ISSUE 6:   **Connector Feature Creation and Implementation**

Background

The National Hydrography Dataset (NHD) contains a feature type called connector. The definition for a connector is "a known, but nonspecific connection between two nonadjacent network segments." Although some of these connectors occur at road intersections, some connect stream reaches where the actual stream location cannot be verified in an area. Connectors are used in areas where streams enter stormwater conveyance structures or disappear underground. In addition, connectors are used as centerlines through dams that are displayed as polygon features.

Issue

The Geodatabase for Streambed Mapping Project utilizes the NHD model. The existing 1:24K NHD contains connectors. It has been noted by members of the Advisory Committee that these features may no longer exist, or that the feature type may have changed since the dataset was last updated. Imagery with increased resolution may show that stream or canal locations can now be verified where these areas were obscured in the 1:24K data. It was also noted that just because a stream flows under a road, it does not necessarily mean that a connector is required. An inquiry was made as to how connectors would be handled and implemented in the Streambed Mapping Dataset.

Methods

There are two concerns regarding the use of the connector feature type within the Streambed Mapping Dataset. The first is how connectors will be conflated from the 1:24k data. The second is how connectors will be implemented for new streams that do not currently exist in the 1:24K NHD.

Method 1

Existing Connectors:

In this method, connectors that currently exist in the 1:24K NHD will be brought into the Streambed Mapping Dataset with a feature type of connector. The geometry of the line will be maintained from the current 1:24K NHD. There are approximately 150 - 200 lines in the existing 1:24K NHD tagged with a feature type of connector within the 19 county study area.

New Connectors:

In this method, connectors will not be utilized for new features. Instead, all linear features will be tagged as streamriver, artificial path, etc.

Method 2

Existing Connectors:

In this method, "connectors" that currently exist in the 1:24K NHD will be revised in the Streambed Mapping Dataset only in instances where connectivity can now be established. The geometry of the line and the feature type will change. The geometry of the line will be amended to reflect more current base data, and to provide a more accurate representation of actual ground conditions. There are approximately 150 - 200 lines in the existing 1:24K NHD tagged with a feature type of "connector" within the 19 county study area. Any "connectors" in the 1:24K NHD that are used as the centerline through dams that are polygon features will not be revised in the Streambed Mapping Dataset.

Each "connector" from the 1:24K NHD will be analyzed against the more current base data to determine whether connectivity can be established and whether a "connector" feature is still necessary. In those instances where a "connector" feature type is revised, the feature type will be changed to "stream/river" or "canal/ditch".

- *The connector feature type will typically be changed to match the adjoining flowline(s). In these cases, the reach code will not be changed in any way.*

- *If the connector is changed to a feature type that's different from the adjoining flowline(s), then the reach code of the connector and the adjoining flowline(s) will be retired, new reach codes will be assigned, the change table will be populated, and the feature code will be revised. An example of this instance is shown below.*

In Figure 1, the original connector and stream features compose a single reach. If, during revision/collection of local resolution the connector is changed to "canal/ditch", it's no longer compatible with the stream segment upstream and requires its own reach. In this example, the reach (and its corresponding reach code) that's delineated by the stream and connector will be retired and two new reach codes applied to the stream and canal segments respectively.

**Figure 1 Connector Use - Changing FTypes for Existing Connectors**
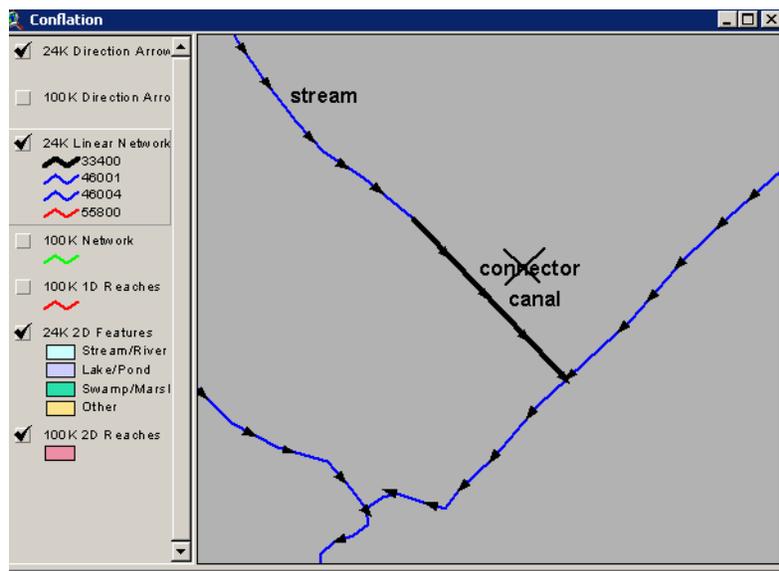
New connectors:

Several procedures will be implemented for the use of "connectors" with streamlines not found in the 1:24K NHD. The following are scenarios that have been encountered while digitizing streamlines and water bodies in the Pigeon Basin delivery area. These examples formulate the basis for the use of "connector" feature types in the Streambed Mapping Dataset.

- *It is likely that more connectors will be required in urban areas due to the large number of piped stream networks. Where applicable, digital stormwater inventory data will be utilized as a reference in order to create a continuous stream network. Connectors will be drawn in for each section of pipe between stormwater structures. In summary, if digital stormwater data exists for an area, connectors will be used to map the underground flow of the streamlines.*

- *In areas where digital stormwater inventory data is not available, the terrain data and the imagery will be utilized to determine the best placement of the streamlines. In general, the streams will be mapped based on the surface flow of water. In urban areas, there will be cases where the surface flow of the stream appears to go through a house or a building when viewing the terrain datasets and the imagery. Typically the stream does not actually flow under a house or a building; rather it has been piped. In cases where stormwater data cannot be used to confirm this, a connector will be drawn from the point where the stream flow becomes indistinguishable until the point where the terrain and imagery can again be utilized to verify the stream placement. Figure 2 illustrates this scenario.*

**Figure 2 Connector Use - Buildings and Houses**
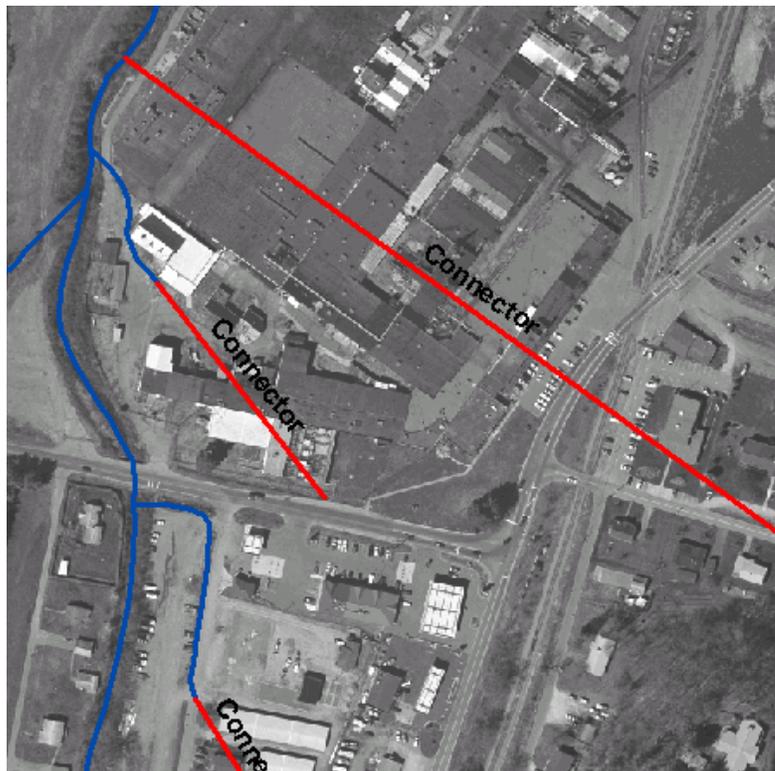
- *In urban areas, there are cases where the surface flow of the stream appears to go through a parking lot when viewing the terrain datasets and the imagery. Typically the stream does not actually flow through a parking lot; rather it has been piped. In cases where digital stormwater data cannot be used to confirm this, a connector will be drawn from one side of the parking lot to the other. If the parking lot is adjacent to a road and the stream crosses the road, the connector may instead be drawn from the road to the other end of the parking lot. An example of this scenario is shown in Figure 3.*

Figure 3 Connector Use - Parking Lots
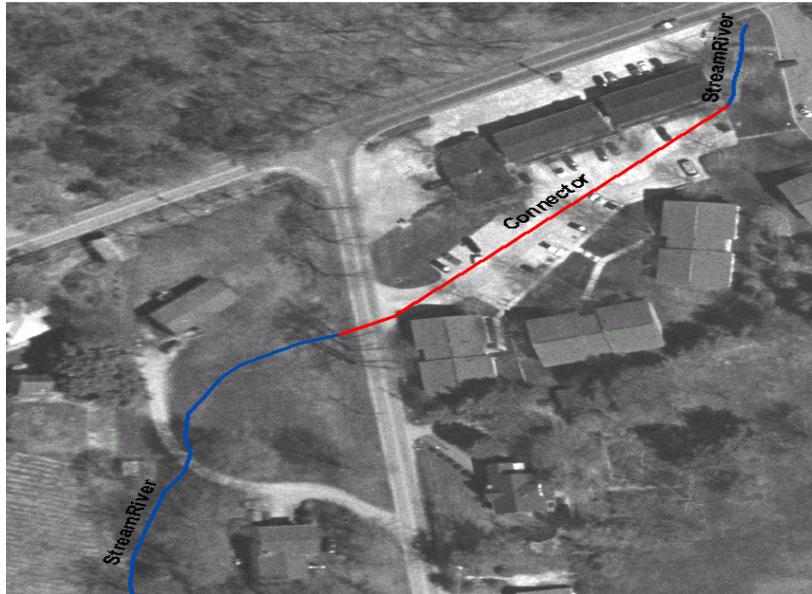
- *In areas where streams and/or water bodies most likely connect but it cannot be confirmed from the imagery or the LIDAR data, a "connector" will be used to create a continuous stream network. Figure 4 below depicts a connector that is used to connect two water bodies.*

Figure 4 Connector Use - Connectivity Between Water Bodies / Streams
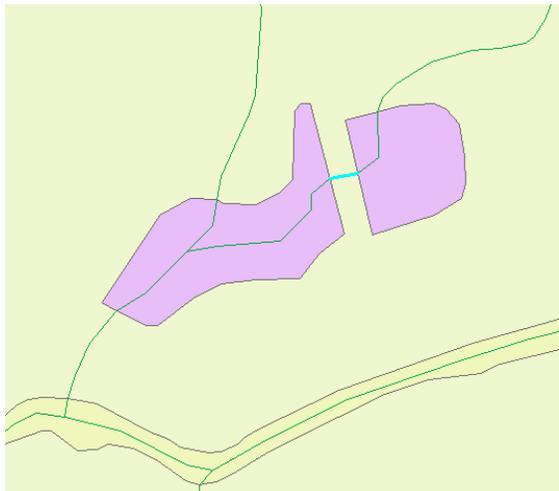
- *Connectors will also be utilized in areas where it is difficult to discern where a stream crosses the road. In many cases, no digital stormwater inventory or bridge and culvert data exists and the location of the stream crossing cannot be identified from the imagery or the terrain data. In these instances, a connector will be drawn from the point where the stream flow becomes indistinguishable until the point where the terrain and imagery can again be utilized to verify the stream placement. An example of this is shown in Figure 5.*

Figure 5 Connector Use - Road Crossings
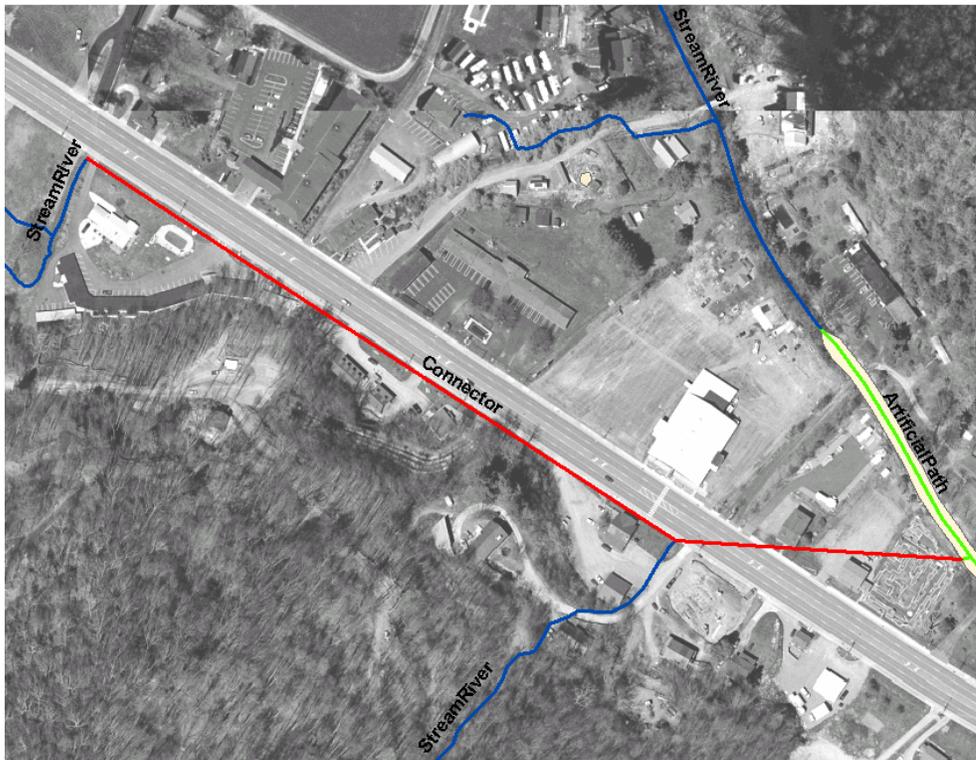
Recommendations

It is recommended that Method 2 be utilized for the Streambed Mapping Project. All lines that are currently tagged in the 1:24K NHD with a feature type of connector will be evaluated to determine if the connector still exists. When the geometry of the line is amended to reflect more current base data, and to provide a more accurate representation of actual ground conditions, the connector feature type is replaced with the actual feature type. The process listed in method 2 shall be used for determining if reach codes will be retired for each feature that is changed from a connector feature type. Method 2 also states that digital stormwater inventory data and bridge and culvert data will be used wherever possible. When these datasets are not available, and stream flow cannot be determined using the terrain datasets and the imagery, then connectors will be utilized. A feature code of 33400 will be used for all connectors. Connectors will mainly be placed in urban areas where streams appear to run through buildings, houses or parking lots, or when streams cross a road at an indeterminable location.

Discussion Summary

Date Discussed: Week of February 27th, 2006; March 24th, 2006
Discussion Participants: Joe Sewash, John Derry, Cam McNutt, David Nail, Terri McLean;
Advisory Committee

Summary of Discussion

Connector Feature Creation and Implementation was one of several issue papers discussed at the Advisory Committee meeting on Friday, March 24th, 2006. It was determined by the Advisory Committee that the issue paper needed more clearly defined procedures for the use of connectors with features that do not exist in the 1:24K NHD. Watershed Concepts agreed to review the Pigeon Basin and document a more formalized process for connector implementation in the Streambed Mapping Dataset.

Final Guidelines

The final guidelines for this issue paper are to use the recommendations provided in Method 2. This method will review all connectors found in 24K NHD in the context of the data creation process for the Stream Mapping Project.