

On-site Wastewater Management Training Course

Land Capability Assessment: Desktop Study

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Land Capability Assessment

- The Environment Protection Act 2017 sets out requirements for reducing the risk of harm to the environment or human health from all activities (including domestic wastewater management) using:
 - Part 3.2 General Environmental Duty (GED), and
 - Part 7.3 Obligations for Managers of Land or Infrastructure (OMLI)Infrastructure includes “wastewater treatment and septic tank systems”

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General Environmental Duty

- Commence 1 July 2021 under EP Act 2017
- Businesses (and persons) are responsible for protecting the environment and human health
- Intended to reduce the risk of harm from activities:
 - to human health and the environment
 - from pollution or waste
- Additional detail in Section 13.1 in notes

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EP Regulations 2021

- Impose obligations for managers (Councils) relating to onsite wastewater management (OWM) systems (<5,000L/day)
- Council (A20) permit and condition the construction, installation, alteration and validation of OWM systems
- If required by Council, the permit application must be supported by a Land Capability Assessment

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Land Capability Assessment

- Residential developments that generate wastewater may require a Land Capability Assessment (LCA) to be undertaken at some time before the development proceeds, for submission to the local Council
- The LCA should demonstrate that wastewater can be treated and retained within allotment boundaries
- May be done at subdivision (required) or single lot development stage

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LCA Definition

- Environmental Protection Regulations 2021 (EPR) defines LCA as:
 - “an assessment of the risks of harm to human health and the environment of the proposed or existing on-site wastewater management system at the site, taking into account the proposed or existing use of the system”
- Regulation 26(2)(e) lists a LCA as prescribed information for an A20 Permit application “if required by the council or Victorian Planning Provisions”

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Reference Material

- Guideline for Onsite Wastewater Management (GOWM) (EPA, 2024)
- Guideline for Onsite Wastewater Effluent Dispersal and Recycling Systems (EDRS Guideline) (EPA, 2024)
- Code of Practice (CoP) – Onsite Wastewater Management, Publication 891.4 (superseded)
- Victorian Land Capability Assessment Framework (2nd Edition, MAV, DEPI & EPA 2014), or as amended

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Victorian LCA Framework

- Model LCA Report (MAV & DSE, 2006 as amended)

Document and water balances from www.mav.asn.au

- Victorian Land Capability Assessment Framework (Word - 1.1MB)
- VLCAF irrigation area sizing spreadsheet (Excel – 42.0KB)
- VLCAF trench and bed sizing spreadsheet (Excel – 27.9KB)

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LCA Purpose

- Identify locality, landscape and soil characteristics significant to the selection, location and size of an OWMS
- Assess capability to sustainably manage all wastewater within allotment boundaries (containment)
- Quantify risk and gather relevant information to inform the design process and formulate a sustainable Wastewater Management Plan
- Enable 'authority' to make informed decision on viability of an unsewered development proposal

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When is LCA required?

- Recommended for all unsewered development
- May not be required by Council if site is considered low risk or if adequate information is already available
- In many LGA's OWMP will inform 'risk' status of unsewered land
- Currently LCA is mandatory for unsewered development in Special Water Supply Catchment areas (Ministers Guideline: Policy 1); where, dwelling density >1:40 ha or non-residential development proposed

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Who should undertake LCA?

- Must be completed by a person that Council considers is "suitably qualified and to a standard acceptable to the Council"
- Generally, a person who has appropriate technical expertise and experience in site and soil assessment and on-site wastewater design
- Councils may require written verification of qualifications, experience, professional membership and professional indemnity (PI) insurance

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Consultation and Review


- Council officers assessing LCAs should be similarly qualified and experienced to competently and confidently interpret and evaluate LCA reports and specify permit conditions
- Developers and LCA Assessors should consult with Council before and during the preparation of a LCA

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Important Advice

- Consultation is the Key: early consultation between Council and the Assessor is vital in determining what is expected in the LCA, what special issues might apply in the area, or additional information available from Council
- Other matters:
 - planning or sensitivity overlays
 - utility / infrastructure plans
 - legal instruments (e.g. easements)
 - local OWM performance issues

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Undertaking LCA

- Single-lot or subdivision/planning scheme changes
- Focus here is on single-lot LCAs
- Reporting based on Victorian Land Capability Assessment Framework (MAV, 2014) and Australian Standard AS/NZS1547:2012
- LCA assigns a level of constraint to each site and soil characteristic
- Should be undertaken “as early as possible in the project planning phase”

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LCA Framework procedure

- Site Details
- Desktop Assessment (focus of this session)
- Field Investigation (Site and Soil assessment) and Interpretation
- Constraint (Risk) Analysis
- OWMS (Treatment and EDS) Design
- Risk Mitigation
- Management and Maintenance
- Detailed Site Plans

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‘Site’ characteristics

- Aspect
- Climate
- Erosion and landslip
- Fill
- Flooding
- Groundwater
- Suitable land area
- Landform
- Rock outcrops
- Setback distances
- Site drainage
- Run-on and run-off
- Seepage
- Slope (%)
- Surface hydrology
- Vegetation and cover

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Desktop Assessment

- Undertaken in consultation with the Site owner
- Collects preliminary data from readily available sources
- Provides an overview of opportunities and constraints
- Determines what information is relevant
- Identifies information gaps and what additional information is required

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Information Sources

- Property boundaries, roads, land zoning and planning specifications
- Topographic information (contours, landscape position and surface hydrology)
- Imagery (current and historic)
- Soil mapping
- Climate data (rainfall and evaporation)
- Groundwater resources (domestic and public supply)
- Location of services (water, sewer, gas, electricity etc.)

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Information Sources

- Land use mapping (adjacent and regional context e.g. agriculture)
- Environmental Overlays (Flooding, Bushfire, Ecology and Special Water Supply Catchment Area)
- Strategic Plans (development strategies, lot size requirements, backlog sewer areas etc.)
- Known OWMS limitations (poor soils, shallow rock or GW in locality)
- Owner resourcing / capacity and understanding

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Council GIS Data

- Many Councils have their own GIS database containing cadastre and property information
- Some Councils will have layers for contours, flood, bushfire, planning, vegetation, assets
- Councils may link OWMS and development applications and approvals to property data
- You may be able to add / import data layers to the existing council managed GIS. Confirm parameters with your GIS support staff

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Maps and Spatial Data

- Department of Transport and Planning manage VicMap™ www.land.vic.gov.au/maps-and-spatial
- VicMap is government data source
- Data is viewable on Digital Twin Victoria
- Available to government, private industry and public
- Provides maps (topographic), spatial data and imagery (aerial, elevation)
- May have licencing costs for some services

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Imagery

- Satellite imagery www.google.com/earth/
- Free to download and activate
- Image quality varies
- Location (latitude/longitude), elevation and has capacity for measurement and historical imagery
- Images can be rotated for different views (including Street View)

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Aerial Imagery

- NearMap – Aerial imagery www.nearmap.com
- Subscription service
- High resolution aerial photos with georeferencing
- Current and historical aerial imagery
- Location (latitude/longitude), elevation and has capacity for measurement and historical imagery time-series

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Case Study - example



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Topographic Maps

Show:

- Landscape
- Contours
- Anthropogenic (human) features
- Cadastral boundaries
- Grid references
- 1:25,000 maps have 10 metre contours

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Topographic Maps

Can determine or identify:

- Shape of land
- Drainage direction
- Water bodies and drainage lines
- Slope
- Relief (difference in elevation)
- Aspect (facing direction)

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Topographic Maps



Image: MapshareVic

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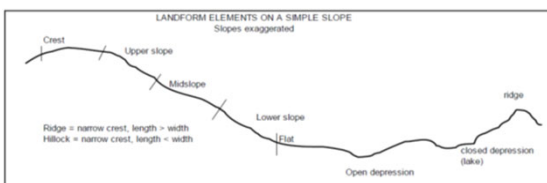
Interactive Maps - Australia

- Geoscience Australia www.ga.gov.au
 - GA Portal – Geological, boreholes, minerals, ASRIS (soils), digital elevation
- Elvis – Elevation and Depth – Foundation Spatial Data elevation.fsdf.org.au
 - Digital Elevation Model, Point Cloud and Bathymetry – used to generate contours
 - LIDAR data available to 0.5-1.0m resolution

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Site Landform

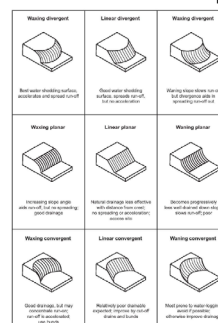


Landform elements on a simple slope

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Slope Configuration



- Slope (gradient and shape)
- Important to understand how surface water will flow in or near LAA
- Waxing / waning / linear
- Converging or diverging


FIGURE C2 SLOPE CONFIGURATION AND SURFACE DRAINAGE

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Interactive Maps - Victoria

- Resources Victoria – GeoVic
resources.vic.gov.au/geology-exploration/maps-reports-data
– Registered or anonymous user option
– Geological, mineral, land-use, borehole and well data
- MapshareVic
www.mapshare.vic.gov.au/mapsharevic
– Property data, SWSC, wetlands, contours

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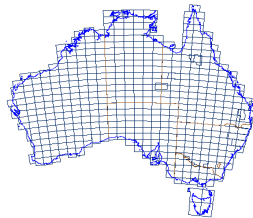
Interactive Maps - Victoria


- Department of Transport and Planning – VicPlan
- www.mapshare.vic.gov.au/vicplan
 - Special Water Supply Catchment Areas
 - Planning (projects, zones)
 - Other (heritage, bushfire, contours)
 - Property (parcels, crown land, roads)

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Geological Maps


- Scanned 1:250,000 geological maps of much of Australia available from Geoscience Australia:
- www.geoscience.gov.au
- Geological maps of Victoria available from:
- <http://dpistore.efirst.com.au>



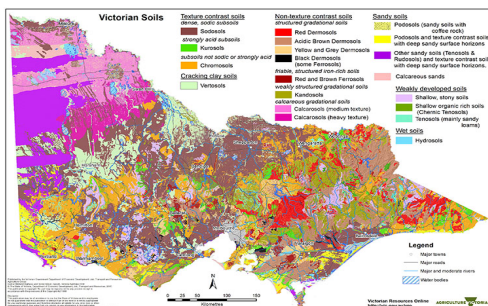
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Soil Information Sources

- Atlas of Australian Resources, Volume 1 Soils and Land Use (Division of National Mapping, Canberra, 1980)
- Victorian Resources Online (VRO) soils maps and data from Agriculture Victoria
vro.agriculture.vic.gov.au
 - Generally 1:100,000 – 1:250,000 scale
 - Detailed 1:25,000 (irrigation regions)

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Soil Maps



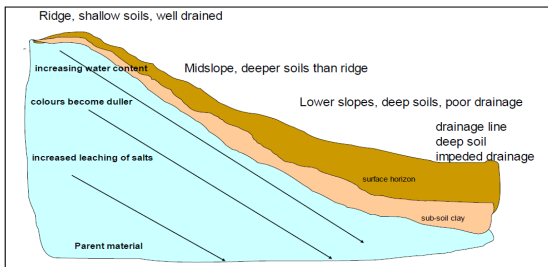
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Soil Data online

- Australian Soil Resource Information System (ASRIS)
<http://www.asris.csiro.au/mapping/viewer.htm>
- TERN ecosystem data collection (90m resolution) Australian Soil Classification
<https://www.tern.org.au/news-australian-soil-classification-map/>

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Soil Properties and Topography



Position in landscape significant in soil profile characteristics

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Climate Data

- Bureau of Meteorology www.bom.gov.au
- Rainfall
- Evaporation
- Consider data range (years) and location suitability
- Compile local climate data into zones across the council area based on topography
- SILO data drill is available if no suitable or local station

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SILO Data Drill

- QLD DNR www.longpaddock.qld.gov.au/silo/

SILO Climate data online resource

SILO (Scientific Information for Land Owners) is a Queensland Government database containing point and gridded daily climate data for Australia from 1889 until present. SILO was designed to serve the needs of agricultural and hydrological modelling and bridges the gap between meteorological services and modellers.

SILO provides daily point and spatially interpolated data with continuous (no missing days) datasets covering the period of 1889 until present. Consistent long-term climate data-series supports various modelling efforts within the Australian environmental sciences community.

SILO climate data services:

- Historical daily climate data for Australia, 1889-present
- Observed data with data in-filling
- SILO data are complete and ready to use
 - Gridded datasets (spatial data for a given day)
 - Point data (time-series data for a given location)
- SILO does nightly processing



Patched datasets

| Color | SILO data | Observed data |
|--------|-----------|---------------|
| Green | SILO data | Observed data |
| Yellow | SILO data | Observed data |
| Red | SILO data | Observed data |

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Groundwater

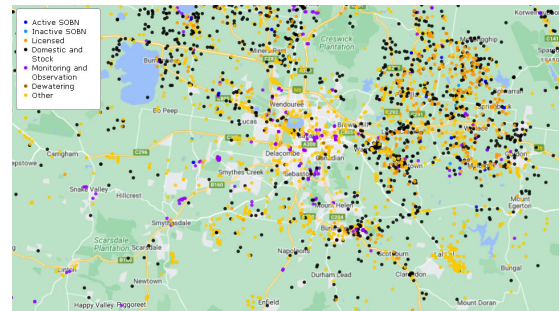


Image: DELWP (GW bores Ballarat)

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Groundwater

- Visualising Victoria's Groundwater www.vvg.org.au
 - Groundwater bores, mineral bores, depth of watertable, drill a virtual bore
 - Other (EPA audit reports and registered sites, wetlands, ecosystems, elevation, geology, SWSCA, CMA)
- DELWP Water Measurement Information System (WMIS) www.data.water.vic.gov.au
 - Surface water, groundwater, state bores

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Flooding


- Melbourne Water
- Local Flood Planning Overlays (SBO, LSIO, FO and UFZ)
- Local Catchment Management Authority
- Australian Flood Risk Information Portal – Geoscience Australia
afrip.ga.gov.au/flood-study-web/#/search
 - Pins and data on flood studies and sources

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Other Resources

- Hydrological maps (waterways)
- Vegetation maps
- Bushfire maps
- Special Water Supply Catchment maps
- Maps of services (water, sewer)
- Local studies
- Council planning documents

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Utility / Service Searches

- Before You Dig Australia
www.byda.com.au
- Asset location referral service
- Interactive map to order asset plans
- Protection of people and assets
- Certified locator database (Telstra)

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Constraint Analysis

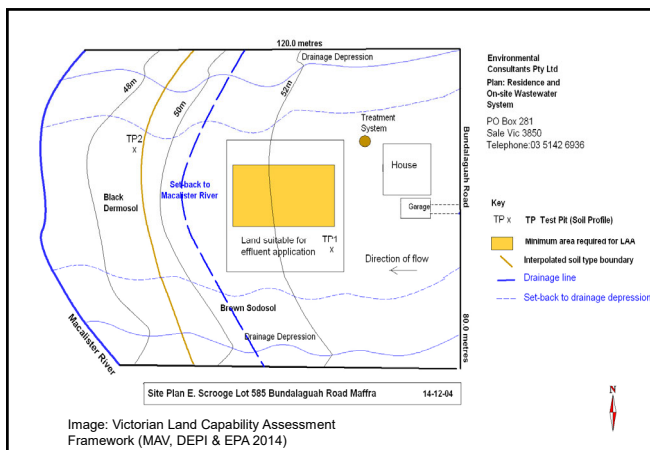
- Table 3 (Site) and Table 4 (Soil) of the LCA Framework provide semi-quantitative risk assessment methodology (MAV, 2014)
- Level of 'constraint' documented for site and soil characteristics, based on observed field conditions
- Moderate and Major constraints to OWMS should be addressed to the extent that the design can reasonably be expected to meet appropriate public health, environmental and amenity requirements
- Suitable mitigation measures explored

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Site Plan and Description

- A Site Plan should be prepared showing, as a minimum:
 - contours, boundaries, location of watercourses, location of any buildings,
 - the wastewater treatment system, and
 - the area available for the application of the treated effluent
- A description of the nature of the key site and soil features

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Buffers or Setbacks

- Provide mitigation against unidentified or unintended hazards
- Reduce potential pathways for human and environmental exposure
- Valuable and cost-effective risk management strategy for OWM
- Table 4-10 in the GOWM (Tier 1) defines conservative minimum setback distances based on level of treatment (Primary, Secondary etc.)

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Buffers or Setbacks

- Alternative setback distances may be applied where appropriate protections/controls can be demonstrated
- Described as a Tier 2 approach in the EDRS (EPA, 2024)
- Acceptable 'minimum' setbacks can be determined using a risk-based approach such as that presented in Appendix R of AS/NZS1547:2012
- For recommended constraint ranges see Table 24 of EDRS

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Desktop Summary

- Tabulate data
- Assessment of level of constraint for each relevant site and soil characteristic
- Design on most limiting feature, or
- Engineer out (mitigate) limiting features

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Preliminary 'Constraint' mapping

- Undertaken in advance of and to prepare for field study
- Guides field study
- Identifies data gaps to be filled by field study
- Most importantly, saves time and money

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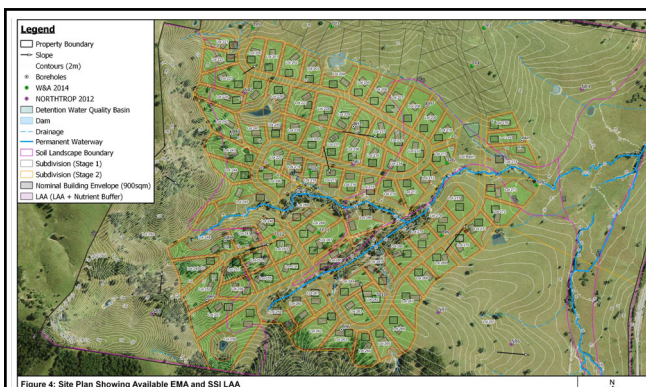


Into the Field we go....

Desktop Study – the study will have identified potentially suitable effluent dispersal areas (EDAs) from available information sources. A preliminary constraints map will also identify:

- Appropriate setback areas from natural or built features (existing and proposed)
- Identified physical constraints (e.g. bedrock, fill)
- Data gaps (areas for investigation)
- Regional soil landscapes (including boundaries)
- Recommended soil (test pit) locations
- Indicative groundwater depth

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