

2.0 Findings and Evaluation of Investigations in the Project Area

This section presents the findings and evaluation of alignment selection factors used to develop and evaluate alternative alignments. Multiple field visits were conducted by HDR personnel to determine topographic features and define alignment alternatives. A reconnaissance trip was also conducted with LWWS staff, other City department staff, and the Lincoln Airport Authority to review alignment issues. Geotechnical investigations were conducted by HWS and survey information was obtained by JEO. Figure 2-1 identifies critical locations, excavations, boring locations, and other investigation information.

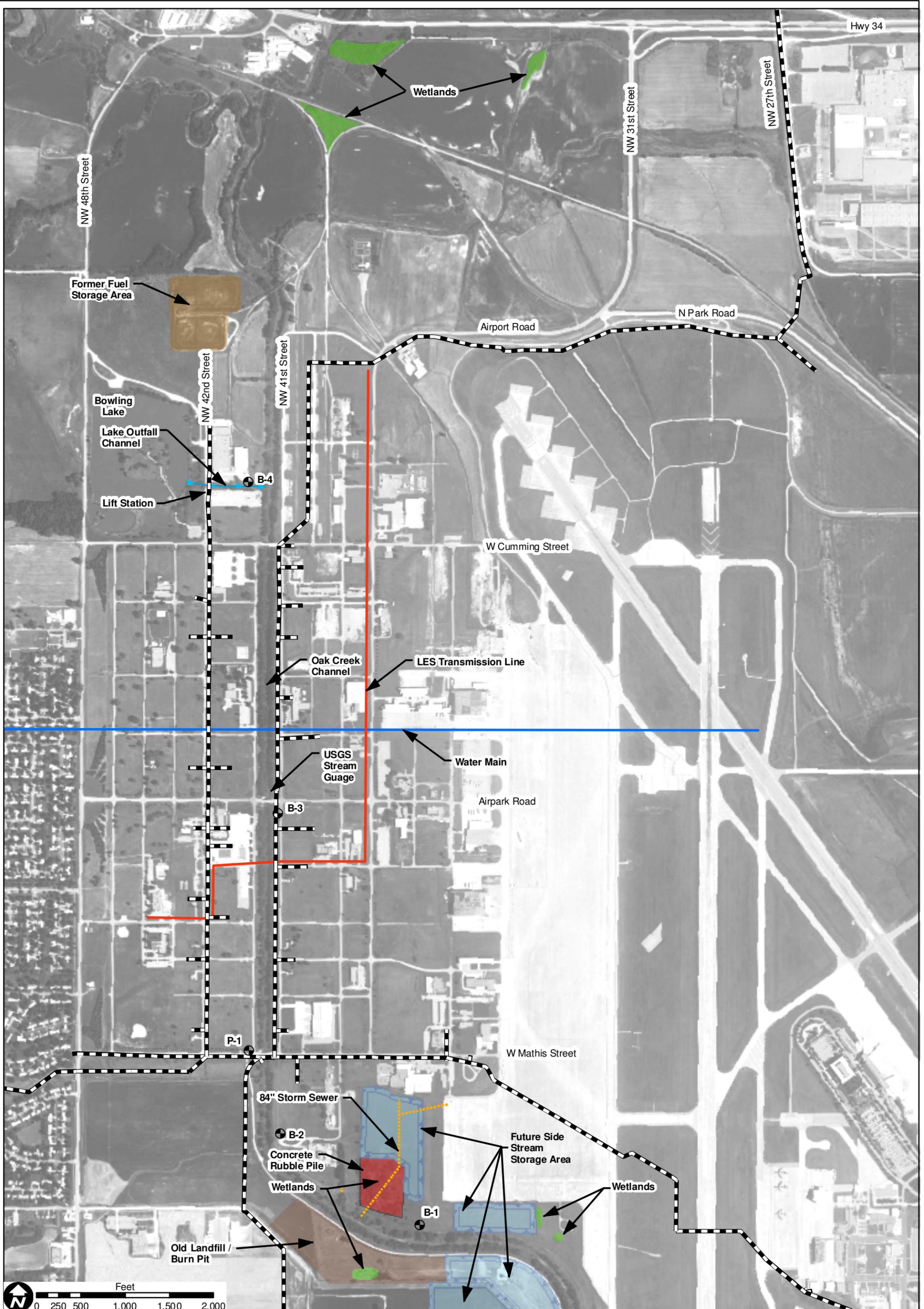
2.1. Geotechnical Investigations

A program of Dutch friction-cone soundings, test borings, and soil sampling was performed by HWS at the project site on July 11 and 12, 2005. Four (4) Dutch friction-cone soundings, four (4) exploratory borings were taken to depths of between 17 and 32 feet below the existing grade to establish the general subsurface conditions of the area under consideration, and one piezometer well was installed. The following summarizes the findings of the geotechnical investigations. A copy of the Preliminary Geotechnical Study is located in Appendix D. The locations of the borings for investigations are indicated on Figure 2-1.

Groundwater was encountered at elevations of 1144.0 and 1149.2 feet (18.0 and 20.8 feet below existing grade) at boring B-2 and piezometer well P-1, respectively. Groundwater was not encountered to the depths of borings B-1, B-3, and B-4. The water table could be expected to fluctuate several feet depending on the surface drainage, rainfall, vegetation, temperature, and other factors.

The soils encountered at borings B-1, B-3, and B-4 generally consisted of clay soils that ranged from very soft to hard. At boring B-2, sands were encountered at 24.5 feet below existing grade. Open cut trenching, when allowed is expected to be a suitable construction method. The siphon flow line (elevation 1137.8 feet) will be approximately 6 feet below the water table and situated near the top of the clean sands encountered in boring B-2.

Dispersive soils were encountered at various locations throughout the area investigated. A non-woven geotextile (such as Contech C-60NW or equal) to completely encapsulate all bedding materials for the project.



Legend	
	Power Pole
	Boring
	Excavation Pit
	Sanitary Sewer MH
	Existing Sanitary Sewer
	Layer
	Exist Storm Sewer
	LES Transmission Line
	Lake Outfall Channel
	Water Main



Critical Locations, Excavations, Boring Locations, Other Investigation Information (Utilities)

Oak Creek Basin and Trunk Sewer

DATE	5/12/06
FIGURE	2-1

2.2. Concrete Rubble Pit

The renovation of the old Lincoln Air Base involved removing the former runway and many of the concrete roads in the area. The concrete rubble was placed in a pit between West Mathis Street and Oak Creek just east of NW 39th Street as indicated on Figure 2-1. LWWS and HDR excavated three pits along the proposed sewer alignment on June 24, 2005. The pits were excavated at the proposed location for the trunk sewer with the purpose of determining if concrete rubble was present or if the soils had been disturbed during the creation of the rubble pit. Upon completion of the excavation, no concrete rubble was encountered and the soil structure appeared to be native soil with no prior disturbances. It was determined that the sewer could be installed along the south end of the rubble pit area without encountering large debris of concrete.

2.3. Surveying

A survey of the existing trunk sewer collection system was conducted from manhole B6-294 (just west of the Theresa Street Raw Water Pumping Station Wetwell – See Appendix E) west to manhole AA7-26 (NW 44th Street and West Mathis Street). In addition, the trunk sewer on the east side of Oak Creek was surveyed from manhole AA7-21 (NW 41st Street and West Mathis Street) north to manhole AA8-158 (NW 41st Street and West Cuming Street). The sewer on the west side of Oak Creek was surveyed from manhole AA7-26 north to manhole AA8-127 (including the Lift Station C-1). The modeling of the existing trunk sewer from the Theresa Street WWTF to manhole AA6-68 (just west of the airport runway) is discussed in Paragraph 3.1. The modeling of the remaining Oak Creek Basin collection system is discussed in Paragraph 4.3.

Rim and flow line elevations were obtained for the remaining collection system from existing drawings and the City of Lincoln CAD Maps.

The existing 84 inch storm sewer located north of Oak Creek and east of the airport was surveyed to determine the flow lines and ascertain the design flow conditions for modifying the storm sewer at the sanitary sewer crossing location.

2.4. Condition Assessment of Existing Facilities

A condition assessment of the existing sanitary sewers and lift station north of West Cuming Street was conducted to determine the need for replacement of sewers because of degradation. Many of the smaller collection system sewers in the basin were installed between 1950 and 1970. In particular, the collection system sewers 18 inches and smaller were constructed for the original Lincoln Air Base and have deteriorated and will

require future replacement. The following sewers have been identified as requiring repair or replacement:

- 21 inch VCP sewer along West Mathis between NW 44th Street and NW 43rd Street (MH AA7-26 to MH AA7-24). The sewer has been identified to have cracked joints and pipe.
- 18 inch VCP, 15 inch VCP, 10 inch VCP, and 8 inch VCP along NW 44th Street from West Mathis Street to north of West Cuming Street (MH AA7-26 to MH AA8-178). The sewer has been identified to have a substantial number of cracked joints and pipe.
- 21 inch VCP and 15 inch VCP along NW 41st Street from West Mathis Street to Air Park Road (MH AA7-21 to AA7-300). The sewer has been identified to be in poor condition and will require replacement.

The lift station that conveys flows from north of the Bowling Lake outlet needs to be considered for abandonment. Proposed sewer alignments must coordinate flowline elevations to permit the abandonment of the lift station and restore the collection system to gravity conveyance.

2.5. Existing Utilities

Existing utilities along each of the alignments were investigated to determine potential conflicts with overhead and underground utility installations. Diggers Hotline of Nebraska was contacted to determine the utilities in the Oak Creek Basin area. Each utility listed below was provided preliminary alignment drawings for review.

Information was obtained from each utility pertaining to their existing and planned future utilities.

Utility	Contact Person	Address	Phone
Alltel	Ken Adams	Alltel Communications 401 South 21st Street P.O. Box 81309 Lincoln, NE 68501	(402) 436-5794
Aquila	Randy Kreifels	Aquila 1600 Windhoek Drive Lincoln, NE 68501	(402) 437-1715
Watershed Management	Devin Biesecker	Public Works/Utilities Department 901 N. 6th Street Lincoln, NE 68508	(402) 441-4955
LPSNRD	Jeff Hegy	3125 Portia Street P.O. Box 83581 Lincoln, NE 68501-3581	(402) 476-2729
LES	Steve Hanks Bill Gardner Mike Peterson	Engineering Services Division PO Box 80869 Lincoln, NE. 68504	(402) 467-7622 (402) 467-7635

Qwest	Lyndon Wichers	4631 Birch Creek Drive Lincoln, NE 68516	(402) 440-9942
Sprint	Micheal J. Riberio	Cable Project Engineer 5810 'F' Street Omaha, NE 68117	(402) 522-2660
Magellan Pipeline Company	Harold Johnson	9405 Bennington Road Omaha, NE 68122	(402) 677-7108 (402) 571-7080

2.5.1. Alltel

Alltel has numerous fiber and communication lines in the Air Park area. The following provides a summary of the installations in the project area:

- West side of NW 42nd Street from West Mathis Street to West Cumming Street.
- West side of Oak Creek extending south from West Mathis Street.
- North side of West Mathis Street from NW 36th Street to NW 47th Street (entire project was bored)
- North side of Oak Creek from approximately NW 36th Street east to the National Guard Armory.
- West side of NW 38th Street from West Air Park Road north to Airport Road.

2.5.2. Aquila

A majority of the gas lines in the Air Park Area provide service to the commercial/industrial areas east of 39th Street. A 10" steel gas main parallels the south side of Airport Road along the north side of the Airport in the general vicinity of the existing trunk sewer to provide the main gas supply for the West Air Park Area. This line extends south from Airport Road along NW 36th Street to West Mathis Street.

A 6 inch steel gas main extends along NW 38th Street from West Stanton Street to West Luke Street. A 4 inch PE gas main crosses Oak Creek at West Luke Street. The gas main transitions to a 4 inch steel main as it extends to the east and west along West Luke Street. The steel gas main has cathodic protection provided by an anode system. An 8 inch gas main crosses Oak Creek along the south side of West Cumming Street. A 4 inch gas main crosses Oak Creek along the north side of West Wilkins Street. A 2 inch PE/steel gas main crosses Oak Creek along the south side of Air Park Road. A 1-1/4 inch steel gas main extends along the east side of NW 39th Street.

2.5.3. Lincoln Electric System (LES)

The primary source of power into the Air Park Subarea is from overhead transmission lines. The main transmission line extends south along the west side of NW 38th Street from Airport Road to West Kearney Ave. Then the transmission line extends west along the north side of West Kearney Ave, across Oak Creek, to the east side of NW 42nd Street. The transmission line then proceeds south along the east side of NW 42nd Street then west again along the north side of West Seward Street.

Overhead LES distribution lines were identified during field reconnaissance at the following locations:

- South side of West Cumming Street from NW 38th Street to NW 48th Street.
- West side of NW 42nd Street from West Cumming Street to West Mathis Street
- East side of NW 41st Street from West Cumming Street to West Superior Street
- West side of NW 41st Street from West Kearney Avenue to West Mathis Street
- Paralleling the north side of Oak Creek from the existing radar facility to approximately NW 39th Street.

Underground LES distribution lines were indicated in drawings provided by LES. An underground 15 kV distribution line extends along the east side of Oak Creek from the south end of the airport runway, crossing beneath Oak Creek, to the existing radar site.

Street lights throughout the Air Park Subarea are operational and are powered primarily by overhead power strung between each street light pole. Removal and replacement of street lights is permissible for installation of the proposed sewers.

The sewer identified as Segment E-3 from West Mathis Street to Airpark Road will require the relocation of one transmission main pole to allow for installation of the replacement sewer between the west side of NW 41st Street and the existing sewer. In addition, the existing sewer will be abandoned in-place, as LES distribution line is located directly above the existing sewer.

2.5.4. Lincoln Water System (LWS)

LWS has a large number of 6 to 10 inch distribution mains in the Air Park Subarea which were used to supply water to the area. The water demand is very low in the area causing stagnation of water supply. In addition, many of the water lines were installed over 40 years ago. LWS is in the process of valving off and removing water distribution mains in the project area; therefore, water distribution mains may be removed if the proposed sewer alignments are in conflict with existing water distribution mains.

The existing water distributions mains that may be in conflict with the proposed sewer alignments extend along the west side of NW 42nd Street from West Morton Street to West Mathis Street. A water distribution main also extends along the east side of NW 41st Street from West Morton Street to West Mathis Street. No water mains have been identified for removal or relocation, but a determination for potential removal and replacement of the water mains will occur during final design for each of the proposed sewer segments.

2.5.5. Watershed Management

Watershed Management does not operate or maintain the storm sewers in the Air Park Subarea. A further discussion of the storm sewers in the project area is covered in Paragraph 2.5.8 Lincoln Airport Authority Utilities.

2.5.6. Magellan Pipeline Company

Magellan used to operate a 6-inch petroleum products pipeline that provided fuel to the abandoned tank farm located directly northeast of Bowling Lake as indicated in Figure 2-1. The pipeline originates at the Magellan terminal, located near Highway 77 and Saltillo Road, and extends in a loop through the West 'O' Street Trunk Sewer project area, then directly past the "checkered" water tower west of the Lincoln Airport to the tank farm. The pipeline may have a rectifier system for cathodic protection. The pipeline has a bury depth of 12 to 36 inches. The pipeline is located west of the proposed trunk sewer alignments; therefore, it will not impact the project. The abandoned tank farm is discussed in further detail in paragraph 2.6.2 – Hazardous Substances.

2.5.7. Sprint

Sprint has a fiber optic line that is located between the NW 27th Street right-of-way and the Union Pacific Railroad right-of-way to the west of the Kawasaki facilities. Improvements or paralleling the existing sewer along NW 27th Street will require coordination with Sprint.

2.5.8. Lincoln Airport Authority Utilities

The Lincoln Airport Authority recently completed channel improvements along approximately 8,300 feet of Oak Creek in the Airpark West Industrial Park. The purpose of the project was to increase stream capacity and to maintain the 100 year flood elevations within the channel. In addition to widening the channel, many storm sewer outlets into Oak Creek were reconstructed along the west bank of the channel. Installation of the sewer along the west side of Oak Creek may require modifications to the storm sewers.

In addition to the widening of the Oak Creek Channel, future stormwater improvements will include installation of side-stream storage areas north and south of Oak Creek as indicated in Figure 2-1. These storage areas would be constructed with excavated berms and would have an approximate depth of 5 feet below the existing grade.

2.6. Environmental

Environment factors were considered for compliance with existing regulations and to assess the potential for adverse impacts during construction which could result in additional costs and delays to the project. Environmental factors include wetlands, hazardous substances, and cultural resources.

2.6.1. Wetlands

A preliminary wetlands evaluation was conducted for the proposed trunk sewer alignments to investigate possible permitting issues that could be encountered once a final alignment is selected. Wetland areas along the proposed alignments as indicated in Figure 2-1 would qualify for a Nationwide Permit #12 (NWP). This is a utility line-crossing permit for temporary impacts with grade restored to pre-existing contours. No saline wetlands are located along the proposed trunk sewer alignments.

2.6.2. Hazardous Substances

A preliminary examination of the project area has identified two locations where hazardous substances may be encountered during the installation of trunk sewers. Magellan Pipeline Company used to have four fuel tanks located at approximately NW 43rd Street and West Fletcher Road (just northeast of Bowling Lake) as indicated on Figure 2-1. The tanks at the site have been removed, but the berms and roads at the site still remain. A proposed park and recreation development at the site is planned which involves constructing a parking lot over the site. No sewer alignments are planned through the site.

An area south of Oak Creek has been identified as a potential abandoned landfill as indicated in Figure 2-1. Potential sanitary sewer alignments along the south side of Oak Creek were removed from consideration because of this site. If a sewer were to be located in the vicinity of the landfill, further investigations would be required to determine the extents and condition of the materials in the landfill.

2.7. Pavement and Traffic Impacts

Construction of the sanitary sewer may require removal and replacement of portions of existing roads in the project area. Traffic flow in the project area is limited and sufficient alternative routes exist to detour traffic around the proposed sewer alignments. A majority of the roads in the project area consist of asphalt paving and are planned to be replaced in the near future in accordance with the Airpark West Subarea Plan. The major traffic roads in the project area include NW 48th Street, West Mathis Street, Airpark Road, West Cumming Street, Airport Road, NW 27th Street, and Highway 34. With the exception of NW 48th Street, all of the major roads will be crossed with the proposed alignments.

2.8. Proposed Roadway/Railway Improvements

The Lincoln Airport Authority has created a draft revision of the New Airpark West Subarea Plan identifying major street improvements in the project area. The improvements are indicated on Figures 1-2 and 1-3 and are as follows:

- Realignment of NW 48th Street from West Adams Street to West Cumming Street. The realignment shifts NW 48th Street approximately 2 blocks east.
- NW 39th Street, NW 41st Street, NW 42nd Street, and NW 44th Street are all planned to be removed.
- A new road alignment for NW 44th Street is proposed from Airpark Road to West Cumming Street.
- NW 38th Street will become a major Truck Route from I-80 north to Airport Road. This improvement is in conjunction with a new exit ramp at the intersection of I-80 and NW 38th Street.
- An intermodal facility is proposed for the area west of NW 38th Street and north of West Cumming Street. Sewer alignments paralleling the existing sewer north of West Cumming Street will not be permitted through the intermodal facility with the planned warehouses and railroad improvements.

Nebraska Department of Roads (NDOR) and the City are planning improvements to Highway 34 including a new interchange with NW 48th Street and widening of the

roadway from NW 27th Street to NW 56th Street. Plans for the improvements are currently out for bids.

2.9. Proposed Natural Resources District Improvements

The Lower Platte South Natural Resources District (LPSNRD) is proposing an off-channel storage area south of Oak Creek. This off-channel storage area would be located southeast of the identified Old Landfill/Burn Pit. This project is still in the planning stages and no definite size or location has been established. No sewer routes are planned in the vicinity of the off-channel storage area. In addition, potential sites for side stream storage are being considered north and south of Oak Creek as indicated in Figure 2-1. These side stream storage areas will not impede a sewer alignment along the north or south side of Oak Creek.

The LPSNRD operates a USGS stream monitoring station just east of Oak Creek and south of Airpark Road.

2.10. Public Relations

Public relations pertain to the potential impacts of the sewer alignment on the public and the surrounding community. The sewer alignments are primarily located on property owned by the Lincoln Airport Authority. No other public or private facilities will be directly impacted by the project.

2.11. Impacts and Disruptions to Existing Businesses

Businesses in the Airpark may be temporarily impacted by construction of the proposed sewers. The primary impacts would be related to temporary road closures and provisions for new service connections from the existing sewers to the proposed sewers. The proposed sewers have been identified as a necessary improvement to support development in the Airpark West area. No major impacts to existing businesses were identified.

Construction of a proposed sewer west of Manhole AA6-68 will require conveying flows beneath the taxiway/tarmac of the Lincoln Airport. Trenchless technology will be required to maintain usage of the taxiway during construction. The existing taxiway pavement is 48"-60" thick and the tarmac is a minimum of 24" thick with a prepared subgrade.

2.12. Easements and Land Acquisition

Land for construction of the proposed sewers and material storage will be identified by the LAA. As part of the agreement between Lincoln Wastewater and the LAA, LWWS will be allowed to construct the sewers in locations acceptable to the LAA and in conformance of the Airpark West Subarea plan. Easements costs will be waived as part of the agreement.

2.13. Permits and Approvals

Permits will be required for crossing Burlington Northern and Santa Fe Railway facilities north of West Cumming Street and paralleling Union Pacific Railroad facilities along NW 27th Street. Construction across Highway 34 will require a road crossing permit from NDOR. Lincoln Electric System requires a “Letter of Understanding” for crossing or paralleling within their easements or conducting any construction activities directly in their easements.

Proposed trunk sewer alignments north of Oak Creek may cross a small wetlands area requiring a USACE Nationwide Permit (NWP) #12. This is a utility line-crossing permit for temporary impacts with grade restored to pre-existing contours. The proposed siphon crossing of Oak Creek south of West Mathis Street may require a NWP #33 (Temporary Construction Permit). NPDES and Floodplain permits will also be required for this project.

Permit/Review	Agency	Point of Contact	Address/Phone
Construction Permit	Nebraska Dept. of Environmental Quality	Curtis Christensen	1200 N Street, Suite 400 PO Box 98922 Lincoln, NE 68508 Ph: 402.471.4260 Fx: 402.471.2909
Section 404 Nationwide Permit #12 Nationwide Permit #33	USACE	Mike Rabbe	Nebraska Field Office US Army Corps of Engineers 8901 S 154 th Street Omaha, NE 68138 Ph: 402.896.0723
NOI Permit	Nebraska Dept. of Environmental Quality	Louise Kolle	1200 N Street Suite 400 - The Atrium PO Box 98922 Lincoln, NE 68508 Ph: 402.471.4220 Fx: 402.471.2909
Flood Plain Development	City of Lincoln	Lana Tolbert	555 South 10th Street Room 203 Lincoln, NE 68508 402.441.6885 v 402.441.8214 f
Project Coordination/Review	Lower Platte South Natural Resources District	Jeff Hegy	3125 Portia Street PO Box 83581 Lincoln, NE 68501