

## On-site Wastewater Management Training Course

### Site Assessment: Desktop Study

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## 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

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## Land Capability Assessment Site and Soil Assessment

- Identify locality, landscape and soil characteristics significant in the selection, location and sizing of an on-site wastewater management system (OWMS)
- Assess the capacity of the Site to sustainably manage sewage within lot boundaries
- Adequately identify and assess the public and environmental health risks of OWM, especially the effect on groundwater and surface water resources

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## Site and Soil Characteristics

- Site analysis must assess risk factors (public health, environment, cultural, economic)
- The Site must have sufficient space for:
  - The wastewater treatment unit (WTU)
  - The land application system (LAA), and
  - Appropriate separation distances (buffers)
- The soil must be of appropriate quality and sufficient depth to accept and further treat the quantity and quality of effluent to be discharged

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## Site and Soil Evaluation (SSE)

- **Site and Soil Evaluation** (per AS/NZS 1547) required by TAS OWMS Guideline (2016) for all 'new' or 'altered' OWMS
- SSE refers to the procedural investigation of land for the purposes of evaluating its potential for OWM, including land application of effluent
  - Should be undertaken by an appropriately qualified ('accredited') person with specific experience in wastewater applications (C3.4 AS/NZS 1547:2012)
- Specific advice regarding field investigation procedures in Appendix A of AS/NZS 1547:2012

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## Levels of Investigation

Guidance documents (AS/NZS 1547 and EPA 891.4) recommend different 'levels of investigation' depending on project intent or scale

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

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## Stages of Data Collection

- Desktop study
- Site and soil check (SSC)
- Soil description and profile assessment
- Calculations
- Collection of additional data
- Identify site and soil opportunities and constraints
- Selection of appropriate system (WTU and LAA)
- Identification of appropriate risk management or mitigation measures

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## Desktop Study

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

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## Site and Soil Characteristics

- AS/NZS 1547:2012 (Appendices B-D) provides a guide to the range of Site and soil characteristics that should be considered in on-site wastewater investigations
- Other matters may also warrant consideration based on site-specific information:
  - planning or sensitivity overlays
  - utility / infrastructure plans
  - legal instruments (e.g. easements)
  - local OWM performance issues

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## Level of Constraint

- AS/NZS 1547:2012 does not take a 'prescriptive' approach to assessing Site information
- The level of 'Constraint' for each characteristic must be interpreted by the SSE practitioner (assessor)
- Other guidelines (DLG 1998, VIC EPA 746.1) have used a semi-quantitative approach to apply a hazard or constraint 'rating' to Site attributes
- AS/NZS 1547:2012 directs the assessor to take a systems approach to SSE, incorporating a range of information (research, empirical and anecdotal) to describe the appropriate level of constraint

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## Site Characteristics

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

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## Desktop Study

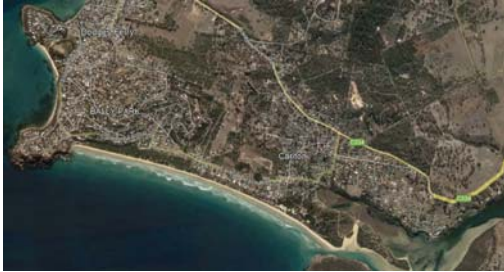
Information sources include:

- Satellite imagery [www.google.com/earth/](http://www.google.com/earth/)
- Free to download and activate
- Image quality varies
- Provides information on 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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## Google Earth



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## Area of Interest



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## Topographic Maps

Show:

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

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## Topographic Maps

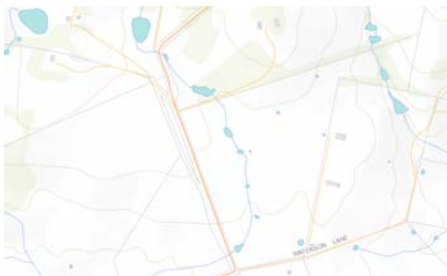
Can determine:

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

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## Geological Maps

- Scanned 1:250,000 geological maps of much of Australia available from Geoscience Australia  
[www.geoscience.gov.au](http://www.geoscience.gov.au)

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## Geological Maps

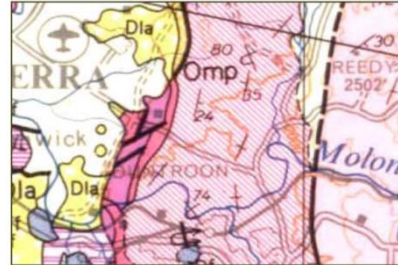
- Select location
- Choose resolution
- Relate landforms
- Solid geology
- Superficial deposits
  - Alluvium
  - Beach deposits
  - Colluvium



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## Geological Map



Geology east of Canberra (Geoscience Australia)

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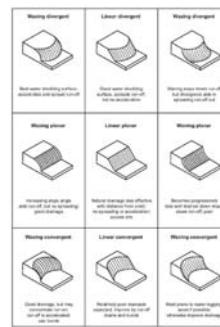
## Maps and Spatial Information

- NSW [www.maps.six.nsw.gov.au](http://www.maps.six.nsw.gov.au)
- NSW [www.nratlas.nsw.gov.au](http://www.nratlas.nsw.gov.au)
- TAS [www.thelist.tas.gov.au](http://www.thelist.tas.gov.au)
- VIC [www.dpi.vic.gov.au](http://www.dpi.vic.gov.au)
- VIC [www.land.vic.gov.au](http://www.land.vic.gov.au)
- WA [www2.landgate.wa.gov.au](http://www2.landgate.wa.gov.au)

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## Slope Configuration

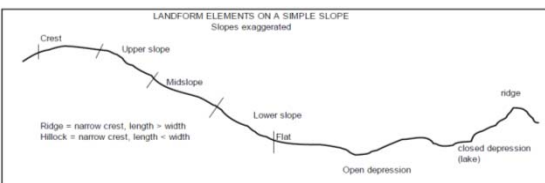


- Slope (gradient and shape)
- Important to understand how surface water will flow in or near LAA
- Waxing / waning / linear
- Converging or diverging

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## Site Landform

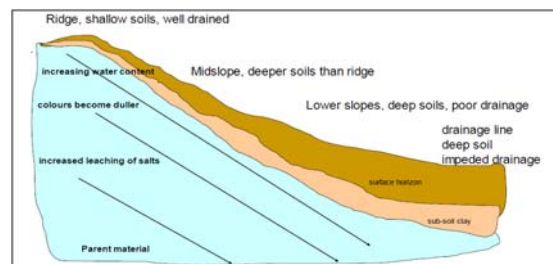


Landform elements on a simple slope

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## Soil Properties and Topography



Position in landscape significant in soil profile characteristics

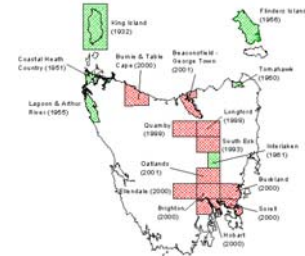
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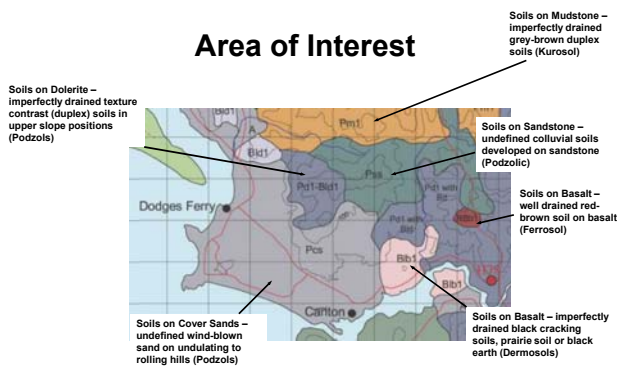
## Soil Information Sources

- Reconnaissance Soils Maps of Tasmania (1:100,000) <https://nre.tas.gov.au/agriculture/land-management-and-soils/land-and-soil-resource-assessment/soil-maps-of-tasmania>
- Atlas of Australian Resources, Vol 1 Soils and Land Use (Division of National Mapping, Canberra, 1980)

## Reconnaissance Mapping



## Area of Interest



## Soils 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/>

## Climate Data

- Bureau of Meteorology [www.bom.gov.au](http://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 preliminary water balance

Site name: HOBART AIRPORT WEST		Site number: 094008		Commenced: 1956									
Latitude: 42 57' S		Longitude: 147 50' E		Elevation: 4 m									
				Operational status: Open									
<b>Statistics</b>													
Mean annual (mm)	41.5	34.9	38.5	40.2	37.2	34.2	41.4	47.2	41.2	44.5	51.1	40.2	46
Highest annual (mm)	101.4	108.4	112.4	107.7	103.4	108.2	105.1	118.4	117.8	118.4	103.3	108.4	94
Lowest annual (mm)	20.7	19.4	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9
Days	2.6	3.9	1.9	7.4	1.4	4.2	8.8	8.0	1.9	1.9	8.1	30.2	84
<b>Records</b>													
Decade 1 number (mm)	10.9	6.0	10.9	10.4	10.2	11.7	13.9	14.9	17.9	16.9	17.7	16.4	94
Decade 2 number (mm)	10.2	17.2	20.3	20.9	20.9	27.9	37.2	42.1	38.1	39.0	40.3	42.4	47.2
Decade 3 number (mm)	10.0	10.0	71.3	70.7	71.3	64.1	74.9	82.0	87.8	82.1	82.3	103.2	94
Highest daily (mm)	10.0	84.0	81.4	103.3	79.4	48.8	82.0	84.0	81.8	83.3	40.3	94.2	103.3
Days	14	20	12	18	18	18	18	18	18	18	18	18	18
Mean number of days of rain	8.0	8.0	10.1	10.9	11.8	11.4	13.0	13.0	13.7	13.8	12.0	14.0	94
Mean number of days of rain > 1 mm	8.0	8.0	8.2	8.9	7.1	8.8	7.7	8.0	8.0	8.8	7.9	7.2	94
Mean number of days of rain > 10 mm	1.0	1.1	0.9	0.9	0.9	1.0	0.9	1.1	0.9	1.1	1.2	1.4	11.9
Mean number of days of rain > 25 mm	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.3	0.1	0.4	94
Mean daily evaporation (mm)	6.0	6.9	6.2	2.9	1.9	1.3	1.4	2.0	3.1	4.1	4.8	6.0	3.9

## Data Drill

- QLD DNR [www.longpaddock.qld.gov.au/silo/](http://www.longpaddock.qld.gov.au/silo/)

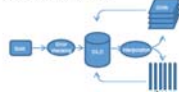
### SILO Climate data online resource

SILO (Scientific Information for Land Owners) is a Queensland Government database containing point and gridded daily climate data for Australia from 1989 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 1989 until present. Consistent long-term climate data-series supports various modelling efforts within the Australian environmental sciences community.

### SILO climate data service:

- Historical daily climate data for Australia, 1989-present
- Observed data with data im-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:



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## Groundwater Resources

- The Groundwater Information Access portal <https://wrt.tas.gov.au/groundwater-info/>



Groundwater bores around Dodges Ferry / Carlton

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## Other Resources

Land Information System Tasmania (LIST)

<https://maps.thelist.tas.gov.au/listmap/app/list/map>

- Zoning Maps
- Hazard Maps (Flood, Bushfire etc.)
- Protection Maps (Vegetation, drinking water catchments, fisheries etc.)
- Air photographs
- Local studies

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## Sensitive Receptors

Land Information System Tasmania (LIST)

<https://maps.thelist.tas.gov.au/listmap/app/list/map>

- Acid Sulfate Soils
- Wetlands and Marine Reserves
- Hydrology and hydrography
- Priority Aquaculture Areas
- Endangered Ecological Communities (EEC)
- Threatened Species

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## Sensitive Receptors



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## Desktop Summary

- Tabulate data
- Assessment or rating – Level of 'constraint' or 'limitation' for OWM
- Design on most limiting feature/s,
- Engineer out limiting features, or
- Provide mitigation to address limitation

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## 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

## 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 OWMS
- Appropriate buffer selection based on TAS OWMS Guideline (2016) and procedures in AS/NZS 1547:2012

## TAS OWMS Guideline (2016) Buffers

- Buildings – 3m (upslope) / 6m (downslope)
- Surface Waters – 100m
- Property Boundary – 40m or 2m (upslope) / 2m per degree (downslope)
- Water Supply bore/well – 50m and NOT within zone of influence
- Vertical Separation:
  - Groundwater – 1.5m (primary) / 0.6m (secondary)
  - Limiting layer – 1.5m (primary) / 0.5m (secondary)

## AS/NZS 1547:2012 Buffers

**TABLE 11**  
GUIDELINES FOR CONSTRUCTION AND VERTICAL SEPARATION DISTANCES  
(See also 11.1 construction site Table 10)

Site feature	Setback distance range (1)	Site constraint items of specific concern (See Table 10)
Property boundary	1.5 – 10 (See Note 2)	A, G, J
Building footprint	0.5 – 0 (See Note 2)	A, G, J
Surface water (See Note 3)	10 – 100	A, B, D, E, K, L, J
Roofs, walls (See Note 3 and 4)	10 – 100	A, G, L, J
Recreational areas (Children's play areas, swimming pools and so on) (See Note 5)	3 – 10 (See Notes 6 and 8)	A, E, J
Un-ground water table	4 – 10 (See Note 10)	A, K, J
Horizontal well and Endowments, man-made, landfill (See Note 11)	0.5 to 20 (range from base of well) (See Note 12)	D, G, H
Groundwater (See Notes 9, 14, and 15)	0.5 – 1.5	A, C, E, K, L, J
Hardcore or landfill	0.5 – 1.5	A, G, J

**NOTES:**  
1. The exact setback distance should be commensurate with the level of risk to public health and the environment. For example, the maximum setback distance should be smaller where site features feature a high risk of the constraint items. The setback distances should be based on an assessment of the site for the constraint items.  
2. The setback distance should be a minimum of 1.5m for residential sites.  
3. The setback distance should be a minimum of 1.5m for industrial sites.  
4. The setback distance should be a minimum of 1.5m for commercial sites.  
5. The setback distance should be a minimum of 1.5m for public places.  
6. The setback distance should be a minimum of 1.5m for public places.  
7. The setback distance should be a minimum of 1.5m for public places.  
8. The setback distance should be a minimum of 1.5m for public places.  
9. The setback distance should be a minimum of 1.5m for public places.  
10. The setback distance should be a minimum of 1.5m for public places.  
11. The setback distance should be a minimum of 1.5m for public places.  
12. The setback distance should be a minimum of 1.5m for public places.

**TABLE 12**  
SITE CONSTRAINT TABLE FOR DEVELOPMENT OF SETBACK DISTANCES  
(used as a guide to determining appropriate setback distances from Table 11)

Item	Constraint	Item	Constraint
A	Residential amenity	H	Horizontal well and endowments
B	Surface water	I	Groundwater
C	Groundwater	J	Property boundary
D	Horizontal well and endowments	K	Un-ground water table
E	Groundwater	L	Recreational areas
F	Surface water	M	Hardcore or landfill
G	Property boundary	N	Recreational areas
H	Horizontal well and endowments	O	Surface water
I	Groundwater	P	Recreational areas
J	Property boundary	Q	Surface water
K	Un-ground water table	R	Recreational areas
L	Recreational areas	S	Surface water
M	Hardcore or landfill	T	Recreational areas
N	Recreational areas	U	Surface water
O	Surface water	V	Recreational areas
P	Recreational areas	W	Surface water
Q	Surface water	X	Recreational areas
R	Recreational areas	Y	Surface water
S	Surface water	Z	Recreational areas
T	Recreational areas	AA	Surface water
U	Surface water	AB	Recreational areas
V	Recreational areas	AC	Surface water
W	Surface water	AD	Recreational areas
X	Recreational areas	AE	Surface water
Y	Surface water	AF	Recreational areas
Z	Recreational areas	AG	Surface water
AA	Surface water	AH	Recreational areas
AB	Recreational areas	AI	Surface water
AC	Surface water	AJ	Recreational areas
AD	Recreational areas	AK	Surface water
AE	Surface water	AL	Recreational areas
AF	Recreational areas	AM	Surface water
AG	Surface water	AN	Recreational areas
AH	Recreational areas	AO	Surface water
AI	Surface water	AP	Recreational areas
AJ	Recreational areas	AQ	Surface water
AK	Surface water	AR	Recreational areas
AL	Recreational areas	AS	Surface water
AM	Surface water	AT	Recreational areas
AN	Recreational areas	AU	Surface water
AO	Surface water	AV	Recreational areas
AP	Recreational areas	AW	Surface water
AQ	Surface water	AX	Recreational areas
AR	Recreational areas	AY	Surface water
AS	Surface water	AZ	Recreational areas
AT	Recreational areas	BA	Surface water
AU	Surface water	BB	Recreational areas
AV	Recreational areas	BC	Surface water
AW	Surface water	BD	Recreational areas
AX	Recreational areas	BE	Surface water
AY	Surface water	BF	Recreational areas
AZ	Recreational areas	BG	Surface water
BA	Surface water	BH	Recreational areas
BB	Recreational areas	BI	Surface water
BC	Surface water	BJ	Recreational areas
BD	Recreational areas	BK	Surface water
BE	Surface water	BL	Recreational areas
BF	Recreational areas	BM	Surface water
BG	Surface water	BN	Recreational areas
BH	Recreational areas	BO	Surface water
BI	Surface water	BP	Recreational areas
BJ	Recreational areas	BQ	Surface water
BK	Surface water	BR	Recreational areas
BL	Recreational areas	BS	Surface water
BM	Surface water	BT	Recreational areas
BN	Recreational areas	BU	Surface water
BO	Surface water	BV	Recreational areas
BP	Recreational areas	BW	Surface water
BQ	Surface water	BX	Recreational areas
BR	Recreational areas	BY	Surface water
BS	Surface water	BZ	Recreational areas
BT	Recreational areas	CA	Surface water
BU	Surface water	CB	Recreational areas
BV	Recreational areas	CC	Surface water
BW	Surface water	CD	Recreational areas
BX	Recreational areas	CE	Surface water
BY	Surface water	CF	Recreational areas
BZ	Recreational areas	CG	Surface water
CA	Surface water	CH	Recreational areas
CB	Recreational areas	CI	Surface water
CC	Surface water	CJ	Recreational areas
CD	Recreational areas	CK	Surface water
CE	Surface water	CL	Recreational areas
CF	Recreational areas	CM	Surface water
CG	Surface water	CN	Recreational areas
CH	Recreational areas	CO	Surface water
CI	Surface water	CP	Recreational areas
CJ	Recreational areas	CQ	Surface water
CK	Surface water	CR	Recreational areas
CL	Recreational areas	CS	Surface water
CM	Surface water	CT	Recreational areas
CN	Recreational areas	CU	Surface water
CO	Surface water	CV	Recreational areas
CP	Recreational areas	CW	Surface water
CQ	Surface water	CX	Recreational areas
CR	Recreational areas	CY	Surface water
CS	Surface water	CZ	Recreational areas
CT	Recreational areas	DA	Surface water
CU	Surface water	DB	Recreational areas
CV	Recreational areas	DC	Surface water
CW	Surface water	DD	Recreational areas
CX	Recreational areas	DE	Surface water
CY	Surface water	DF	Recreational areas
CZ	Recreational areas	DF	Surface water
DA	Surface water	DF	Recreational areas
DB	Recreational areas	DF	Surface water
DC	Surface water	DF	Recreational areas
DD	Recreational areas	DF	Surface water
DE	Surface water	DF	Recreational areas
DF	Recreational areas	DF	Surface water

## Into the Field We Go.....

**Desktop Study** – the study will have identified potentially suitable effluent management areas (EMAs) 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

