

## **British Columbia Technical Working Group on Indian Residential Schools (BC TWG IRS)**

As noted in a separate technical summary, LiDAR is new technology that can be used to accurately and precisely map landscapes. It has value in many field disciplines, including archaeology and heritage management.

### **What is UAV or Handheld LiDAR?**

LiDAR is available from a number of sources/platforms such as airplanes and cellphones. Most IRS searches use sensors attached to UAV (unstaffed/manned aerial vehicle) / drones. These systems are large enough to carry high resolution sensors while covering large areas; a single 45-minute flight can survey about 1-2 km<sup>2</sup>, with results that can resolve topographic differences as small as 5-10 cm. New sensors are increasing resolution. Improvements to battery and drone technology are extending flight times. UAV/drone LiDAR will remain a standard tool in archaeology and IRS work. UAV/drone LiDAR can map the ground through vegetation – not all the signal from the sensor reaches the ground, but typically enough does to generate a ground surface map.

Handheld LiDAR puts the sensor on a handheld bracket that can be carried in front of you as you walk or on a pole out of a backpack; the system includes a control unit and battery. These are sometimes referred to as laser scanners, but these devices are similar to UAV/drone sensors. They are used to map construction infrastructure, such as under bridges and inside buildings. They can be used for this purpose in IRS searches, if buildings of interest are still standing. They can also be used to map the ground surface when there are overhead obstacles such as dense forest canopy.

### **What Role Can It Play in Identifying Missing Children?**

LiDAR can play a key role in IRS searches in two ways: 1) it provides an excellent basemap on which to compile other data, such as from archives or field surveys – and can be used as such within GIS (geographical information systems) databases, and 2) as a source of information on the location of burials. If the LiDAR resolution is sufficient and the burial has a surface contour shape (usually a slight mound or depression), then these can be a line of evidence for the location of unmarked burials.

The difference between handheld and UAV/drone systems is the resolution of result in different contexts. When the ground is blocked by dense forest or infrastructure, UAV/drone systems cannot produce high resolution maps. New sensors that produce more signal are increasing the role of UAV/drone systems, but we have found that there are places on the landscape that they cannot map. For these handheld systems provide an option.

### **What Are the Challenges of UAV/drone and Handheld LiDAR?**

LiDAR models have higher resolution when high levels of signal reach the surface being mapped, such as the ground. In dense forests, especially deciduous canopies, UAV/drone LiDAR resolution drops considerably and may lose its value for IRS searches. UAV/drone systems cover more area than handheld system, but require UAV licenses to operate.

Handheld systems can be brought beneath forest canopies as a way of increasing resolution of ground surface maps. Handheld results are more complex to filter to generate models of ground surfaces. Both systems require specialized software and training to produce usable results.