

## **2021 airborne topo-bathymetric lidar survey on the South Saskatchewan River**

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**Background:** In the Fall of 2021, NV5 Geospatial was contracted by Natural Resources Canada (NRCan) to perform an airborne topo-bathymetric lidar survey of the South Saskatchewan River. This project was the first major contract for topo-bathymetric lidar from NRCan and was funded through the Canadian Emergency Management Strategy and by the Saskatchewan Water Security Agency.

**Objectives:** Share project details and an overview the methodology used for acquisition, calibration, processing, and product generation. This will include review of data that was acquired as well as the coverage results and findings from the survey.

**Methods:** The airborne topo-bathymetric lidar survey was performed using the Leica Chiroptera 4X and Leica Hawkeye 4X sensor system with a fixed-wing aircraft. The corresponding ground survey included daily turbidity monitoring as well as bathymetry checkpoints and RTK survey techniques with extensive NVA and VVA requirements. The acquired lidar data was calibrated and processed using a combination of commercial and proprietary software to meet the deliverable data specifications of the Federal Airborne Lidar Data Acquisition Guideline 3.0

**Results:** The survey successfully mapped 96% of the riverbed with an average density over 8 points per square meter, with maximum depths reaching 7 meters. The point density and accuracy achieved will support high resolution seamless topo-bathymetric digital elevation modelling for the National Elevation Data Strategy.

**Discussion:** Sensor selection, site characterization, survey approach, and processing methodology will be reviewed to determine impact on results and data quality. How lessons learned should impact future development of topo-bathymetric lidar projects.

**Conclusion:** Mapping the riverbed and surrounding floodplain was successfully achieved with careful acquisition planning and proper sensor selection. Expectations and project design should be specific to the river system of interest. Utilizing topo-bathymetric lidar for floodplain mapping can fill the gap of traditional mapping techniques and complete high resolution seamless bare earth models.