

# Elevation QC Report

Project: OR\_UpperGrandeRonde\_2009

Contractor: Watershed Sciences, Inc.

Data Delivery Date: 04/20/2011

Date Data Reviewed: 07/13/2011-07/13/2011

Reviewer: Jeremiah Vinyard-Houx

Total Square Miles Reviewed: 74.803

Elevation Type: LIDAR Format: Arcgrid Grid Spacing: 1m Tile size:  
1/4 USGS quad (quarter quads)

Projection: UTM Zone: 11 Datum: NAD83 Units: Meters

Licensing: Public Domain Metadata: Tile Level

## Materials Received:

### CLICK

~All laser return points (LAS v. 1.1, classified only)

### Metadata

~Full Report containing introduction, methodology, and accuracy

~LiDAR tile index (shapefile format)

### NED

~Bare-Earth Model (1-m ESRI GRID format; 1/4th USGS quad delineation)

~Ground classified points (LAS v. 1.1 and ASCII formats)

### Other

~Highest-Hit Model (1-m ESRI GRID format; 1/4th USGS quad delineation)

~Intensity Images (0.5-m GeoTIFF format; 1/100th USGS quad delineation, corrected and raw)

~0.5-m Contours (.dxf format; 1/100th USGS quad delineation)

~First return points (LAS v. 1.1 and ASCII formats)

~All laser return points (ASCII formats, classified only)

Vertical Accuracy Test Performed: No Test Point Source: Contractor

RMSE: 0.026m

## Vertical Accuracy Test Notes:

959 RTK points were collected on fixed, hard-packed road surfaces within the survey area.

RMSE= 0.026m

Standard Deviations:

1 sigma 0.021m

2 sigma: 0.043m

Minimum delta= -0.096

Maximum delta= 0.109m

Average delta= 0.019m

Target Vertical Accuracy: <15 cm (2.1 cm achieved)

Target Resolution: >8 points/m<sup>2</sup> (8.31 points/m<sup>2</sup> achieved)

## QC Review Summary:

### **Projection Review:**

**Projection: UTM zone 11 n**

**Horizontal Datum: NAD83**

**Vertical Datum: NAVD88 Geoid03**

**Horizontal Units: Meters**

**Vertical Units: Meters**

**The Upper Grande Ronde 2009 dataset was collected by Watershed Sciences Inc for the Bureau of Reclamation. The final exported dataset is of adequate accuracy and density for the NED and is free of major processing errors. It is recommended that the dataset is accepted for the NED.**

**Data issues of note include one bridge that was poorly removed. The area was relevelled to better reflect the removal of the bridge (see figures ). Also of note is that many returns in stream areas were classified as ground (class 2) and contribute to the character of the final bare earth DEM (see figure ).**

**The Final raster product is a 32 bit IMG file located in the Final For NED folder along with the project's footprint. The error tags shapfile is located in the NED>errors folder. XML metadata can be found in the Metadata>documents folder.**

LiDAR Quality Control (QC) Review ProcessPreparation:

- Metadata reviewed to determine data projection, datum, format, etc.
- If ARRA contract, check for raw .LAS files, classified .LAS files, breaklines, blind control points, and DEM in Image or Grid format
- Open data in Global Mapper

Vertical accuracy testing:

- If ARRA contract, use Vertical Accuracy Test Worksheet to perform RMSE on 20 blind point positions provided by contractor

Inspection and Correction of data:

- Minimum and maximum elevations in dataset; correct if in error
- Appropriate hydro flattening as specified in V12 Lidar Specification (For ARRA/GPSC Data)
- Data void areas
- Data spikes
- Tile edge seam lines
- Non-bare earth surface artifacts (structures, bridges, vegetation, etc.)
- Elevation errors - raised/lowered areas/tiles
- Other surface treatment anomalies
- Check DRGs for correct elevations and horizontal positioning (if test points not available)
- Create footprint (project boundary) shape file and establish square miles

*During Inspection, identify data errors and create "error" file folder:*

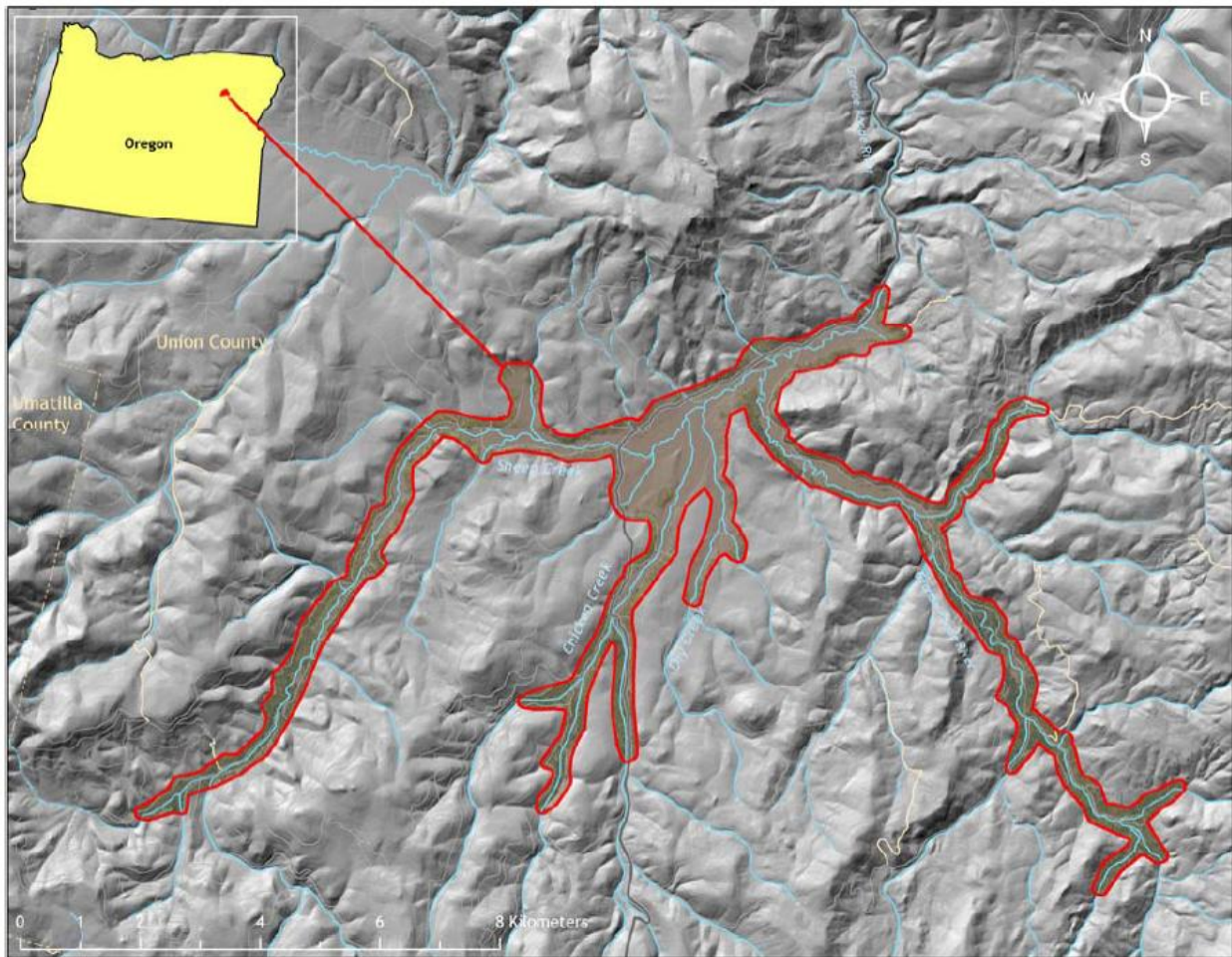
- Capture geo-referenced JPG or TIFF image(s) of identified errors
- Copy to Error file

*During Inspection, level elevations and remove artifacts (these two steps not done for ARRA data):*

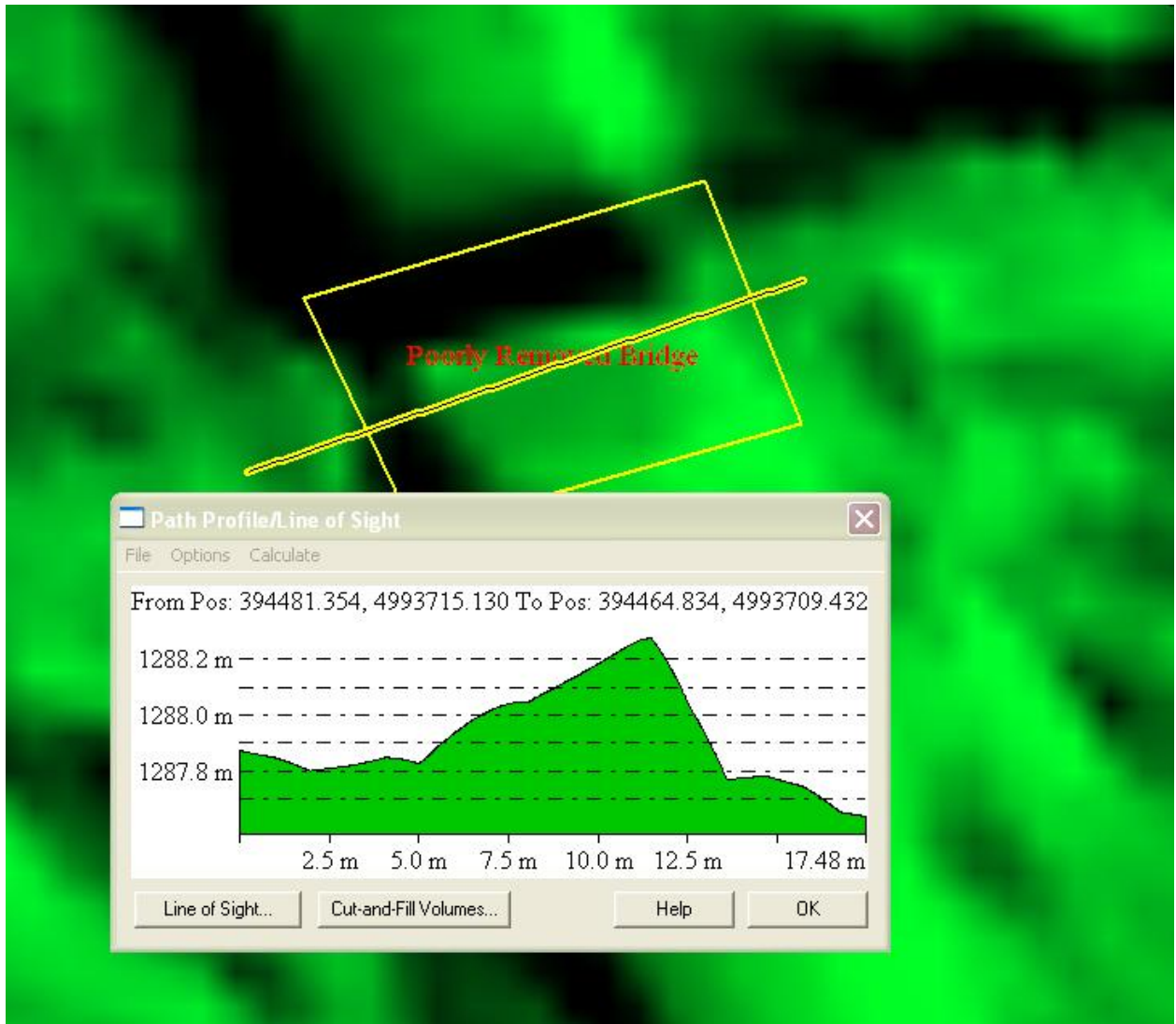
- Level smoothing to remove non-bare earth surface artifacts (structures, bridges, vegetation, etc.)
- Level data spikes where possible

Export image files and create project Elevation QC Review Report:

- Export ERDAS Imagine image files in native projection and resolution
- If ARRA, Copy Vertical Accuracy Test Worksheet into QC Report
- Place QC Review Process and Project Area Extent into QC Report
- If rejected, attach sample geo-referenced JPG or TIFF error images with an explanation of reason
- If rejected, restart QC process when replacement data is received
- Provide completed Elevation QC Review Report to Elevation Supervisor for final viewing
- Add QC Report, footprint, Imagine image(s), and Error file to original data file for final shipment to EROS



**Figure 1: Project Area**



**Figure 2: Initial Poor Bridge Removal**



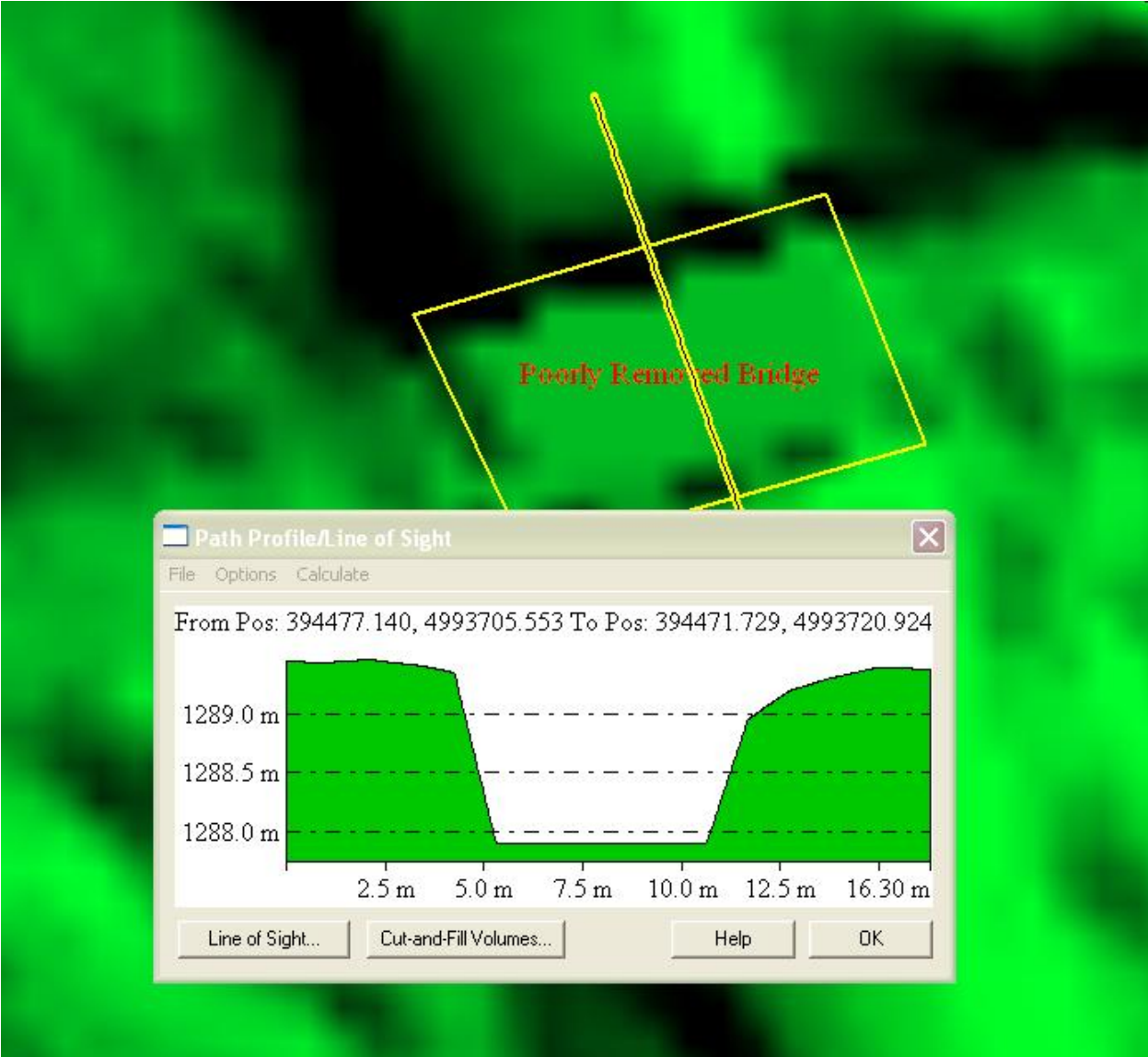
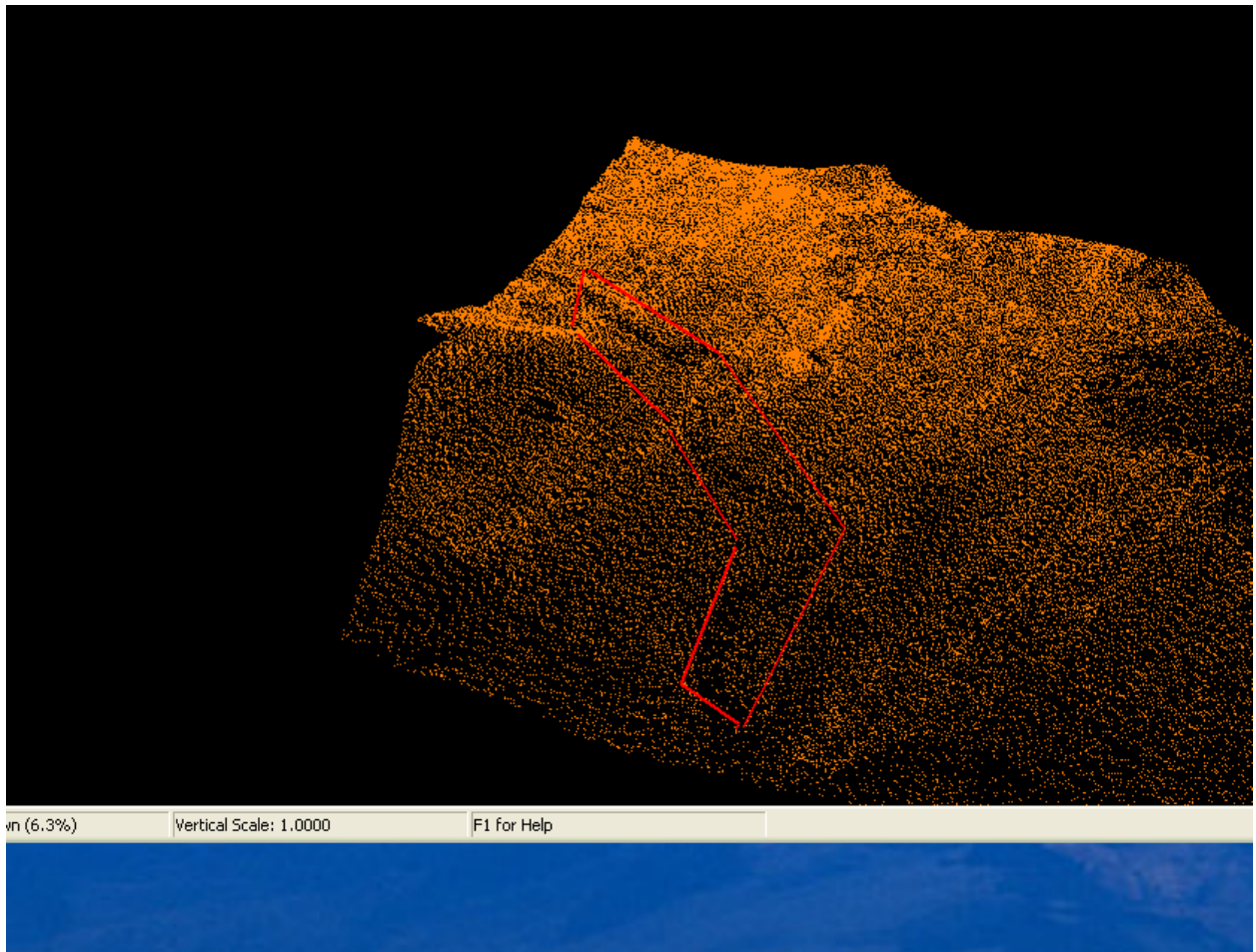


Figure 3: Fixed Bridge Removal



**Figure 4: 3D Point Cloud of Bare Earth Points, note the points in the stream bed.**