Vector Topology

Topology is planar

Specified by rules

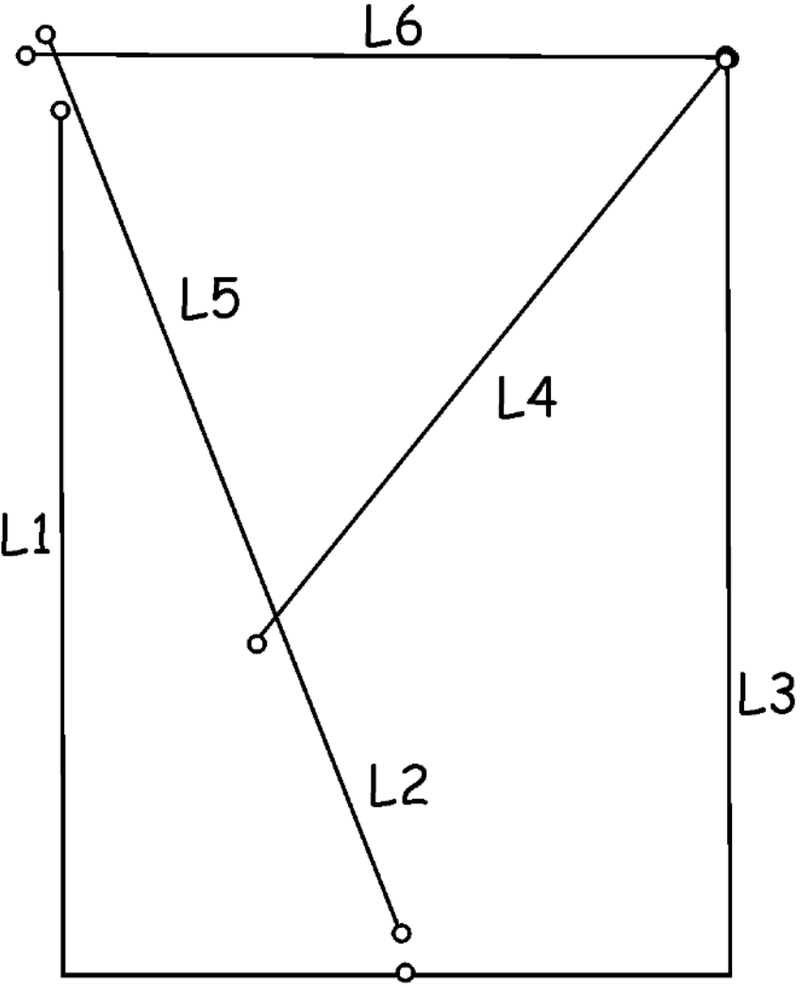
Within and between layers

Needed to ensure correct functioning of many spatial operations (e.g. area calculations, adjacency, containment, connectedness)

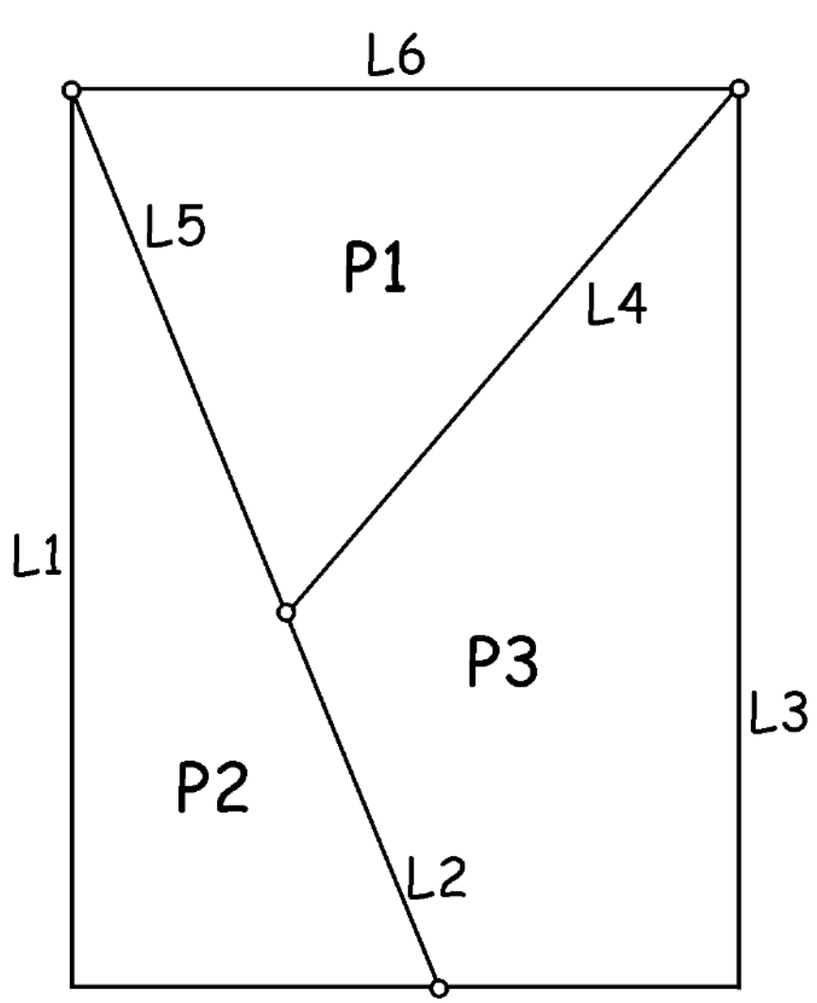
Vector Topology

geometric properties that to not change with shape:
adjacency, connectivity, containment

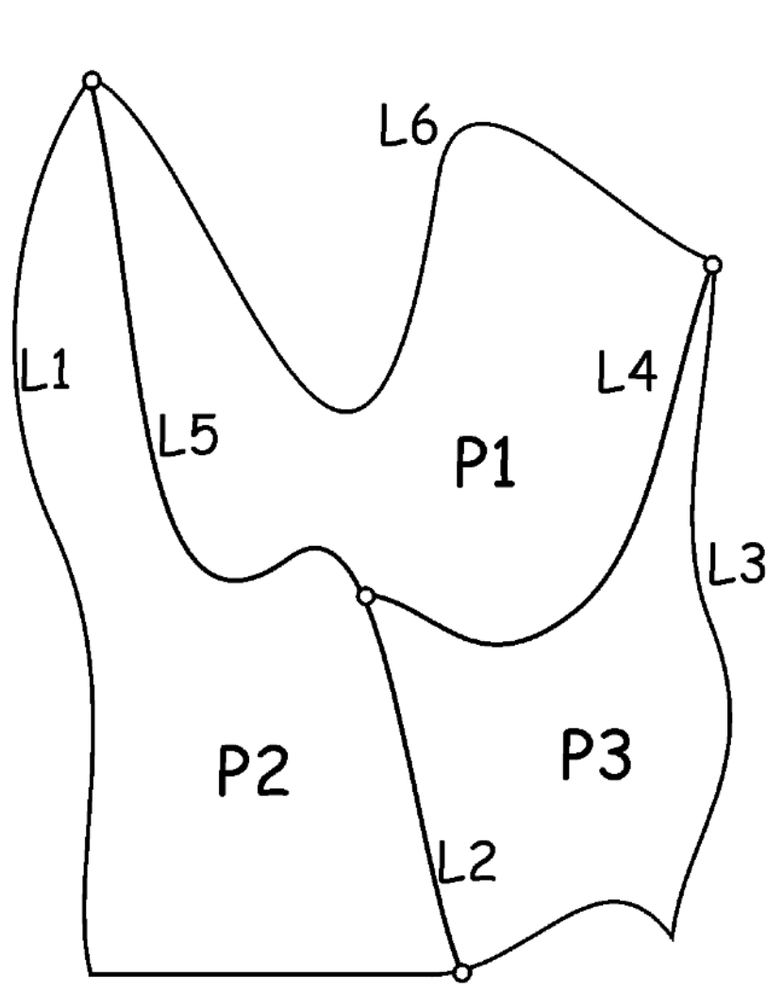
a) spaghetti



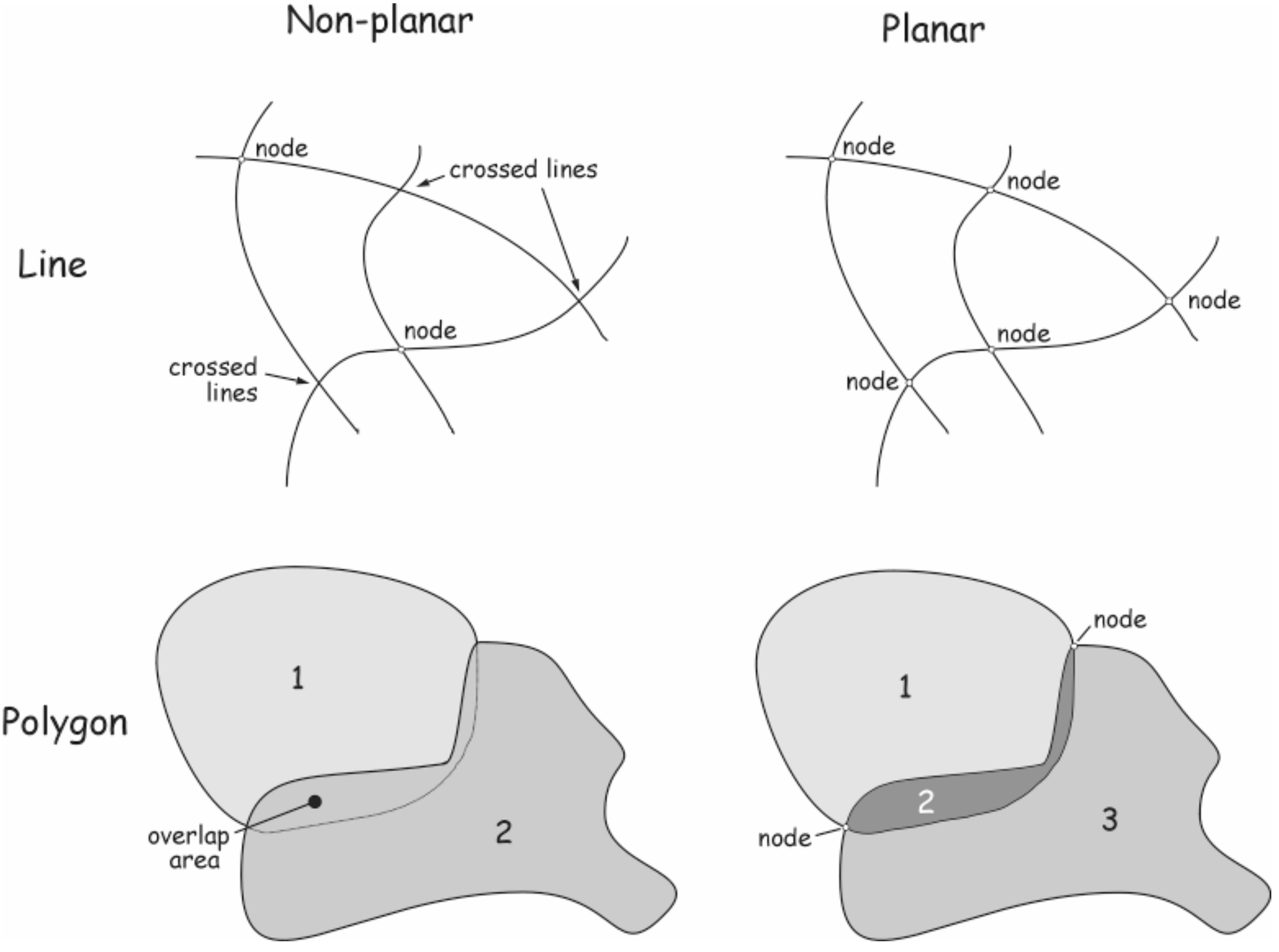
b) topological



c) topological - warped



Planar Topology – no overlaps



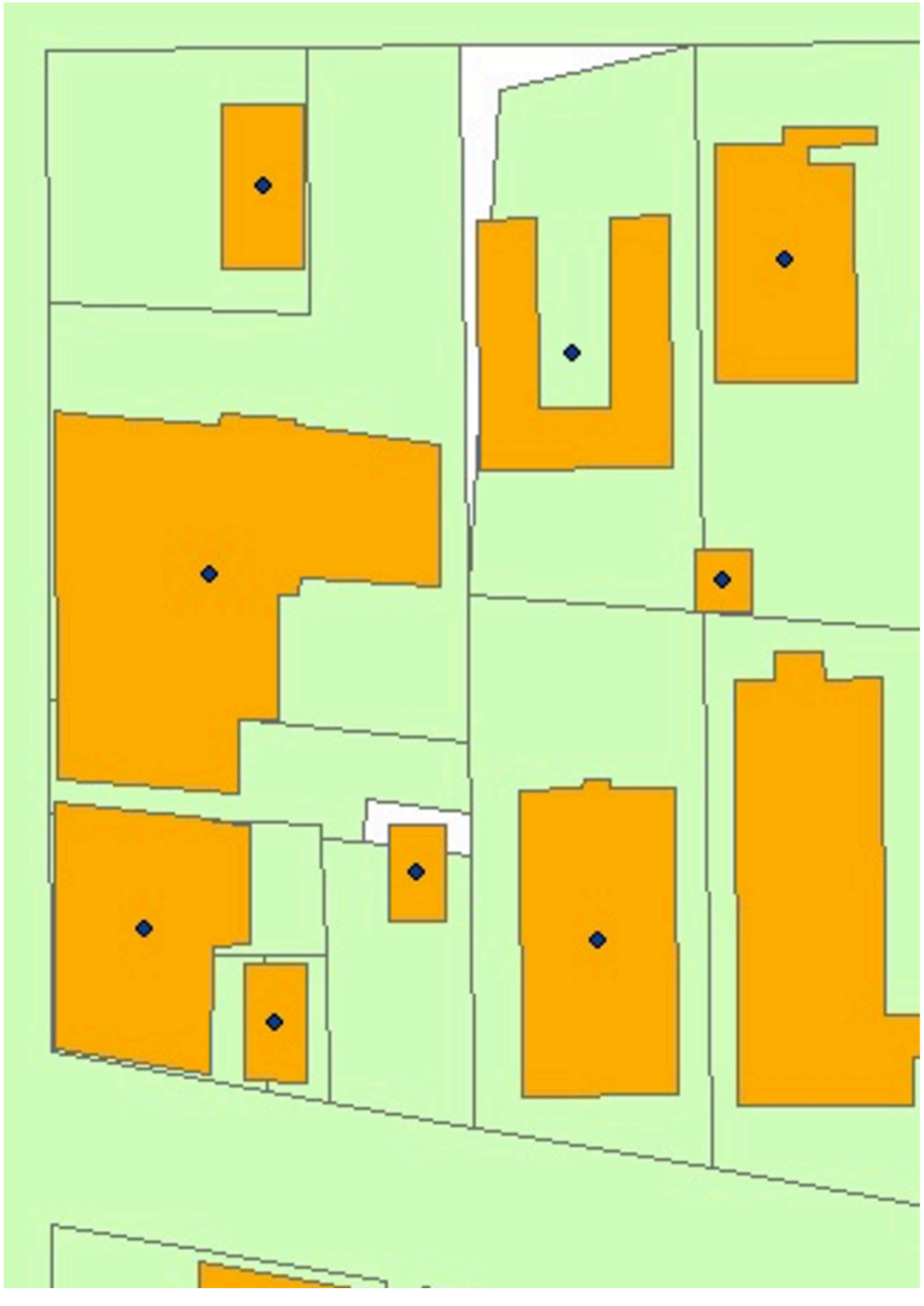
Topology

Enforced through rules

Parcel polygon layer must not have gaps

Centroid points must fall building polygons

Building polygons must not cross parcel boundaries



Polygon Topology

Two layer Example - Buildings & Landcover

Landcover classes can’t overlap or have gaps

Edges of buildings can’t overlap, have gaps with landcover

Buildings are isolated, so don’t have to worry about building/building overlaps or gaps

Possible Polygon Topology - An ESRI Example

Must not overlap

Polygons must not overlap within a feature class or subtype. Polygons can be disconnected or touch at a point or touch along an edge.

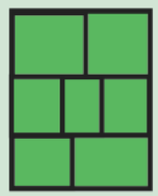
Polygon errors are created from areas where polygons overlap.

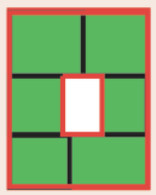
A voting district map cannot have any overlaps in its coverage.

Use this rule to make sure that no polygon overlaps another polygon in the same feature class or subtype.

Must not have gaps

Polygons must not have a void between them within a feature class or subtype.





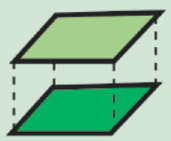
Line errors are created from the outlines of void areas in a single polygon or between polygons. Polygon boundaries that are not coincident with other polygon boundaries are errors.

Soil polygons cannot include gaps or form voids—they must form a continuous fabric.

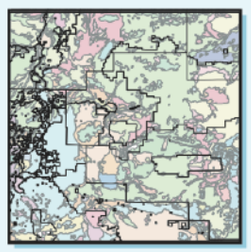
Use this rule when all of your polygons should form a continuous surface with no voids or gaps.

Must cover each other

All polygons in the first feature class and all polygons in the second feature class must cover each other.
- FC1 Must be covered by feature class of FC2.
- FC2 Must be covered by feature class of FC1.



Polygon errors are created where any part of a polygon is not covered by one or more polygons in the other feature class or subtype.

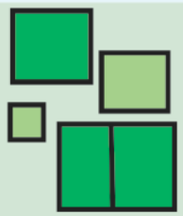


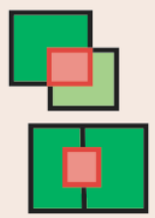
Vegetation and soils must cover each other.

Use this rule when you want the polygons from two feature classes or subtypes to cover the same area.

Must not overlap with

Polygons of the first feature class or subtype must not overlap polygons of the second feature class or subtype.





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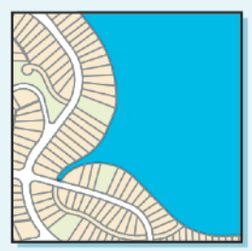
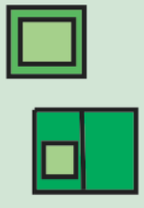


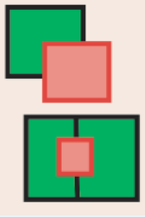
Lakes and land parcels from two different feature classes must not overlap.

Use this rule when polygons from one feature class or subtype should not overlap polygons of another feature class or subtype.

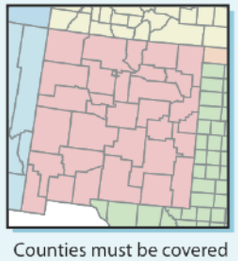
Must be covered by

Polygons in one feature class or subtype must be covered by a single polygon from another feature class or subtype.





Polygon errors are created from polygons from the first feature class or subtype that are not covered by a single polygon from the second feature class or subtype.



Counties must be covered by states.

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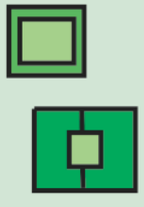
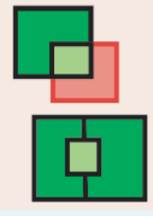
The polygons in the first feature class or subtype must be covered by the polygons of the second feature class or subtype.





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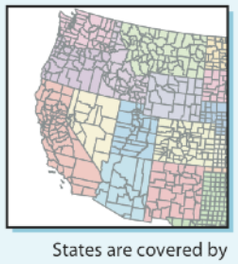

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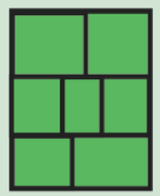

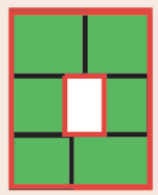

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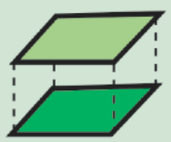

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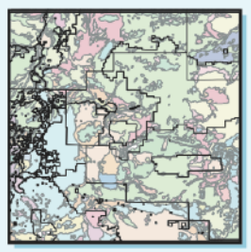

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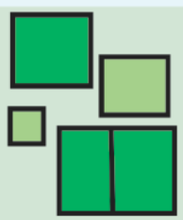

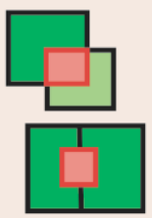

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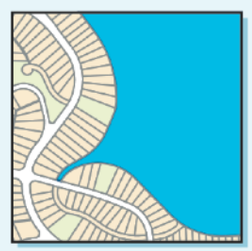

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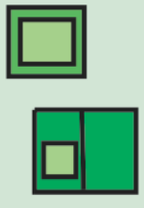

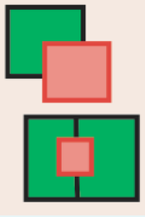

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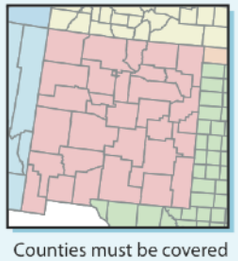

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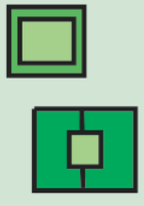

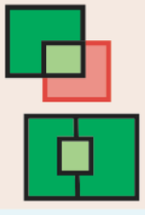

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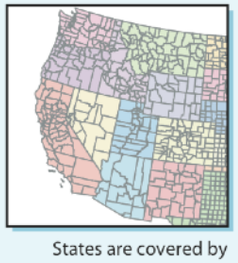

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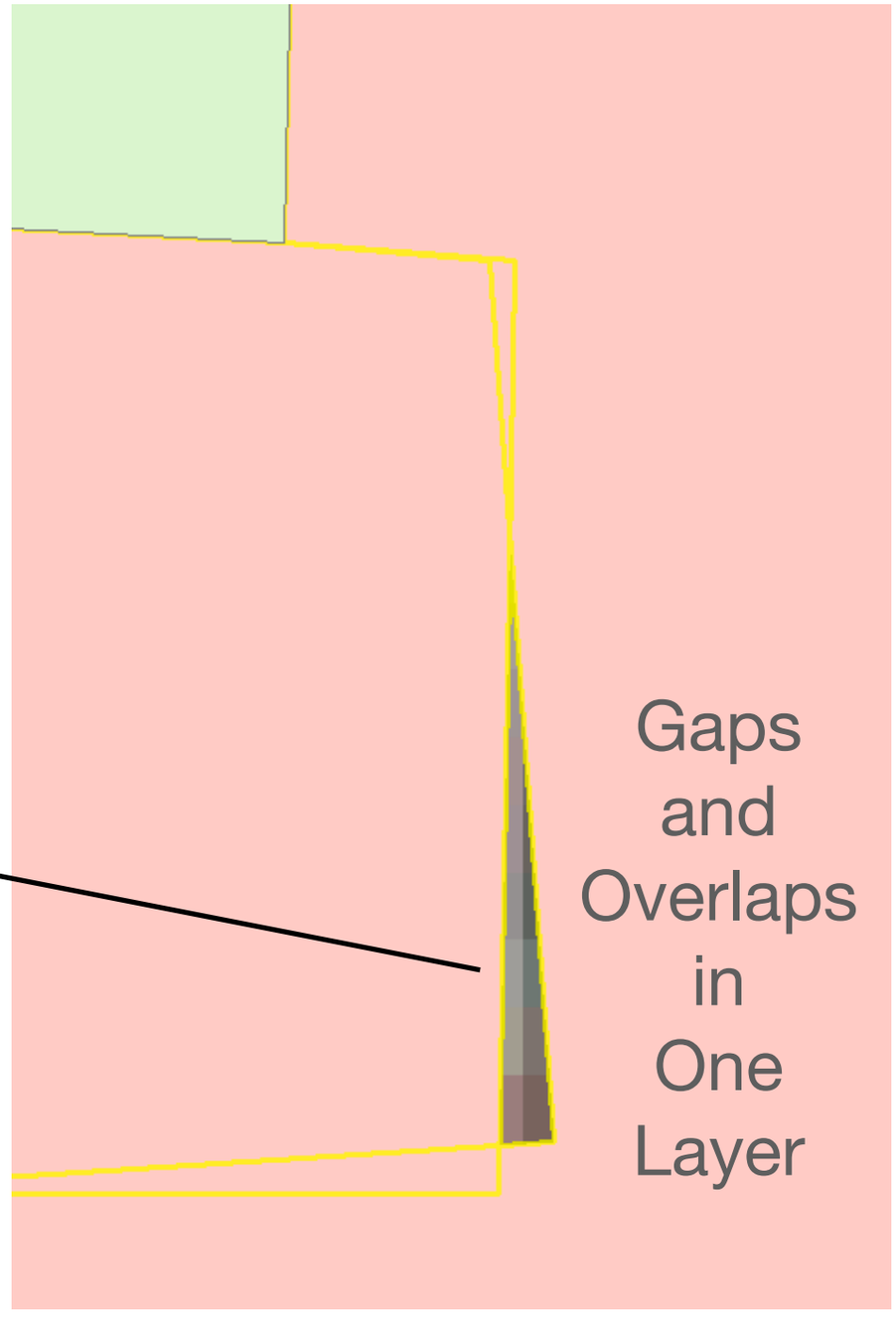
Typical Area

Typical Area



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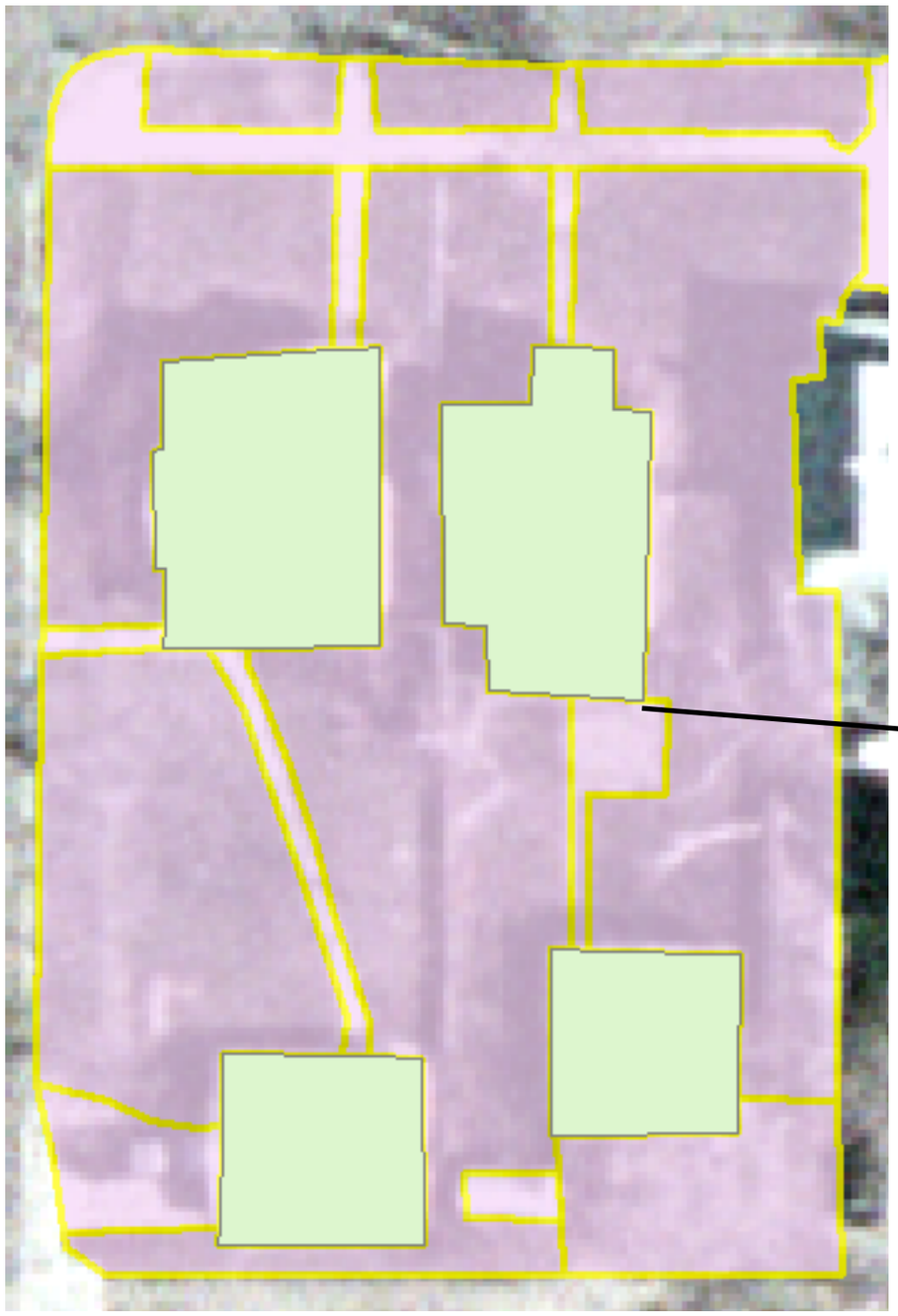
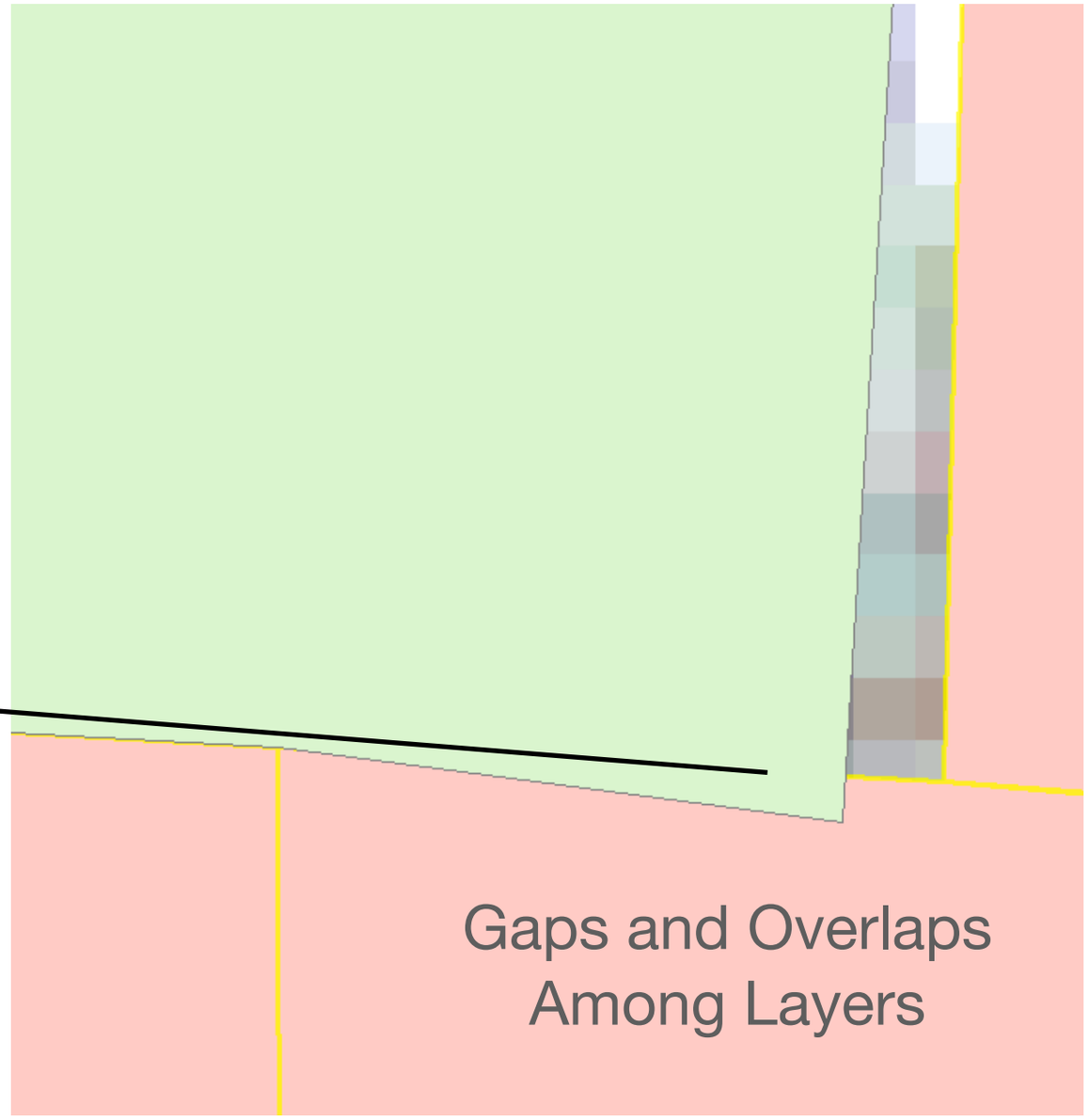
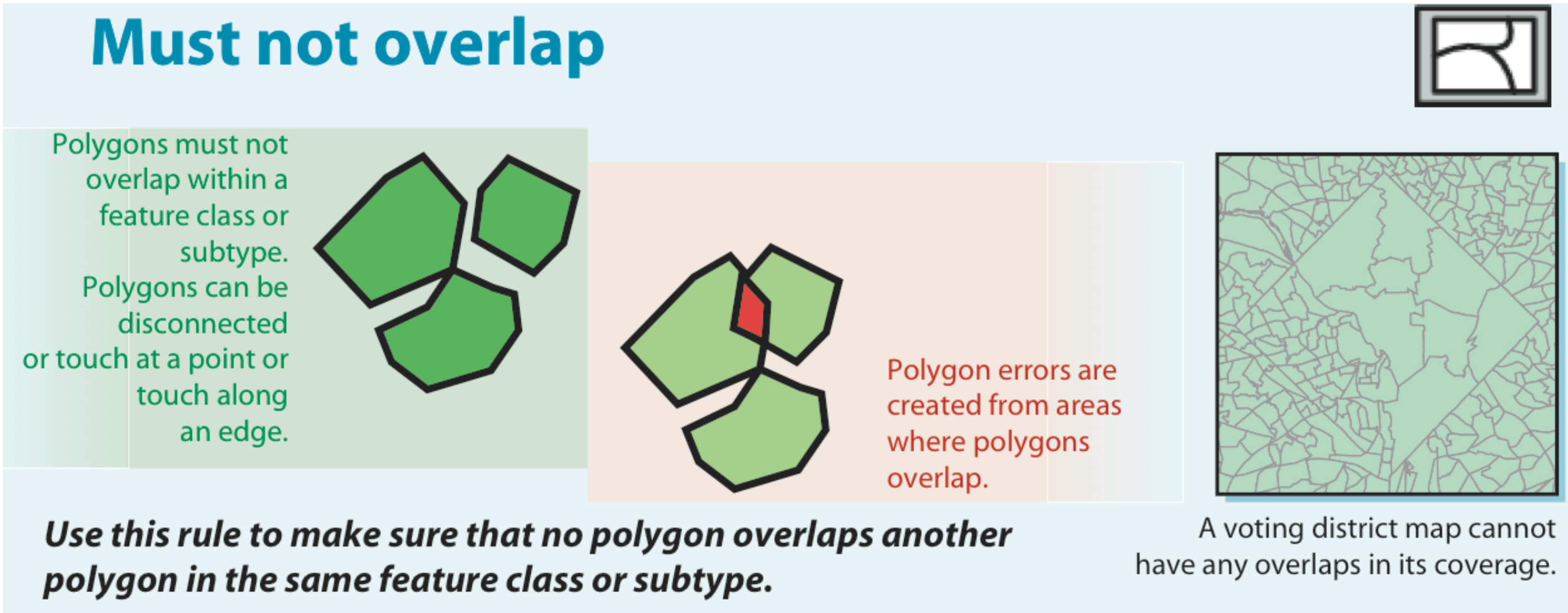




Landcover classes can’t overlap or have gaps



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can’t overlap or have gaps

Must not have gaps

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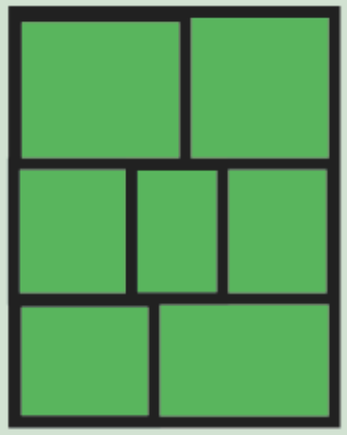

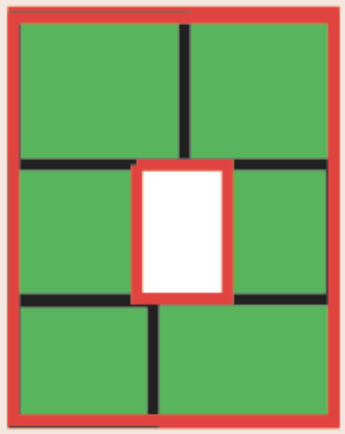

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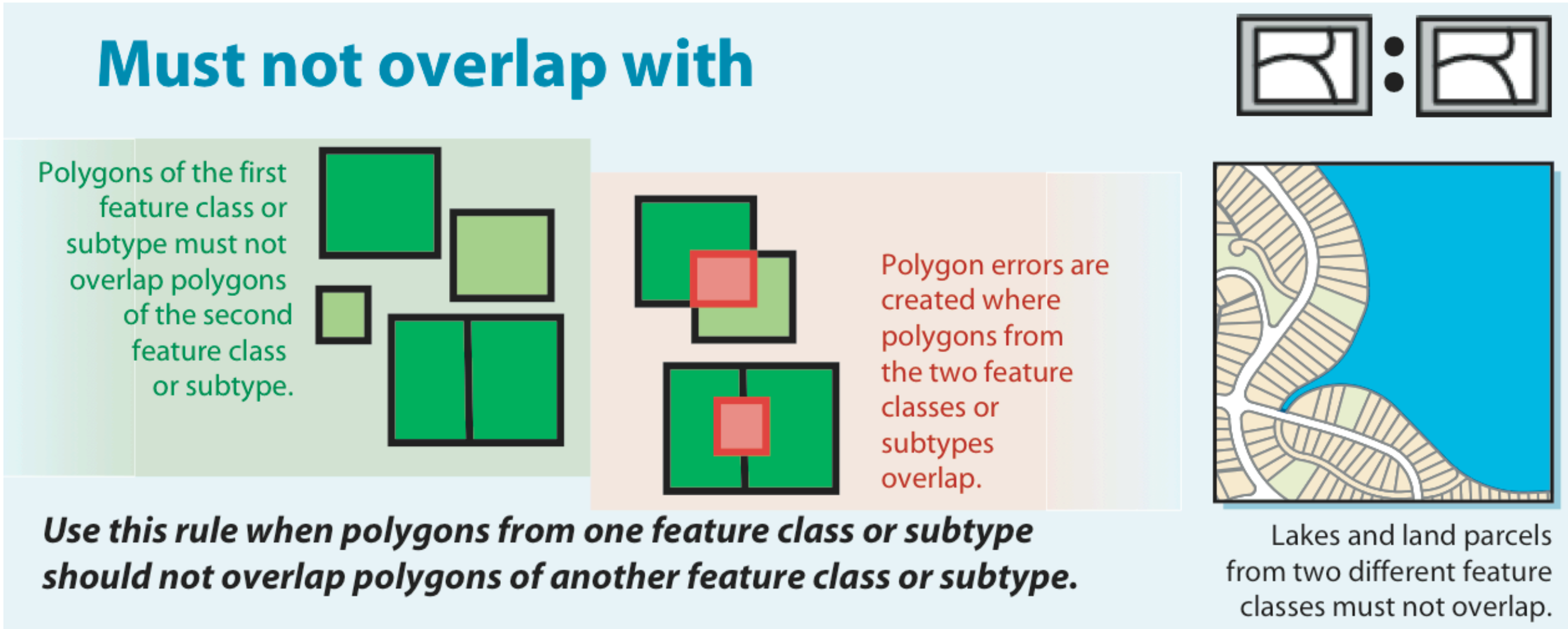
verlap, have gaps with landcover



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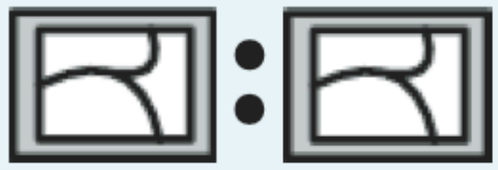
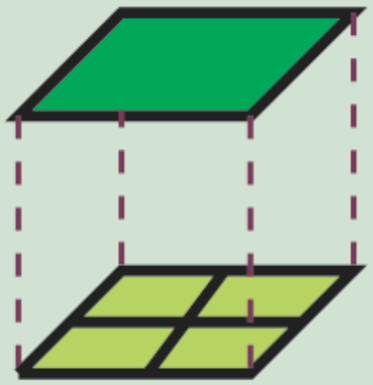
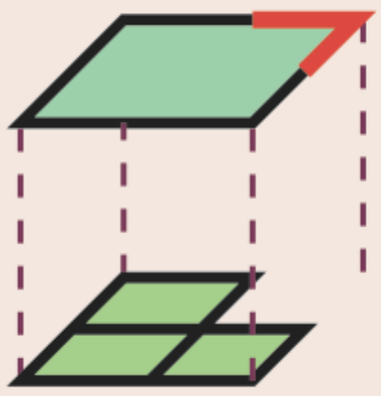
verlap, have gaps with landcover

Area boundary must be covered by boundary of



The boundaries of polygons in one feature class or subtype must be covered by the boundaries of polygons in another feature class or subtype.





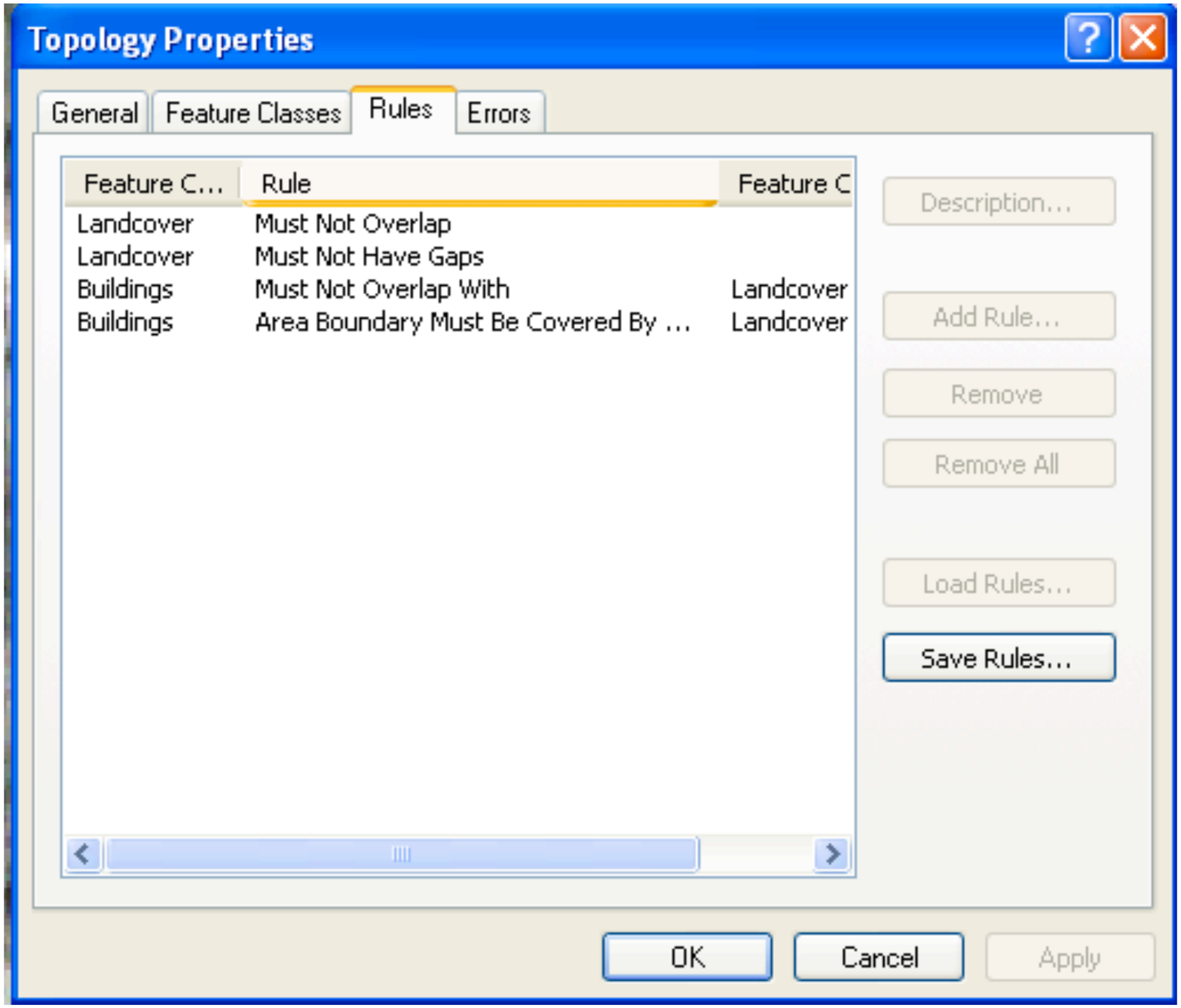
Line errors are created where polygon boundaries in the first feature class or subtype are not covered by the boundaries of polygons in another feature class or subtype.

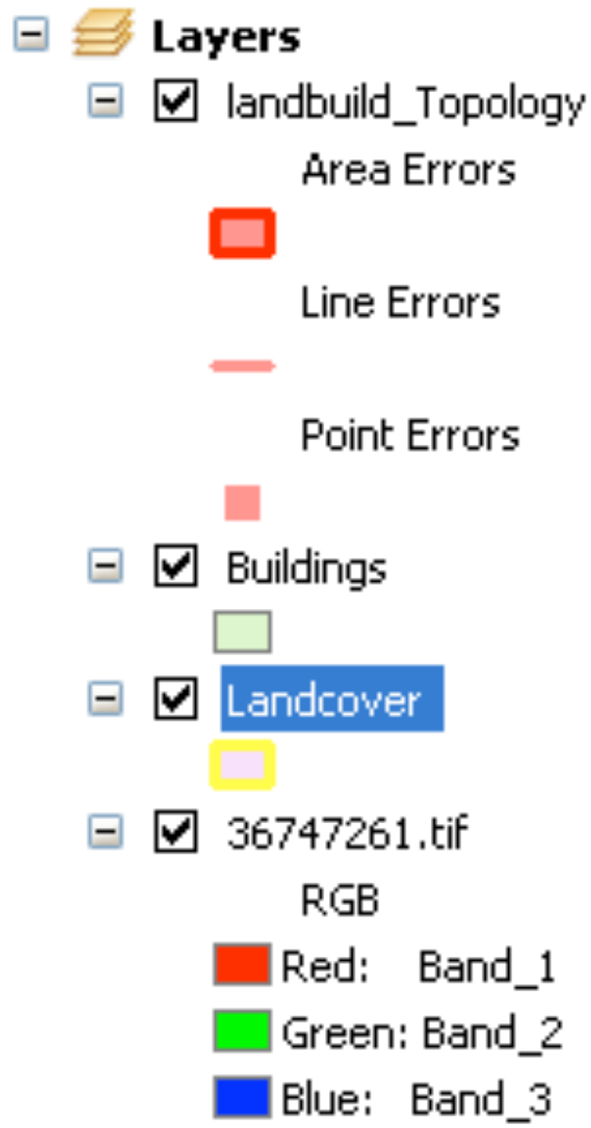
Use this rule when the boundaries of polygons in one feature class or subtype should align with the boundaries of polygons in another feature class or subtype.

Subdivision boundaries are coincident with parcel boundaries, but do not cover all parcels.

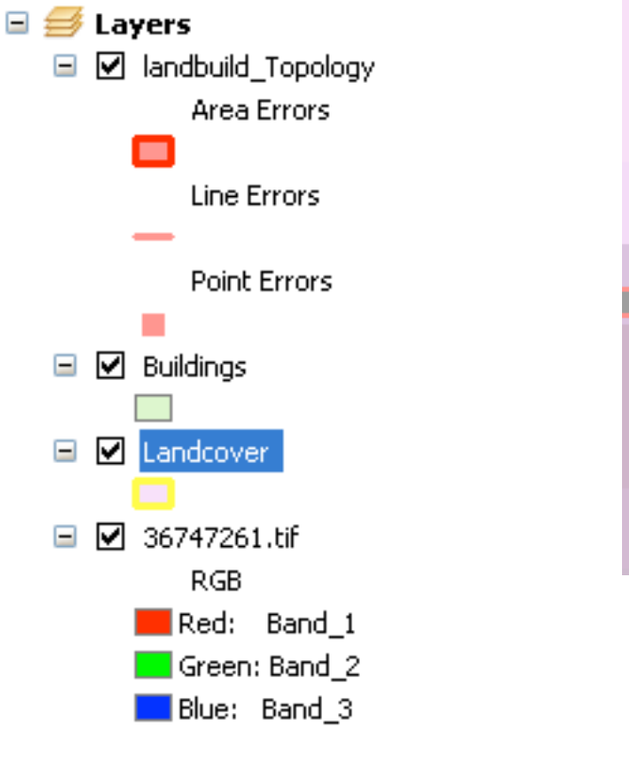
http://webhelp.esri.com/arcgisserver/9.3/java/index.htm#geodatabases/topology_in_arcgis.htm

Polygon Topology Rules





Polygon Topology Rules



Error: Landcover must not have gaps

Polygon Topology Rules

Error?

Polygon Topology Rules

"Faux" Errors

Topology

Understand the Concept of Topology

Define planar topology

Describe how rules can be created and applied to enforce topology

Understand “faux” errors