

Appendix B:
Terrain Processing

**LOWER BRAZOS
FLOOD PROTECTION
PLANNING STUDY
APPENDICES**

Appendix B –Terrain Processing

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Appendix B –Terrain Processing

B.1.0 Terrain Processing Scope

Topographic data covering an area extending one-mile around the Lower Brazos River hydrologic study area information was collected from the existing best available sources. The data were compiled and developed into a Geographic Information System (GIS) terrain data set for the Lower Brazos River. The terrain processing was completed by URS (now AECOM). The following tasks were completed for the terrain processing:

- Acquire USGS 10-meter or 30-meter Digital Elevation Models (DEM) for areas where Light Detection and Ranging Data (LiDAR) is unavailable.
- Convert LiDAR and USGS DEMs to North American Vertical Datum 1988 vertical control (NAVD88) if not already provided in that format.
- Project all data to State Plane, Texas South Central, Zone 4204, North American Datum 1983 (NAD83), US survey feet.
- Develop terrain data from source topographic data within an ESRI geodatabase with the following criteria:
 - Represent each elevation data source by a single multi-point feature class
 - Data sources to be edge matched with priority given to most current and accurate data sources
 - Terrain data set will be built using the multi-point feature classes with the z-tolerance pyramid option.
- Develop 30-foot grid cell resolution DEM in State Plane, Texas South Central, Zone 4204, North American Datum 1983 (NAD83), US survey feet with vertical units in feet NAVD88.
- Quality control review of the terrain data to look for discrepancies at the interface of different data sets. All discrepancies were resolved.

B.2.0 Data Acquisition

URS acquired LiDAR data sets for portions of Austin, Bell, Bosque, Brazos, Brazoria, Burleson, Falls, Fort Bend, Grimes, Leon, Limestone, Madison, McLennan, Milam, Robertson, Waller, Washington, and Williamson counties. Terrain data was collected from eight data sources including:

- Brazoria County 2006 LiDAR data
- Fort Bend County 2014 LiDAR data
- Houston-Galveston Area Council (HGAC) 2008 LiDAR data
- 2010 Texas Natural Resources Information System (TNRIS) 2010 LiDAR data
- 2011 TNRIS LiDAR Data
- 2013 TNRIS LiDAR Data
- 2007 Capital Area Council of Governments (CAPCOG) LiDAR Data

- U.S Geological Survey (USGS) National Elevation Datasets (NED) at 10-meter resolution

Data sources and their coverage areas are listed in Table B-1: Topographic Data Sources. Figure B-1 shows the location of the data sources for the Lower Brazos Floodplain Protection Planning Study.

Table B-1: Topographic Data Sources

County	Data Source
Austin	TNRIS 2011
Bell	TNRIS 2011
Bosque	NED
Brazos	NED and TNRIS 2010
Brazoria	2006 LiDAR
Burleson	NED
Falls	NED and TNRIS 2011
Fort Bend	2014 LiDAR
Grimes	HGAC, TNRIS 2011, TNRIS 2010
Hill	NED and TNRIS 2013
Leon	TNRIS 2010
Limestone	NED
Madison	TNRIS 2010
McLennan	NED, TNRIS 2013, and TNRIS 2011
Milam	NED and TNRIS 2010
Robertson	NED and TNRIS 2010
Waller	TNRIS 2011 and HGAC
Washington	TNRIS 2011 and NED
Williamson	CAPCOG

B.3.0 Terrain Processing

All data acquired from TNRIS was re-projected from NAD83 UTM Zones to NAD83 State Plane Texas South Central FIPS 4204 feet. Elevations were also converted from meters to feet. The bare earth points (Class 2) for all LiDAR datasets were converted from LAS format to MultipointZ shapefiles.

The processed bare earth points were imported as MultipointZ feature classes inside a feature dataset within a File Geodatabase. Eight ESRI terrains were created from the feature classes due to the study area size to allow for processing. The eight subdivisions were determined by the HUC 8 boundaries within the study area and these areas are shown in Figure B-2. The average point spacing was defined at 5 feet for the terrains to approximate for the varying data

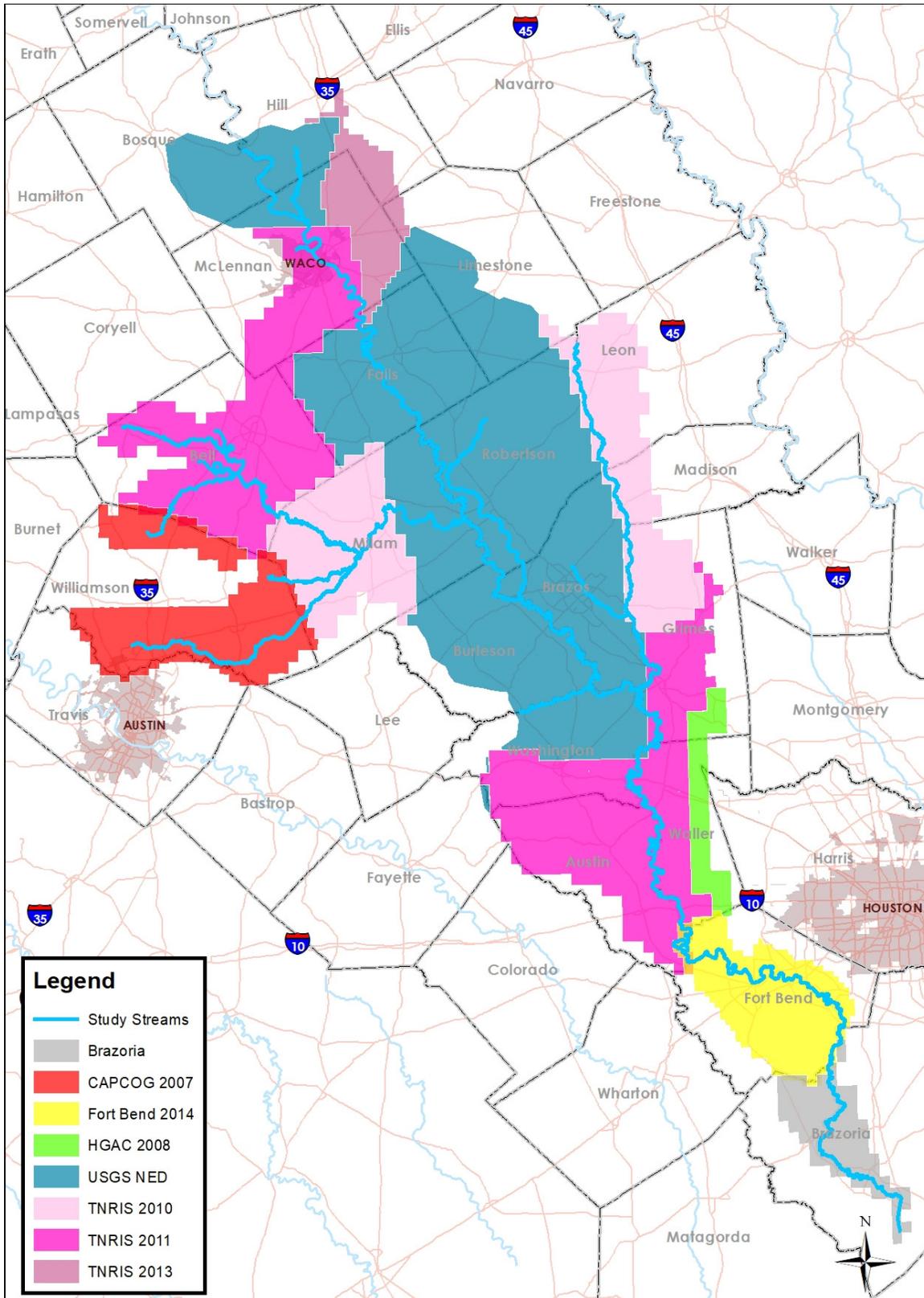


Figure B-1: Terrain Data Coverage

sources. Two Z-tolerance pyramid levels were created during the processing including 2.5 and 10. Additional pyramid levels would significantly increase processing time due to the size of the study area. The final database includes two datasets, one that includes the areas of coverage from the multiple data sources and one that includes the multipoint and terrain data. Additionally, there are nine rasters included in the database, one 30-foot raster for each of the eight subdivisions that were developed from the respective terrain and one 30-foot raster for the full study area that is a mosaic of the eight subdivisions. The topographic DEM for the study area is shown in Figure Figure B-3.

B.4.0 Exceptions

It should be noted that Terrain 7 shows an elevation range that has a minimum Z value of -1,267. This irregularity was investigated, and two points were identified as anomalies and removed from the terrain dataset. While these points were removed, the terrain continues to show the negative minimum Z value. It does not appear to have any negative impact on the final product and should be noted as an irregularity.

Break lines were not incorporated into the terrains as they were not widely available or provided. Based on the data quality and expected use of the topographic data, it is not expected to have a negative impact on the final product.

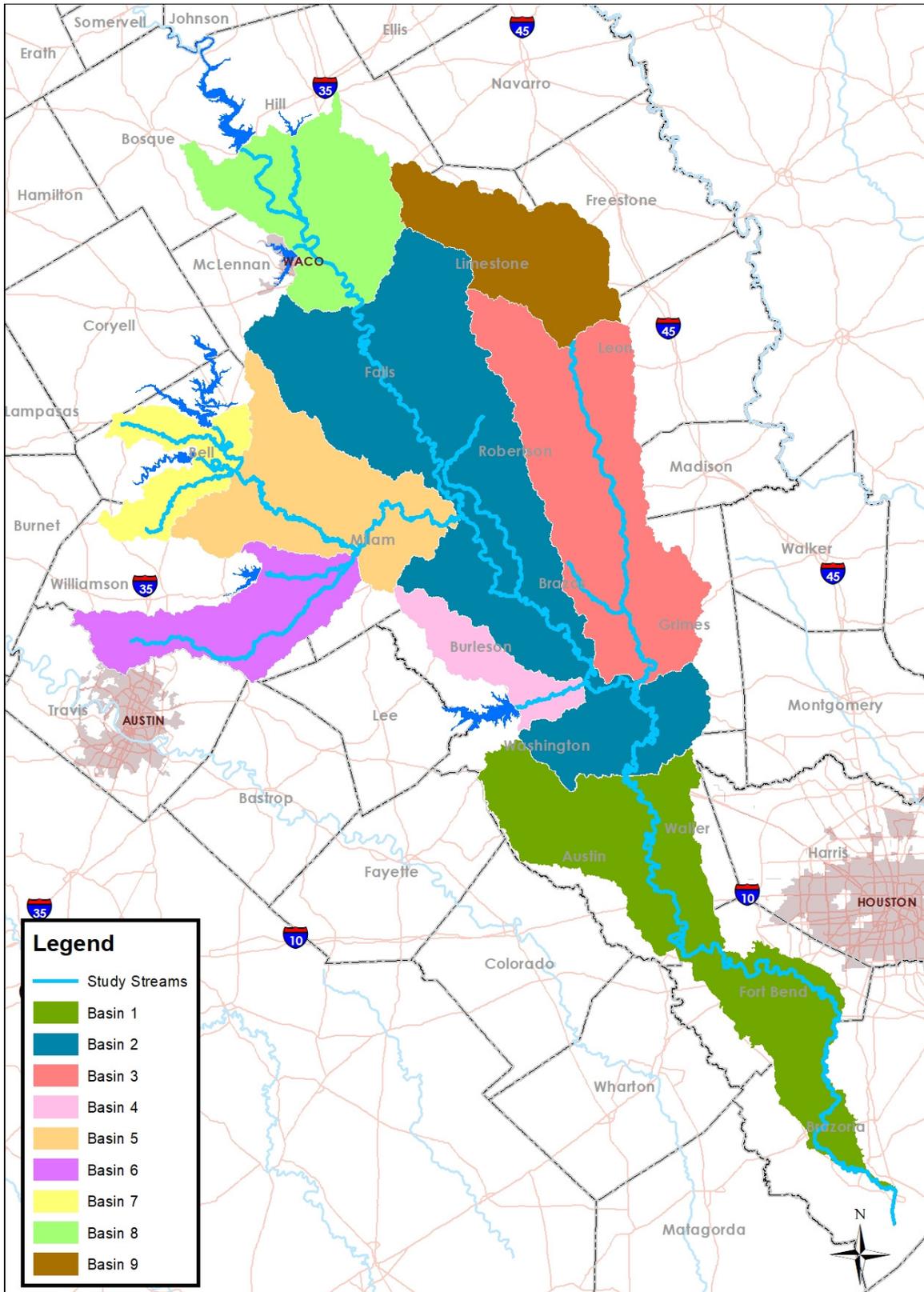


Figure B-2: Topographic Development Subdivisions

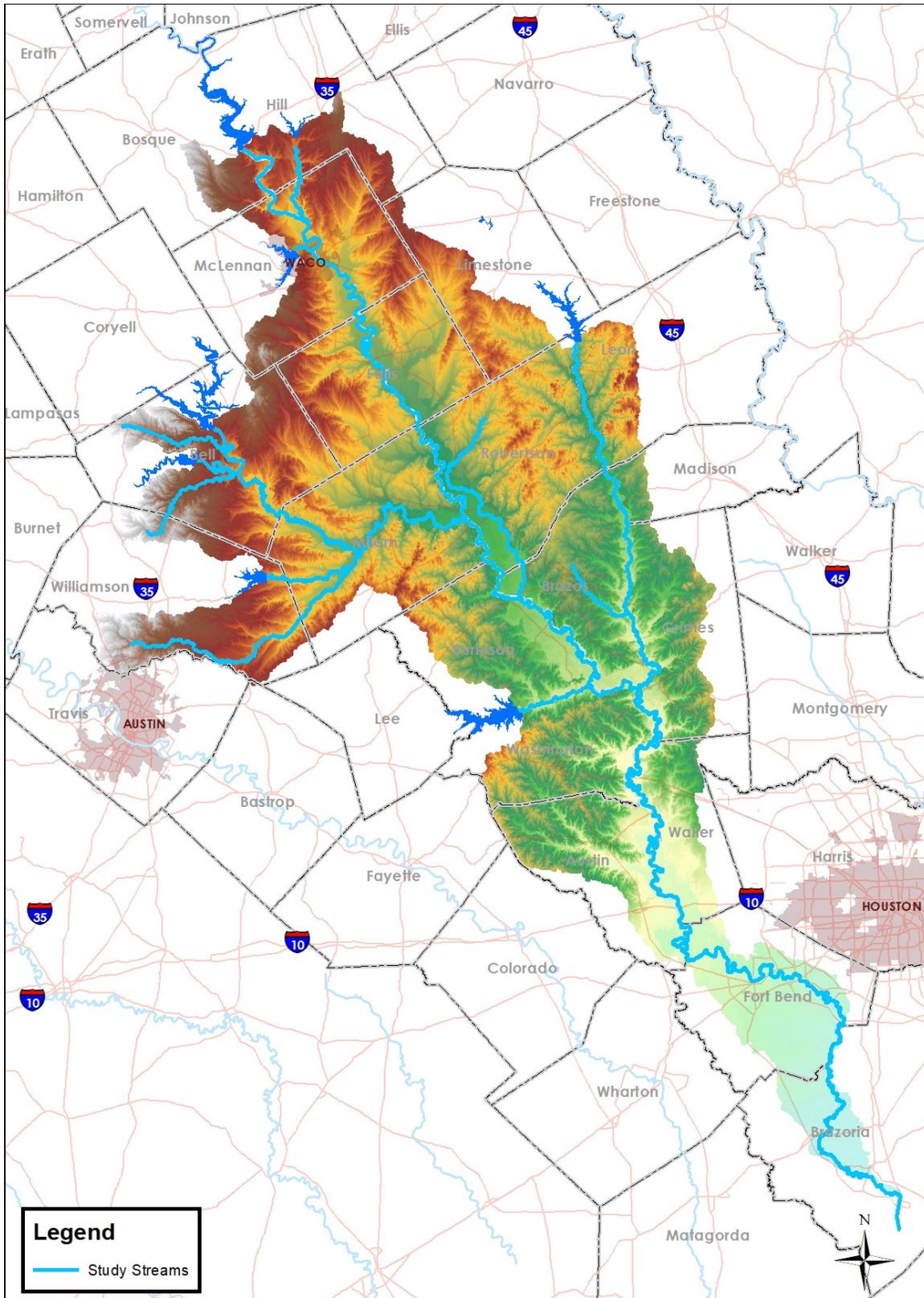


Figure B-3: Lower Brazos River Topographic DEM