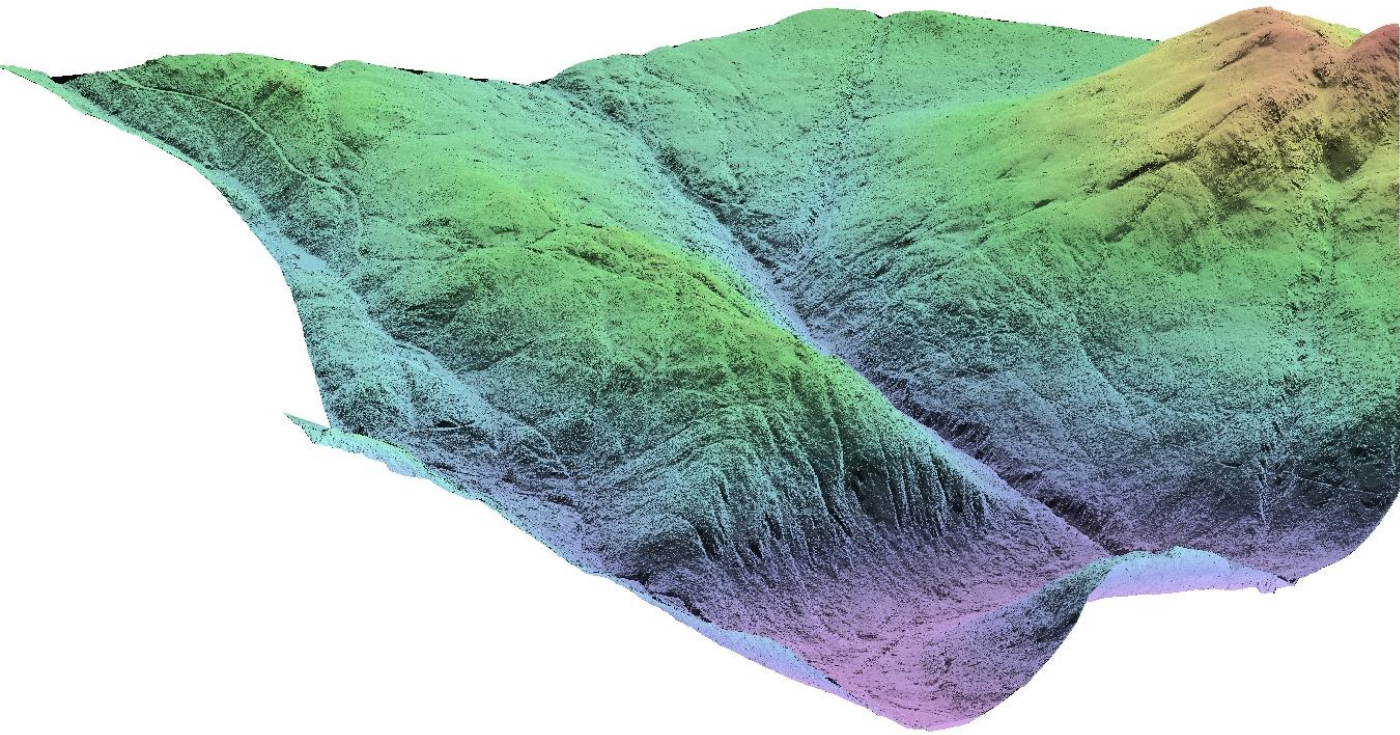




Chilkoot Trail and White Pass LiDAR Reprocessing



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Introduction

Quantum Spatial (QS) conducted the reprocessing of the Chilkoot Trail and White Pass LiDAR in September 2017 at the request of the National Park Service (NPS). The original dataset was acquired in May 2003 and was delivered as XYZ points in UTM Zone 8N, NAD27, NAVD88 (Geoid99 MLLW adjusted) with horizontal units in meters and vertical units in US survey feet. The outdated coordinate reference system somewhat hindered data use and therefore it was requested that data be re-processed and delivered in UTM Zone 8N, NAD83(2011), NAVD88 (Geoid 12b) with horizontal and vertical units in meters.

Table 1 summarizes the deliverable products from the reprocess, Figure 1 displays the project area, and further detail about the reprocessing procedure is presented below.

Table 1: Products Delivered to NPS for the Chilkoot Trail and White Pass LiDAR Reprocessing Project

Chilkoot Trail and White Pass LiDAR Products	
Points	LAS v 1.2 All Classified Returns (1 – Default, 2 – Ground, 7 – Noise)
Vectors	Shapefiles (*.shp) - Site Boundary - Tile Index
Rasters	TIFF 1m Bare Earth Digital Elevation Model (DEM) 1m Highest Hit Digital Surface Model (DSM)
Metadata	Updated Project Metadata with processing steps

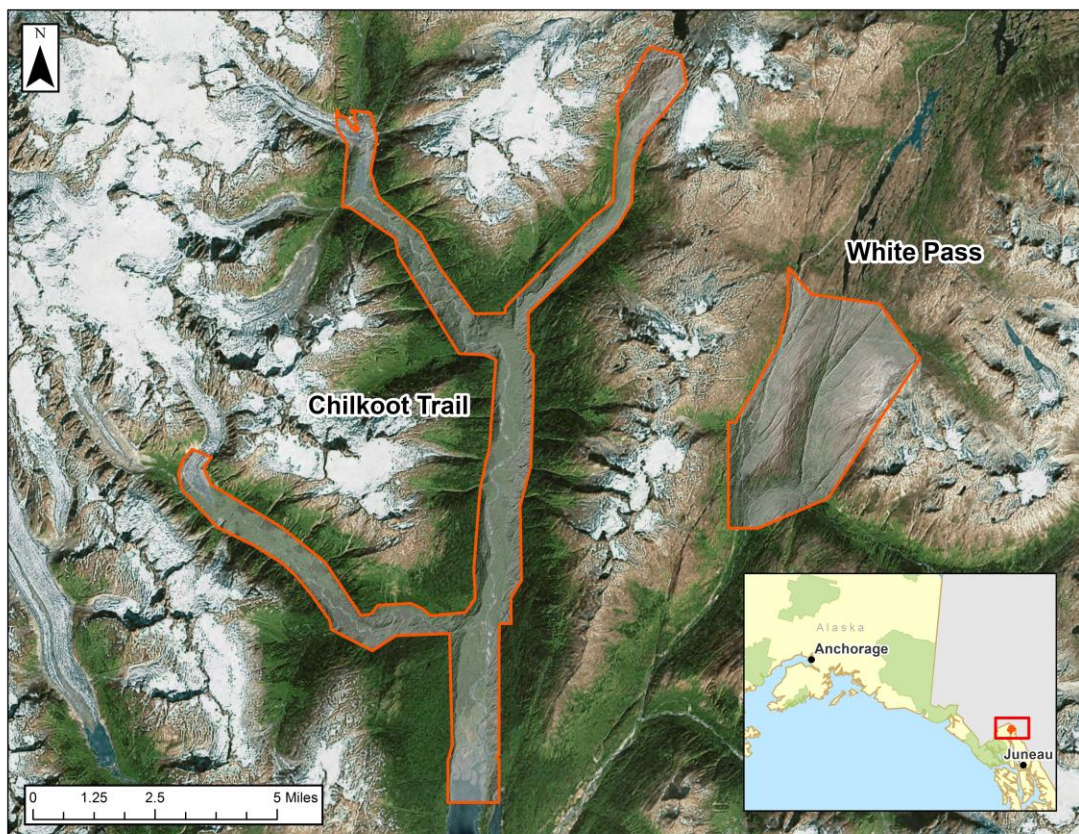


Figure 1: Chilkoot Trail and White Pass LiDAR reprocessing Area of Interest

Data Reprocessing

After initial review of the archived data, it was presumed that the archived data available was projected in UTM Zone 8N, with a horizontal datum of NAD83(CORS 96 - epoch 2002) and a vertical datum of NAVD88 (geoid 99 MLLW) with horizontal and vertical units in meters. Data was transformed from the above using Blue Mable's Geographic Calculator into the preferred UTM Zone 8N, NAD83(2011), NAVD88 (Geoid12B) coordinates with horizontal and vertical units in meters. Ground truth data from 2014 located in the nearby town of Skagway, AK was used to then refine the vertical accuracy of the point cloud and the data was compared to the 2014 Skagway LiDAR dataset to ensure horizontal and vertical alignment. (Figure 2)

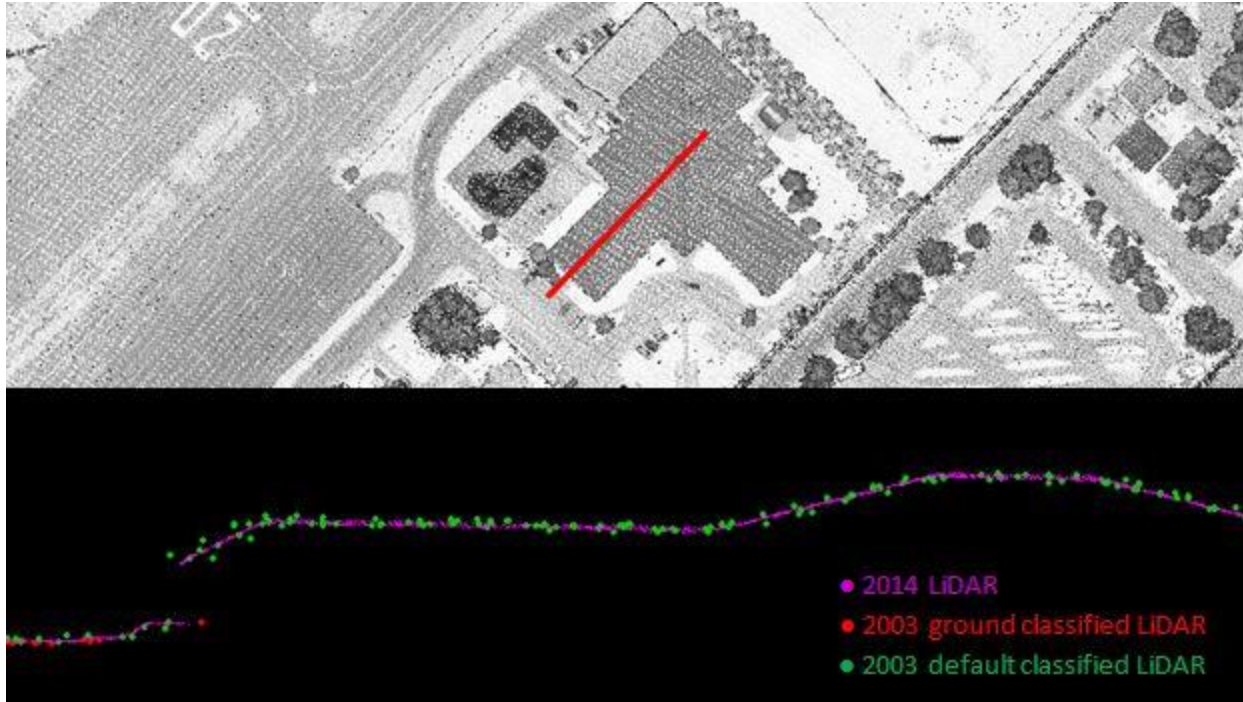


Figure 2: A 0.5m cross section over the Skagway City School showing the alignment of the 2003 and 2014 LiDAR data after the datum transformations.

Once data was transformed to the preferred coordinate reference system, further processing was performed. During the initial review of the data to assess the feasibility of reprocessing, it was noticed that there appeared to be duplicate points within the point cloud as well as classification anomalies. The original dataset indicated 3 classifications – first returns, ground returns, and Veg_bld. Metadata from the original delivery stated that the Veg_Bldg class represented all returns that were neither first returns nor ground returns. The Veg_Bldg class in the archived LiDAR data did not fully match that of the delivered XYZ data and as mentioned, there appeared to duplicate points specifically between the first return and veg_bldg classes. After removal of the duplicate points, due to slight time stamp truncation in the archived data, it was not feasible to correctly renumber returns and differentiate the true first returns of several pulses with the same time stamp. Therefore, Quantum Spatial was unable to preserve the Veg_blding classification. All ground classification was preserved however and additional high noise previously left in the first return/default class was removed.

Bare Earth and High Hit rasters were then re-generated from the transformed data using Terrascan and Quantum Spatial tools.