Polygon Buffer Zone Options

Expand Shrink Outer Ring Inner Ring

Border

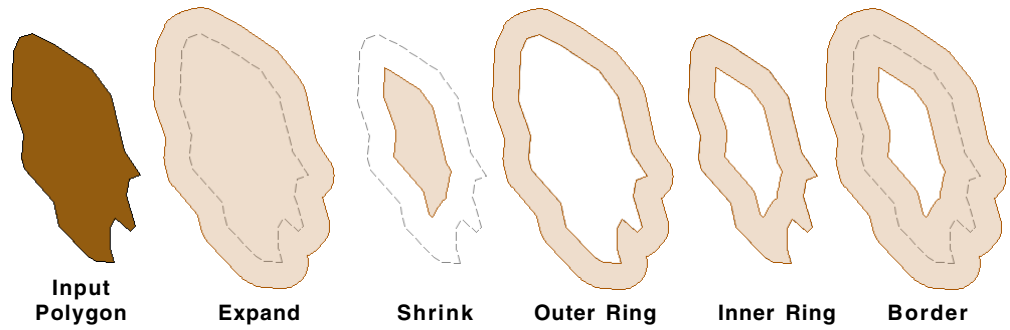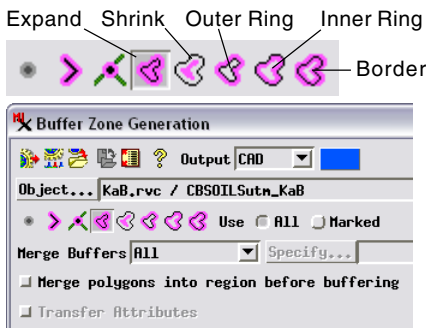| Input Polygon | Expand | Shrink | Outer Ring | Inner Ring | Border |

Polygon Buffer Zone Operations

The Buffer Zone Generation process in TNTmips (Geometric / Compute / Buffer Zones) provides varied options for generating buffer zones for polygon elements in geometric objects (vector, CAD, shape, or region). Because a polygon being buffered already has a finite area, even the simple case of a single buffer distance applied to the polygon can produce different results depending on whether the buffer distance is applied to the outside or inside of the polygon boundary (or both) and on how the buffer operates on the original polygon area. The Buffer Zone process presents these choices as separate polygon buffer operations that are selected using icon buttons. These operations and their results are:

Expand: original polygon plus outside buffer
Shrink: original polygon minus inside buffer
Outer Ring: outside buffer only
Inner Ring: inside buffer only
Border: outer ring plus inner ring

The illustration above shows examples of these buffer operations for a single input polygon. You can thus choose the type of polygon buffer operation that is best suited to your application. The buffer output can be a vector, CAD, or region object.

Merging Buffer Zones

When you use the Expand, Outer Ring, or Border operations, buffer zones generated for adjacent or nearby polygons may overlap with each other. The results will differ for CAD and vector buffer output. Because CAD objects allow elements to overlap, such overlapping buffer zones in a CAD result remain as separate individual elements. In the vector result, polygonal topology requires that the overlapping buffer zones must intersect to form separate polygons for the overlap areas (see illustration for an Outer Ring example above right), segmenting the original buffer polygons. If you use the Transfer Attributes option, the overlap polygons have multiple records attached if their parent polygons had different attributes.

You can choose to merge overlapping buffer zones from separate input polygons. The Merge Buffers menu offers the options None (no buffers are merged), All (all buffers are merged), and By Attribute. With the latter option, you are prompted to select a database table and field from the input object polygons; only buffers from polygons with the same value in the designated field are merged.

All three merge options are available when the output is a vector or CAD object. If you choose Region as the output object, all buffers must be merged, so the Merge Buffers menu is automatically set to All and the control is disabled. Sample results from these merge options are illustrated below.

Polygon Buffer Merge Options (Outer Ring Example)
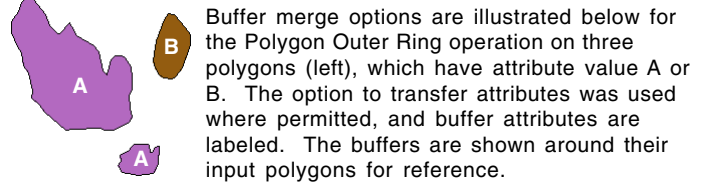
Buffer merge options are illustrated below for the Polygon Outer Ring operation on three polygons (left), which have attribute value A or B. The option to transfer attributes was used where permitted, and buffer attributes are labeled. The buffers are shown around their input polygons for reference.

Merge: None
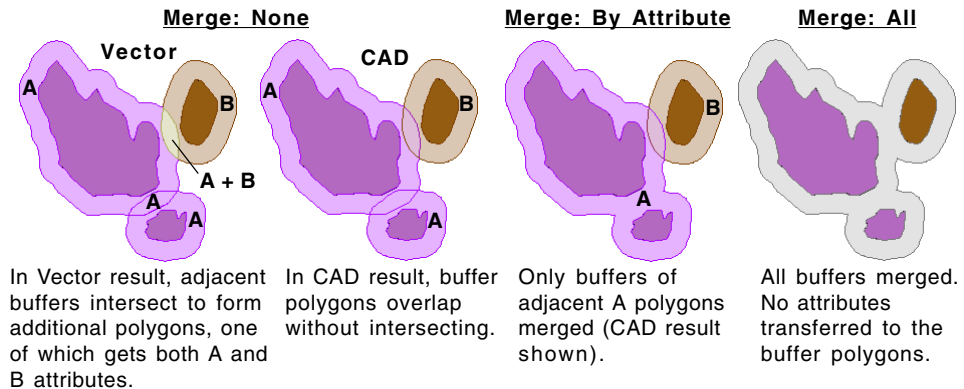
Vector

In Vector result, adjacent buffers intersect to form additional polygons, one of which gets both A and B attributes.

CAD
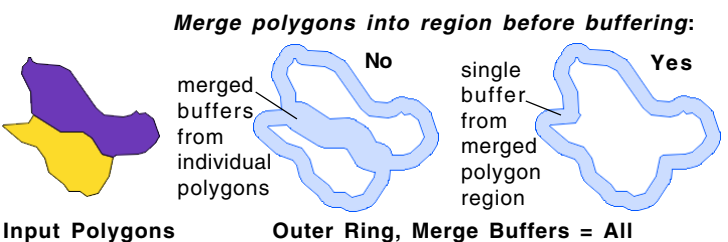
In CAD result, buffer polygons overlap without intersecting.

Merge: By Attribute

Only buffers of adjacent A polygons merged (CAD result shown).

Merge: All

All buffers merged. No attributes transferred to the buffer polygons.

The option to transfer attributes is available if you merge buffers By Attribute, but not when you merge all buffers. Therefore this option is automatically disabled for the region output choice.

Merge Polygons Before Buffering

When you merge polygon buffers (All or By Attribute), you also have the option to *Merge polygons into region before buffering*. When this option is used, all polygons are merged into a single temporary region before the buffer zones are generated. Polygons that are adjoining and those that are within twice the buffer distance of each other are affected by this setting, as illustrated for adjoining polygons below. (over)

Merge polygons into region before buffering:

No

merged buffers from individual polygons

Yes

single buffer from merged polygon region

Input Polygons
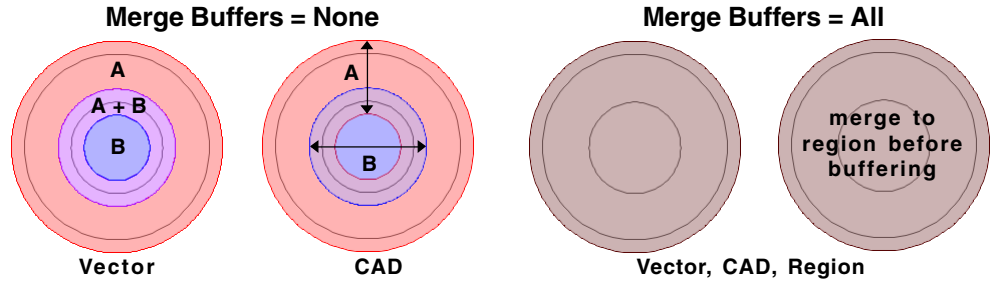
Outer Ring, Merge Buffers = All

Buffer Zones for Polygons with Islands

Polygons with enclosed interior polygons (termed *island polygons* in a vector object) are a complicating factor in generating polygon buffer zones. The boundary of an island polygon is also a boundary of the enclosing polygon. Therefore if all polygons are being processed, this common boundary will be buffered separately for the parent and island polygon. The result will depend upon the buffer operation chosen and whether or not you have chosen to merge buffers. Results are illustrated below for different buffer operations and combinations of settings. All examples use the input vector shown to the right, consisting of an outer circular polygon (attribute A) and an inner circular polygon (attribute B). The Use: All option was selected. Attributes were transferred where permitted, and attributed buffers are labeled and shown in transparent colors corresponding to their parent polygon attribute. Merged buffers, which cannot have attributes transferred from the parent element, are shown in a neutral color. Buffer illustrations include gray lines marking the original polygon boundaries for reference.
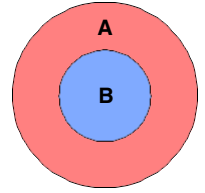

Expand

Polygon A expands outward from its outer (free) boundary and also from its inner boundary into Polygon B, which expands outward into polygon A. In the nonmerged result the overlap is preserved in CAD but in vector creates an intersect "ring", centered on the A-B boundary, that receives both attributes.

Merge Buffers = None — Vector, CAD
**Merge Buffers = All** — Vector, CAD, Region (merge to region before buffering)

Shrink

Polygon A shrinks from outer and inner boundaries while Polygon B shrinks from its boundary. There are no buffer overlaps. Simple buffer merge results in separate concentric buffer zones; merging the polygons before buffering eliminates the inner B polygon, leaving the merged larger polygon to shrink from its outer boundary.

Merge Buffers = None
**Merge Buffers = All** — Vector, CAD, Region (merge to region before buffering)
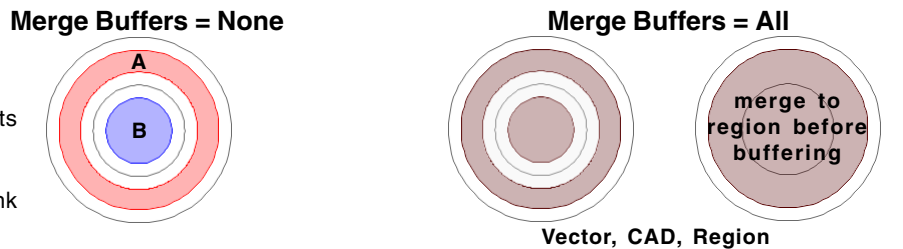
Outer Ring

Polygon A is buffered on its outer and inner boundaries, producing a ring inside the area of the original Polygon B. Polygon B is buffered on its boundary, producing a ring inside the area of the original Polygon A. There are no buffer overlaps. Merging the polygons before buffering eliminates the rings around the Polygon B boundary, leaving only the outer ring around the larger merged polygon.

Merge Buffers = None
Merge Buffers = All — Vector, CAD, Region (merge to region before buffering)
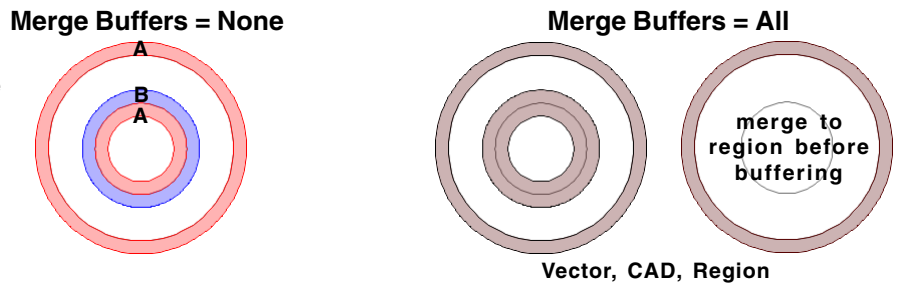
Inner Ring

Polygon A is buffered on its outer and inner boundaries, producing rings inside its area. Polygon B is buffered on its boundary. There are no buffer overlaps. Merging the polygons before buffering eliminates the rings around the Polygon B boundary, leaving only the inner ring around the larger merged polygon.

Merge Buffers = None
Merge Buffers = All — Vector, CAD, Region (merge to region before buffering)
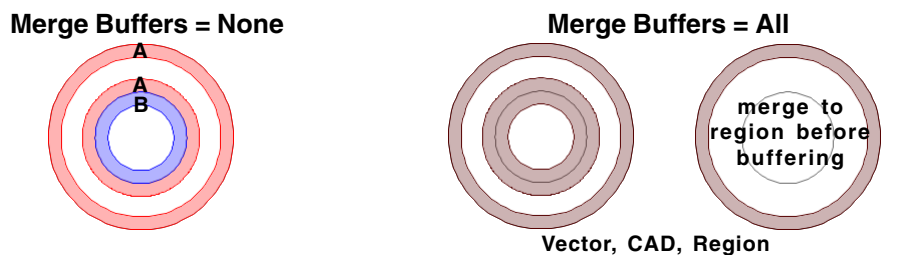
Polygon Border

Polygon A gets outer and inner rings on both its outer and inner boundaries. The latter buffer area exactly coincides with the border around Polygon B. In the nonmerged cases the CAD result preserves overlapping buffers around the A-B boundary, but in the vector result these collapse to a single polygon with both attributes.

Merge Buffers = None — Vector, CAD
Merge Buffers = All — Vector, CAD, Region (merge to region before buffering)