### Benefits of Sharing Breaklines

Limited breaklines are currently (2016) being collected for lidar data. Collecting breaklines with the goal of sharing them across data themes and programs will maximize the potential benefits.

#### Benefits of sharing breaklines include the following:

1. Improve agreement of the NHD and WBD with the 3DEP Bare Earth digital elevation model (DEM).
2. Enhance 3D cartographic products.
3. Augment NHD data with high-accuracy elevation data.
4. Augment the 3DEP Bare Earth DEM with well-defined hydrographic data.
5. Allow production of additional types of DEM products, such as hydroflattened DEM.

### Finding the Connection

- The NHD has a long-established data dictionary by which all data, regardless of source, uses a single common attribute table structure and set of domain values.
- No such template has been developed for elevation breaklines; each delivered set of breaklines could have different attribute-field definitions and attribute values.
- The variability has made it impractical to assemble multiple breakline data deliveries into a coherent, usable hydrographic dataset.
- Using the established NHD Data Dictionary as a starting point, attributes needed for elevation have been added, and topological differences have been identified.

### 3D Elevation Program and National Geospatial Program Hydrography Datasets

#### National Geospatial Program Hydrography Datasets
- The NHD and WBD are used to portray surface water on The National Map.
- The NHD represents the drainage network, including features such as rivers, streams, canals, lakes, reservoirs, wetlands, and estuaries.
- The WBD represents drainage basins as enclosed areas in eight size categories.

#### U.S. Geological Survey Elevation-Hydrography Breakline Specifications

#### What are Breaklines?

- Breaklines are vector features that are used to enforce or maintain linear features on an elevation surface.
- Elevation data can be used with breaklines to make multiple elevation surface types; for example, breaklines defining hydrographic features can be used to impose different hydrologic treatments (flattening and enforcement) on DEMs.

#### Example Geospatial Products Generated from Lidar and Hydrographic Breaklines

- **Example of Hydroflattening:**
  - Core earth surface before hydroflattening or hydroenforcement.
  - Note the rough surface of the stream and waterbody.

- **Example of Hydroenforcement:**
  - Note the smooth surface of the waterbody and double-line stream.

- **Example of Breakline:**
  - Breaking vector features that are used to enforce or maintain linear features on an elevation surface.

#### How are Breaklines Encoded?

- **Breakline data dictionary:**
  - Defines the features that can be used as breaklines.
  - Breaklines are encoded with point, line, or polygon geometry.

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#### The National Enhanced Elevation Assessment, completed in 2011, assessed elevation data needs, projected benefits, and application business uses for Federal and state agencies. This survey determined numerous hydrologic application business uses for elevation data:

1. Natural resources conservation
2. Water supply and quality
3. River and streams resource management
4. Coastal zone management
5. Forest resources management
6. Rangeland management
7. Wildlife and habitat management
8. Agriculture and precision farming
9. Geologic resource assessment and hazard mitigation
10. Resource mining
11. Renewable energy resources
12. Oil and gas resources
13. Cultural resources preservation and management
14. Flood risk management
15. Sea-level rise and subsidence
16. Wildlife management, planning, and response
17. Homelands security, law enforcement, and disaster response
18. Land navigation and safety
19. Marine navigation and safety
20. Aviation navigation and safety
21. Infrastructure and construction management
22. Urban and regional planning
23. Health and human services
24. Real estate, banking, mortgage, and insurance
25. Education K-12 and beyond
26. Recreation

### Example of Breakline

- Breaking vector features that are used to enforce or maintain linear features on an elevation surface.

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