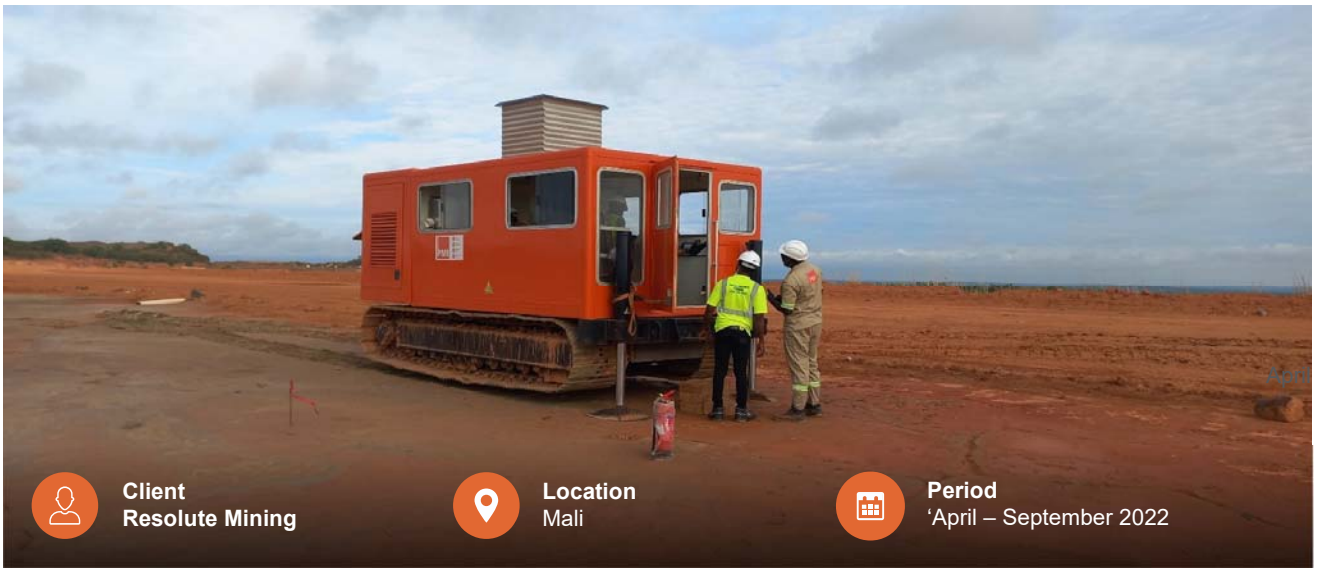
PROJECT SHEET

SYAMA GOLD MINE 2021 TSF GEOTECHNICAL SITE INVESTIGATIONS



Syama Gold Mine 2021 Tailings Storage Facility, Geotechnical Investigations – Mali.

Syama Gold Mine required insitu characteristic of the tailings as well as the foundation material of the Tailing Storage Facility (TSF) embankments to be used for analysis to inform them about the possibilities of design of embankment raises or otherwise, of their existing TSF, as well as monitoring of the overall structural integrity of the TSF during its life span.

Syama Gold Mine, through its consultants Advisian, contracted PMI to conduct a geotechnical site investigation and installation of monitoring instruments.

The Scope of Work included

- 19 No SCPTu, depths between 10.58m and 46.55m BGL
- 78 No Shear Wave velocity
- Pore Pressure Dissipation = 29hrs
- 50 No Insitu Shear Vane tests
- 33 No Mostap samples
- 16 No Boreholes, depths between 15m to 75m)
- 52 No Shelby samples
- 40 No Pocket Shear Vane tests
- 9 No push in VWP installations
- 10 No Borehole VWP installations
- 449m Inclinometer casing installations
- Testing & Commissioning of instruments

PMI Resources on Site

- CPTu 200kN push capacity crawler unit
- Fraste MD ML drill rig
- LDV & Service trucks

Contract Execution

Seismic Cone Penetration Testing

- The SCPTu is conducted using a Seismic Piezocone. The Seismic Piezocone is the same as a standard Piezocone with an additional seismic module which consists of a triaxial accelerometer array housed 0.64m behind the piezocone tip.
- For SCPTu all the standard CPTu equipment is utilized as well as a Seismic Signal Conditioning Box which separates the seismic data and allows the CPTu data to be logged as per a normal CPTu. A seismic source is also used which in these tests consisted of seismic source plates and a hammer

Borehole Drilling

- PMI used a Fraste Multidrill ML Drill rig for this project
- The rig is designed and equipped to perform a variety of drilling methods that can be selected per hole, depending on the material encountered and subsurface condition, to deliver optimum sampling

Robit drilling system

- DTH (Down the Hole Hammer) Robit drilling method is designed to drill in waste rock and fill material of gravel to boulder size bit. DTH system utilises compressed air as the circulating medium instead of water or drilling mud to advance borehole drilling in rockfill deposit. The DTH hammer fitted with a tungsten carbide drill bit is attached to a string of drill rods and locked unto the lead casing. Compressed air is passed through the string of drill rods through the bit and drilling is advanced simultaneously with the casing under the rotation of a high torque hydraulic unit and the percussive action of the hammer being driven by a high-pressure compressor.
- The installed casings allow for the stability of the rock fill and drilling continues thereafter using the conventional drilling techniques. The Robit casing is retained in the hole for the entire length of the waste rock or boulders.

VWP Installation

- The vibrating wire piezometers were installed at specified depth to monitor pore water pressure in the tailing facility. Measurement of pore water pressure is used to detect the level and flow pattern of

groundwater. The VWP are pushed into depth using the hydraulic system of the CPT Crawler

Mostap Sampling

- The CPT crawler was established over the desired location as indicated by the client.
- The tip of the sampler is carefully assembled and plastic liner with catcher also inserted into the sampler.
- Sufficient lengths of probing tubes was prepared, made ready and placed on the tube rack in the CPT crawler.
- The carefully completely assembled sampler was attached to the first probing tube.
- The probing tube was advanced into the ground meter by meter using the hydraulics of the CPT crawler till the required depth.
- A steel cable connected to the tip release bar was dropped into the probing tube. The release bar locks into the tip of the sampler.
- The tip of the sampler was be disengaged by pulling on the steel cable attached to the release bar.
- Pushing was continued to the desired final sample depth during which the sampler is filled.
- The probing tubes was be withdrawn together with the sampler and the sample removed, sealed, and labelled.
- The process was repeated for all other locations.

Shear Vane Testing

- The CPT Crawler was established over the desired test location.
- Sufficient lengths of casing and CPT probing tubes were prepared and secured.
- The vane was connected to the shaft and first probing tube and secured in the shoe. The first casing was also connected to the shoe.
- The casing and tubes were advanced into the ground meter by meter till the required depth.
- The vane was pushed through the protector to the required depth.
- The drive gear was installed on the bridge of the hydraulics of the CPT Crawler and connected to the control box, software started and the required parameters inputted. The following were inputted:
- − Vane type 50 x 100
- − Speed 240 degrees per minute
- − Sampling rate of 2hz.
- The test was started with the drive gear delivering torque to turn the vane whilst monitoring the results in real time.
- Test was stopped once shearing was completed or Maximum allowable torque is being applied.
- − The maximum allowable torque was 50Nm.
- Once shearing was complete, the test is stopped and remoulding test conducted. Once the process is completed the test is ended with data saved and the vane pushed to the next depth for testing.

Upon completion of tests at the required depths at each location, casings and probing tubes are retracted, cleaned and made ready for the next test location.

Conclusion

The contract was executed to the required standards requested by the Client.