

Mining Projects, Western Australia



Western Australia more than any other Australian state, experienced significant investments in the mining and petroleum industry, through expansions of existing mines and creation of new mining projects in response to unprecedented Chinese demand for major commodities, such as iron ore, between 2010 and 2014.

In response to the abovementioned ‘mining boom’ and in a reduced demand recently, Douglas Partners has been providing geotechnical advice for new mining projects and several proposed expansions of existing mine sites. A general description of Douglas Partners’ assistance on such projects is provided below.

Douglas Partners geotechnical specialists have been engaged on multiple occasions to undertake geotechnical investigations and provide construction supervision for new and expansions of mine sites and associated infrastructure. The geotechnical investigations typically included:

- Drilling of diamond core and shallow boreholes;
- Performance of cone penetration tests (CPTs);
- Excavation of test pits together with penetrometer testing such as Perth sand or dynamic cone penetrometers;
- Geophysical surveys; and
- Geological mapping.

Data from the abovementioned investigation techniques were used to derive ground models for the study sites and to provide geotechnical advice regarding:

- Suitable foundation systems and site preparation (including ground improvement techniques to limit settlements to acceptable levels) for:
 - rail bridges (16 bridges in total) and communication towers along existing and proposed new railway lines;
 - railway crossing culverts;
 - multiple conveyor belts, crushers and other mining facilities; and
 - storage tanks up to 17 m in diameter.
- Ultimate and allowable bearing pressures and modulus of subgrade reaction, for foundation design of building and retaining structures;
- Bearing capacity, settlement and horizontal ground displacement analyses (using finite element modelling software), for train loading facilities, stackers, reclaimers and railway crossings;

Scope Of Works

- Developing geotechnical ground models
- Advice on suitable foundation systems and site preparation
- Advice on suitable retaining wall and foundation design parameters
- Raise bore drilling and curtain grouting design
- Pavement design
- Assessment of suitability of existing borrow materials for re-use
- Assessment of problematic soils (e.g. collapsing and gilgai soils)
- Construction supervision
- Advanced numerical modelling (e.g. PLAXIS 2D/3D)

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- Raise bore drilling and curtain grouting design for the construction of a 750 m deep ventilation shaft;
- Pavement designs (including heavy duty and unsealed pavements and haul roads) and assessment of suitability of existing borrow materials for re-use in pavement construction; and
- Mapping and assessment of problematic soils such as collapsing and gilgai soils and their impact on proposed facilities such as a flash butt welding yard, several mining accommodation villages, a new LNG plant and pipeline.

Several technically suitable types of foundation systems (including shallow footings, ridged rafts, piled rafts or piled foundation systems) and site preparation techniques (including ground improvement techniques such as impact rolling) were suggested to our clients, to achieve their financial and constructability objectives. Earthworks supervision and piling supervision were provided.

Douglas Partners' office includes several engineers with suitable expertise and successful experience in working within mining environment to assist our clients in developing practical, efficient and cost-effective recommendations for site preparation, foundations and excavation support associated with mining developments.

Douglas Partners' capability also offer advanced FEM numerical analyses from a dedicated numerical modelling hub with a wealth of experience, directed by our Principal Analyst Dr. Richard Merifield.

