



National Radioactive Waste Management Facility Site Characterisation Project

February 2018

Objectives and Scope of the Site Characterisation

Objectives:

- To characterise and document the surface and subsurface environment; and
- To document infrastructure in the area around each of the shortlisted sites
- To provide information to support design considerations for a facility

Our scope involves:

- Desktop review of available data and information *currently underway - local knowledge and information is needed to inform our work*
- Field surveys to document the environment at each site *early works started*
- Technical reports
- ‘Summary reports’ for communication to each local community and interested parties
- Preparation of a work plan outlining requirements for more detailed surveys to be undertaken on the preferred site(s)

AECOM Team

AECOM is managing this project from its local Adelaide office, with a 'best for project' team with members from around the country

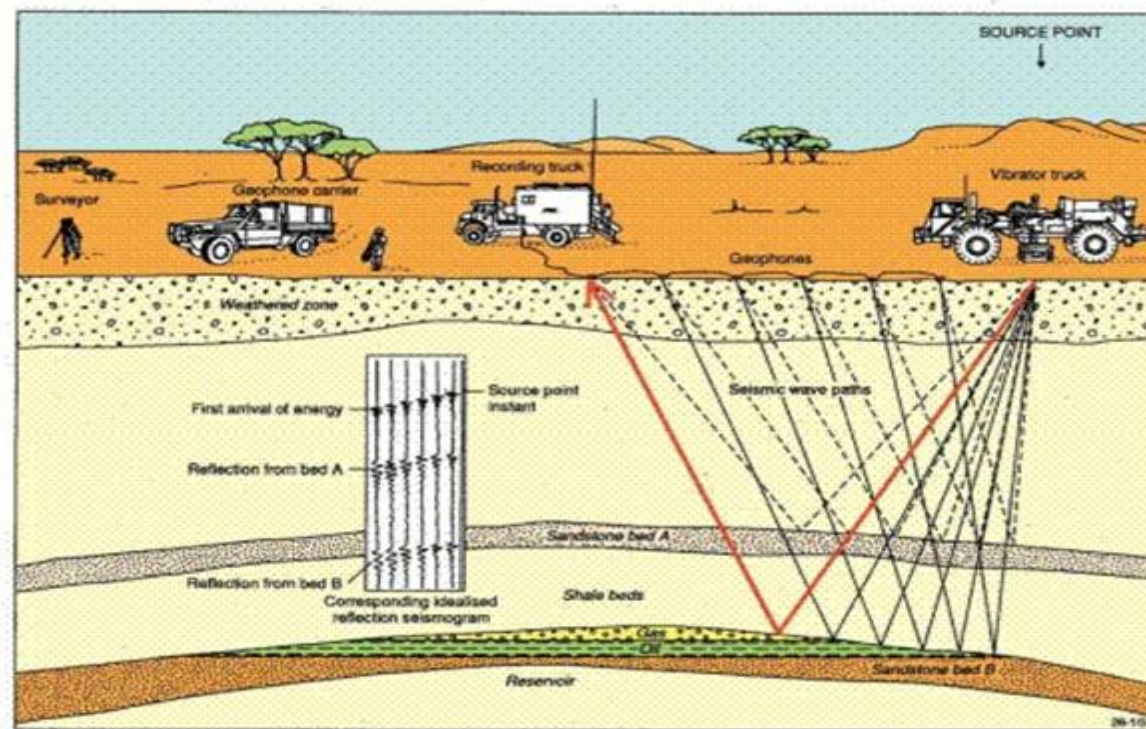
- Our team includes:
 - Specialists to lead each of the Technical Themes
 - Staff experienced in conducting site flora and fauna (plant and animal) surveys, and the logging and sampling of soil, rock and groundwater
 - Subcontractors specialising and licensed in conducting geophysical surveys, drilling boreholes and installing wells
 - A Technical Advisory Group which comprises international experts with experience in conducting similar works to this project, and experience in the requirements for developing a safety case for siting of such a waste facility, design and construction of similar radioactive wastes facilities overseas.

Theme	Key Items to be Investigated
Flora, Fauna, Conservation	Habitats that may be used by any endangered or threatened plants or animals
Landscape and landforms	Long-term stability of landscape and landforms
Geotechnical	Stability of the soil/ ground to support buildings and other structures for a facility
Seismicity	Location and properties of faults (if any) that could lead to near-surface ground movement or an earthquake in the future
Geology, Hydrogeology, Soil, Hydrogeochemistry, Geochemistry	Soils, bedrock, groundwater
Hydrology	Flow of surface water across land and waterways – risk of flooding
Wastes and Emmissions	Wastes that are not radioactive produced by the facility – recycling, disposal options
Climate and Bushfire	Extreme weather conditions – wind, bushfire, cold/ heat
Climate Change	Predictions of changes to climate
Background radiation	Baseline conditions
Utilities, energy, infrastructure, human impacts	Needs, reliability and proximity of existing services and power in area Current and future potential land uses, population and activities on land in the area
Transport	Needs, reliability and standard of transport (e.g. roads) to/ from the sites

Stage 1 - Seismic Survey

February / March

- **Seismic surveys** to obtain images displaying major changes in the soils and rock beneath the surface up to 200 m depth
 - A 'shot' of energy is produced at surface
 - The travel time upon which the energy waves return to the surface, is measured with ground motion sensors or *geophones*
 - In the subsurface, seismic energy is *refracted* (i.e. bent) and/or *reflected* at interfaces between materials with different seismic velocities (i.e. different densities)



Stage 1 - Seismic Survey

February / March

- A road impactor will be used to send out a 'shot' of energy
- This is repeated at regular intervals every few metres along diagonal lines across the sites
- Ground motion sensors 'geophones' are also placed at regular intervals every few metres along the 'survey lines'
- The points at which the road impactor and geophones are to be used will be marked out
- The information obtained by the geophones is monitored from inside a truck
- The survey works will take about 1 day per 1 kilometre of survey carried out by team of about 10



Mini-SOSIE Vibratory Rammer



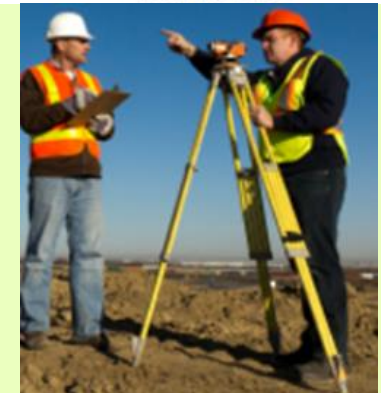
Geophones



Mini-SOSIE Operation



Recording Vehicle



Stage 1 - Seismic Survey

February / March

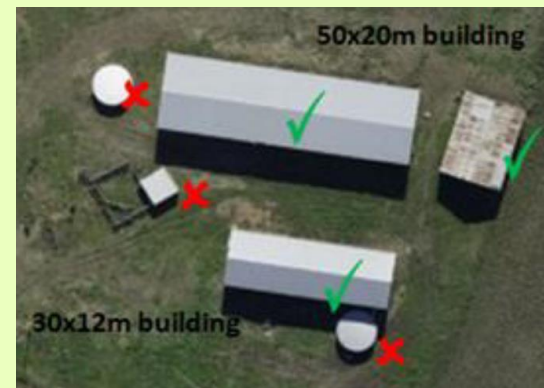
- Each point at which the road impactor or geophones are used will be marked out along the survey line
- Each point will be marked using plastic marker flags or wooden pegs, removed after surveying of its location
- Rocks at surface will be cleared to create a smooth surface for the road impactor
- No native plants (shrubs and trees) are to be removed when conducting the survey
- The survey works will take about 1 day per 1 kilometre of survey



Stage 1 – LiDAR Aerial Survey

February/ March

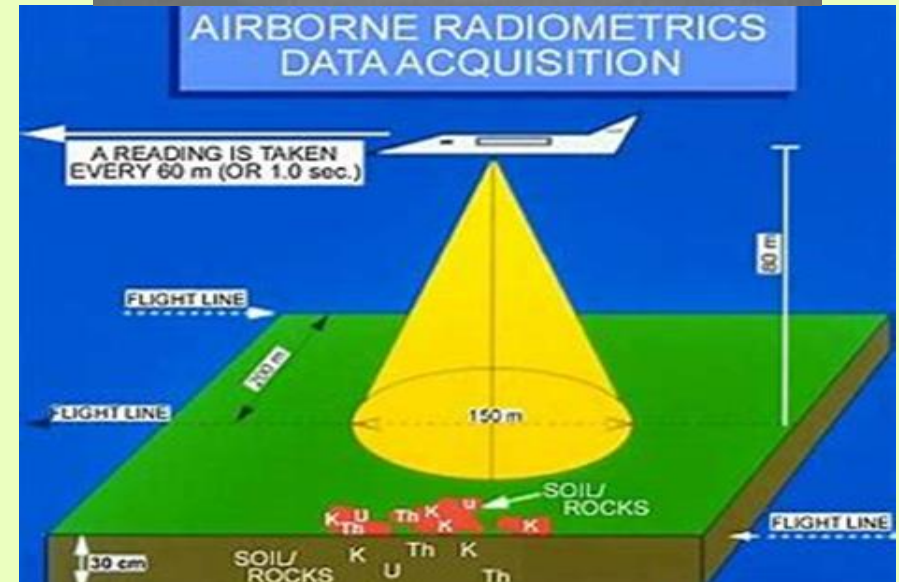
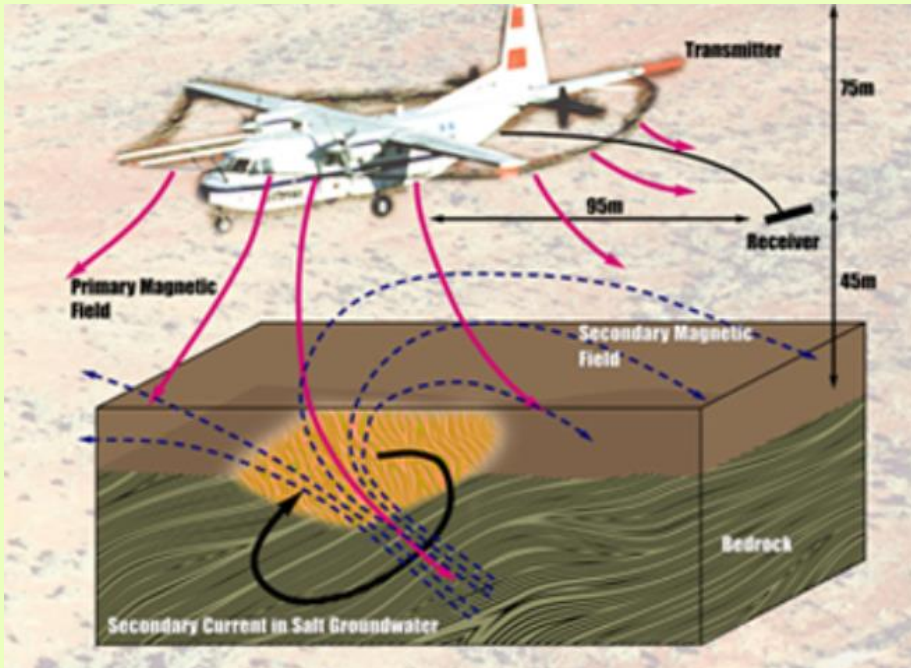
- **Airborne Light Detection and Ranging (LiDAR)survey:**
 - survey of features/ control points on the ground is required prior to the flight
 - a small aeroplane will fly over each site on a day
 - it will measure distances to the ground across the site by sending out a laser light and measuring the reflection with a sensor
 - used to create a model of the terrain to +/-10 cm accuracy



Stage 1 – Geophysical Aerial Surveys

February/ March

- **Airborne geophysical surveys** at Napandee and Lyndhurst will be conducted using a low flying aeroplane over one day, flying 50 m tie lines :
 - to identify bedrock with magnetic properties (e.g. magnetite and potential groundwater formations) = “magnetic data”
 - to map soil and rocks with radioactive elements which form ‘background radiation’ = “radiometric data”



Stage 1 – Drilling Bores, Test Pits, Groundwater Wells

April

To record, sample and test properties of soil, bedrock and groundwater at each site:

- Borehole drilling using sonic rigs (uses vibration) for installation of 5 shallow groundwater wells and 1 deeper well per site
- Excavation of test pits to record soil types and properties across the site
- The depth of groundwater from wells will be gauged and samples collected



Stage 1 – Survey of Plants and Animals

April

- To record the vegetation types and ecological communities/ habitats present on-site and in the local area
- Assess whether such habitats could contain any endangered or threatened plants or animals
- A more detailed survey of the plant and animals present at each area will occur in the future



Stage 1 – Inspection of Local Features and Infrastructure

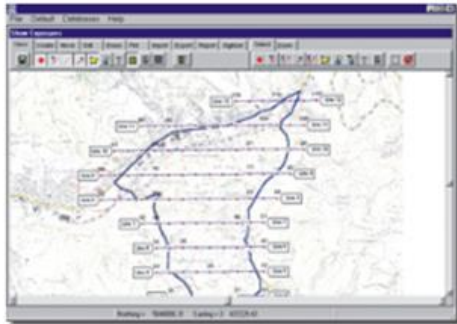
April

- On-ground inspections to observe land uses and existing local infrastructure e.g. roads, capacity of substations, power lines, available services



Stage 1 Reporting

- Technical Reports for each site covering all aspects of the environment at surface and below the ground surface, plus an outline of local transport, energy and utility infrastructure and needs for the facility
- Work plan for more detailed Stage 2 site characterisation work on preferred site(s)



Local Business Opportunities

Local knowledge and skills will be invaluable to project success

Project Phase	Services that may be required
Site Characterisation (AECOM) stages	<ul style="list-style-type: none">• Fuel supply to drill rigs and vehicles• Excavation of test pits• Cartage of water, soil• Accommodation• Catering/ meals• Labour hire• Licensed surveying• Environmental support (local knowledge)• Cultural heritage monitors, where heritage values have the potential to be identified on or near the site
Construction (subject to site suitability and approvals)	<p>In addition to the above</p> <ul style="list-style-type: none">• Civil works (earthmoving and trenching)• Supply of raw and building materials, and furnishings• Engineering/ fabrication• Trades e.g. electrician, builder, crane operator, plumber, fencing• Equipment, office and yard hire• Safety and environmental supervision of construction
Operation and Maintenance (subject to licensing of facility)	Site operational roles and support services to be outlined by Department