SECTION 5

Infrastructure, Utility, and Site Modifications

Increasing the discharge down Bayou Lafourche will require some level of modification to existing constructed features, depending on the alternative selected. Some alternatives require land to be acquired for a new bypass channel and associated structures. Raising water levels along the existing bayou might also affect existing improvements. Issues associated with the potential changes to railroad, road, and utility crossings are summarized in this section. A summary of land requirements for the bypass channels is also presented. However, most details of these changes will be addressed later in the design process.

5.1 Railroad Crossings

The railroad tracks near the Mississippi River levee must be crossed by a new conveyance system at least once for any project alternative. Two potential railroad crossing locations exist along the conveyance routes of the alternatives being considered: the existing crossing in Donaldsonville and Smoke Bend. As discussed in Section 3, the railroad bridge in Donaldsonville must have additional conveyance capacity if flow rates being introduced at the existing Donaldsonville pump station are increased over the existing 200- to 350-cfs level.

The existing railroad crossing at Donaldsonville is an earthfill foundation with three culverts near its base. There are two 8.33-foot-diameter steel pipes and one 5-foot by 6-foot concrete box culvert. Currently, a significant head buildup on the upstream side forces water through the conduits. According to the HEC-RAS hydraulic model results, there is about 1 foot of friction loss at 1,000 cfs. When coupled with the channel dredging, which lowers the water level downstream, the difference in water level across the railroad crossing is about 4 feet. Water levels in the bayou upstream of the railroad bridge would have to be raised to convey flows higher than currently experienced. This might cause flooding of nearby roadways and businesses.

Alternatively, more water could be conveyed if additional pipes were installed through the fill or the existing culverts lowered to match the dredge depth. According to site reconnaissance, up to three additional pipes could be installed near or between the existing conduits. These pipes would be installed by first driving sheet pile cofferdams around the upstream and downstream areas where the new pipes would penetrate the fill. Temporary bridges would also be needed to access the cofferdams. After dewatering the cofferdams, the microtunneling machine would be set and the pipe would be installed. After complete, the cofferdams and temporary bridges would be removed.

Additional pipe conduits probably will not provide enough conveyance capacity for flows above 1,500 cfs; therefore, the fill supporting the railroad bridge will have to be removed for larger flows and a new bridge constructed for a high project flow. This will be difficult to implement because the tracks are part of the main railroad line. Rail traffic would need to be diverted or somehow maintained during construction. This factor would have to be

investigated further, but is a major construction disadvantage for increasing flow through the bayou.

It might be possible to construct a new bridge across the bayou along the existing earthfill alignment if the existing rail line can be partially shut down or a bypass line (shoofly) constructed. In the Phase 1 design, a shoofly alignment and a new bridge were used for alternatives with a modified railroad crossing. Constructing a new bridge while maintaining railway service with a shoofly was determined necessary for some of the recommended project alternatives.

For the Smoke Bend alternative, the same rail line must be crossed. At Smoke Bend, the discharge pipes from the reintroduction structure would have to cross under Highway 1, a short open field, and a set of railroad tracks.

As discussed in Section 4, multiple pipes would extend from the new pump station to a newly constructed channel. These pipes would likely be microtunneled under the railroad tracks and roadways at these locations. The specific method of tunneling will depend on the geotechnical investigation to be performed during the 30 percent design. Microtunneling would involve excavating pits on one side of the tracks and the far side of the roadway and using steel sheet piling for shoring. These pits would be for the jacking side of the work and the receiving side of the pipes. The microtunnel machine would be anchored into the bottom of the jacking pit at the alignment of the individual pipes. The machine would push segments of each pipe hydraulically under the track and roadway while drilling fluids are used to remove the material from the tunnel face. An earth pressure balance would be maintained at the tunnel face to prevent groundwater inflow and soil loss during tunneling operations. Five to nine large-diameter pipes (36 to 96 inches) would be individually jacked beneath the tracks to provide flow capacity from 500 to 2,000 cfs. The length of each pipe beneath the roadway and railroad tracks would be about 300 feet.

Railroad design procedures typically require special reinforcement and cover requirements for pipelines. These design factors would probably require a deeper bypass channel segment at the headworks of a new canal. It is assumed for the Phase 1 design that crossing the railroad tracks at any of the locations is feasible, as was similarly assumed in previous studies (EPA, 1998).

Existing railroad bridges are also just upstream of Napoleonville and at Lafourche Crossing, just below Thibodaux. These facilities have not been reviewed in detail for the Phase 1 design, but major modifications to the structures are not expected. Railroad crossings are shown on Figure 5-1.

5.2 Roads and Bridges

The bypass conveyance channel alternatives will require new pipelines to be installed under Highway 1 (near the Mississippi River levee). It is anticipated that this can be accomplished by microtunneling and might be combined with the railroad crossing (bypass alternatives) as discussed above. It might be possible to conduct open-cut crossings of the highways if

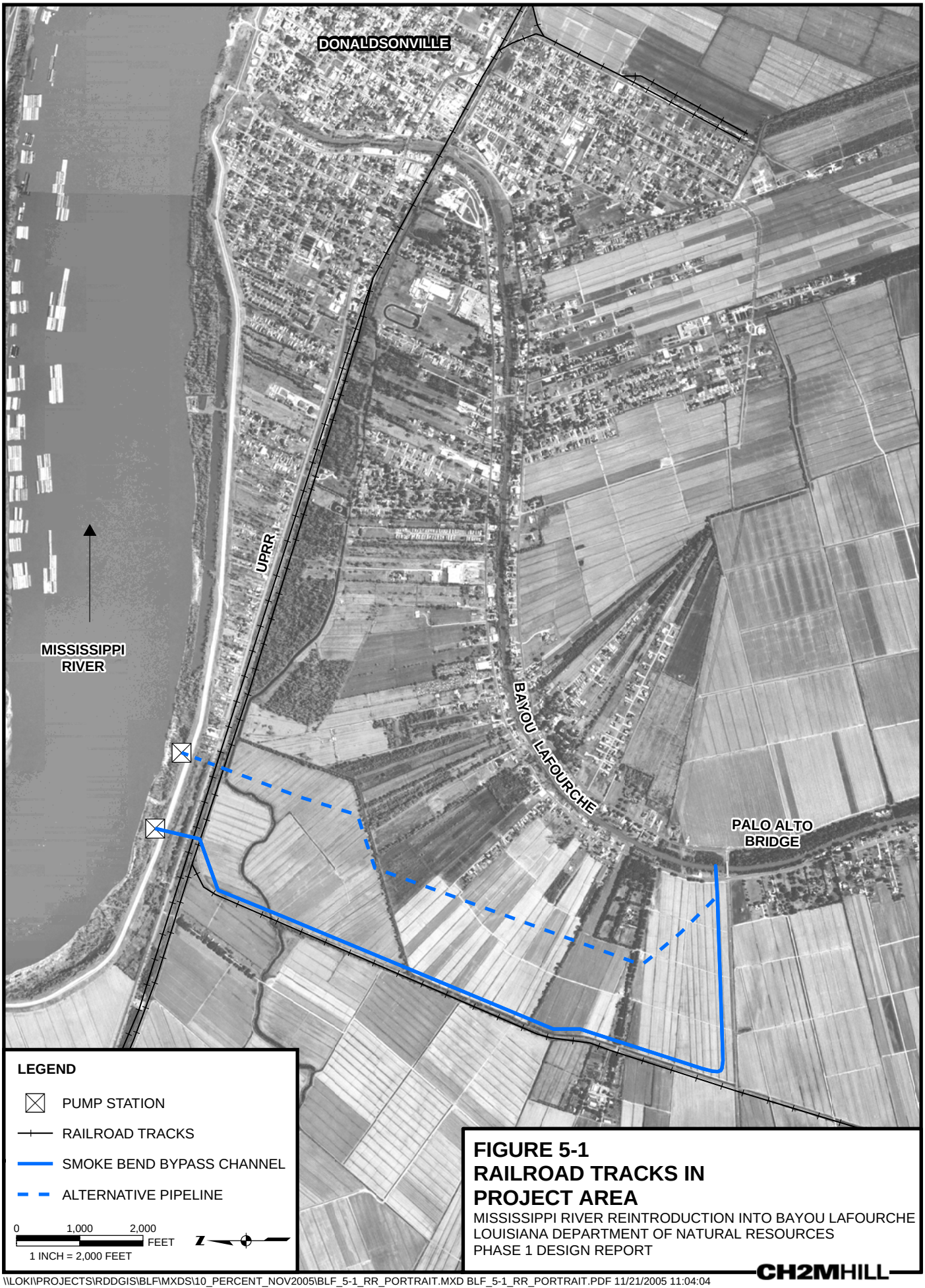

FIGURE 5-1
RAILROAD TRACKS IN PROJECT AREA
MISSISSIPPI RIVER REINTRODUCTION INTO BAYOU LAFOURCHE
LOUISIANA DEPARTMENT OF NATURAL RESOURCES
PHASE 1 DESIGN REPORT

CH2MHILL

\\LOKI\PROJECTS\RDDGIS\BLF\MXDS\10_PERCENT_NOV2005\BLF_5-1_RR_PORTRAIT.MXD BLF_5-1_RR_PORTRAIT.PDF 11/21/2005 11:04:04

detours are possible. In general, road crossings were not considered to be a significant obstacle to the project. Figure 5-2 shows the location of bridge crossings along Bayou Lafourche.

No permanent roadway relocation is expected for any of the alternatives studied. However, one consideration for alternatives with higher target water levels in Donaldsonville near the existing railroad crossing is that Highway 308 is located about 4 feet above the existing bayou water surface. Should the bayou water surface be allowed to rise, a retaining wall might have to be constructed to prevent water from entering the roadway. This wall would be about 2 to 4 feet high and 300 feet long. Alternatively, a stretch of the busy Highway 308 arterial road would need to be reconstructed at a higher elevation.

For dredging alternatives, several existing bridges have narrow horizontal openings across the bayou, which will make passage by boats and barge construction/dredge equipment difficult. Although it is not anticipated that modifications to the bridges will be necessary, dredging around the bents will be more difficult than at longer clear-span bridges.

Scour analyses will be conducted in the next phase of the design, when there are fewer alternatives to evaluate. The initial HEC-RAS model results do not indicate high velocities at the bridges, except for the highest allowable flow rates. Additional evaluation of reinforcement around bridges might be necessary, depending on the alternatives that are carried forward.

Temporary impacts to roads and bridges would include roadway detours and construction zones where access ramps to the bayou will intersect existing paved roads. Dredging access points would require several hundred feet of bayou frontage for barge assembly, pumps, pipelines, and staging areas.

Where dredging pipelines leave the bayou, pipelines could be placed on the ground surface and under existing roadways. Typically, the pipelines under paved roads would either be set in a trench that was open cut with short-term detours or by bore-and-jacking techniques that do not require temporary removal of the roadway. Outside of the roadways, the pipelines would be set on the ground surface where possible. Pipeline crossings of non-paved roads would be accomplished with open cuts and shallow trench depths. Crossings of drainage channels and other types of watercourses would be via existing bridges or pipes installed under the channels.

5.3 Utility Conflicts

Many utility crossings are both over and under Bayou Lafourche. Only a preliminary inventory and cost allowance was included in the Phase 1 design. Potential utility conflicts will be reviewed in greater detail in a later design phase.

5.3.1 Water Intakes and Drainage Structures

Numerous stormwater drainage canals and culverts and a much smaller number of water intake structures are along the reach of the bayou. It was assumed for the Phase 1 design that these structures will be sufficient. Because of the significant number of channel and piped systems draining into the bayou, and lack of detailed size and elevation data for most of these structures, a detailed analysis of impacts is not appropriate for the Phase 1

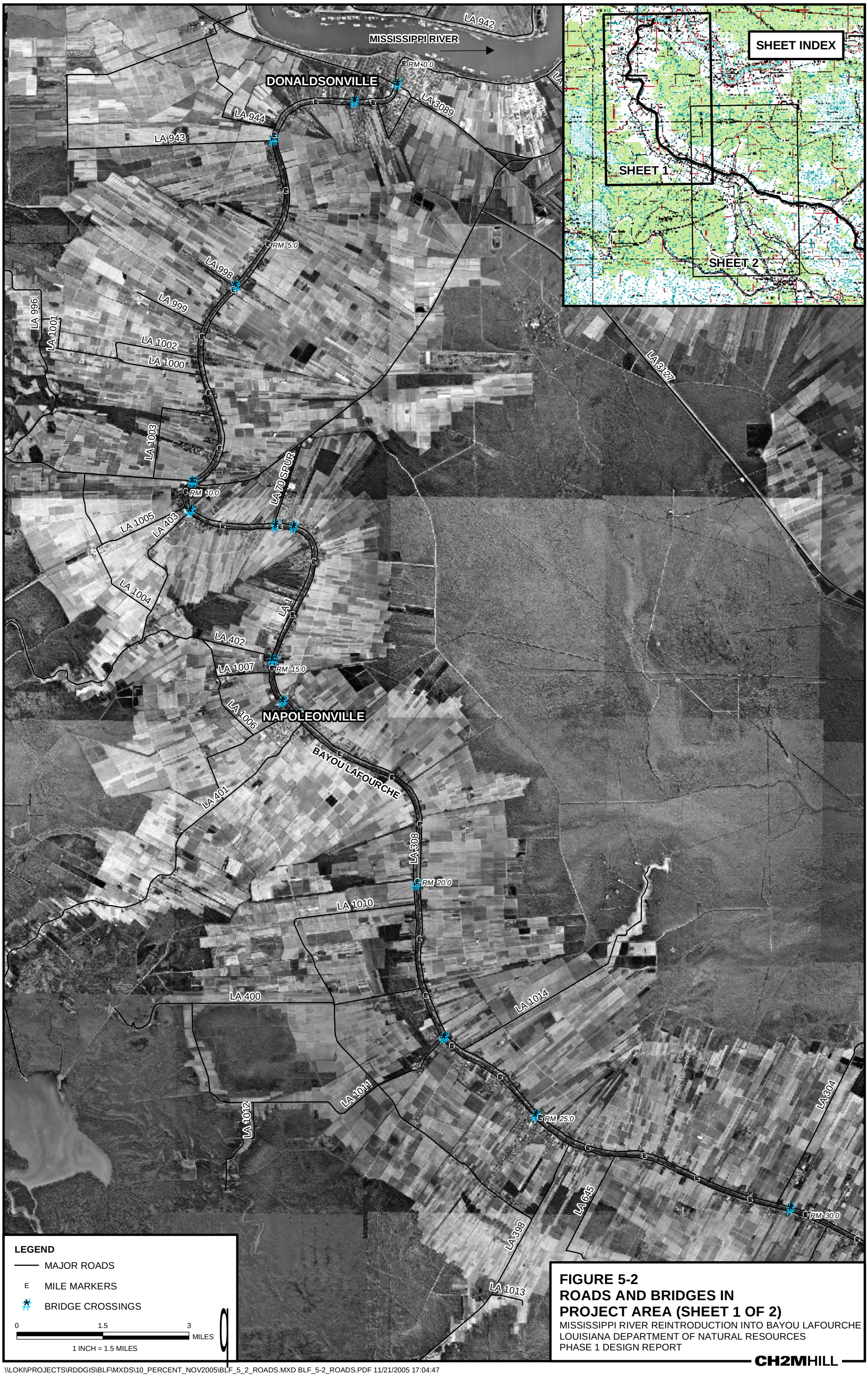

FIGURE 5-2
ROADS AND BRIDGES IN PROJECT AREA (SHEET 1 OF 2)
MISSISSIPPI RIVER REINTRODUCTION INTO BAYOU LAFOURCHE
LOUISIANA DEPARTMENT OF NATURAL RESOURCES
PHASE 1 DESIGN REPORT

CH2MHILL

\\LOKI\PROJECTS\RDDGIS\BLF\MXDS\10_PERCENT_NOV2005\BLF_5_2_ROADS.MXD BLF_5-2_ROADS.PDF 11/21/2005 17:04:47

SHEET INDEX

SHEET 1

SHEET 2

LA 304

RM 30.0

THIBODAUX

LA 3185

LA 3107

LA 309

RM 35.0

LA 308

LA 648 SPUR

LA 648

BAYOU LAFOURCHE

RM 40.0

LA 1

LA 311

LA 24

49

LA 653

LA 660

LA 316

LA 3040

LEGEND

MAJOR ROADS

E MILE MARKERS

BRIDGE CROSSINGS

0 1.5 3 MILES

1 INCH = 1.5 MILES

FIGURE 5-2
ROADS AND BRIDGES IN PROJECT AREA (SHEET 2 OF 2)

MISSISSIPPI RIVER REINTRODUCTION INTO BAYOU LAFOURCHE
LOUISIANA DEPARTMENT OF NATURAL RESOURCES
PHASE 1 DESIGN REPORT

CH2MHILL

\\LOKI\PROJECTS\RDDGIS\BLF\MXDS\10_PERCENT_NOV2005\BLF_5_2_ROADS.MXD BLF_5-2_ROADS.PDF 11/21/2005 17:04:47

design effort. More detailed analysis of these issues can begin in the 30 percent design effort; however, additional surveys of these facilities will be required to fully characterize impacts.

5.3.2 Overhead Utilities

No detailed overhead utility studies have been performed to date. Major power lines should not be an issue for this project. Overhead utility crossings of the bayou might be sufficiently low at some locations to affect clearance for some dredging and excavating tools. These will be identified in a later design phase.

5.3.3 Belowground Utilities

Pipelines cross the bayou throughout the reaches that would be dredged. These lines typically contain liquid or natural gas, water, oil, or other chemical products. No power or communication conduits have been identified. Pipeline sizes range from 2 to 36 inches in diameter and are made of steel, cast iron, polyvinyl chloride, polyethylene, or concrete. A listing of the belowground utilities is provided in Appendix H. Figure 5-3 provides maps illustrating where these pipeline crossings were identified.

Additional pipelines would also be encountered for any new bypass channel and for crossings of the two highways adjacent to the bayou. Detailed field investigations of these crossings will be performed during later design phases.

The pipelines that cross the bayou might have to be relocated to lower depths to prevent damage from dredging. A field survey of pipelines was made for this analysis. Pipelines were compared with the HEC-RAS model dredge templates to assess the need for utility crossing replacement. The bottom elevation of the dredge templates was compared to the top of pipe elevations, where known. Eighty-one utility crossings were identified in the survey between Donaldsonville and RM 38.0 (about 4 miles downstream of Thibodaux). Of those 81 crossings, there were 42 actual measurements of the top elevation of the pipes.

A cover of 4 feet over the top of pipelines was assumed necessary to be judged a non-conflict for the Phase 1 design. If the top elevation of the pipeline was unknown, it was assumed that the utility crossing requires replacement. This is a conservative approach, which will be verified by additional excavation and survey efforts in later design phases.

For the Phase 1 design, different combinations of dredging in the 56-mile reach between Donaldsonville and Lockport were analyzed (see Section 3.3). The dredging depths in Table 3-2 are averages over the length of the applied reach and are not intended to represent exact depths of cut. The dredged depth for each dredge template, or combination template, was compared against the 81 utility crossings identified to determine the number of utility crossing replacements expected. Table 5-1 shows the dredge templates and the expected number of crossings to be replaced for each alignment, out of the 81 identified utility crossings. These data were used to develop a cost allowance for utility replacement for each alternative that was quantitatively compared.

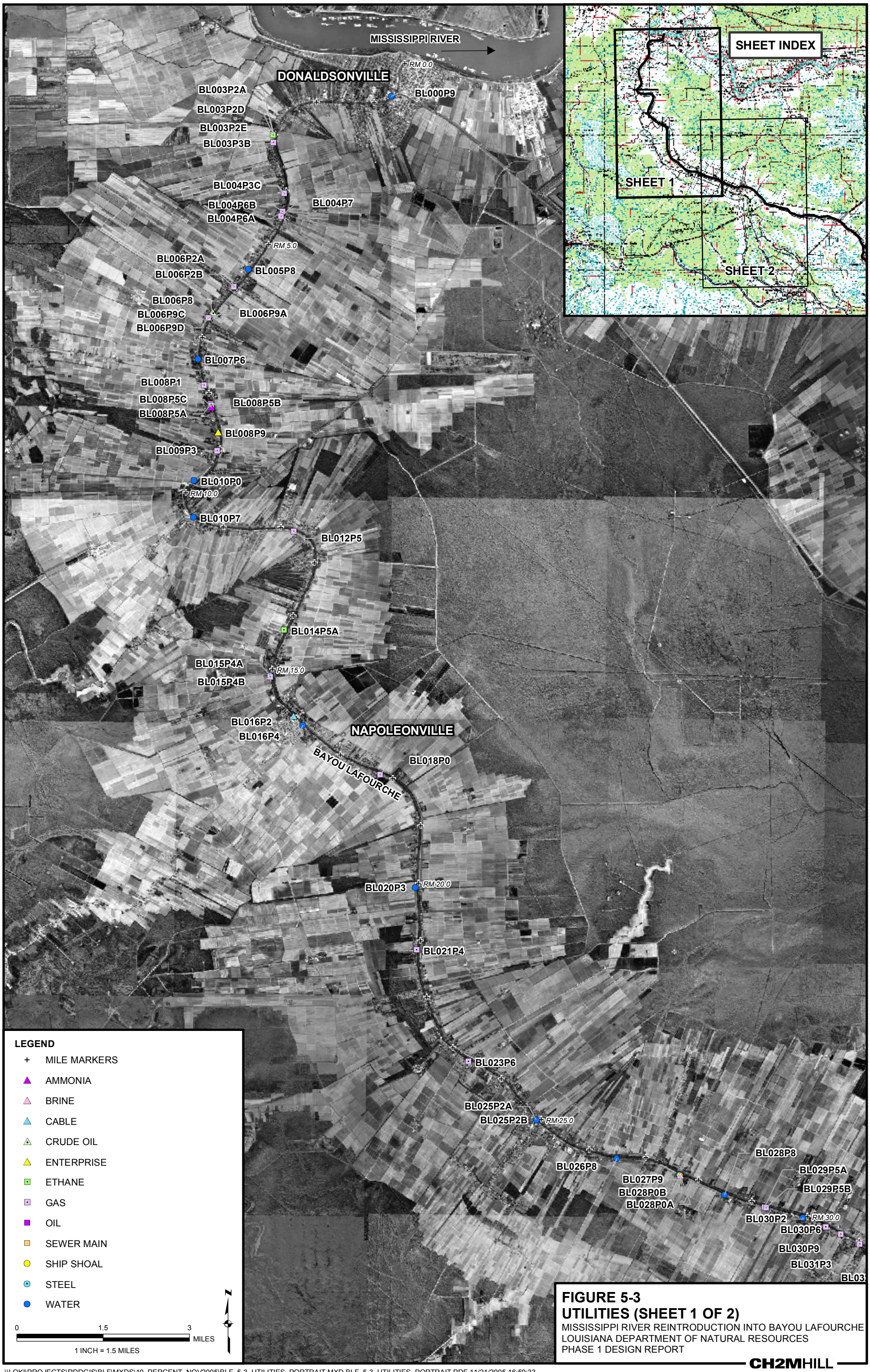

FIGURE 5-3
UTILITIES (SHEET 1 OF 2)
MISSISSIPPI RIVER REINTRODUCTION INTO BAYOU LAFOURCHE
LOUISIANA DEPARTMENT OF NATURAL RESOURCES
PHASE 1 DESIGN REPORT

CH2MHILL

\\LOKI\PROJECTS\RDDGIS\BLF\MXDS\10_PERCENT_NOV2005\BLF_5-3_UTILITIES_PORTRAIT.MXD BLF_5-3_UTILITIES_PORTRAIT.PDF 11/21/2005 16:59:33

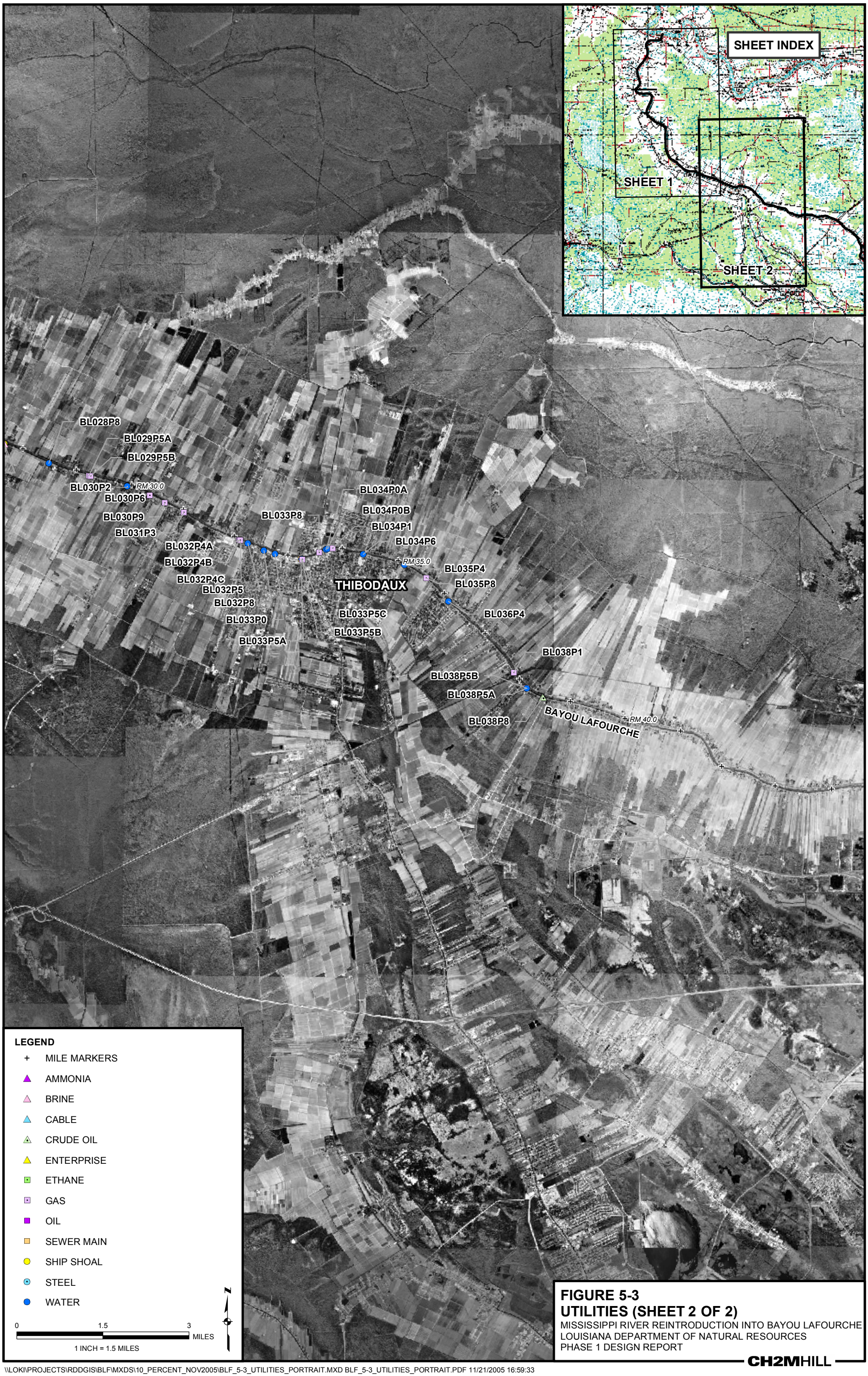

FIGURE 5-3
UTILITIES (SHEET 2 OF 2)
MISSISSIPPI RIVER REINTRODUCTION INTO BAYOU LAFOURCHE
LOUISIANA DEPARTMENT OF NATURAL RESOURCES
PHASE 1 DESIGN REPORT

CH2MHILL

\\LOKI\PROJECTS\RDDGIS\BLF\MXDS\10_PERCENT_NOV2005\BLF_5-3_UTILITIES_PORTRAIT.MXD BLF_5-3_UTILITIES_PORTRAIT.PDF 11/21/2005 16:59:33

TABLE 5-1
Preliminary Estimate of Utility Crossing Replacements for Each Dredge Template Used in the Phase 1 Design
Mississippi River Reintroduction into Bayou Lafourche – Phase 1 Design Report

	Donaldsonville		Smoke Bend	
Dredge Template ID	**Replacement**	**Non-replacement**	**Replacement**	**Non-replacement**
2-ALL	52	29	45	36
8-ALL	74	7	66	15
2-0@RM3.4	7	74	0	81
2-0@RM29	39	42	32	49
8-0@RM29	50	31	42	39
8-2@RM3.4	53	28	45	36
8-2@RM29	63	18	55	26

5.4 Site Modifications

Site modifications are permanent changes to the landscape that are necessary to accommodate the allowable flow down the bayou for a given alternative. These include rights-of-way for new facilities and land changes along the bayou.

5.4.1 Rights-of-Way and Easements

New facilities might include pump stations at Donaldsonville or at one of the new reintroduction sites on the Mississippi River. Crossing the river levee will also require easements from the USACE. Crossings under the railroad tracks and highway adjacent to the levee will also require easements from their respective owners.

Temporary easements or encroachment permits would be needed for dredging equipment to gain access to each reach of the bayou between bridges and at locations where the dredge's discharge pipes cross private property and roadways, and along public rights-of-way. Additional temporary easements would also be needed for construction activities when deepening existing pipelines that cross the bayou.

The open bypass channel from Smoke Bend through the various agricultural areas to Palo Alto Bridge and to the bayou will require the acquisition of permanent rights-of-way. These channels typically require a maintenance road reserved for vehicular access. Therefore, the bypass channel easements would need to be approximately 200 feet wide. The total length of the Smoke Bend alignment was assumed to be 13,500 feet. Permanent acreage requirements across agricultural areas are approximately 40 to 80 acres for Smoke Bend (depending on the alignment). Approximately 2 acres would also be needed adjacent to the bayou for the outfall structure from the bypass channel. Additional land might need to be purchased for storage of maintenance dredging materials.

5.4.2 Land Use Modifications

A new pump station on the Mississippi River, associated piping, the bypass channel, and check structures would be permanent changes to existing land uses. Some minor changes might also be required for some of the larger utility crossings. Except for the bypass channel, land use changes are generally small and are not considered significant.

For alternatives where the existing water surface is approximately maintained and the channel is deepened, some slope protection and changes to existing docks, walls, and structures might be required to maintain their use. No significant widening of the channel is expected. The dredge templates used for the Phase 1 design assumed that the dredging would begin from the edge of the existing water surface. Detailed investigations will be conducted in later design phases regarding the need for additional structural improvements of existing features adjacent to the bayou.

Alternatives that would increase flow in the bayou by allowing the target water level to increase would inundate some shoreline that is currently out of the water most of the time. Higher water surface effects on existing uses vary greatly according to the types of property and type of use adjacent to the bayou. Existing aerial and topographic mapping are not sufficiently detailed to allow reliable quantification of these effects for the Phase 1 design. More detailed imaging and topography will be used in later design phases to quantify the effects of increased water levels along the bayou.