



The classification of a LIDAR data point consists of both a classification and a classification flag. The classification flag allows for a point to be simultaneously flagged for particular uses while maintaining the classification of the point. For example, a model key-point can be flagged as such while maintaining the ground classification. Classification flags are used to indicate special characteristics associated with the point¹.

There are currently four flags: Synthetic (0), Key-point (1), Withheld (2) and Overlap (3).

- **Bit 0 – Synthetic:** If set, this bit indicates that the point was created by a technique other than LIDAR collection, such as digitized from a photogrammetric stereo model or by traversing a waveform.
- **Bit 1 – Key-point:** If set, this bit indicates that this point is considered to be a model key-point and thus generally should not be withheld in a thinning algorithm.
- **Bit 2 – Withheld:** If set, this bit indicates that the point should not be included in normal processing. Points that are tagged with this flag are to be retained in the LAS file and included in exports of the LAS file. Withheld is synonymous with “Deleted”.
- **Bit 3 – Overlap:** If set, this bit (only available with LAS version 1.4) indicates that the point is within the overlap region of two or more flightline swaths. If this bit is used, then all points in the overlap region must have this bit set. Allows for the classification of overlap points to be preserved.

The LAS specification has included this ability to use classification flags since the release of the LAS v1.1 specification. However, the biggest drawback of the initial implementation was that it limited the initial 256 possible classifications available in the v1.0 specification to only thirty-two. With the release of LAS v1.4, the 256 classifications are once again possible using the new point data record formats, six through ten. LAS v1.4 also introduced the concept of the Overlap classification flag.

Software vendors have implemented the user’s ability to use the classification flags in a number of ways. In LP360, a user has the ability to set, clear, and filter based upon classification flags located within LIDAR data. Located in the LP360 LIDAR Layer Properties, users can filter the display based upon flags within the dataset (Figure 1).

Tools, Tips and Workflows

Under the Hood: Classification Flags in LP360

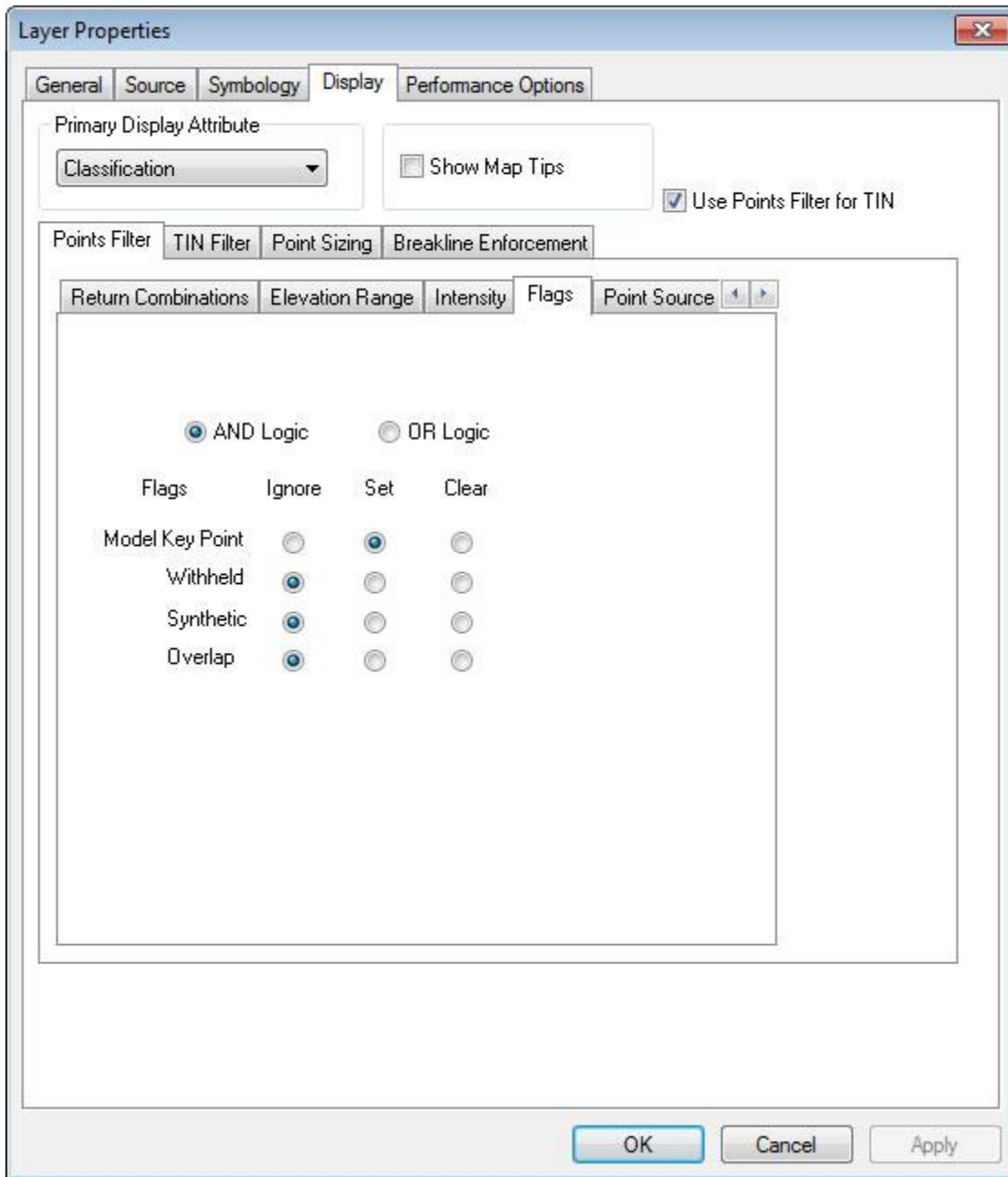


Figure 1 - LIDAR Layer Properties

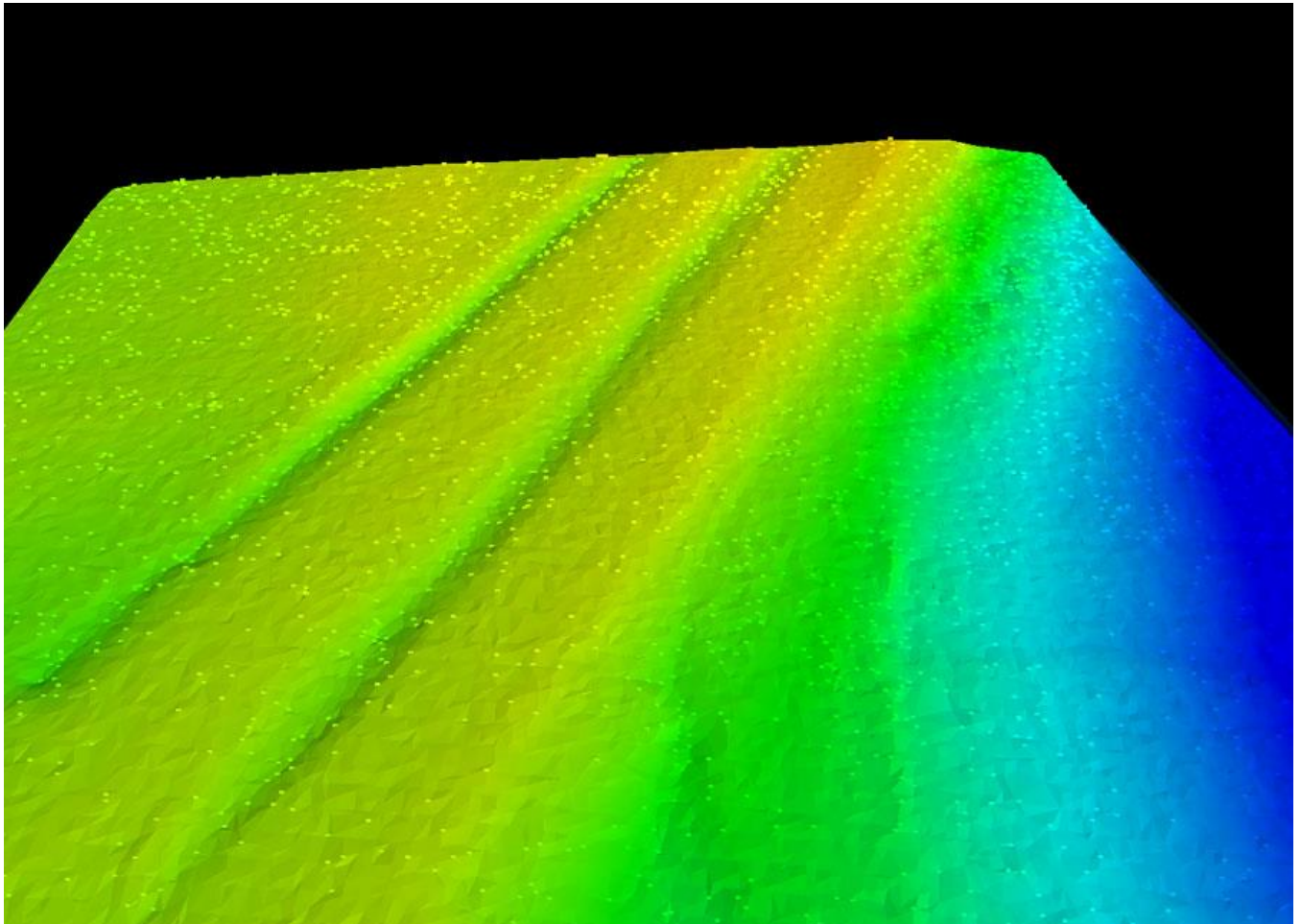


Figure 2 - Digital Elevation Model with Model Key Points Overlaid

These classification flags can also be used within the LP360 Export Wizard for filtering the data during the export process.

The above processes are based upon classification flags already set within the dataset. LP360 can also be used to set those flags directly. The Model Key-point Filter is a Point Cloud Task designed to apply intelligent thinning to reduce the source point density based upon a surface model error tolerance. During this classification point cloud task, the model key-point flag is set (Figure 3). With older datasets, it was common practice to change the classification of these model key-points to class eight in order to accommodate the available software options at that time. Many datasets with this type of classification likely still exist.

Tools, Tips and Workflows

Under the Hood: Classification Flags in LP360

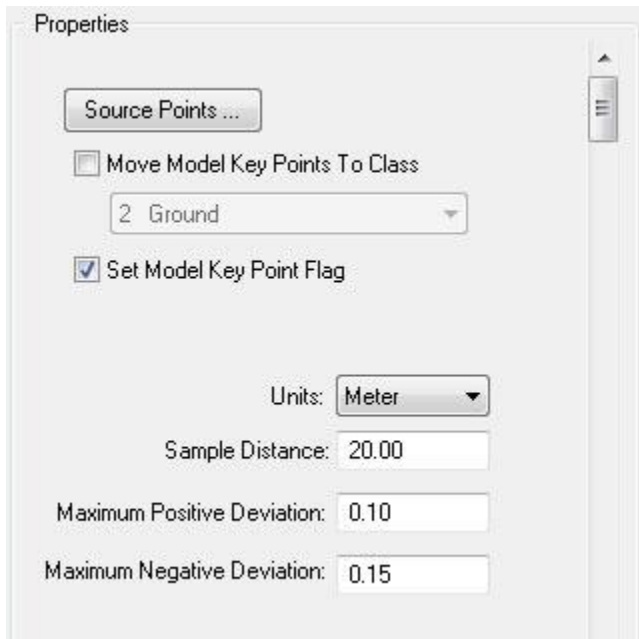


Figure 3 - Model Key-point Point Cloud Task

In LP360, version 2013.2, users have the ability to set or clear flags on LIDAR points directly. As an example, if the project consists of one of these legacy datasets which has model key-points that have been classified to class 8, then one would wish to fix the class and classification flag appropriately. This can be accomplished using the basic filter PCT to flag the points on class and then reclassify the points from class 8 back to class 2 (Figure 4). This will allow for the ground model to be accurately depicted using a single class, while allowing access to the model key-points for processes requiring a thinned model.

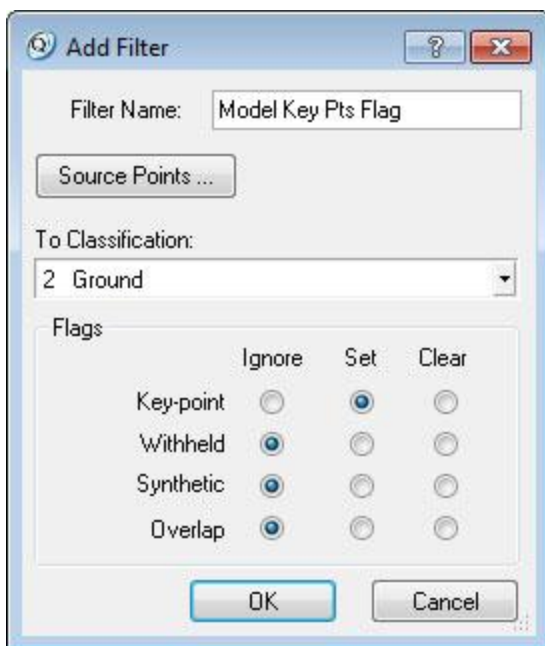


Figure 4 - Set flags and reclassify data

Allowing users full access to use and modify both the classification code and classification flag broadens what one may accomplish with a point cloud dataset. In addition, the ability to set, modify and process data using the classification flags greatly assists data providers in creating datasets that meet the various standards used around the world, such as the USGS LIDAR Base Specification Version 1.0.

¹<http://www.asprs.org> - ASPRS LAS Specification Version 1.4 – R11