The Phoenix LiDAR RECON-XT at First Mode's Centralia Proving Ground

The Centralia Coal Mine in Centralia WA ceased mining operations in 2006 and is moving through phases of reclamation with a long-term reclamation plan to support a wide variety of land uses, including agriculture, industrial, woodlands, wildlife habitat and wetlands. Today the 9800-acre site is very green and teeming with wildlife including deer, elk, and waterfowl. You must look closely at the land to realize this used to be an enormous coal mine.

How might a reclaimed mine site be repurposed you ask? Seattle's First Mode came up with an innovative idea.

First Mode has developed the world's largest hydrogen powered vehicle, a mine haul truck. To build a proof-of-concept and then put it into mass production, a proving ground with lots of space in which to put the truck through its paces is going to be required. The safe production and storage of hydrogen also requires space.

The first proof-of-concept haul truck

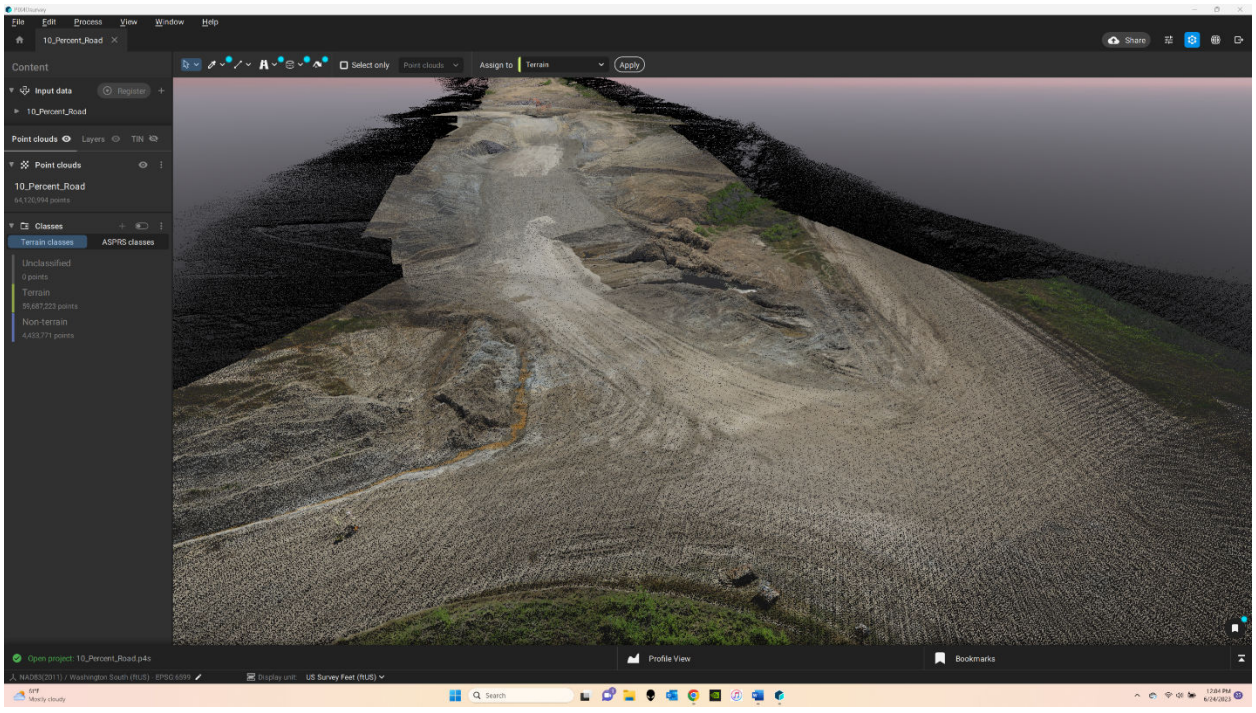
A portion of the reclaimed Centralia Coal Mine site is now leased from the landowner by First Mode and is known as the First Mode Proving Ground.

Because First Mode's proof-of-concept mine haul truck is enormous - weighing in at around 210 metric tons and standing three stories tall, what better place to operate, maintain and test the truck than a former mine?

Mine haul roads have unique design requirements. Trucks this size carrying loads up to 290 metric tons can only climb and descend certain grades, need lots of space to negotiate turns, etc. and do it all safely.

To mimic the environments where the trucks will be deployed, First Mode is currently building a 10% grade haul road at the Centralia Proving grounds for truck testing.

Ongoing construction of a new 10% grade mine haul road for First Mode's new Hydron Powered haul truck.



The RECON data seen in Pix4D Survey of the 10% grade road

As with any construction project this requires ground truthing. Understanding what the ground looks like in 3D, today, is imperative. Design software can use this model of "existing ground" to alter existing roads and/or design new haul roads required for testing. Monitoring the construction progress is also important in terms managing time and budget.

The site is ideal for drone based remote sensing. The challenges for drones are the overhead electric power lines running to and from the power plant, with some towers as high as 200', and the topography that has significant elevation changes.

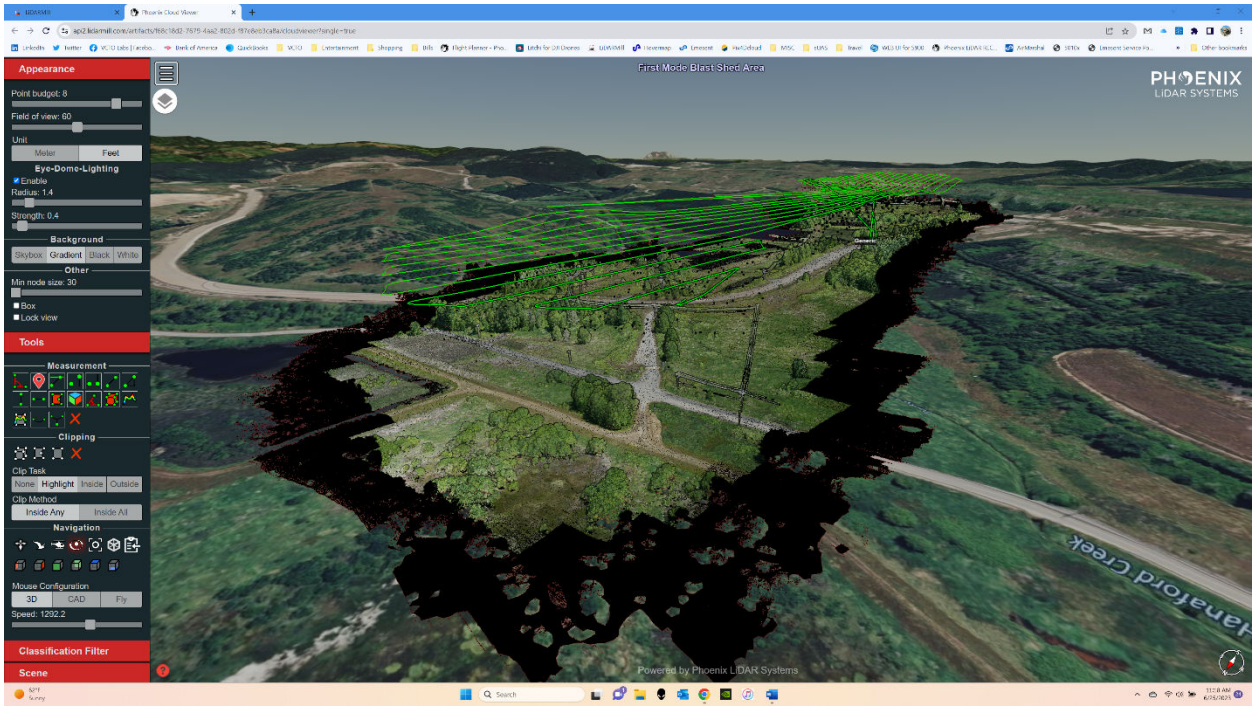
The Phoenix LiDAR RECON-XT was the perfect choice for this task. The RECON-XT can be mounted to a drone or to a vehicle. Furthermore, it can provide survey grade accuracy results often required for road design. The RECON-XT can do all this quickly and safely without disrupting ongoing operations on the site. Additional LiDAR surveys can be flown as often as needed for construction monitoring.

Pre-flighting the DJI M300 RTK and Phoenix LiDAR RECON-XT at the Centralia Proving Ground

Flying the RECON-XT with a DJI M300 RTK drone covered the most ground in the least time and by simply switching the RECON-XT from the drone to the vehicle mount and driving under the overhead powerlines was a simple, safe, and risk-free solution.

The RECON-XT mobile / vehicle mount

The terrain at the proving grounds is uneven. 200’ changes in elevation are commonplace. The drone needs to maintain a consistent, above ground altitude to capture quality data. This means the drone needs to be able to follow the terrain, in this case maintaining 60m (200’) above the ground regardless of hills, valleys, below it. Flying at a fixed altitude of 60m with the ground rising and falling toward and away from the drone is simply not an option as this alters the LiDAR sensor’s field of view. Attempting to fly terrain following missions manually presents significant risk to the gear and in this case was out of the question.



RECON-XT LiDAR data and the terrain following flight lines the drone flew (shown in green). Note the altitude changes along the flight lines.

The terrain following feature in Phoenix LiDAR's Flight Planner software worked perfectly. Most importantly it resulted in meeting First Mode's level of detail (LOD) requirement for the survey (and) it made flying the surveys safe, simple, and quick.

As with any project, selecting the right tools for the job is the key to success. In this case the choice was easy. The RECON-XT's ability to safely capture survey grade data from the ground and from the air in a timely matter over varying terrain made it the perfect solution.