DEIS Reasonable Alternatives Water Resources Technical Report

SH 68 from I-2/US 83 to I-69C/US 281

CSJs: 3629-01-001, -002, -003

Hidalgo County, Texas

Texas Department of Transportation - Pharr District

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The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by TxDOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated December 16, 2014, and executed by FHWA and TxDOT.

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1.0 INTRODUCTION

The Pharr District of the Texas Department of Transportation (TxDOT) proposes to construct State Highway (SH) 68, a new highway facility from Interstate (I)-2/U.S. Highway (US) 83 to I-69C/US 281, located in eastern Hidalgo County. The proposed project corridor would begin at I-2/US 83 and travel north then west to connect to I-69C/US 281. The total length of the proposed project is approximately 22 miles.

The purpose of this technical report is to describe water resource issues and assess potential impacts for the three reasonable alternatives and the No-Build Alternative identified for the proposed project. This document would serve as support for *Section 4: Affected Environment and Environmental Consequences* of the SH 68 Draft Environmental Impact Statement (DEIS).

1.1 Project Description

SH 68, as currently described in the Metropolitan Transportation Plan (MTP) and the Statewide Transportation Improvement Program (STIP), is a proposed four-lane divided rural highway facility with future mainlanes and overpasses.

SH 68 would be constructed in several phases, as funding becomes available. Funding has been secured for Phase I of the proposed project. Funding for future phases has not yet been determined.

Phase I would construct a new four-lane divided rural highway facility from I-2/US 83 to Farm-to-Market (FM) 1925, which is also known as Monte Cristo Road. The four-lane divided facility would serve as frontage roads for the ultimate facility and consist of two lanes in each direction with shoulders, separated by a grassy median. Future phases would extend the four-lane divided rural highway from FM 1925 to I-69C/US 281, and eventually would complete the ultimate facility by constructing the mainlanes and overpasses. The proposed project is being developed as a non-tolled facility.

The ultimate, controlled-access facility would be contained within a 350-foot typical right-of-way (ROW) width, with up to 400 feet of ROW needed at proposed grade separations. The proposed frontage roads would consist of two 12-foot wide lanes in each direction, with 4-foot wide inside shoulders and 8-foot wide outside shoulders. The frontage roads would include curb and gutter to accommodate drainage requirements. The proposed mainlanes would consist of two 12-foot wide lanes in each direction, with 4-foot wide inside shoulders and 10-foot wide outside shoulders. Mainlanes would be separated by a grassy median. Mainlane overpasses would be provided at major roadway crossings. Proposed future entrance and exit ramps would consist of 14-foot wide lanes, with 2-foot wide inside shoulders and 8-foot wide

outside shoulders. The termini at I-2/US 83 and I-69C/US 281 would include proposed connections to existing frontage roads and proposed direct connector ramps to and from existing mainlanes.

As part of the alternatives analysis and public involvement process for SH 68, study corridors and preliminary alternatives were developed within the approximately 179 square-mile study area for the proposed project. The preliminary alternatives were analyzed and evaluated to identify three reasonable alternatives. These reasonable alternatives, as well as the No-Build Alternative, are being advanced for more detailed analysis in order to identify a recommended preferred alternative. For more information about the development of the reasonable alternatives and alternatives analysis methodology, refer to the *SH 68 Alternatives Analysis Technical Report (TxDOT 2018a)*.

The reasonable alternatives are shown in **Exhibits 1** and **2** in **Attachment A** and are described below along with the No-Build Alternative. The alternatives are presented in order geographically, from west to east. All alternatives would have the same ultimate typical section, as described above.

1.1.1 2014 Modified 2 Alternative

The 2014 Modified 2 Alternative (light purple route in **Exhibits 1** and **2** in **Attachment A**) is approximately 21.7 miles in length and would require an estimated 1,057 acres of ROW. The 2014 Modified 2 Alternative is almost entirely on new location.

This alternative connects to I-2/US 83 approximately 7 miles east of I-69C/US 281, between the FM 1423 (Val Verde Road) overpass and the North Hutto Road overpass, near the existing intersection of the I-2/US 83 westbound frontage road and Valley View Road. From I-2/US 83, the 2014 Modified 2 Alternative would travel northwest on new location for approximately 3 miles to near Minnesota Road before turning generally northward for approximately 7 miles through the communities of Muniz and San Carlos, continuing north of SH 107.

Approximately 1 mile north of SH 107, near Mile 17 ½ Road, the 2014 Modified 2 Alternative would curve to the west for approximately 2 miles, crossing FM 1925/Monte Cristo Road and Davis Road. North of Davis Road, the 2014 Modified 2 route would run parallel to the west side of Brushline Road for approximately 5 miles. The proposed roadway would then curve to the northwest for approximately 2 miles before running along the north side of the existing FM 490 for approximately 3 miles and connect to I-69C/US 281 near the South Texas International Airport at Edinburg.

Future mainlane overpasses are assumed to be provided at Ferguson Road, Sioux Road, East Nolana Loop/Earling Road, Owassa Road, Alberta Road, Trenton Road, Wisconsin Road, Canton Road, SH 107, FM 1925, FM 2812, Brushline Road, and Air Cargo Drive.

1.1.2 2014 PSM Alternative

Like the 2014 Modified 2 Alternative, the 2014 Public Scoping Meeting (PSM) Alternative (orange route in **Exhibits 1** and **2** in **Attachment A**) is almost entirely on new location. The 2014 PSM Alternative is approximately 22.4 miles in length and would require an estimated 1,076 acres of ROW. The 2014 PSM Alternative follows the same new location route as the 2014 Modified 2 Alternative from its intersection with I-2/US 83 to SH 107, a distance of approximately 8 miles, and continues generally northward for another 2 miles to cross FM 1925.

North of FM 1925, the 2014 PSM Alternative would curve to the east for approximately 1 mile, approaching Mile 19 N Road, where it would then run parallel to the west side of Val Verde Road for approximately 4 miles. The corridor would then curve to the northwest for approximately 4 miles before running along the north side of the existing FM 490 for approximately 3 miles and connect to I-69C/US 281 near the South Texas International Airport at Edinburg.

This alternative would also pass through the communities of Muniz and San Carlos. Future mainlane overpasses are assumed to be assumed to be provided at Ferguson Road, Sioux Road, East Nolana Loop/Earling Road, Owassa Road, Alberta Road, Trenton Road, Wisconsin Road, Canton Road, SH 107, FM 1925, FM 2812, Brushline Road, and Air Cargo Drive.

1.1.3 FM 1423 PSM Alternative

The FM 1423 PSM Alternative (dark pink route in **Exhibits 1** and **2** in **Attachment A**) is approximately 21.6 miles in length and would require an estimated 1,061 acres of ROW. This alternative would connect to I-2/US 83 approximately 6 miles east of I-69C/US 281.

This alternative would generally follow FM 1423/ Val Verde Road northward for approximately 7.5 miles from the intersection with I-2/US 83 to SH 107 in the community of San Carlos. From SH 107, the alternative would continue northward along Val Verde Road approximately 2 miles to FM 1925/Monte Christo Road. Approximately 1.5 miles north of FM 1925, between Mile 19 Road and Davis Road, the route would then follow the 2014 PSM Alternative route for approximately 11 miles north and west to I-69C/US 281 near the South Texas International Airport at Edinburg.

This alternative would pass through the City of Donna and the community of San Carlos. Future mainlane overpasses are assumed to be at FM 495/Kansas Road, Sioux Road, East

Nolana Loop/Earling Road, Roosevelt Road, Alberta Road, Trenton Road, Wisconsin Road, Canton Road, SH 107, FM 1925, FM 2812, Brushline Road, and Air Cargo Drive.

1.1.4 No-Build Alternative

The No-Build Alternative means that the proposed improvements associated with the SH 68 project would not occur. Under this alternative, the existing facilities would operate as they currently do and there would be no new roadway constructed. There would be no relocations or conversion of land to transportation uses, and no adverse environmental or economic impacts with this alternative would occur. However, the No-Build Alternative would not address the purpose and need for the proposed project because it would not improve north-south mobility, increase travel capacity for local and regional traffic, or provide an alternate north-south evacuation route during emergency events.

2.0 METHODOLOGY

This water resources technical report is based on a review of relevant regulations (**Section 2.1**), a background review of the water resources in the region and study area (**Section 2.2**), and field reconnaissance site visits (**Section 2.3**).

2.1 Regulatory Authority

The water resources of the Lower Rio Grande Valley (LRGV) are regulated by a variety of agencies, including the U.S. Army Corps of Engineers (USACE), International Boundary and Water Commission (IBWC), Texas Commission on Environmental Quality (TCEQ), Texas General Land Office (GLO), various irrigation and drainage districts, county and city floodplain administrators. The U.S. Fish & Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and Texas Parks & Wildlife Department (TPWD) regulate state and federal threatened and endangered species, including those that inhabit aquatic features. Protected species of potential occurrence in the study area are addressed in a separate technical report titled *DEIS Reasonable Alternatives Biological Resources Technical Report* (TxDOT 2018b).

Multiple laws and regulations provide regulatory authority to these agencies. The following is a discussion of pertinent regulatory programs for water resources in the LRGV. A description of the expected applicability of each of these programs is provided in **Sections 3.4** through **3.9**.

2.1.1 Clean Water Act (CWA) of 1977

The CWA is an amendment to the Federal Water Pollution Control Act of 1972 (33 United States Code [USC] Section 251 et seq.) and sets the basic structure for regulating discharges of pollutants and other materials to waters of the U.S. The CWA is under the jurisdiction of the

U.S. Environmental Protection Agency (EPA), but critical portions of the law are administered by the USACE. The relevant CWA sections are discussed below.

Section 303d

Section 303 of the CWA requires TxDOT coordinate with TCEQ if the project is located within five miles upstream of an impaired assessment stream unit on the most recent list of Section 303(d) features. The *2014 Texas Integrated Report of Surface Water Quality for Clean Water Act, Sections 305(b) and 303(d)* list was utilized in this assessment.

Section 404

Section 404 of the CWA regulates the discharge of dredged and fill materials into waters of the U.S. Under Section 404 of the CWA, regulated waters of the U.S. are broadly categorized to include the territorial seas, tidal waters, and non-tidal waters of the U.S., and include all tidally-influenced and navigable waters, as well as numerous additional inland features such as lakes, rivers, streams, mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, and natural ponds (33 CFR §323 and 328). The definition of "waters of the U.S." has evolved as a result of U.S. Supreme Court decisions. Solid Waste Agency of Northern Cook County v. USACE (2001, the SWANCC decision) excluded the protection of hydraulically isolated coastal prairie depressions, playa lakes, and other ponded water features. Subsequently, following the U.S. Supreme Court's decision in *Rapanos v. United States (2006)* and *Carabell v. United States (2004)*, USACE and the EPA developed guidance for defining waters of the U.S. (those waters subject to protection under the CWA). Current guidance (USACE 2007) states that the USACE and EPA will assert jurisdiction over:

- traditionally navigable waters (TNW) and all wetlands adjacent to TNWs;
- relatively permanent waters (RPW), which include non-navigable tributaries of TNWs that typically flow year-round or have continuous flow at least seasonally, and all wetlands that directly abut RPWs;
- other water bodies (such as non-RPWs, wetlands adjacent to non-RPWs, and wetlands adjacent to but not directly abutting an RPW) that are analyzed and determined to have a significant nexus with a TNW.

A significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or an insubstantial effect on the chemical, physical, and/or biological integrity of a TNW.

If the proposed action will result in the discharge of dredged or fill material into a water of the U.S., Section 404 of the CWA requires that the project sponsor be authorized by a permit

before the discharge occurs, unless the activity is exempt from regulation. Types of Section 404 permits issued by the USACE include Individual Permits, General Permits, and Letters of Permission. Nationwide Permits (NWPs) are general permits designed to regulate, with little (if any) delay or paperwork, certain activities having minimal impacts. The NWPs are periodically proposed, issued, modified, reissued (extended), and revoked.

On January 6, 2017, the USACE published a notice in the Federal Register announcing the reissuance of existing NWPs, general conditions, and definitions with some modifications. The USACE also issued two new NWPs, one new general condition, and five new definitions. The 2017 NWPs went into effect on March 19, 2017, and expire on March 18, 2022.

The NWP most frequently used to authorize impacts to waters of the U.S. for new transportation projects is NWP 14 for Linear Transportation Projects. The following provides a brief summary of reauthorized NWP 14.

NWP 14 provides for the construction, expansion, modification, or improvement of linear transportation projects in all waters of the U.S., if the activity does not result in a loss of more than 0.5 acre of waters of the U.S. in non-tidal waters, and 0.33 acre in tidal waters. A Pre-construction Notification (PCN) to the USACE District Engineer under NWP 14 is required for activities that result in:

- the loss of waters of the U.S. exceeding 0.1 acre at a single and complete crossing;
- a discharge into a special aquatic site, including wetlands;
- impacts to a federally listed threatened or endangered species or National Register of Historic Places (NRHP)-eligible cultural resource site.

There are several General Conditions and Regional Conditions to the NWPs that must also be complied with in order to receive authorization under a NWP. Several of the General Conditions require a PCN be submitted to the USACE District Engineer if the following criteria apply:

- any listed species or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat. Work shall not begin on the activity until the USACE District Engineer has notified the applicant that the requirements of the Endangered Species Act (ESA) have been satisfied and that the activity is authorized.
- a PCN must be submitted to the USACE District Engineer if the activity may have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the NRHP, including previously unidentified properties.

Section 401

In Texas, the EPA has delegated authority to regulate Section 401 (State Water Quality Certification), of the CWA to TCEQ. Crossings of waters of the U.S. that are authorized by a USACE Section 404 permit are required to meet standards and/or review to insure water quality is not diminished. At crossings of waters of the U.S. that are authorized by a NWP permit, including NWP 14 Linear Transportation Projects, compliance with Section 401 requires the use of at least one Best Management Practice (BMP) from each of three categories (erosion control, sedimentation control, and post-construction total suspended solids control) identified in the TCEQ's *401 Water Quality Certification Best Management Practices (BMPs) for Nationwide Permits* (TCEQ 2016a). These BMPs are generally addressed by planting temporary vegetation in disturbed areas, installing silt fences and/or rock berms, and maintaining vegetation-lined drainage ditches. **Table 1** provides a list of all approved BMPs in each of the three categories. If NWPs are used to permit crossings of waters of the U.S. and the appropriate BMPs are implemented, no individual review by TCEQ would be required.

Table 1. Approved Best Management Practices for Nationwide Permits

Category I Erosion Control	Category II Sedimentation Control	Category III Post-construction Total Suspended Solids Control
Temporary Vegetation	Sand Bag Berm	Retention/Irrigation Systems
Mulch	Silt Fence	Extended Detention Basin
Interceptor Swale	Triangular Filter Dike	Vegetative Filter Strips
Erosion Control Compost	Stone Outlet Sediment Traps	Grassy Swales
Compost Filter Socks	Erosion Control Compost	Erosion Control Compost
Blankets/Matting	Compost Filter Socks	Compost Filter Socks
Sod	Rock Berm	Constructed Wetlands
Diversion Dikes	Hay Bale Dike	Wet Basins
Mulch Filter Socks	Brush Berms	Vegetation-lined Drainage Ditches
	Sediment Basins	Sand Filter Systems
	Mulch Filter Socks	Mulch Filter Socks
		Sedimentation Chambers*

Source: TCEQ 2016a
Note *Only to be used when there is no space available for other approved BMPs.

Section 402

Section 402 of the Clean Water CWA regulates the discharge of pollutants into waters from construction activities through the National Pollutant Discharge Elimination System. Within the State of Texas, authority for most of this program has been transferred to the TCEQ through the Texas Pollutant Discharge Elimination System (TPDES). Under the TPDES, construction projects that disturb more than 1 acre of land must obtain coverage under the

TCEQ's TPDES Permit TXR150000 (Construction General Permit [CGP]), which authorizes storm water discharges from construction activities. In general, coverage under the CGP requires that a Storm Water Pollution Prevention Plan (SWPPP) be prepared and implemented prior to and during construction to minimize the discharge of sediment and other pollutants from the construction site. In addition, if the proposed construction activities disturb greater than 5 acres of land, a Notice of Intent (NOI) must be submitted to the TCEQ. The current CGP TXR150000 expires on March 5, 2018 (TCEQ 2017a). The construction contractor is generally responsible for obtaining the appropriate TPDES permit and complying with Section 402 of the CWA.

2.1.2 Executive Order 11990 Wetlands

Executive Order 11990, Protection of Wetlands prohibits new construction in wetlands unless (1) there is no practicable alternative to such construction, and (2) the project includes all practicable measures to minimize harm to wetlands.

2.1.3 Rivers and Harbors Act of 1899

The Rivers and Harbors Act (RHA) of 1899 (33 USC 403, Chapter 425) regulates work in "navigable" waters of the U.S., as those waters that are subject to the ebb and flow of the tides and/or are presently used or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce (33 U.S.C. 401 et seq. §329.4). Examples of Section 10 waters in the LRGV include the Rio Grande, Arroyo Colorado, bays, and tidal flats. Like Section 404 of the CWA, Section 10 of the RHA is administered by the USACE. Section 10 of the RHA prohibits the construction of any structure, excavation/dredging, fill, or other work that may alter a navigable water of the U.S. without a Section 10 Permit (33 U.S.C. 403). One of the primary functions of Section 10 of the RHA is to maintain the navigability of Section 10 waters.

2.1.4 Floodplains- *Executive Order 11988, Floodplain Management and* 44 CFR Parts 59 and 60

The National Flood Insurance Program (NFIP) is regulated by floodplain management regulations in 44 Code of Federal Regulations (CFR) 44. Community ordinances are covered in Parts 59 and 60 (https://www.fema.gov/pdf/floodplain/nfip_sg_unit_5.pdf). It requires development projects that could impact the 100-year floodplain coordinate with the local (county) NFIP coordinator and potentially obtain a county permit. Actions that place above-grade fill within designated floodplains may require a permit from the county or city within which the action is located. The Federal Emergency Management Agency (FEMA) regulates flood-prone areas through the NFIP. The applicable portions of that program relate to development or modification of the 100-year floodplains. Since Hidalgo County is a participant

in the NFIP, a permit from the local NFIP coordinator is required for any construction or modification of the 100-year floodplains in Hidalgo County (FEMA 2017).

2.1.5 State-Owned Streambeds and Submerged Lands

The State of Texas retains ownership of streambeds that have a continuous average width of 30 feet or greater between the ordinary high water marks. The state also owns submerged lands that are tidally influenced. The crossing of a state-owned streambed or submerged land requires an easement from the GLO (2017). Examples of state-owned streambeds in the LRGV include the Rio Grande and Arroyo Colorado. Examples of submerged lands include bays, flats, and tidal streams.

2.1.6 Hidalgo County Drainage District Easements

The majority of the drainage canals in the study area are under the jurisdiction of the Hidalgo County Drainage District #1 (HCDD). The HCDD administers the construction and maintenance of these drainages and other facilities to control runoff and manage flooding. A drainage easement is necessary to construct new road crossings or improve existing crossings over these features. A permit is required for construction projects crossing the features under their jurisdiction (HCDD 2017).

2.1.7 Irrigation District Easements

The LRGV has over 2,000 miles of irrigation canals, ditches, or pipes, which are managed by 22 separate irrigations districts (TxDOT 2016a). The study area encompasses portions of eight irrigation districts. They are generally political subdivisions of the State of Texas that develop, maintain, and regulate irrigation facilities. Permits or easements may be required to cross irrigation district facilities.

2.1.8 Groundwater Regulations

The use and production of groundwater resources in Texas is not regulated by the state. However, they are managed by Groundwater Management Areas (GMA) and regulated in some regions (TCEQ 2017c). The study area is within GMA 16, which includes all or portions of 16 south Texas counties from the coastal bend to the LRGV. There are currently 99 Groundwater Conservation Districts (GCD) in Texas. The LRGV is part of four GCDs, but the study area is not within a GCD (Texas Water Development Board [TWDB] 2017a). Areas outside of GCDs are subject to the rule of capture, which means that landowners own the water beneath their property and once the water has been captured and brought to the surface by a well and produced, it belongs to the landowner. Limits to rule of capture include common law exceptions related to contaminated wells, wonton waste, causing subsidence, and harming

neighbors. Legislative exceptions relate to the creation of GCDs and delegation of authority to regulate to conserve precious natural resources necessary for the general public.

Water wells are regulated by GCDs and State of Texas Occupations Code Title 12. Practices and Trades Related to Water, Health, and Safety. Chapter 1901.255 and 1901.256, which is administered by the Texas Department of Licensing and Regulation. The Texas Groundwater Protection Committee provides guidance to landowners and commercial drilling operators to assist with drilling, managing, and plugging water wells (TCEQ 2017d).

2.2 Description of Review Methods

The water resources study was conducted by reviewing numerous data sources relative to the three build alternatives in the study area followed by reconnaissance-level field assessments using public roads to ground-truth aerial signatures and mapped aquatic features. Sources included natural color and infrared aerial photography, USACE and U.S. Geological Survey (USGS) historic topographic maps (USACE 192- [year unknown], 1930, 1936) (USGS 1916, 1932, 1949, 1954, and 1983), current USGS 7.5 minute topographic quadrangle maps (Donna-2012, Edinburg-2012, Hargill-2012, La Blanca-2012, and Pharr-2013, Texas) (USGS 2012a, 2012b, 2012c, 2012d, 2013), U.S. Department of Agriculture (USDA) soil maps (USDA 2017), USFWS' National Wetlands Inventory (NWI) maps (USFWS 2017), FEMA floodplain maps (FEMA 1981, 1982, 2000), watershed data from the USGS (HUC Code 12110208) (EPA 2017), catchment basins and other data from the National Hydrography Dataset (USGS 2016), drainage and irrigation canal data from HCDD, historic aerial photographs on Google Earth (July 1985-December 2016), precipitation data from National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC) (NOAA 2017), aquatic habitats from TPWD's Ecological Mapping System of Texas (EMST), and water well data from the (TWDB 2017b).

2.3 Description of Water Resources Assessment Methods

Following the desktop review, field reconnaissance visits were conducted in April, May, and September of 2014 and May and October 2016 to identify and photo-document the water resources present in the study area; ground-truth aerial signatures; generally characterize water resources with respect to type, size, uses, and physical attributes; and evaluate potential permitting requirements for the regulatory programs described in **Section 2.1.** However, there are significant portions of the three reasonable alternatives proposed on new location where access was not available. These areas were analyzed by reviewing 2015 aerial imagery. The types and relative quality of the water resources identified in the study area were assessed to assist with the evaluation of the potential occurrence or absence of regulated water resources.

2.4 Evaluation Criteria

The water resources in the study area were evaluated based on the best available information from published data sources such as EMST and reconnaissance-level field visits using public access roads to ground-truth aquatic aerial signatures and map those aquatic features as particular land use/land cover (LULC) types.

3.0 RESOURCES IN STUDY AREA

3.1 Regional Description

The study area is situated in a relatively flat region where the Coastal Plain converges with the Rio Grande Valley. The Rio Grande drains 335,500 square miles in three U.S. and five Mexican States (TCEQ 2016b). Although much of the basin is arid, periodic monsoon flood events in the vast basin affect the physiography of the LRGV where distributary channels and frequent river overflows formed the flat deltaic terrain of the region.

The study area is located within the LRGV sub-region of the Western Gulf Coastal Plain Ecoregion, also known as the Gulf Coast Prairies and Marshes (EPA 2016). This ecoregion is a slowly drained, relatively level floodplain that slopes gently toward the Gulf of Mexico. Historically, the Western Gulf Coastal Plain was dominated by tallgrass prairies and oak savannas. From a physiographic perspective, the study area is on the boundary of the flat Coastal Prairies to the east and the small ridges and valleys of the uplands of the Interior Coastal Plains to the west (Texas Bureau of Economic Geography 2017). The Interior Coastal Plains support the South Texas Plains, which are dominated by mesquite brushlands and chaparral. Elevations in the area range from approximately 50 feet to approximately 100 feet above mean sea level (msl).

The southern portion of the study area is within the Lower Rio Grande Alluvial Floodplain sub-region of the Western Gulf Coastal Plain Ecoregion (EPA 2016). The study area is within the Lower Rio Grande Valley Land Resource Area, which transitions in the northern part of the study area to the vast Central Rio Grande Plains area (Texas Almanac 2017). The Central Rio Grande Plain comprises about 5.9 million acres in South Texas from Live Oak to Hidalgo County and is dominated by the South Texas Sand Sheet, an area of deep, sandy soils and active sand dunes.

Land use/land cover in the study area includes agriculture (row crops and orchards), transportation, residential/commercial, grassland, and brushland.

3.1.1 Hydrology

With the exception of the Rio Grande, Arroyo Colorado, and associated resacas and adjacent wetlands, the majority of the LRGV region is an area of relatively flat coastal plain that drains gradually eastward to the Laguna Madre and the Gulf of Mexico. Based on a review of historic maps, no natural named drainages occurred in the study area, but the headwaters of the Arroyo Colorado is mapped just south of the study area (USACE 192- [year unknown] and USACE 1930; USGS 1916 and USGS 1949). The flat northern portion of Hidalgo County has poor drainage with no natural outlets. However, the larger issue was periodic flooding from overbanking of the Rio Grande across the eastern valley. Several serious flooding events along the Rio Grande occurred in the LRGV during the early 1900s. As a result, Hidalgo County, in conjunction with other local authorities and the USACE, began studying and designing floodway structures in the 1920s and most were constructed by the 1950s. As shown on a 1949 USGS topographic-based map (**Exhibit 2** in **Attachment A**), construction of drainage improvements, in the form of major drainage canals, were begun prior to the middle of the 20th century.

The study area has an average annual precipitation of 24 inches (NOAA 2017), with the most precipitation coming on average from May through October. Small portions of the study area are located within the FEMA's 100-year floodplain (FEMA 1981, 1982, and 2000, and USFWS 2017).

3.1.2 Geology and Soils

Geology of the majority of the study area is Quarternary deposits of eolian sands with smaller amounts of silt, clay, and gravel on humocky terrain and in longitudinal stabilized dunes. There are also a few irregular depressions in the central and northern portion of the study area from the Lissie and Goliad Formations (USGS 2017). The Goliad Formation consists of Pliocene-aged clays, sand, sandstone, caliche, limestone, and conglomerate. Upland soils are mostly deep, grayish-brown, neutral to alkaline sandy loams and clay loams, but eastward toward the coast soils are mostly gray, silty clay loam, and silty clay, with some saline soils. The soils of the LGRV region are comprised primarily of sandy clays and sandy loams. The soils in the majority of the study area are mapped as Hidalgo sandy clay loam, Hidalgo fine sandy loam, Willacy fine sandy loam, and Hargill fine sandy loam (USDA 2017). Only a few soils in the study area are designated as hydric soils on the state or national hydric soils lists (USDA 2017, USDA 2016). These occur roughly in association with floodplains and/or NWI features in the northern part of the study area (**Exhibit 7** in **Attachment A**). The hydric soils that are mapped in the study area and shown on **Exhibit 7** include Racombes Sandy Clay Loam, Rio Clay Loam, and Tiocano Clay.

3.2 Drainage Basins

Runoff from the entire study area drains into the Lower Laguna Madre via five sub-basins Donna Main Canal, East Main Drain, West Main Drain, Upper Pilot Channel (North Floodway), and Arroyo Colorado (**Exhibit 3** in **Attachment A**). The northern part of the study area drains via a complex system of canals, and ditches to the West Main Drain, which flows eastward to the Laguna Madre approximately 32.5 miles east via the East Main Drain. The majority of the southern portion of the study area drains through a similar system of drainage structures into the pilot channel of the North Floodway, which drains into the Laguna Madre approximately 35 miles east of the study area. The extreme southern portion of the study area drains into the Arroyo Colorado via the Donna Reservoir. The Arroyo Colorado drains into the Laguna Madre approximately 41 miles east of the study area (**Exhibit 3** in **Attachment A**).

3.3 Aquatic Habitats

Historically, aquatic features in the study area were sparse and consisted of small internally drained flats that may have supported shallow wetlands and open water features. The remnants of these, which are scattered throughout the northern portion of the study area, are shown as isolated floodplains and NWI features on **Exhibits 4.1** through **4.7** in **Attachment A**. Aquatic habitats in the study area are relatively small and sparse, but important to local wildlife. In addition to the natural depressions in the northern portion of the study area, numerous drainage and irrigation canals provide important habitats for aquatic, semi-aquatic, and terrestrial wildlife (**Exhibits 6.1** through **6.7** in **Attachment A**). Aquatic features in the study area range from small isolated depressions, which are temporarily flooded, to larger perennial impoundments and drainage features (**Photos 1** through **9** in **Attachment B**). The majority of the NWI features in the study area are relatively small. In the southern portion of the study area, the NWI features are primarily excavated palustrine features with unconsolidated bottoms that are semi-permanently flooded. The NWI features mapped in the northern portion include forested/shrub and emergent depressional wetlands that are temporarily to seasonally flooded, and excavated lacustrine features that are semi-permanently flooded (USFWS 2017).

The aquatic and semi-aquatic habitats in the study area include open water, emergent, and shrub/forested wetlands, and riparian habitats. The TPWD's EMST was used to determine mapped aquatic features such as marsh and open water habitats that occur in the study area. EMST is a Geographic Information Systems (GIS) model that interprets aerial imagery into 398 different vegetation classes based vegetation cover and biotic variables. Emergent and shrub/forested wetlands are often associated with man-made ponds or natural depressions, but also occur on the fringes of linear drainage features. Common herbaceous species observed during field reconnaissance and/or expected in wetlands based on literature

reviews include various caric-sedges (*Carex* spp.), flat sedges (*Cyperus* spp.), rushes (*Juncus* spp.), spikerushes (*Eleocharis* spp.), bulrushes (*Scirpus* spp.), spiny aster (*Chloracantha spinosa*), Nealley's sprangletop (*Leptochloa nealleyi*), golden-fruited dock (*Rumex chrysocarpus*), long tom (*Paspalum denticulatum*), curly-top smartweed (*Polygonum lapathifolium*), catchfly cutgrass (*Leersia lenticularis*), purple pluchea (*Pluchea odorata*), frogfruit (*Phyla* sp.), narrowleaf cattail (*Typha domingensis*), barnyardgrass (*Echinochloa crus-galli*), red-throat morning-glory (*Merremia dissecta*), yellow cowpea (*Vigna luteola*), climbing hempweed (*Mikania scandens*), giant reed (*Arundo donax*), sea ox-eye daisy (*Borrichia frutescens*), saltwort (*Batis maritima*), Mediterranean lovegrass (*Eragrostis barrelieri*), South Texas four o'clock (*Mirabilis austrotexana*), and hydrophytic grasses.

Common woody species in forested/shrub wetlands include black willow (*Salix nigra*), cottonwood (*Populus deltoides*), Chinese tallow (*Triadica sebifera*), dryland willow (*Baccharis neglecta*), white popenac (*Leuceana leucocephala*), retama (*Parkinsonia aculeata*), shrubby morning-glory (*Ipomoea carnea*), spiny aster, and buttonbush (*Cephalanthus occidentalis*).

Riparian corridors along drainages and pond edges often support riparian woods/shrublands (**Photo 6** in **Attachment B**), but most drainage canals in the study area are maintained by periodic mowing and/or brush clearing (**Photo 7** in **Attachment B**). Common woody species along drainage canals and pond edges include honey mesquite (*Prosopis glandulosa*), hackberry (*Celtis laevigata*), huisache (*Acacia farnesiana*), coma (*Sideroxylon lanuginosum*), dryland willow, white popenac, anacua (*Ehretia anacua*), western soapberry (*Sapindus saponaria*), retama, brasil (*Condalia hookeri*), granjeno (*Celtis pallida*), blackbrush acacia (*Acacia rigidula*), lime prickly ash (*Zanthoxylum fagara*), Engelmann's prickly pear (*Opuntia engelmannii*), pale ebony (*Havardia pallens*), narrow-leaf elbowbush (*Forestiera angustifolium*), and sabal palm (*Sabal mexicana*). The herbaceous component includes King Ranch bluestem (*Bothriochloa ischaemum*), buffelgrass (*Pennisetum ciliaris*), johnsongrass (*Sorghum halepense*), guinea grass (*Megathyrsus maximus*), common bermudagrass (*Cynodon dactylon*), giant sacaton (*Sporobolus wrightii*), old man's beard (*Clematis drummondii*), pigeonberry (*Rivina humilis*), possumgrape (*Cissus incisa*), scarlet sage (*Salvia coccinea*), sarsaparilla (*Cocculus diversifolius*), red-throat morning-glory, yellow cowpea, climbing hempweed, Rio Grande dewberry (*Rubus riograndis*), and spiny aster.

3.4 Waters of the U.S.

Potential waters of the U.S. in the study area include the larger perennial drainage canals and associated wetlands (**Photos 1, 3, 6,** and **7** in **Attachment B**). Historically, aquatic features in the study area were sparse and consisted of small internally drained flats that likely supported shallow wetlands and seasonally flooded open water features. The remnants of these, which are scattered throughout the study area, are shown as isolated floodplains and NWI features

on **Exhibits 4.1** through **4.7** in **Attachment A**. The NWI features mapped in the study area are mostly small isolated features, but a few larger impoundments also occur in the study area. The NWIs in the study area range from 0.23 acre to 110.9 acres. In the southern portion of the study area, the NWI features are primarily excavated palustrine features with unconsolidated bottoms that are semi-permanently flooded. The NWI features mapped in the northern portion of the study area include forested/shrub and emergent depressional wetlands that are temporarily to seasonally flooded, and excavated lacustrine features that are semi-permanently flooded (https://www.fws.gov/wetlands/data/mapper.html).

Many of the aquatic features in the study area would not be considered waters of the U.S. because they are isolated and not connected to other waters via drainage channels or other significant nexus. The larger perennial drainage canals would likely be considered waters of the U.S., but small ephemeral and intermittent drainage canals/ditches and elevated irrigation canals/ditches would not likely be subject to Section 404 of the CWA. The drainage features are shown relative to irrigation canals/ditches in **Exhibits 6.1** through **6.7** in **Attachment A**.

3.5 Water Quality

Water quality in the LRGV is complex because of intensive agricultural and urban land use practices, unique diversion of Rio Grande water for irrigation, and complex drainage and floodway structures. In 1991 The Texas legislature created the Clean Rivers Program (CRP). In 1998, the IBWC implemented the CRP for the Rio Grande Basin (IBWC 2017). The objectives of the CRP are to identify and address water quality issues. TCEQ's Segment 2302, Rio Grande below Falcon Reservoir to Brownsville, has been determined to be impaired starting in 1996 because of high bacteria levels, elevated levels of ammonia, sulfates, and chlorophyll A, and depressed levels of dissolved oxygen (IBWC 2017). The bacterial and depressed dissolved oxygen issue could be related to the discharge of sub-standard wastewater treatment from colonias (IBWC 2017). The entire segment has a concern for fish consumption because of elevated mercury levels. Segment 2491B, North Floodway, exceeded the state's standards for chlorophyll A and nitrates, but was not determined to be impaired (TCEQ 2017b).

A 2016 study of water quality in canal segments in the vicinity of Edinburg found that, with the exception of elevated levels of Total Dissolved Solids (TDS), water quality parameters in general meet or exceed state and federal water quality standards, and Dissolved Oxygen supported high aquatic use (Dirrigl and Huston 2016). The study evaluated the influence of adjacent land uses and structures (bridges, culverts, etc.) on 18 physiochemical and nutrient parameters (e.g. turbidity, flow velocity, temperature, pH, total dissolved solids, biological oxygen demand, salinity, and selected nutrient and pollutant concentrations). Vegetated

banks and shorelines were positively correlated with decreased TSS. Other pertinent conclusions include increased oil and grease levels at roadway crossings. Runoff from the three reasonable alternatives would not discharge directly into a Section 303(d) listed threatened or impaired water, or into a stream within 5 miles upstream of a Section 303(d) listed threatened or impaired water (TCEQ 2017b).

3.6 100-Year Floodplains

The study area is relatively flat, but portions are lower and poorly drained. As mentioned, the central part of the study area from just north of FM 107 to just south of Mile 20 ½ Rd is within a FEMA mapped 100-year floodplain (**Exhibits 4.3** and **4.4** in **Attachment A**). In addition, several smaller mapped 100-year floodplains are scattered throughout the study area, especially in the northern portion of the study area (**Exhibits 4.1** through **4.7** in **Attachment A**). These floodplains are generally isolated and represent low lying areas that are not associated with a major drainage.

Portions of the three reasonable alternatives are located within a FEMA designated 100-year floodplain (**Exhibits 4.1** through **4.7** in **Attachment A**) (FEMA 1981, 1982, and 2000). The hydraulic design for this project would be in accordance with current Federal Highway Administration (FHWA) and TxDOT design policies. The proposed facility would be designed to permit the conveyance of a 100-year flood to an acceptable inundation of the roadway without causing significant damage to the highway, drainage facilities, or other property. Coordination with the local Floodplain Administer would be required.

3.7 Navigable Waters of the U.S. and State-Owned Streambeds

There are no navigable waters of the U.S., as defined in the RHA, and no state-owned streambeds in the study area. Therefore, the proposed project would not require a Section 10 RHA permit or easement from the GLO for crossings of state-owned streams. Since no navigable waters of the U.S. or state-owned streambeds occur in the study area, they are not discussed further in this document.

3.8 Drainage Districts

The majority of the study area is within the HCDD (Sectors 1, 2, and 4) (**Exhibit 5** in **Attachment A**). The HCDD owns and controls numerous drainage structures including the Donna Drain and North Main Drain (co-owned with the Willacy County Drainage District #1). Other localized drainage projects in the study area included the construction of numerous canals, ditches, and storage lakes in the 1970s (Turner Collie & Braden 1997) (**Exhibits 6.1** through **6.7** in **Attachment A**).

The Drainage/Irrigation Canals land use/land cover type include areas within the study area that are part of the extensive system of drainage and irrigation canals that have been built across the LRGV. The Donna Main Canal (**Photos 2** and **3** in **Attachment B)** and Santa Cruz Canal are the largest of the canals in the study area. At this preliminary stage of planning there is no specific design for the proposed facility, but coordination with the HCDD will be conducted to determine whether a permit is required for crossing various drainage features under their jurisdiction.

3.9 Irrigation Districts

Irrigation in the LRGV was the first large-scale system in Texas. Today it is second only to the High Plains irrigation complex in terms of size and complexity in the State of Texas (TxDOT 2016a). Irrigation canals and ditches in the study area range in size from large channelized conveyance features such as the Donna and Santa Cruz Canals (**Photo 3** in **Attachment B**) to small elevated concrete-lined delivery ditches with standpipes (**Photos 8** and **9** in **Attachment B**).

Currently eight irrigation districts are located within the study area. These include the Hidalgo County Irrigation District (ID) #1, Hidalgo County ID #2, Hidalgo County ID #13, Donna ID, H & GCWC ID #9, Santa Cruz ID #15, Engelman ID, and Delta Lake ID (**Exhibit 5** in **Attachment A**). Common irrigation features include diversion structures, conveyance structures, and distribution system. The diversion components are headworks, intake structures, pumps, and lift stations. Conveyance components include canals, laterals, plumes, pipes, and reservoirs. Distribution components include a series of dams and gates, and measurement features and weirs (TxDOT 2016a). At this preliminary stage of planning there is no specific design for the proposed facility, but coordination with the various Irrigation Districts will be conducted to determine if a permit is required for crossing various irrigation features under their jurisdiction.

3.10 Groundwater Resources

According to *The Ground Water Atlas of the United States* (Ryder 1996), the study area and most of the LRGV is over the Gulf Coast Aquifer. This is a major aquifer that stretches along the coastal plain from Florida to Mexico and provides water for all or part of 54 Texas counties. It consists of discontinuous sand, silt, clay, and gravel beds and is heterogeneous because of buried deltaic deposits and landforms such as old river channels (TWDB 2017c). The Gulf Coast Aquifer in the LRGV, which averages approximately 700 feet thick, is composed of the Jasper, Evangeline, and Chicot aquifers. The northern portion of the study area is on the Evangeline Aquifer, and the southern portion of the study area is on the Chicot Aquifer. The Evangeline Aquifer consists of the Goliad Sand and sand and clay of the Fleming Formation. The Chicot Aquifer includes the overlying Rio Grande alluvial and sand plain deposits, and the

underlying Montgomery, Lissie, and Beaumont Formations. The Chicot Aquifer generally has a greater concentration of sand than the underlying Evangeline Aquifer (TWDB 2007).

Groundwater elevations in the LRGV generally follows the region's topography and flows are from west to the east toward the Gulf of Mexico, except near the Rio Grande where flows are toward and into the river. The depth to ground water in the Chicot Aquifer is generally 20 to 40 feet below the surface compared to 20 to 60 feet below the surface in Evangeline Aquifer. Recharge is from precipitation, surface water discharges from the Rio Grande and Arroyo Colorado, and irrigation return flows. Water levels generally increase during the winter and the spring months when most recharge to the aquifer occurs. Water well yields in the Chicot and the Evangeline aquifers vary considerably because of micro-differences in the subsurface stratigraphy. Natural discharges include evapotranspiration, and groundwater flows to the Rio Grande, Arroyo Colorado, resacas, and the Gulf of Mexico. A significant amount of discharge also occurs artificially by groundwater pumping (TWDB 2007).

The Gulf Coast Aquifer is an important source of groundwater for agricultural, municipal, and domestic uses. However, groundwater in many areas of the LRGV does not meet drinking water or irrigation water quality standards. Most of the groundwater is slightly saline (1,000 to 3,000 milligrams per liter of total dissolved solids) with local occurrences of high nitrate, sodium, chloride, and boron. In addition, high levels of naturally occurring radionuclides are found in some areas. In general, groundwater quality deteriorates because of salinization with distance from the Rio Grande and depth below the surface, but in some cases salinity decreases with depth. In addition, because of the heterogeneity of the stratigraphy, this trend is not predictable from well to well (TWDB 2007).

Based on data from the 1980-1999, the TWDB determined that about 88,000 acre-feet per year of water flows through the Gulf Coast Aquifer in the LRGV. Approximately 47 percent comes from rainfall and 53 percent from the Arroyo Colorado and the Rio Grande contributions. Because of the higher sand levels in the Chicot Aquifer, approximately 62 percent of the total recharge from rainfall recharges through the Chicot outcrop, 32 percent percolates through the Evangeline outcrop, and the remainder (6 percent) percolates through the thin sliver of the Jasper outcrops. Of the total water budget, approximately three percent is lost through evapotranspiration, 15 percent is pumped out and used primarily for irrigation, 32 percent flows into the Rio Grande and Arroyo Colorado, and 50 percent discharges to the Laguna Madre and Gulf of Mexico (TWDB 2007).

There are 462 registered water wells scattered throughout the study area (TWDB 2017b) (**Exhibit 8** in **Attachment A**). The water wells within the study area range from 8 to 2,500 feet deep, with the majority between 100 and 500 feet deep. Numerous monitoring wells are 15 to 65 feet deep. The primary water uses identified for these wells in TWDB drilling records are irrigation, stock watering, and domestic uses. Other identified uses of water wells within the study area include industrial, public water supply, historical observation well, current

observation well, plugged/destroyed, and unused. The majority of the water wells within the study area are private wells, but some were identified as owned and operated by water supply corporations, and local governments, and one owned and operated by the U.S. Army.

4.0 ASSESSMENT OF REASONABLE ALTERNATIVES

Reasonable alternatives were compared based on the number of mapped features crossed (e.g. water wells, drainage and irrigation canal crossings), and acreages of features crossed (e.g. area of floodplains, open water from LULC analysis, and NWI features). These data represent the relative amounts of water resources in each alternative based on mapped data sources and limited field verification. Field assessments may change the relative amounts of water resources for the three alternatives. In addition, without detailed design information, it is impossible to determine specific impacts to water resources.

The three reasonable alternatives are generally similar with respect to potential impacts to water resources. Water resources in the area include groundwater, man-made irrigation and drainage canals, relatively small excavated ponds and lakes, and temporarily flooded natural depressions. While the three reasonable alternatives cross drainage and irrigation canals and ditches, it is expected they will span the majority of larger features. It is required by TxDOT design standards and other applicable regulations that minimal flows and existing hydraulics are maintained. In addition, the majority of the excavated ponds and lakes, and natural depressions were avoided during earlier planning stages of the project.

One registered water well located in the northern portion of the study area (State Well Number 8740401) could potentially be affected by all three reasonable alternatives. The well is a 212-foot deep private well drilled in Goliad Sands. It is located just north of FM 490 where all three reasonable alternatives converge (**Exhibit 8** in **Attachment A**). According to TWDB records, the well is powered by a windmill-driven piston pump and used for stock watering (TWDB 2017b).

The proposed project is not expected to have a significant impact on surface or groundwater resources. Specific water resource information for each alternative is described in **Table 2.**

4.1 2014 Modified 2 Alternative

The 2014 Modified 2 Alternative would impact the largest amount of EMST open water habitat, but the least amount of EMST marsh habitat. Along with the 2014 PSM Alternative, the 2014 Modified 2 Alternative crosses the most drainage canals/ditches (11), when compared to the FM 1423 PSM Alternative (6). The 2014 Modified 2 Alternative crosses the least number of irrigation canals/ditches (15), but crosses a moderate amount of acreage of irrigation crossings (because of the larger size of one or more irrigation crossing). Drainage and irrigation canals/ditches are shown relative to the three reasonable alternatives in

Exhibits 6.1 through **6.7** in **Attachment A**. The 2014 Modified 2 Alternative crosses the least amount of 100-year floodplain and crosses a comparable amount of area of NWI features (**Exhibits 4.1** through **4.7** in **Attachment A**).

Table 2. Water Resources Within the Three Reasonable Alternatives

	2014 Modified 2 Alternative	2014 PSM Alternative	FM 1423 PSM Alternative	No Build Alternative
Number of Mapped Drainage Canal/Ditch Crossings	11	11	6	0
Number of Mapped Irrigation Canal/Ditch Crossings	15	21	35	0
Mapped Drainage Canal Area (acres)	2.61	2.49	1.37	0
Mapped Irrigation Canal Area (acres)	1.99	2.61	1.76	0
Mapped 100-Year Floodplains (acres)	140.2	148.7	161.2	0
Mapped National Wetland Inventory Features (acres)	4.17	4.81	4.59	0
Marsh Habitat based on Mapped TPWD Ecological System of Texas (EMST) (acres)	0	1.71	2.25	0
Open Water Habitat based on Mapped TPWD EMST (acres)	1.03	0	0	0
Open Water Habitat based on field verification of LULC aerial signatures (acres)	1.70	0.44	0.60	0
Number of Water Wells	1	1	1	0

4.2 2014 PSM Alternative

The 2014 PSM Alternative would impact no EMST open water habitat, and relatively small amounts of open water based on limited ground-truthed land use/land cover analysis. The 2014 PSM Alternative crosses a moderate amount of EMST marsh habitat (1.71 acres). Along with the 2014 Modified 2 Alternative, the 2014 PSM Alternative crosses the most drainage canals/ditches (11), when compared to the FM 1423 PSM Alternative (6). The 2014 PSM Alternative crosses a moderate number of irrigation canals/ditches (21) and area of irrigation features (2.61 acres). Drainage and irrigation canals/ditches are shown relative to the three reasonable alternatives in **Exhibits 6.1** through **6.7** in **Attachment A**. The 2014 PSM Alternative crosses a moderate amount of 100-year floodplain and crosses a comparable amount of area of NWI features (**Exhibits 4.1** through **4.7** in **Attachment A**).

4.3 FM 1423 PSM Alternative

The FM 1423 PSM Alternative would impact no EMST open water habitat, and relatively small amounts of open water based on limited ground-truthed land use/land cover analysis. The FM 1423 PSM Alternative crosses the most EMST marsh habitat (2.25 acres). The FM 1423 PSM Alternative crosses the least number of drainage canals/ditches (6), when compared to the other two alternatives (11). However, the FM 1423 PSM Alternative crosses the highest number of irrigation canals/ditches (35), but the lowest area of irrigation features (1.76 acre). This is probably because of the higher number of small irrigation features crossed by this alternative in the Donna Irrigation District (**Exhibit 5** in **Attachment A**). Drainage and irrigation canals/ditches are shown relative to the three reasonable alternatives in **Exhibits 6.1** through **6.7** in **Attachment A**. The 2014 PSM Alternative crosses the highest amount of 100-year floodplain of all three reasonable alternatives and crosses a comparable amount of area of NWI features (**Exhibits 4.1** through **4.7** in **Attachment A**).

4.4 No-Build Alternative

The No-Build Alternative means that the proposed improvements associated with the SH 68 project would not occur. Under this alternative, the existing facilities would operate as they currently do and there would be no new roadway constructed. There would be no relocations or conversion of land to transportation uses, and no adverse environmental or economic impacts associated with this alternative would occur. There would be no impacts to any water resources as a result of the No-Build Alternative. The No Build Alternative would have no impact on potential waters of the U.S., and coordination with USACE, county NFIP coordinator, and irrigation and drainage districts would not be required.

While the No Build Alternative would have no impact on 100-year floodplains and would not require coordination, it was determined not to be practicable since it would not meet the project's need and purpose. Pursuant to the requirement of 23 CFR 650, Subpart A, this floodplain assessment demonstrates that the three reasonable alternatives are the only practicable alternatives.

4.5 Water Resource Permitting

None of the reasonable alternatives would require permitting under Section 10 of the RHA, or require an easement from the GLO for crossing a state-owned streambed. The three reasonable alternatives would all likely require minor permitting under Sections 401, 402, and 404 of the CWA, NFIP floodplain coordination/permits, and county irrigation and drainage district permitting.

4.5.1 CWA Section 303(d) Coordination

Runoff from the three reasonable alternatives would not discharge directly into a Section 303(d) listed threatened or impaired water, or within 5 miles upstream of a Section 303(d) listed threatened or impaired water (TCEQ 2017b). TxDOT will implement BMPs to minimize potential impacts to receiving streams and other aquatic features and would coordinate with TCEQ for this project in accordance with the TxDOT-TCEQ MOU. To date, TCEQ has not identified (through either a total maximum daily load [TMDL] or the review of projects under the TCEQ MOU) a need to implement control measures beyond those required by the CGP on road construction projects. Therefore, compliance with a project's CGP, along with coordination under the TCEQ MOU collectively meets the need to address impaired waters. The assessment unit does not have an EPA-approved TMDL, but the project will be implemented, operated, and maintained using BMPs to control the discharge of pollutants from the project site.

4.5.2 CWA Section 404 Permits

It is expected all three reasonable alternatives would require CWA Section 404 permits for minor impacts to waters of the U.S., but there are no significant differences in terms of potential impacts to waters of the U.S. The NWP most frequently used to authorize impacts to waters of the U.S. for new transportation projects is NWP 14 for Linear Transportation Projects. It is anticipated that each of the three reasonable alternatives would be authorized by Section 404 NWPs 14 for Linear Transportation Projects because the permanent impacts are expected to be less than 0.5 acre at each individual crossing of a potential water of the U.S. The activities would likely meet the requirements of all general and regional conditions applicable to NWP 14. Once the preferred alternative is selected and more detailed studies are conducted, the USACE will be requested to review the Section 404 jurisdictions of aquatic features potentially impacted to determine permitting requirements under Section 404 of the CWA. However, it is unknown without further field investigations whether any of the alternatives would require a PCN to the USACE.

The No Build Alternative would have no impact on potential waters of the U.S. A CWA Section 404 Permit and coordination with USACE would not be required.

4.5.3 CWA Section 401 and 402 Permitting

There are no known differences for permitting the three alternatives with respect to Sections 401 or 402 of the CWA. TxDOT design standards and other regulatory programs require the proposed project is designed and constructed to maintain the existing hydrology (flows) (TxDOT 2016b). The project will likely require a permit from the USACE under Section 404 of the CWA for crossings of potential waters of the U.S. Therefore, it must also comply

TCEQ Water Quality Certification Program under Section 401 of the CWA. To comply with state water quality standards, TxDOT will use of at least one BMP from each of three categories (erosion control, sedimentation control, and post-construction total suspended solids control) identified in the TCEQ's *401 Water Quality Certification Best Management Practices (BMPs) for Nationwide Permits* (**Table 1**) (TCEQ 2016a).

To comply with Section 402 of the CWA, BMPs would be outlined in the SW3P prepared for the project and would be implemented during and after construction. The Project Development Process Manual and the Plans, Specifications, and Estimates (PS&E) Preparation Manual require a SWP3 be included in the plans of all projects that disturb one or more acres. The Construction Contract Administration Manual requires that the appropriate CGP authorization documents (notice of intent or site notice) by completed, posted, and submitted, when required by the CGP, to TCEQ and the municipal separate storm sewer system (MS4) operator (TCEQ 2017c). It also requires that projects be inspected to ensure compliance with the CGP.

The TxDOT PS&E Preparation Manual requires that all projects include Standard Specification Item 506 (Temporary Erosion, Sedimentation, and Environmental Controls), and the "Required Specification Checklists" require Special Provision 506-003 on all projects that need authorization under the CGP. These documents require the project contractor to comply with the CGP and SWP3, and to complete the appropriate authorization documents.

4.5.4 Executive Order 11990 Wetlands

Wetlands in the study area are associated with man-made irrigation and drainage canals, relatively small excavated ponds and lakes, and temporarily flooded natural depressions. While the three reasonable alternatives cross drainage and irrigation canals and ditches, it is expected they will span the majority of larger features. In addition, the majority of the excavated ponds and lakes and natural depressions were avoided during earlier planning stages of the proposed project.

4.5.5 Floodplain Permitting- *Executive Order 11988, Floodplain Management and* 44 CFR Parts 59 and 60

There are no significant differences in permitting the three reasonable alternatives for potential impacts to 100-year floodplains. All three reasonable alternatives would cross similar amounts of FEMA 100-year floodplains ranging from 140.2 to 161.2 acres (**Table 2**). SH 68 would be used for an evacuation route and would be designed and constructed above the 100-year flood event. Since the project would be constructed in phases, with the frontage roads being constructed first, the entire proposed project (main lanes and frontage roads) would be designed above the 100-year floodplain.

The hydraulic design for this project would be in accordance with current FHWA and TxDOT design policies. The proposed facility would be designed to permit the conveyance of a 100-year flood to an acceptable inundation of the roadway without causing significant damage to the highway, drainage facilities, or other property. The proposed project would not increase the base flood elevation to a level that would violate acceptable floodplain regulations and ordinances.

TxDOT would coordinate with the FEMA and the local NFIP coordinators (city and county) to determine whether a permit is required. TxDOT uses Title 23 CFR Part 650 Subpart A, which prescribes FHWA's policies and procedures for the location and hydraulic design of highway encroachments on floodplains. In addition, TxDOT follows guidance procedures which ensure compliance with all applicable federal regulations that apply to any federally approved highway construction, reconstruction, rehabilitation, repair, or improvement project which affects the base floodplain. The Department's premise is as follows:

- avoid significant floodplain encroachment where practicable;
- minimize the impact of highway actions that adversely affect the base floodplain;
- be compatible with the NFIP of the FEMA.

The design of the preferred alternative would minimize potential impacts from flood events; therefore, any flooding that takes place would not be because of the proposed project. The proposed project would also be designed so that it would not practically support incompatible 100-year floodplain development.

4.5.6 Irrigation and Drainage District Permitting

There are no known differences in permitting crossings of irrigation and drainage canals. The only differences are that the FM 1423 PSM Alternative crosses more irrigation canals/ditches and fewer drainage canals compared to the 2014 PSM or 2014 Modified 2 Alternatives (**Table 2**). However, considering the type of roadway facility proposed and plans to span drainage and irrigation features, it was determined that the three reasonable alternatives are relatively similar with respect to water resources. At this preliminary stage of planning there is no specific design for the proposed facility. Coordination with the appropriate Irrigation and Drainage Districts will be conducted to determine if a permit will be required for crossing various features under their jurisdiction.

4.5.7 Water Well Permitting

One registered water well could be affected by all three reasonable alternatives. Since no GCD has been created for the study area, the well is regulated by State of Texas Occupations Code Title 12 Practices and Trades Related to Water, Health, and Safety and Chapters 1901.255

and 1901.256, which are administered by the Texas Department of Licensing and Regulation. The well should be evaluated to determine whether it can be avoided. If avoidance is not possible, and the well needs to be properly plugged and abandoned, the Texas Groundwater Protection Committee provides the applicable guidance (TCEQ 2017d).

5.0 CONCLUSIONS

The three reasonable alternatives are generally similar with respect to potential impacts to water resources and associated permitting. Water resources in the study area include man-made irrigation and drainage canals, relatively small excavated ponds and lakes, and temporarily flooded natural depressions. While the three reasonable alternatives cross drainage and irrigation canals and ditches, it is expected they will span the majority of larger features, and it is required by TxDOT design standards and other applicable regulations that minimal flows and existing hydraulics are maintained (TxDOT 2016b). In addition, the majority of the excavated ponds and lakes, and natural depressions were avoided during earlier planning stages of the proposed project.

After a preferred alternative is identified, qualified water resource specialists will conduct a field assessment of water resources to identify, characterize, and photo-document the aquatic habitats present in and adjacent to the preferred alternative corridor, including delineations of wetlands and other waters of the U.S. in the proposed ROW. A jurisdictional determination of waters of the U.S. from the USACE will also be requested. Based on those assessments and more detailed project plans, specific permitting recommendations will be made and documented.

One water well located in the northern portion of the study area should be evaluated to determine whether it can be avoided or needs to be plugged and abandoned. If it needs to be plugged, TxDOT should follow TCEQ guidance on appropriate plugging of abandoned wells.

Coordination with local drainage and irrigation districts, and the NFIP coordinator will also be conducted to determine specific requirements to address permitting for drainage and irrigation canal crossings, and construction in FEMA 100-year floodplains.

6.0 REFERENCES

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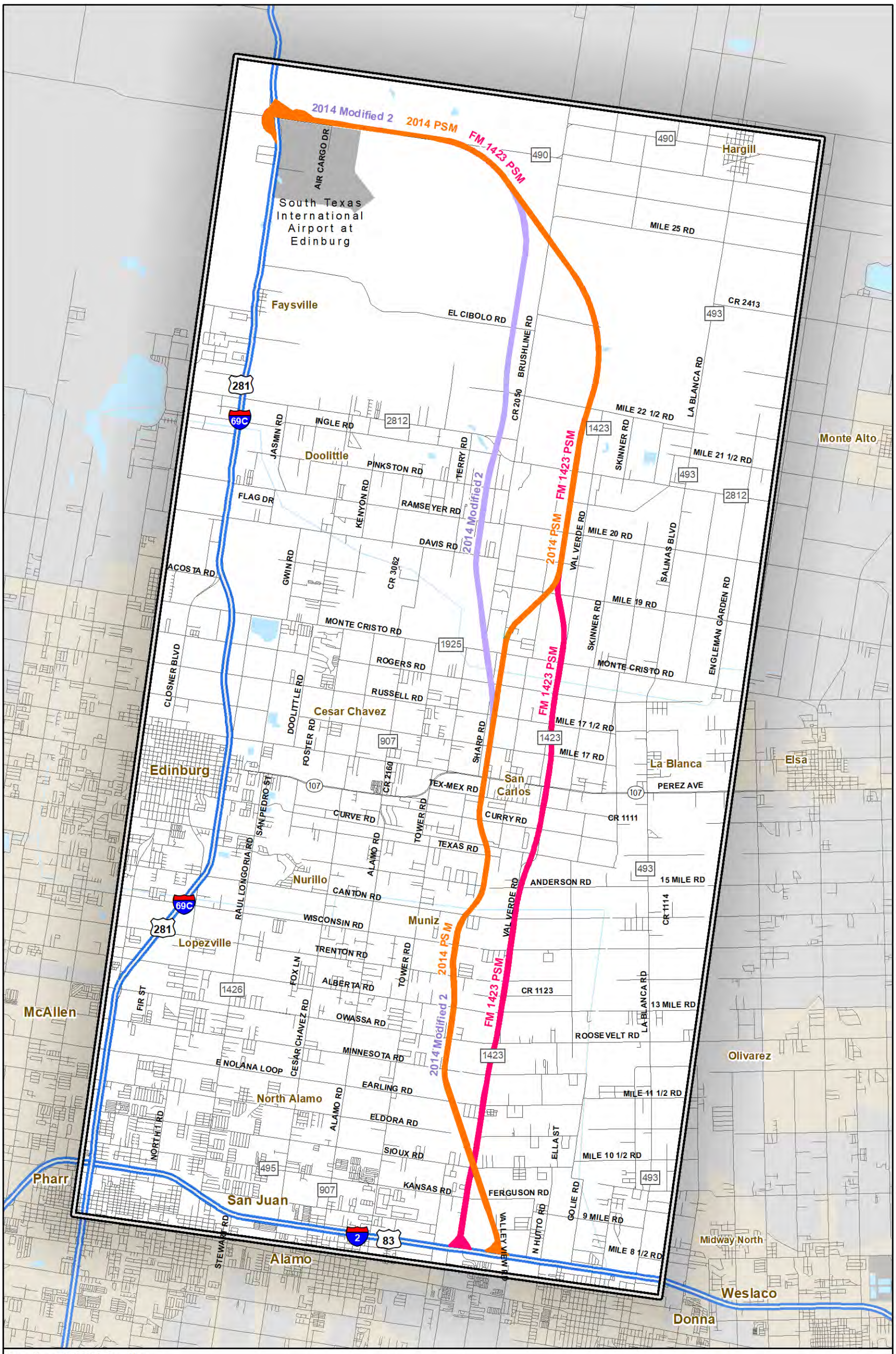
Attachment A

Exhibits



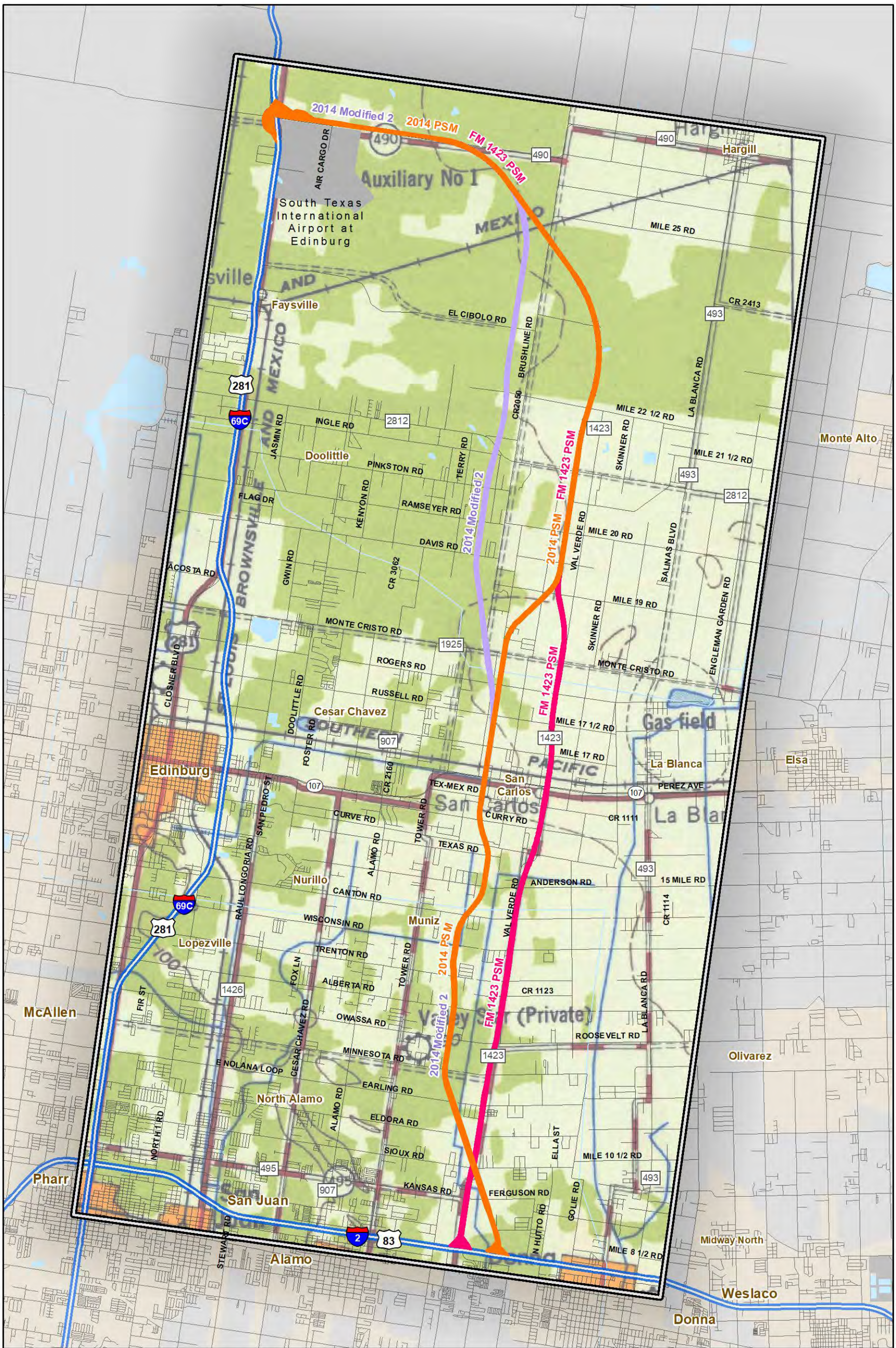
Base Map: ESRI-USA Base Map

2014 Modified 2 Alternative
2014 PSM Alternative
FM 1423 PSM Alternative
Study Area

N W E S

0 0.5 1 2
Miles

Exhibit 1
Project Location on County Base
SH 68 from
I-2/US 83 to I-69C/US 281
Hidalgo County, Texas
CSJs: 3629-01-001, 002, and 003


2014 Modified 2
2014 PSM
FM 1423 PSM
Hargill
Auxiliary No I
South Texas International Airport at Edinburg
Faysville
Doolittle
Cesar Chavez
Edinburg
San Carlos
La Blanca
Gas field
Nurillo
Muniz
Lopezville
McAllen
North Alamo
San Juan
Alamo
Pharr
Monte Alto
Elsa
Olivarez
Midway North
Weslaco
Donna
Valley Spur (Private)
INGLE RD
PINKSTON RD
RAMSEYER RD
DAVIS RD
MONTE CRISTO RD
ROGERS RD
RUSSELL RD
TEX-MEX RD
CURVE RD
CURRY RD
TEXAS RD
ANDERSON RD
CANTON RD
WISCONSIN RD
TRENTON RD
ALBERTA RD
OWASSA RD
MINNESOTA RD
EARLING RD
ELDORA RD
SIOUX RD
KANSAS RD
FERGUSON RD
ROOSEVELT RD
MILE 25 RD
MILE 22 1/2 RD
MILE 21 1/2 RD
MILE 20 RD
MILE 19 RD
MILE 17 1/2 RD
MILE 17 RD
15 MILE RD
MILE 10 1/2 RD
MILE 8 1/2 RD
EL CIBOLO RD
BRUSHLINE RD
LA BLANCA RD
SKINNER RD
VAL VERDE RD
SALINAS BLVD
ENGLEMAN GARDEN RD
CR 2413
CR 1111
CR 1114
CR 1123
PEREZ AVE
Base Map: Historic USGS Topographic McAllen, Texas 1949, ESRI-USA Base Map
2014 Modified 2 Alternative
2014 PSM Alternative
FM 1423 PSM Alternative
Study Area
0 0.5 1 2
Miles
Exhibit 2
Project Location on
Historic USGS Topographic Map (1949)
SH 68 from
I-2/US 83 to I-69C/US 281
Hidalgo County, Texas
CSJs: 3629-01-001, 002, and 003

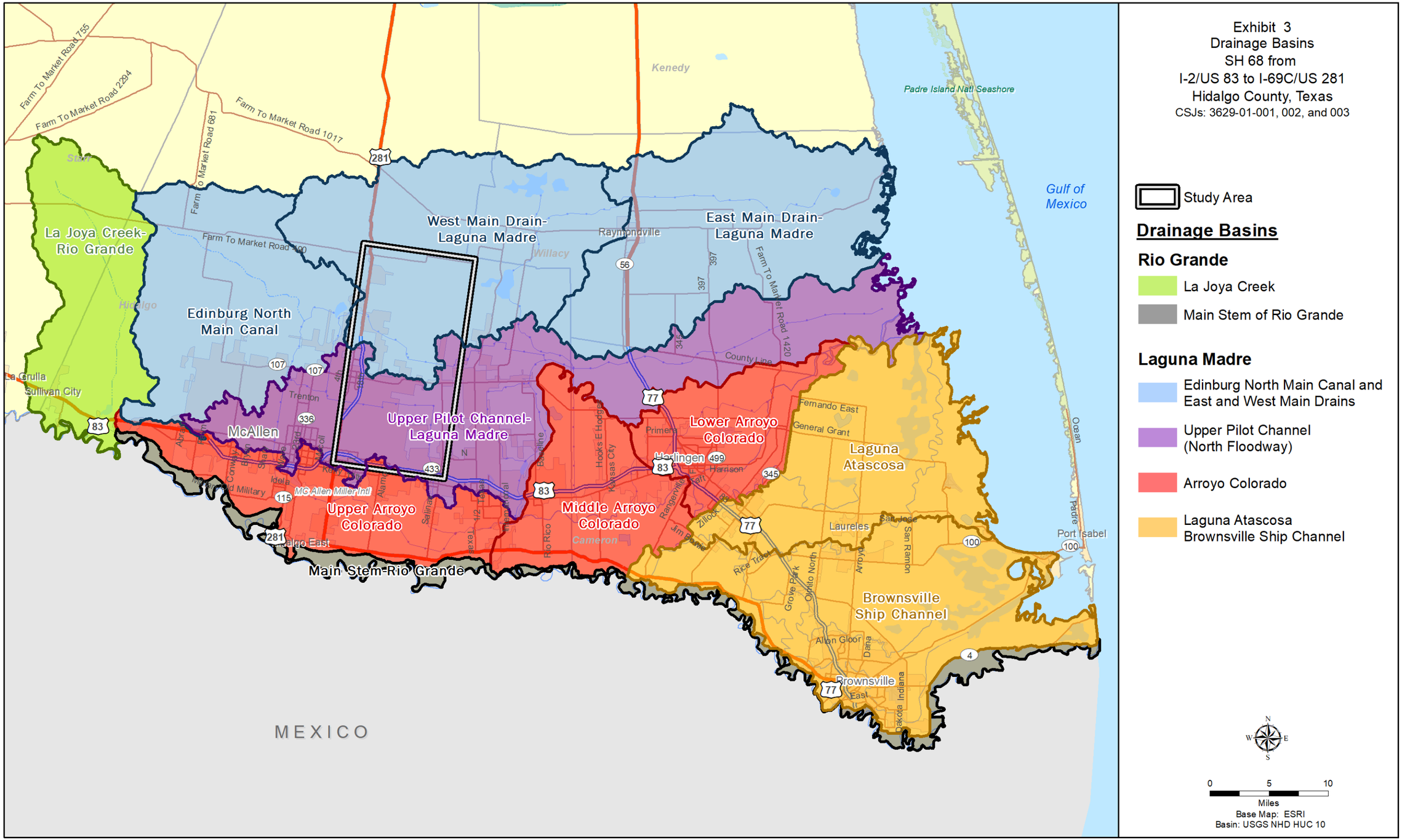
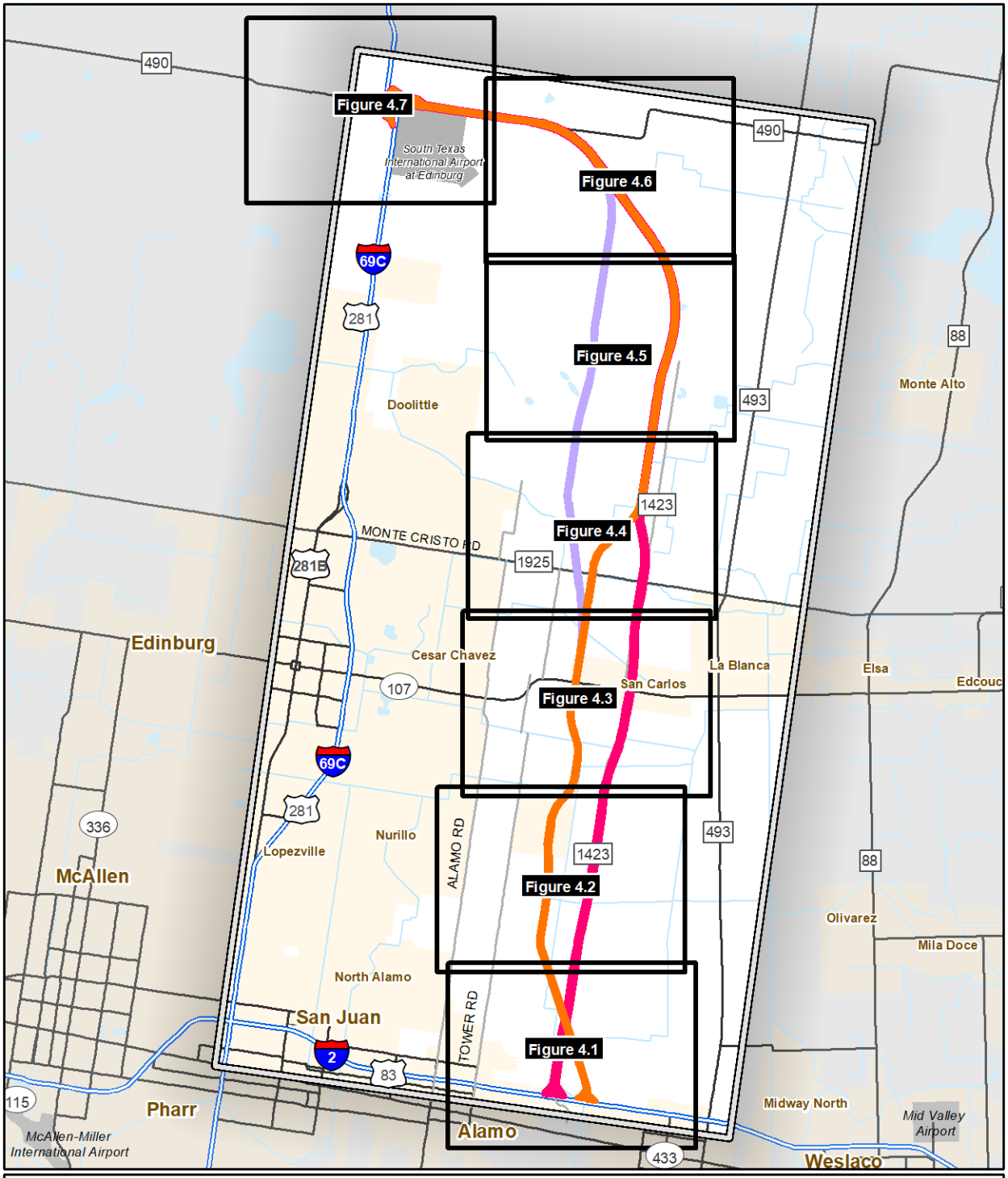


Exhibit 3
Drainage Basins
SH 68 from
I-2/US 83 to I-69C/US 281
Hidalgo County, Texas
CSJs: 3629-01-001, 002, and 003
Study Area
Drainage Basins
Rio Grande
La Joya Creek
Main Stem of Rio Grande
Laguna Madre
Edinburg North Main Canal and East and West Main Drains
Upper Pilot Channel (North Floodway)
Arroyo Colorado
Laguna Atascosa Brownsville Ship Channel
La Joya Creek-Rio Grande
Edinburg North Main Canal
West Main Drain-Laguna Madre
East Main Drain-Laguna Madre
Upper Pilot Channel-Laguna Madre
Upper Arroyo Colorado
Middle Arroyo Colorado
Lower Arroyo Colorado
Laguna Atascosa
Brownsville Ship Channel
Main Stem-Rio Grande
MEXICO
Gulf of Mexico
Padre Island Natl Seashore
McAllen
Edinburg
Harlingen
Brownsville
Port Isabel
Raymondville
Kenedy
Willacy
Hidalgo
Cameron
Sullivan City
La Grulla
Trenton
Idella
Hidalgo East
Laureles
Primera
Harrison
Fernando East
General Grant
Rio Rico
Olmito North
Grove Park
Allen Gloor
Dana
Dakota Indiana
Arroyo
San Ramon
Rangerville
Kansas City
Hooks E Hodges
Baseline
Texas
Alamo
Salina
Idela
Conway
Military
Zillock
Jim Bayard
Rice Track
Ocean
Padre
Miles
Base Map: ESRI
Basin: USGS NHD HUC 10



2014 Modified 2 Alternative
2014 PSM Alternative
FM 1423 PSM Alternative
Study Area

N W E S

0 1 2
Miles

Exhibit 4.0 Index
Water Resources Index
SH 68 from
I-2/US 83 to I-69C/US 281
Hidalgo County, Texas
CSJs: 3629-01-001, 002, and 003

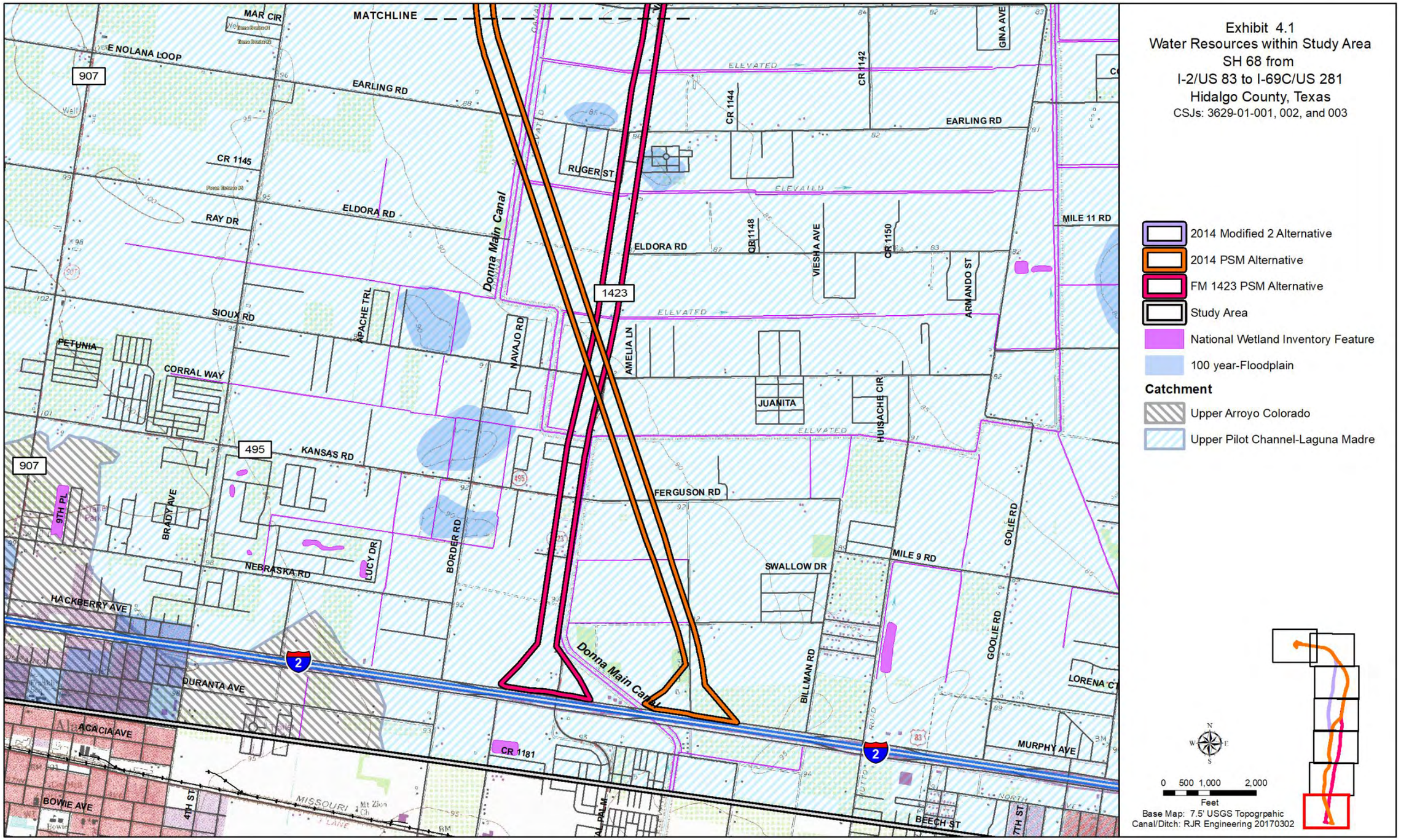


Exhibit 4.1
Water Resources within Study Area
SH 68 from
I-2/US 83 to I-69C/US 281
Hidalgo County, Texas
CSJs: 3629-01-001, 002, and 003
2014 Modified 2 Alternative
2014 PSM Alternative
FM 1423 PSM Alternative
Study Area
National Wetland Inventory Feature
100 year-Floodplain
Catchment
Upper Arroyo Colorado
Upper Pilot Channel-Laguna Madre
0 500 1,000 2,000
Feet
Base Map: 7.5' USGS Topogrpahic
Canal/Ditch: RJR Engineering 20170302
MATCHLINE
MAR CIR
E NOLANA LOOP
907
EARLING RD
CR 1145
RAY DR
ELDORA RD
SIOUX RD
PETUNIA
CORRAL WAY
APACHE TRL
NAVAJO RD
Donna Main Canal
1423
RUGER ST
CR 1144
CR 1142
GINA AVE
CR 1148
VIESHA AVE
CR 1150
ARMANDO ST
MILE 11 RD
AMELIA LN
JUANITA
HUISACHE CIR
495
KANSAS RD
FERGUSON RD
9TH PL
BRADY AVE
BORDER RD
LUCY DR
NEBRASKA RD
HACKBERRY AVE
SWALLOW DR
MILE 9 RD
GOLIE RD
BILLMAN RD
DURANTA AVE
LORENA CT
ACACIA AVE
CR 1181
MURPHY AVE
BOWIE AVE
4TH ST
MISSOURI
BEECH ST
7TH ST
2
83

Exhibit 4.2
Water Resources within Study Area
SH 68 from
I-2/US 83 to I-69C/US 281
Hidalgo County, Texas
CSJs: 3629-01-001, 002, and 003
2014 Modified 2 Alternative
2014 PSM Alternative
FM 1423 PSM Alternative
Study Area
National Wetland Inventory Feature
100 year-Floodplain
Catchment
Upper Pilot Channel-Laguna Madre
0 500 1,000 2,000
Feet
Base Map: 7.5' USGS Topogrpahic
Canal/Ditch: RJR Engineering 20170302
MATCHLINE
Donna Main Canal
E IOWA RD
CLAY ST
JASMINE ST
907
CANTON RD
WISCONSIN RD
TOWER RD
CESSNA AVE
CR 1029
FE DR
CR 1120
EL BOSQUE DR
PALMERAS CIR
VIOLETA DR
TEJANO DR
OWASSA RD
AZURE AVE
MINNESOTA RD
CORTEZ DR
MAR CIR
LUXURY LN
JAM SQ
SKYHAWK DR
CARL ST
1423
VAL VERDE RD
MILE 15 RD
DILLON RD
COUNTY ROAD 1106
ABEL DR
ATLANTA AV
VERDE CIR
EDINBURG EAST GAS FIELD
TRENTON RD
CR 1123
CR 1138
VIEJO DR
CR 1136
TWEETY RD
ROOSEVELT RD
LEAL ST
MILE 12 RD
ELEVATED
Oil Well
Gas Well
Trailer Park

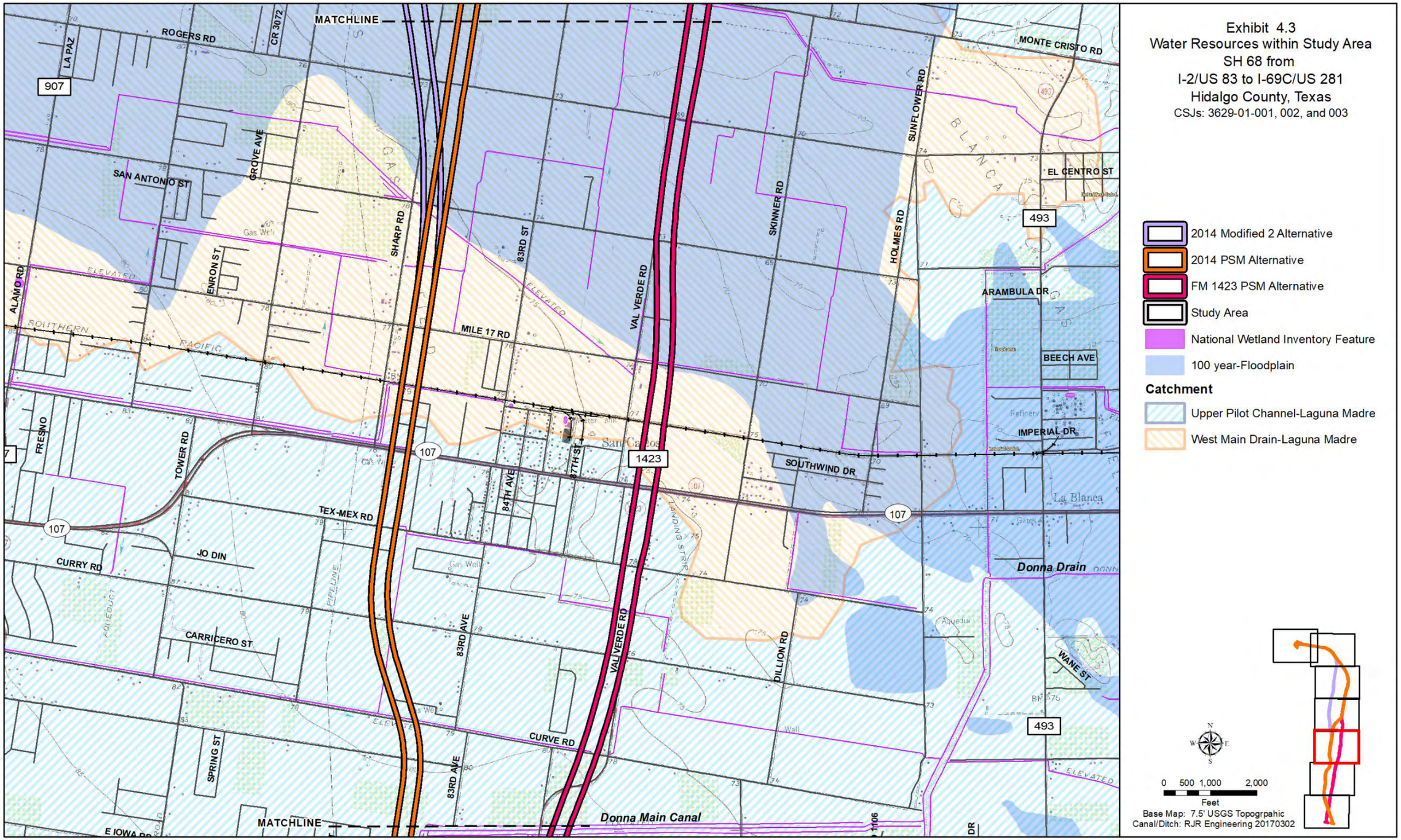


Exhibit 4.3
Water Resources within Study Area
SH 68 from
I-2/US 83 to I-69C/US 281
Hidalgo County, Texas
CSJs: 3629-01-001, 002, and 003
2014 Modified 2 Alternative
2014 PSM Alternative
FM 1423 PSM Alternative
Study Area
National Wetland Inventory Feature
100 year-Floodplain
Catchment
Upper Pilot Channel-Laguna Madre
West Main Drain-Laguna Madre
0 500 1,000 2,000
Feet
Base Map: 7.5' USGS Topogrpahic
Canal/Ditch: RJR Engineering 20170302
MATCHLINE
ROGERS RD
LA PAZ
CR 3072
907
SAN ANTONIO ST
GROVE AVE
ENRON ST
ALAMO RD
SOUTHERN PACIFIC
SHARP RD
83RD ST
MILE 17 RD
VAL VERDE RD
SKINNER RD
HOLMES RD
SUNFLOWER RD
MONTE CRISTO RD
EL CENTRO ST
493
ARAMBULA DR
BEECH AVE
IMPERIAL DR
SOUTHWIND DR
1423
107
FRESNO
TOWER RD
TEX-MEX RD
JO DIN
CURRY RD
CARRICERO ST
84TH AVE
87TH ST
83RD AVE
DILLION RD
WANE ST
CURVE RD
SPRING ST
E IOWA RD
Donna Drain
Donna Main Canal
La Blanca
San Carlos
Refinery
Gas Well
ELEVATED
PIPELINE
AQUEDUCT

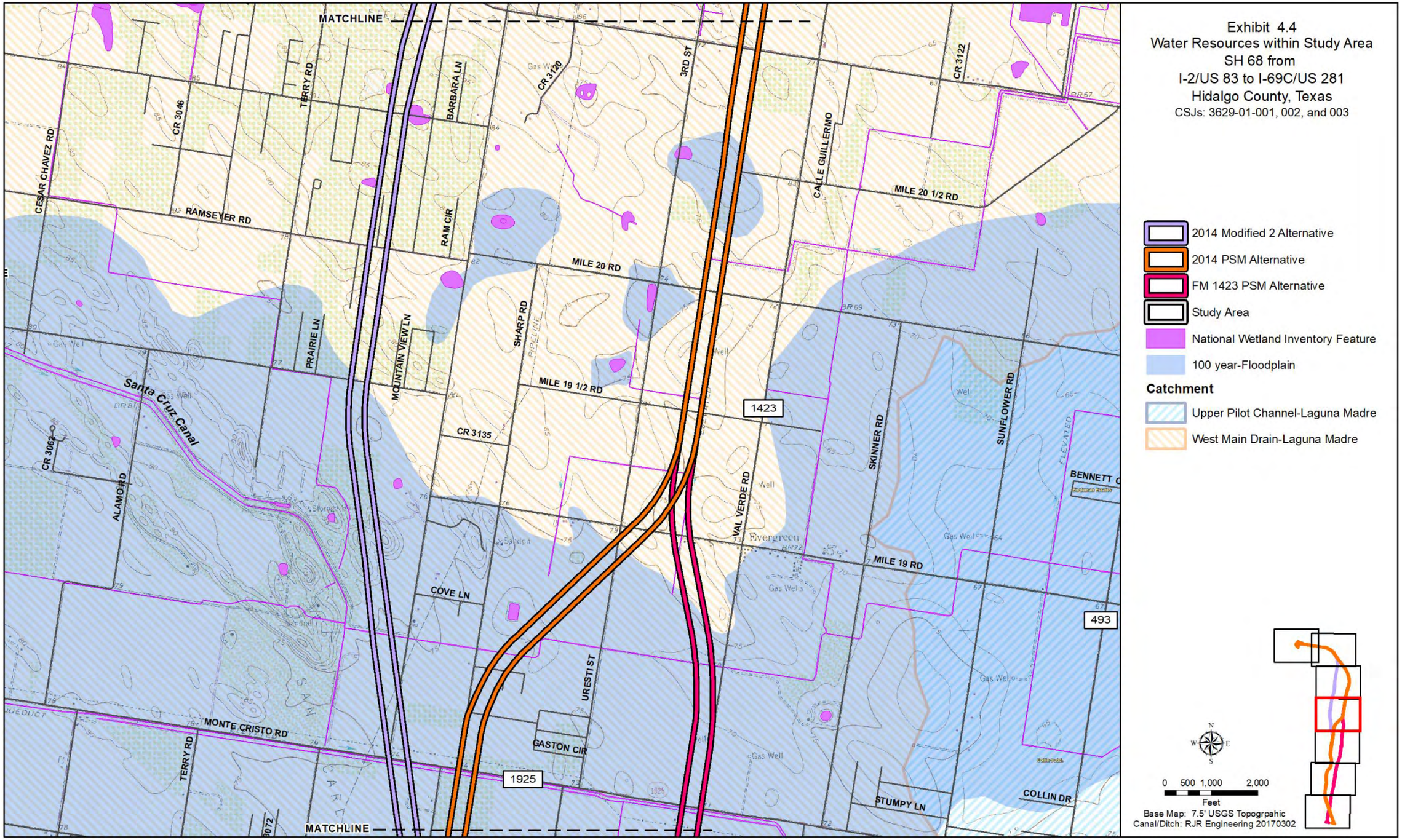


Exhibit 4.4
Water Resources within Study Area
SH 68 from
I-2/US 83 to I-69C/US 281
Hidalgo County, Texas
CSJs: 3629-01-001, 002, and 003
2014 Modified 2 Alternative
2014 PSM Alternative
FM 1423 PSM Alternative
Study Area
National Wetland Inventory Feature
100 year-Floodplain
Catchment
Upper Pilot Channel-Laguna Madre
West Main Drain-Laguna Madre
0 500 1,000 2,000
Feet
Base Map: 7.5' USGS Topogrpahic
Canal/Ditch: RJR Engineering 20170302
MATCHLINE
MATCHLINE
CESAR CHAVEZ RD
CR 3046
TERRY RD
BARBARA LN
CR 3120
3RD ST
CR 3122
CALLE GUILLERMO
MILE 20 1/2 RD
RAMSEYER RD
RAM CIR
MILE 20 RD
SHARP RD
PIPELINE
PRAIRIE LN
MOUNTAIN VIEW LN
MILE 19 1/2 RD
1423
Santa Cruz Canal
CR 3135
CR 3062
ALAMO RD
VAL VERDE RD
SKINNER RD
SUNFLOWER RD
BENNETT C
Evergreen
MILE 19 RD
COVE LN
493
URESTI ST
MONTE CRISTO RD
GASTON CIR
1925
TERRY RD
STUMPY LN
COLLIN DR

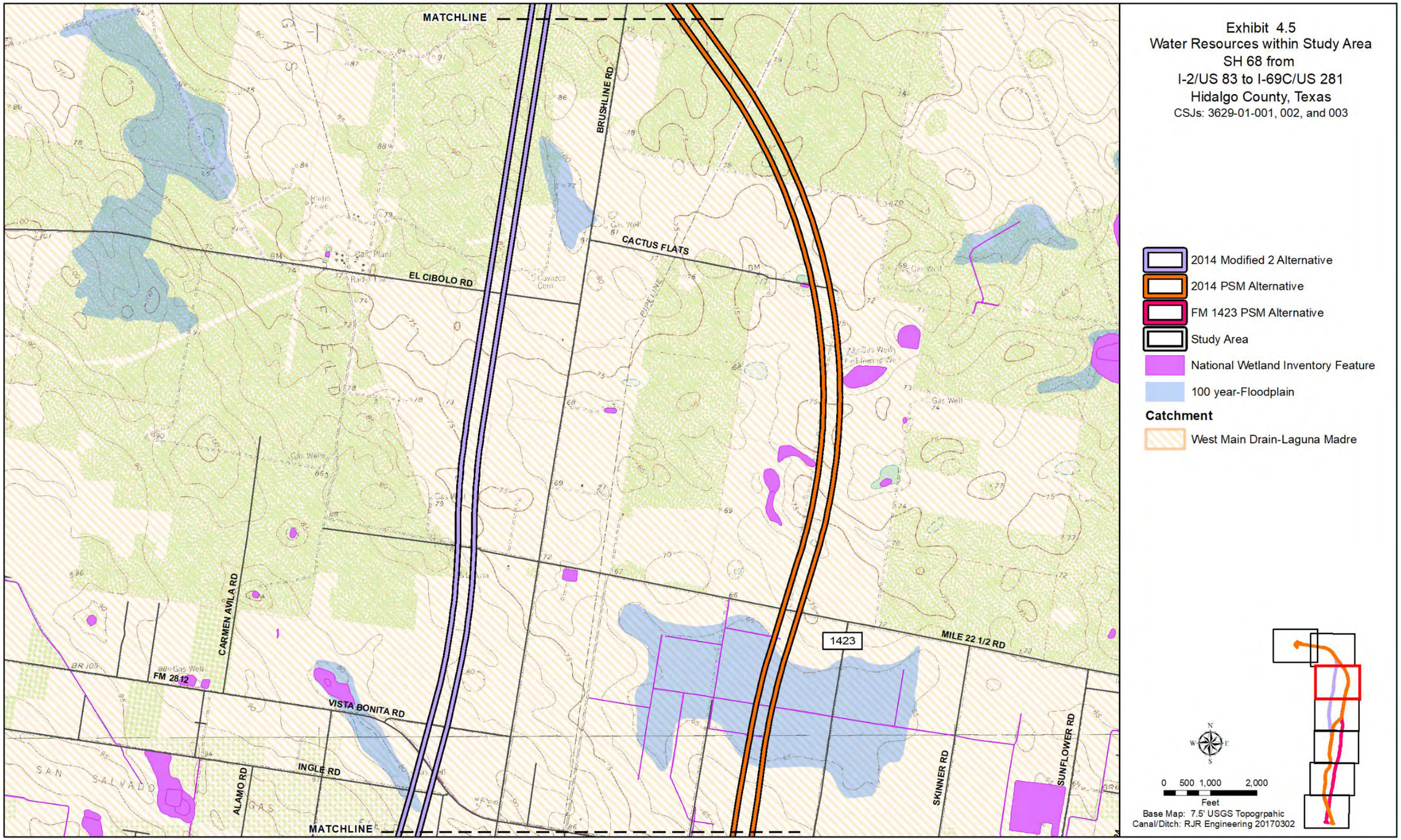


Exhibit 4.5
Water Resources within Study Area
SH 68 from
I-2/US 83 to I-69C/US 281
Hidalgo County, Texas
CSJs: 3629-01-001, 002, and 003
2014 Modified 2 Alternative
2014 PSM Alternative
FM 1423 PSM Alternative
Study Area
National Wetland Inventory Feature
100 year-Floodplain
Catchment
West Main Drain-Laguna Madre
MATCHLINE
BRUSHLINE RD
CACTUS FLATS
EL CIBOLO RD
CARMEN AVILA RD
FM 2812
VISTA BONITA RD
INGLE RD
ALAMO RD
1423
MILE 22 1/2 RD
SKINNER RD
SUNFLOWER RD
0 500 1,000 2,000
Feet
Base Map: 7.5' USGS Topogrpahic
Canal/Ditch: RJR Engineering 20170302

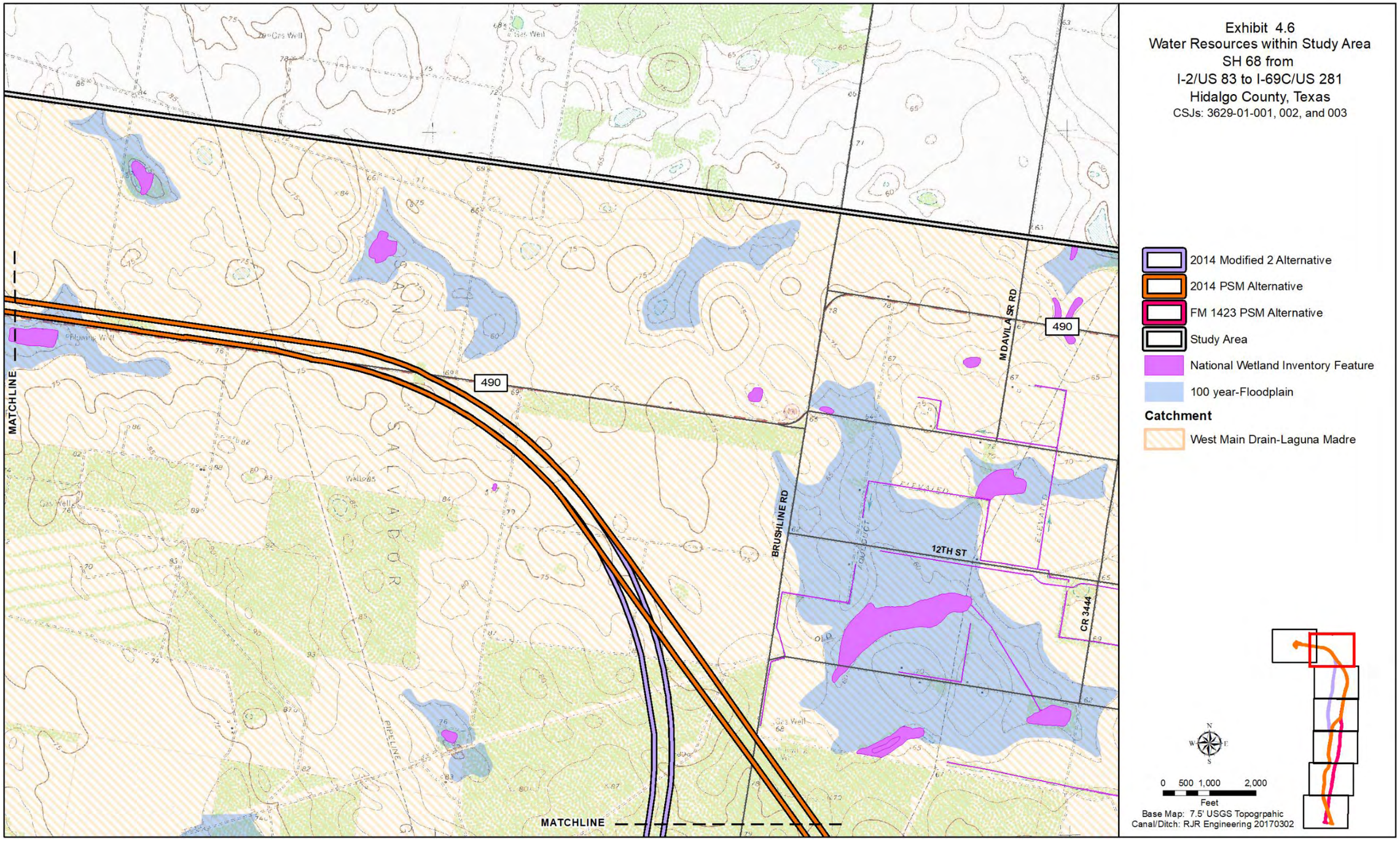


Exhibit 4.6
Water Resources within Study Area
SH 68 from
I-2/US 83 to I-69C/US 281
Hidalgo County, Texas
CSJs: 3629-01-001, 002, and 003
2014 Modified 2 Alternative
2014 PSM Alternative
FM 1423 PSM Alternative
Study Area
National Wetland Inventory Feature
100 year-Floodplain
Catchment
West Main Drain-Laguna Madre
MATCHLINE
490
M DAVILA SR RD
BRUSHLINE RD
12TH ST
CR 3444
ELEVATED
AQUEDUCT
PIPELINE
0 500 1,000 2,000
Feet
Base Map: 7.5' USGS Topogrpahic
Canal/Ditch: RJR Engineering 20170302

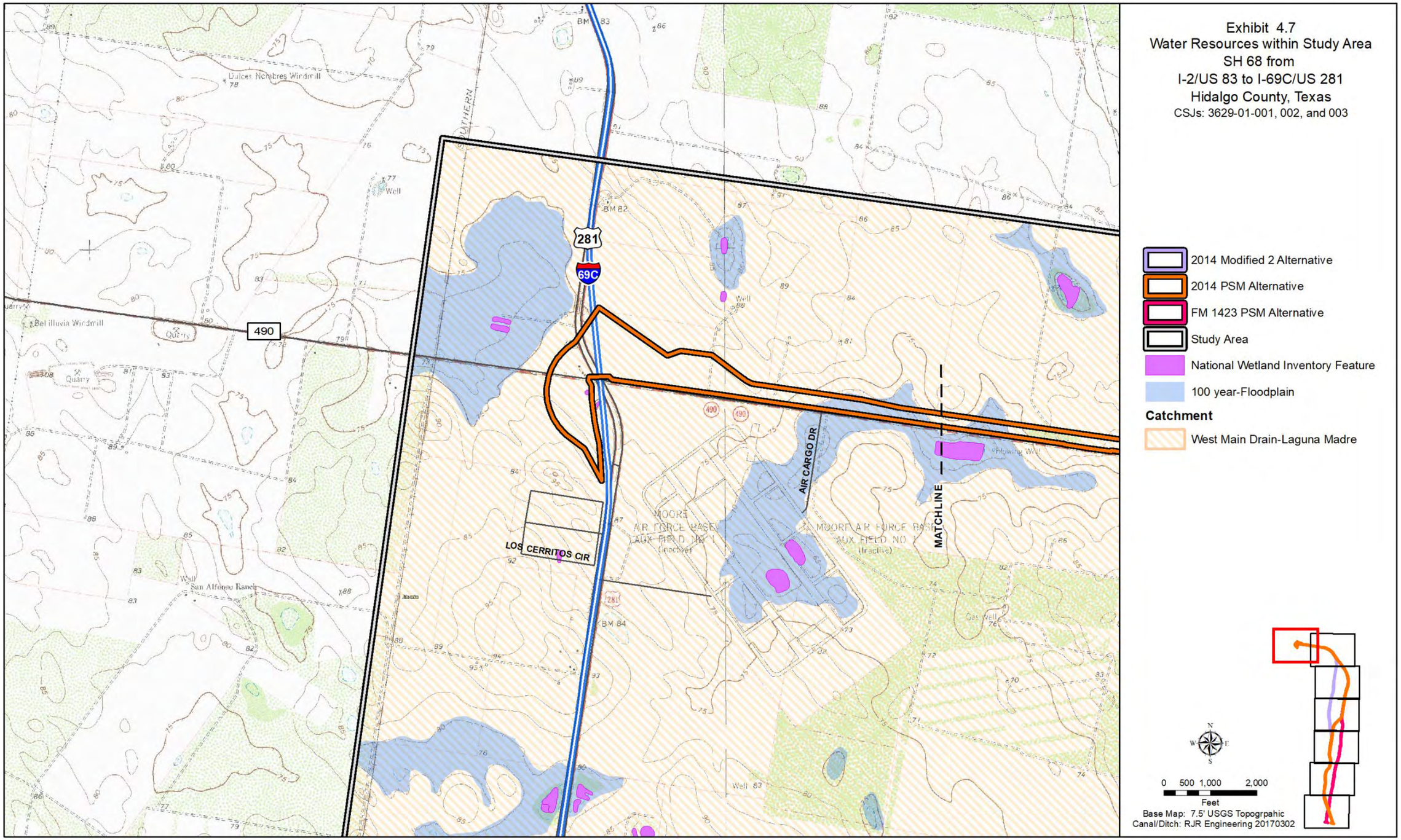
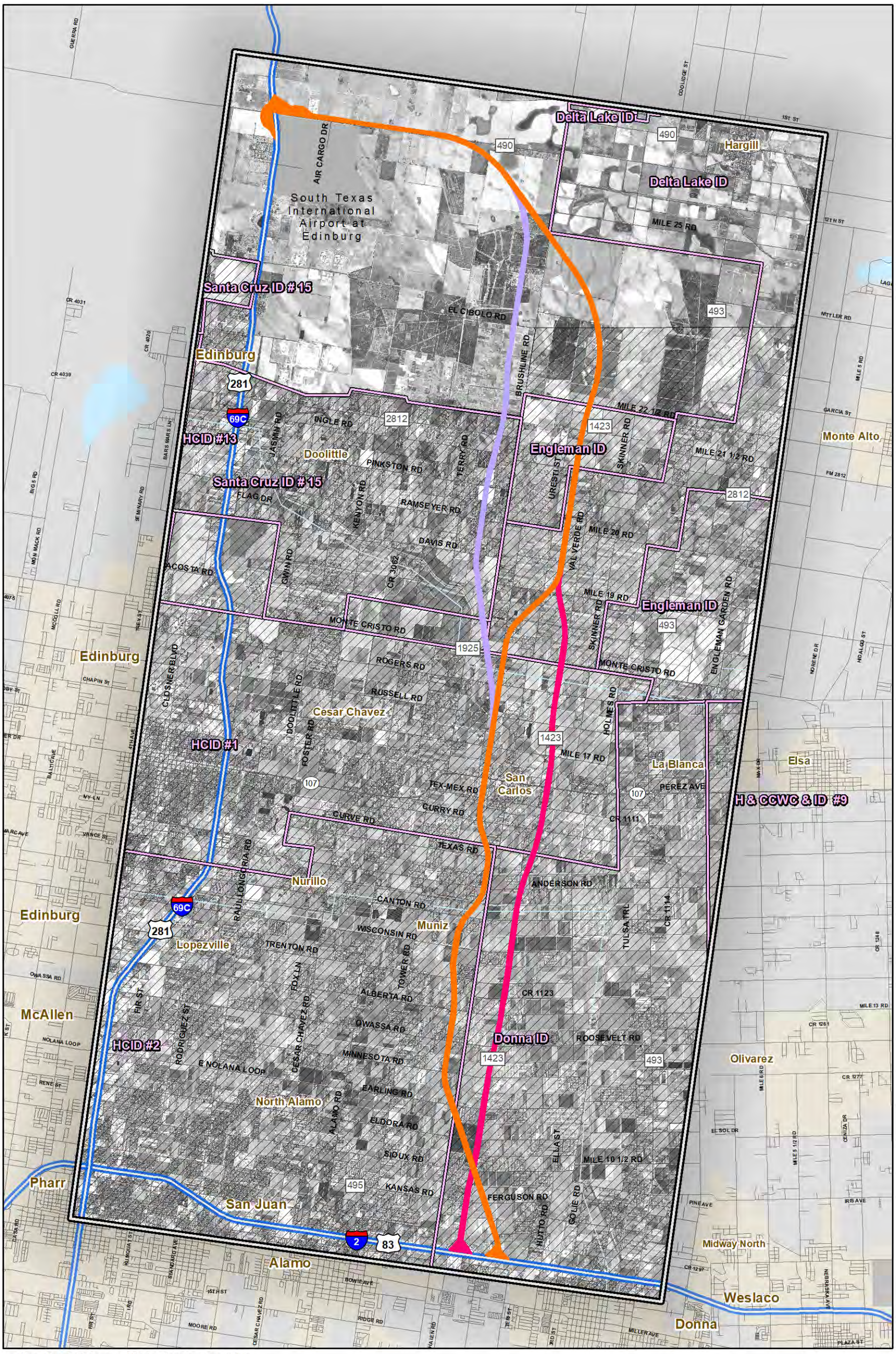


Exhibit 4.7
Water Resources within Study Area
SH 68 from
I-2/US 83 to I-69C/US 281
Hidalgo County, Texas
CSJs: 3629-01-001, 002, and 003
2014 Modified 2 Alternative
2014 PSM Alternative
FM 1423 PSM Alternative
Study Area
National Wetland Inventory Feature
100 year-Floodplain
Catchment
West Main Drain-Laguna Madre
281
69C
490
AIR CARGO DR
LOS CERRITOS CIR
MATCHLINE
MOORE AIR FORCE BASE AUX FIELD NO 1 (Inactive)
0 500 1,000 2,000
Feet
Base Map: 7.5' USGS Topogrpahic
Canal/Ditch: RJR Engineering 20170302



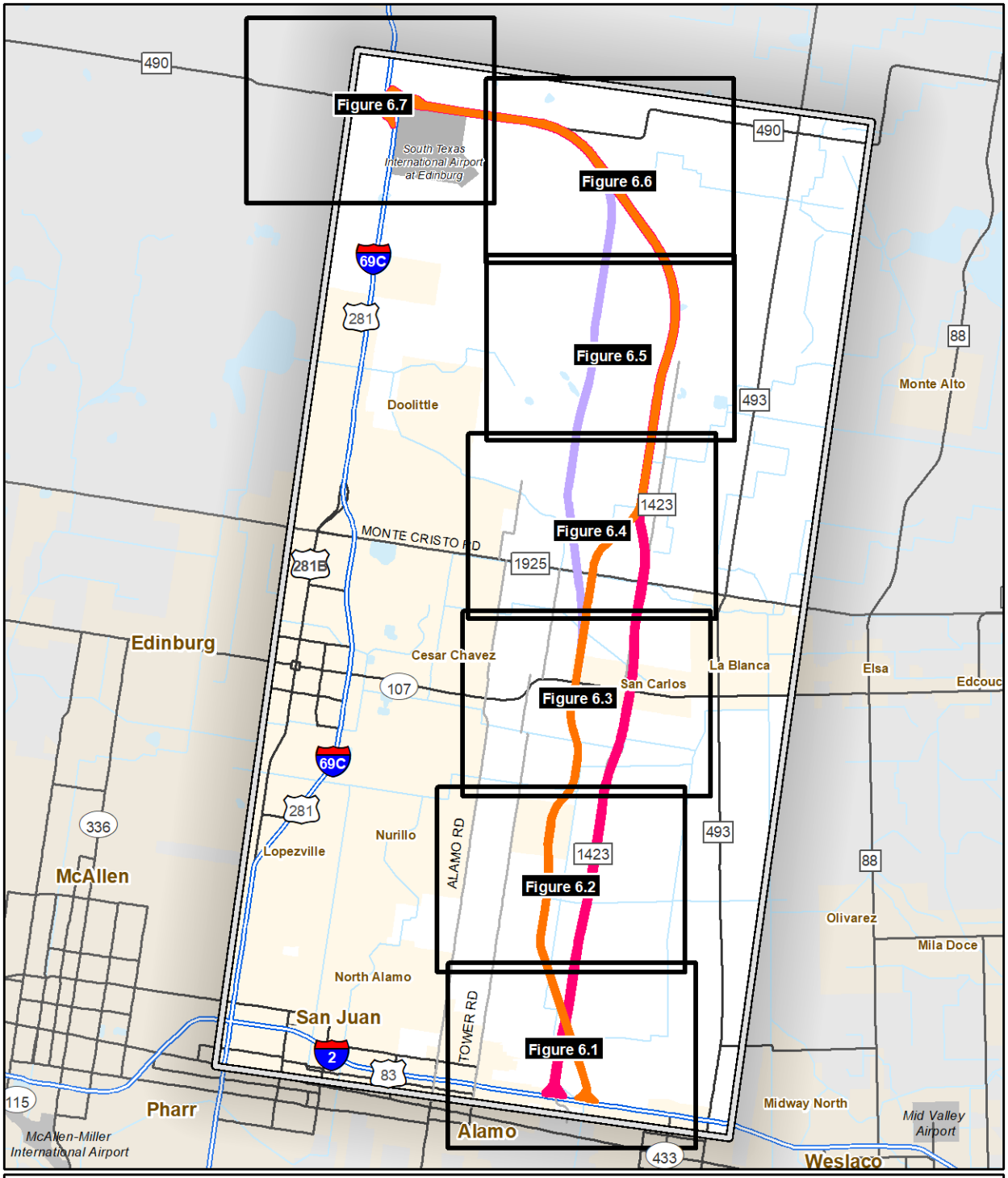
Base Map: TOP Imagery Hidalgo County, Texas 2015

- Study Area
- 2014 Modified 2 Alternative
- 2014 PSM Alternative
- FM 1423 PSM Alternative
- Irrigation District Boundaries
- Hidalgo County Drainage District 1

N W E S

0 0.5 1 2
Miles

Exhibit 5
Drainage and Irrigation District Boundary
SH 68 from
I-2/US 83 to I-69C/US 281
Hidalgo County, Texas
CSJs: 3629-01-001, 002, and 003



2014 Modified 2 Alternative
2014 PSM Alternative
FM 1423 PSM Alternative
Study Area

N W E S

0 1 2
Miles

Exhibit 6 Index
Canals and Drainages Index
SH 68 from
I-2/US 83 to I-69C/US 281
Hidalgo County, Texas
CSJs: 3629-01-001, 002, and 003

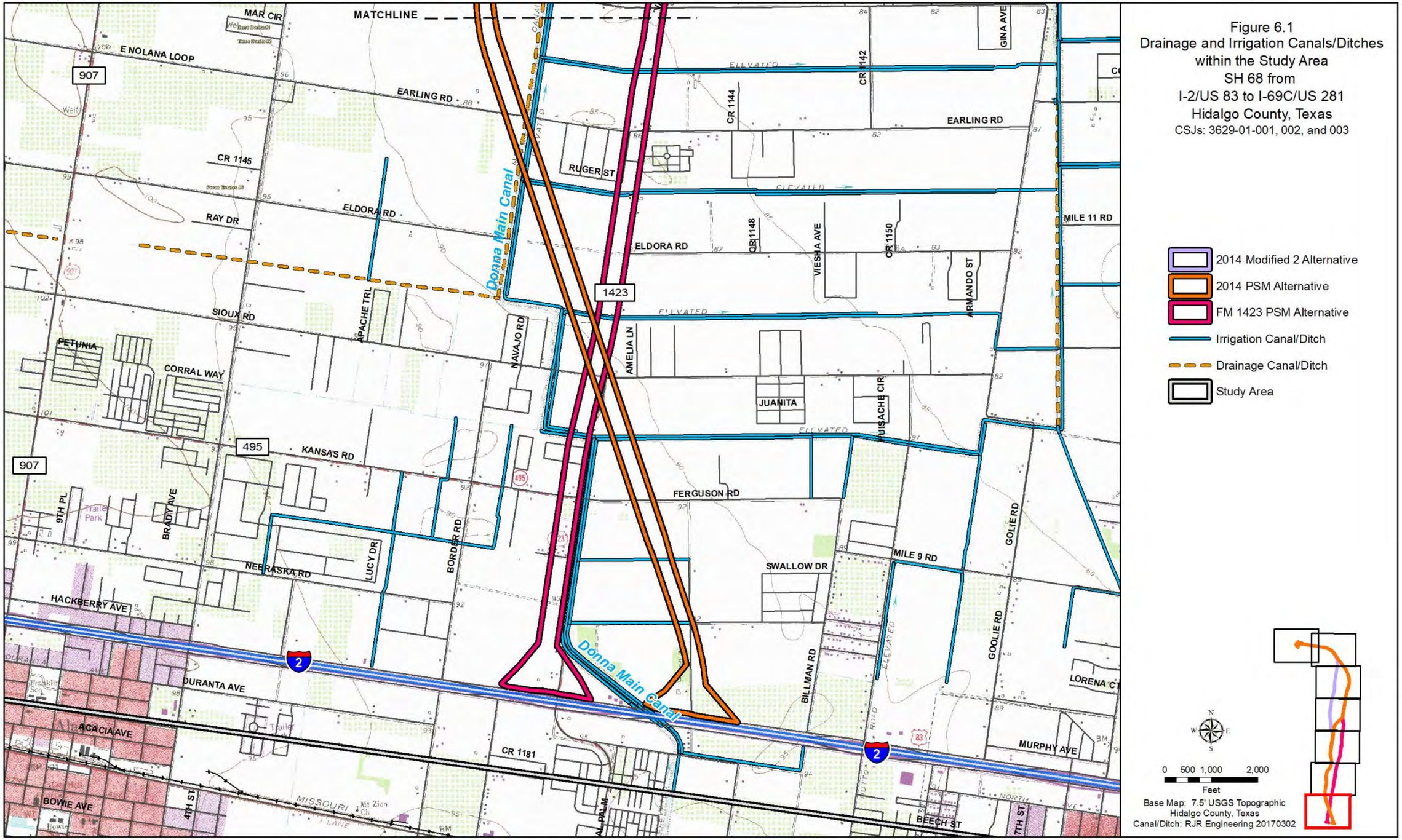
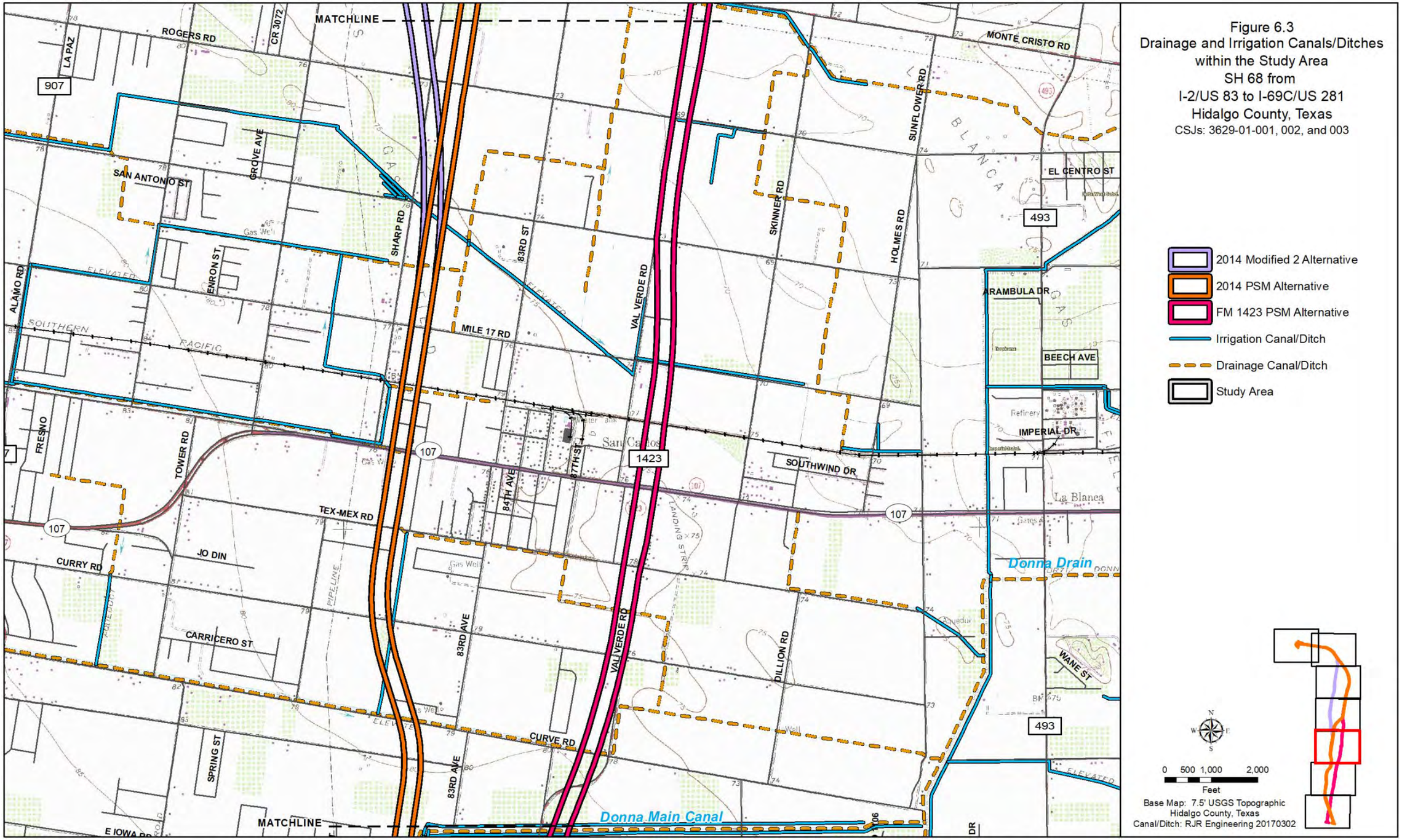

MATCHLINE
MAR CIR
E NOLANA LOOP
907
EARLING RD
CR 1145
RAY DR
ELDORA RD
SIOUX RD
PETUNIA
CORRAL WAY
APACHE TRL
NAVAJO RD
Donna Main Canal
1423
RUGER ST
CR 1144
CR 1142
GINA AVE
ELEVATED
CR 1148
VIESHA AVE
CR 1150
ARMANDO ST
MILE 11 RD
AMELIA LN
JUANITA
LUISACHE CIR
495
KANSAS RD
FERGUSON RD
9TH PL
BRADY AVE
BORDER RD
LUCY DR
NEBRASKA RD
SWALLOW DR
MILE 9 RD
GOLIE RD
HACKBERRY AVE
2
DURANTA AVE
BILLMAN RD
LORENA CT
ACACIA AVE
CR 1181
MURPHY AVE
BOWIE AVE
4TH ST
MISSOURI
BEECH ST
7TH ST
Figure 6.1
Drainage and Irrigation Canals/Ditches
within the Study Area
SH 68 from
I-2/US 83 to I-69C/US 281
Hidalgo County, Texas
CSJs: 3629-01-001, 002, and 003
2014 Modified 2 Alternative
2014 PSM Alternative
FM 1423 PSM Alternative
Irrigation Canal/Ditch
Drainage Canal/Ditch
Study Area
0 500 1,000 2,000
Feet
Base Map: 7.5' USGS Topographic
Hidalgo County, Texas
Canal/Ditch: RJR Engineering 20170302

Figure 6.2
Drainage and Irrigation Canals/Ditches
within the Study Area
SH 68 from
I-2/US 83 to I-69C/US 281
Hidalgo County, Texas
CSJs: 3629-01-001, 002, and 003
2014 Modified 2 Alternative
2014 PSM Alternative
FM 1423 PSM Alternative
Irrigation Canal/Ditch
Drainage Canal/Ditch
Study Area
0 500 1,000 2,000
Feet
Base Map: 7.5' USGS Topographic
Hidalgo County, Texas
Canal/Ditch: RJR Engineering 20170302
Donna Main Canal
MATCHLINE
E IOWA RD
907
CLAY ST
JASMINE ST
N VAL VERDE RD
MILE 15 RD
COUNTY ROAD 1106
ABEL DR
CANTON RD
LUXURY LN
DILLON RD
ATLANTA AV
WISCONSIN RD
TOWER RD
CESSNA AVE
CR 1029
SKYHAWK DR
VERDE CIR
EDINBURG EAST GAS FIELD
JAM SQ
FE DR
CR 1120
CARL ST
1423
TRENTON RD
CR 1123
EL BOSQUE DR
Trailer Park
PALMERAS CIR
VIOLETA DR
TEJANO DR
CR 1138
VIEJO DR
CR 1136
TWEETY RD
ROOSEVELT RD
AZURE AVE
CORTEZ DR
LEAL ST
MILE 12 RD
MAR CIR
ELEVATED
Oil Well
Gas Well


MATCHLINE
ROGERS RD
CR 3072
LA PAZ
907
MONTE CRISTO RD
SUNFLOWER RD
SAN ANTONIO ST
GROVE AVE
SHARP RD
83RD ST
SKINNER RD
HOLMES RD
EL CENTRO ST
493
ALAMO RD
ENRON ST
VAL VERDE RD
ARAMBULA DR
SOUTHERN PACIFIC
MILE 17 RD
BEECH AVE
IMPERIAL DR
FRESNO
TOWER RD
107
1423
SOUTHWIND DR
84TH AVE
87TH ST
TEX-MEX RD
La Blanca
CURRY RD
JO DIN
Donna Drain
CARRICERO ST
83RD AVE
DILLION RD
WANE ST
CURVE RD
SPRING ST
Donna Main Canal
E IOWA RD
Figure 6.3
Drainage and Irrigation Canals/Ditches
within the Study Area
SH 68 from
I-2/US 83 to I-69C/US 281
Hidalgo County, Texas
CSJs: 3629-01-001, 002, and 003
2014 Modified 2 Alternative
2014 PSM Alternative
FM 1423 PSM Alternative
Irrigation Canal/Ditch
Drainage Canal/Ditch
Study Area
0 500 1,000 2,000
Feet
Base Map: 7.5' USGS Topographic
Hidalgo County, Texas
Canal/Ditch: RJR Engineering 20170302

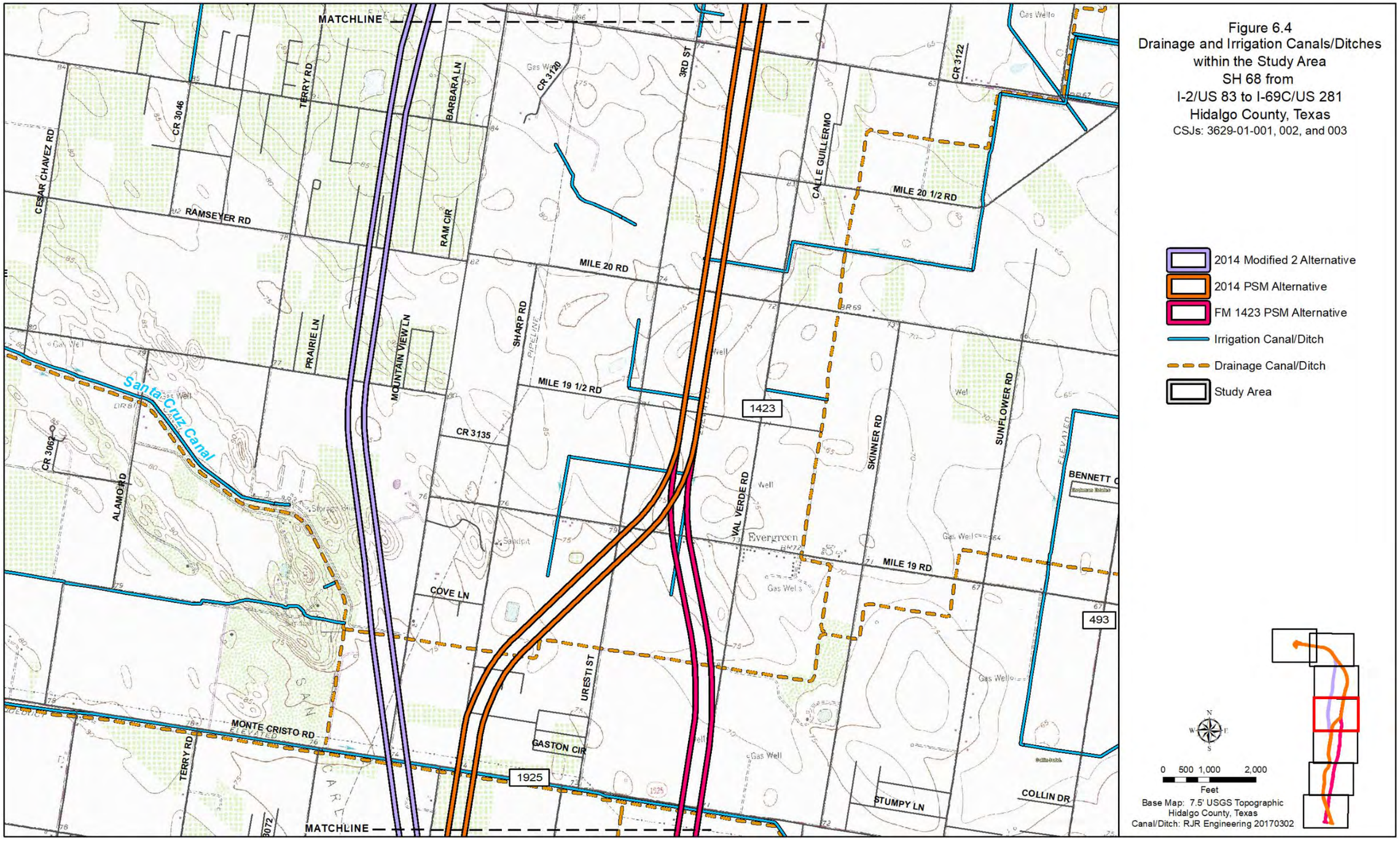


Figure 6.4
Drainage and Irrigation Canals/Ditches
within the Study Area
SH 68 from
I-2/US 83 to I-69C/US 281
Hidalgo County, Texas
CSJs: 3629-01-001, 002, and 003
2014 Modified 2 Alternative
2014 PSM Alternative
FM 1423 PSM Alternative
Irrigation Canal/Ditch
Drainage Canal/Ditch
Study Area
0 500 1,000 2,000
Feet
Base Map: 7.5' USGS Topographic
Hidalgo County, Texas
Canal/Ditch: RJR Engineering 20170302
MATCHLINE
MATCHLINE
Santa Cruz Canal
CESAR CHAVEZ RD
CR 3046
TERRY RD
BARBARA LN
CR 3120
3RD ST
CR 3122
CALLE GUILLERMO
RAMSEYER RD
RAM CIR
MILE 20 1/2 RD
MILE 20 RD
PRAIRIE LN
MOUNTAIN VIEW LN
SHARP RD
PIPELINE
MILE 19 1/2 RD
1423
CR 3135
CR 3062
ALAMO RD
VAL VERDE RD
SKINNER RD
SUNFLOWER RD
BENNETT
Evergreen
MILE 19 RD
COVE LN
493
URESTI ST
MONTE CRISTO RD
GASTON CIR
1925
TERRY RD
STUMPY LN
COLLIN DR

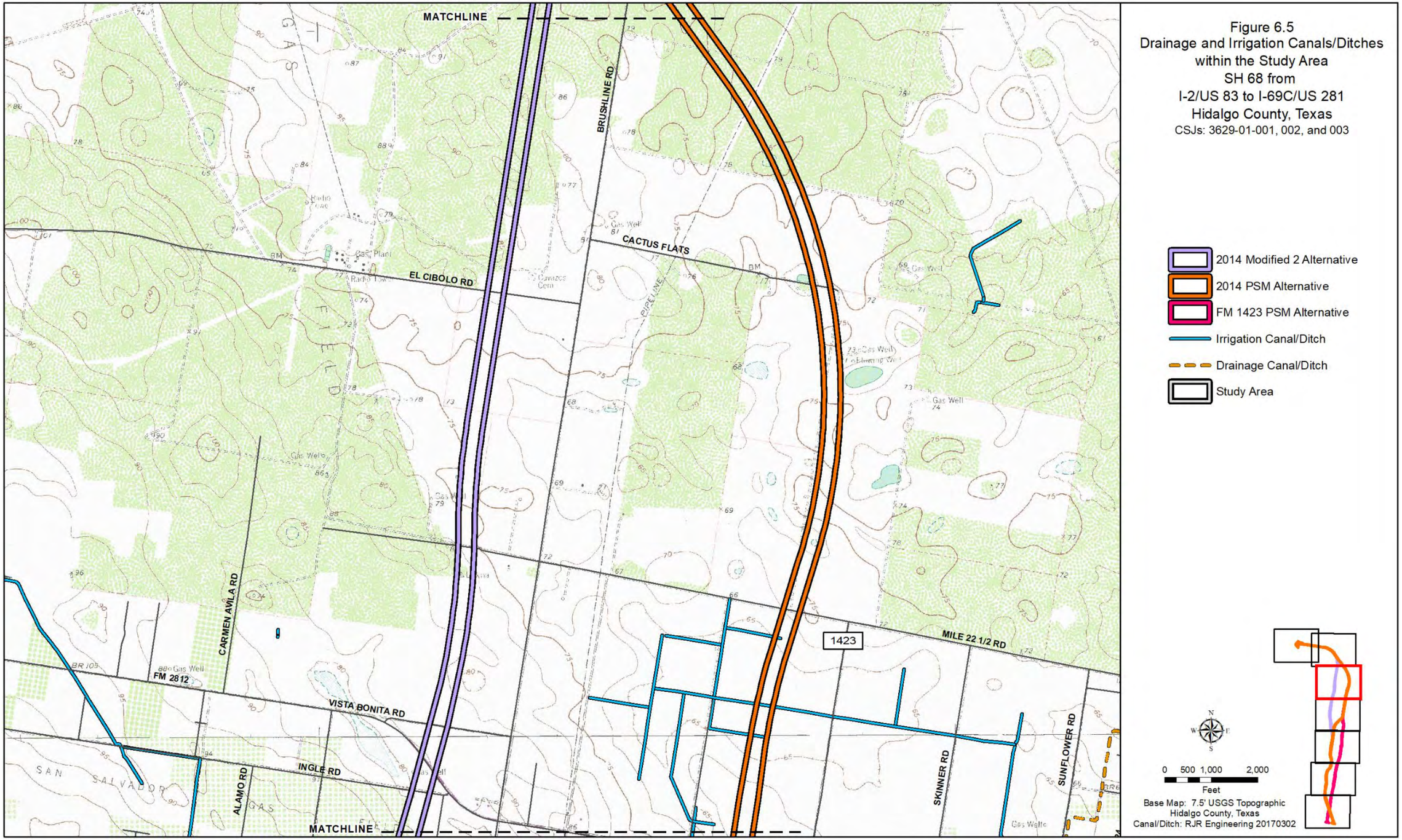


Figure 6.5
Drainage and Irrigation Canals/Ditches within the Study Area
SH 68 from
I-2/US 83 to I-69C/US 281
Hidalgo County, Texas
CSJs: 3629-01-001, 002, and 003

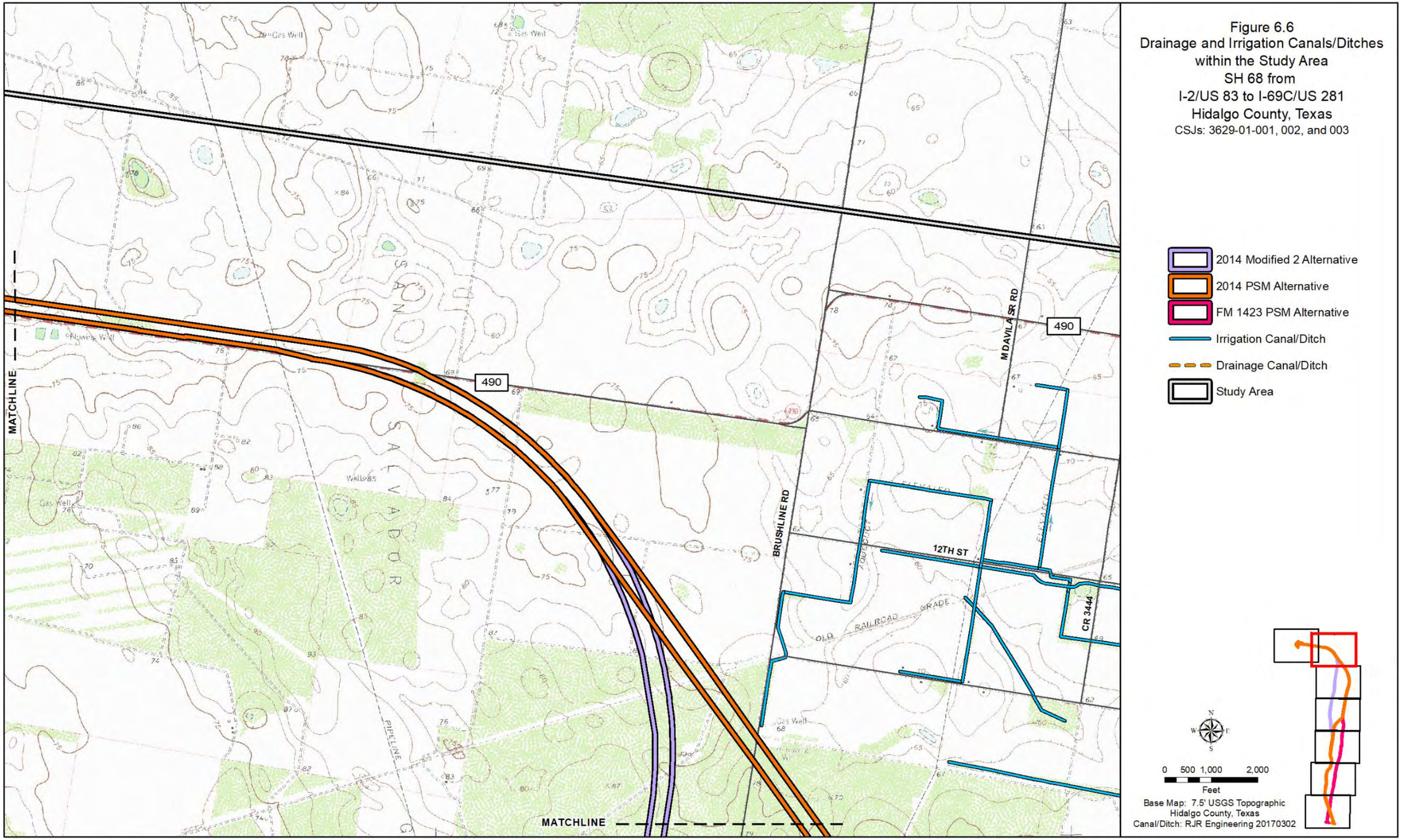


Figure 6.6
Drainage and Irrigation Canals/Ditches
within the Study Area
SH 68 from
I-2/US 83 to I-69C/US 281
Hidalgo County, Texas
CSJs: 3629-01-001, 002, and 003
2014 Modified 2 Alternative
2014 PSM Alternative
FM 1423 PSM Alternative
Irrigation Canal/Ditch
Drainage Canal/Ditch
Study Area
MATCHLINE
490
M DAVILA SR RD
BRUSHLINE RD
12TH ST
CR 3444
OLD RAILROAD GRADE
PIPELINE
0 500 1,000 2,000
Feet
Base Map: 7.5' USGS Topographic
Hidalgo County, Texas
Canal/Ditch: RJR Engineering 20170302

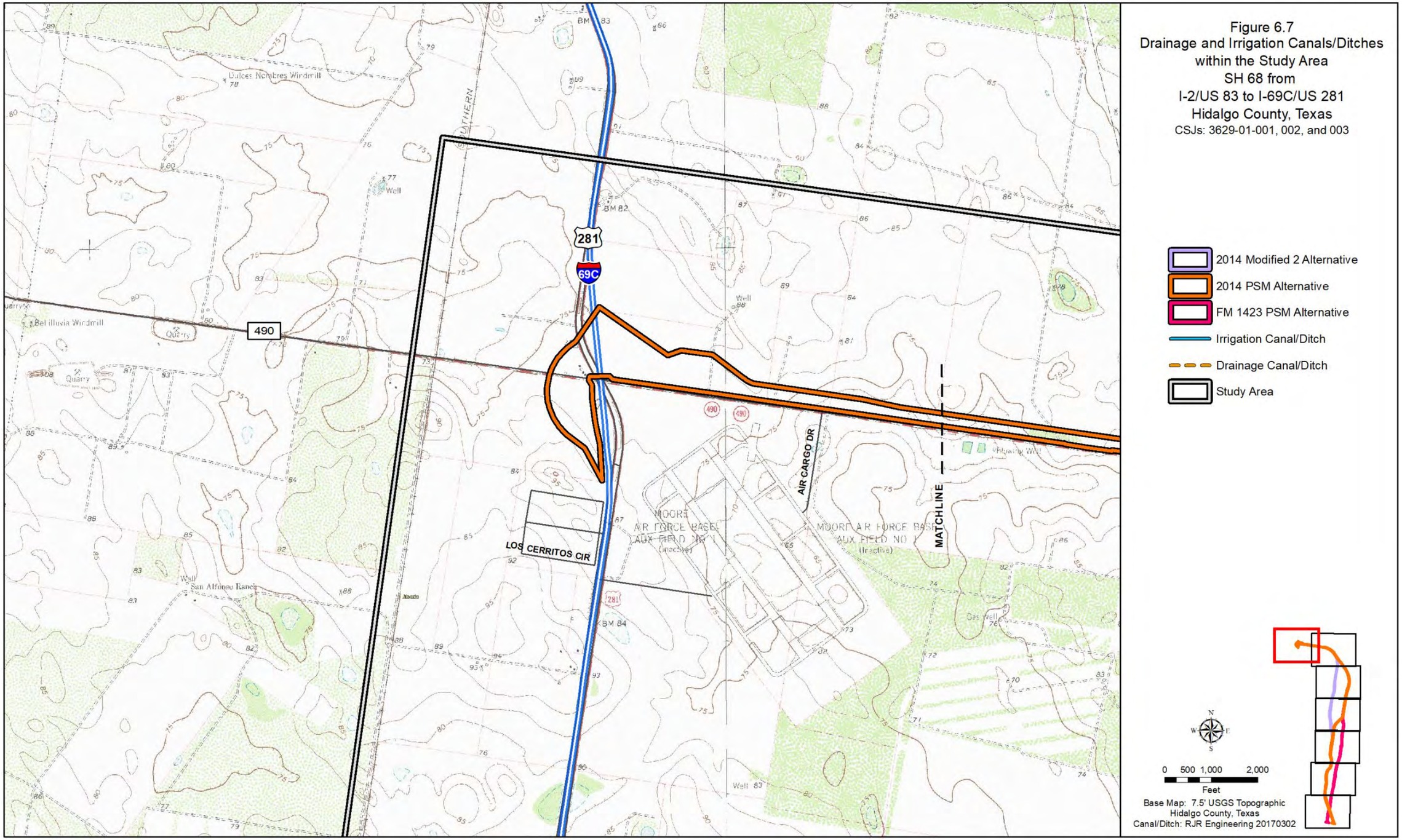


Figure 6.7
Drainage and Irrigation Canals/Ditches
within the Study Area
SH 68 from
I-2/US 83 to I-69C/US 281
Hidalgo County, Texas
CSJs: 3629-01-001, 002, and 003
2014 Modified 2 Alternative
2014 PSM Alternative
FM 1423 PSM Alternative
Irrigation Canal/Ditch
Drainage Canal/Ditch
Study Area
281
69C
490
LOS CERRITOS CIR
AIR CARGO DR
MATCHLINE
MOORE AIR FORCE BASE AUX FIELD NO 1
0 500 1,000 2,000
Feet
Base Map: 7.5' USGS Topographic
Hidalgo County, Texas
Canal/Ditch: RJR Engineering 20170302

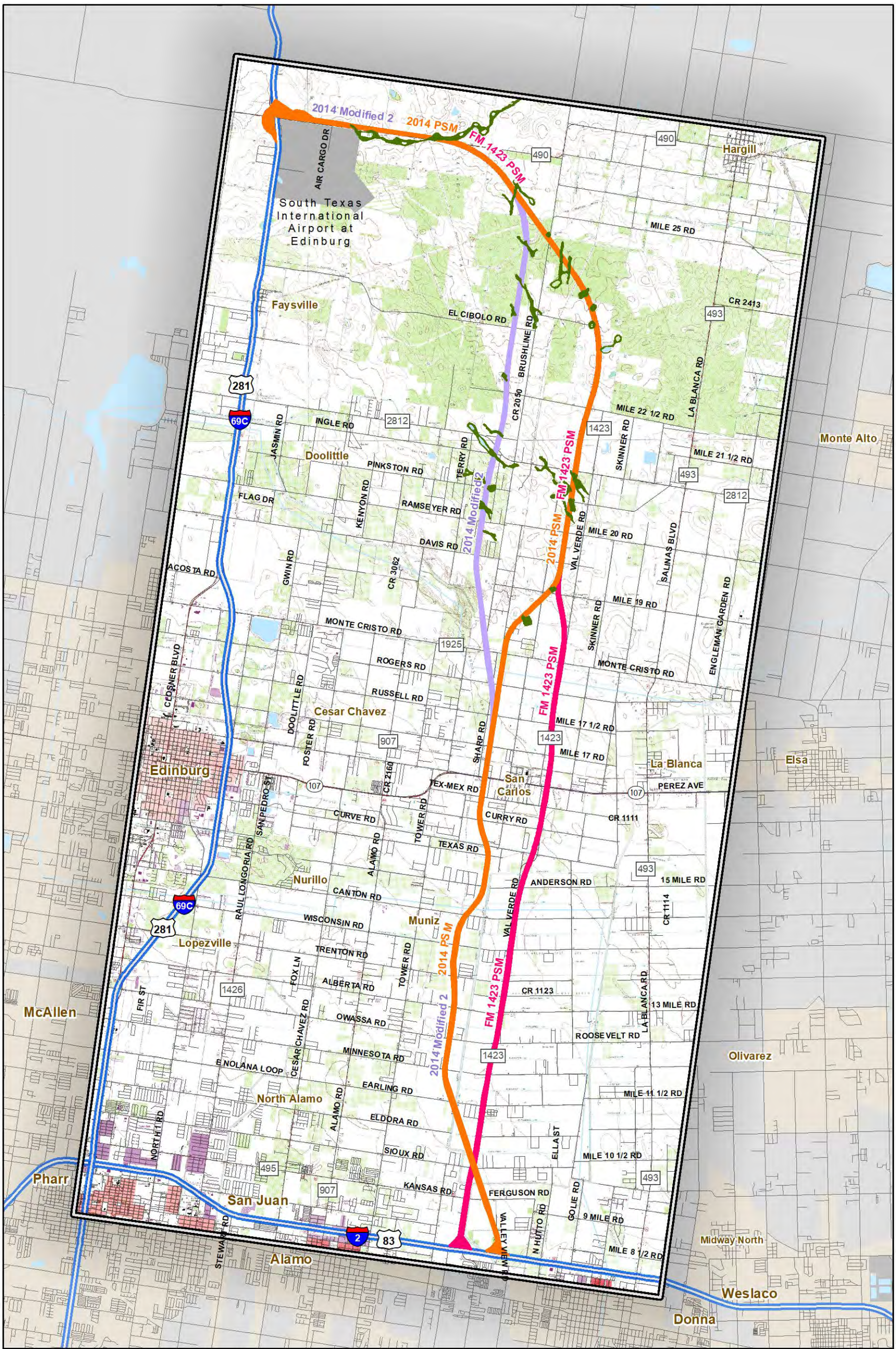
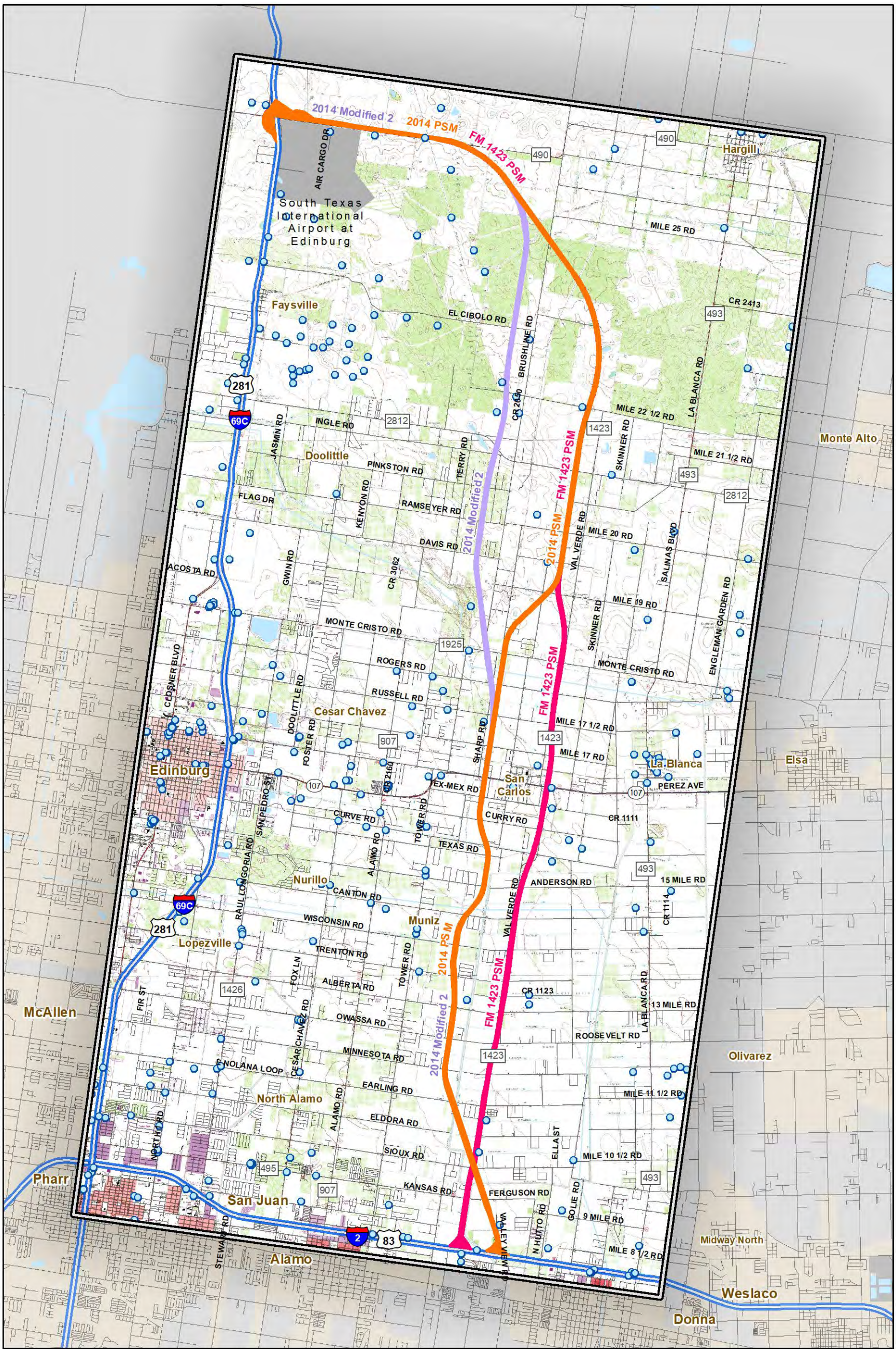


Exhibit 7
Hydric Soils in Relation to Reasonable Alternatives
SH 68 from
I-2/US 83 to I-69C/US 281
Hidalgo County, Texas
CSJs: 3629-01-001, 002, and 003



Base Map: USGS 7.5' Topographic, ESRI-USA Base Map

Water Well (Not to scale)

2014 Modified 2 Alternative

2014 PSM Alternative

FM 1423 PSM Alternative

Study Area

0 0.5 1 2
Miles

Exhibit 8
Water Wells in Relation to Reasonable Alternatives
SH 68 from
I-2/US 83 to I-69C/US 281
Hidalgo County, Texas
CSJs: 3629-01-001, 002, and 003

Attachment B

Representative Photographs of Water Resources in the Study Area

Photo 1 Major drainage canal crossing Sharp Road just north of FM 1925 facing east.

Photo 2 Donna Main Canal facing north from FM 495 east of FM 1423 where primary use is irrigation conveyance.

Photo 3 Donna Main Canal (left) mapped as drainage and an adjacent irrigation ditch (right) facing west from FM 1423.

Photo 4 Perennial excavated and diked pond facing west from US 281 north of El Cibolo Road.

Photo 5 Small ephemeral excavated and diked feature in an isolated floodplain facing east from FM 493 just south of FM 490.

Photo 6 Typical drainage canal with riparian corridor facing north from FM 490 just west of FM 493.

Photo 7 Typical maintained drainage canal from FM 493 facing east.

Photo 8 Typical small elevated concrete-lined irrigation ditch facing east from Valley View Road between FM 495 and Nebraska.

Photo 9 Typical irrigation standpipe on Nebraska across from the Alamo Golf Club.

This report was written on behalf of the Texas Department of Transportation by

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