Manage LAS Point Clouds

TNTmips allows you to directly view and process LIDAR point data stored in the standard LAS file format. The Lidar Manager process provides a suite of specialized tools that allow you to prepare, repair, and process large sets of LAS files. In the Lidar Manager you can:

- scan and link to multiple LAS files
- update LAS files in place or produce new LAS files
- change class numbers assigned to points
- extract points by area or by class
- reproject points to a different coordinate reference system
- merge LAS point clouds
- subdivide individual or merged inputs into rectangular tiles
- create a Lidar DataSet file for a set of LAS files.
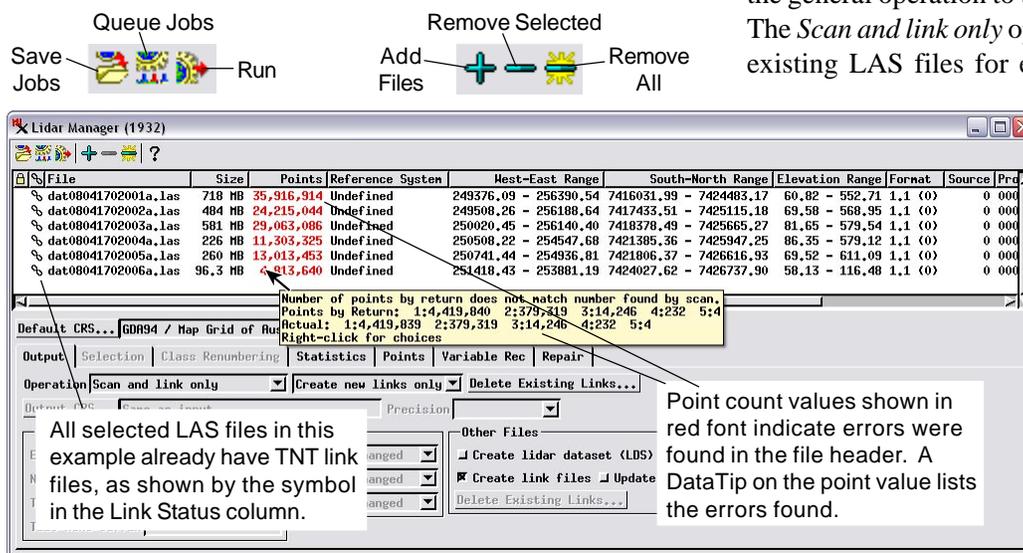
File List

You can choose one file or a set of LAS files to work with in the TNT Lidar Manager. All of the selected files are shown in a list in the upper part of the Lidar Manager window. For files not previously used in TNTmips, the manager automatically scans the points in the files to determine and list for each file the number of points, the coordinate reference system, the x-y-z ranges of the point coordinates, and other information. The scan also builds a spatial index of the points (for efficient spatial processing), which is automically saved in a file with the extension LASX. The LAS file name is shown with a blue font color until the scan has been completed, at which time it reverts to black.

The scan also identifies any inconsistencies between the point set and the summary parameters stored in the file header. If errors are detected, the point number in the list for that file is shown in red. Hovering the mouse over the point value shows a DataTip describing the discrepancy. Header values checked include the number of points at each return value, extra return numbers not counted in the header, and missing header infor-

mation. Controls on the Repair tabbed panel allow you to fix incorrect header information and to set the Manager to perform such repairs automatically.

When you highlight an input file in the list, you can open the Statistics tabbed panel to see a full set of point statistics, including counts of points by class, return type (such as single return, last return, and so on), and information on the range of intensities and scan angles in the file. The Points tabbed panel shows a full list of the contained points in the highlighted file including the point coordinates and attributes.

Operations

The Operation menu on the Output tabbed panel lets you choose the general operation to be carried out on the input LAS files. The *Scan and link only* operation lets you prepare large sets of existing LAS files for efficient viewing and processing in TNTmips (see the following section). The *Update In-Place* setting applies any changes you select directly to the selected input files. The remaining operation choices produce new LAS files. The *Output one file per input* option is self-explanatory. The *Merge to Single File*, *Tile inputs separately*, and *Merge and tile* options allow you to spatially merge adjacent LAS point clouds and to subdivide individual or merged inputs into sets of output LAS files along rectangular grid lines with any designated spacing and coordinate reference system (see the Technical Guide entitled *LIDAR: Merge and/or Tile LAS Point Clouds*).

Scan and Link

The *Scan and link only* operation includes the scan and indexing described previously (performed automatically on loading if required) and the option to create a link file for each input. The link file (with file extension RLK) stores georeference information, display style settings, and other information needed for efficient use of the LAS in TNTmips.

If any input files already have TNT link files, a link symbol is shown in the Link Status column just to the left of the file name. The Other Files box on the Output tabbed panel includes separate toggle buttons you can turn on to create link files for input LAS file that lack them, and to update existing link files.

LAS files containing points from an entire LIDAR flight line include a parameter that identifies points at the edges of the

(over)

acquired point cloud. For such swath data files, the scan and link operation uses these edge points to construct a TNT region object demarking the exact boundary of the point cloud. When you create tiled output, a region is created outlining the rectangular extents of the tile, which may exceed the actual point coverage. The LAS region object is also stored in the TNT link file. It can be selected for viewing along with LAS points so that the data boundary is visible even when the view is zoomed out to levels at which it is impractical to render the closely-spaced LIDAR points.

LIDAR Classes

The Classes menu lets you choose the point classes that will be available for use with the input LAS files being linked or updated and with any output LAS files. You can choose the default ASPRS class set, a custom set you have previously defined, or create a new class set (see the Technical Guide entitled *LIDAR: Auto-Linking to LAS Point Clouds*).

Class Renumbering

The Lidar Manager allows you to change the class numbers assigned to the points. The Class Renumbering tabbed panel becomes active when you choose to update input files in-place or to make new output LAS files. The controls on this panel let you choose individual current point class numbers and assign them different output class numbers.
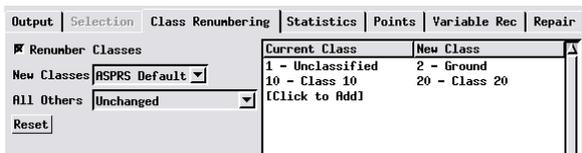

Georeference

The Lidar Manager's input list shows the coordinate reference system (CRS) for each input LAS file or lists it as *Undefined* if none is detected. (Only CRS information stored directly in the LAS file is detected; a CRS you may have designated for a previously-linked LAS file, which is stored in the TNT link file, will not be shown in the list). You can use the Default CRS button on the Lidar Manager to choose a CRS to assign; pressing this button opens the TNT standard Coordinate Reference System window for this selection procedure. If you are only linking to the input files, the designated CRS information is added to the TNT link file created or updated for each input. If you are updating in-place or creating new output LAS files, the CRS information is written into the LAS file header for each updated or output file. If the CRS information stored with an input LAS file is incorrect, you can turn on the *Override detected CRS* toggle to assign the correct CRS.

Reprojecting LAS Points

You can choose to reproject the input LIDAR points to a different coordinate reference system in any of the operations

that create new LAS files. Use the Output CRS button on the Output tabbed panel to select the desired output CRS. The Precision menu lets you set the precision to use for the output coordinates. For a projected CRS using meters, for example, you can choose precision values from 1 m to 1/10000 m.
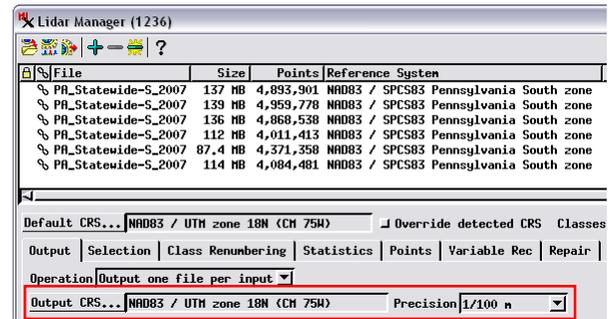
In the illustration above the individual input LAS files are being reprojected from Pennsylvania State Plane coordinates to UTM coordinates (set using the Output CRS button).

Extracting LAS Points

You can use the Lidar Manager to extract points from one or more input LAS files and transfer them to the output files. This option is available for any operation that produces new LAS files. You can select points to extract by area and/or by class using controls on the Selection tabbed panel. For more details see the TechGuide entitled *LIDAR: Extract LAS Points by Area and/or by Class*.

Create Lidar DataSet File

You can turn on a toggle in the Other Files box on the Output tabbed panel to create a Lidar DataSet (LDS) file for a set of input files you are scanning and linking or updating, or for a set of new output files. The LDS file makes it easy to select, view, and process the tiled set in a convenient and seamless fashion (see the TechGuide entitled *LIDAR: Use LAS Files as Single Seamless Dataset*).

Job Processing

Lidar Manager operations with many input files can involve processing tens to hundreds of millions of elevation points. You have the option to run these operations immediately in the Lidar Manager or to assign them as jobs to be run in the TNTmips Job Processing system. For job processing you can choose to either Queue Job or Save Job. The Queue Job option adds the job to the pending jobs queue in the TNTmips Job Manager, where it will be run immediately or as soon as a job slot becomes available. The Save Job option adds the job to the queue with Hold status; this status allows you to queue the job manually when it is convenient or schedule the job to be run automatically at the designated time (such as after normal work hours).