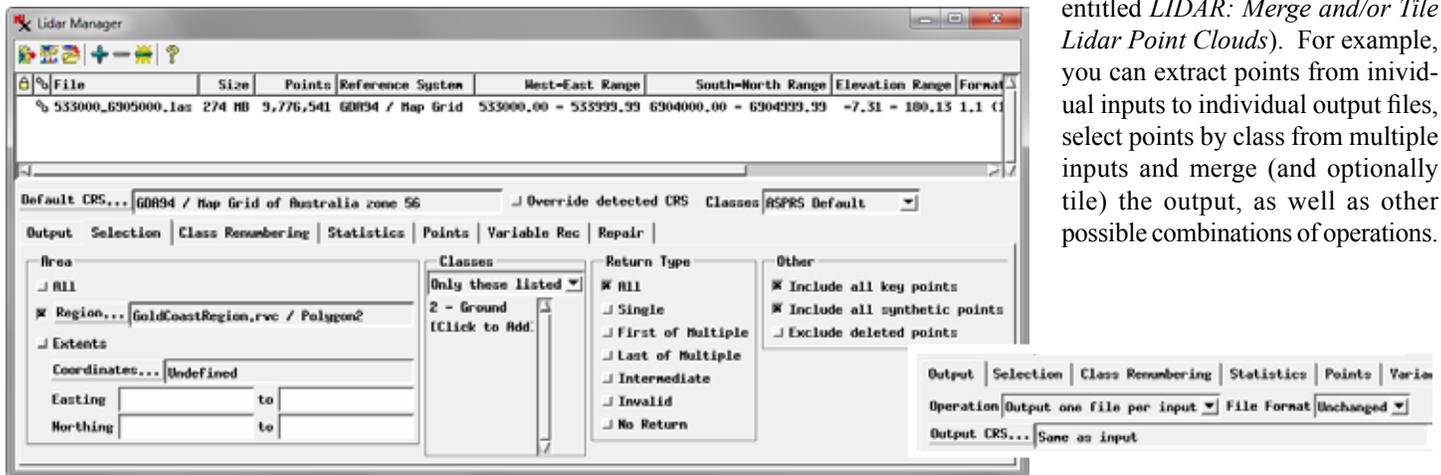# Extract Lidar Points by Area, Class, Return Type

You can use the Lidar Manager in TNTmips Pro (Terrain / Lidar Manager) to extract points from one or more input LAS files and transfer them to one or more output LAS files. (See the Technical Guide entitled *LIDAR: Manage Lidar Point Clouds* for a general introduction to the process). You can extract all input points or limit the selection by area, by class, and/or by return type.

Point selection parameters for extraction are specified on the Selection tabbed panel. An extraction area can be specified either by choosing a pre-existing region object or by entering coordinates defining the extents of a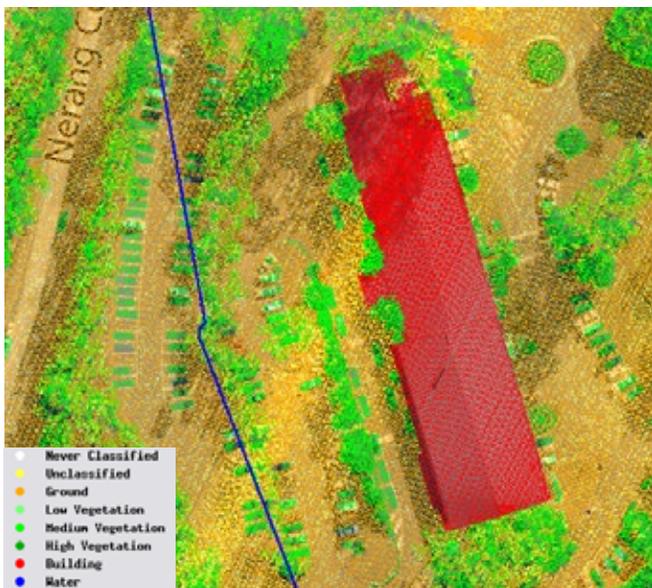 rectangular area. Rectangular extraction extents can be provided in any supported coordinate reference system. The Classes section of the Selection panel allows you to choose Lidar point classes to build a class list to determine the selection. The list can be used to set the point classes to include in the extraction (Classes menu setting *Only these listed*) or to exclude from the extraction (Classes menu setting *All except listed*). The Return Type controls allow you to select one or more (or all) pulse return types (such as *First of Multiple* or *Last of Multiple*).

The point selection controls can be used in conjunction with the merging and tiling options in the Lidar Manager (see the TechGuide entitled *LIDAR: Merge and/or Tile Lidar Point Clouds*). For example, you can extract points from individual inputs to individual output files, select points by class from multiple inputs and merge (and optionally tile) the output, as well as other possible combinations of operations.

The Selection panel provides controls for choosing points for extraction by area, by class, and by return type. The extraction area can be limited using a region object (as in the illustrated example) or by specifying rectangular extents in any coordinate reference system. The Classes controls allow you to create a list of classes to be included or excluded during the extraction. In this example, points in the Ground class are set for extraction. You can also select points by Return Type, such as *Single* or *First of Multiple*. The Operation (set on the Output tabbed panel) for this example is *Output one file per input*.

Above left, TNTmips display of input classified LIDAR points styled by class. The area includes a large building (red points), vegetation (green), and parking lots and streets; the inset at lower left shows the legend for the point colors. The background reference layer is Bing Maps Aerial with Labels. The dark blue line is the boundary of a region object (inside to the right) used to designate the area for extracting ground points in the Lidar Manager. Above right, TNTmips display of the resulting LAS file containing the extracted ground points (brown). Only ground points inside the region were extracted.