On-site Wastewater Management Training Course

Site Assessment: Desktop Study

Land Capability Assessment Site and Soil Evaluation (SSE)

Aim:

- Identify landscape and soil characteristics significant in the selection, location and sizing of an on-site sewage management system
- Assess the capacity of the site to sustainably manage sewage within lot boundaries
- Identify public and environmental health risks of onsite sewage management especially the effect on groundwater and surface water on the site

Site and Soil Characteristics

- The site must have sufficient space for:
  - The treatment system
  - The land application system, and
  - Appropriate buffers
- The soil must be appropriate and of sufficient depth to accept and further treat the quantity and quality of effluent to be discharged

Land Capability

- Defines biogeophysical capacity of land to support a given land use
- Land suitability introduces an economic consideration
- Designs should aim to be both:
  - Sustainable
  - Affordable

Land Capability Classification

- Groups soils into units according to their suitability for particular usage
- Often developed by State agencies for agriculture but commonly not available for on-site wastewater management suitability
- Can be developed for individual regions, catchments etc. using GIS

Stages of Data Collection

- Desktop study
- Site and soil check
- Soil description and profile assessment
- Calculations
- Collection of additional data
- Identify site and soil opportunities and constraints
- Selection of appropriate system

Desktop Study

- Collects preliminary data from readily available sources
- Provides an overview of opportunities and constraints
- Determines what information is relevant
- Identifies information gaps exist and what additional information is required

Detail of Investigation

Guidance documents WA Health (2018) and AS/NZS 1547:2012) recommend different 'levels of investigation' depending on project intent or scale

- **Subdivision or Rezoning** – investigation will focus on regional or site-wide implications of OSSM (soil characterisation, system suitability, system density, cumulative impacts, planning considerations etc.)
- **Single-lot Development** – at this scale investigation will focus on site-specific attributes (buffers, soil controls, drainage etc.) and optimising OSSM (treatment / application) options

Site and Soil Evaluation

Site and Soil Evaluation (AS/NZS 1547) refers to the procedural investigation of land for the purposes of evaluating its potential for onsite sewage management, including land application of effluent

- Should be undertaken by an appropriately qualified person with specific experience in wastewater applications
- Specific advice regarding field investigation procedures in AS/NZS 1547:2012 (Appendices C and D)

Site and Soil Characteristics

- AS/NZS 1547:2012 provides a guide (Appendices B-D) to site and soil characteristics that should be considered in onsite wastewater investigations
- Other matters may also warrant consideration based on site-specific information

Example Site Characteristics

- Flood potential
- Exposure
- Slope (%)
- Landform
- Run-on and seepage
- Erosion potential
- Drainage (indicative)
- Fill
- (Available) Land Area
- Geology and rock outcrops
- Vegetation

Desktop Study

Information sources include:

- Satellite imagery *www.google.com/earth/*
- Free to download and activate
- Image quality varies
- Provides information on location (latitude/longitude), elevation and has capacity for measurement of distance
- Images can be rotated for different views (Street View)

Google Earth

Topographic Maps

Show:

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

Topographic Maps

Can determine:

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

Topographic Maps

Topographic map SIX Maps

Topographic Maps

Topographic map maps.gosford.nsw.gov.au

Maps and Spatial Information

- NSW *www.maps.six.nsw.gov.au*
- NSW *www.nratlas.nsw.gov.au*
- TAS *www.mrt.tas.gov.au*
- VIC *www.dpi.vic.gov.au*
- VIC *www.land.vic.gov.au*
- WA *www2.landgate.wa.gov.au*

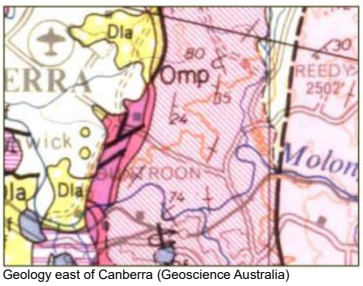
Geological Maps

- Scanned 1:250,000 geological maps of much of Australia available from Geoscience Australia *www.geoscience.gov.au*

Geological Maps

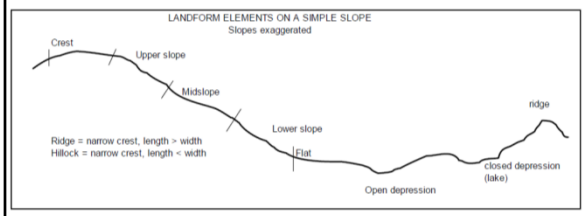
- Select location
- Choose resolution
- Relate landforms
- Solid geology
- Superficial deposits
  - Alluvium
  - Beach deposits
  - Colluvium

Geological Map



Geology east of Canberra (Geoscience Australia)

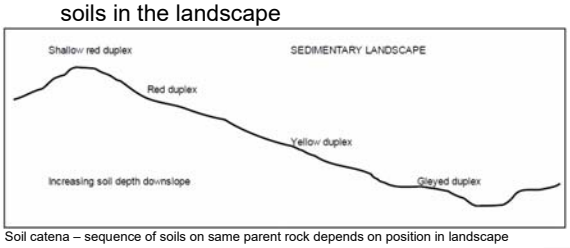
Landform Elements



Landform elements on a simple slope

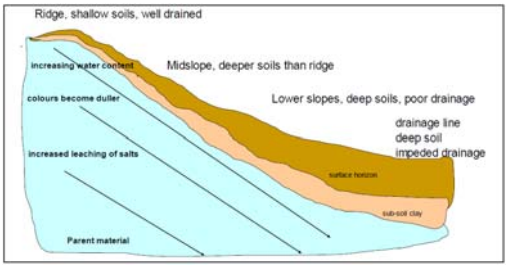
Soil Landscape

- The soil landscape describes the pattern of soils in the landscape



Soil catena – sequence of soils on same parent rock depends on position in landscape

Soil Properties and Topography



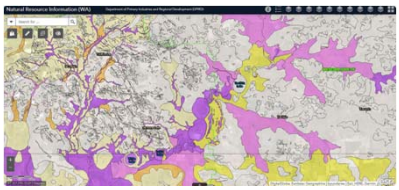
Position in landscape significant in soil profile characteristics

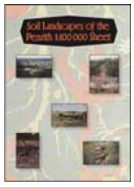
Soil Landscape Sources

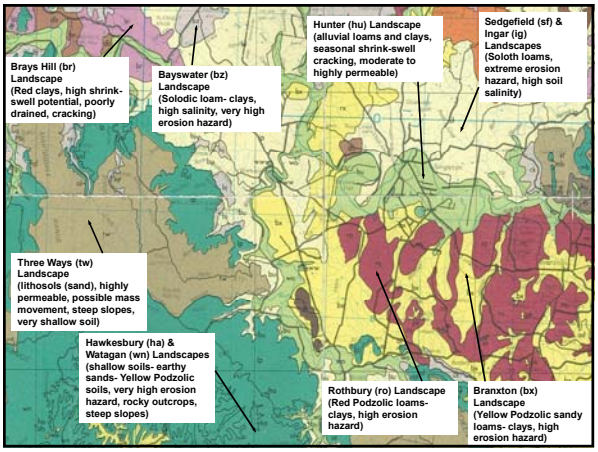
- Atlas of Australian Resources, Volume 1 Soils and Land Use (Division of National Mapping, Canberra, 1980)
- NSW Soil Landscapes (1:100,000) (NSW Department of Land and Water Conservation)
- VIC soils maps and data from Department of Primary Industries
- WA NR info portal – Primary Industries and Regional Development (DPIRD):Soil Landscape Mapping

Soil Landscape Maps

- Soil landscape maps covering WA at varying scales from DPIRD
- *https://catalogue.data.wa.gov.au/dataset/soil-landscape-mapping-best-available*







Other Related Datasets Online

- Vegetation
- Digital Elevation Models
- Topo and Contour Mapping
- Hydrozones (soil/water and GW)

- Can be accessed via:
- *www.agric.wa.gov.au/resource-assessment/nrinfo-western-australia*

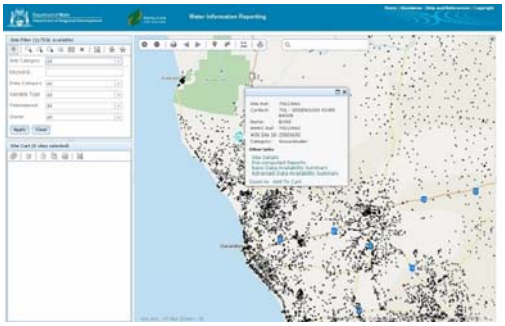
Climate Data

- Bureau of Meteorology *www.bom.gov.au*
- Rainfall
- Evaporation
- SILO or Data Drill data available if no suitable or local station

Rainfall and Evaporation Data

- Use to prepare a water balance

Groundwater



WA Department of Water – Hydrogeological Atlas

Groundwater

- WA Department of Water *http://www.water.wa.gov.au/maps-and-data*
- WA Department of Agriculture and Food https://www.agric.wa.gov.au/resource-assessment/interactive-groundwater-and-salinity-map-south-west-agricultural-region#legendmap

Sensitive Receptors

- Wetlands and Marine Reserves
- World Heritage Areas
- Rare Flora
- Endangered Ecological Communities (EEC)
- Threatened Lake systems

https://www.der.wa.gov.au/your-environment/environmentally-sensitive-areas

Desktop Summary

- Tabulate data
- Assessment or rating – Level of 'constraint' or 'limitation' for OSWM

- Design on most limiting feature/s,
- Engineer out limiting features, or
- Provide mitigation to address limitation.

NSW Site Assessment: Rating

Site Feature	Relevant System(s)	Minor Limitation	Moderate Limitation	Major Limitation	Restrictive Feature
Flood potential	All land application systems	Rare, above 1 in 20 year flood contour		Frequent, below 1 in 20 year flood contour	Transport of wastewater off-site
	All treatment systems	Vents, openings, and electrical components above 1 in 100 year flood contour		Vents, openings, and electrical components below 1 in 100 year flood contour	Transport of wastewater off-site. System failure and electrocution hazard
Exposure	All land application systems	High sun and wind exposure		Low sun and wind exposure	Poor evapotranspiration
Slope%	Surface irrigation	0-6	6-12	>12	Run-off, erosion
	Sub-surface irrigation	0-10	10-20	>20	Run-off, erosion
	Absorption system	0-10	10-20	>20	Run-off, erosion
Landform	All systems	Hill crests, convex side slopes and plains	Concave side slopes and footslopes	Drainage plains and incised channels	Groundwater pollution hazard Resurfacing hazard
Run-on and upslope seepage	All land application systems	None - low	Moderate	High - diversion not practical	Transport of wastewater off-site.

Preliminary Constraints 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

Into the Field We Go……..

A preliminary constraints map will 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