Subsurface Intelligence in Infrastructure Design and Construction with MUD®

(Mapped Underworld Dimension)

Background

What lies beneath the Earth's surface is critical information, especially to those responsible for building and maintaining infrastructure, and complying with regulations. To most, the subsurface is a complex, hidden sphere that is challenging and costly to investigate.

Because conditions underground change quickly and unpredictably and in ways that negatively impact surface conditions, engineers and regulators require an efficient and cost-effect way to exploit the potential of subsurface intelligence.

Like an X-ray of the Earth, MUD® penetrates layers including deep vegetation, snow, ice, overburden and even water, to reveal underlying surfaces

Auracle's MUD® gives shape to the integration of the surface and subsurface systems to infrastructure design and development. It links water and soil interactions to identify and monitor the impact of naturally occurring systems on soil stability and carrying capacity in the early stages of building site preparation.

Auracle worked with a LNG facility, located on the Gulf Coast, United States, to provide contour and change maps of the interface between natural ground and the fill material being placed. The facility required about 85,000 subsurface pilings to be set for the base of construction.

During the placement of these pilings, ground surveys were conducted which revealed major elevation changes, as much as +/- 11 inches vertically, in the pilings. Water also was pooling in the pilings' excavations.

Both conditions significantly disrupted construction and remediation attempts were costly and unsuccessful. The cause of these discrepancies was unknown.

Auracle used its MUD® system to locate subsurface watercourses within the construction site and provided accurate change models to validate the +/- 11-inch changes identified by the ground surveyors.

Using MUD®'s algorithms and analyses, based on 3D models of detected subsurface water courses, it was determined that the construction area was affected by land tide, causing the pilings to move as the subsurface water flowed in and out, in relation to tidal variations.

The facility built underground retaining walls to block the tidal water flow, which secured the placement of the pilings.

Solutions

Applying MUD® algorithms to investigate subsurface water systems at the beginning of infrastructure design enabled a sustainable approach that linked surface conditions to the subsurface characteristics of a site.

The MUD® system, with its advanced analytics and 3D subsurface modelling, contributed to a full understanding of natural subsurface water systems so that appropriate planning and design and monitoring solutions were designed and implemented.

This data formed a base model for monitoring to proactively identify changes to water presence and flow zones at, on and underground.

Auracle's MUD® technology successfully identified underground water and water flow at depths of 100 m.

MUD® 3D models were used to demonstrate regulatory compliance, reduced risk to assets and optimized sustainable infrastructure.

Get in touch with any questions you may have.

Auracle's MUD® adds 3D visualization of the subsurface which can operate as a digital twin in each stage of design and development.