

MSE wall structure with liner system for landfill vertical expansion in Sydney, Australia

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This presentation describes the design process and elements of a mechanically stabilised earth (MSE) retaining wall and liner support system for a significant vertical landfill expansion at the Cleanaway Erskine Park Landfill in western Sydney, NSW. Geosynthetic materials were used in all major design components.

The existing 17 ha landfill footprint is located within the original Erskine Park Quarry site, which operated from 1920-1994. Since 1994, the site has been licensed by NSW EPA as a non-putrescible landfill and recently approached its licensed landform capacity. The primary structure of the vertical expansion design is a large perimeter retaining wall supporting a landfill lining system extension.

The preliminary design stage included geotechnical investigations along the landfill perimeter and project geometry optimisation. The final design geometry comprises an MSE wall with a length of 900 m. and maximum height of 18.5 m, providing an additional landfill capacity of over 400,000 cu.m. within the existing landfill footprint. The MSE wall structure comprises engineered fill reinforced with multiple layers of geogrid, wall facing system, access roadway on top of wall, and a geosynthetic landfill lining system on the internal side.

Key challenges for detailed MSE design included: (a) wall foundation conditions, including quarry overburden and landfill waste; (b) stability of the wall on overburden slopes; (c) surface and subsurface drainage; (d) lining and leachate collection, including connection to existing systems; (e) internal wall stability; (f) facing design and durability; and (g) roadway design and safety. Detailed design also included safety in design and construction quality requirements.

The project included use of a wide range of geosynthetic materials for:

- soil reinforcement
- landfill waste containment,
- wall facing system
- subsoil drainage
- surface water drainage channels

Project construction was completed in early 2023. The designers provided technical assistance during construction, particularly with foundation improvements required due to landfill waste materials and other weak materials encountered during excavation.