



# Land Capability Assessment (LCA) Guidelines

## Index

<b>1.</b>	<b>Introduction .....</b>	<b>3</b>
<b>2.</b>	<b>Guideline Notes for Land Capability Assessors .....</b>	<b>3</b>
<b>3.</b>	<b>Requirements for Land Capability Assessments .....</b>	<b>6</b>
	<b>3.1 Soil Category and Effluent Design Loading Rate .....</b>	<b>7</b>
<b>4.</b>	<b>Land Capability Assessment Matrix .....</b>	<b>8</b>
<b>5.</b>	<b>Type of Wastewater System Recommended .....</b>	<b>9</b>
<b>6.</b>	<b>Management Program for Wastewater System .....</b>	<b>9</b>
<b>7.</b>	<b>Site Plan .....</b>	<b>9</b>
<b>8.</b>	<b>Size of Wastewater Envelope .....</b>	<b>10</b>

## Tables

<b>2.1</b>	<b>Name of LCA &amp; Details of Proposal</b>	<b>3</b>
<b>2.2</b>	<b>Property Features</b>	<b>4</b>
<b>2.3</b>	<b>Maps</b>	<b>4</b>
<b>2.4</b>	<b>Constraints List</b>	<b>5</b>
<b>2.5</b>	<b>Development Issues</b>	<b>5</b>
<b>2.6</b>	<b>Appendices</b>	<b>5</b>
<b>3.1</b>	<b>Example of LCA Site Description</b>	<b>6</b>
<b>3.2</b>	<b>LCA Site Features</b>	<b>7</b>
<b>3.3</b>	<b>Soil Features</b>	<b>8</b>
<b>3.4</b>	<b>Soil Category and Effluent Design Loading Rate</b>	<b>8</b>
<b>4.1</b>	<b>Example of a Land Capability Assessment Matrix</b>	<b>9</b>
<b>8.1</b>	<b>Wastewater Envelopes</b>	<b>11</b>
<b>8.2</b>	<b>Suitable Treatment System Options by Township</b>	<b>12</b>
	<b>Land Capability Assessors</b>	<b>13</b>

## 1. Introduction

A Land Capability Assessment (LCA) is generally completed by a wastewater engineer or geotechnical engineer when a site has a number of environmental constraints which could adversely affect the site's ability to adequately treat and retain the disposal of wastewater.

A number of these environmental constraints for allotments within a township zone have already been highlighted by Council in the domestic Wastewater Management Plan. The allotments are generally colour coded red or orange.

The LCA should address all of the environmental constraints associated with the proposed development, and where possible design a wastewater management system that will address each of these constraints whilst ensuring public health standards are not compromised during the process.

The management regime proposed must ensure that the procedures and monitoring required to be undertaken is sustainable over the life of the wastewater treatment system and not just achievable by the present applicant.

## 2. Guideline Notes for Land Capability Assessors

The LCA should include the following information:

**Table 2.1 - Name of LCA & Details of Proposal**

Name of LCA & Details of Proposal	
Field work undertaken by	Name, qualifications
Report completed by	Name, qualifications, accreditations
Proposal	Type: residential, commercial, government, tourism Size: number of bedrooms Occupancy: full, part time, seasonal occupation
Location	Address, title details
Area	m <sup>2</sup> or hectares
Wastewater disposal	Volume in litres/day (reasonable "peak" volumes) Field area in m <sup>2</sup> (include active and the reserve field)
Infrastructure available	Water (detail source - if reticulated, roof catchment and or bore), power

**Table 2.2 - Property Features**

<b>Property Features</b>	
The aim is to describe the land characteristics and their relationship to the proposed use	
Topography of the site and of the wastewater envelope	Identify, and where possible map, the land units on the property. Describe the features of each of the identified units, for example slope, rock outcrop, surface characteristics, runoff, erosion potential etc.
Soils	Identify relevant soil profile characteristics such as depth, textural grade, horizonation, structure, dispersibility, slake potential and classify soil category, anticipated percolation, depth to permanent and seasonal ground water, rock inclusions etc.
Drainage	Identify the Water Supply Catchment status. Estimate the proximity of the wastewater disposal fields (both active & reserve) to drainage features, dams, bores, springs, reservoirs, water bodies. Is the site subjected to seasonal inundation?
Climate	Average annual rainfall and evaporation, and expected "wet months", 90 percentile factor of BOM date (water budget).
Vegetation	Cover type, % cover, any indigenous vegetation worthy of protection.

**Table 2.3 - Maps**

<b>Maps</b>	
Maps provide a visual appraisal of the situation on a property to be developed. Each map must have a clear legend, indication of orientation and approximate scale. Assessors are encouraged to include the following maps -	
Cadastral Map	To highlight property in relation to neighbouring land, roadways, special uses etc.
Land Feature Map	Delineate units (soil and topographic) identified on the property (and immediately offsite if relevant e.g. low-lying areas subject to inundation). Include features (both onsite and immediately offsite) such as waterways, bores (stock and potable bores) within 20 meters of the property boundary, rock outcrops, cuttings/escarpments, existing buildings and vegetation.
Envelopes	Building envelop (includes all associated structures which includes areas beyond the immediate house footprint). Wastewater envelope (area for wastewater disposal should also include a reserve area should the primary area fail). The size of the wastewater envelope is governed by the soil type and the wastewater treatment process. This area could be 241sqm for a wastewater treatment plant on a category 1 soil type to 488sqm for a wastewater treatment plant on a category 6 soil type.

**Table 2.4 - Constraints List**

<b>Constraints List</b>	
List the geographical features associated with the proposal that could constrain development and could give rise to a negative impact on environmental or human health. Present constraints in a rough order of significance. These include block size, soil type, topography, drainage, depth to seasonal water table, proximity of sensitive features, climate, vegetation, concentration of development etc. Acknowledge any regulatory requirements, Council environmental overlays, and relevant town planning zoning.	
<b>Assessment</b>	
Risk Rating (determined by most constraining issue)	1 (very low) to 5(very high). Refer to the EPA Land Capability Information Bulletin and the MAV Land Capability Guidelines.

**Table 2.5 - Developmental Issues**

<b>Developmental Issues</b>	
<b>Considerations</b>	<b>Management Recommendations</b>
Wastewater	In preparing managerial recommendations the following must be considered: <ul style="list-style-type: none"> <li>• Provide details of the program recommended for managing these (and any other relevant) issues. This must include the site specific maintenance and the monitoring requirements for wastewater treatment and disposal system recommended.</li> <li>• Reproducing rating descriptions from the Information Bulletin, Certificates of Approval or Australian Standards may not produce an adequate management program.</li> <li>• Advanced wastewater treatment systems that can produce effluent quality that meets a 20/30/10 standard may enable a reduction in the buffer distances specified in the EPA Code of Practice – Onsite Wastewater Management and Council wastewater guidelines.</li> </ul>
Waterway Protection	
Soil Conservation	
Vegetation	

**Table 2.6 - Appendices**

<b>Appendices</b>	
Photographs, tables etc	<ul style="list-style-type: none"> <li>• Appendices should be site specific.</li> <li>• General material, such as extensive regional plant lists, may include irrelevant information.</li> <li>• Manufacturer's brochures are generally considered nothing more than "padding" and may not support the applicant's proposal.</li> </ul>

### 3. Requirements for Land Capability Assessments

**Table 3.1 - Example of LCA Site Description**

Site Address:	Lot 585 Bundalaguah Road, Portland (Figure 1)
Owner/ Developer:	Mr. Victor Leakage
Postal Address:	PO Box 15081, Portland, Vic 3305
Contact:	Ph: 03 5523 40678
Council Area:	Corangamite Shire Council
Zoning:	Rural living, with a strip of land zoned Public Conservation and Resource along the Macalister River.
Allotment Size:	1 ha.
Domestic Water Supply:	Onsite roof water collection – no reticulated supply available or likely to be provided in the short to medium term future.
Anticipated Wastewater Load:	One 4-bedroom residence with 6 people per residence (maximum occupancy 8). Design wastewater load based on dwelling being equipped with all standard water reduction fixtures (11/5.5 cistern, shower flow restrictors is number of bedrooms plus 1 x 115Litres/day, therefore total design load = 575 L/day. This design load is sourced from the EPA Code of Practice 891.2.
Availability of Sewer:	The area is unsewered and unlikely to be sewerred in the short to medium term future. Sewerage development is not included in the current Wannan Water works schedule for the period 2008/2113.

**Table 3.2 - LCA Site Features**

Feature	Comment
Rainfall (water balance)	<p>What is the water budget for the site? (Number of months when rainfall exceeds transpiration).</p> <p>The water balance can be expressed by the following equation:            Precipitation + Effluent Applied = Evapotranspiration + Percolation</p> <p>Data used in the water balance includes:</p> <ul style="list-style-type: none"> <li>• Mean monthly rainfall and mean monthly pan evaporation.</li> <li>• Average daily effluent load.</li> <li>• Design irrigation rate (DIR).</li> <li>• Crop Factor.</li> <li>• Retained Rainfall.</li> </ul> <p>The nominated area method is used to calculate the area required to balance all inputs and outputs, without the need for wet weather storage.</p> <p>The LCA must clearly state the months where rainfall exceeds transpiration and evaporation.</p>
Exposure	Is the exposure to the sun/wind likely to influence transpiration and evaporation? Are there any other influencing factors?
Vegetation	Does the site contain native and/or exotic vegetation?
Landform	What is the landform for the site?
Slope	What are the site gradients and what are the site gradients for the wastewater envelope (both primary & reserve)?
Fill	Was any fill observed or is it required for the site?
Rocks and Rock Outcrops	Where rocks or outcrops evident at the site? Are any rocks within the wastewater envelope?
Erosion Potential	Is there potential for erosion?
Surface Water	Is the site subject to surface water?
Flood Potential	Is the site subject to flooding (both permanent and seasonal)?

Storm water run-on and upslope seepage	Will the house and wastewater system be affected by storm water and/or seepage from an adjoining development.
Groundwater	Is the groundwater depth within 10metres of the surface? If so, specify the depth of the water table (both permanent and seasonal).
Site Drainage and Subsurface Drainage	What is the drainage capability of the site?
Recommended Buffer Distances	Will any of the buffer distances recommended in the Corangamite Shire Council Wastewater Management Plan not be complied with?
Available Land Application Area	Consider all the site constraints and buffers that have been mentioned above. Is the site suitable for a wastewater system?
Location of Groundwater Bores	Are there any groundwater bores (both private and registered) that are located within 20 meters of the site?

**Table 3.3 - Soil Features**

Soil Feature	Comment	
Soil Depth	What is the soil depth?	
Coarse Fragments (%)	Are coarse fragments observed and in what percentage (%)?	
Soil Permeability and Design Loading Rates	What is the soil permeability and design loading rates?	
	Topsoil's (depth to 200mm)	Subsoil's (Depth from 200 – 600mm)
Description	Describe soil type.	Describe soil type.
Soil Category (AS/NZ 1547:2000)	What is the Soil Category?	What is the Soil Category?
Design Loading Rate (DLR mm/day)	What is the DLR mm/day?	What is the DLR mm/day?
Design Loading Rate (DLR mm/day) for trenches/beds	What is the DLR mm/day for trenches/beds?	What is the DLR mm/day for trenches/beds?
pH	What is the pH of the site?	
Electrical Conductivity	What is the electrical conductivity of the site?	

### 3.1 Soil Category and Effluent Design Loading Rate

What is the soil category and the proposed effluent loading rates for the proposed dwelling? The table below lists the soil categories as specified in the Australian Standard 1546:2008 and also includes the effluent design loading rates specified in Council's Wastewater Management Plan.

To assist you Council's Wastewater Management Plan has specified the soil category within the townships and specified the applicable design loading rates for these townships.

**Table 3.4 - Soil Category and Effluent Design Loading Rate**

Soil Category AS/NZ 1546:2008	Soil Type	Design Loading Rate	
		Septic Tank	Wastewater Treatment Plant
1	Sand & Gravel	Not Suitable	5
2	Sandy Loams	20	5

3	Loams	15	4
4	Clay Loams	10	3.57
5	Light Clays	5	2.86
6	Medium to Heavy Clays	5	2.14

Refer to the Table 3.1 & 3.2 in Council's Wastewater Management Plan.

#### 4. Land Capability Assessment Matrix

The Land Capability Assessment Matrix enables the LCA assessors to assign a rating from 1 to 5 for each of the constraints. Rating 1 indicates the site has excellent potential to address the individual constraint while a rating 5 is deemed as a constraint that is difficult to overcome or address within the current proposal. The LCA matrix must be completed for the whole site and must address if any of these constraints are on the proposed development site.

**Table 4.1 - Example of Land Capability Assessment Matrix**

Land Features	Land Capability Class Rating					Site Rating
	Very Good (1)	Good (2)	Fair (3)	Poor (4)	Very Poor (5)	
<b>General Characteristics</b>						
<b>Site drainage</b>	No visible signs of dampness	Moist soil, but no standing water in soil pit		Visible signs of dampness	Water ponding on surface	3
<b>Runoff</b>	None	Low	Moderate	High	Very High	2
<b>Flood Levels</b>	Never		<1 in 100	>1 in 100	<1 in 20	3
<b>Proximity to watercourses</b>	>60m				<60m	1
<b>Slope %</b>	0-2	2-8	8-12	12-20	>20	2
<b>Landslip</b>	No actual or potential failure		Low potential for failure	High potential for failure	Present or past failure	1
<b>Groundwater (seasonal watertable depth (m))</b>	>5	5-2.5	2.5-2.0	2.0-1.5	<1.5	4
<b>Rock outcrop (% of land surface containing rocks &gt;200mm)</b>	0	<10%	10-20%	20-50%	>50%	2
<b>Erosion Potential</b>	No erosion potential	Minor	Moderate	High	Severe erosion potential	2
<b>Exposure</b>	High sun and wind exposure		Moderate	Low sun and wind exposure		1
<b>Landform</b>	Hill crests, convex side slopes and plains		Concave sideslopes and footslopes		Floodplains and incised channels	1
<b>Vegetation Type</b>	Turf or pasture				Dense forestry	1



<b>Average Rainfall (mm/year)</b>	<450	450-650	650-750	750-1000	>1000	2
<b>Pan Evaporation (mm/year)</b>	<1500	1250-1500	1000-1250		<1000	2
<b>Fill</b>	No fill		Fill present			1
<b>Soil permeability category</b>	2 and 3	4		5	1 and 6	4
<b>Profile depth</b>	>2m	1.5m-2m	1.5-1	1-0.5m	>0.5m	3
<b>Presence of mottling</b>	None				Extensive	4
<b>pH</b>	6-8		4.5-6		<4.5, >8	1
<b>Course fragments (%)</b>	<10	10-20	20-40		>40	1
<b>Emerson Aggregate</b>	4, 6, 8	5	7	2, 3	1	1
<b>Electrical Conductivity (ECe)(dS/m)</b>	<0.3	0.3-0.8	0.8-2	2-4	>4	4
<b>Solidity ESP%</b>	<3		6-8	8-14	>14	5
<b>Overall Rating</b>	Very Poor					5

## 5. Type of Wastewater System Recommended

The LCA must nominate a preferred wastewater treatment system and nominate a management regime for the proposed wastewater treatment system.

The proposed treatment system must include a detailed design for the installation of the wastewater system and specify the location and area required for wastewater disposal.

The management system must include the name and contact details of the person/s contracted to undertake the monitoring during the first two years of the development and must demonstrate how this management system will be sustainable over the life of the treatment system.

## 6. Management Program for Wastewater System

When the LCA has been approved, and following Council approval to install the proposed wastewater treatment system, Council will then issue an "Approval to Use" certificate.

This "Approval to Use" certificate will contain a number of permit conditions that are based on the Environment Protection Authority's Certificate of Approval Conditions.

These conditions combined with the management conditions proposed in the LCA will form the basis of the management program to be undertaken by the land owner.

## 7. Site Plan

The site plan should specify the following:

- The location of the dwelling, proposed outbuildings and/or structures (swimming pools, tennis courts, vegetable gardens, driveways, rainwater tanks etc).
- The site gradients (if greater than 20% slope, contours to be at 5m intervals).
- Location of all water courses, creeks, streams, ocean.
- Location of any groundwater bores within 20m of the site boundary.
- Location of wastewater system including the location of the wastewater envelope. This may include a schematic of disposal envelope and construction design.

## 8. Size of Wastewater Envelope

To assist applicant's calculate the area required for the wastewater effluent envelope. Council has provided the area required for a 4 bedroom dwelling and has provided details of the area required for both a septic tank with effluent absorption trenches and or the area required for a wastewater treatment plant with sub surface disposal.

**Table 8.1 – Wastewater Envelopes**

Soil Category (To a depth of 450mm)	Soil Description	Area Required (sqm)	
		Septic (m <sup>2</sup> )	Wastewater Treatment Plant
1	Sand	Not suitable	250
2	Sandy loam	500	250
3	Loans	730	300
4	Clay Loans	1200	350
5	Light clays	1420	450
6	Medium to heavy clays	Not Suitable	510



# Land Capability Assessors

To assist landowner and developers, Council has provided the names and contact details of eight Land Capability Assessors.

These assessors are not endorsed by the Shire and their names and contact details are provided as a point of reference only.

The names of other LCA assessors are located in Victoria phone directory or can be located by undertaking a Google search.

COMPANY	ADDRESS	TELEPHONE NUMBER	MOBILE	FAX	E-MAIL
2020 Engineering Solutions	1745 Colac – Forrest Road, Colac 3249		0428141441	52334608	<a href="http://www.2020es.com">www.2020es.com</a>
Bruce Hollioake & Partners	102 Dawson Street, South Ballarat 3350	(03) 5338 8270		(03) 5338 8202	
Civil Test Pty Ltd (Mornington)	10 Latham Street, Mornington 3931	(03) 5975 6644		(03) 5975 9589	
Dr. Chris Day	2 Chaucer Street, Box Hill South 3128	(03) 9888 9548	0434 020 853		<a href="mailto:cday1576@hotmail.com">cday1576@hotmail.com</a>
EWS Environmental	8 Simmons Street, Box Hill North 3129	(03) 9846 0150		(03) 9849 0152	<a href="mailto:ews@bigpond.com">ews@bigpond.com</a>
Paladin White Pty Ltd (Bendigo)	PO Box 686, Strathfieldsaye, 3581	(03) 5439 3511	0419 189 879		<a href="mailto:larryw@bendigo.net.au">larryw@bendigo.net.au</a>
Provincial Geotechnical Pty Ltd (Ballarat)	3 Gnarr Street, Ballarat 3350	(03) 5338 1770	0428 522 408	(03) 5339 6598	
Provincial Geotechnical Pty Ltd (Geelong)	PO Box 1161, Geelong 3220	(03) 5223 1566	0428 522 408	(03) 5222 4560	
Robert van de graaff & Associates Pty Ltd	14 Linlithgow Street, Mitcham 3132	(03) 9872 4677	0438 456 601		<a href="mailto:Vdg.robert@vandergraaff-soils.com.au">Vdg.robert@vandergraaff-soils.com.au</a>
Woodhouse Graesser Johnston Pty Ltd	116 Timor Street, Warrnambool 3280	(03) 5562 4930		(03) 5562 0763	<a href="mailto:engineers@wgi.com.au">engineers@wgi.com.au</a>