Innovative Uses of LIDAR Technology to Assist in the Remediation of former Coal Mine Sites

Glenn MacLeod

The Sydney Coalfield has been mined for more than 300 years and over 100 underground mines have extracted in excess of 350,000,000 tonnes of coal.

Queen Pit, Sydney Mines 1854 - 1917

1. The identification of unstable ground and mine openings that could potentially fail during and after site remediation; and
2. The identification of potential locations where acid mine water might discharge and enter the environment in an uncontrolled manner.

LiDAR – Light Detection And Ranging

LiDAR is an airborne laser profiling system that produces location and elevation data to define the surface of the earth and the heights of above-ground features.

Data Validation Method

Survey showed a mean difference of 0.02m with a standard deviation of 0.04m between the Ground Survey and LiDAR Survey.

In this example, the first return measurement is a range value of the tree top; the last return is the ground. By acquiring first- and last-pulse data simultaneously, it is possible to measure both tree heights and the topography of the ground.

1 sq km tile can have >1,000,000 data points
High Precision Topographic Maps created from LiDAR Survey Data

Port Morien, Nova Scotia

Subsidence Detected over Shallow Mine Workings with DEM

Port Morien, Nova Scotia

Digital Elevation Model (DEM) created from LiDAR Survey Data
Overlap with the Blockhouse Colliery Mine Plan

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Digital Elevation Model used to Detect Former Mine Shafts

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Remediation Concerns

Two of the concerns are:
1) The identification of unstable ground and mine openings that could potentially fail during and after site remediation; and
2) The identification of potential locations where acid mine water might discharge and enter the environment in an uncontrolled manner.

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Questions?

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Trough Subsidence