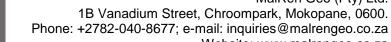
Website: www.malrengeo.co.za





Geological Services

Mineral Exploration

- ❖ Project Planning and Management Effective development and management of project-specific quality programmes that cater for the clients exploration objectives.
- > This includes (but not limited to):
- Community relations and stakeholder engagement.
- Field camp design and site construction.
- Human resources appointment and administration.
- Implementation of health and safety measures.
- Material procurement and supply chain management.
- Logistics and vehicle fleet management.
- Overall Project planning, budgeting and permitting.
- Competent/Qualified Persons, drilling personnel and commercial laboratories contracting.
- Development, planning, application and management of exploration sub-services.
- Mineral Targeting Improvement of the orebody search through comprehensive understanding of the target mineral by aid of exploration and field techniques coupled with cutting-edge technologies.
- > This includes (but not limited to):
- Geological desktop studies (i.e. literature review, data reconnaissance, etc.).
- Regional- to local-scale geological and structural mapping.
- Application of geospatial analyses and remote sensing techniques (production of interactive and updateable geological/structural/GIS maps and models that help target deposits).
- Field geology (including inspection of terrain and surface exposures).
- Analysis and applicability of related mineral systems (i.e. comparisons and contrasts of the spatial and temporal co-occurrence of mineral deposits within a specific mineral province).
- Dynamic and interactive 3D geological/ore body/structural modelling (i.e. using Leapfrog, DataMine, etc.).
- Delineation of mineralisation controls and mineral grade distributions.
- Exploration Field/Site Services Effective methods that best help in interacting and properly understanding the subsurface geology.
- > This includes (but not limited to):
- Ground geophysical survey methods and data acquisition.
- Development, planning and implementation of dynamic drilling programmes (including budgeting, drilling method, drilled hole collar and positioning, as well as contracting and management of drilling personnel).
- Implementation of geological/structural logging with the aid of uniform project-specific logging procedures (e.g. core/RC chips/percussion chips logging) that are in compliance with associated logging principles.



- Establishment of storage facilities (e.g. core yard/storage).
- Development and application of QA/QC procedures pertaining to field services (i.e. effectiveness of the drilling method, logging procedures, storage, correct and uniform database capturing and documentation).
- Sampling Strategies and QA/QC Procedures Essential for the increase in the accuracy and overall level of confidence in the geological data and resource estimates.
- > This includes:
- Development and planning of exploration sampling programmes.
- Application of uniform and project-specific sampling methods and collection procedures.
- Development and application of QA/QC procedures (i.e. monitoring sample for collection, storage, recovery, preparation, and analysis at working sites and commercial laboratories).
- Capturing of sampling data in an interactive database system.
- ❖ Petrographic and Geochemical Investigations Delineation of anomalous and target mineralisation through strategic sampling and analysis of selected samples by using advanced laboratory techniques.
- > This includes (but not limited to):
- Development and planning of an exploration geochemical programme (including budgeting, as well as contracting and management of commercial laboratories).
- Determination and implementation of project-specific sampling strategies and QA/QC procedures (e.g. drilled core, soil, sediment sampling, etc.).
- Petrographic investigations (microscopic studies including optical microscopy, SEM, TEM, etc.).
- Determination and implementation of relevant geochemical analytical techniques (XRF, XRD, ICP-MS, ICP-AES, LA-ICPMS, EPMA, Fire Assay, etc.).
- Analysis, interpretation and reporting of petrographic and geochemical data.
- Integration of geochemical data with mineral targeting data (i.e. enhance the delineation of mineralisation controls and mineral grade distributions).

Resource and Reserve Estimations

- Geostatistical and Mineral Analysis Ensures an enhanced understanding of ore deposit grade distribution and continuity, as well as the accurate and precise description and classification of mineral resources and compute selective mining.
- > This includes (but not limited to):
- Development and planning of a geostatistical and mineral analysis programmes by Competent and Qualified Persons, as per the requirements listed by international reporting codes or standards, such as SAMREC, JORC and NI 43-101.
- Composite length analysis.
- Geological and statistical domaining.
- Statistical analysis (uni-, bi- or multivariate).
- Spatial analysis and de-clustering.
- Multivariate correlation, interdependency, and regression analysis.
- Variographic analyses (raw, pairwise, and Gaussian transforms).
- 2D and 3D environment development for statistical and geostatistical analysis.
- Outlier and top-cut analysis.



- Grade Estimations Enables the accurate development of 3D ore grade models by aid of a variety of estimation and simulation strategies.
- > This includes (but not limited to):
- Customised statistical and geostatistical analysis.
- Grade interpolation.
- Dynamic and interactive 3D ore body modelling.
- Integration with the 3D geological/structural model.
- Resource Estimations Systematic application of conditional simulation to mineral resource evaluations in order to create ore mineral resource models.
- > This includes (but not limited to):
- Data collection.
- Simulation model building and reporting.
- Mineral resource modelling.
- Simulation model validation.
- Use of simulation results to assess interpolated model ore grade and tonnage predictions.
- Use of simulated models for resource classification and ore/waste delimitation.

Project Audit and Evaluation

- Due diligence investigations Overall verification and validation of the quality of the geological data and any associated geological risks.
- > This includes:
- Review of Prospecting and Mineral Rights Applications in South Africa.
- Application of due diligence studies of exploration projects and small-scale operating mines.
- Overall project risk assessments and potential opportunities.
- Contracting of Competent and Qualified Persons, as per the requirements listed by international reporting codes or standards, such as SAMREC, JORC and NI 43-101 for verification and validation.

Mining Geology

- Mine Planning Optimisation and Profitability Enables the effective reduction in operating costs, increases operation safety, as well as the improvement in ore grades, recovery, and throughput.
- > This includes (but not limited to):
- Development, execution and management of underground/open-pit drilling programmes.
- Grade control studies and reconciliation (i.e. by aid of continuous logging and sampling procedures).
- Underground/open-pit geological/structural mapping and evaluation.
- On-site geological modelling, mineral resource estimation and continuous modification of the already compiled models (including the compilation of block models).
- Stockpile control and management.
- Development and compilation of Mine Works Program (MWP) in accordance with Department of Mineral Resources (DMR) regulations.



Database Setup and Management

- A system that ensures accurate and uniform data capturing, validation, integration and management across a wide range of geological sub-services and various MalRen Geo Divisions.
- > This includes (but not limited to):
- Setup and management of a customised geological database system.
- On-site or office-based data collection and capturing.
- Integrated information systems and their management.
- Data validation and application of QA/QC procedures.

Prospecting and Mineral Rights Applications in South Africa

- > This includes:
- Formal Prospecting and Mineral Right applications.
- All geological studies as required by Department of Mineral Resources (DMR) for the Prospecting Right applications.
- Competent and Qualified Persons reports for Prospecting and Mineral Rights Applications (i.e. All required geological and due diligence reports).
- Geological support services for mine operation (i.e. including on-mine exploration and mine geology services).