA)

Table 81 Bolwarra Rural Living Zone growth Scenarios and Land Requirements

Growth Scenarios	Low	Medium	High
	2%	4%	6%
Annual Demand for Lots ⁽¹⁾	3	4	5
Required Land to meet 20 yr Scenario (lots) (HA) ⁽²⁾	50 lots (25 HA)	60 Lots (30 HA)	70 lots (35 HA)
Current Land Supply ⁽³⁾	242Lots (121 HA)	242 Lots (121 HA)	242 Lots (121 HA)
20 year Surplus Shortage ⁽⁴⁾	192 lots	182 Lots	172 Lots
Annual land required ⁽⁵⁾	None	None	None

1. Current 2 lots per year current usage of times the various respective growth rates then continually summated to give final total

2. Point 1 time 20 year span giving total

3. Current available land as indicated in Table 67

4. Require land minus Current Land Supply

5. Point 4 divided by 20 time span

Table 82 Cashmore Rural Living Zone Land Supply and Demand

Available Land and Development	
1. Vacant Residential Lots (3.14 HA) ⁽¹⁾	6
2. House construction over 10 years (2000-2009)	0
3. Average Annual lot take up 2000-2009 ⁽²⁾	0
4. Estimated Current supply of LDRZ zone land (HA)	3.14 HA (6 lots)
5. 20 Year Supply Requirement at current take up rate ⁽³⁾	0 lots
6. Surplus /Deficiency of lots ⁽⁴⁾	6(0 HA)

⁽¹⁾3.14 HA (31400 sq meters) individual lot size is 4,000 sq calculations 31400 /4000 = 6
200 sq meters for services and roads etc

⁽²⁾ 2 lots per HA

⁽³⁾ Point 3 x Point 5 (2*20)

⁽⁴⁾ 6 lots (6 lots / 2 lots per HA = 3 HA)

Table 83 Cashmore Rural Living Zone growth Scenarios and Land Requirements

Growth Scenarios	Low	Medium	High
	2%	4%	6%
Annual Demand for Lots ⁽¹⁾	0	0	0
Required Land to meet 20 yr Scenario (lots) (HA) ⁽²⁾	0	0	0
Current Land Supply ⁽³⁾	6 Lots (3.14 HA)	6 Lots (3.14 HA)	6 Lots (3.14 HA)
20 year Shortage ⁽⁴⁾	0 lots	0 Lots	0 Lots
Annual land required ⁽⁵⁾	6 Lots (3.14 HA)	6 Lots (3.14 HA)	6 Lots (3.14HA)

^{1.} Current 2 lots per year current usage of times the various respective growth rates then continually summated to give final total

^{2.} Point 1 time 20 year span giving total

^{3.} Current available land as indicated in Table 67

^{4.} Require land minus Current Land Supply

^{5.} Point 4 divided by 20 time span

Table 84 Gorae Rural Living zone Land Supply and Demand

Available Land and Development	
1. Vacant Residential Lots (31.05 HA) ⁽¹⁾	62
2. House construction over 10 years (2000-2009)	3
3. Average Annual lot take up 2000-2009 ⁽²⁾	<1
4. Estimated Current supply of LDRZ zone land (HA)	31 HA (62 lots)
5. 20 Year Supply Requirement at current take up rate ⁽³⁾	<20 lots
6. Deficiency of lots ⁽⁴⁾	42 (21 HA)

⁽¹⁾31.05 HA (310500 sq meters) individual lot size is 4,000 sq calculations 310,500 /4000 = 62
200 sq meters for services and roads etc

⁽²⁾ 2 lots per HA

⁽³⁾ Point 3 x Point 5 (2*20)

⁽⁴⁾ 42 lots (42 lots / 2 lots per HA = 21 HA)

Table 85 Gorae Rural Living Zone growth Scenarios and Land Requirements

Growth Scenarios	Low	Medium	High
	2%	4%	6%
Annual Demand for Lots ⁽¹⁾	<1	<1	<1
Required Land to meet 20 yr Scenario (lots) (HA) ⁽²⁾	<20 lots (10 HA)	<20 Lots (10 HA)	<20 lots (15 HA)
Current Land Supply ⁽³⁾	62 Lots (12.05 HA)	62 Lots (12.05 HA)	62 Lots (12.05 HA)
20 year Shortage ⁽⁴⁾	40 lots	40 Lots	40 Lots
Annual land required ⁽⁵⁾	None	None	None

1. Current 2 lots per year current usage of times the various respective growth rates then continually summated to give final total

2. Point 1 time 20 year span giving total

3. Current available land as indicated in Table 67

4. Require land minus Current Land Supply

5. Point 4 divided by 20 time span

Table 86 Heathmere Rural Living Zone Land Supply and Demand

Available Land and Development	
1. Vacant Residential Lots (2.35 HA) ⁽¹⁾	5
2. House construction over 10 years (2000-2009)	3
3. Average Annual lot take up 2000-2009 ⁽²⁾	<1
4. Estimated Current supply of LDRZ zone land (HA)	2.35 HA (5 lots)
5. 20 Year Supply Requirement at current take up rate ⁽³⁾	1 lots
6. Surplus /Deficiency of lots ⁽⁴⁾	4 (2.0 HA)

⁽¹⁾2.35 HA (23500 sq meters) individual lot size is 4,000 sq calculations $23500 / 4000 = 6$
200 sq meters for services and roads etc

⁽²⁾ 2 lots per HA

⁽³⁾ Point 3 x Point 5 (2*20)

⁽⁴⁾ 4 lots (4 lots / 2 lots per HA = 2 HA)

Table 87 Heathmere Rural Living Zone growth Scenarios and Land Requirements

Growth Scenarios	Low	Medium	High
	2%	4%	6%
Annual Demand for Lots ⁽¹⁾	<1	<1	<1
Required Land to meet 20 yr Scenario (lots) (HA) ⁽²⁾	1 Lot(0.5 HA)	1 Lot (0.5 HA)	1 Lot (0.5 HA)
Current Land Supply ⁽³⁾	5 Lots (2.0 HA)	5 Lots (2.0 HA)	5 Lots (2.0 HA)
20 year Surplus /Shortage ⁽⁴⁾	4 lots	4 Lots	4 Lots
Annual land required ⁽⁵⁾	0	0	0

1. Current 2 lots per year current usage of times the various respective growth rates then continually summated to give final total

2. Point 1 time 20 year span giving total

3. Current available land as indicated in Table 67

4. Require land minus Current Land Supply

5. Point 4 divided by 20 time span

Table 88 Narrawong Rural Living Zone Land Supply and Demand

Available Land and Development	
1. Vacant Residential Lots (97.33 HA) ⁽¹⁾	194
2. House construction over 10 years (2000-2009)	6
3. Average Annual lot take up 2000-2009 ⁽²⁾	<1
4. Estimated Current supply of LDRZ zone land (HA)	97 HA (194 lots)
5. 20 Year Supply Requirement at current take up rate ⁽³⁾	190 lots
6. Surplus /Deficiency of lots ⁽⁴⁾	170+ (85 HA)

⁽¹⁾97.33 HA (973300 sq meters) individual lot size is 4,000 sq calculations $973300 / 4000 = 194$
200 sq meters for services and roads etc

⁽²⁾ 2 lots per HA

⁽³⁾ Point 3 x Point 5 (2*20)

⁽⁴⁾ 170 lots (15 lots / 2 lots per HA = 85 HA)

Table 89 Narrawong Rural Living Zone growth Scenarios and Land Requirements

Growth Scenarios	Low	Medium	High
	2%	4%	6%
Annual Demand for Lots ⁽¹⁾	<1	<1	<1
Required Land to meet 20 yr Scenario (lots) (HA) ⁽²⁾	20 lots (10 HA)	20 Lots (10 HA)	20 lots (10 HA)
Current Land Supply ⁽³⁾	190 Lots (97 HA)	190 Lots (97 HA)	190 Lots (97 HA)
20 year Surplus /Shortage ⁽⁴⁾	170 lots	170 Lots	170 Lots
Annual land required ⁽⁵⁾	None	None	None

1. Current 2 lots per year current usage of times the various respective growth rates then continually summated to give final total

2. Point 1 time 20 year span giving total

3. Current available land as indicated in Table 67

4. Require land minus Current Land Supply

5. Point 4 divided by 20 time span

Table 90 Portland Rural Living Zone Land Supply and Demand

Available Land and Development	
1. Vacant Residential Lots (9.28 HA) ⁽¹⁾	18
2. House construction over 10 years (2000-2009)	7
3. Average Annual lot take up 2000-2009 ⁽²⁾	<1
4. Estimated Current supply of LDRZ zone land (HA)	9.28 HA (18 lots)
5. 20 Year Supply Requirement at current take up rate ⁽³⁾	20 lots
6. Deficiency of lots ⁽⁴⁾	2 (1 HA)

⁽¹⁾9.28 HA (92800 sq meters) individual lot size is 4,000 sq calculations $92800 / 4000 = 18$
200 sq meters for services and roads etc

⁽²⁾ 2 lots per HA

⁽³⁾ Point 3 x Point 5 (2*20)

⁽⁴⁾ 2 lots (2 lots / 2 lots per HA = 7.5 HA)

Table 91 Portland Rural Living Zone growth Scenarios and Land Requirements

Growth Scenarios	Low	Medium	High
	2%	4%	6%
Annual Demand for Lots ⁽¹⁾	1	2	2
Required Land to meet 20 yr Scenario (lots) (HA) ⁽²⁾	20 lots (10 HA)	40 Lots (20 HA)	40 lots (20 HA)
Current Land Supply ⁽³⁾	18 Lots (9 HA)	18 Lots (9 HA)	18 Lots (9 HA)
20 year Shortage ⁽⁴⁾	2 lots	22 Lots	22 Lots
Annual land required ⁽⁵⁾	.5 Lots (1 HA)	2 Lots (1HA)	2 Lots (1 HA)

^{1.} Current 2 lots per year current usage of times the various respective growth rates then continually summated to give final total

^{2.} Point 1 time 20 year span giving total

^{3.} Current available land as indicated in Table 67

^{4.} Require land minus Current Land Supply

^{5.} Point 4 divided by 20 time span

9.10 Rural Living Soils

There are many factors which impact on the quality of agricultural land. Thirteen factors were identified including:

Table 92 Rural Living Zone Soil Factors

Soils type,	Dispersive behaviour
Total Soil Depth,	Soil structure decline
Top Soil depth	Waterlogging
Soil pH,	Landslides
Soil impedance,	The susceptibility to water erosion
Soil drainage,	Salinity

Source: DSE and Glenelg Shire

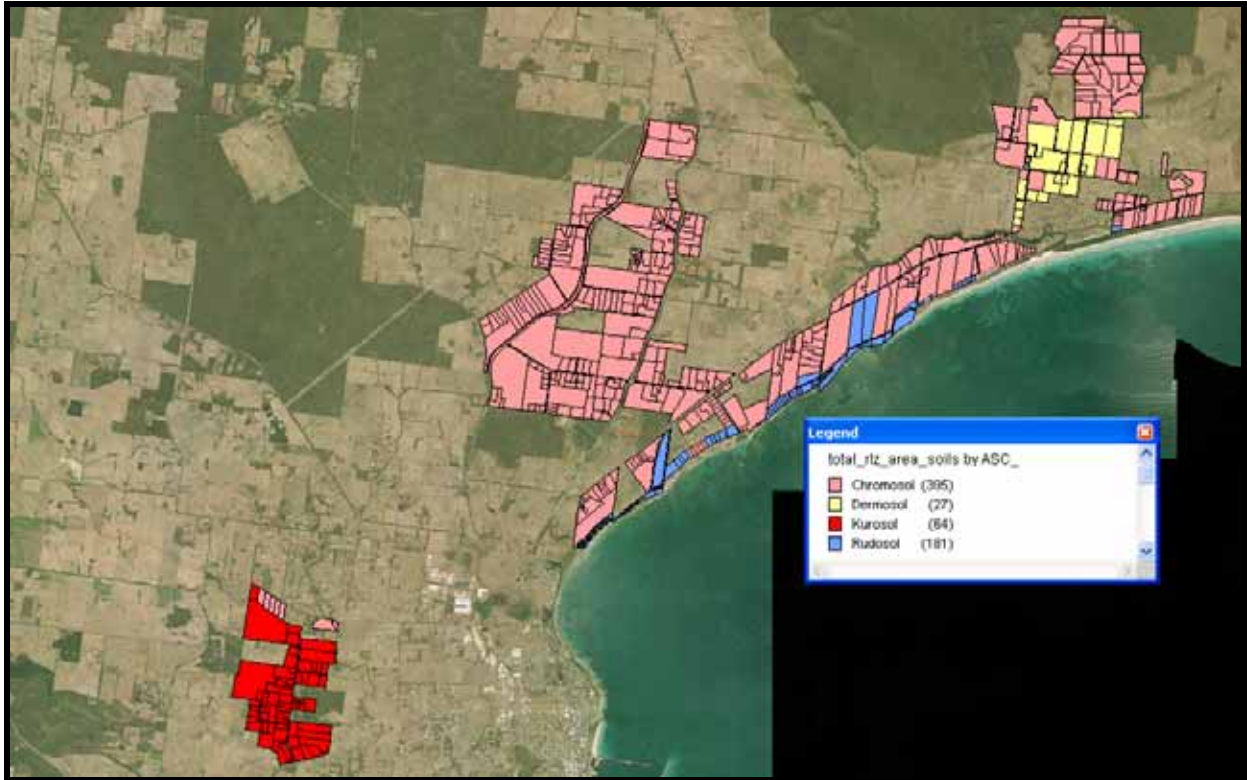
A series of analyses were performed on the 13 factors to quantify what soils are the most prominent in the shire; their current condition and projected future outlook. Four different soil classes exist in the Rural Living Zone as illustrated in Table 93, the distribution pattern of these soils is illustrated in Map 97. The most prominent soil category is *Chromosol* which suitable for Broad acre cropping followed by *Kurosol* (Broad acre); *Dermosol* (Broad acre cropping); and *Rudosol* (Conservation and broad acre)

Table 93 Rural Living Zone Soil Types

		ASC_					Total
			Chromosol	Dermosol	Kurosol	Rudosol	
locality	ALLESTREE	1	55	0	0	47	103
	BOLWARRA	0	176	0	0	125	301
	CASHMORE	0	5	0	2	0	7
	DUTTON WAY	0	0	0	0	2	2
	GORAE	0	45	0	0	0	45
	HEATHMERE	0	11	0	0	0	11
	NARRAWONG	4	101	27	0	7	139
	PORTLAND WEST	0	2	0	62	0	64
	Total	5	395	27	64	181	672

Source: Glenelg Shire

Map 97 Rural Living Zone Soil Types



Source: Glenelg Shire and DSE

Total Soil Depth

The range of soil depths across the Rural Living Zone range from a minimum of 70 mm to approximately 260 mm in depth. The methodology used to calculate this figure involved interpreting soil data from the Department of Primary Industry, Department of Sustainability and Environment and satellite imagery. As indicated by Table 94 the greatest depth frequencies were **80 mm** (221 recordings) **210 mm** (181 recordings); **195 mm** (80 recordings); **260 mm** (51 recordings) and **90 mm** (27 recordings).

Table 94 Rural Living Zone Total Soil Depth

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	5	.7	.7	.7
	70	2	.3	.3	1.0
	80	221	32.9	32.9	33.9
	90	27	4.0	4.0	37.9
	115	41	6.1	6.1	44.0
	195	80	11.9	11.9	56.0
	200	64	9.5	9.5	65.5
	210	181	26.9	26.9	92.4
	260	51	7.6	7.6	100.0
	Total	672	100.0	100.0	

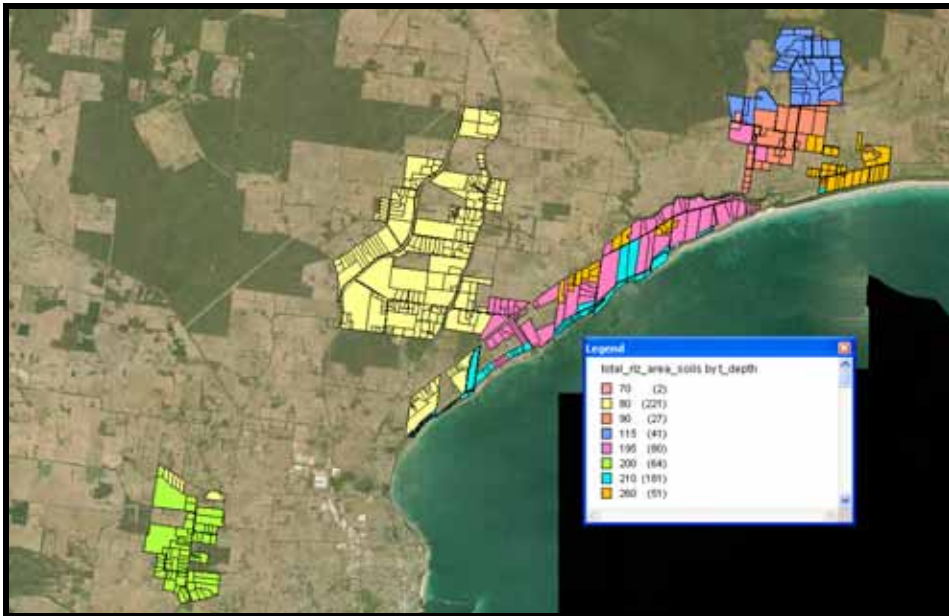
Source: DSE

Map 98 indicates where the various soil depths occur across the shire. As indicated by the map the soil pattern is granular. Eight bands of soil depth are highlighted on the map.

The areas with the highest soil depths are along the coastline past Narrawong. The soil categories with the deepest soil profiles are the Chromosols along the coastal strip. The area with the shallowest soil profile (i.e. Chromosol) is situated on the northern side of the Princess highway near Narrawong.

The two middle range soil bands (i.e. 90mm-115mm and 200 mm) are situated to the north of the Princess Highway past Narrawong and to the west of the Portland CBD respectively.

Map 98 Rural Living Zone Total Soil Depth



Source: Glenelg Shire and DSE

Topsoil Depth

The depth of topsoil is a crucial element in the performance of agricultural soils. Plants generally concentrate their roots in and obtain most of their nutrients from this layer. The actual depth of the topsoil layer can be measured as the depth from the surface to the first densely packed soil layer known as subsoil. Table 95 gives the soil depth in mm.

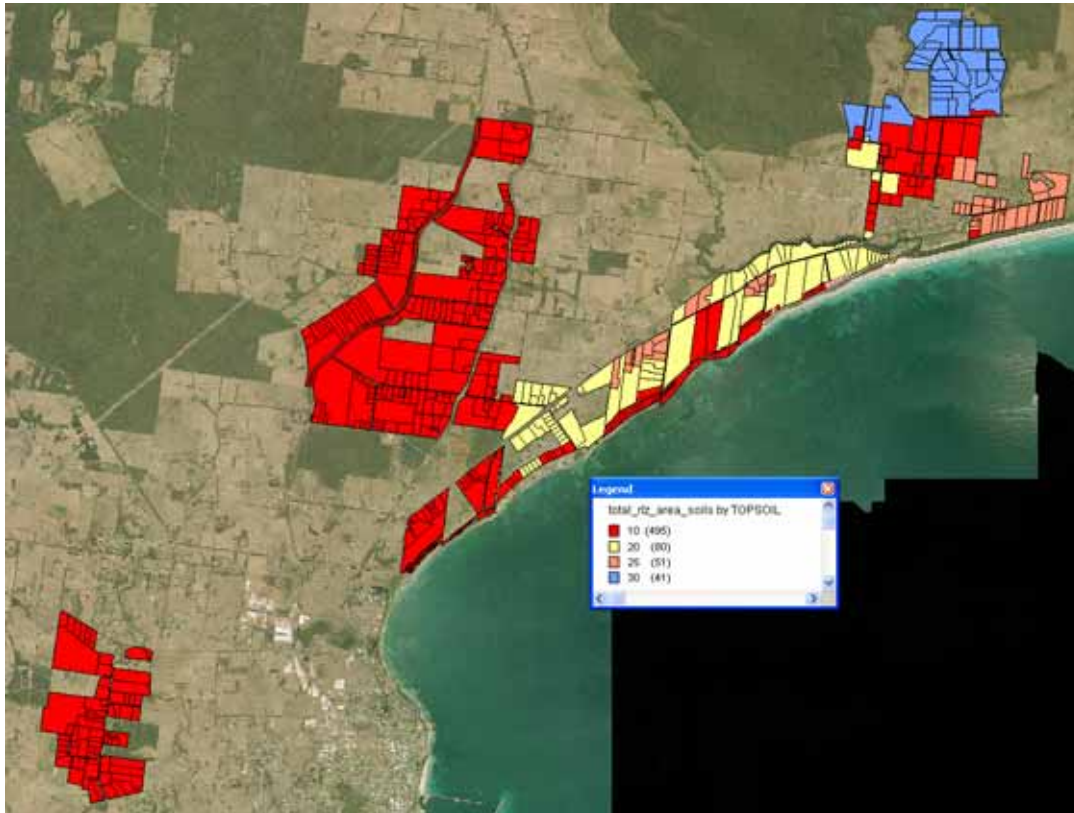
Table 95 Rural Living Zone Top Soil Depth

		TOPSOIL					Total
		0	10	20	25	30	
locality	ALLESTREE	1	47	39	16	0	103
	BOLWARRA	0	283	18	0	0	301
	CASHMORE	0	7	0	0	0	7
	DUTTON WAY	0	2	0	0	0	2
	GORAE	0	45	0	0	0	45
	HEATHMERE	0	11	0	0	0	11
	NARRAWONG	4	36	23	35	41	139
	PORTLAND WEST	0	64	0	0	0	64
	Total	5	495	80	51	41	672

Source: Glenelg Shire

As shown by Map 99 the majority of the Rural Living Zone has less than 10 mm of top soil irrespective of soil category. The area which has the deepest topsoil layer is situated north of the Princess Highway and has approximately 30 mm of top soil.

Map 99 Rural Living Zone Top Soil Depth



Source: Glenelg Shire and DSE

Soil pH

The pH of a soil measures its acidity or alkalinity. In acid soils pH is a useful surrogate for aluminum toxicity, while in alkaline soils high pH can indicate the presence of calcium carbonate, high sodality or the presence of toxic compounds like sodium carbonate (for more information see Moore *et al.* 1998a, Scholz and Moore 1998).

Soil pH is an important consideration for farmers and gardeners for several reasons:

- Many plants and soil life forms have a preference for either alkaline or acidic conditions, affecting the choice of crop or plant that can be grown without intervention to adjust the pH
- Diseases affecting plants also tend to thrive in soil with a particular pH range
- The pH can affect the availability of nutrients in the soil

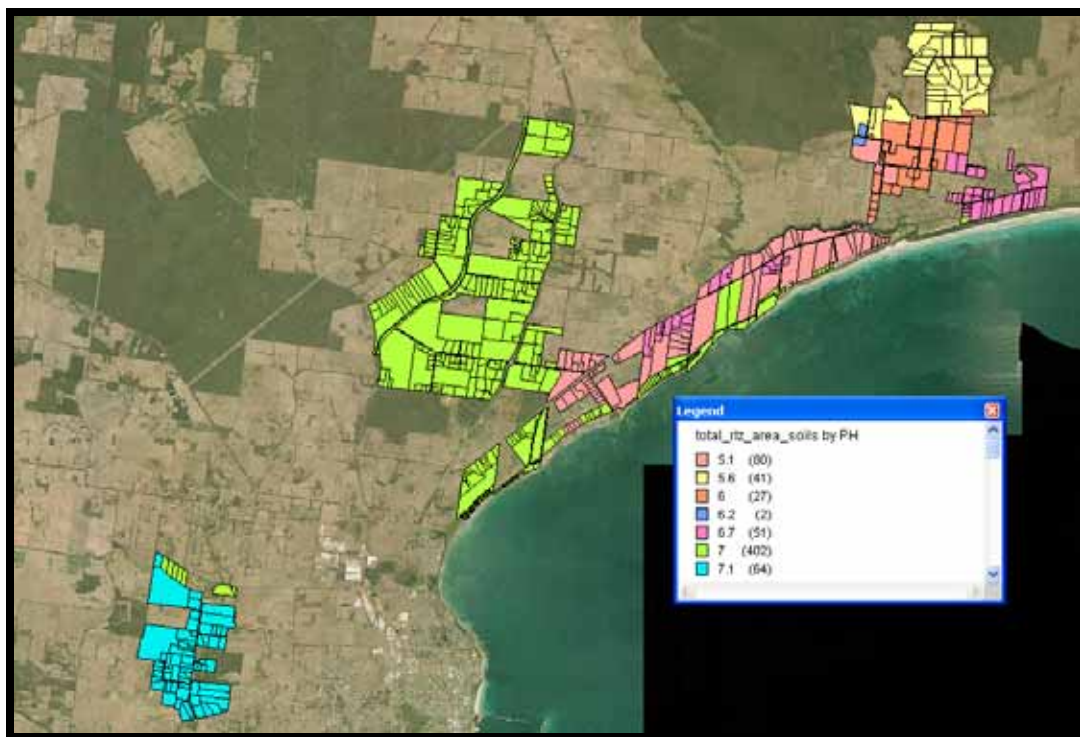
Table 96 Rural Living Soil pH

Location	pH								Total
	.0	5.1	5.6	6.0	6.2	6.7	7.0	7.1	
ALLESTREE	1	39	0	0	0	16	47	0	103
BOLWARRA	0	18	0	0	0	0	283	0	301
CASHMORE	0	0	0	0	0	0	5	2	7
DUTTON WAY	0	0	0	0	0	0	2	0	2
GORAE	0	0	0	0	0	0	45	0	45
HEATHMERE	0	0	0	0	0	0	11	0	11
NARRAWONG	4	23	41	27	2	35	7	0	139
PORTLAND WEST	0	0	0	0	0	0	2	62	64
Total	5	80	41	27	2	51	402	64	672

Source: Department of Sustainability and Environment

The majority of food crops prefer a neutral or slightly acidic soil (pH 7). Some plants, however, prefer more acidic (e.g., potatoes, strawberries) or alkaline (e.g., brassicas) conditions

Map 100 Rural Living Zone Soil pH



Source: Glenelg Shire and DSE

The most acidic soils were situated along the Narrawong coastline while the neutral soils (i.e. 7.0 or higher) were located further inland from the coastline.

Soil acidification

Soil acidification is a process by which soil pH decreases over time, and there are often no visible signs of the problem.

Acidification can occur under natural conditions over thousands of years, with high rainfall areas most affected. However, rapid acidification can occur over a few years under intensive agricultural practices.

Acidification can affect either the surface soil only or the subsoil as well. Surface acidity can be relatively simple to treat, and brings considerable benefits in plant growth and yield. Sub-surface acidity is difficult and costly to correct. Farmers in high-risk areas need to identify the problem as early as possible

There are no visible symptoms of soil acidification other than declines in crop and pasture production, which may be dramatic in serious cases. As soils become more acidic some nutrients may become less available while other elements in the soil may reach toxic levels. Acidic soils may have some or all of the following problems:

Table 97 Rural Living Zone Soil Acidification

		Acidification			Total
		1.Low	2.Moderate	3.High	
locality	ALLESTREE	34	0	69	103
	BOLWARRA	54	0	247	301
	CASHMORE	0	1	6	7
	DUTTON WAY	2	0	0	2
	GORAE	0	0	45	45
	HEATHMERE	0	0	11	11
	NARRAWONG	94	16	29	139
	PORTLAND WEST	0	62	2	64
	Total	184	79	409	672

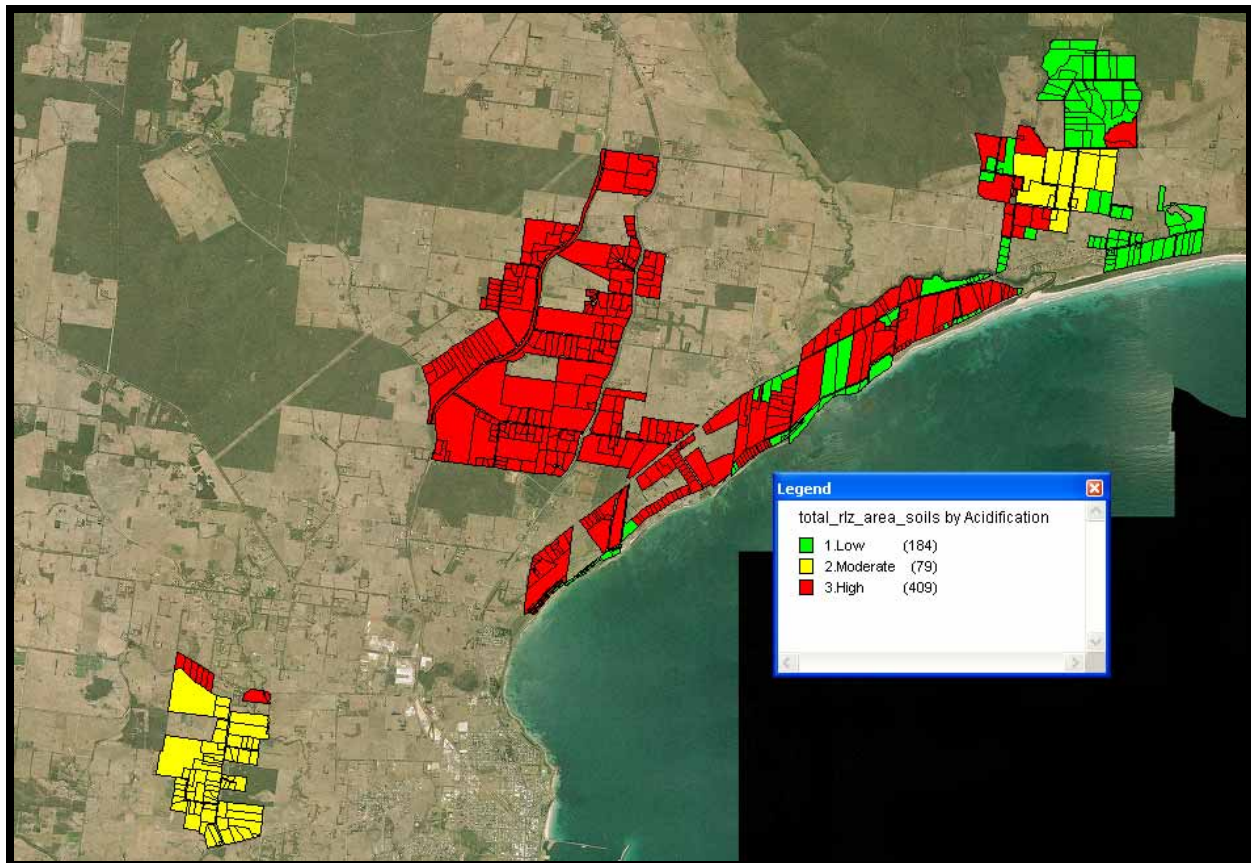
Source: Glenelg Shire and DSE

- Reduction in the amount of nutrients being recycled by soil micro-organisms (e.g. nitrogen supply may be reduced)
- Phosphorus in the soil may become less available to plants
- Induced deficiencies of calcium, magnesium and molybdenum
- The ability of plants to use subsoil moisture may be limited
- Aluminum, which is toxic to plants and microorganisms, may be released from the soil
- Manganese may reach toxic levels
- Uptake of cadmium (a heavy metal contaminant) by crops and pastures may increase

It is most important that soil acidity be treated early. If acidity spreads into the sub-soil, serious yield reduction may occur. Sub-soil acidity is difficult and costly to control.

The first step in managing soil acidity is to diagnose any increase in acidity. This involves reliable soil tests of pH, aluminum and manganese levels for the plough layer (zero to 10 cm) and for the sub-surface to 50 or 60 cm

Map 101 Rural Living Zone Soil Acidification



Source: Glenelg Shire

Soil impedance

A condition that hinders the movement of water by gravity through soils this condition is brought about through the process of soil compaction. Soil compaction describes the reduction in soil pore size and total pore space through applied stresses. The high strength of compacted soils restricts root elongation and results in a reduced soil volume available for water and nutrient uptake.

Susceptibility to compaction relates to particle size distribution and the presence or absence of secondary structure and organic matter. Soils with a wide range of particle sizes, low organic matter and no secondary structure are particularly susceptible.

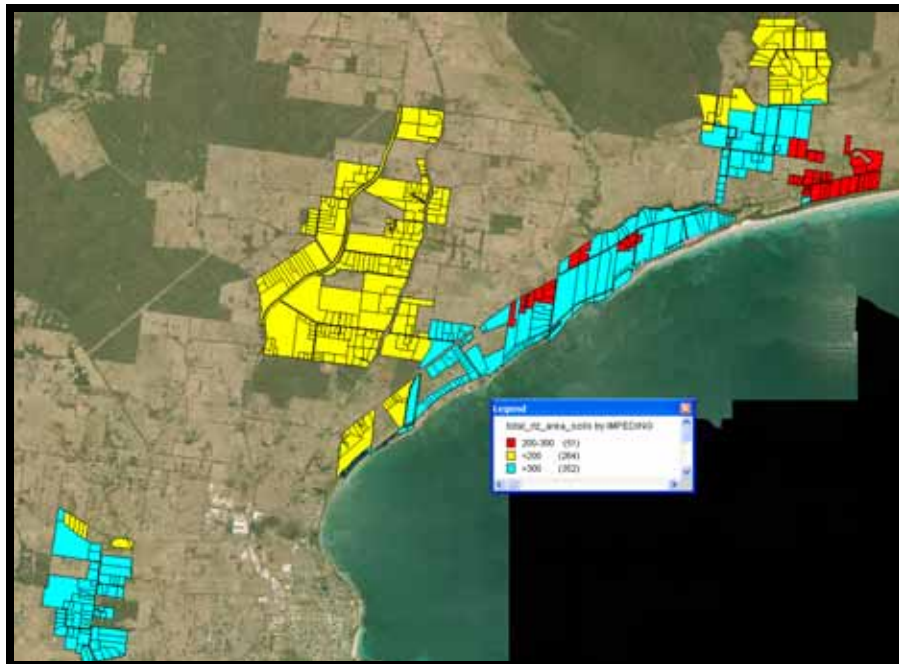
Table 98 Rural Living Zone Soil Impedance

		IMPEDING				Total
			<200	>300	200-300	
locality	ALLESTREE	1	0	86	16	103
	BOLWARRA	0	158	143	0	301
	CASHMORE	0	5	2	0	7
	DUTTON WAY	0	0	2	0	2
	GORAE	0	45	0	0	45
	HEATHMERE	0	11	0	0	11
	NARRAWONG	4	43	57	35	139
	PORTLAND WEST	0	2	62	0	64
	Total	5	264	352	51	672

Source: Glenelg Shire and DSE

As indicated in the Map 102 the lowest level of soil impedance is situated near the Princess highway to the east Narrawong. The impedance level across the entire Rural Living zone are very similar ranging from just under 200 mm through to just over 400 mm.

Map 102 Rural Living Zone Soil Impedance



Source: Glenelg Shire and DSE

Soil drainage

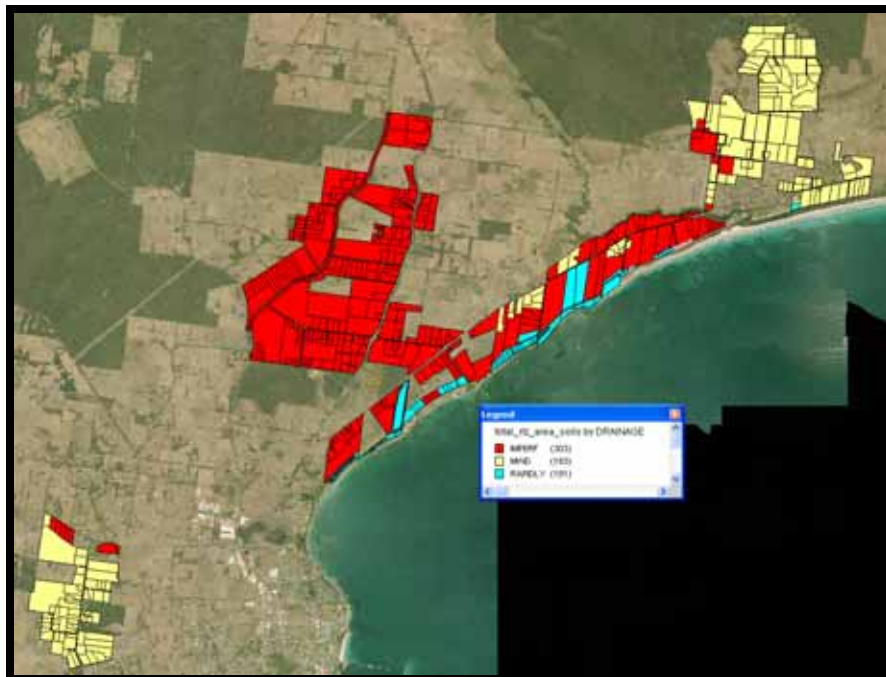
Drainage is the natural or artificial removal of surface and sub-surface water from an area. Many agricultural soils need drainage to improve production or to manage water supplies

Table 99 Rural Living Zone Soil Drainage

		DRAINAGE				Total
			IMPERF	MWD	RAPIDLY	
locality	ALLESTREE	1	39	16	47	103
	BOLWARRA	0	176	0	125	301
	CASHMORE	0	5	2	0	7
	DUTTON WAY	0	0	0	2	2
	GORAE	0	45	0	0	45
	HEATHMERE	0	11	0	0	11
	NARRAWONG	4	25	103	7	139
	PORTLAND WEST	0	2	62	0	64
	Total	5	303	183	181	672

Source: Glenelg Shire

Map 103 Rural Living Zone Soil Drainage Map



Source: Glenelg Shire

Dispersive behaviour

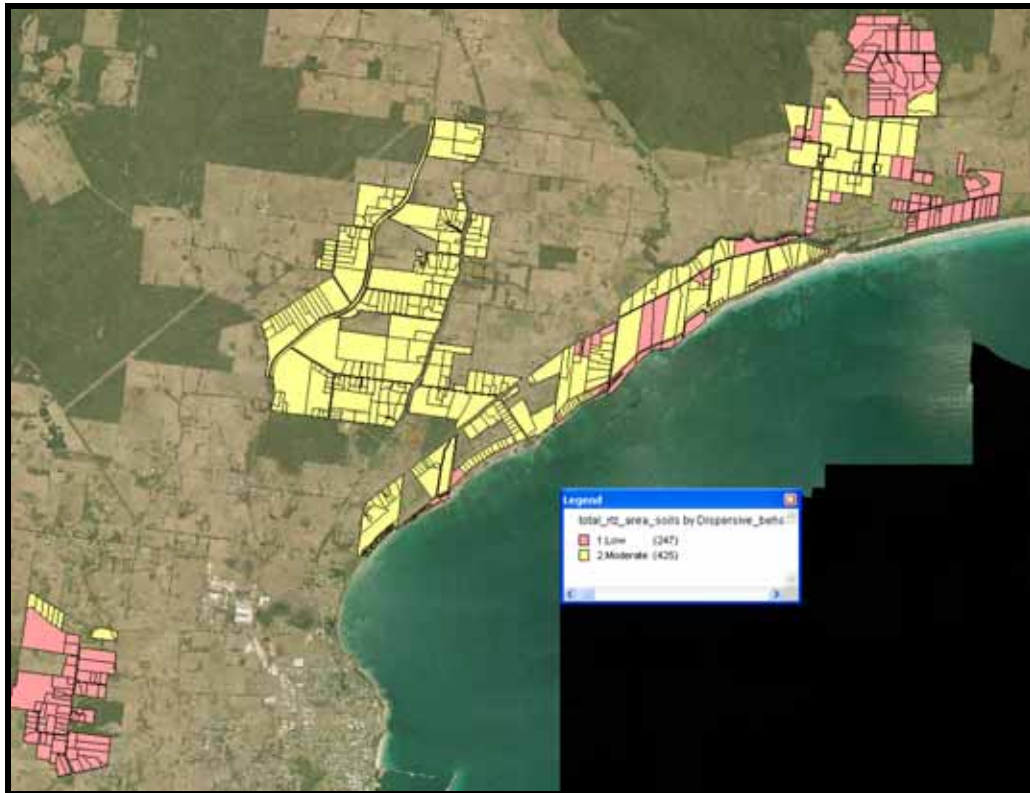
A dispersive soil is structurally unstable. In dispersive soils the soil aggregates – small clods – collapse when the soil gets wet because the individual clay particles disperse into solution. This collapse of structure causes the soil to slump, lose porosity and become denser thus restricting root growth of annual crops and pastures. Soils often disperse when they are sodic, which means they contain enough sodium to interfere with the structural stability of the soil.

Table 100 Rural Living Zone Dispersive Behaviour

		Dispersive_behaviour		Total
		1.Low	2.Moderate	
locality	ALLESTREE	34	69	103
	BOLWARRA	54	247	301
	CASHMORE	1	6	7
	DUTTON WAY	2	0	2
	GORAE	0	45	45
	HEATHMERE	0	11	11
	NARRAWONG	94	45	139
	PORTLAND WEST	62	2	64
	Total	247	425	672

Source: Glenelg Shire and DSE

Map 104 Rural Living Zone Dispersive Behaviour



Source: Glenelg Shire and DSE

Soil structure decline

Soil structure is determined by how individual soil granules clump or bind together and aggregate, and therefore, the arrangement of soil pores between them. Soil structure has a major influence on water and air movement, biological activity, root growth and seedling emergence.

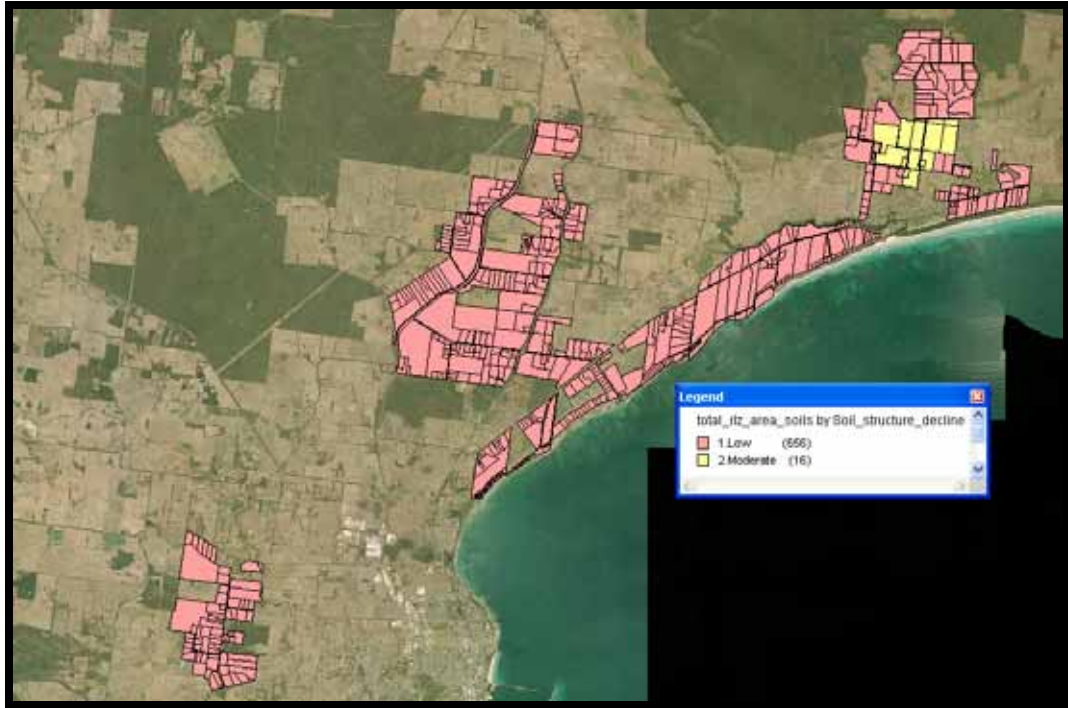
Soil structure will decline under most forms of cultivation – the associated mechanical mixing of the soil compacts and shears aggregates and fills pore spaces; it also exposes organic matter to a greater rate of decay and oxidation (Young & Young, 2001). Soil structure decline under irrigation is usually related to the breakdown of aggregates and dispersion of clay material as a result of rapid wetting.

Table 101 Rural Living Soil Structure Decline

		Soil_structure_decline		
		1.Low	2.Moderate	Total
locality	ALLESTREE	103	0	103
	BOLWARRA	301	0	301
	CASHMORE	7	0	7
	DUTTON WAY	2	0	2
	GORAE	45	0	45
	HEATHMERE	11	0	11
	NARRAWONG	123	16	139
	PORTLAND WEST	64	0	64
	Total	656	16	672

Source: Glenelg Shire and DSE

Map 105 Rural Living Zone Soil Structure Decline



Source: Glenelg Shire and DSE

Waterlogging

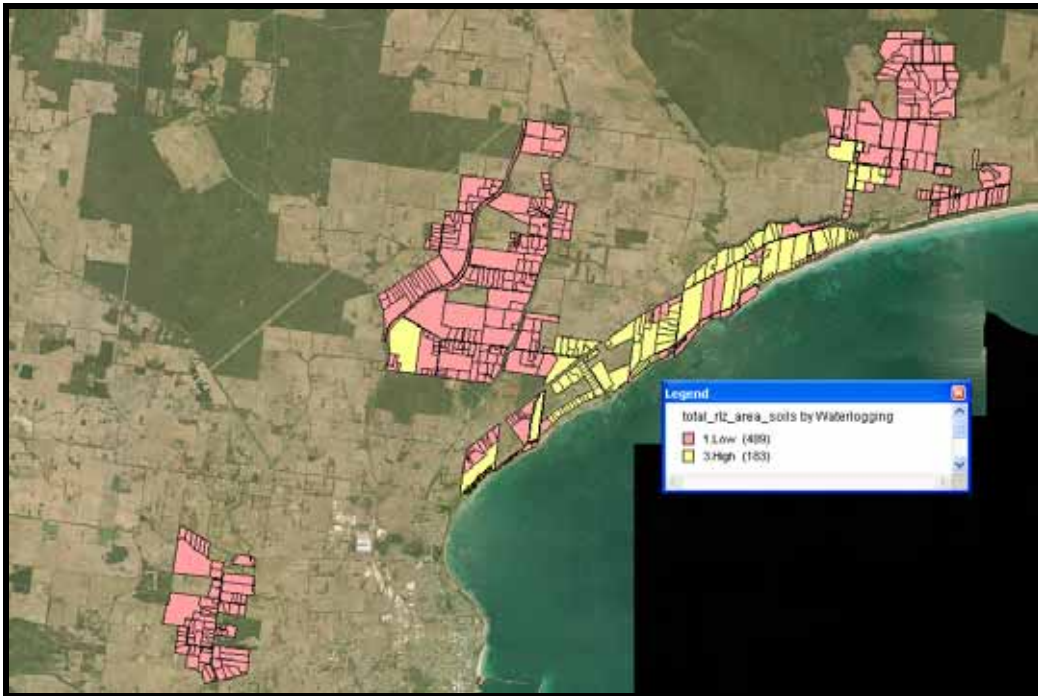
Water logging is excess water, in terms of saturated soil layers, in the root zone accompanied by anaerobic conditions. In saturated soils biological activity rapidly uses the available oxygen, retarding oxygen and water uptake and restricting root and plant growth. Water logging for extended periods near the surface (e.g. <30 cm) can result in poor crops or plant death. The ability to tolerate different periods of water logging varies greatly between crops. Also in many situations, the presence of a saturated layer or water table deeper in the soil can be advantageous because a water supply is available to the plant and adequate air is available in the topsoil to maintain root activity.

Table 102 Rural Living Zone Soil Waterlogging Ability

		Waterlogging		Total
		1.Low	3.High	
locality	ALLESTREE	34	69	103
	BOLWARRA	210	91	301
	CASHMORE	7	0	7
	DUTTON WAY	2	0	2
	GORAE	45	0	45
	HEATHMERE	11	0	11
	NARRAWONG	116	23	139
	PORTLAND WEST	64	0	64
	Total	489	183	672

Source: Glenelg Shire and DSE

Map 106 Rural Living Zone Soil Waterlogging ability



Source: Glenelg Shire and DSE

Landslides

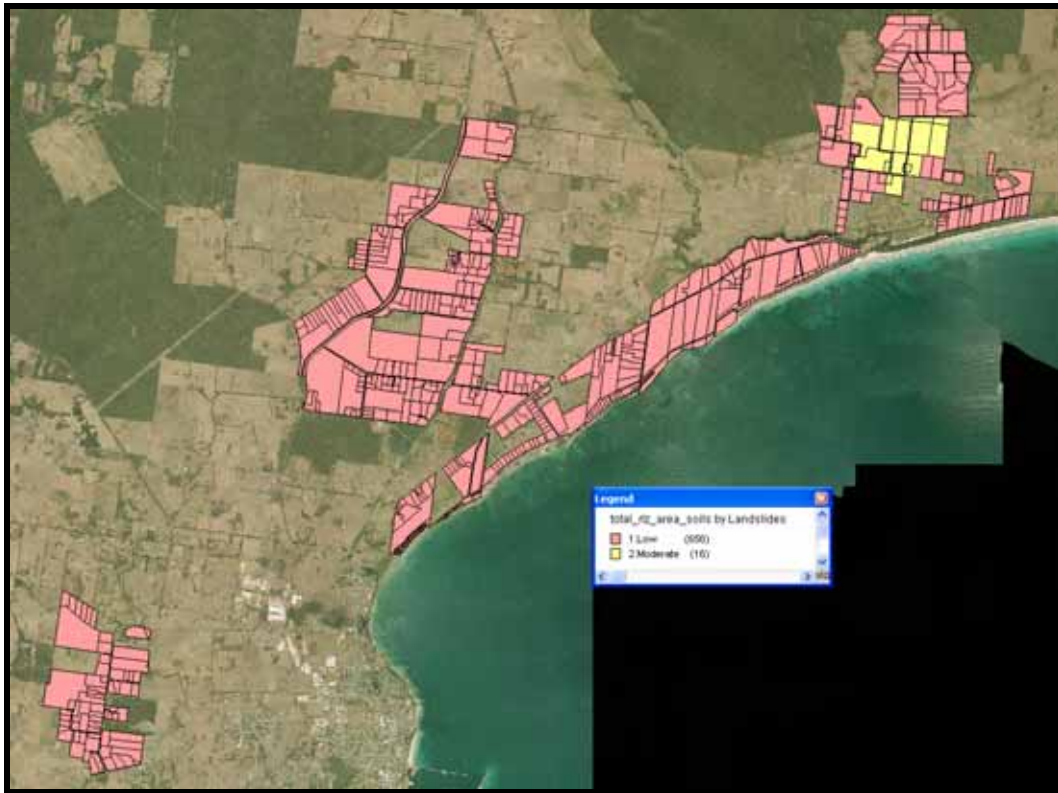
Land instability assesses the potential for rapid movement of a large volume of soil. This includes mass soil movement through slope failure, shifting sand dunes, wave erosion and subsidence in karst topography (land underlain by caves).

Table 103 Rural Living Zone Landslides

		Landslides		
		1.Low	2.Moderate	Total
locality	ALLESTREE	103	0	103
	BOLWARRA	301	0	301
	CASHMORE	7	0	7
	DUTTON WAY	2	0	2
	GORAE	45	0	45
	HEATHMERE	11	0	11
	NARRAWONG	123	16	139
	PORTLAND WEST	64	0	64
	Total	656	16	672

Source: Glenelg Shire and DSE

Map 107 Rural Living Zone Land Slide Probability



Source: Glenelg Shire and DSE

The Susceptibility to Water Erosion

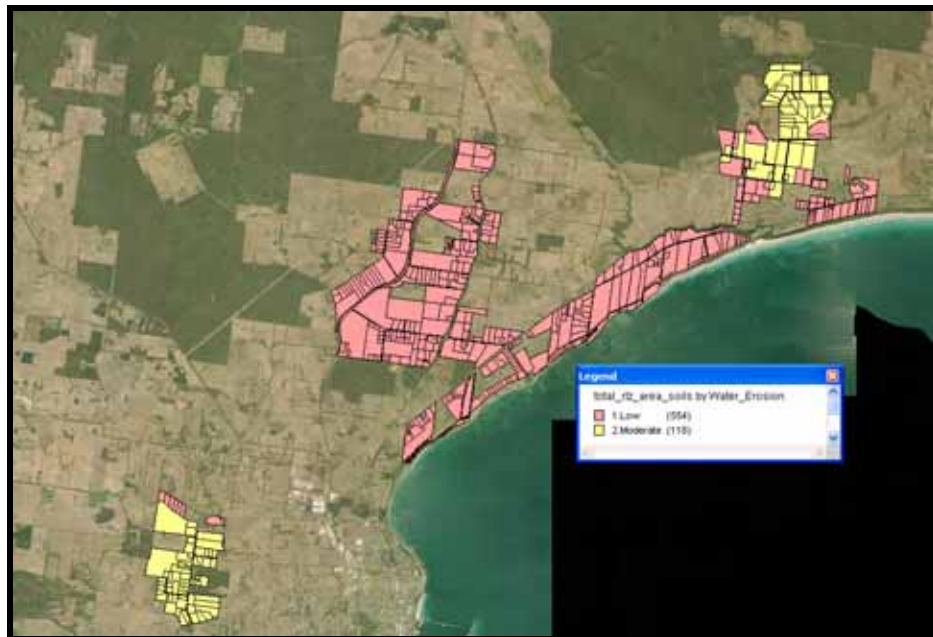
Water erosion hazard is the inherent susceptibility of the land to the loss of soil as a result of water movement across the surface. It is also an important cause of soil fertility decline as soil nutrients tend to be concentrated near the surface. Water erosion is highly variable depending on seasonal and climatic factors with most soil loss occurring from a small proportion of the agricultural area. For example, a high rainfall event immediately after summer, when soil plant cover is low can result in 'flush' of sediment and valuable topsoil nutrients into nearby drains. Management also affects erosion through the timing (and type) of cultivation, and frequency and intensity of water logging that affect saturation excess run-off.

Table 104 Rural Living Zone Susceptibility to Water Erosion

		Water_Erosion		
		1.Low	2.Moderate	Total
locality	ALLESTREE	103	0	103
	BOLWARRA	301	0	301
	CASHMORE	6	1	7
	DUTTON WAY	2	0	2
	GORAE	45	0	45
	HEATHMERE	11	0	11
	NARRAWONG	84	55	139
	PORTLAND WEST	2	62	64
	Total	554	118	672

Source: Glenelg Shire and DSE

Map 108 Rural Living Zone Susceptibility to Water Erosion



Source: Glenelg Shire and DSE

Salinity

This refers to the hazard of the land being affected by salinity in the future. It considers the maximum extent of saline land likely to develop given present land uses, clearing patterns and management practices. It is an estimate of the extent of salinisation when the water balance

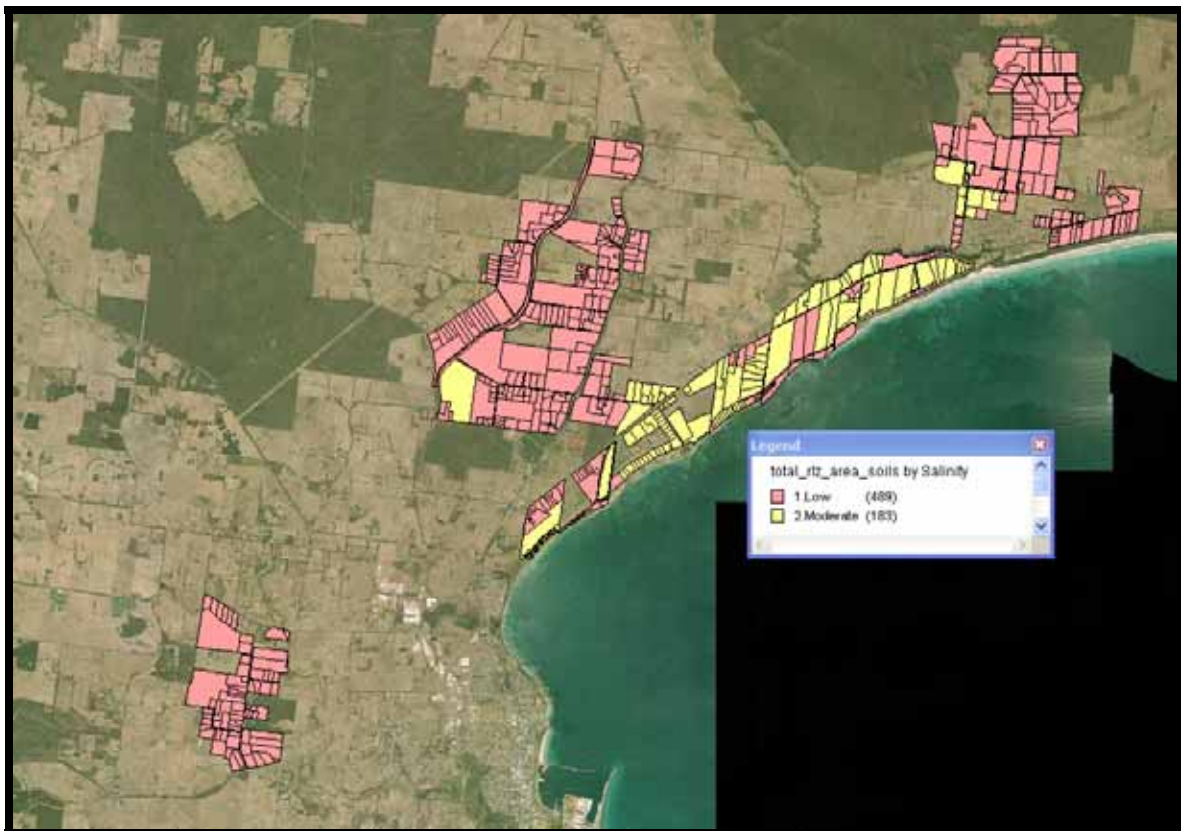
reaches a new (post-clearing) equilibrium. An accurate estimate of salinity risk is difficult because water table rise is affected by climate, land use (vegetation), soil-landforms, hydrology and geology. This also has to be compared with current salinity information.

Table 105 Rural Living Zone Salinity

		1.Low	2.Moderate	Total
locality	ALLESTREE	34	69	103
	BOLWARRA	210	91	301
	CASHMORE	7	0	7
	DUTTON WAY	2	0	2
	GORAE	45	0	45
	HEATHMERE	11	0	11
	NARRAWONG	116	23	139
	PORTLAND WEST	64	0	64
	Total	489	183	672

Source: Glenelg Shire and DSE

Map 109 Rural Living Zone Salinity Profile



Source: Glenelg Shire and DSE

10 Rural Living Zone Issues

- Desire to subdivide
- Agriculture potential /suitability
- Land degradation/water issue
- Industrial encroachment
- Natural constraints (flooding, sinkholes)
- Climate change & impacts droughts etc, reduction n rainfall , hotter summers

Options

- Identify areas here consolidation is possible or required
- Possible into RAZ and rezone to RZ1` or RCZ2

11 Rural Living Zone Issues

- Desire to subdivide
- Agriculture potential /suitability
- Land degradation/water issue
- Industrial encroachment
- Natural constraints (flooding, sinkholes)
- Climate change & impacts droughts etc, reduction n rainfall , hotter summers

Options

- Identify areas here consolidation is possible or required
- Possible into RAZ and rezone to RZ1` or RCZ2

12 LDRZ

12.1 Rationale for inclusion

The rationale to include this zone in the Sustainable Land Use Study was based on the strategic location and role of the zone in relation to their respective communities.

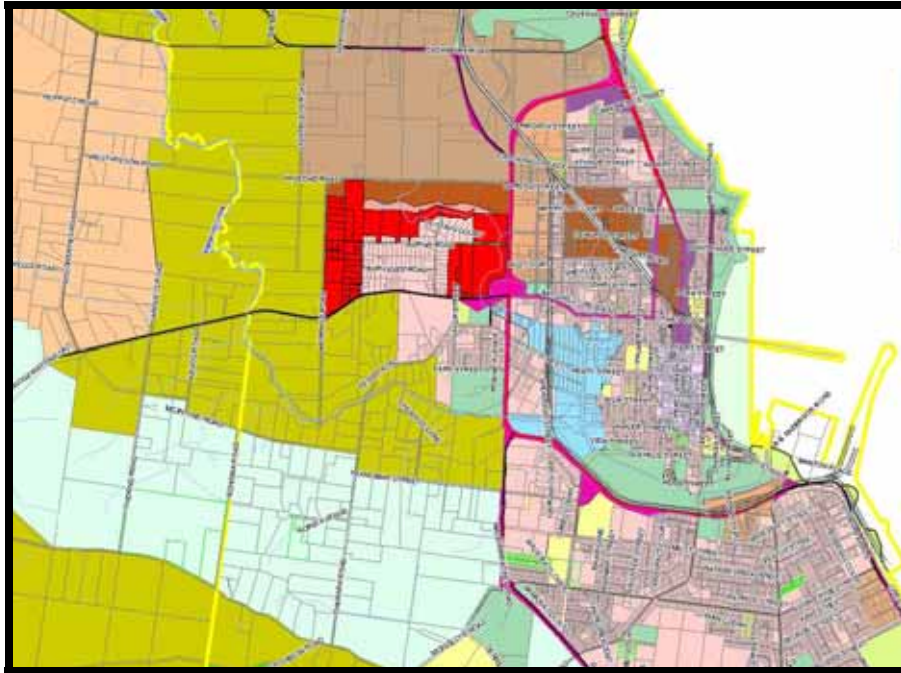
12.2 Purpose

To provide for low density residential development on lots which, in the absence of reticulated sewerage, can retain all wastewater.

12.3 Introduction

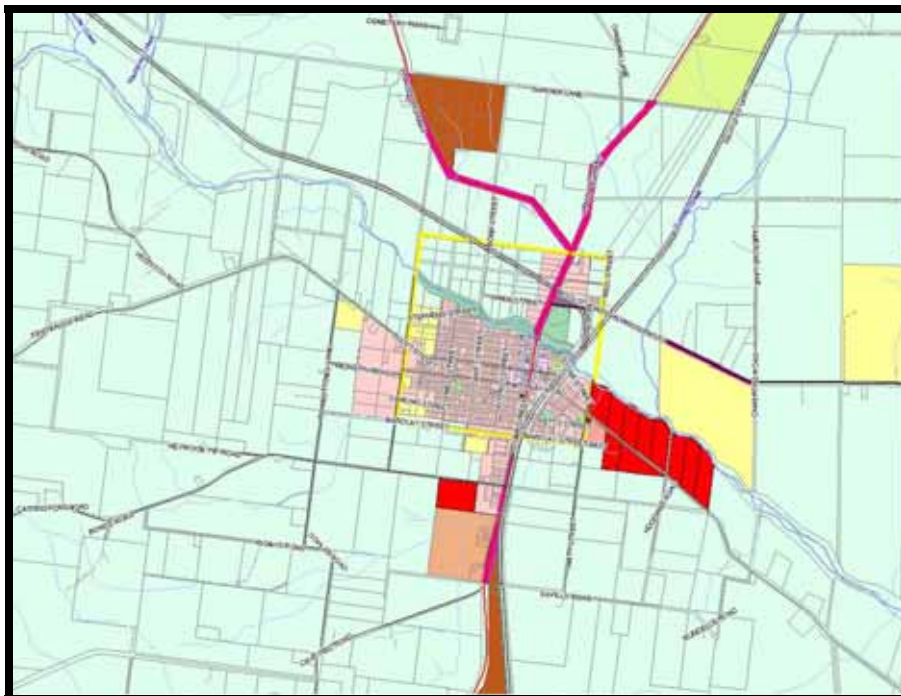
This zone is situated in Portland, Casterton and Heywood. In Portland the LDRZ is situated to the west of the CBD; in Casterton, the LDRZ is located in two locations (south of the CBD) and to the west of the town) finally in Heywood the LDRZ is to the south east of the town.

Map 110 LDRZ in Portland



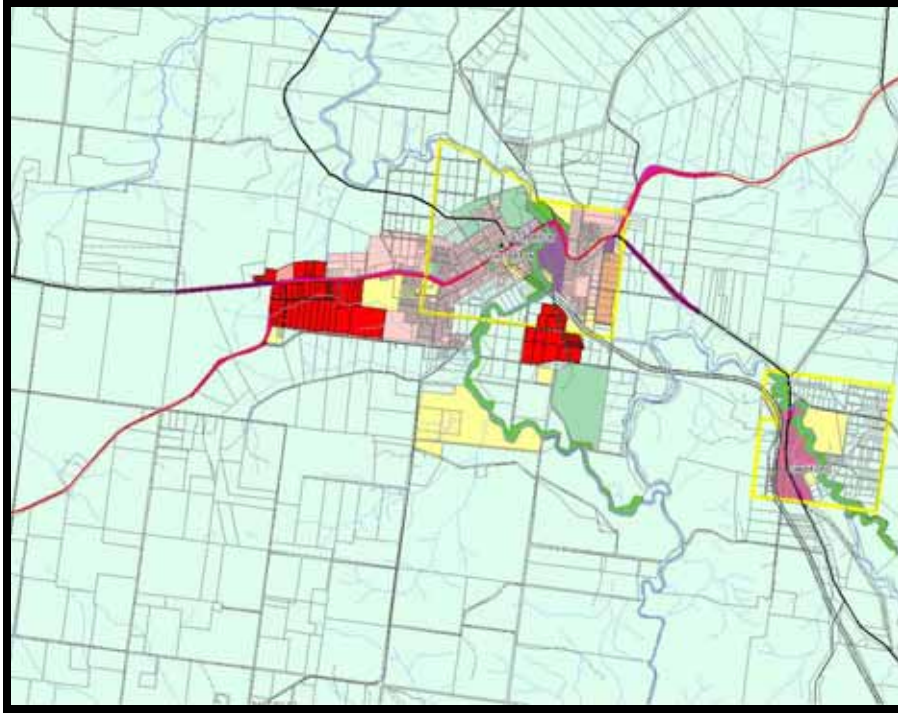
Source: Glenelg Shire

Map 111 LDRZ in Heywood



Source: Glenelg Shire

Map 112 LDRZ Casterton



Source: Glenelg Shire

The Glenelg Low Density Residential Zone contains 119 parcels in three locations. Casterton has the greatest number with 77 parcels followed by Portland with 44 and Heywood with 5 parcels.

The size of parcels ranges from under .5 of HA to parcels nearly 20 HA in size. The most frequent parcel sizes are under .5 HA with 37 in total (31% of the total), parcels with a size of 2-4 Ha represent 24% of the total (29 lots) and parcels with a size of .5-1HA have 20% of the total (24 lots) respectively.

Table 106 LDRZ Parcel Numbers and Size by Location

		locality			Total
		CASTERTON	HEYWOOD	PORTLAND	
area_ha	<.50	19	0	18	37
	.5 -1.0	13	0	11	24
	1 -1.50	7	0	1	8
	1.5 -2.0	5	0	3	8
	2 -4.0	23	0	6	29
	4 -6.0	1	5	2	8
	6 -10.0	1	0	2	3
	10 -20.0	1	0	1	2
	Total	70	5	44	119

Source: Glenelg Shire

12.4 Land Use

There are 10 separate classes or categories of LDRZ zone land in Glenelg shire as shown in Table 107.

The rural areas (i.e. B category) have 4

Residential Built;

Residential Land;

Rural / Residential Built and

Rural Residential Land.

Casterton has only 1 category

Residential Built

Portland has 5 with

Commercial / Industrial Land;

Non rateable;

Residential Built;

Residential Land and

Rural / Residential Land.

Table 107 LDRZ Levy Codes by Location

	locality			Total
	CASTERTON	HEYWOOD	PORTLAND	
Levy_Desc	2	0	7	9
B-Residential Built	34	3	0	37
B-Residential Land	4	2	0	6
B-Rural/Resid Built	10	0	0	10
B-Rural/Resid Land	10	0	0	10
C-Residential Built	10	0	0	10
P-Comm/Indust Land	0	0	1	1
P-Non Rateable	0	0	3	3
P-Residential Built	0	0	25	25
P-Residential Land	0	0	7	7
P-Rural/Resid Land	0	0	1	1
Total	70	5	44	119

Source: Glenelg Shire

Certain land use activities in the LDRZ zone may or may not be regulated through the use or application of a planning overlay. Overlays do not change the intent of the zone. In the LDRZ there are currently 5 overlays as indicated by Table 108.

Table 108 LDRZ Level and Concentration of Overlays by Location

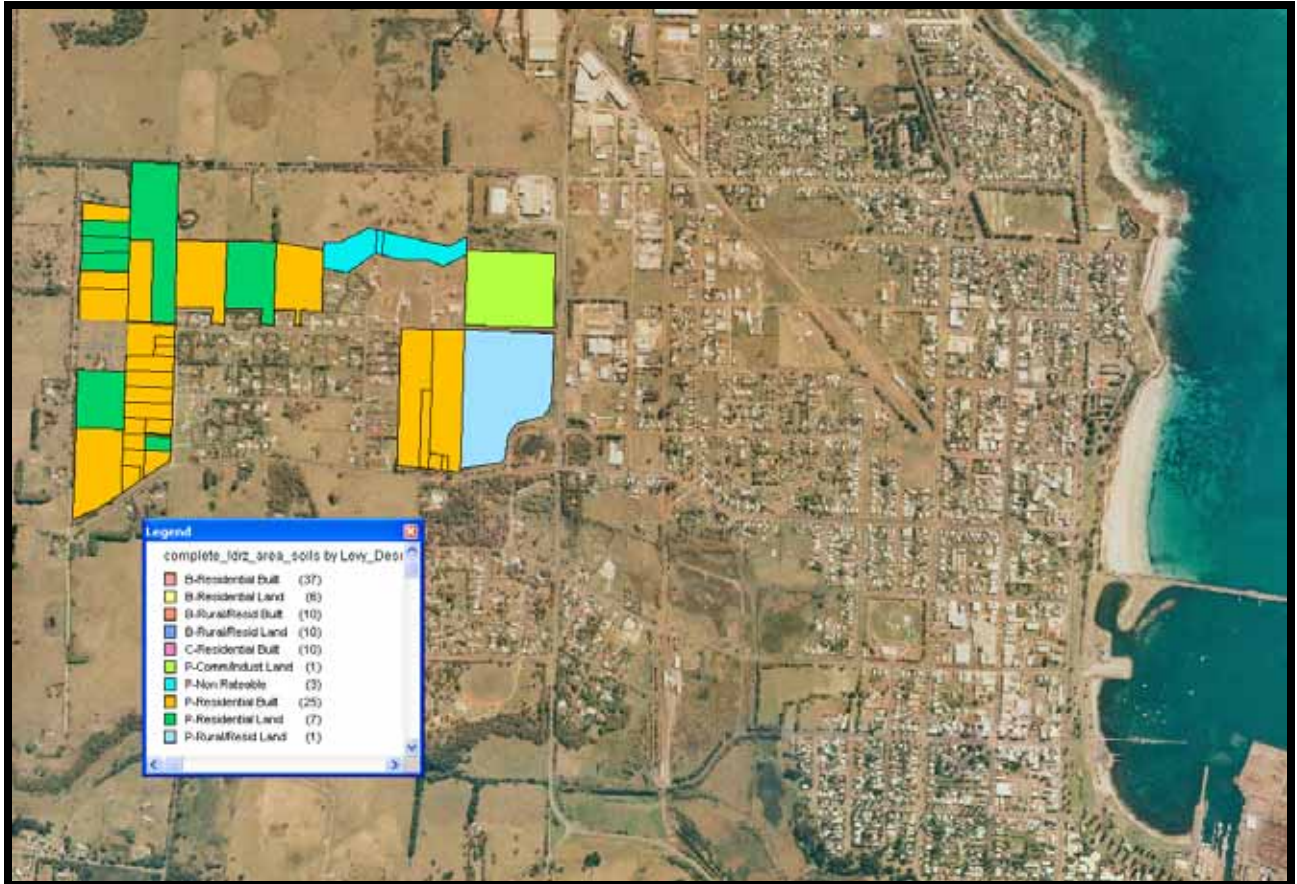
	locality			Total
	CASTERTON	HEYWOOD	PORTLAND	
Overlay DPO1	0	0	3	3
DPO3	67	5	36	108
DPO6	0	0	5	5
LSIO	1	0	0	1
RFO	2	0	0	2
Total	70	5	44	119

Source: Glenelg Shire

12.5 Current Land Use Analysis

As indicated by Map 113 Portland's LDRZ zone is situated to the west of the city with the largest category being residential built.

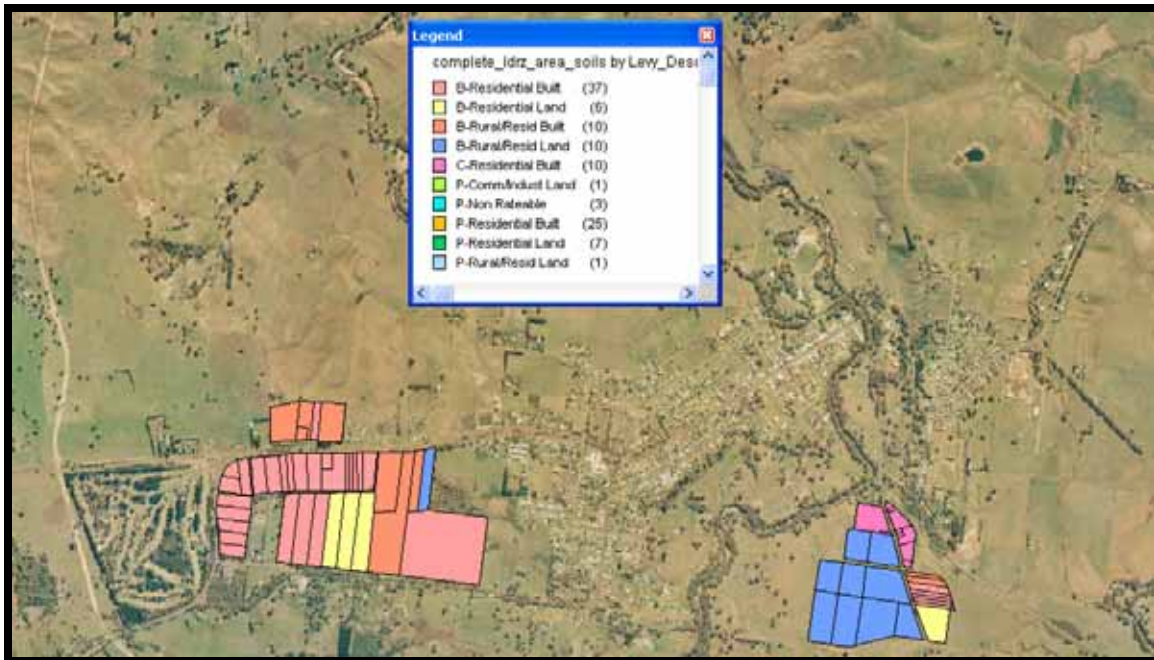
Map 113 LDRZ Portland Land Use Categories



Source: Glenelg Shire

Casterton has a mixture of land use in the LDRZ (Residential Built; Rural / Residential Built; Rural /Residential Land and Residential Land) as indicated by Map114.

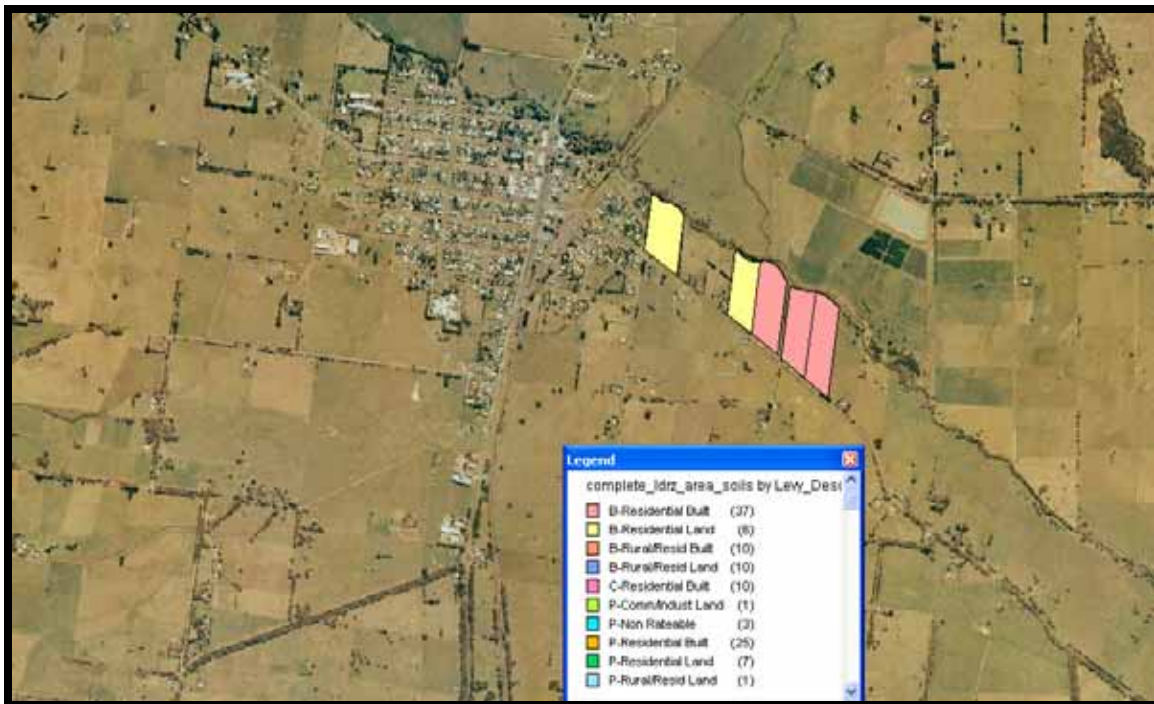
Map 114 Casterton LDRZ Land Use Patterns



Source: Glenelg Shire

Heywood has only 2 categories, residential built and residential land.

Map 115 Heywood LDRZ Land Use Patterns

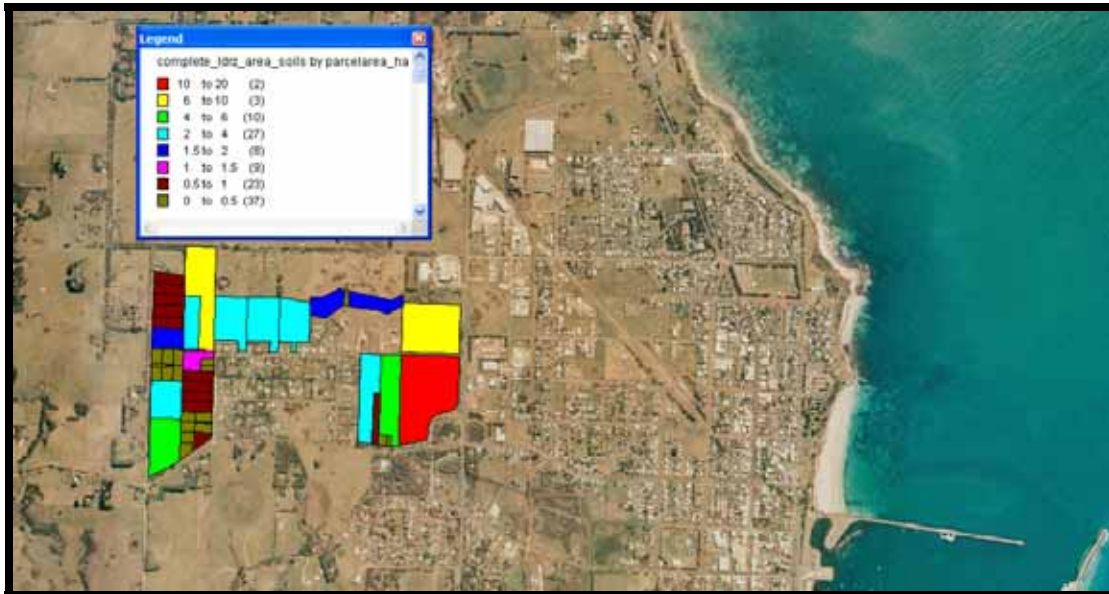


Source: Glenelg Shire

12.6 Parcel Size

Over 65% of the LDRZ in greater Portland is less than 1 HA. The dispersion of lot sizes is fairly uniform across the Portland area.

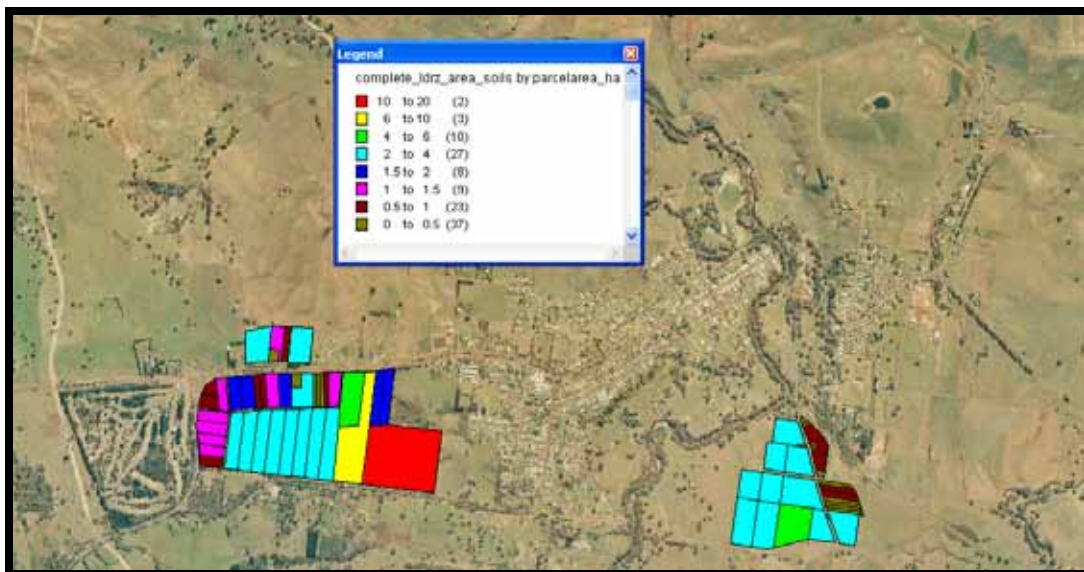
Map 116 LDRZ Lot Sizes across Portland



Source: Glenelg Shire

Casterton parcel size as indicated by Map 117 is predominately in the 2-4 HA class. .

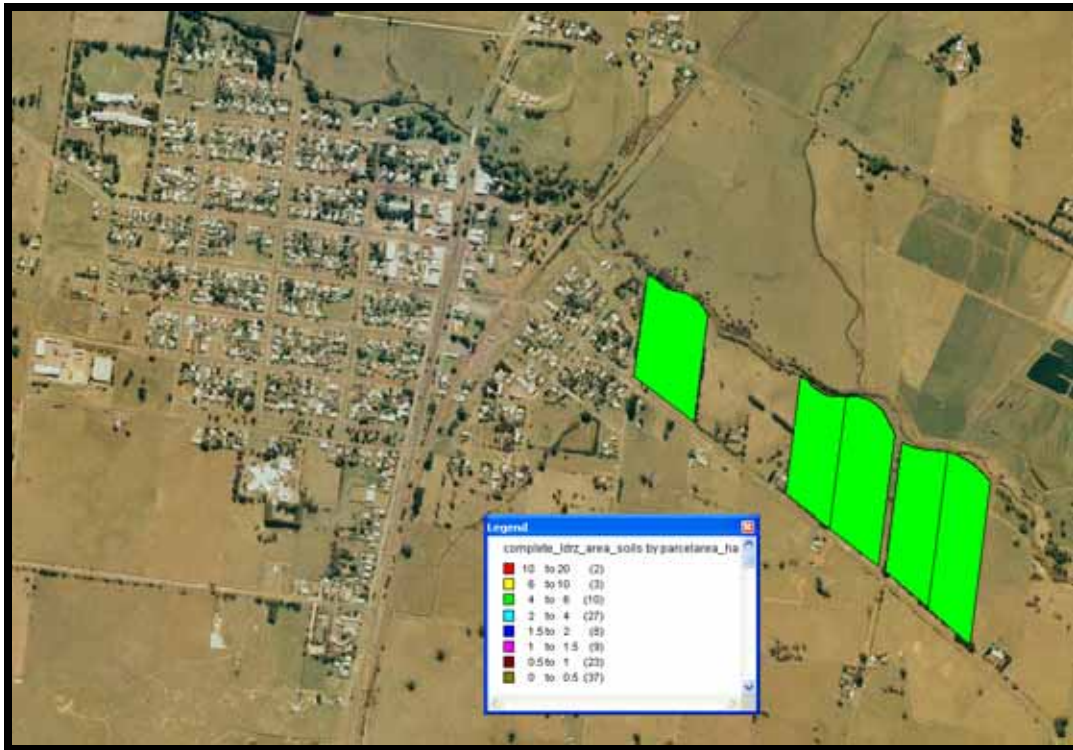
Map 117 LDRZ lot sizes Casterton



Source: Glenelg Shire

All of Heywood LDRZ parcels have an area of between 4 and 6 HA.

Map 118 LDRZ parcel sizes Heywood



Source: Glenelg Shire

12.7 Subdivision Activity

For the period 2000-2010 there were 7 subdivisions submitted for Low Density Residential Zone. Table 109 highlights the year and the respective number of subdivision permits received by Glenelg Shire, all LDRZ subdivisions occurred in Greater Portland.

Table 109 LDRZ Subdivision Activity 2000-2010

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 2007	1	14.3	14.3	14.3
2008	4	57.1	57.1	71.4
2009	2	28.6	28.6	100.0
Total	7	100.0	100.0	

Source: Glenelg Shire

During that time frame (2000-2010) three of the plans were certified and certificates issued while 4 applications were pending comments from referral agencies.

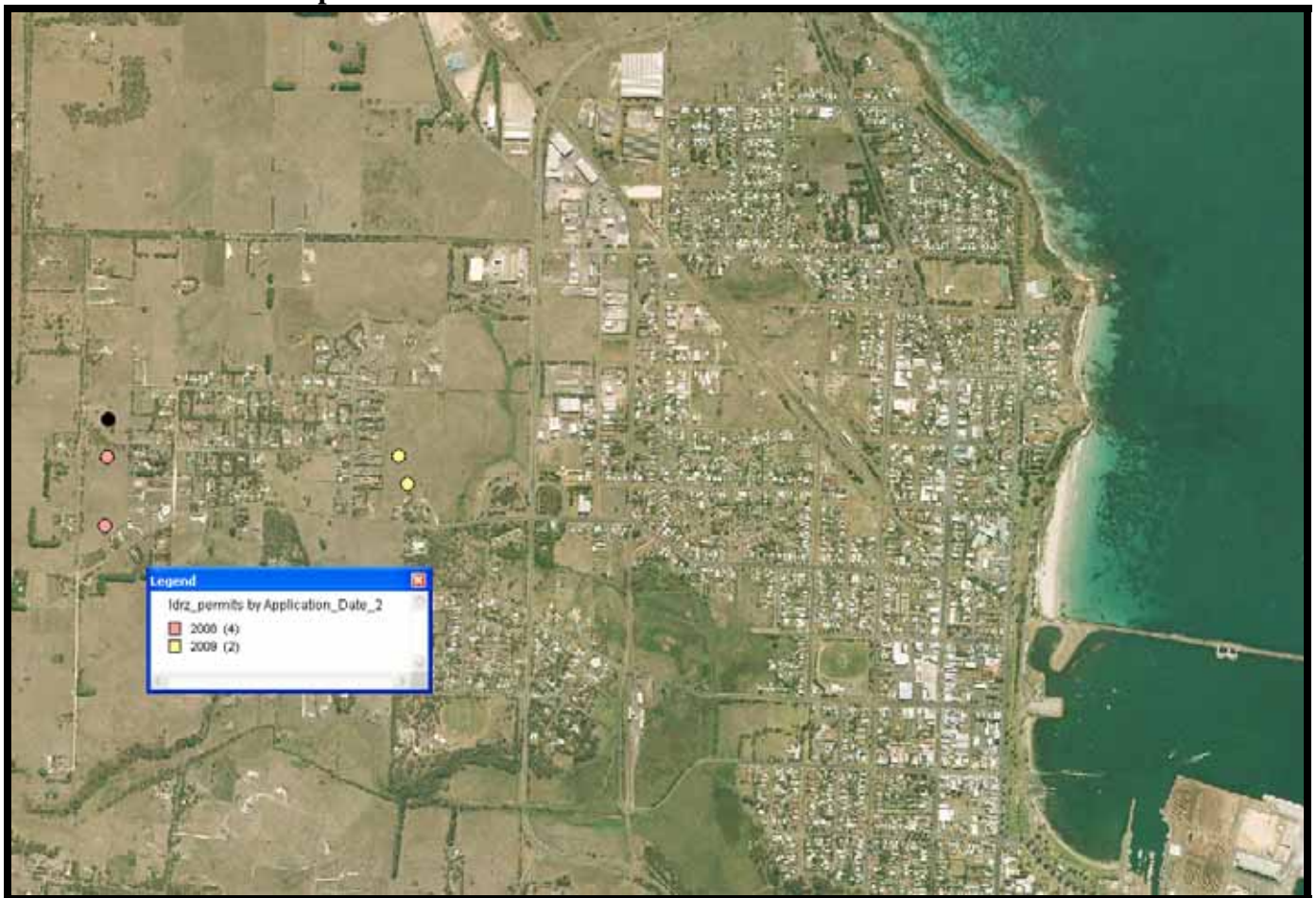
Table 110 LDRZ Subdivision Progress 2000-2010

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Certified and SOC Issued	3	42.9	42.9	42.9
Referral	4	57.1	57.1	100.0
Total	7	100.0	100.0	

Source: Glenelg Shire

Map 119 indicates the subdivision development for the LDRZ. Two of the subdivisions were staged over a 2 year time frame and are represented by a single dot. (Pink dots)

Map 119 LDRZ Subdivision Activities 2000-2010



Source: Glenelg Shire

12.8 Building Permit Activity

An analysis of building permits for the LDRZ shows that for the 10 year period (2000-2010) there were 65.

Table 111 LDRZ Building Permits 2000-2010

	Frequency	Percent	Valid Percent	Cumulative Percent
2000	1	1.5	1.6	1.6
2001	2	3.1	3.2	4.8
2002	2	3.1	3.2	8.1
2003	10	15.4	16.1	24.2
2004	7	10.8	11.3	35.5
2005	11	16.9	17.7	53.2
2006	8	12.3	12.9	66.1
2007	3	4.6	4.8	71.0
2008	10	15.4	16.1	87.1
2009	8	12.3	12.9	100.0
Total	62	95.4	100.0	
System	3	4.6		
Total	65	100.0		

Source: Glenelg Shire

Table 112 LDRZ Permit Activity 2000-2010

	Frequency	Percent	Valid Percent	Cumulative Percent
	15	23.1	23.1	23.1
Addition	1	1.5	1.5	24.6
Dwelling	19	29.2	29.2	53.8
Extension	3	4.6	4.6	58.5
Garage	4	6.2	6.2	64.6
Pergola	1	1.5	1.5	66.2
Relocate Dwelling	1	1.5	1.5	67.7
Restump	2	3.1	3.1	70.8
Shed	16	24.6	24.6	95.4
Spa	1	1.5	1.5	96.9
Swimming Pool	2	3.1	3.1	100.0
Total	65	100.0	100.0	

Source: Glenelg Shire

As indicated by Table 112 only 19 Dwellings were constructed during the 10 year (2000-2010) period. The major building activity in the zone revolved around either the construction of sheds, garages, home additions or extensions. The level of building activity shows that the demand for vacant land over that time period was less than 2 lots per annum for the Low Density Residential Zone. Table 113 indicates the building activity by year.

Table 113 LDRZ Building Activity by year

Item	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
Not identified	0	0	0	0	0	0	1	0	3	8	12
Addition	0	0	0	0	1	0	0	0	1	0	2
Dwelling	0	0	0	0	0	0	1	0	0	0	1
Extension	1	1	1	4	2	6	2	1	1	0	19
Garage	0	1	0	0	0	1	0	0	1	0	3
Pergola	0	0	0	3	0	0	0	0	1	0	4
Relocate Dwelling	0	0	0	0	0	0	1	0	0	0	1
Restump	0	0	0	1	0	0	0	0	0	0	1
Shed	0	0	0	1	1	0	0	0	0	0	2
Spa	0	0	1	1	3	3	3	2	3	0	16
Swimming Pool	0	0	0	0	0	1	0	0	0	0	1
Total	1	2	2	10	7	11	8	3	10	8	62

Source: Glenelg Shire

Table 114 LDRZ Building Activity by Location

	Misc	CASTERTON	HEYWOOD	PORTLAND	Total
	3	3	0	9	15
Addition	0	1	0	0	1
Dwelling	0	3	1	15	19
Extension	0	1	0	2	3
Garage	0	2	0	2	4
Pergola	0	0	0	1	1
Relocate Dwelling	0	0	0	1	1
Restump	0	1	1	0	2
Shed	0	1	2	13	16
Spa	0	0	0	1	1
Swimming Pool	0	0	1	1	2
Total	3	12	5	45	65

Source: Glenelg Shire

Nearly 80 percent of all the dwellings that were constructed in the LDRZ were located in the Portland area. Casterton had three dwellings constructed in the 10 year time frame while Heywood had only 1.

The estimated value of construction for the LDRZ during the 10 year period (2000-2009) is approximately \$6.9 million. Table 115 highlights the construction value per year for the 10 year time period.

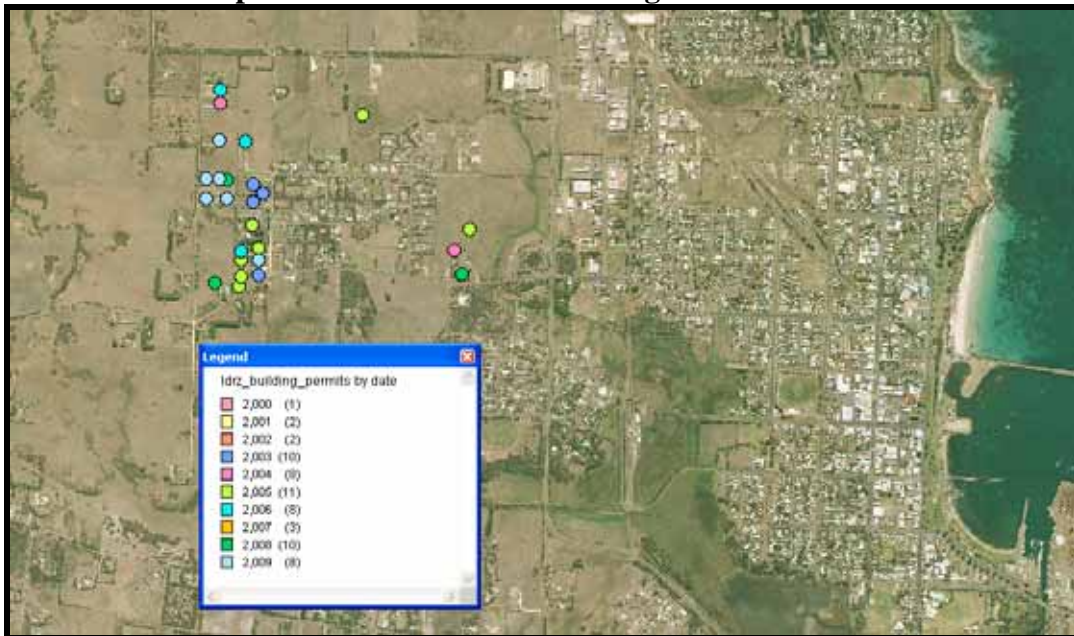
Table 115 LDRZ Construction Value per Year

Year	Number of Permits	Construction Value
2000	1	\$58,505
2001	2	\$168,764
2002	2	\$177,500
2003	10	\$826,679
2004	7	\$463,966
2005	11	\$1,708,723
2006	8	\$689,927
2007	3	\$369,464
2008	10	\$789,630
2009	8	\$1,671,901
Total	62	\$6,925,059

Source: Glenelg Shire

Map 120 highlights the building permits activity in the greater Portland area development was concentrated in the Burns Road, Bridgewater Road and Murphy’s Road area.

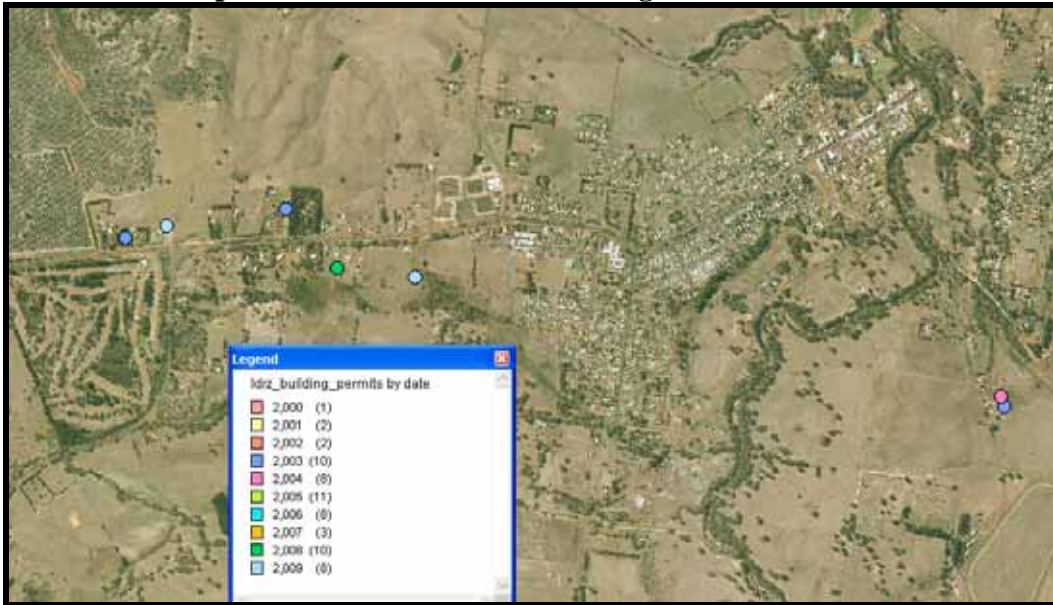
Map 120 Portland LDRZ Building Permit Activities



Source: Glenelg Shire

Building permit activity in Casterton is concentrated to the west and south of the town.

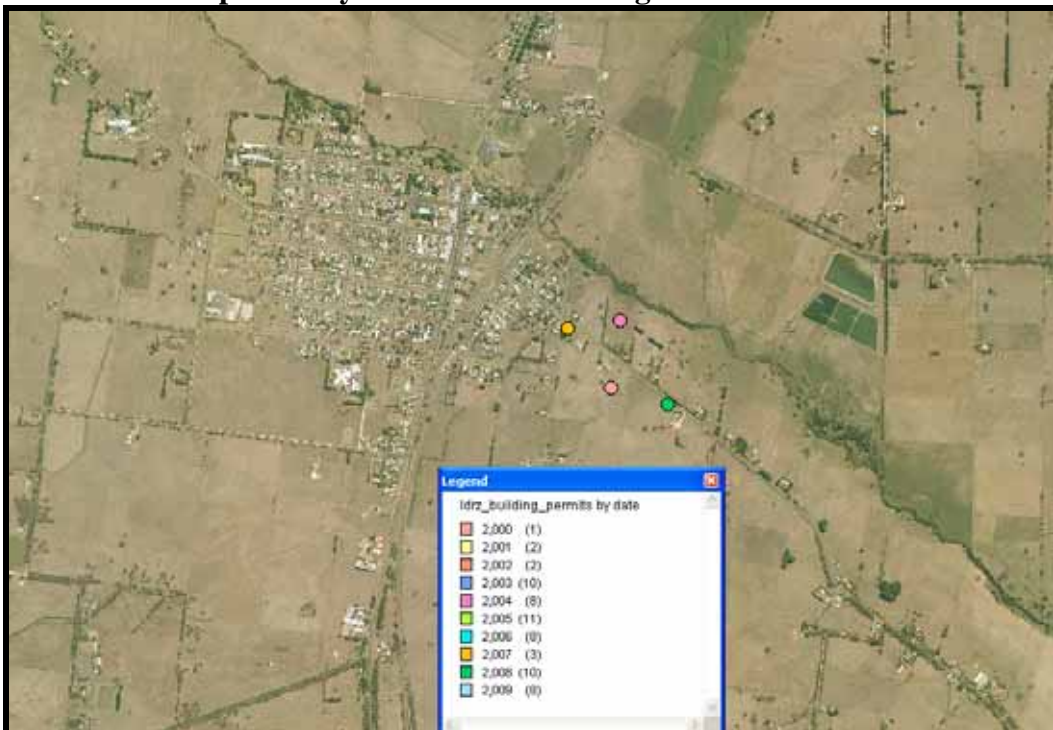
Map 121 Casterton LDRZ Building Permit Activities



Source: Glenelg Shire

Building permit activity in Heywood is concentrated to south east of the town.

Map 122 Heywood LDRZ Building Permit Activities



Source: Glenelg Shire

12.9 Fire proneness of the Zone

This area does not represent a high fire risk area

12.10 Land Use Impediments

The LDRZ has a series of impediments that include potential flooding issues, infrastructure impediments (i.e. waste water and sewerage) and the possibility of sink holes.

12.11 Forecast Demand and available LDRZ Land Stocks

The following tables (Portland, Casterton and Heywood) identify the amount of conventional land in the LDRZ that may be required in the three centers for future residential development under a range of potential town scenarios.

12.11.1 Portland

Table 116 Portland LDRZ Land Supply and Demand

Available Land and Development	
7. Vacant Residential Lots (12.05 HA) ⁽¹⁾	25
8. House construction over 10 years (2000-2009)	15
9. Average Annual lot take up 2000-2009 ⁽²⁾	2
10. Estimated Current supply of LDRZ zone land (HA)	12.05 HA (25 lots)
11. 20 Year Supply Requirement at current take up rate ⁽³⁾	40 lots
12. Deficiency of lots ⁽⁴⁾	15 (7.5 HA)

⁽¹⁾12.05 HA (120500 sq meters) individual lot size is 4,000 sq calculations $120,500 / 4000 = 25$
200 sq meters for services and roads etc

⁽²⁾ 2 lots per HA

⁽³⁾ Point 3 x Point 5 (2*20)

⁽⁴⁾ 15 lots (15 lots / 2 lots per HA = 7.5 HA)

Table 117 Portland LDRZ growth Scenarios and Land Requirements

Growth Scenarios	Low	Medium	High
	2%	4%	6%
Annual Demand for Lots ⁽¹⁾	2.5	3	3.5
Required Land to meet 20 yr Scenario (lots) (HA) ⁽²⁾	50 lots (25 HA)	60 Lots (30 HA)	70 lots (35 HA)
Current Land Supply ⁽³⁾	25 Lots (12.05 HA)	25 Lots (12.05 HA)	25 Lots (12.05 HA)
20 year Shortage ⁽⁴⁾	25 lots	35 Lots	45 Lots
Annual land required ⁽⁵⁾	1.5 Lots (1 HA)	2 Lots (1HA)	2.5 Lots (1.5 HA)

⁽¹⁾ Current 2 lots per year current usage of times the various respective growth rates then continually summated to give final total

⁽²⁾ Point 1 time 20 year span giving total

⁽³⁾ Current available land as indicated in Table 107

⁽⁴⁾ Require land minus Current Land Supply

⁽⁵⁾ Point 4 divided by 20 time span

12.11.2 Casterton

Table 118 Casterton LDRZ Land Supply and Demand

Available Land and Development	
1. Vacant Residential Lots (32.74 HA) ⁽¹⁾	66
2. House construction over 10 years (2000-2009)	3
3. Average Annual lot take up 2000-2009 ⁽²⁾	.3
4. Estimated Current supply of LDRZ zone land (HA)	32.7 HA (66 lots)
5. 20 Year Supply Requirement at current take up rate ⁽³⁾	10 lots
6. Surplus of lots ⁽⁴⁾	56 (28 HA)

⁽¹⁾32.74 HA (327400 sq meters) individual lot size is 4,000 sq calculations $327400 / 4000 = 66$
200 sq meter for services and roads etc

⁽²⁾ 2 lots per HA

⁽³⁾ Point 3 x Point 5 (2*20)

⁽⁴⁾ $66 - 10 = 56$ lots (56 lots / 2 lots per HA = 28 HA)

Table 119 Casterton LDRZ Growth Scenarios and Land Requirements

Growth Scenarios	Low	Medium	High
	2%	4%	6%
Annual Demand for Lots ⁽¹⁾	.42	.5	.7
Required Land to meet 20 yr Scenario (lots) (HA) ⁽²⁾	8	9	10
Current Land Supply ⁽³⁾	32.7 HA (66 lots)	32.7 HA (66 lots)	32.7 HA (66 lots)
20 year Shortage ⁽⁴⁾	24	23	22
Annual land required ⁽⁵⁾	0	0	0

(1) Current 2 lots per year current usage of times the various respective growth rates then continually summated to give final total

(2) Point 1 time 20 year span giving total

(3) Current available land as indicated in Table 107

(4) Require land minus Current Land Supply

(5) Point 4 divided by 20 time span

12.11.3 Heywood

Table 120 Heywood LDRZ Land Supply and Demand

Available Land and Development	
(1) Vacant Residential Lots (8.05 HA) ⁽¹⁾	16
(2) House construction over 10 years (2000-2009)	1
(3) Average Annual lot take up 2000-2009 ⁽²⁾	0.1
(4) Estimated Current supply of LDRZ zone land (HA)	8.05 HA (20 lots)
(5) 20 Year Supply Requirement at current take up rate ⁽³⁾	1 lots
(6) Surplus \Deficiency of lots ⁽⁴⁾	15 (7.5 HA)

⁽¹⁾8.05 HA (80500 sq meters) individual lot size is 4,000 sq calculations $80500 / 4000 = 16$
200 sq meter for services and roads etc

⁽²⁾ 2 lots per HA

⁽³⁾ Point 3 x Point 5 (2*20)

⁽⁴⁾ 16 lots -1= 15 (15 lots / 2 lots per HA = 7.5 HA)

Table 121 Heywood LDRZ Growth Scenarios and Land Requirements

Growth Scenarios	Low	Medium	High
	2%	4%	6%
Annual Demand for Lots ⁽¹⁾	<1	< 1	<1
Required Land to meet 20 yr Scenario (lots) (HA) ⁽²⁾	0	0	0
Current Land Supply ⁽³⁾	16 lots (8.05 HA)	16 lots (8.05 HA)	16 lots (8.05 HA)
20 year Shortage ⁽⁴⁾	0	0	0
Annual land required ⁽⁵⁾	0	0	0

- (1) Current 2 lots per year current usage of times the various respective growth rates then continually summated to give final total
(2) Point 1 time 20 year span giving total
(3) Current available land as indicated in Table 107
(4) Require land minus Current Land Supply
(5) Point 4 divided by 20 time span

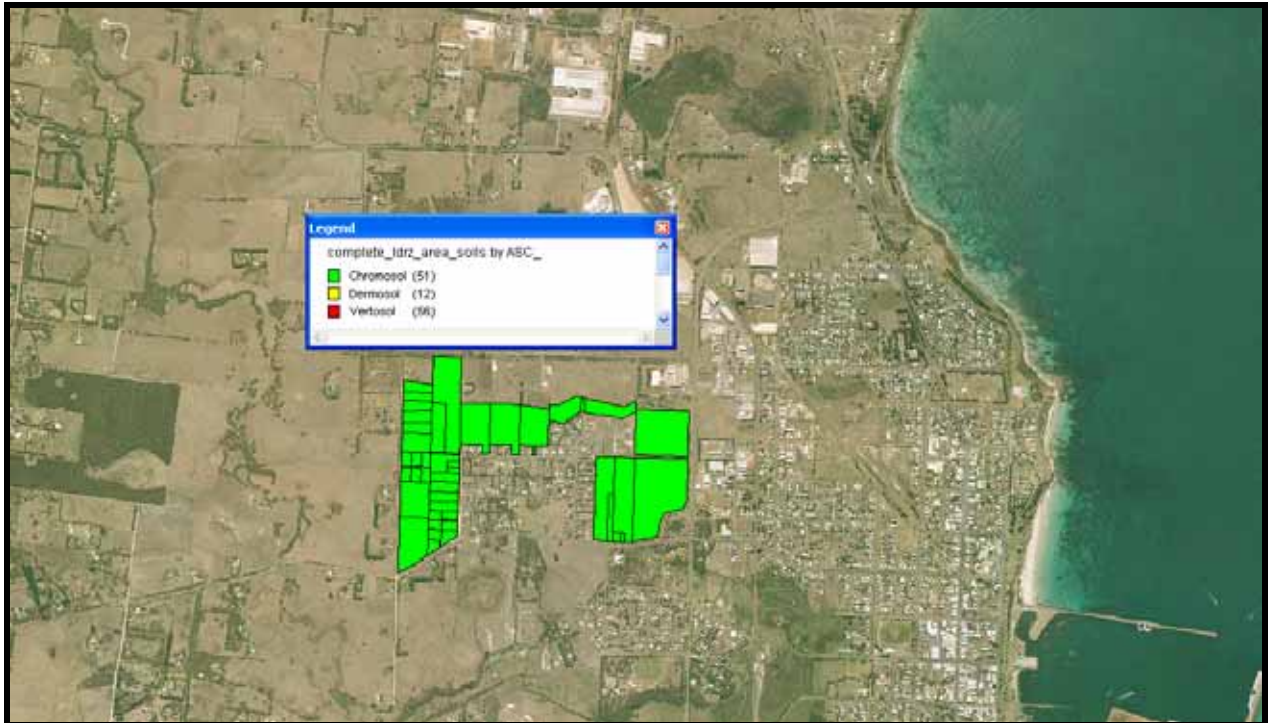
12.12 Levels of Fragmentation

The level of fragmentation is more pronounced in Portland and Casterton. The zone has such a small volume of parcels that fragmentation is a minor issue.

12.13 Current LDRZ Soil Characteristics

The Portland LDRZ zone has the following soil characteristics as indentified by the Victorian Department of Primary Industry (DPI) and the Department of Sustainability and environment (DSE). As indicated by the Portland Soil Map there is only 1 type of soil in the Portland LDRZ zone that being Chromosol. This type of soil is suitable for broad acre cropping.

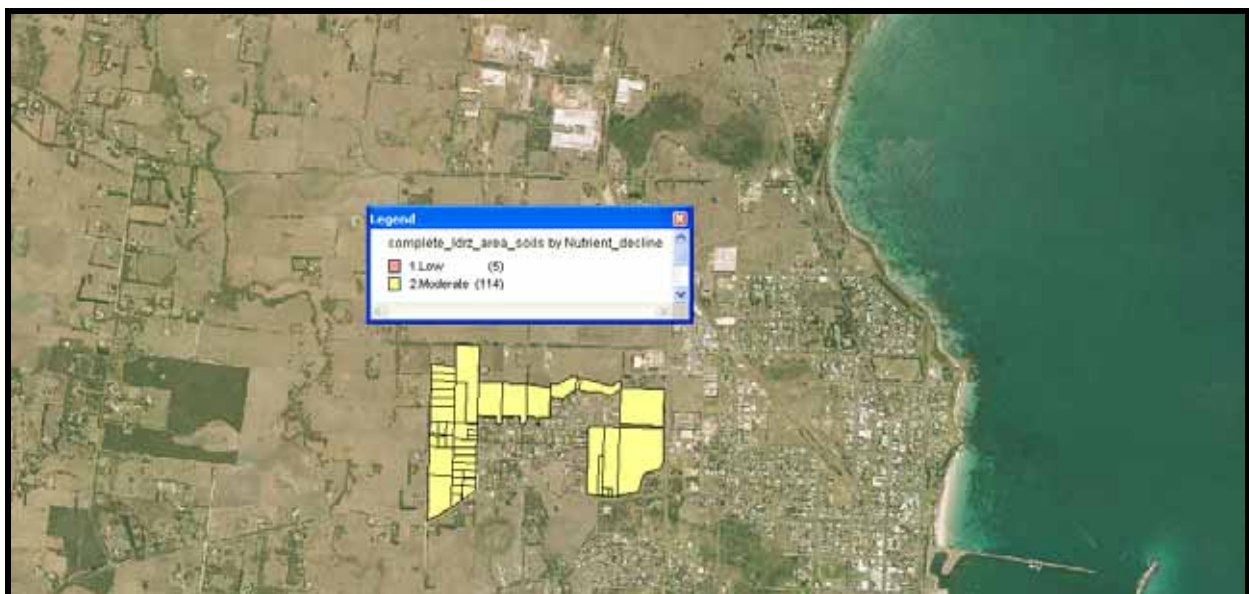
Map 123 Portland LDRZ Soil types



Source: Glenelg Shire

The soils in the Portland LDRZ are experiencing a moderate level of nutrient decline as indicated by Map 124.

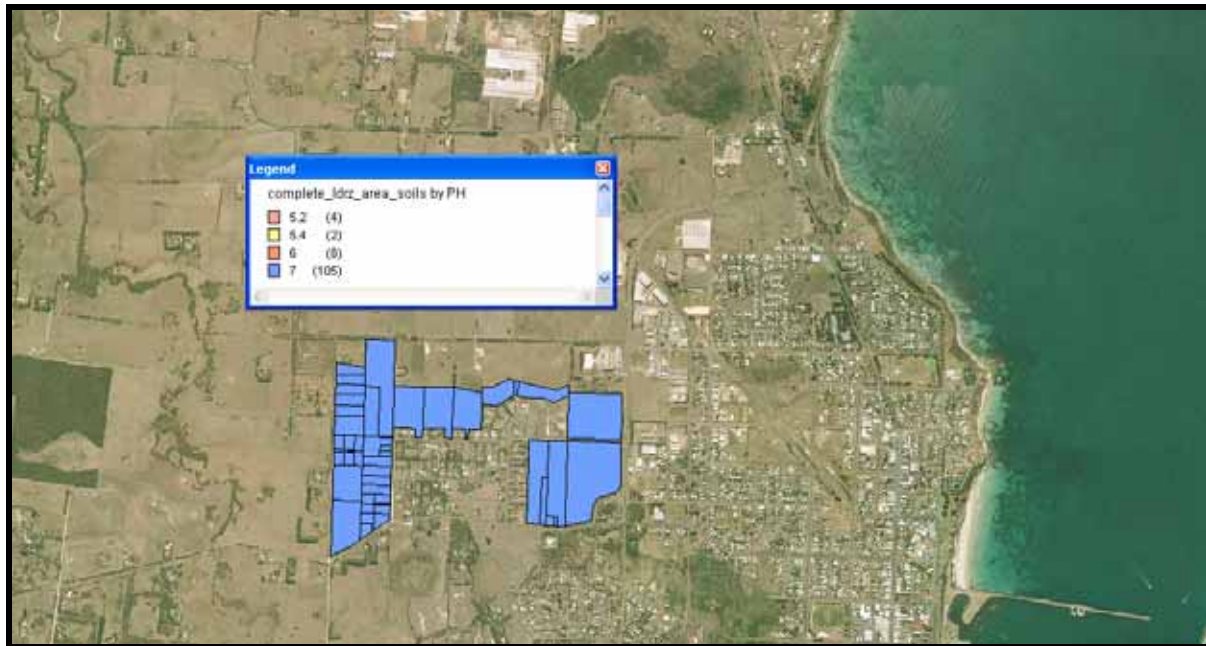
Map 124 Portland LDRZ Soils Nutrient Decline



Source: Glenelg Shire

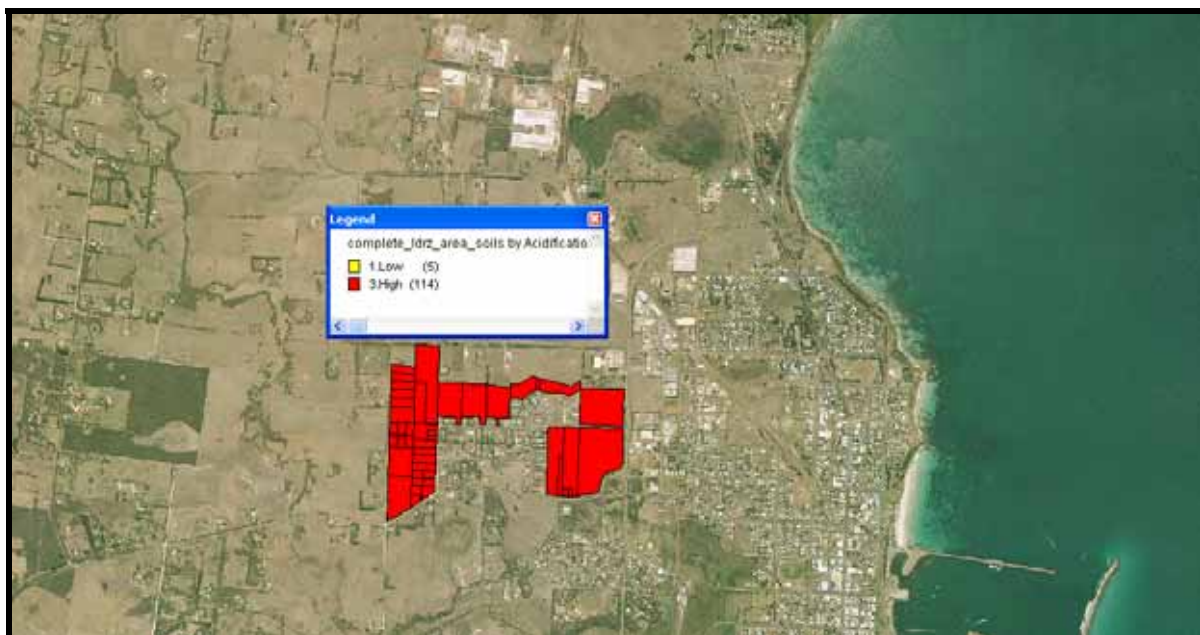
Soils in the Portland LDRZ are neutral with a pH of 7. As indicated in Map 125 the Portland LDRZ is becoming or have the potential to become more acidic.

Map 125 Portland LDRZ Soil pH



Source: Glenelg Shire

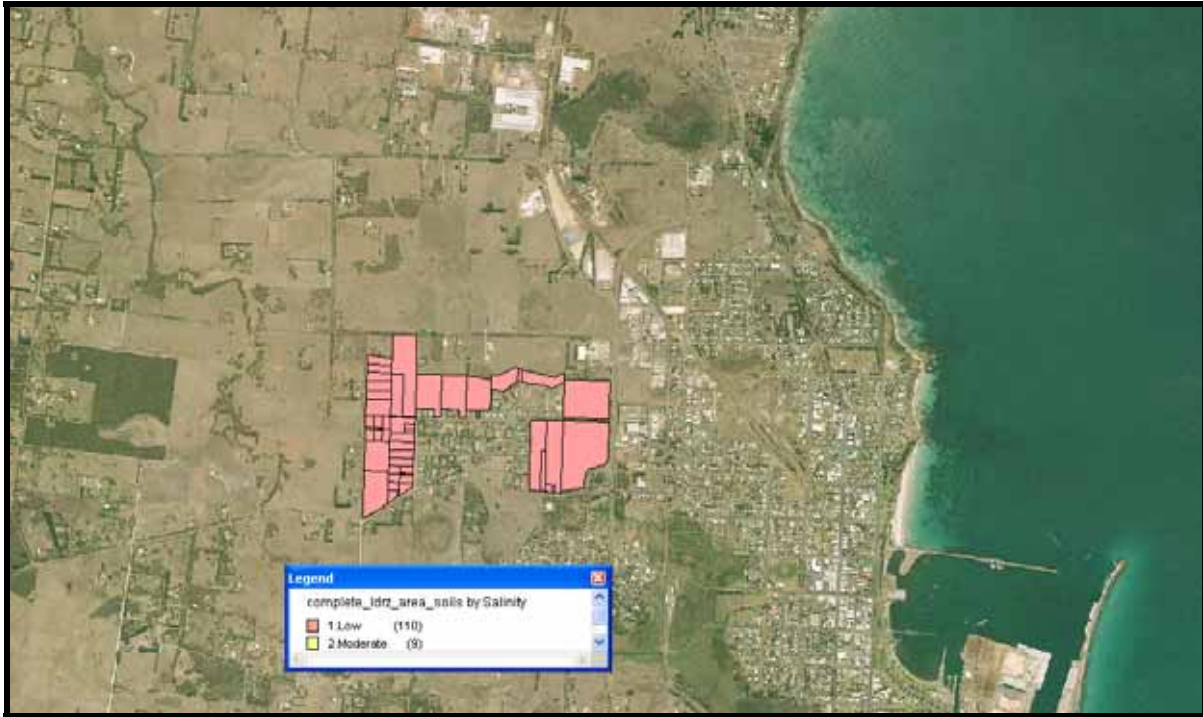
Map 126 Portland LDRZ Soil Acidity



Source: Glenelg Shire

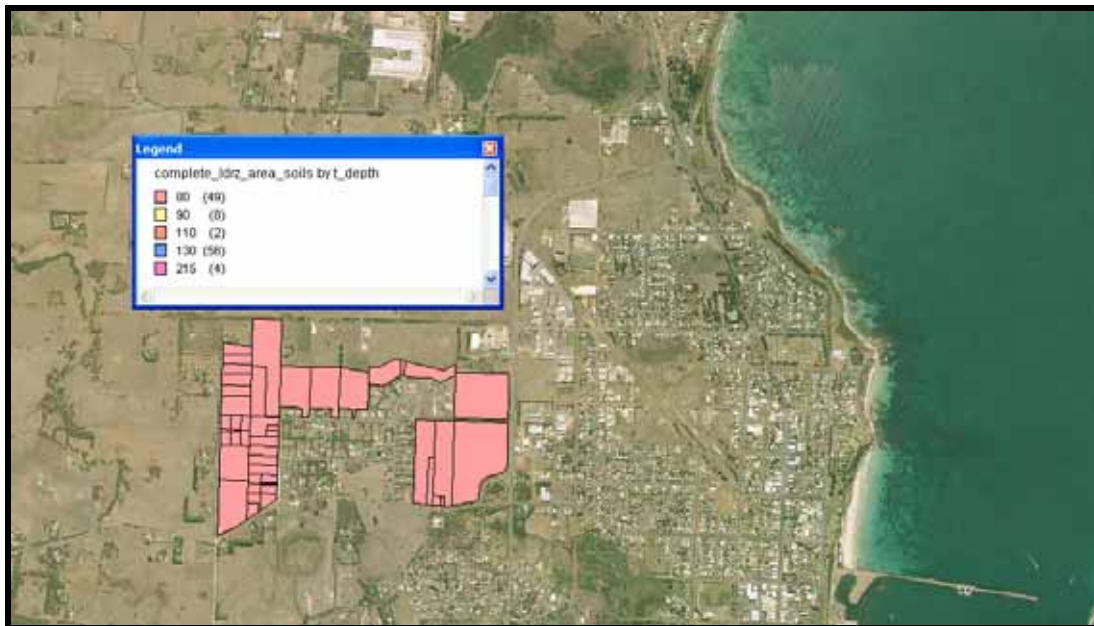
The Portland LDRZ soils have a low probability of becoming effected by salinity. The recorded soil depth for Portland LDRZ soils is 80 mm before reaching gravel.

Map 127 Portland LDRZ Soil Salinity



Source: Glenelg Shire

Map 128 Portland LDRZ Soil Depth

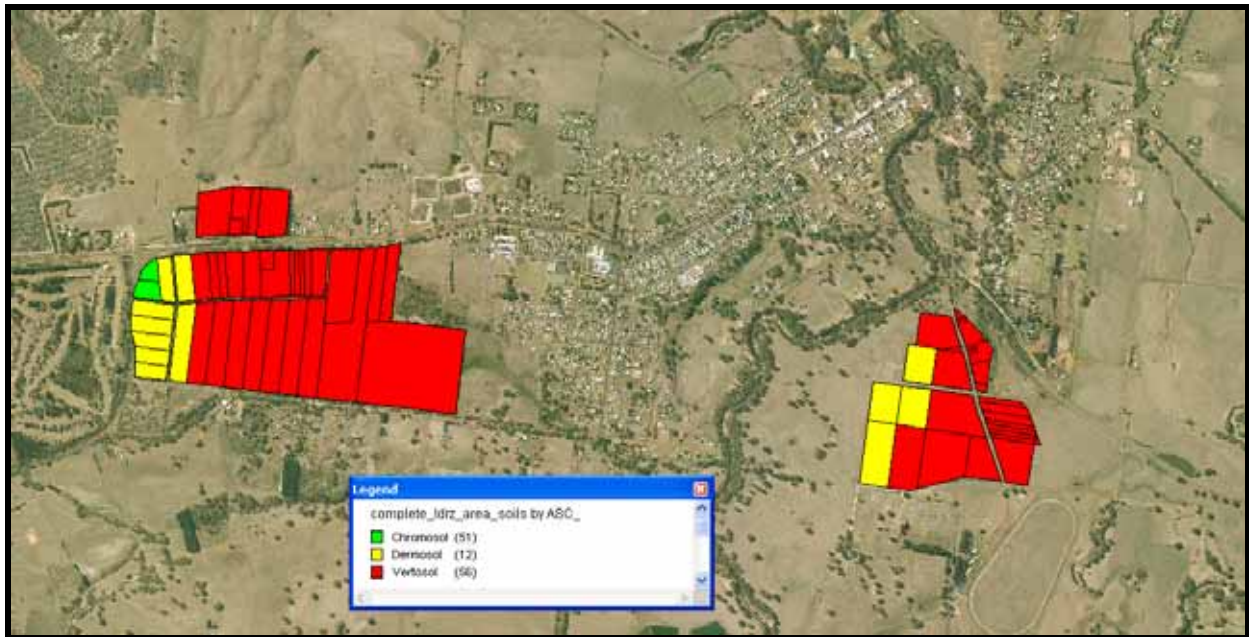


Source: Glenelg Shire

12.13.1 Casterton

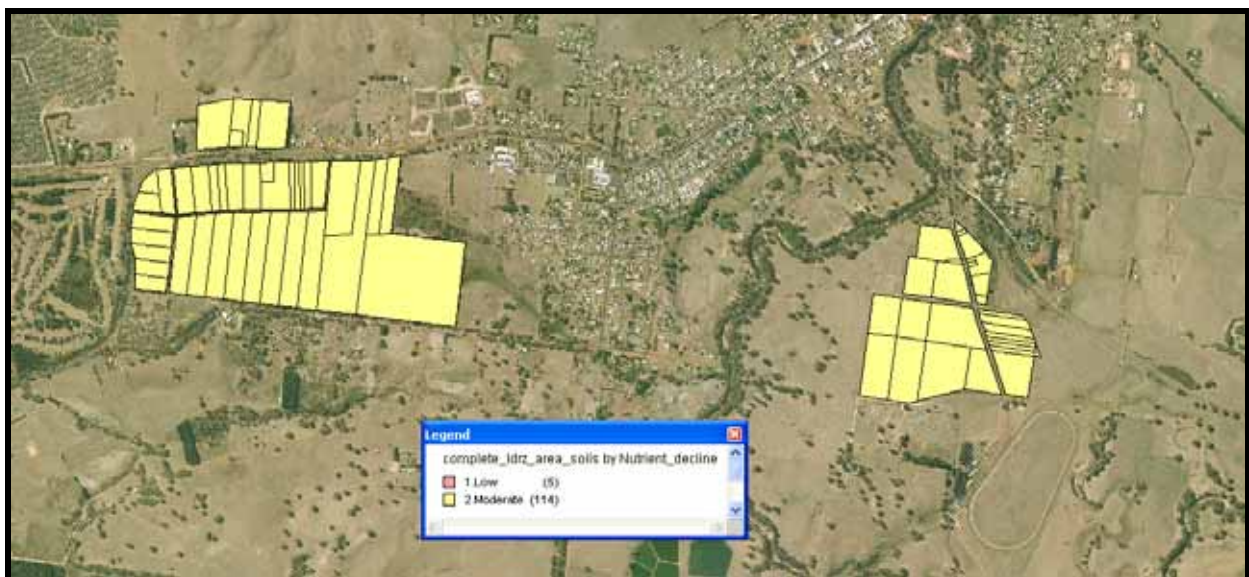
In Casterton LDRZ there are three type of soil, Chromosol, (i.e. Broad Acre Cropping) Dermosols (i.e. Broad Acre Cropping) and Vertosols (i.e. Grain and Dry Acre Crops). Casterton soils suffer a moderate level of nutrient decline.

Map 129 Casterton LDRZ Soil types



Source: Glenelg Shire

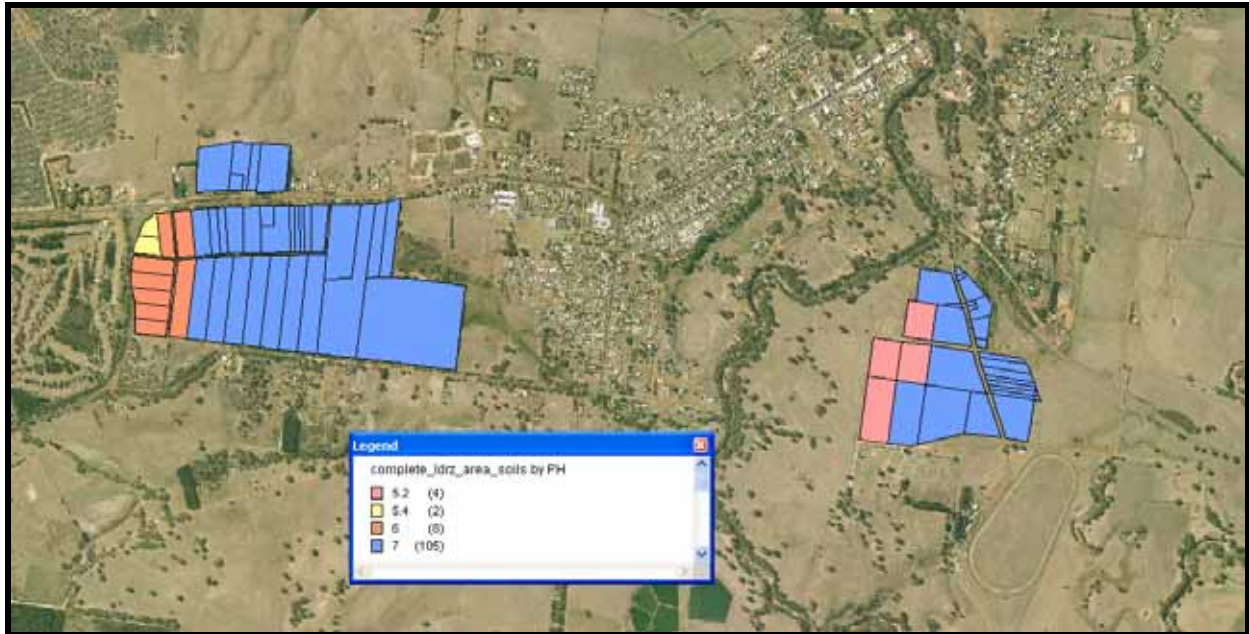
Map 130 Casterton LDRZ Soil Nutrient Decline



Source: Glenelg Shire

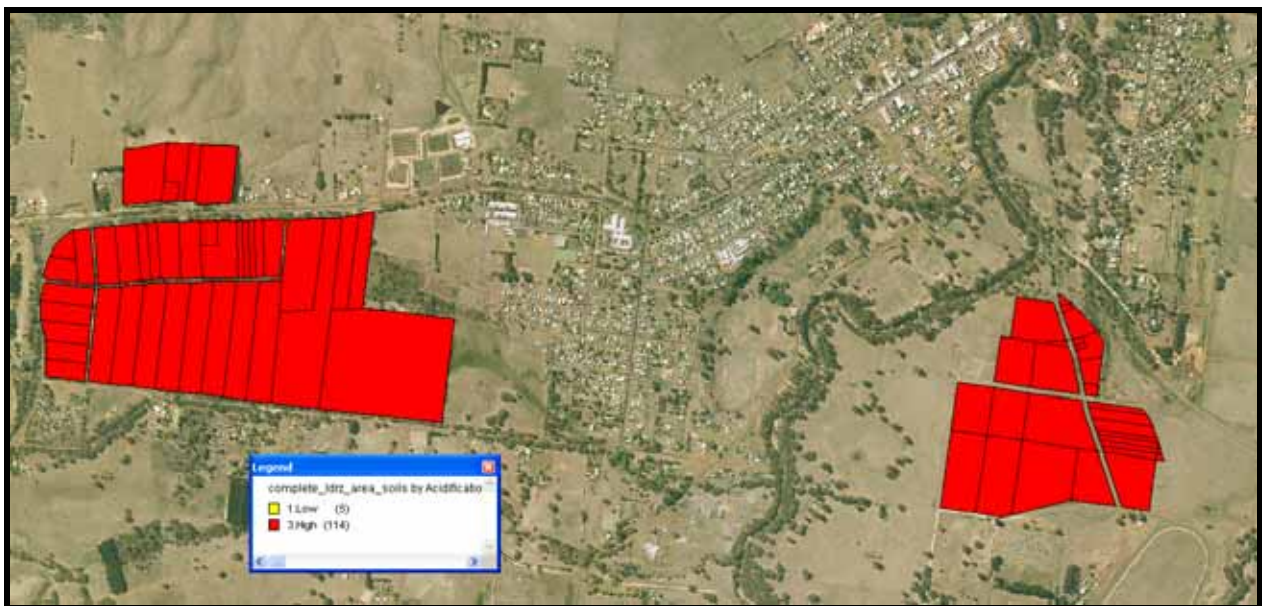
Soils in the Casterton LDRZ are neutral with a pH of 7. All of the soils in the Casterton LDRZ are becoming more acidic.

Map 131 Casterton LDRZ Soil pH



Source: Glenelg Shire

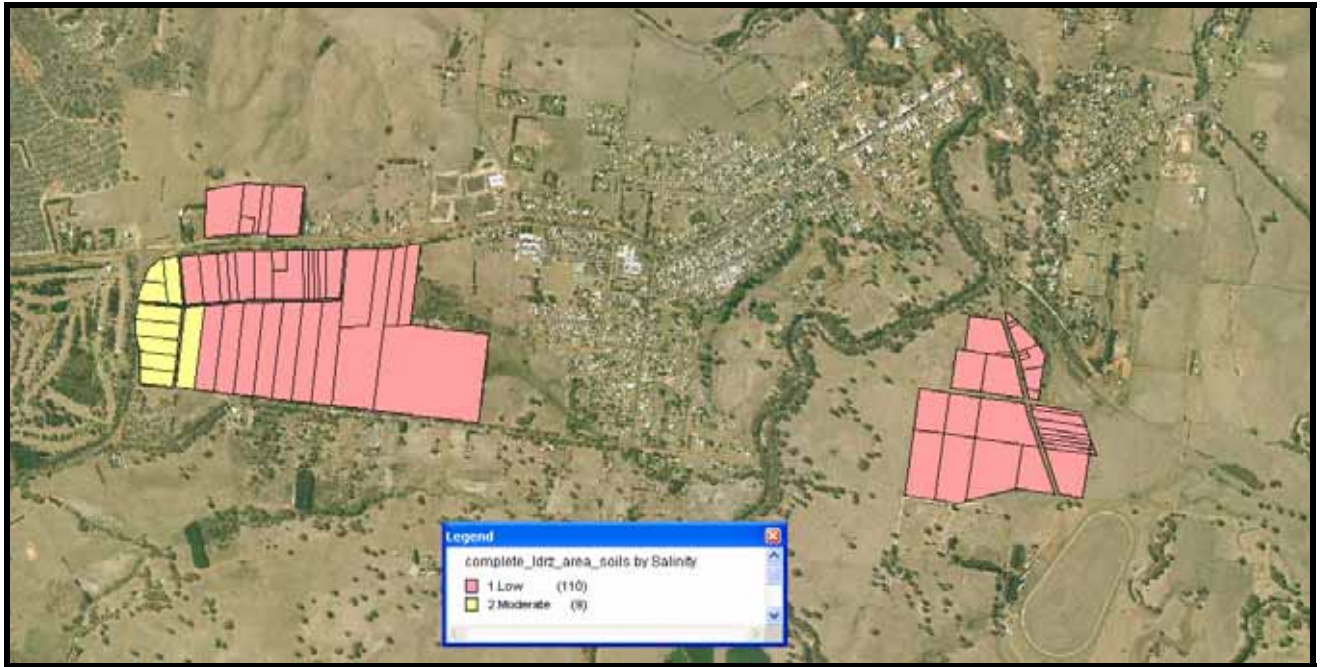
Map 132 Casterton LDRZ Soil Acidity



Source: Glenelg Shire

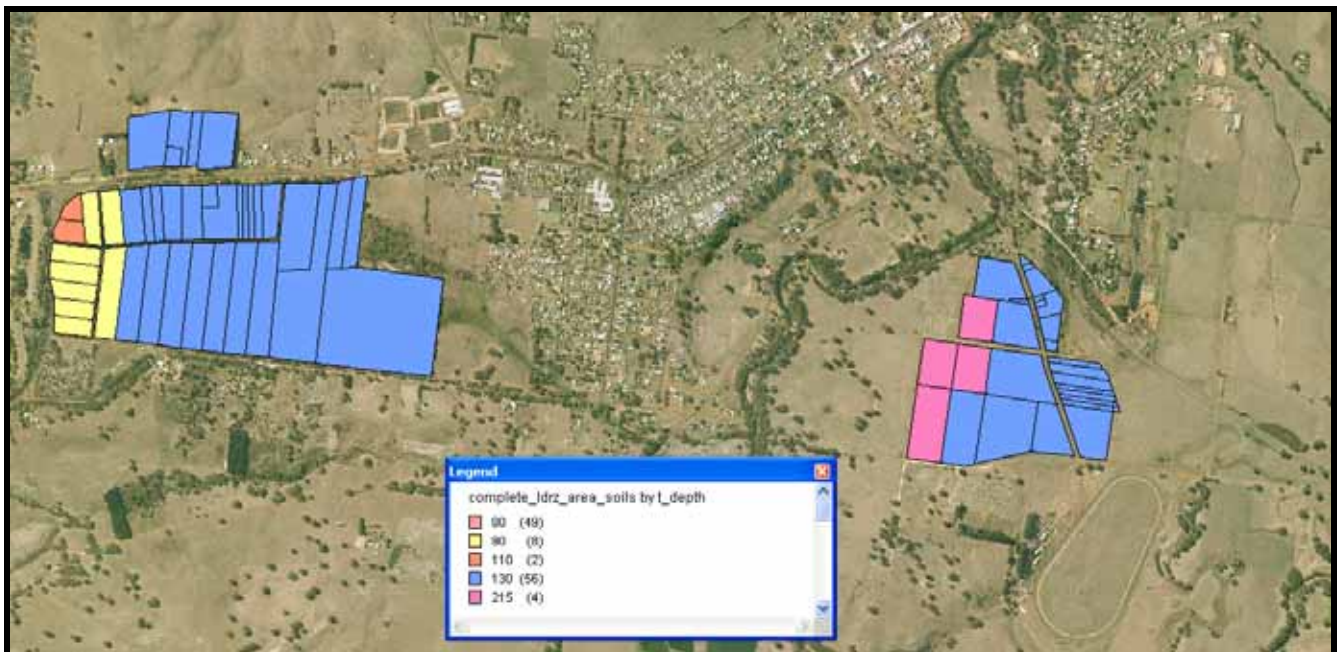
The majority of Casterton LDRZ soils are not impacted by salinity. Those parcels which have been affected are to the extreme western portion of the LDRZ zone. Soil depths in Casterton range from 110 mm through to 215mm.

Map 133 Casterton LDRZ Soils Salinity



Source: Glenelg Shire

Map 134 Casterton LDRZ Soil Depths

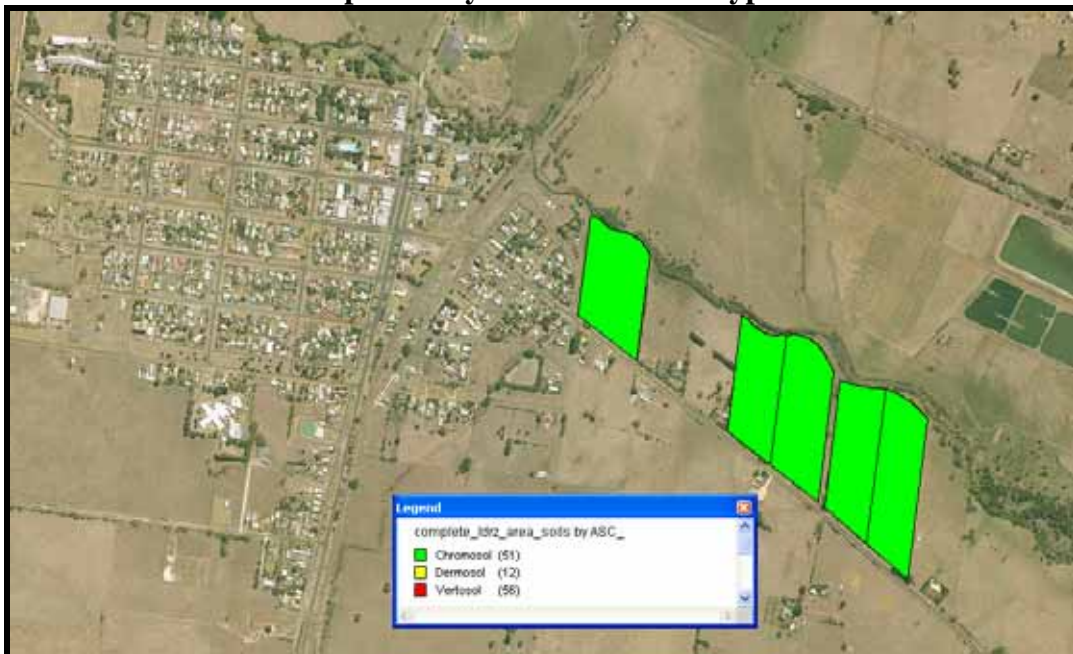


Source: Glenelg Shire

12.13.2 Heywood

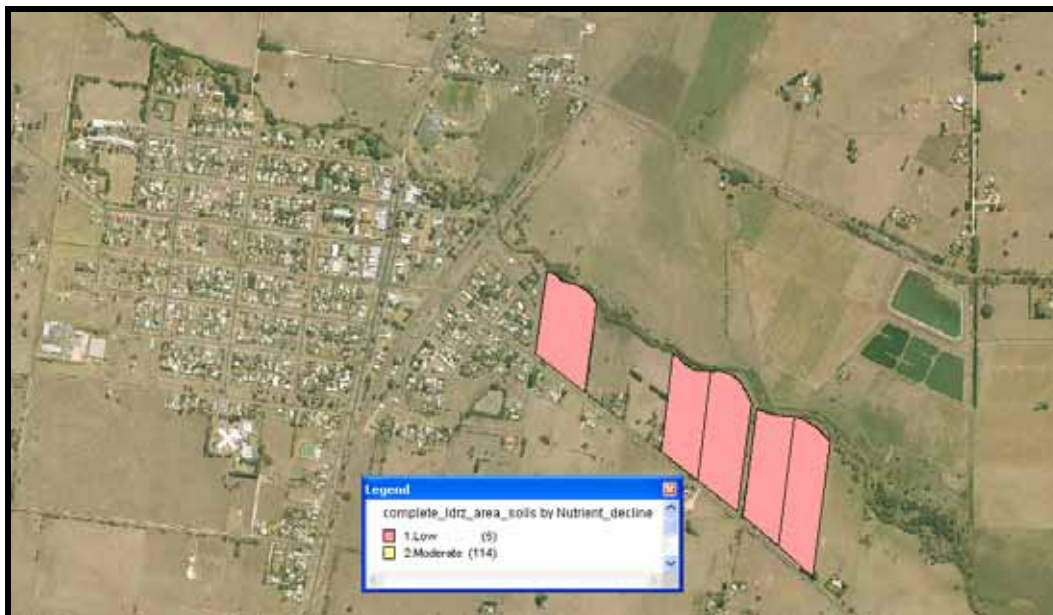
Heywood has only 1 type of soil in its LDRZ. (i.e. Chromosol which is suitable for broad acre cropping) Heywood soils are experiencing low levels of nutrient decline.

Map 135 Heywood LDRZ Soil types



Source: Glenelg Shire

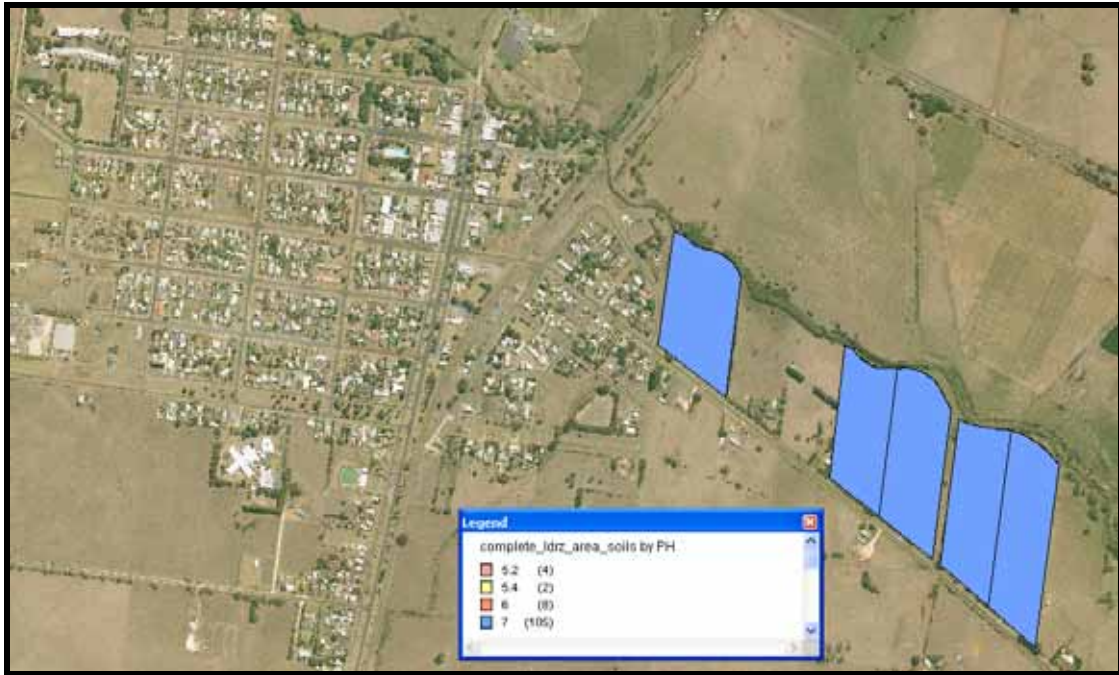
Map 136 Heywood Soils Nutrient Decline



Source: Glenelg Shire

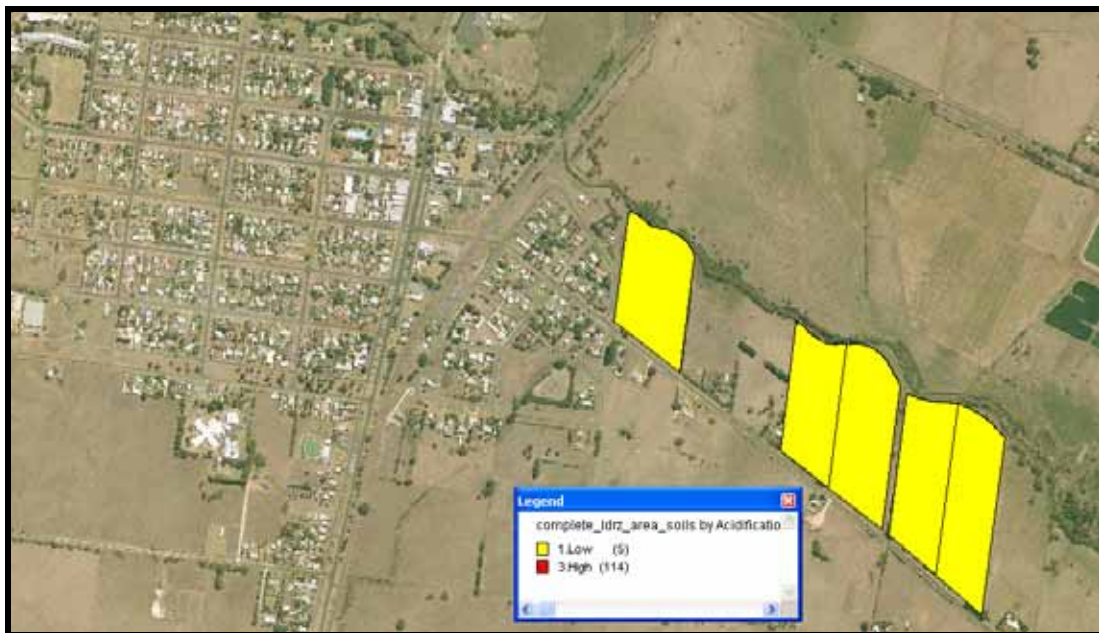
Casterton Soils are neutral with a pH of 7. The soil has a low probability of becoming acidic in the future.

Map 137 Casterton LDRZ Soil pH



Source: Glenelg Shire

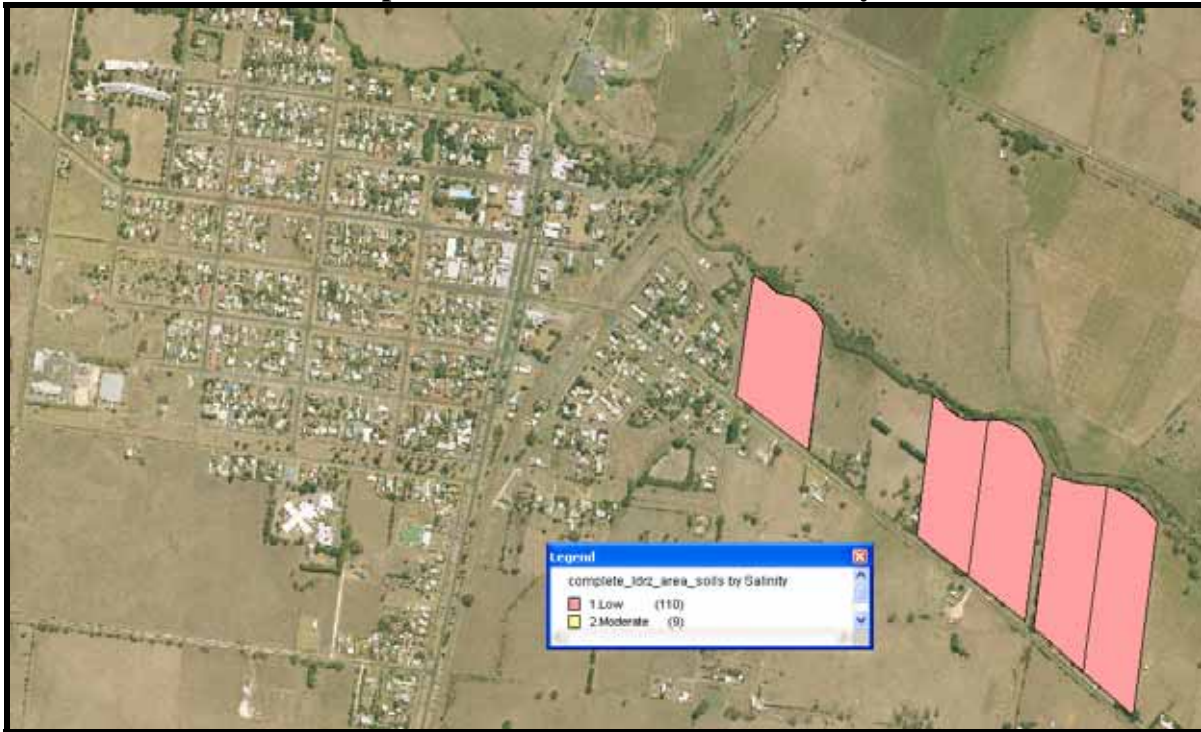
Map 138 Casterton LDRZ Soil Acidity



Source: Glenelg Shire

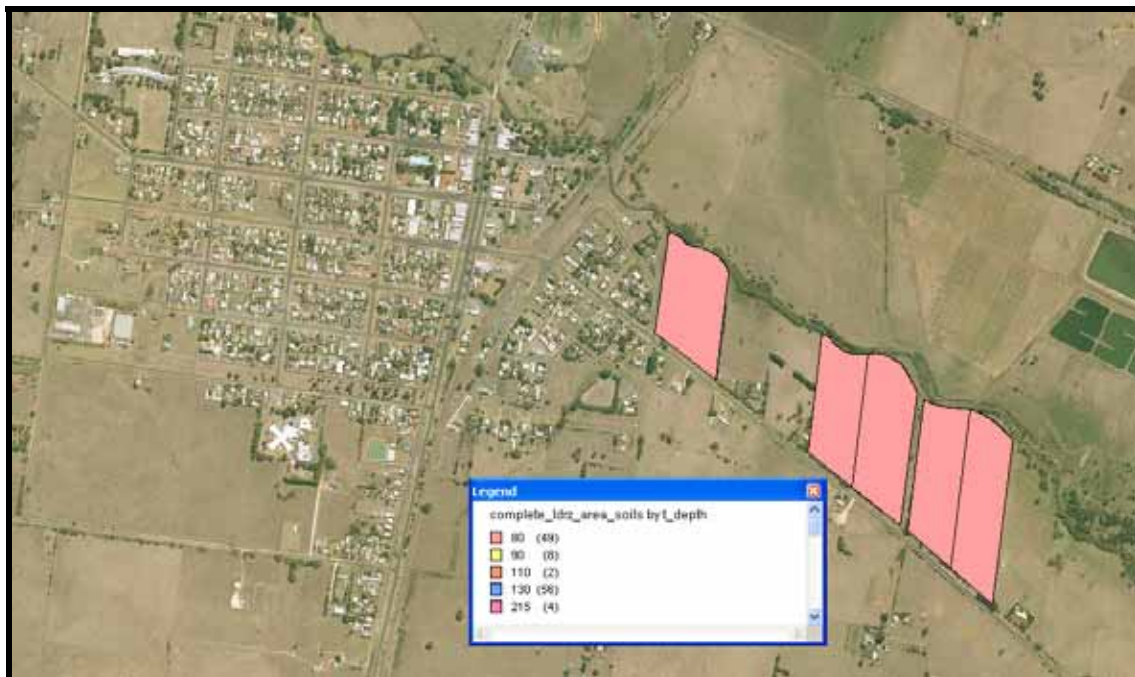
The soils in the Casterton LDRZ are not impacted by the effects of salinity as indicated by Map 139. The depth of soil in the Casterton LDRZ is uniform at 110 mm.

Map 139 Casterton LDRZ Soil Salinity



Source: Glenelg Shire

Map 140 Casterton LDRZ Soil Depth



Source: Glenelg Shire

12.14 Challenges and Options

13 Farm Zone

13.1 Rationale for Inclusion

The Farm zone is the largest zone in the shire in terms of allotments and in hectares.

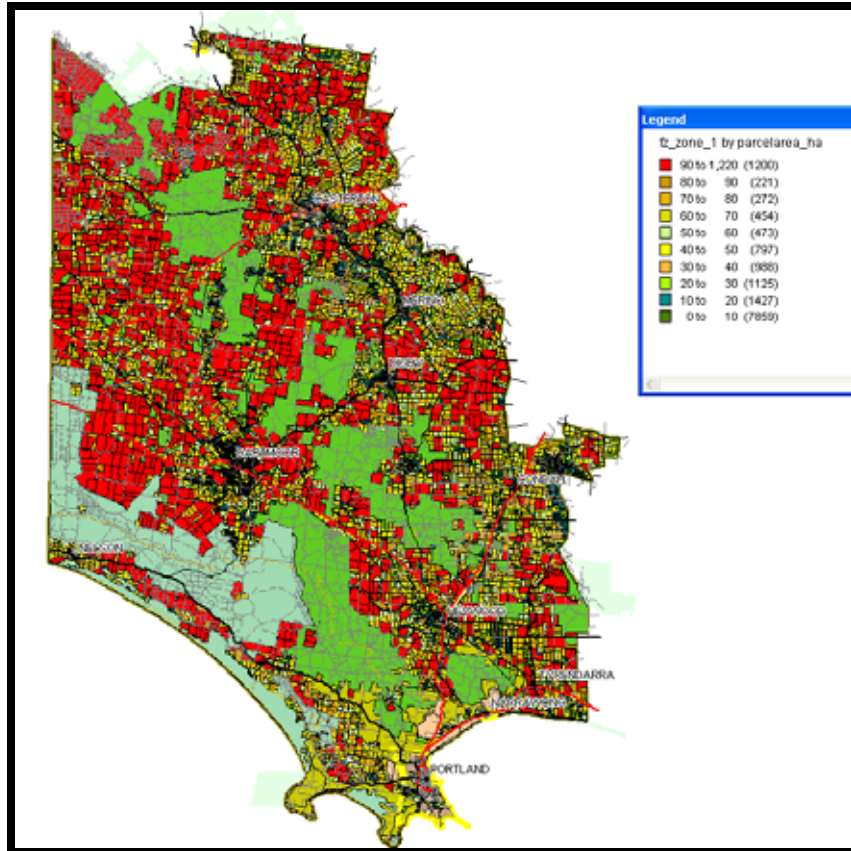
13.2 Purpose of the Farm Zone

The farm zone has five purposes in addition to allowing private housing they include:

- To provide for the use of land for agriculture.
- To encourage the retention of productive agricultural land.
- To ensure that non-agricultural uses, particularly dwellings, do not adversely affect the use of land for agriculture.
- To encourage use and development of land based on comprehensive and sustainable land management practices and infrastructure provision.
- To protect and enhance natural resources and the biodiversity of the area.

Table 122 and Map 141 shows the distribution by area of Farm Zone designated land across the shire.

Map 141 Farm Zone Parcels by Area



Source: Glenelg Shire

Table 122 Farm Zone by HA

	Frequency	Percent	Valid Percent	Cumulative Percent
2.00	4987	34.1	34.5	34.5
4.00	1134	7.8	7.8	42.3
6.00	704	4.8	4.9	47.2
8.00	395	2.7	2.7	49.9
10.00	343	2.3	2.4	52.3
20.00	1436	9.8	9.9	62.2
30.00	1118	7.6	7.7	69.9
40.00	975	6.7	6.7	76.7
50.00	781	5.3	5.4	82.1
100.00	1599	10.9	11.1	93.1
150.00	618	4.2	4.3	97.4
200.00	172	1.2	1.2	98.6
300.00	172	1.2	1.2	99.8
400.00	17	.1	.1	99.9
1000.00	12	.1	.1	100.0
2000.00	2	.0	.0	100.0
Total	14465	98.9	100.0	
System	162	1.1		
Total	14627	100.0		

Source: Glenelg Shire and DSE

13.3 Land Use

There are 24 separate classes or categories of Farm zoned land in Glenelg shire as shown in Table 123. Casterton has 3 categories (*C- Non Rateable; C-Residential Built and C Residential Land*). Heywood has two categories (*H-Non rateable and H-residential Built*). Portland has eight categories (*P-aluminium Smelter; P-Commercial / Industrial Land; P-culture / Recreation; P- Non Rateable; P Residential Built; P- Rural / Residential Built and P-Rural / Residential land*)

The B categories are areas outside Portland, Casterton and Heywood of the Farm Zone. They represent the smaller communities and settlements in the shire. There are eleven categories (*B- Commercial / Industrial Built; B- Culture / Recreation; B Farm Built; B Farm Land; B Non*

Rateable; B Recreation Built / Land; B Residential Built; B residential Land; B rural / Residential Built; B- rural / Residential Land and B Timber)

Table 123 Farm Zone By Land Use Code

	Frequency	Percent	Valid Percent	Cumulative Percent
	1483	10.1	10.1	10.1
B-Comm/Indust Built	73	.5	.5	10.6
B-Culture/Recreation	28	.2	.2	10.8
B-Farm Built	4334	29.6	29.6	40.5
B-Farm Land	1988	13.6	13.6	54.1
B-Non Rateable	238	1.6	1.6	55.7
B-Recreation Built/land	3	.0	.0	55.7
B-Residential Built	19	.1	.1	55.8
B-Residential Land	33	.2	.2	56.1
B-Rural/Resid Built	1420	9.7	9.7	65.8
B-Rural/Resid Land	655	4.5	4.5	70.2
B-Timber	4250	29.1	29.1	99.3
C-Non Rateable	1	.0	.0	99.3
C-Residential Built	8	.1	.1	99.4
C-Residential Land	15	.1	.1	99.5
H-Non Rateable	1	.0	.0	99.5
H-Residential Built	1	.0	.0	99.5
P-Aluminium Smelter	11	.1	.1	99.5
P-Comm/Indust Land	1	.0	.0	99.6
P-Culture/Recreation	1	.0	.0	99.6

Source: Glenelg Shire

Table 124 Farm Zone By Land Use Code

	Frequency	Percent	Valid Percent	Cumulative Percent
P-Non Rateable	14	.1	.1	99.7
P-Residential Built	2	.0	.0	99.7
P-Residential Land	6	.0	.0	99.7
P-Rural/Resid Built	32	.2	.2	99.9
P-Rural/Resid Land	10	.1	.1	100.0
Total	14627	100.0	100.0	

Source: Glenelg Shire

13.4 Current Land Use Analysis

The current Farm Zone contains 14,627 parcels which have been categorized into 24 separate classes. As indicated by Table 4 the five major land use activities in the Farming zone are the Built Environment (Residential, Commercial, Industrial and Smelter) with 5900 parcels or 40.34% of the total; Plantation forest represents 4250 allotments or 29% of the total farm zone; land which has not been built upon and is used for farming represents 18.5 % or 2708 parcels; ten percent of the Farm zone (1433 allotments) has not been classified through the rating system and has been labeled as miscellaneous with the remaining 2 percent of allotments represents non rateable properties.

The parcel area table was recoded to reflect the new parcel area sizes of under 2 HA; 2-10 HA; 10 -40 HA; 40-100 HA; 100 -400 HA and 400-2000 HA. The recoded areas were then cross tabulated with the Levy Descriptions to produce Table 4.

As indicated by the table substantial development has occurred in the under 2 HA category. The built category represents 26% or 1298 parcels; the plantation forestry represents 51% of the allotments (2574) and the vacant land sized less than 2 HA represents 2 percent of the allotments with 596 parcels.

The built areas of the Farm Zone have substantial representation across the various allotment sizes. In summary, the built areas represent:

- 41.2 % of allotments in the 2-10 HA class;
- 51.7% of allotments in the in the 10-40HA class;
- 52% in the 40 – 100 HA;
- 41.06% in the 100- 400 HA: and
- 14 % in the 400- 2000 HA

Table 125 Farm Zone Land Use by HA

<i>Levy_Desc</i>	Classes						
	<i>< 2.00</i>	<i>2 - 10.00</i>	<i>10 - 40.00</i>	<i>40 - 100.00</i>	<i>100 400.00</i>	<i>400 2000.00</i>	<i>Total</i>
No Description	355	328	404	226	129	5	1447
B-Comm/Indust Built	57	4	4	3	0	0	68
B-Culture/Recreation	20	4	3	1	0	0	28
B-Farm Built	441	630	1601	1235	402	2	4311
B-Farm Land	179	433	726	490	145	0	1973
B-Non Rateable	131	43	21	14	6	0	215
B-Recreation Built/land	2	0	1	0	0	0	3
B-Residential Built	12	1	0	0	0	0	13
B-Residential Land	23	5	1	0	0	0	29
B-Rural/Resid Built	757	407	220	2	0	0	1386
B-Rural/Resid Land	372	174	101	2	0	0	649
B-Timber	2574	520	437	407	297	7	4242
C-Non Rateable	1	0	0	0	0	0	1
C-Residential Built	7	0	0	0	0	0	7
C-Residential Land	14	0	0	0	0	0	14
H-Non Rateable	0	1	0	0	0	0	1
H-Residential Built	0	1	0	0	0	0	1
P-Aluminium Smelter	1	5	5	0	0	0	11
P-Comm/Indust Land	0	1	0	0	0	0	1
P-Culture/Recreation	1	0	0	0	0	0	1
P-Non Rateable	11	2	1	0	0	0	14
P-Residential Built	2	0	0	0	0	0	2
P-Residential Land	4	2	0	0	0	0	6
P-Rural/Resid Built	21	11	0	0	0	0	32
P-Rural/Resid Land	2	4	4	0	0	0	10
Total	4987	2576	3529	2380	979	14	14465

Source: Glenelg Shire

13.5 Subdivision Permit Activity

For the period 2000-2010 there were 126 subdivisions applications submitted for Farm Zone. Table 126 highlights the year and the respective number of subdivisions permits received by Glenelg Shire.

Table 126 Farm Zone Subdivision Activity

		Application Date			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2002	1	.8	.8	.8
	2003	3	2.4	2.4	3.2
	2004	2	1.6	1.6	4.8
	2005	44	34.9	34.9	39.7
	2006	26	20.6	20.6	60.3
	2007	17	13.5	13.5	73.8
	2008	14	11.1	11.1	84.9
	2009	16	12.7	12.7	97.6
	2010	3	2.4	2.4	100.0
	Total	126	100.0	100.0	

Source: Glenelg Shire

As indicated by the Table 127 the breadth of subdivisions proposals ranges from actual subdivisions to referrals and withdrawn applications.

Table 127 Farm Zone subdivision activity

		Decision			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Certified and SOC Issued	104	82.5	82.5	82.5
	Certified Only	4	3.2	3.2	85.7
	Lapsed	3	2.4	2.4	88.1
	Outstanding Requirements	5	4.0	4.0	92.1
	Permit Approved	2	1.6	1.6	93.7
	Referral	7	5.6	5.6	99.2
	Withdrawn	1	.8	.8	100.0
	Total	126	100.0	100.0	

Source: Glenelg Shire

13.6 Building Permits

The number of building permits that was generated in Glenelg shire from 2000 through 2009 is indicated in Table 128. This table shows that there were 714 permits over the 10 year period with a combined construction value of \$39.2 million.

Table 128 Farm Zone Building Permit Activity

Year	Number of Permits	Percent	\$ Value
2009	41	5.74%	\$4,290,274.50
2008	55	7.70%	\$3,104,871.00
2007	44	6.16%	\$4,802,885.50
2006	57	7.98%	\$3,301,673.43
2005	75	10.50%	\$4,092,413.90
2004	104	14.57%	\$5,749,981.49
2003	97	13.59%	\$4,106,236.70
2002	99	13.87%	\$4,999,840.65
2001	66	9.24%	\$1,984,849.50
2000	76	10.64%	\$2,849,855.00
Total	714	100.00%	\$39,282,881.67

Source: Glenelg Shire

13.7 Fire proneness of the Zone

Sections of the Farm zone are prone to bush fire and have been included in the Glenelg Wild Fire Management Overlay.

13.8 Land Use Impediments

There are a series of impediments across the Farm zone including Flooding, Sink holes and infrastructure impediments. The Farm Zone has a series of planning overlays which can impact development. These overlays include: DPO's, ESO's and the WMO.

13.9 Forecast Demand and Available Land Stocks

Not Applicable to this zone as other factors impact on whether individuals can build on Farm Zone parcels.

13.10 Levels of Land Fragmentation

Varies throughout the zone, the closer the property is to a major population center the greater the probability that the land will be fragmented into smaller holdings.

14 Glenelg Agriculture Profile

15 Introduction

Agricultural industries are a major activity in Glenelg. Farmland in the shire represents approximately 246,000 hectares which is just under on half of the area of the Shire. The region is well suited to agriculture due to the quality of farming land with the most productive being located in the southern areas of the shire.

The majority activities are beef cattle sheep dairy and some cropping. In total, Glenelg accounts for 8 % of the total Victorian Cattle herd; 4% of sheep flocks in Victoria; and 2% of the total Victorian dairy cattle herd. In 2006 a total of 1105 residents (i.e.12.4% of all jobs held by Glenelg Shire residents) were employed in agriculture.

There are 57 settlements/ communities in the Glenelg Farming Zone.

15.1 Dollar Value of Glenelg Agriculture

Glenelg is one of the leading agricultural shires in Victoria. Table 129 highlights the dollar value of Agricultural production in the shire. The table highlights the value of total production by various categories and region in Glenelg.

The agricultural sector in Glenelg includes broad acre farming, dairying, horticulture, livestock production, and vegetable production.

Table 129 Glenelg Agricultural Production

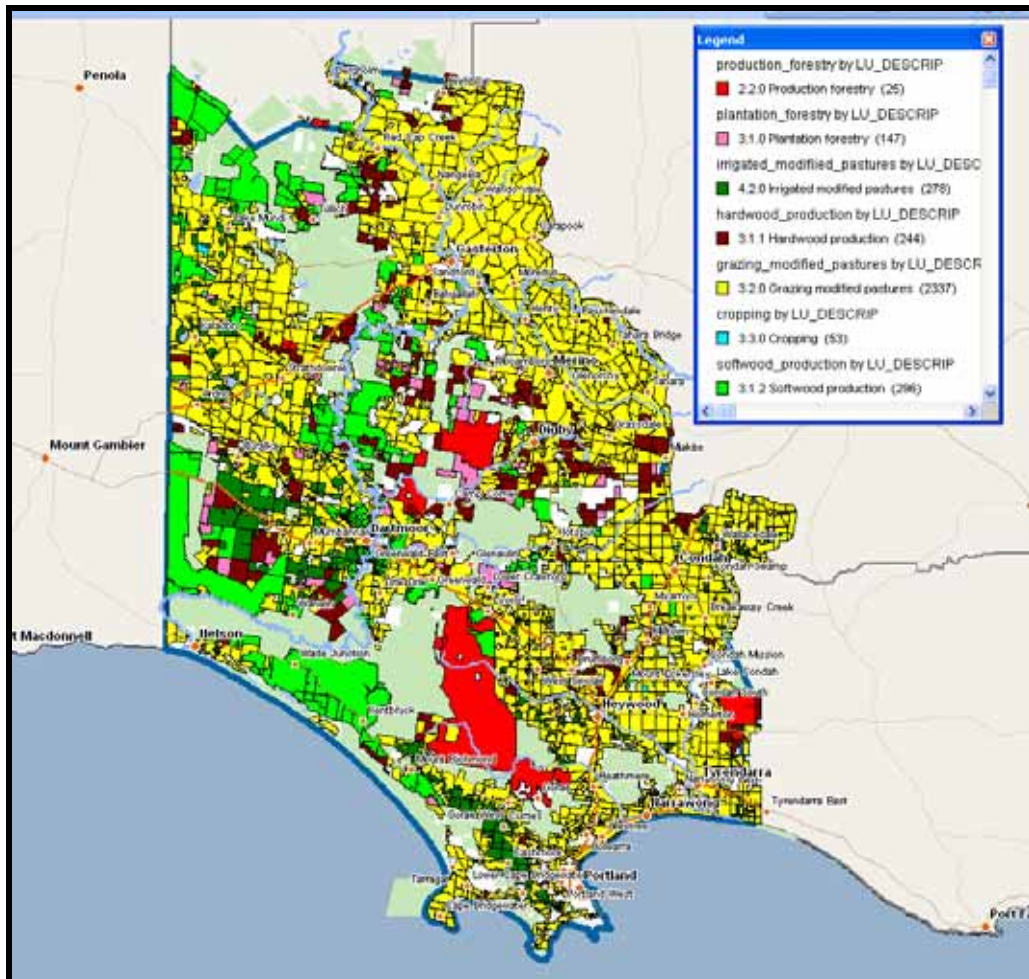
Total Agriculture	Agriculture- total Value (\$)	Crops- total value (\$)	Pasture. Cereal and other crops for hay – total value (\$)	Crops (excluding hay) total value (\$)	Nurseries, cut flowers and cultivated turf - total value (\$)	Vegetables - total value (\$)	Fruit - total value (\$)	Livestock slaughterings - total value (\$)	Livestock products - total value (\$)
	<i>Gross Value</i>	<i>Gross Value</i>	<i>Gross Value</i>	<i>Gross Value</i>	<i>Gross Value</i>	<i>Gross Value</i>	<i>Gross Value</i>	<i>Gross Value</i>	<i>Gross Value</i>
Glenelg – Heywood	100,573,969	15,274,234	10,124,174	5,150,060	266,563	1,837,049	473,726	50,248,892	35,050,843
Glenelg – North	80,295,969	9,666,184	7,001,442	2,664,741	845,706	515,879	18,332	52,933,925	17,695,860
Glenelg - Portland	5,583,643	3,384,906	52,897	3,332,008	2,008,713	426,628	524,369	766,941	1,431,797
Total	186,453,581	28,325,324	17,178,513	11,146,809	3,120,982	2,779,556	1,016,427	103,949,758	54,178,500

Source: Department of Primary Industry and ABS

15.2 Extent of the Glenelg Farm Zone

The extent of the Farm zone in Glenelg is shown in Map 142. Seven different agricultural activities are illustrated in Map 142 ranging from forest to grazing and cropping.

Map 142 Glenelg Farm zone



Source: Glenelg Shire

Settlements and their respective allotment numbers that are included in the farm zone are highlighted in Table 130.

Table 130 Farm Zone Parcels by Locale

Settlement	Frequency	Percent	Valid Percent	Cumulative Percent
ALLESTREE	23	.2	.2	.2
BAHGALLAH	127	.9	.9	1.0
BRANXHOLME	180	1.2	1.2	2.3
BREAKAWAY CREEK	117	.8	.8	3.1
BRIMBOAL	66	.5	.5	3.5
CAPE BRIDGEWATER	66	.5	.5	4.0
CARAPOOK	52	.4	.4	4.3
CASHMORE	68	.5	.5	4.8
CASTERTON	720	4.9	4.9	9.7
CHETWYND	19	.1	.1	9.8
CLOVER FLAT	26	.2	.2	10.0
CONDAH	427	2.9	2.9	12.9
CORNDALE	129	.9	.9	13.8
DARTMOOR	3139	21.5	21.5	35.3
DERGHOLM	44	.3	.3	35.6
DIGBY	471	3.2	3.2	38.8
DRIK DRIK	368	2.5	2.5	41.3
DRUMBORG	275	1.9	1.9	43.2
DUNROBIN	92	.6	.6	43.8
GORAE	33	.2	.2	44.0
GORAE WEST	63	.4	.4	44.5
GRASSDALE	224	1.5	1.5	46.0
GREENWALD	121	.8	.8	46.8
HEATHMERE	133	.9	.9	47.7
HENTY	311	2.1	2.1	49.9
HEYWOOD	667	4.6	4.6	54.4

Source: Glenelg Shire

Settlement	Frequency	Percent	Valid Percent	Cumulative Percent
HOMERTON	62	.4	.4	54.9
HOTSPUR	385	2.6	2.6	57.5
KILLARA (GLENELG)	165	1.1	1.1	58.6
LAKE CONDAH	27	.2	.2	58.8
LAKE MUNDI	332	2.3	2.3	61.1
LINDSAY	68	.5	.5	61.5
LYONS	143	1.0	1.0	62.5
MERINO	541	3.7	3.7	66.2
MILLTOWN	216	1.5	1.5	67.7
MOUNT RICHMOND	176	1.2	1.2	68.9
MUMBANNAR	503	3.4	3.4	72.3
MUNTHAM	24	.2	.2	72.5
MYAMYN	205	1.4	1.4	73.9
NANGEELA	141	1.0	1.0	74.9
NAREEN	40	.3	.3	75.1
NARRAWONG	46	.3	.3	75.4
NELSON	206	1.4	1.4	76.9
PASCHENDALE	89	.6	.6	77.5
PORTLAND	68	.5	.5	77.9
PORTLAND WEST	143	1.0	1.0	78.9
SANDFORD	499	3.4	3.4	82.3
STRATHDOWNIE	952	6.5	6.5	88.8
TAHARA	168	1.1	1.1	90.0
TAHARA BRIDGE	76	.5	.5	90.5
TAHARA WEST	88	.6	.6	91.1
TYRENDARRA	347	2.4	2.4	93.5
WALLACEDALE	352	2.4	2.4	95.9
WANDO BRIDGE	148	1.0	1.0	96.9
WANDO VALE	164	1.1	1.1	98.0
WARROCK	177	1.2	1.2	99.2
WINNAP	115	.8	.8	100.0
Total	14627	100.0	100.0	

15.3 Glenelg Agricultural Land Characteristics

15.3.1 Soil Type

There are many factors which impact on the quality of agricultural land. Thirteen factors were identified including:

Table 131 Farm Zone Soil Factors

Soils type,	Dispersive behaviour
Total Soil Depth,	Soil structure decline
Top Soil depth	Waterlogging
Soil pH,	Landslides
Soil impedance,	The susceptibility to water erosion
Soil drainage,	Salinity

Source: DSE and Glenelg Shire

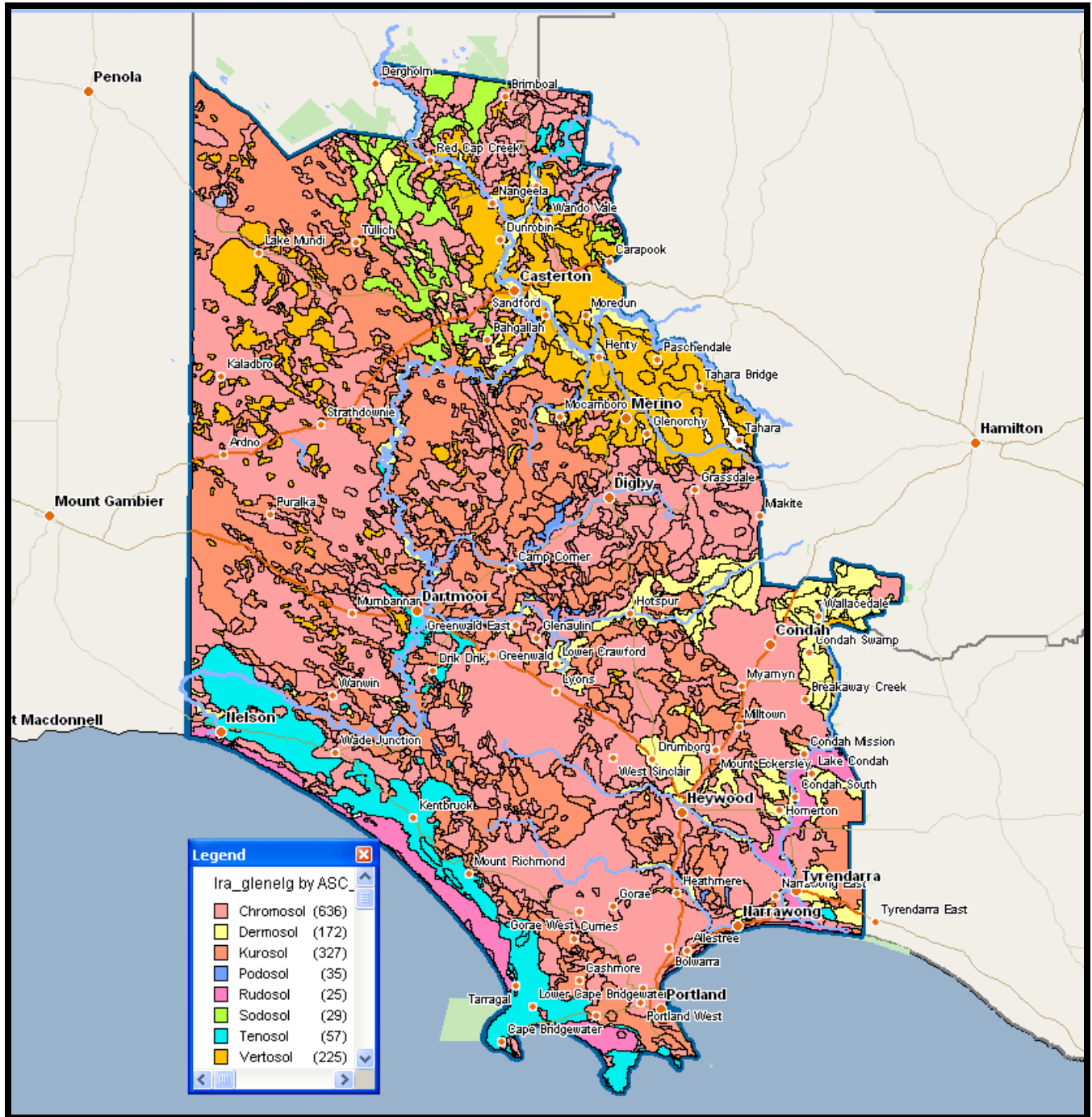
A series of analysis were performed on the 13 factors to quantify what soils are the most prominent in the shire; their current condition and projected future outlook. Eight different soil classes exist in Glenelg Farm Zone as illustrated in Table 132, the distribution pattern of these soils is illustrated in Map 3. The most prominent soil category is *Chromosol* which suitable for broad acre cropping followed by *Kurosol* (Broad acre); *Vertosol* (grain and dry acre crops); *Dermosol* (Broad acre cropping); *Tenosol* (Conservation and natural environment); *Podosol* (Conservation and natural environment); *Rudosol* (Conservation and broad acre) and *Sodosol* (Horticulture)

Table 132 Farm Zone Soil Types

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	92	.6	.6	.6
Chromosol	5761	39.4	39.4	40.0
Dermosol	2233	15.3	15.3	55.3
Kurosol	2956	20.2	20.2	75.5
Podosol	76	.5	.5	76.0
Rudosol	95	.6	.6	76.7
Sodosol	212	1.4	1.4	78.1
Tenosol	933	6.4	6.4	84.5
Vertosol	2269	15.5	15.5	100.0
Total	14627	100.0	100.0	

Source: Glenelg Shire

Map 143 Farm Zone Soil Types



Source: Glenelg Shire and DSE

15.3.2 Total Soil Depth

The range of soils depths across Glenelg ranges from a minimum of 55 mm to approximately 290 in depth. The methodology used to calculate this figure involved interpreting soil data from the Department of Primary Industry, Department of Sustainability and Environment and satellite imagery. As indicated by Table 11 the greatest depth frequencies were **200 mm** (2944 recordings) **130 mm** (1995 recordings); **195 mm** (1594 recordings); **260 mm** (1337 recordings) and **90 mm** (1106 recordings).

Table 133 Farm Zone Top Soils Depths

	Frequency	Percent	Valid Percent	Cumulative Percent
0	92	.6	.6	.6
55	104	.7	.7	1.3
60	52	.4	.4	1.7
70	35	.2	.2	1.9
80	518	3.5	3.5	5.5
83	32	.2	.2	5.7
90	1106	7.6	7.6	13.3
95	17	.1	.1	13.4
100	4	.0	.0	13.4
110	719	4.9	4.9	18.3
115	265	1.8	1.8	20.1
120	1	.0	.0	20.1
125	102	.7	.7	20.8
130	1995	13.6	13.6	34.5
135	53	.4	.4	34.8
140	80	.5	.5	35.4
155	901	6.2	6.2	41.5
160	69	.5	.5	42.0
170	53	.4	.4	42.4
175	14	.1	.1	42.5
180	26	.2	.2	42.6
184	681	4.7	4.7	47.3

195	1594	10.9	10.9	58.2
-----	------	------	------	------

	Frequency	Percent	Valid Percent	Cumulative Percent
200	2944	20.1	20.1	78.3
205	39	.3	.3	78.6
210	43	.3	.3	78.9
215	1106	7.6	7.6	86.4
220	348	2.4	2.4	88.8
260	1337	9.1	9.1	98.0
275	95	.6	.6	98.6
285	198	1.4	1.4	100.0
290	4	.0	.0	100.0
Total	14627	100.0	100.0	

Source: DSE

Map 144 indicates where the various soil depths occur across the shire. As indicated by the map the soil pattern is granular. Five bands of soil depth are highlighted on the map.

The areas with the highest soil depths are along the coastline which can be affected by the elevation of coast dunes and other natural structures, the Digby area and the northern end of the shire.

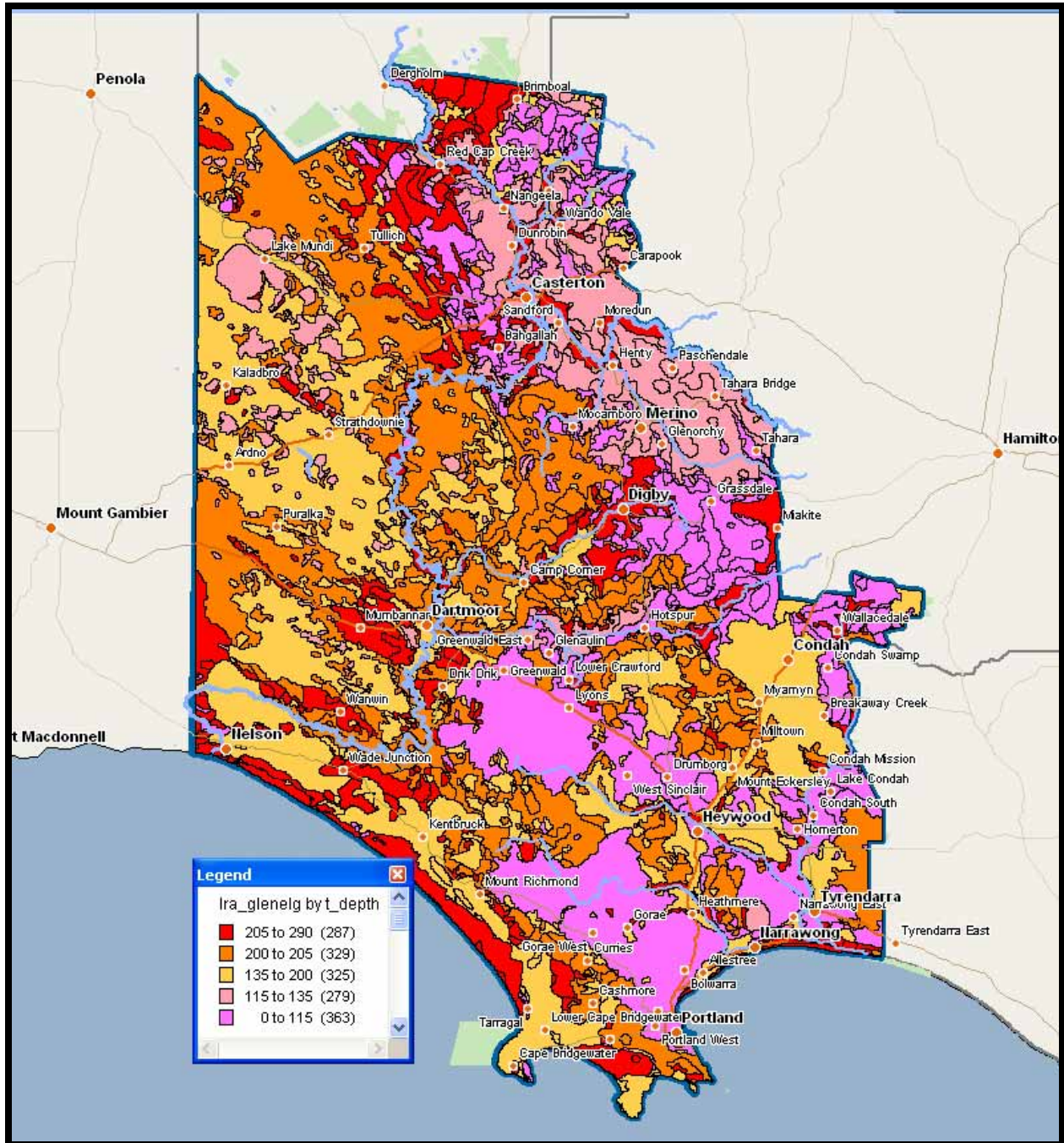
The soil categories with the deepest soil profiles are the Rudosols along the western coastline of the shire, the Chromosols in the central region of the shire and the Sodosols and Chromosols near and around Dergholm and Brimboal.

The areas with the most shallow soil profiles are area such as Cashmore, Bolwarra, Gorae, Grassdale and Greenwald.

The soil categories with the shallowest soil profiles are the Chromosols near and around Portland, Grassdale Greenwald and Narrawong.

The two middle range soil bands (i.e. 135mm-200mm and 200 mm -205mm) are situated predominately in the west half of the shire. The two bands and interleave between each other from the shires northern boundary to the coastline.

Map 144 Farm Zone Top Soils Depths



Source: Glenelg Shire and DSE

15.3.3 Top Soil Depth

The depth of top soil is a crucial element in the performance of the agricultural soils. Plants generally concentrate their roots in and obtain most of their nutrients from this layer. The actual

depth of the topsoil layer can be measured as the depth from the surface to the first densely packed soil layer known as subsoil. Table 134 gives the soil depth in mm.

Table 134 Farm Zone Top Soil Depth

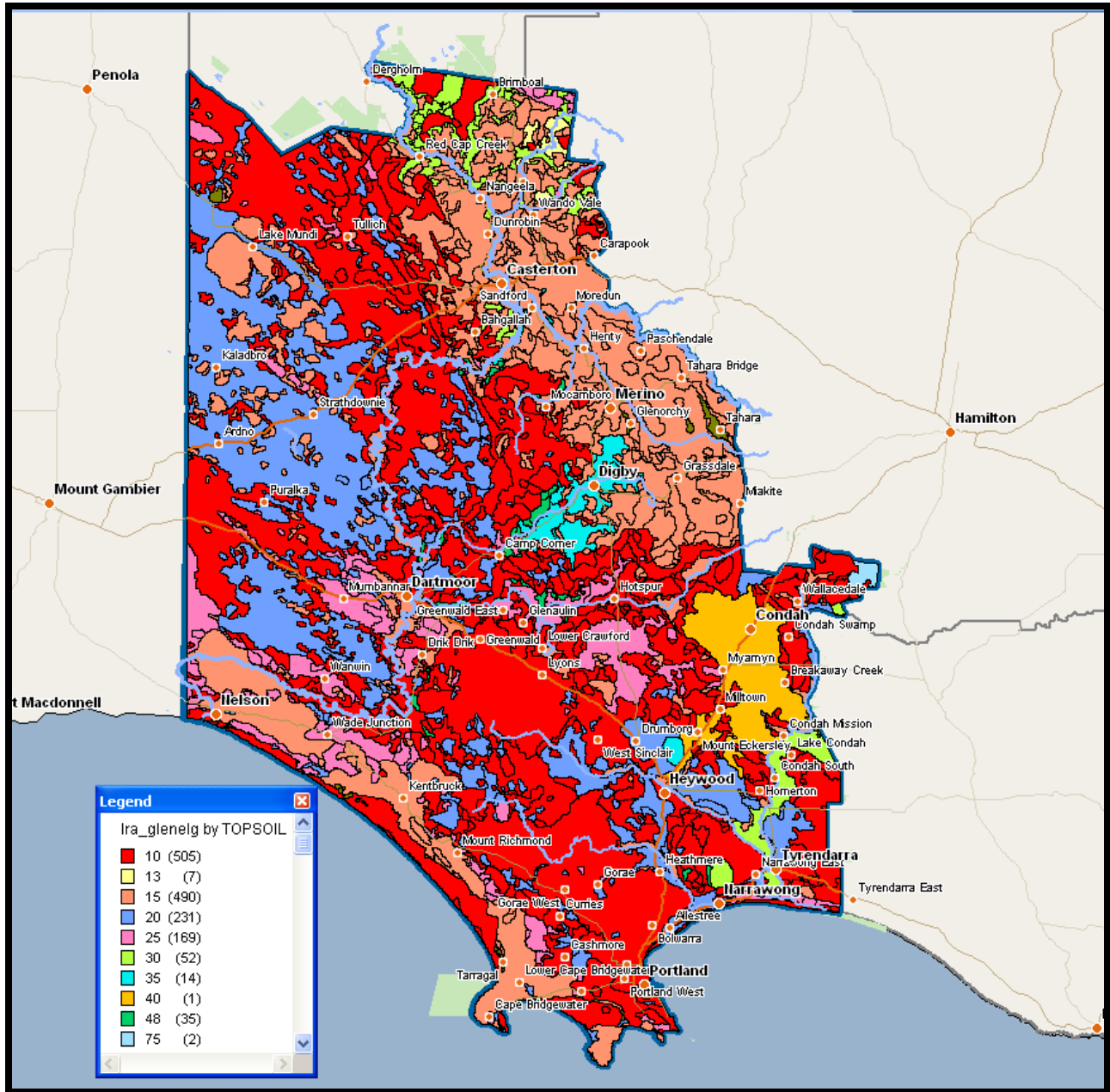
		TOPSOIL			Cumulative
		Frequency	Percent	Valid Percent	Percent
Valid	0	92	.6	.6	.6
	10	4854	33.2	33.2	33.8
	13	32	.2	.2	34.0
	15	4964	33.9	33.9	68.0
	20	1721	11.8	11.8	79.7
	25	1499	10.2	10.2	90.0
	30	269	1.8	1.8	91.8
	35	415	2.8	2.8	94.7
	40	681	4.7	4.7	99.3
	48	76	.5	.5	99.8
	75	24	.2	.2	100.0
Total	14627	100.0	100.0		

Source: Glenelg Shire

As shown by Map 145 the majority of the shire has less than 15 mm of top soil irrespective of soil category. The area which has the deepest topsoil layer is situated around Digby with 75 mm.

The topsoil depth around Portland and Heywood is approximately 10mm; Casterton and Dartmoor, Nelson and Merino have 15 mm.

Map 145 Farm Zone Top Soil Depth



Source: Glenelg Shire and DSE

15.3.4 Soil pH

The pH of a soil measures its acidity or alkalinity. In acid soils pH is a useful surrogate for aluminum toxicity, while in alkaline soils high pH can indicate the presence of calcium carbonate, high sodality or the presence of toxic compounds like sodium carbonate (for more information see Moore *et al.* 1998a, Scholz and Moore 1998).

Soil pH is an important consideration for farmers and gardeners for several reasons:

- Many plants and [soil life](#) forms have a preference for either alkaline or acidic conditions, affecting the choice of crop or plant that can be grown without intervention to adjust the pH
- Diseases affecting plants also tend to thrive in soil with a particular pH range
- The pH can affect the availability of nutrients in the soil

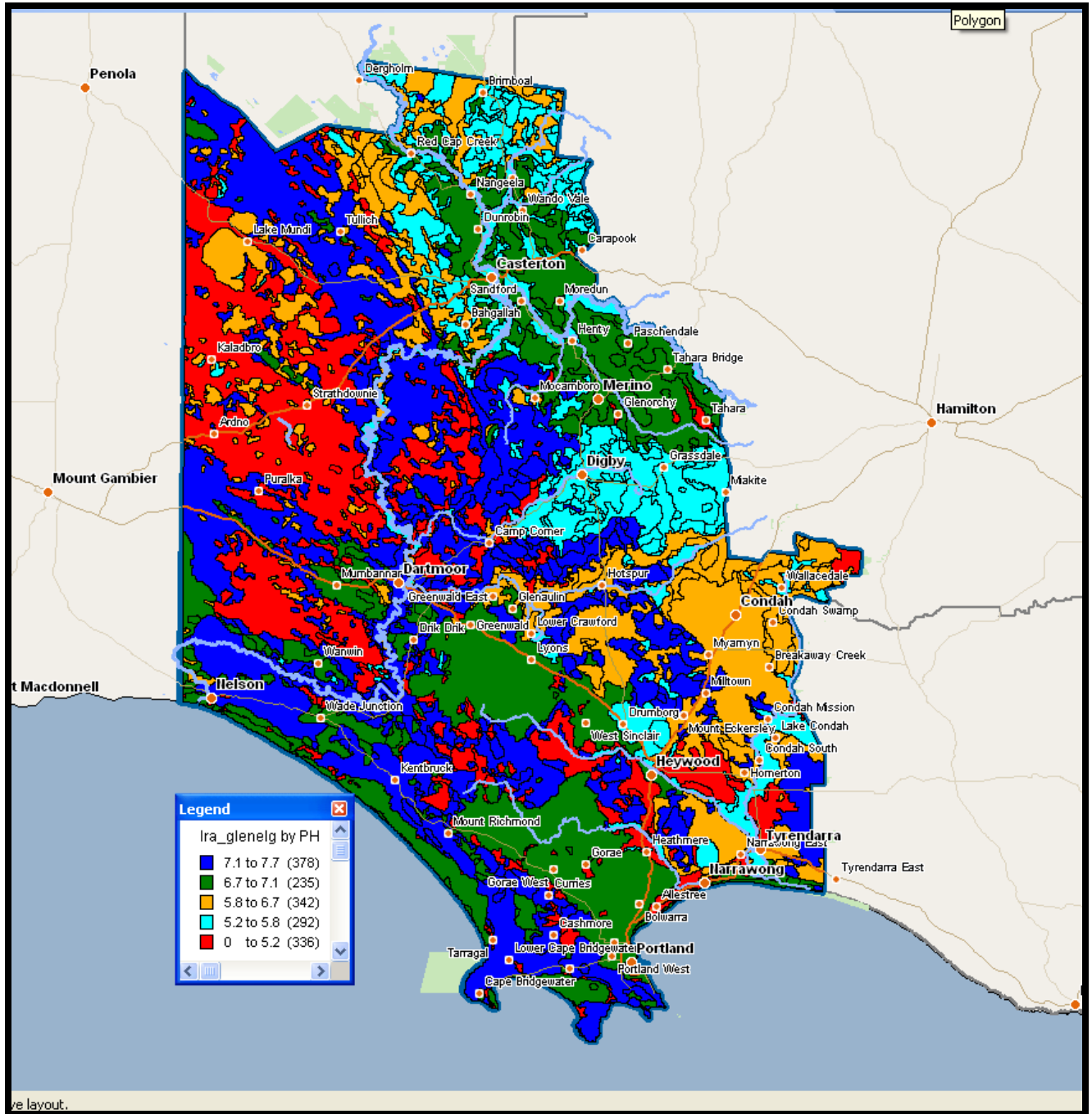
Table 135 Farm Zone Soil pH

		PH			Cumulative
		Frequency	Percent	Valid Percent	Percent
Valid	.0	92	.6	.6	.6
	4.7	76	.5	.5	1.1
	5.0	24	.2	.2	1.3
	5.1	1594	10.9	10.9	12.2
	5.2	1034	7.1	7.1	19.3
	5.3	2	.0	.0	19.3
	5.4	1105	7.6	7.6	26.8
	5.5	79	.5	.5	27.4
	5.6	65	.4	.4	27.8
	5.7	248	1.7	1.7	29.5
	5.8	198	1.4	1.4	30.9
	6.0	2124	14.5	14.5	45.4
	6.2	35	.2	.2	45.6
	6.5	229	1.6	1.6	47.2
	6.7	1337	9.1	9.1	56.3
	7.0	2542	17.4	17.4	73.7
	7.1	2941	20.1	20.1	93.8
	7.6	901	6.2	6.2	100.0
	7.7	1	.0	.0	100.0
	Total	14627	100.0	100.0	

Source: Department of Sustainability and Environment

The majority of food crops prefer a neutral or slightly acidic soil (pH 7). Some plants, however, prefer more acidic (e.g., potatoes, strawberries) or alkaline (e.g., brassicas) conditions

Map 146 Farm Zone pH Soil Map



Source: Glenelg Shire and DSE

The highest pH levels are recorded in the North West portion of the shire.

15.3.5 Soil acidification

Soil acidification is a process by which soil pH decreases over time, and there are often no visible signs of the problem.

Acidification can occur under natural conditions over thousands of years, with high rainfall areas most affected. However, rapid acidification can occur over a few years under intensive agricultural practices.

Acidification can affect either the surface soil only or the subsoil as well. Surface acidity can be relatively simple to treat, and brings considerable benefits in plant growth and yield. Sub-surface acidity is difficult and costly to correct. Farmers in high-risk areas need to identify the problem as early as possible

There are no visible symptoms of soil acidification other than declines in crop and pasture production, which may be dramatic in serious cases. As soils become more acidic some nutrients may become less available while other elements in the soil may reach toxic levels. Acidic soils may have some or all of the following problems:

Table 136 Farm Zone Soil Acidification

		Acidification_2			Cumulative
		Frequency	Percent	Valid Percent	Percent
Valid	1.Low	2486	17.0	17.0	17.0
	2.Moderate	4967	34.0	34.0	51.0
	3.High	7174	49.0	49.0	100.0
Total		14627	100.0	100.0	

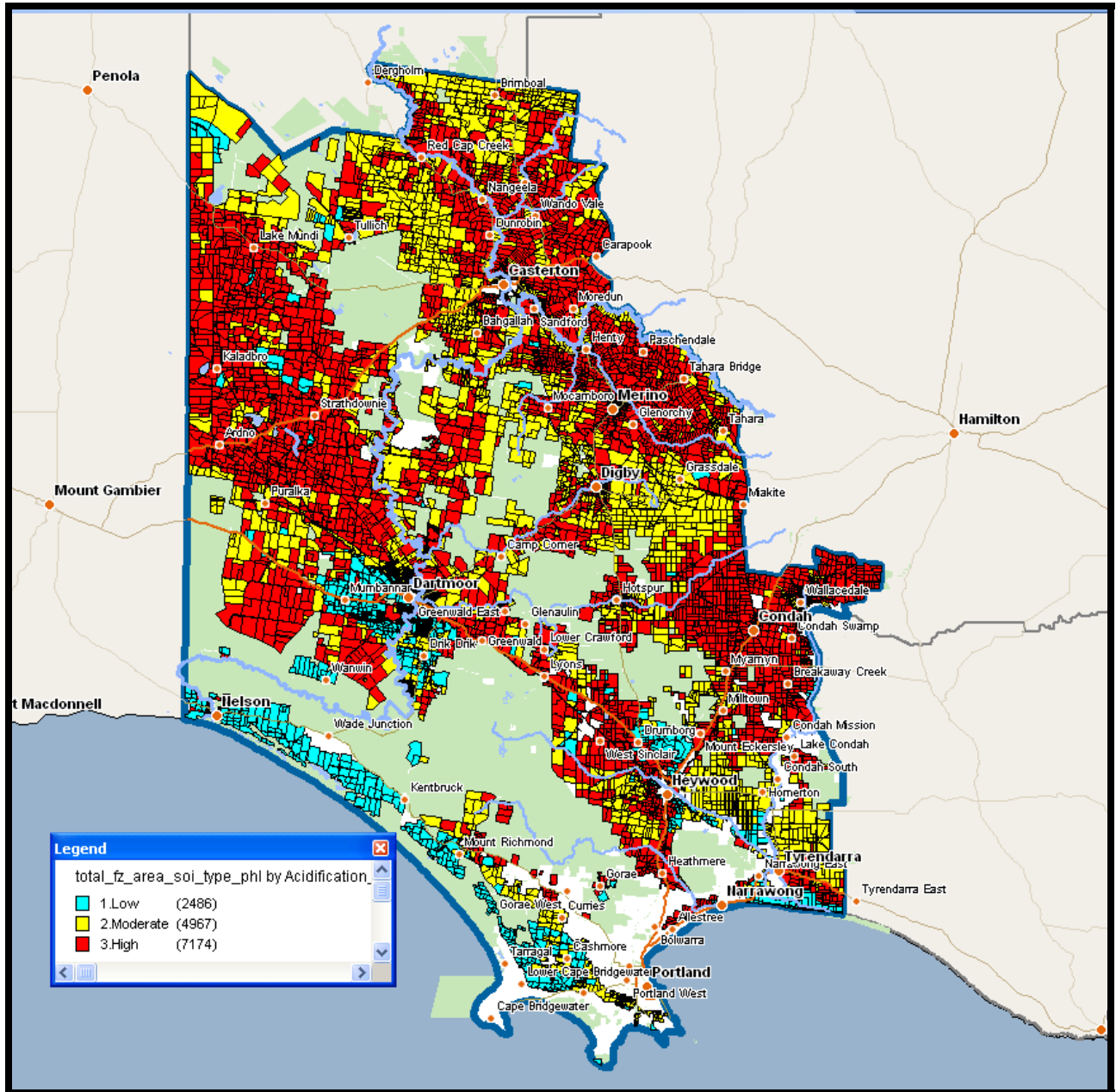
Source: Glenelg Shire and DSE

- Reduction in the amount of nutrients being recycled by soil micro-organisms (e.g. nitrogen supply may be reduced)
- Phosphorus in the soil may become less available to plants
- Induced deficiencies of calcium, magnesium and molybdenum
- The ability of plants to use subsoil moisture may be limited
- Aluminium, which is toxic to plants and microorganisms, may be released from the soil
- Manganese may reach toxic levels
- Uptake of cadmium (a heavy metal contaminant) by crops and pastures may increase

It is most important that soil acidity be treated early. If acidity spreads into the sub-soil, serious yield reduction may occur. Sub-soil acidity is difficult and costly to control.

The first step in managing soil acidity is to diagnose any increase in acidity. This involves reliable soil tests of pH, aluminium and manganese levels for the plough layer (zero to 10 cm) and for the sub-surface to 50 or 60 cm

Map 147 Farm Zone Acidification of soils



Source: Glenelg Shire

15.3.6 Soil impedance

A condition that hinders the movement of water by gravity through soils this condition is brought about through the process of soil compaction. Soil compaction describes the reduction in soil pore size and total pore space through applied stresses. The high strength of compacted soils restricts root elongation and results in a reduced soil volume available for water and nutrient uptake.

Susceptibility to compaction relates to particle size distribution and the presence or absence of secondary structure and organic matter. Soils with a wide range of particle sizes, low organic matter and no secondary structure are particularly susceptible.

Table 137 Farm Zone Soil Impedance

IMPEDING				
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	92	.6	.6	.6
<200	1605	11.0	11.0	11.6
>300	8404	57.5	57.5	69.1
200-300	4474	30.6	30.6	99.6
30	52	.4	.4	100.0
Total	14627	100.0	100.0	

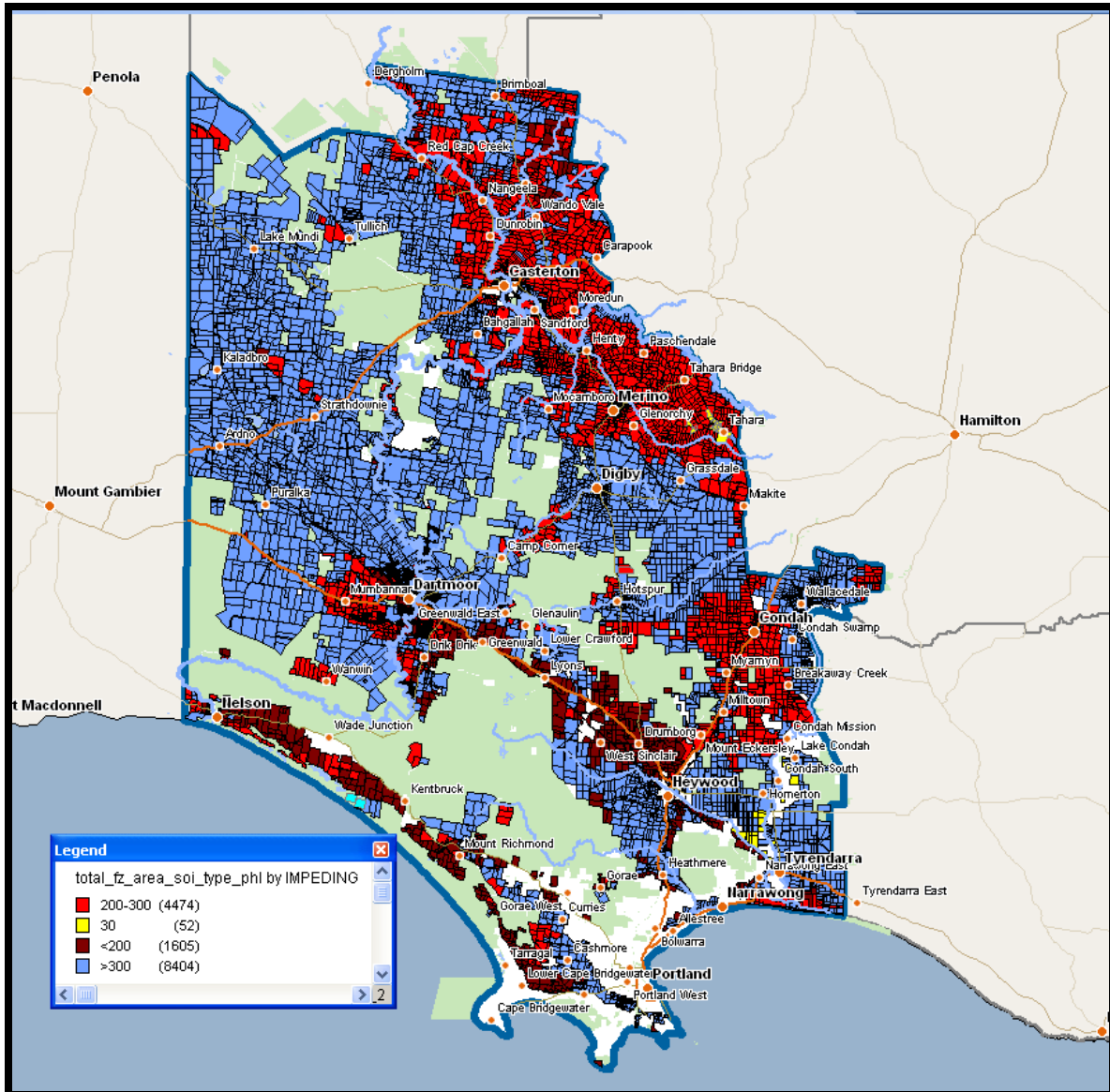
Source: Glenelg Shire and DSE

As indicated in the table Map 148 the lowest level of soil impedance is situated along the western coastline from Nelson to Cape Bridgewater; the region north west of Heywood stretching to Lyons and a region south of Heywood which stretches to Heathmere.

The majority of the soils in the Farm Zone have a high level of impedance in excess of 300mm. These soils are in the western half of the shire.

Soils which are in the band of 200-300 mm soil impedance are predominately in the eastern and north eastern section of the shire (i.e. Merino, Tahara, Casterton, Carapook etc)

Map 148 Farm Zone Soil Impedance



Source: Glenelg Shire and DSE

15.3.7 Soil drainage

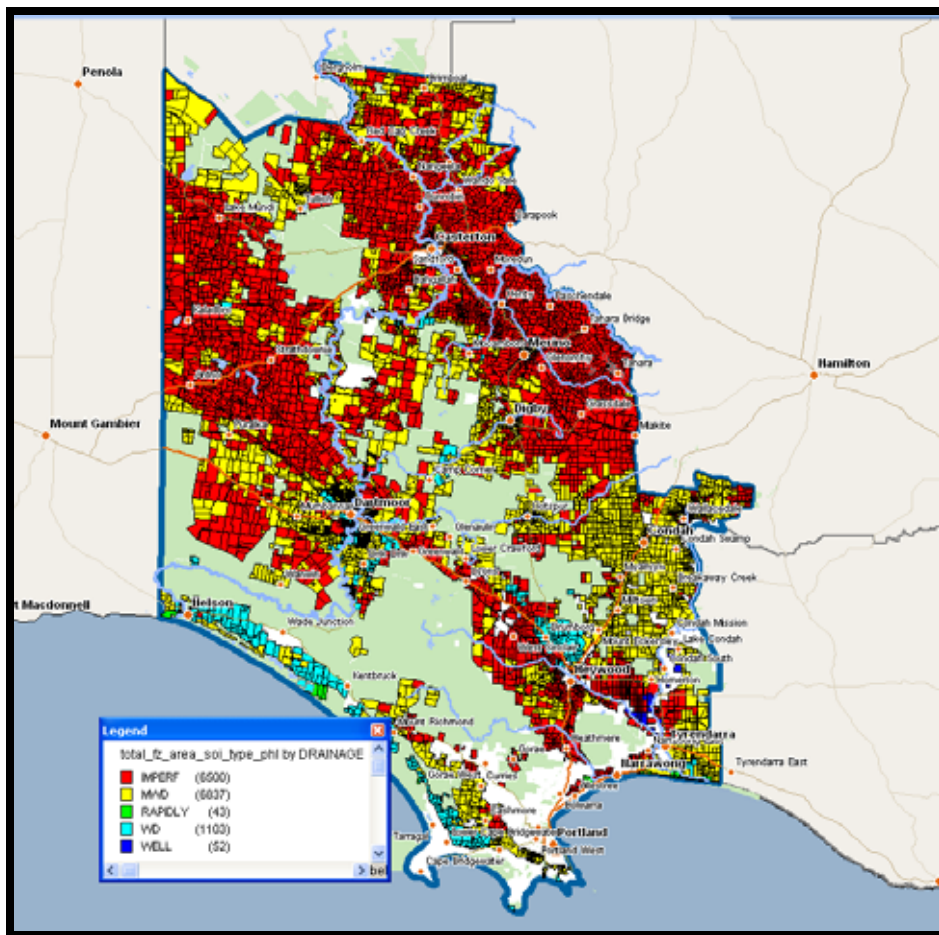
Drainage is the natural or artificial removal of surface and sub-surface water from an area. Many agricultural soils need drainage to improve production or to manage water supplies

Table 138 Farm Zone Soil Drainage

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	92	.6	.6	.6
IMPERF	6500	44.4	44.4	45.1
MWD	6837	46.7	46.7	91.8
RAPIDLY	43	.3	.3	92.1
WD	1103	7.5	7.5	99.6
WELL	52	.4	.4	100.0
Total	14627	100.0	100.0	

Source: Glenelg Shire

Map 149 Soil Drainage Map



Source: Glenelg Shire

15.3.8 Dispersive behaviour

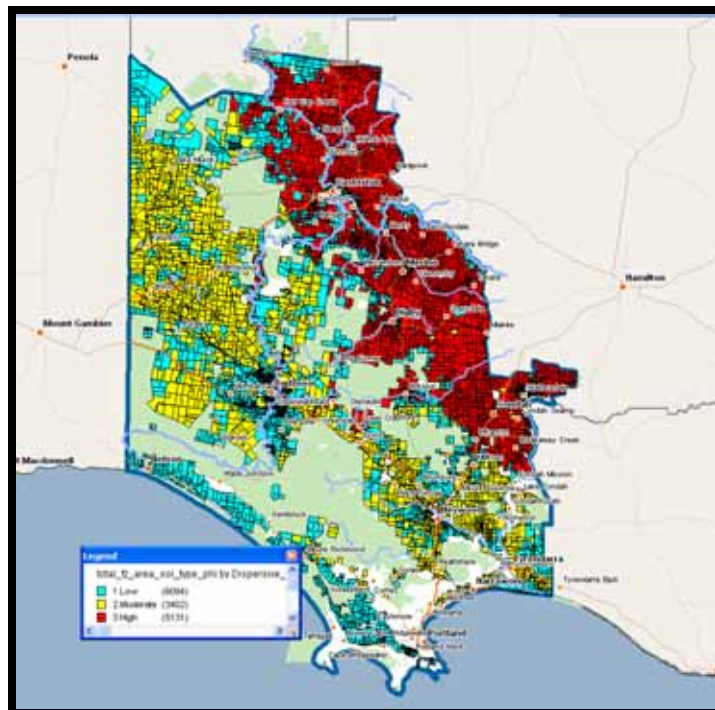
A dispersive soil is structurally unstable. In dispersive soils the soil aggregates – small clods – collapse when the soil gets wet because the individual clay particles disperse into solution. This collapse of structure causes the soil to slump, lose porosity and become denser thus restricting root growth of annual crops and pastures. Soils often disperse when they are sodic, which means they contain enough sodium to interfere with the structural stability of the soil. Clay particles have a negative charge on their surface; this charge is balanced by positively charged cations, such as Ca^{2+} , Mg^{2+} , K^+ and Na^+ , distributed around the surface of the clay. Cation exchange capacity (CEC) is a measure of the total number of exchange sites in a given mass of a soil. When the ratio of sodium to other ions at these exchange sites is high, clay particles are less tightly bound to each other and the soil aggregates easily disperse when the soil becomes wet.

Table 139 Farm Zone Dispersive Behaviour

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.Low	6094	41.7	41.7	41.7
	2.Moderate	3402	23.3	23.3	64.9
	3.High	5131	35.1	35.1	100.0
	Total	14627	100.0	100.0	

Source: Glenelg Shire and DSE

Map 150 Farm Zone Dispersive Behaviour



Source: Glenelg Shire and DSE

15.3.9 Soil structure decline

Soil structure is determined by how individual soil [granules](#) clump or bind together and aggregate, and therefore, the arrangement of soil pores between them. Soil structure has a major influence on water and air movement, biological activity, root growth and seedling emergence.

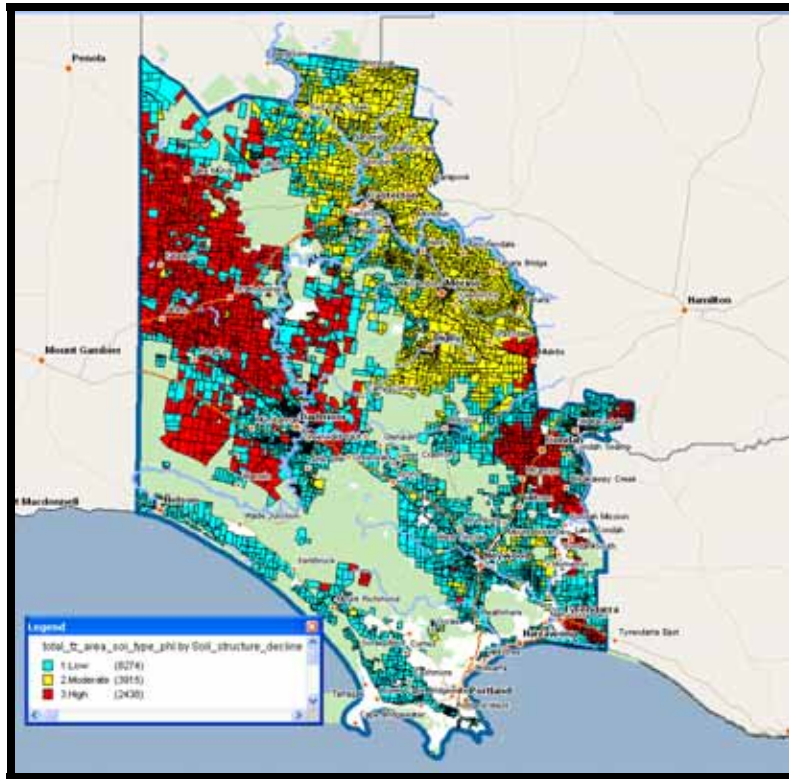
Soil structure will decline under most forms of cultivation – the associated mechanical mixing of the soil compacts and sheers aggregates and fills pore spaces; it also exposes organic matter to a greater rate of decay and oxidation (Young & Young, 2001). Soil structure decline under irrigation is usually related to the breakdown of aggregates and dispersion of clay material as a result of rapid wetting.

Table 140 Farm Zone Soil Structure Decline

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.Low	8274	56.6	56.6	56.6
	2.Moderate	3915	26.8	26.8	83.3
	3.High	2438	16.7	16.7	100.0
	Total	14627	100.0	100.0	

Source: Glenelg Shire and DSE

Map 151 Farm Zone Soil Structure Decline



Source: Glenelg Shire and DSE

15.3.10 Waterlogging

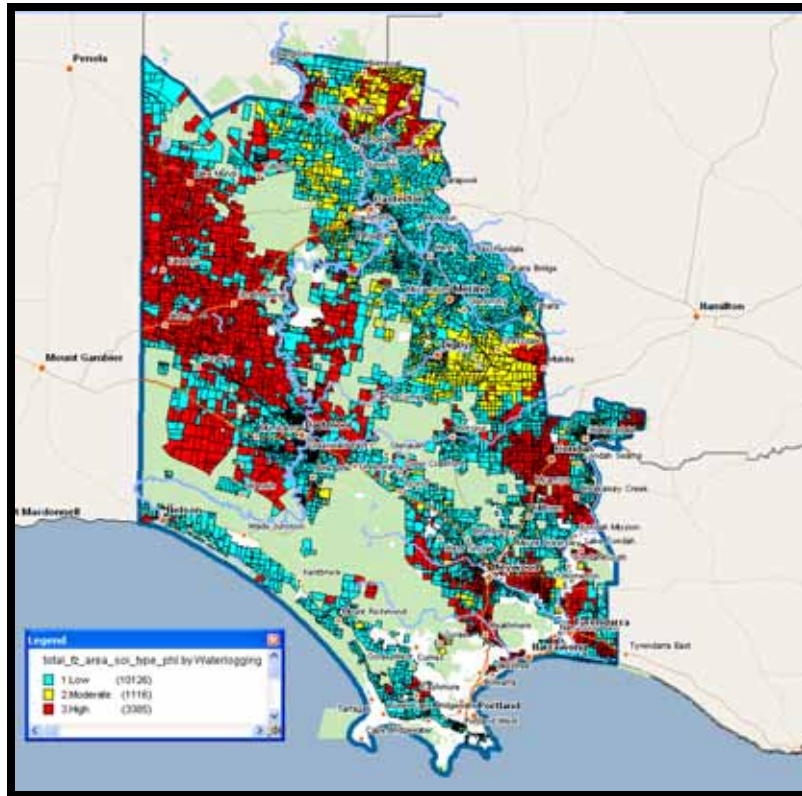
Water logging is excess water, in terms of saturated soil layers, in the root zone accompanied by anaerobic conditions. In saturated soils biological activity rapidly uses the available oxygen, retarding oxygen and water uptake and restricting root and plant growth. Water logging for extended periods near the surface (e.g. <30 cm) can result in poor crops or plant death. The ability to tolerate different periods of water logging varies greatly between crops. Also in many situations, the presence of a saturated layer or water table deeper in the soil can be advantageous because a water supply is available to the plant and adequate air is available in the topsoil to maintain root activity.

Table 141 Farm Zone Waterlogging

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.Low	10126	69.2	69.2	69.2
	2.Moderate	1116	7.6	7.6	76.9
	3.High	3385	23.1	23.1	100.0
	Total	14627	100.0	100.0	

Source: Glenelg Shire and DSE

Map 152 Farm Zone Waterlogging



Source: Glenelg Shire and DSE

15.3.11 Landslides

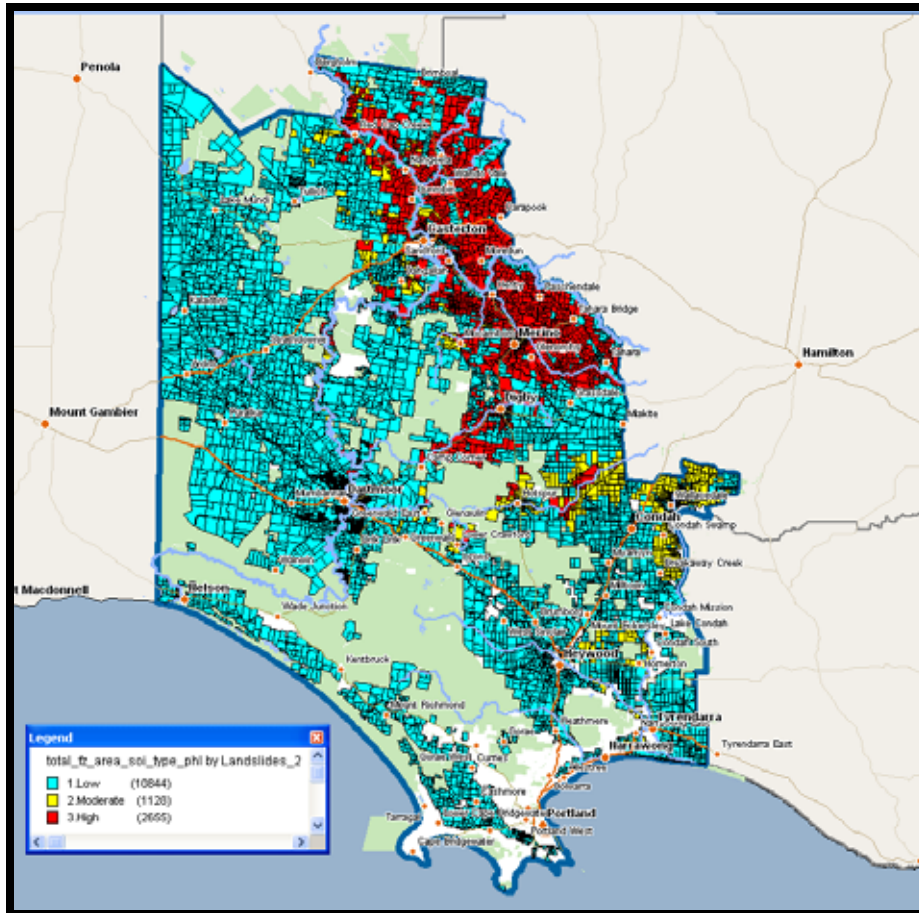
Land instability assesses the potential for rapid movement of a large volume of soil. This includes mass soil movement through slope failure, shifting sand dunes, wave erosion and subsidence in karst topography (land underlain by caves).

Table 142 Farm Zone Landslides

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.Low	10844	74.1	74.1	74.1
	2.Moderate	1128	7.7	7.7	81.8
	3.High	2655	18.2	18.2	100.0
	Total	14627	100.0	100.0	

Source: Glenelg Shire and DSE

Map 153 Farm Zone Land Slide Probability



Source: Glenelg Shire and DSE

15.3.12 The Susceptibility to Water Erosion

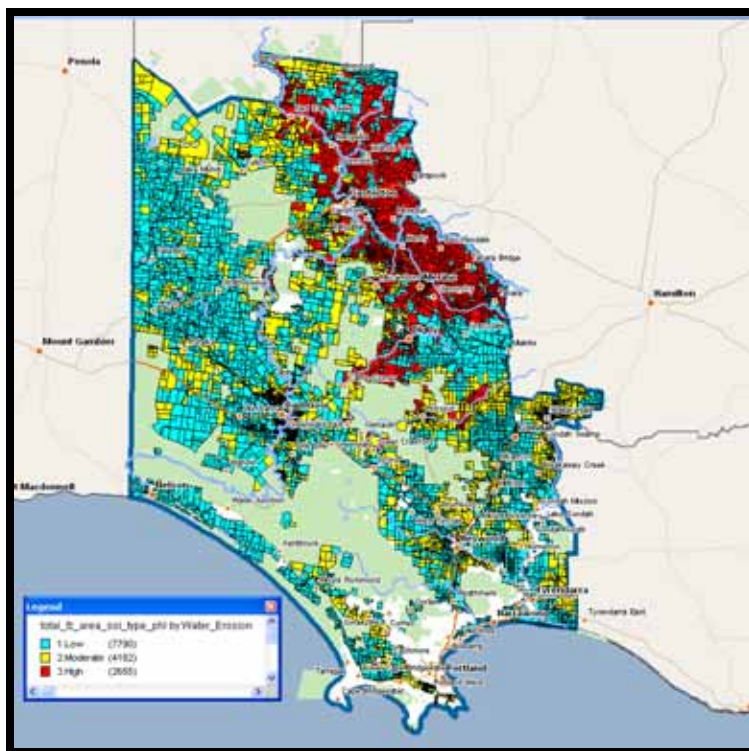
Water erosion hazard is the inherent susceptibility of the land to the loss of soil as a result of water movement across the surface. It is also an important cause of soil fertility decline as soil nutrients tend to be concentrated near the surface. Water erosion is highly variable depending on seasonal and climatic factors with most soil loss occurring from a small proportion of the agricultural area. For example, a high rainfall event immediately after summer, when soil plant cover is low can result in 'flush' of sediment and valuable topsoil nutrients into nearby drains. Management also affects erosion through the timing (and type) of cultivation, and frequency and intensity of water logging that affect saturation excess run-off.

Table 143 Farm Zone Susceptibility to Water Erosion

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.Low	7790	53.3	53.3	53.3
	2.Moderate	4182	28.6	28.6	81.8
	3.High	2655	18.2	18.2	100.0
	Total	14627	100.0	100.0	

Source: Glenelg Shire and DSE

Map 154 Farm Zone Susceptibility to Water Erosion



Source: Glenelg Shire and DSE

15.3.13 Salinity

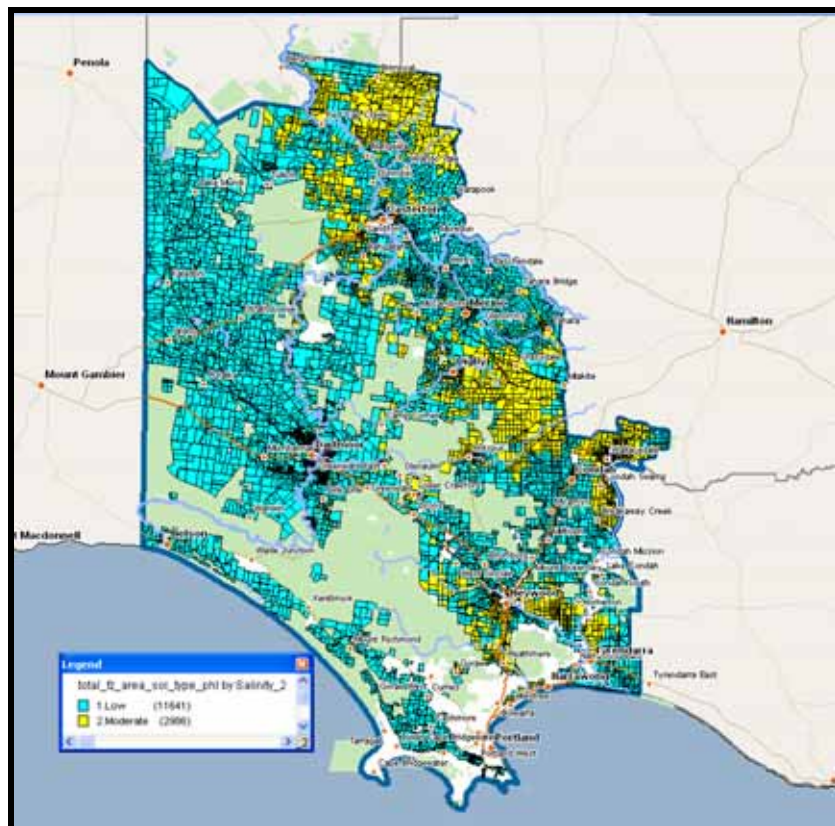
This refers to the hazard of the land being affected by salinity in the future. It considers the maximum extent of saline land likely to develop given present land uses, clearing patterns and management practices. It is an estimate of the extent of salinisation when the water balance reaches a new (post-clearing) equilibrium. An accurate estimate of salinity risk is difficult because water table rise is affected by climate, land use (vegetation), soil-landforms, hydrology and geology. This also has to be compared with current salinity information.

Table 144 Farm Zone Salinity

		Salinity_2			Cumulative
		Frequency	Percent	Valid Percent	Percent
Valid	1.Low	11641	79.6	79.6	79.6
	2.Moderate	2986	20.4	20.4	100.0
Total		14627	100.0	100.0	

Source: Glenelg Shire and DSE

Map 155 Farm Zone Salinity Profile



Source: Glenelg Shire and DSE

15.4 Land Capability Classes for Agriculture

The Departments of Sustainability and Environment and Agriculture have developed a grading system for categorizing land capability in respect to agricultural purposes.

The system has five classes and describes the degree of limitation that each class has in relation to agricultural potential. The five classes and limitations are highlighted in Table 16.

Table 145 Land Capability Classes For Agriculture

Class	Capability	Degree of Limitation
Class 1	Very Good	Can sustain a wide range of uses including an intensive cropping regime. Very high levels of production possible with standard management levels.
Class 2	Good	Moderate limitations to agricultural productivity, overcome by readily available management practices.
Class 3	Fair	Can sustain agricultural uses with low to moderate levels of land disturbance such as broadacre cultivation in rotation with improved pastures. Moderate to high levels of productions possible with specialist management practices such as minimum tillage.
Class 4	Poor	Low capacity to resist land disturbance such as cultivation. Moderate production levels possible with specialist management such as improved pasture establishment with minimum tillage techniques. Recommended for low disturbance agriculture such as grazing pro perennial horticulture
Class 5	Very Poor	Very low capability to resist disturbance. Areas of low production capability. Minimal grazing levels or non agricultural uses recommended.

Source: Department Natural Resources & Environment

The five classes have a series of components which when combined and summarized give a rating as to the viability of a respective area or soil type. Table 146 highlights the various factors which determine land capability in relation to agricultural activities.

Table 146 Agricultural Land Capability

Parameters Influencing Agricultural Production		Land Capability Ratings				
		<i>Class 1</i>	<i>Class 2</i>	<i>Class 3</i>	<i>Class 4</i>	<i>Class 5</i>
C: Climate	Length of Growing Season (Months)	12-11	10-8	7-5	4-2	<2
T: Topography	Slope %	<1	1-3	4-10	11-32	>32
S: Soil	Condition of Topsoil	25-21	20-16	15-11	10-6	5-1
	Depth of topsoil (mm)	>300	300-160	150-110	100-50	<50
	Depth to rock/ hardpan (mm)	>2.0	20.-1.5	1.5-1.0	1.0-.05	<.05
	Depth to seasonal water table (m)	>5.0	5.0-2.0	2.0-1.5	1.5-1.0	<1.0
	Total amount of water (mm) available to plants	>200	200-151	150-101	100-51	50-0
	Index of rainfall	Very High	High	Moderate	Low	Very low
	Dispersibility of to soil					
	Gravel / stone boulder content	0	1-10	11-25	26-50	>50
	Electrical conductivity	<300	300-600	600-1400	1400-3500	>3500
	Susceptibility to sheet / rill erosion	Very low	Low	Moderate	High	Very high
	Susceptibility to gully erosion	Very low	Low	Moderate	High	Very high
	Susceptibility to wind erosion	Very low	Low	Moderate	High	Very high

Source: Department of Natural Resources and Environment

15.5 Current Farm zone Soil Characteristics

See section on Glenelg agricultural characteristics

16 FZ Issues

- Desire to subdivide
- Excision of dwellings
- Agriculture potential /suitability
- Timber production
- Land degradation/water issue
- Economics of agriculture (farm viability) people leaving the land demography ageing
- Industrial encroachment
- Natural constraints (flooding, sinkholes)
- Past settlement patterns (Dartmoor- plantation forest issue)
- Wildfire
- Climate change & impacts droughts etc, reduction n rainfall , hotter summers

Options

- Rezone smaller allotments near towns where viable (Portland, Heywood, Casterton, Nelson<Digby, Dartmoor)
- Excisions-not allow change local policy
- Plantations forests- bush fire wait until royal commission
- Identify areas here consolidation is possible or required
- Possible into RAZ and rezone to RZ1` or RCZ2 or RLZ