Purpose

This document is to aid in the collection for hydrographic breaklines for use in the classification of LIDAR data. These breaklines will serve a dual purpose to help in the creation of a final surface for both a hydro flattened and hydo enforced surface. The data can be collected in a photogrammetric collection program. Microstation Version 8 is preferred as we are then able to use these files to ingest the files and immediately start processing the data with Terra Scan for automated LAS classification.

Horizontal & Vertical Coordinate System and Projection Information

The horizontal datum shall be **NAD83, UTM Zone 15N, Meters.**
The vertical datum shall be **North American Vertical Datum of 1988 (NAVD 88) – Geoid09.**

HYDROGRAPHIC FLATTENING BREAKLINES

Double_Line_Drain

Description	Collection Rules	Classification Rule
Linear hydrographic features such as streams, shorelines, canals, swales, etc. with an average width greater than **30 meters**.	Capture features showing dual line (one on each side of the feature) with the water feature to the **LEFT**. Average width shall be greater than **30 meters** to show as a double line. Each vertex placed should maintain vertical integrity. Monotonicity must be maintained throughout entirety of feature. Opposite sides of banks should be of equal value. Line intersections must be at nodes. Double Line hydrographic features should be carried through all bridges.	Ground points should be classified inside all Double Line Drain features and a **1 meter buffer** shall be used around each feature. **Class 2 points will be moved to Class 9 (Water)**

Double_Line_Drain_Island

Description	Collection Rules	Classification Rule
Land/Water boundary of varying elevation, depicting a land mass found inside of a double line drain. Features shall be defined as closed polygons and contain an elevation value that reflects the best estimate of the water elevation at the time of data capture. Land Mass will be captured for any feature of **4,040 sq. meters or greater** in size.	Land mass shall be captured as closed polygons with the water feature to the **LEFT**. The compiler shall take care to ensure that the z-values for all vertices placed on the water body are equal to the surrounding Double Line Drain Feature (DGN Level 399). Each vertex placed should maintain vertical integrity. Monotonicity must be maintained throughout entirety of feature. Opposite sides of banks should be of equal value. Line intersections must be at nodes. Double Line hydrographic features should be carried through all bridges.	Ground points should be classified between all Double Line Drain and Double Line Drain Island features and a **1 meter buffer** shall be used around each feature. **Class 2 points will be moved to Class 9 (Water)**

Closed Water Body Features

Description	Collection Rules	Classification Rule
Land/Water boundaries of constant elevation such as lakes, reservoirs, ponds, etc. Features shall be defined as closed polygons and contain an elevation value that reflects the best estimate of the water elevation at the time of data capture. Water body features will be captured for features **8,080 sq. meters or greater** in size.	Water bodies shall be captured as closed polygons with the water feature to the **RIGHT**. The compiler shall take care to ensure that the z-value remains constant for all vertices placed on the water body.	Ground points should be classified inside all Closed Water Body features and a **1 meter buffer** shall be used around each feature. **Class 2 points will be moved to Class 9 (Water)**

Closed Water Body Island

Description	Collection Rules	Classification Rule
Land/Water boundaries of constant elevation found inside a Closed Water Body Feature (DGN Level 302). Features shall be defined as closed polygons and contain an elevation value that reflects the best estimate of the water elevation at the time of data capture. Land mass features will be captured for features **4,040 sq. meters or greater** in size.	Land mass shall be captured as closed polygons with the water feature to the **RIGHT**. The compiler shall take care to ensure that the z-value remains constant for all vertices placed on the water body and is equal to the surrounding Closed Water Body Feature (DGN Level 302).	Ground points should be classified between all Closed Water Body and Closed Water Body Island features and a **1 meter buffer** around each feature. **Class 2 points will be moved to Class 9 (Water)**

HYDROGRAPHIC ENFORCEMENT BREAKLINES

These feature classes will outline the land/water interface at the time of acquisition for those specific areas that aid in the enforcement of hydrographic features crossing under raised roadway networks, bridges, etc. where LIDAR data would not typically be removed during manual bare-earth cleanup. The width of the hydrographic feature is below the required Version 13 specification. In general, any drain crossing not meeting the specifications for the above collection specifications will be covered in the following collection methodology. A 1 foot contour should be used to place the drain crossings in order to maintain monotonicity.

Double_Line_Enforcement_Drain

Definition	Collection Rules	Classification Rule
Linear hydrographic features such as streams, shorelines, canals, swales, etc. with an average width between **4.5 and 30 meters**.	Capture features showing dual line (one on each side of the feature) with the water feature to the **LEFT**. Average width should be between **4.5-30 meters** to show as a double line. Each vertex placed should maintain vertical integrity. Monotonicity must be maintained throughout entirety of feature. Opposite sides of banks should be of equal value. Line intersections must be at nodes. Double Line hydrographic features should be carried through all bridges.	Ground points should be classified inside all Double Line Enforcement Drain features and a **1 meter buffer** shall be used around each feature. **Class 2 points will be moved to Class 17 (Reserved USGS Class)**

Double_Line_Enforcement_Single_Drain

Description	Collection Rules	Classification Rule
Linear hydrographic features such as streams, culverts, canals, swales, etc. with an average width between **0.25 and 4.5 meters**.	Capture features showing single line (centerline of the feature). Average width should be between **0.25-4.5 meters** to show as a single line. Each vertex placed should maintain vertical integrity. Monotonicity must be maintained throughout entirety of feature. Opposite sides of banks should be of equal value. Line intersections must be at nodes. Single Line hydrographic features should be carried through all culverts and bridges.	Ground points should be classified inside all Double Line Enforcement Drain features and a **2 meter buffer** shall be used around each feature. **Class 2 points will be moved to Class 17 (Reserved USGS Class)**

Double_Line_Enforcement_Drain_Island

Description	Collection Rules	Classification Rule
Land/Water boundary of varying elevation, depicting a land mass found inside of a double line drain. Features shall be defined as closed polygons and contain an elevation value that reflects the best estimate of the water elevation at the time of data capture. Land Mass will be captured for any feature of **2,020 sq. meters or greater** in size.	Land mass shall be captured as closed polygons with the water feature to the **LEFT**. The compiler shall take care to ensure that the z-values for all vertices placed on the water body are equal to the surrounding Double Line Drain Feature (DGN Level 359). Each vertex placed should maintain vertical integrity. Monotonicity must be maintained throughout entirety of feature. Opposite sides of banks should be of equal value. Line intersections must be at nodes. Double Line hydrographic features should be carried through all bridges.	Ground points should be classified between all Double Line Enforcement Drain and Double Line Enforcement Drain Island features and a **1 meter buffer** shall be used around each feature. **Class 2 points will be moved to Class 17 (Reserved USGS Class)**