Shapefile Vertex Solution Guide

Troubleshooting your Shapefiles for Upload

SMART uploads have a limit of 10,000 vertices. When uploading shapes via WKT, it is difficult to count the actual number of vertices. There are two ways to learn the number of vertices in your shape if a user is experiencing issues in the uploading process.

SMART will often throw a generic error in the map when a polygon fails to meet standards, unfortunately it does not specify the error. Below we provide tips on how to identify the most common errors in a polygon.

(1) Finding the number of vertices in ArcMap
   a. Open your shape in ArcMap, right-click the layer you want evaluated in the Table of Contents and choose **Open Attribute Table**.
   b. Next, from the Table Options choose to **Add Field...** and a dialogue box will open.
      i. Name the field "`Vx_Count`" and choose Long Integer
   c. Right-click field header, and select **Field Calculator**
   d. Under Parser, select **Python**
      i. In the expression box, set:
         `Vx_Count = !shape!.pointcount`
   e. Vertex count will appear for each attribute in the shapefile
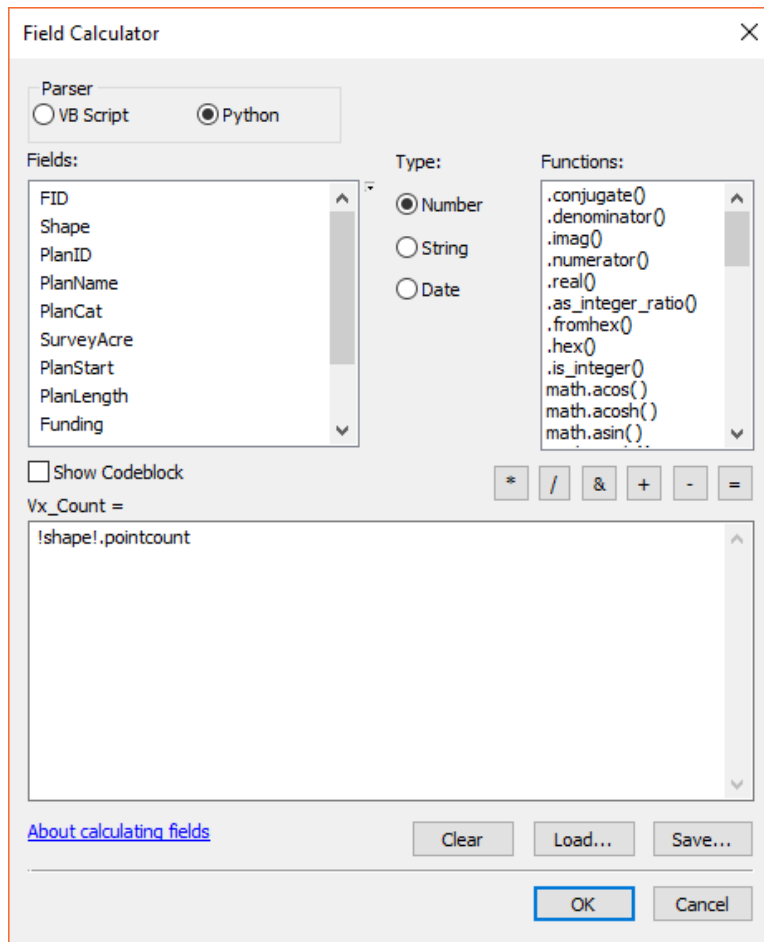

Figure 1 - Field Calculator dialog box with python

(2) Finding the number of vertices using the **ShapeUp Tool**
    Note: if you have not already installed the desktop ShapeUp Tool, find it here

    a. Open the **SMART ShapeUp Application**

    b. Click **Open Shapefile** and navigate to the file you wish to open

    c. The shapefile will appear in the map of the application. Click the shape and it will highlight red, also giving you the WKT string to copy and Vertex Count.
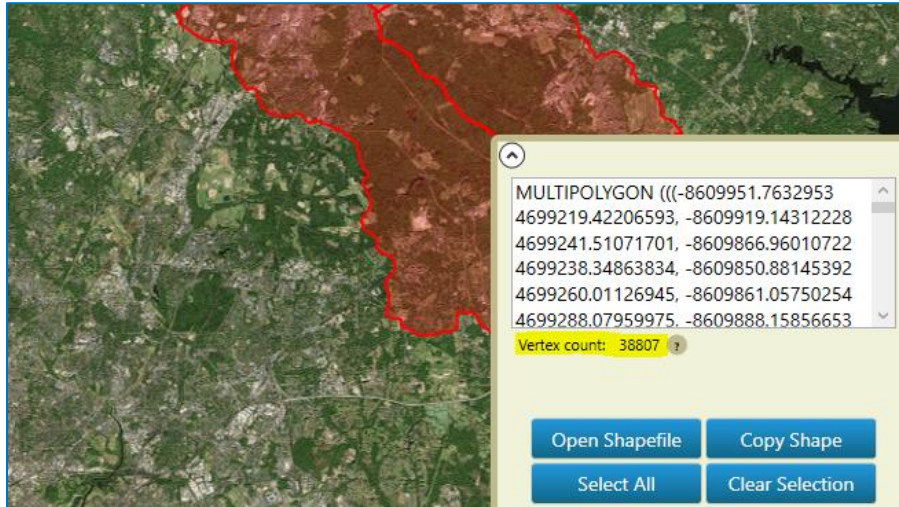

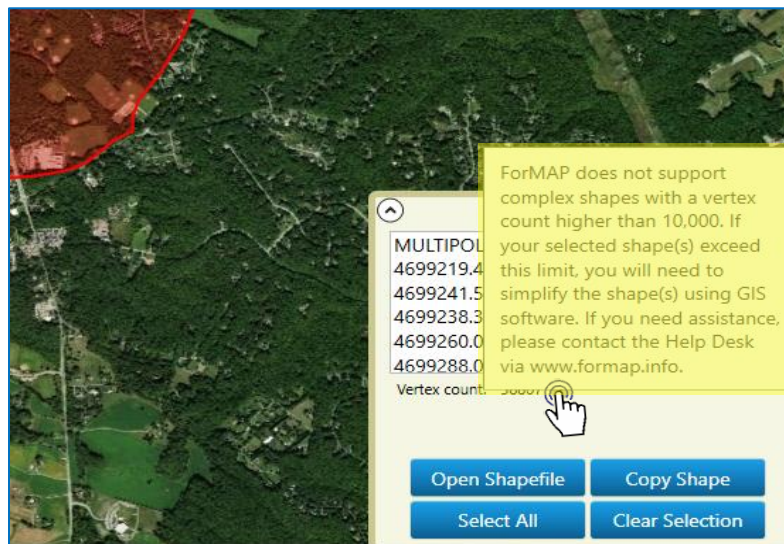*Figure 2 - ShapeUp application showing WKT and Vertex count*

Figure 3 - the user can find a Help (?) icon next to the Vertex Count that will display directions for shapes greater than ten thousand points

(3) Vertex Proximity

Another issue that may cause problems in the WKT upload is with proximity between vertices. That can mean closeness, the application may have a sensitivity when two or more vertices are *too* close or touching (sharing a common point). Overlapped shapes in a multi-part polygon is also a proximity issue that the user must fix to get their shape into SMART.
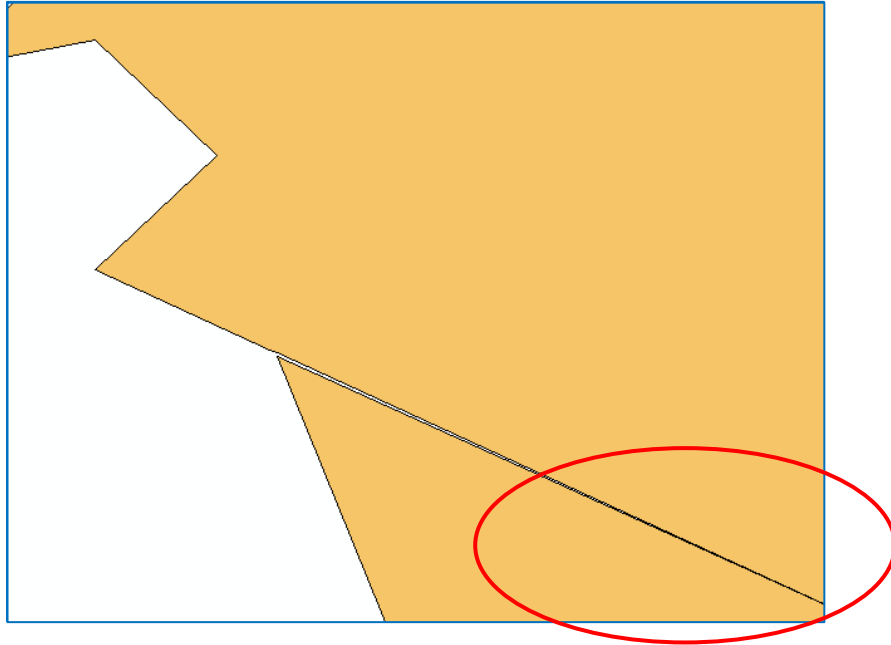

Figure 4 - example of closeness between two shapes in a multi-part polygon

Overlapping shapes in a multi-part polygon is also a proximity issue that the user must fix to get their shape into SMART. Shapes are invalid if lines overlap (share a segment) within the same feature.

Fixing the Problem

If your shapefile is failing to upload in SMART, your issue will either lie with the WKT itself (syntax error) or the number of vertices that we just addressed. The solution for these issues can be performed in ArcMap.

For vertex counts over 10,000 it's best to simplify the polygon in ArcMap using the **Simplify Polygon tool**. This is found under the *Cartography Arc toolbox* under *Generalization* tools. Open the tool and enter the following parameters:

a. **Input features** – input the polygon you want to simplify for SMART
b. **Output feature class** – output file location for new polygon
c. **Simplification Algorithm** – two primary choices to consider, **POINT_REMOVE** or **BEND_SIMPLIFY**. Point removal will retain critical points and removal redundancies; however, it results in a coarser polygon. Retaining the bend in the polygon will produce results more faithful to the original boundary, only removing insignificant bends. This BEND_SIMPLIFY is highly suggested for SMART plan shapes to maintain integrity of the project area.
d. **Simplification Tolerance** – this determines the degree of simplification. For BEND_SIMPLIFY algorithm, the linear unit and tolerance is the baseline length of the bend.
e. **Minimum Area, Handling Topological Errors, Minimum Area, Input Barriers** – all these parameters are optional and not required to successfully simplify the boundary
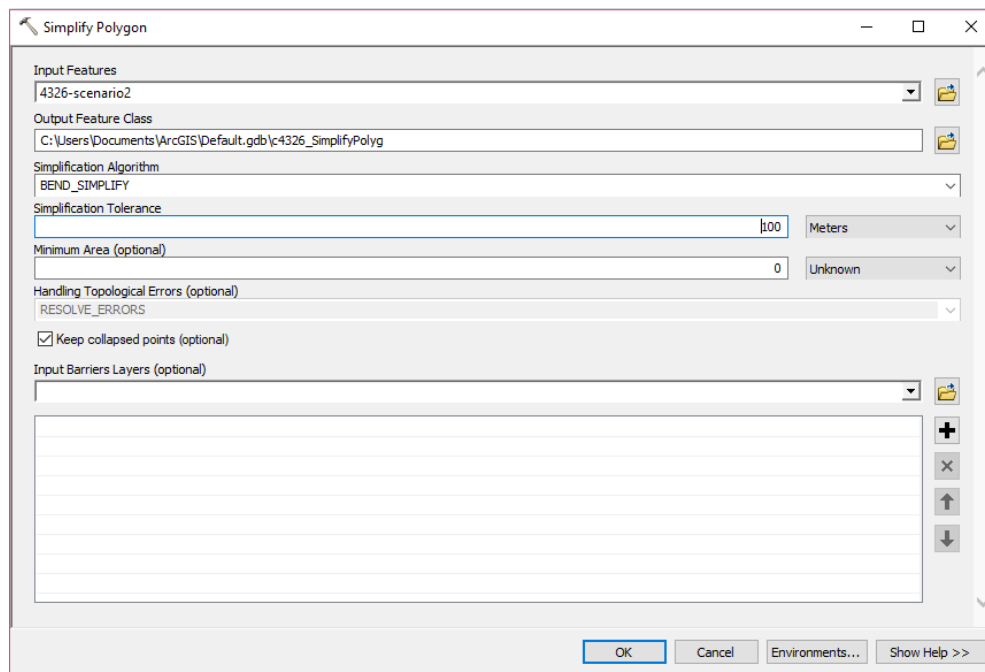

Figure 5 - Simplify Polygon dialogue box in ArcMap

Vertex proximity issues, such as in Figure 4, are best fixed with an editing session in ArcMap – manually moving or removing vertices. Simply open an ArcMap, view your polygon and begin an **Edit** session.

One can manually edit the points or choose **Clip…** in the Editor tools.

a. Select the polygon feature whose border you want to maintain. The other polygon will be clipped back to match it.

b. Click the **Editor** menu and click **Clip**.

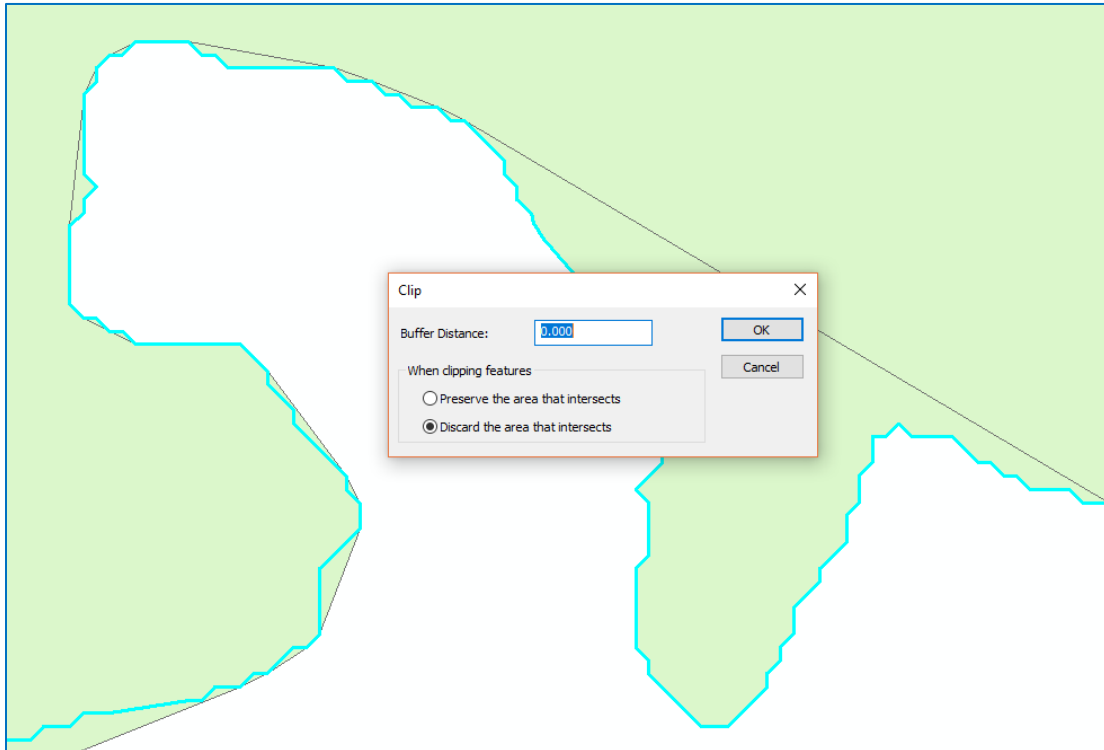c. Set the buffer distance to **0** and choose to discard the area that intersects.

d. Click **OK**.

Figure 6 - Clip tool within an Edit session