3.8 Hazardous Waste

This section discusses the known and listed hazardous waste sites in the Study Area and the potential for the strategies to affect or disturb materials at these sites.

What is Hazardous Waste?

Hazardous wastes as regulated by the Environmental Protection Agency (EPA) are defined as "waste with properties that make it dangerous or potentially harmful to human health or the environment. Hazardous wastes can be liquids, solids, contained gases, or sludges. They can be the by-products of manufacturing processes or simply discarded commercial products, like cleaning fluids or pesticides". In order for a waste to be considered hazardous, it must exhibit at least one of the four characteristics of hazardous waste: ignitability, corrosivity, reactivity, or toxicity. If the waste exhibits just one of these characteristics, it is given the title of hazardous waste.

How did the Study Team Identify Hazardous Waste Sites in the Study Area?

The Study Team reviewed the EPA and Missouri Department of Natural Resources (MoDNR) online databases for major hazardous waste locations and interviewed the Mid-America Regional Council's (MARC) regional solid waste management planner. Active, inactive, closed, and proposed locations were evaluated. The locations were plotted on a Study Area map by online coordinates to determine where sites were located. A windshield survey was conducted to verify the locations, their coordinates (using a Garmin ETrex), and obvious limits of contamination.

Where are the Hazardous Waste Sites located within the Study Area?

The Study Team identified five sites located in the Study Area that are listed in **Table 3.8.1.** The sites include three Delisted Superfund sites and two active Hazardous Waste Treatment

What is a Major Hazardous Waste Site?

A major hazardous waste site is a Superfund site; Hazardous Waste Treatment, Storage, or Disposal Facility (TSDF); or solid waste landfill.

What do the four characteristics of hazardous waste mean?

Ignitability - Ignitable wastes can create fires under certain conditions, are spontaneously combustible, or have a flash point less than 60 °C. Examples include waste oils and used solvents.
Corrosivity - Corrosive wastes are acids or bases that are capable of corroding metal containers, such as storage tanks, drums, and barrels. Battery acid is an example.
Reactivity - Reactive wastes are unstable under normal conditions. They can cause explosions, toxic fumes, gases, or vapors when heated, compressed, or mixed with water. Lithium-sulfur batteries are an example.
Toxicity - Toxic wastes are harmful or fatal when ingested or absorbed (e.g., containing mercury, lead, etc.). When toxic wastes are land disposed, contaminated liquid may leach from the waste and pollute ground water.

What is a Delisted Superfund Site?

A Delisted Superfund Site is a major hazardous waste site that has been deemed to pose no hazard and classified as No Further Remediation Action Planned (NFRAP).

What are Recognized Environmental Conditions (REC)?

The presence of or likely presence of hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products.

Philips Solvent Recovery Services TSDF

Storage or Disposal Facility (TSDF) sites. The locations of the sites are shown on **Figure 3.8.1** at the end of this chapter. The Study Team determined the TSDF and Superfund sites have no obvious contamination visible from the right of way.

Table 3.8.1 Hazardous Waste Sites in the Study Area

Site	Hazardous Waste Site Type	Status
Philip Services Corp.	TSDF & LQG*	Active
City Environmental	TSDF	Active
Hanna Rubber Co.	Superfund	Delisted
Exide Battery Sales	Superfund	Delisted
Benton Apartments	Superfund	Delisted

*LQG = large quantity generator, generates more than 2,200 pounds of waste per month

Throughout the Study Area there are scattered gas stations, dry cleaners, industrial buildings, and potential sites with underground storage tanks. These sites contain recognized environmental conditions that could cause contamination affects if uncovered during construction. This First Tier study did not include an identification of these types of sites, which are not listed. A full project area contamination survey will be completed as part of the Second Tier studies.

Does the No-Build Strategy have any Affects on Hazardous Waste Sites?

The three Delisted Superfund sites in the Downtown Sub-Area of the Study Area are considered to have no potential for contamination and the two TSDF sites in the Downtown Sub-Area are considered to have a low potential for contamination. There are no listed hazardous waste sites in the other portions of the Study Area.

Do the Build Strategies have any Affects to Hazardous Waste Sites?

The Delisted Superfund sites have no potential for contamination. The Philips Solvent Recovery Services site (700 Mulberry Street) has completed corrective actions to resolve previous business and residential exposure and contaminated groundwater migration. The north side of the facility which

faces I-70 has the greatest potential for groundwater contamination (volatile organic compounds) from construction. However, this facility is located a safe distance from the proposed construction areas for the Build Strategies, including the Identified Preferred Strategy, making disturbance of materials improbable.

The City Environmental, Inc. TSDF site is not currently in operation. This TSDF has been identified by the EPA for corrective action; however, mitigation has not been completed at the site. The site location in relationship to the proposed construction areas for the Build Strategies, including the Identified Preferred Strategy, makes the potential for adverse affects minimal.

What are the Next Steps to Address Potential Hazardous Waste Sites?

During the Second Tier studies, MoDOT will complete more detailed project area contamination surveys. These may include further database searches, aerial photography analysis, and site walkovers to identify and verify the presence and potential boundaries of sites with contamination. Potential mitigation measures to address the potential for contamination in areas affected by construction will also be developed during the Second Tier studies.

What is a Volatile Organic Compound (VOC)?

Volatile organic compounds are compounds that have a high vapor pressure and low water solubility. Many VOCs are human-made chemicals that are used and produced in the manufacture of paints, pharmaceuticals, and refrigerants. VOCs are emitted as gases from certain solids or liquids.

City Environmental, Inc. TSDF

What is meant by Corrective Action?

Accidents at facilities that house hazardous wastes release pollutants into soil, groundwater, surface water, and air. To combat those affects, the Resource Conservation and Recovery Act (RCRA) Corrective Action Program, run by EPA works with responsible facilities to investigate and clean up hazardous releases.

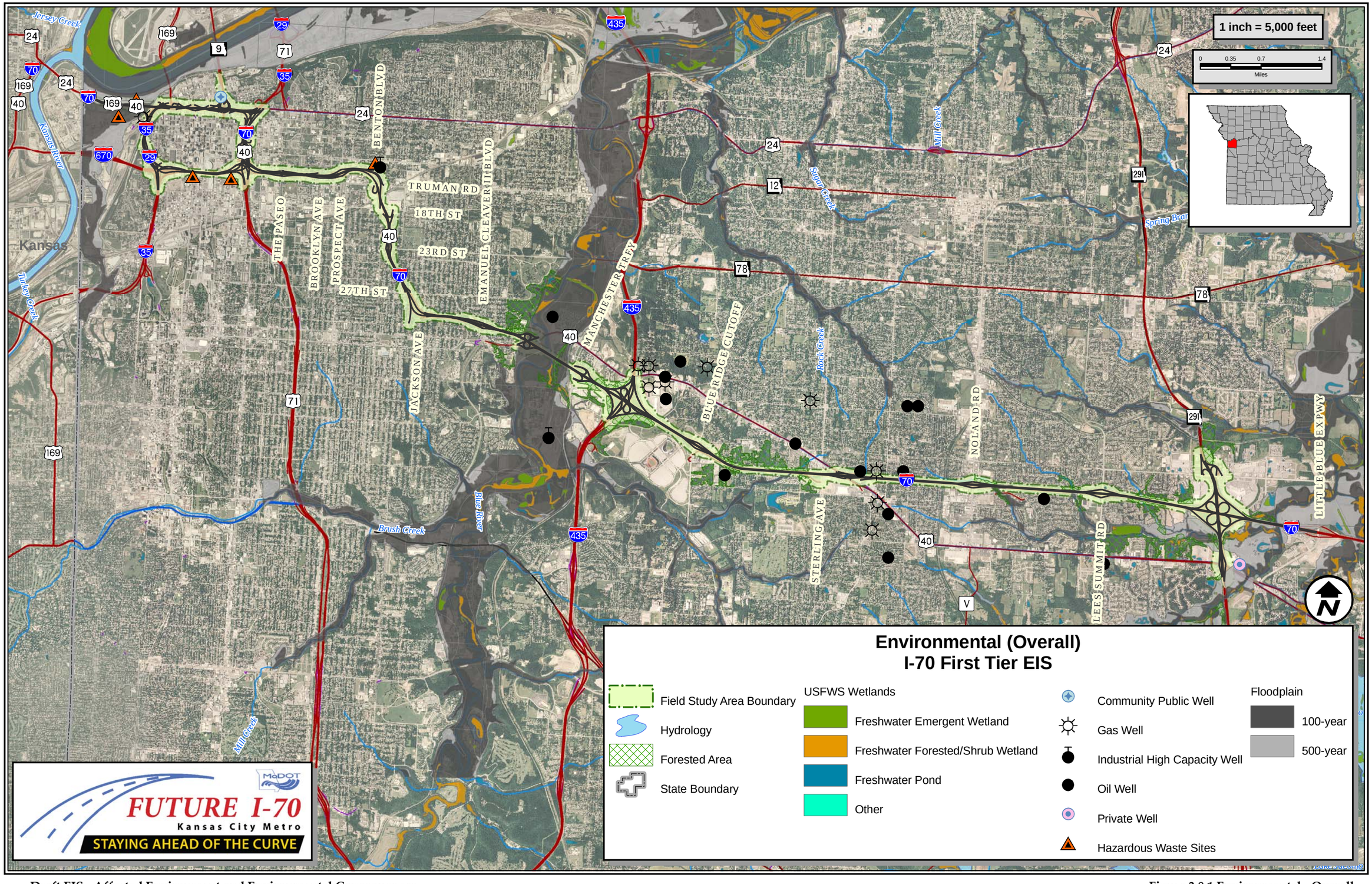


Figure 3.8.1 Environmental - Overall

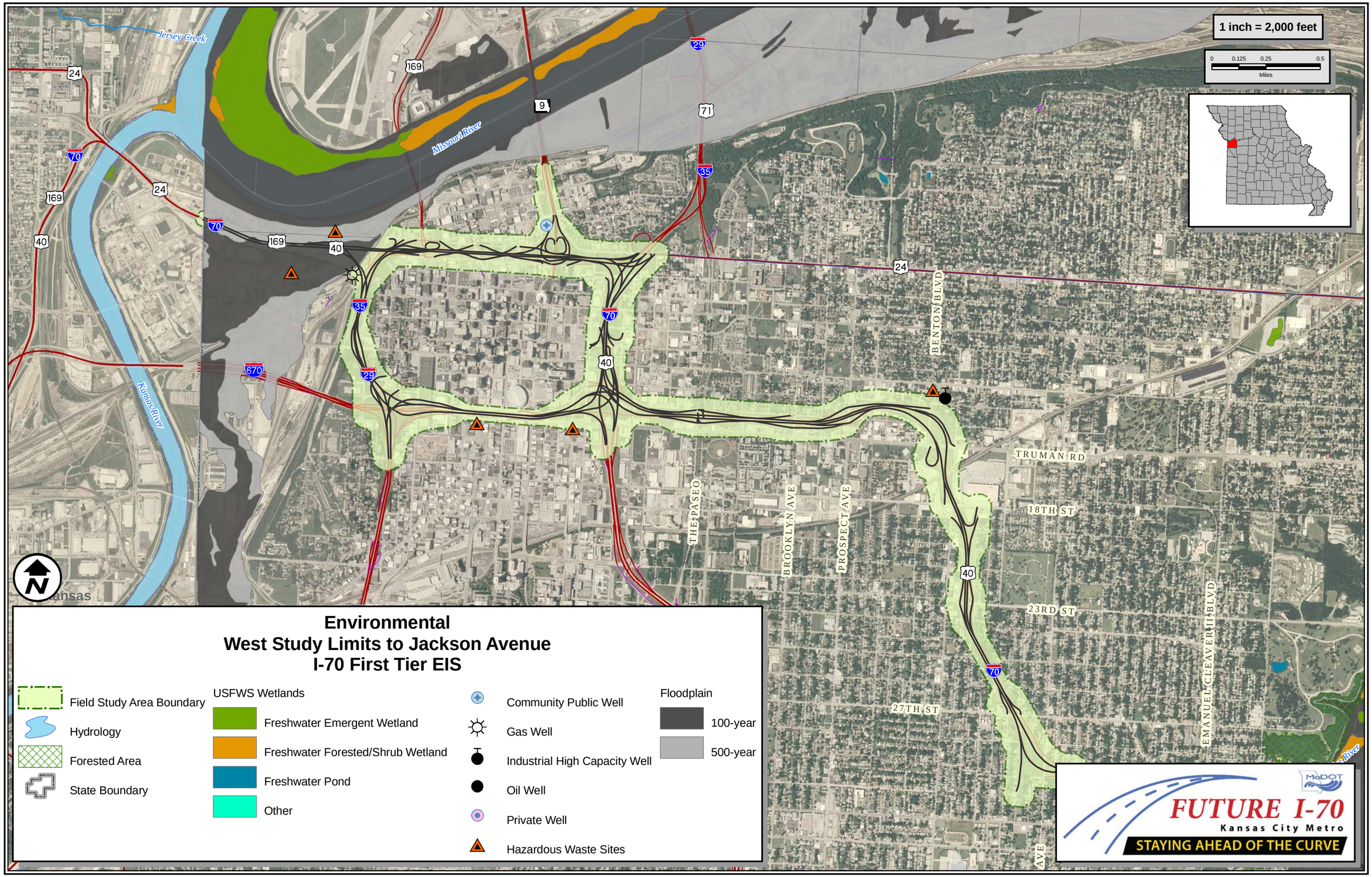


Figure 3.8.1 Environmental - West Study Limits to Jackson Avenue

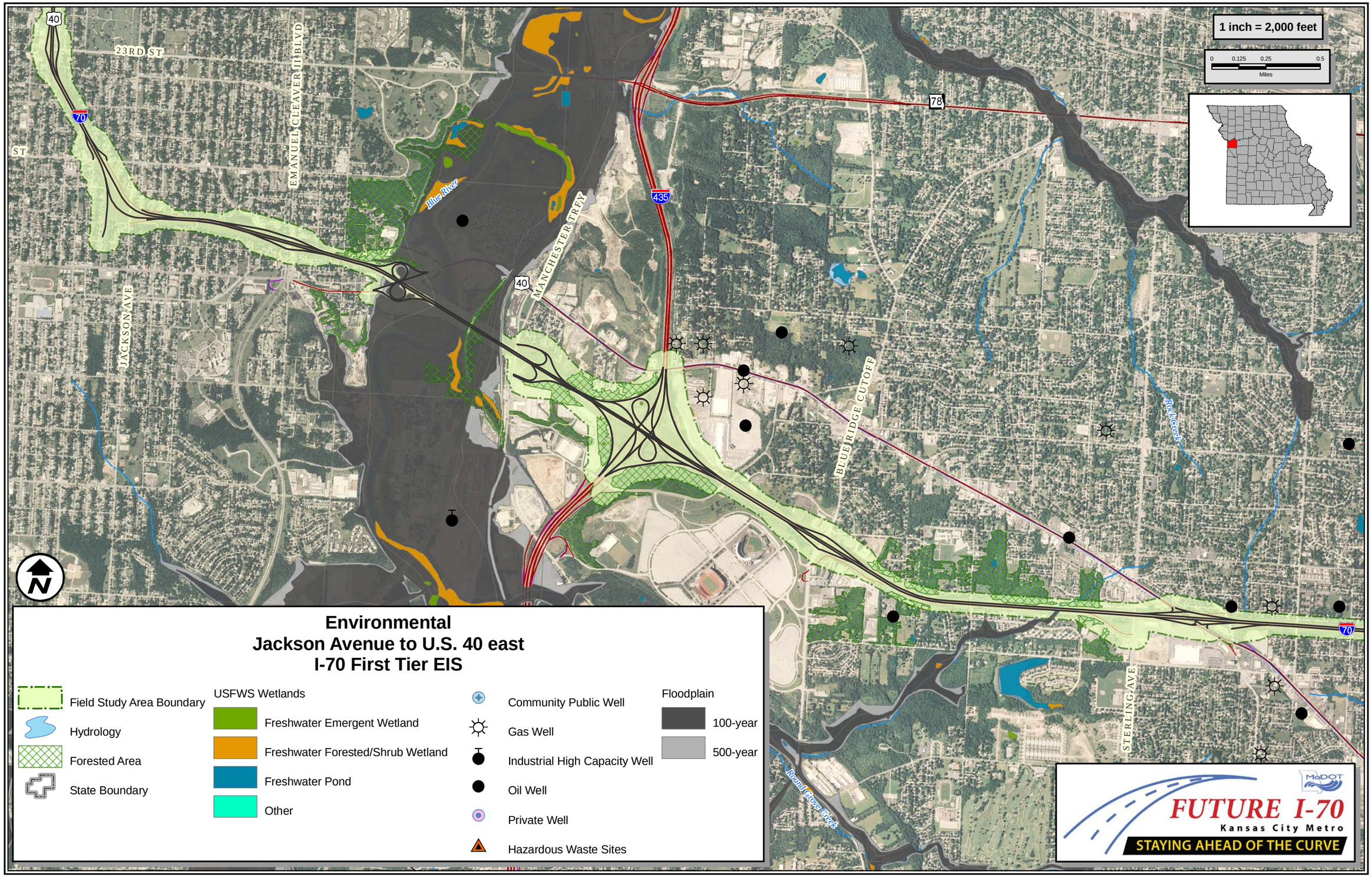


Figure 3.8.1 Environmental - Jackson Avenue to U.S. 40 east

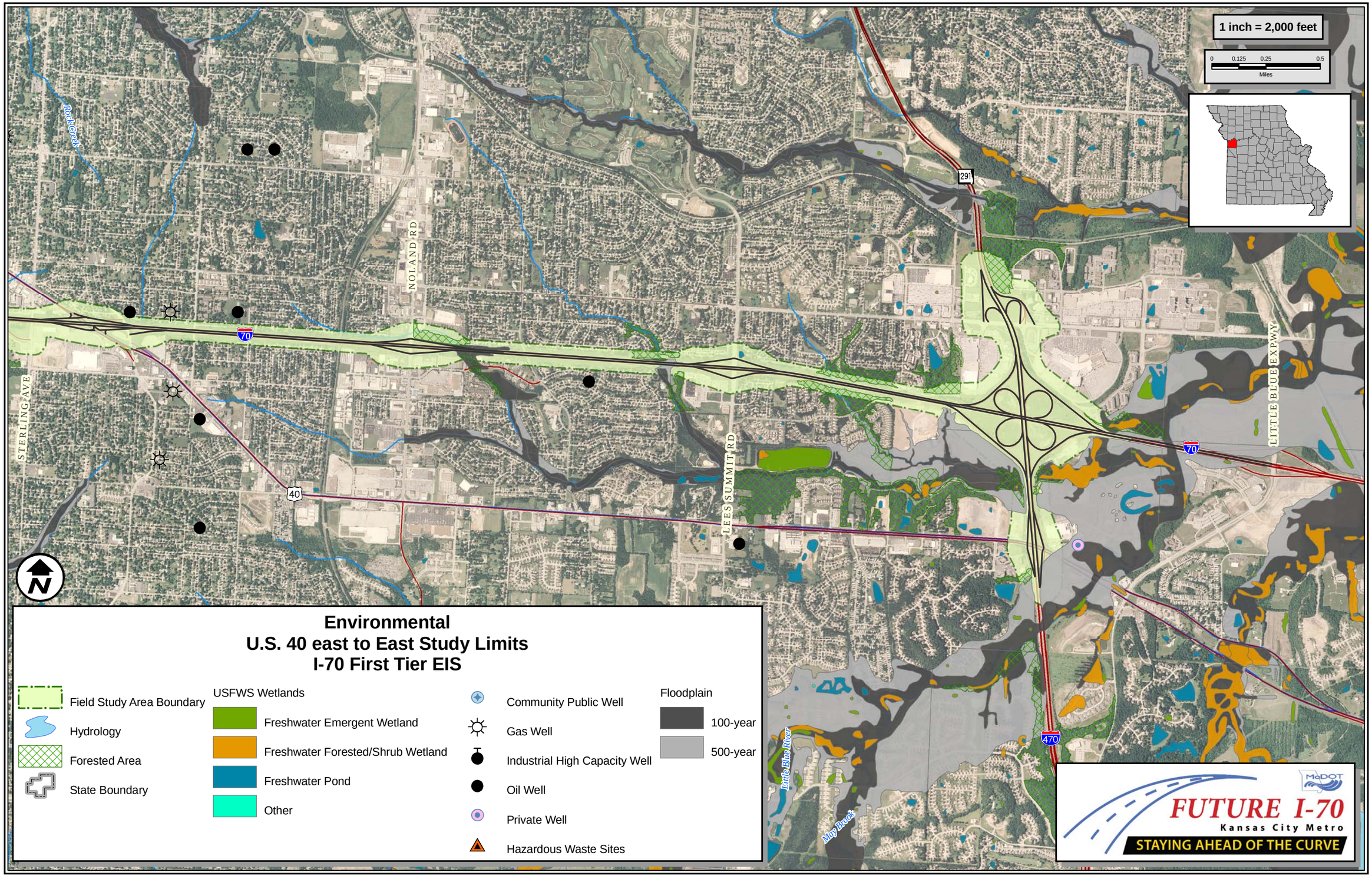


Figure 3.8.1 Environmental - U.S. 40 east to East Study Limits

3.9 Historic and Archaeological Resources

This section discusses the initial review to determine whether the proposed Strategies will affect properties that are or may be eligible for the National Register of Historic Places (NRHP); or, adversely affect significant historic or prehistoric resources.

The Study Team determined the cultural resource documentation for the FTEIS would include the following:

- Desktop research for known archaeological records and previously reported archaeological sites.
- Development of a generalized archeological site predictive model based upon existing information.
- Desktop research for known architectural investigations.
- Windshield survey to identify potential NRHP eligible architecture.
- Desktop research for known historic bridge investigations.

For this First Tier study, the Study Team surveyed the 18-mile I-70 corridor that extends from the last ramp termini east of the Missouri-Kansas state line to east of the I-470 interchange in Jackson County, Missouri. The survey area included four interchanges and the downtown loop. The surveyed area included a 300 feet wide zone from the shoulders on either side of I-70.

Historic vs. Prehistoric

Prehistoric pertains to the time or a period prior to recorded history. Historic means belonging to the past; of what is important or famous in the past; e.g. "historic structures"; "historic times"; "a historical character ".

What is a Cultural Resource?

Cultural resources include both physical assets and intangible cultural materials including such things as, artifacts, archaeological sites, buildings, ships, cemeteries, bridges and dams, paintings, sculptures, folklore storytelling, and drama.

How did the Study Team identify Cultural Resources in the Study Area?

In October 2008, the Study Team conducted a computer database search to gather known historic property information from the National Park Service NRHP files and the Kansas City, Missouri Landmark Commission files. They also conducted an on-site review of the Kansas City Public Library archives and the files of the Historic Preservation Division of the City of Independence. A current list of bridges along the I-70 corridor from the Missouri-Kansas state line to east of I-470 was reviewed to identify potential historic bridges. A windsheld survey of the Study Area was conducted to field verify the known historic architectural properties identified in

What is Desktop Research?

Desktop research uses a computer to obtain on-line data and information and telephone interviews.

the database search and records review, in addition, the windshield survey was used to locate and determine potential above-ground historic properties.

What is a Windshield Survey?

A windshield survey is conducted while driving to make observations. This method is a cursory survey tool that involves making several driving passes in and around the perimeter the Study Area. Some curbside/shoulder stops may be made to take a better look at features.

Are there Historic Properties within the Study Area?

The architectural resources that were assessed included historic commercial buildings, private residential buildings, historic districts, bridges, and churches. The Study Team identified 14 historic buildings and four historic districts in or immediately adjacent to the Study Area. The buildings included: one private residence, two church buildings, and 11 commercial buildings. Of the 14 historic buildings, 10 historic buildings and all four historic districts are within the 300 feet wide zone from the shoulders on either side of the downtown loop.

All of the historic buildings identified are located in the Downtown Sub-Area. **Figure 3.9.1** at the end of this chapter provides a map of these locations. No architectural resources were identified in the Urban, I-435, Suburban, or I-470 Sub-Areas.

Early 1900 to present architecture styles in the Kansas City skyline. Photo from the Intersection of Grand and Admiral Avenues in the northeast corner of the downtown loop.

Many of the commercial buildings that represent the significant architectural materials, forms, and styles in Kansas City architectural history are concentrated primarily in the Kansas City Central Business District (CBD). Some examples of these notable buildings in the CBD that are located immediately adjacent to the I-70 Study Area include:

- The Buick Automobile Company Building, built in 1907 to 1908 in the "Chicago School" tradition at 215 Admiral Boulevard.
- The Richards and Conover Hardware Company Building, designed by Shepard & Farrar and built between 1902 and 1903 at 200 W. 5th Street.
- The Temple Block Produce and Exchange Building, designed by James Basson and built in 1892 located at 531 Walnut Street.

The St. Mary's Episcopal Church designed by William Halsey Wood and built in 1888 and the residence of Frank M. Howe designed by Van Brunt and Howe and built in 1887 are also

located within or immediately adjacent to the Study Area in the CBD. In addition, the Old Town Historic District, Quality Hill Historic District, Quality Hill West Historic District, and the Holy Rosary Historic District are located in the CBD.

Other aboveground resources evaluated for this study include bridges along the I-70 corridor. None of the bridges are historically significant.

The Study Team did not preliminarily identify any potentially NRHP eligible historic properties or cemeteries in the Study Area during the windshield survey. However, a full cultural resources survey of the buildings and other structures will be conducted as part of the Second Tier studies.

Quality Hill Historic District in the Downtown Sub-Area

How did the Study Team identify Archaeological Resources in the Study Area?

The Study Team consulted the Missouri State Historic Preservation Office (SHPO) archaeological database to identify previous archaeological sites recorded in or near the Study Area. Eighteen sites were identified through this electronic search. In order to evaluate current conditions of the previously recorded sites, the Study Team used the windshield survey and site verification from public right of way.

North side of the downtown loop

What Known Archaeological Sites are within the Study Area?

The 18 archaeological sites previously recorded within the Study Area boundaries have largely been destroyed over the years. The site observations revealed that three of the sites are in relatively good condition. Either excessive erosion, brush overgrowth, and/or construction has largely impacted seven of the sites observed. These sites in large measure have lost most of their site integrity. The Study Team was unable to locate eight sites identified in the SHPO database during the windshield survey.

What is the State Historic Preservation Office (SHPO)?

SHPO is an agency within each state and territory charged with enforcing the provisions of the National Historic Preservation Act of 1966. SHPO's allocate National Park Service and state funds to local agencies and private citizens for the protection of sites eligible for listing in the National Register of Historic Places.

The intact known prehistoric and historic cultural resources found in the vicinity of the I-70 corridor are in the vicinity of the downtown loop, the urban area, the I-435 interchange area, and the I-470 section of the Study Area.

What are Environmental Factors?

Environmental factors include but are not limited to water, soil, vegetation elevation and slope of a particular area.

How Was the Potential for Unknown Archaeological Sites determined for the Study Area?

The Study Team used environmental factors for existing sites to identify areas with potential to have archaeolgocial resources along the Study Area. In addition, the archaeological SHPO database was used for the development of this generalized model to predict locations of unknown sites. Its records include known archeological sites within the boundaries of the current project area. The majority of the existing sites are located on hilltop, hill/slope, ridge top, and upland ravine, bluffs, along stream and river areas. These locations are consistent with the type of locations that archaeologists commonly associate with the settlement choice location of prehistoric groups. The environmental setting information generated from the site verification visit was also used in developing the generalized prediction of potential archaeological site locations along the I-70 corridor.

What is Debitage?

Archaeologists refer to the sharp-edged waste material left over when someone creates a stone tool as Debitage.

How are known cultural resources destroyed?

Oftentimes cultural resources are destroyed by development-related activities, such as, road, housing, parking lots, and commercial real estate construction activities.

Are there areas where Potential Archaeological Sites could be located in the Study Area?

The Study Team used a probability method and predicted nine different locations where archeological materials, may be located. See **Table 3.9.1** for the Study Area location of these potential archaeological sites. Historic and/or prehistoric resources could be present at these locations. These sites could contain ceramics, stone tools (lithic), and prehistoric debitage.

Table 3.9.1 Potential Archaeological Sites

Study Sub-Area Location	Number of Potential Sites - Probability Rating
1-470 Sub-Area	2-High 1-Moderate
Suburban Sub-Area	3-High
I-435 Sub-Area	1-High 2 -Moderate

How will the Strategies Affect Cultural Resources in the Study Area?

The following is a discussion of the potential effects of the Build Strategies on historic properties and districts. Although the Study Team identified 14 historic properties within or immediately adjacent to the Study Area, none of the properties would require acquisition by any of the Build Strategies. Therefore, none of the strategies would have a direct effect on historic properties. The potential for indirect effects such as noise would need to be evaluated more closely in the Second Tier studies.

The four identified historic districts close to or in the Study Area boundary include Quality Hill District, Quality Hill West District, Holy Rosary District, and the Old Town District.

The No-Build Strategy and the Build Strategies, including the Identified Preferred Strategy will have no effect on these historic structures or historic districts.

Will the Strategies Affect Archaeological Sites?

The potential for affecting known archaeological sites is considered to be minimal because the archaeological resources previously recorded within the Study Area boundaries have been destroyed over the years.

The 18 known sites are located immediately adjacent to the Study Area boundaries and nine potential archaeological sites are located within the Study Area.

No-Build Strategy

The No-Build Strategy will have no effect on these cultural resources.

What does secondary effects mean for cultural resources?

Secondary effects are caused by such actions as earth moving equipment or construction equipment being driven over cultural resources site locations to the project area. Such impacts can affect the integrity of the site or completely destroy the site.

Build Strategies

The design of the Build Strategies, including the Identified Preferred Strategy indicates that none of the known archaeological resources identified in the vicinity of the Study Area will be directly impacted. However, secondary effects could be possible during construction activity.

Potential unknown archaeological resource locations identified by the predictive model in the I-435, Suburban, and I-470 Sub-Areas could be affected by the Build Strategies; see **Table 3.9.2.**

Table 3.9.2 Areas of Potential Archaeological Effects

Strategy	Study Area Location	Number of Potential Archaeological Site Location Affected*
No-Build	Entire Study Area	None
Improve Key Bottlenecks	Urban	None
	I-435 Interchange	3 Locations
	Suburban	None
	I-470 Interchange	4 locations
Add General Lanes	Urban	None
	I-435 Interchange	3 Locations
	Suburban	2 Locations
	I-470 Interchange	4 Locations
Transportation Improvement Corridor	Urban	None
	I-435 Interchange	3 Locations
	Suburban	2 Locations
	I-470 Interchange	4 Locations
Identified Preferred Strategy	Urban	None
	I-435 Interchange	3 Locations
	Suburban	2 Locations
	I-470 Interchange	4 Locations

*Sites identified as potential to contain archaeological resources using a predictive model.

What Cultural Resources Studies Will Occur in the Second Tier Studies?

In the Second Tier studies, detailed cultural resources investigations including site walkovers, Phase 1 and potentially Phase 2 archaeological investigations including soil samples, shovel tests and other site specific investigations for previously unidentified sites will be conducted. The Second Tier studies will also identify whether there are potentially affected buildings and structures that are not currently registered historic sites but may be eligible for the NRHP. These surveys will identify whether the Identified Preferred Strategy is likely to affect the architectural or archaeological cultural resources and how these effects will be addressed.

How Will Cultural Resource Found in the Study Area Be Protected?

The Second Tier studies will identify any needed measures to avoid, minimize, or mitigate cultural resource impacts. This will include preparation of any documentation required under Section 4(f) of the Department of Transportation Act or Section 6(f) of the National Historic Preservation Act.

In the event that a potential cultural resource is found during the construction phase of the project, the project should temporarily cease, while a cultural investigation is conducted and the appropriate agencies are contacted and the NRHP significance of the cultural resource evaluated.

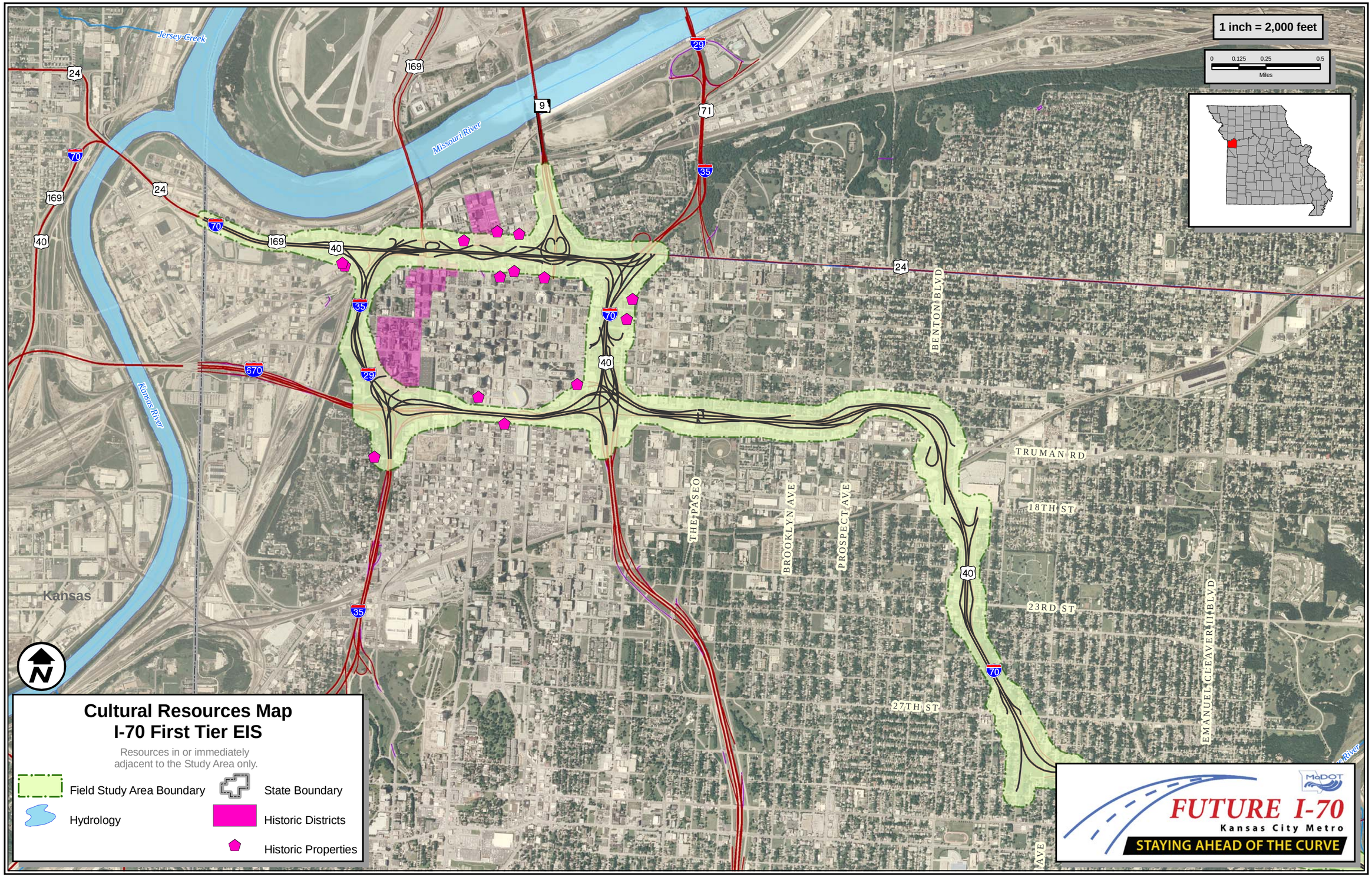


Figure 3.9.1 Cultural Resources Map

3.10 Noise

This section discusses the potential effects of improvements to I-70 on noise levels in the Study Area. Studies have shown that some of the most common sources of urban and rural noise are associated with transportation. Traffic noise is one of the most dominant concerns expressed by the public during development and expansion of transportation systems.

In 1982, the Federal Highway Administration (FHWA) established guidance under Title 23 of the Code of Federal Regulations, Part 772 to evaluate the effects of highway traffic noise. This guidance commonly known as 23 CFR 772 provides guidelines for highway noise mitigation and abatement. To conform to 23 CFR 772, the Missouri Department of Transportation (MoDOT) created their own Traffic Noise Policy in 1972. MoDOT's policy provides guidance for determining the feasibility and need of noise abatement measures. FHWA has approved MoDOT's Traffic Noise Policy.

What is meant by a Logarithmic Scale?

Since decibels are measured on a logarithmic scale, noise levels do not follow a linear progression. A doubling of noise energy creates an actual increase of about 3 dBA. For example, if one source of noise is at a 50 dBA level, a doubling of the noise intensity (two identical 50 dBA sources) would create a combined level of about 53 dBA, not 100 dBA.

Fundamentals of Noise

Noise is generally referred to as a loud, surprising, irritating, or unwanted sound. Sound is caused by vibrations of air molecules given off when an object moves. The vibrations travel through the air like ripples on water until they eventually lose energy. When the vibrations reach a human's ear, they hear what is called sound.

What is dBA?

Since sound is made up varying frequencies, sound level meters will use the weighting system to filter out frequencies the human ear cannot detect. The most common filter is called the A-weighted scale and is expressed as "dBA".

The strength of sound is measured with a metering instrument that uses units called "decibels". A decibel (dB) is a logarithmic unit that is the ratio of a sound pressure level to a standard reference level. Sound is measured on a logarithmic scale because the human ear is responsive to an intense range of frequencies; therefore, the sensitivity of the ear is more logarithmic than linear.

The decibel scale is very useful but it can be somewhat confusing since the mathematical operations differ from the normal arithmetic scale. On a logarithmic scale the sound combined from two identical noise sources will create a 3 dBA increase over the sound created from one source operating

alone. In other words, two 50 dBA sources together would result in a sound measuring 53 dBA, not 100 dBA. Also on a logarithmic scale, an increase or decrease of 10 dBA in sound level is perceived as a doubling or halving of sound to a listener. For example, a sound level of 50 dB will be heard as twice as loud as a sound level at 40 dBA, but only half as loud as a sound level at 60 dBA.

When considering highway noise, an adjustment or weighting of high and low frequencies is made to approximate how the average human hears sounds. Since sound is made up varying frequencies, sound level meters will use the weighting system to filter out frequencies the human ear cannot detect. The most common filter is called the A-weighted scale and is expressed as "dBA". **Table 3.10.1** shows examples of noise levels associated with highways and other common activities in dBA.

Highway noise is not constant; it varies over time with the number, type, and speed of the vehicle which produces the noise. To measure the changing levels of noise, a calculated average is found that represents the steady-state noise level during any given amount of time. This calculated average is referred to as the *equivalent sound level*, or L_{eq}, and represents low and high noise levels averaged over a given time period.

One of the most commonly used descriptors of noise is described as L_{eq} (h) or hourly L_{eq}. This represents an average A-weighted sound level over one hour. An additional descriptor sometimes used is called L_{10} and represents an A-weighted sound level that is exceeded 10 percent of the time. The hourly L_{eq} is the most common descriptor of highway noise used by many state highway agencies and the FHWA.

Table 3.10.1 Illustrated Comparison of Noise Levels

COMMON SOUND/NOISE LEVELS		
Outdoor	**dBA**	**Indoor**
	110	Rock band at 5 meters
Jet flyover at 300 meters		
Pneumatic hammer	100	Subway train
Gas lawn mower at 1 meter		
	90	Food blender at 1 meter
Downtown (large city)	80	Garbage disposal at 1 meter
		Shouting at 1 meter
Gas Lawn mower at 30 meters	70	Vacuum cleaner at 3 meters
Commercial area		Normal speech at 1 meter
Air conditioning unit	60	Clothes dryer at 1 meter
Babbling brook		Large business office
Quiet urban (daytime)	50	Dishwasher (next room)
Quiet urban (nighttime)	40	Library
	30	
	20	
	10	
		Threshold of hearing
	0	

Source: *Guidelines for Analysis and Abatement of Traffic Noise*, TxDOT, 1996.

What are the Sources of Highway Noise in the Study Area?

Highway noise depends largely on three things: (1) the volume of traffic, (2) the speed of the traffic, and (3) the number of trucks in the traffic flow. Highway noise will increase with heavier traffic volumes, higher speeds, and a greater numbers of trucks on the highway. The noise is typically produced from a vehicle's engine, exhaust, and tires. However, the loudness of highway noise can be increased by a vehicle's faulty equipment and defective mufflers. In addition,

any condition such as a steep incline that causes heavy use of motor engines will also increase vehicle noise levels along the highway.

How are Noise Impacts Determined?

The FHWA developed noise abatement criteria (NAC) to measure highway noise levels and determine if the noise levels are compatible with surrounding land uses. The NAC is shown in **Table 3.10.2**. A noise impact occurs when predicted traffic noise levels "approach or exceed" the applicable noise abatement criteria or "substantially exceed" existing noise levels.

Approaching the NAC is defined as being within one dBA of the applicable NAC category. For example, all properties covered in NAC Category B (generally residential) that have a calculated L_{eq} of 66 dBA or higher would "approach or exceed" the 67 dBA NAC Category B criterion. Therefore, the L_{eq} value of 66 dBA for NAC Category B is used as a threshold value for determining existing and future noise impacts. The FHWA gives each individual state highway agency the authority to create their definition of "substantial". The MoDOT Traffic Noise Policy considers any noise level greater than or equal to 15 dBA increase over existing levels as being substantial.

Table 3.10.2 Noise Abatement Criteria (NAC)
Hourly Weighted Sound Level in Decibels (dBA)*

Activity Category	L_{eq} (h) dBA	Description of Activity Category
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (exterior)	Developed lands, properties, or activities not included in categories A or B above.
D	-	Undeveloped lands.
E	52 (exterior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

*Either hourly L_{eq} or L_{10} (but not both) may be used on a project.
Source: 23 CFR 722, U.S. Department of Transportation, Federal Highway Administration, 1982.

Are there any Noise-Sensitive Land Uses in the Study Area?

The I-70 Study Area contains many noise-sensitive land uses, most of which would be categorized under NAC Category B (generally residential). Each noise-sensitive land use was identified during a Study Area drive through and analyzed using Geographic Information System (GIS) technology. The following paragraphs briefly provide a quantitative list of all noise-sensitive land uses in the Study Area. Because the Study Area is quite large, the list of land uses is divided into five Sub-Areas.

Leedy Volkos Art Center

Downtown Sub-Area

The identified noise-sensitive land uses include 12 park or recreation areas, three hotels or motels, five schools, one university, 12 churches, 29 community or cultural facilities, and numerous residential buildings.


Sycamore Hills Elementary School

Urban Sub-Area:

The identified noise-sensitive land used include two park or recreation areas, one university, 39 churches, 15 community or cultural facilities, one cemetery, and numerous residential buildings.

I-435 Sub-Area

The identified noise-sensitive land uses include one park or recreation area, seven hotels or motels, two universities, two churches, one community or cultural facility, and numerous residential buildings.

Suburban Sub-Area

The identified noise-sensitive land uses include one park or recreation area, five hotels or motels, five schools, five churches, one community or cultural facility, and numerous residential buildings.

I-470 Sub-Area

The identified noise-sensitive land uses include two park or recreation areas, three hotels or motels, two churches, and numerous residential buildings.

How will the Strategies for I-70 Affect Noise Levels?

In this First Tier Study, detailed noise modeling was not completed for the strategies. The Study Team did count the number of noise receptors within 150 feet of each of the proposed strategies. The Study Team considered relocations prior to summing the impacted noise receptors. For example, a relocated noise receptor would no longer be impacted by noise while the receptor across the street may not be within 150 feet of the strategy. As a result, the impacted noise receptors would be decreasing as the roadway scenario footprints are increasing. These receptors would be the most likely to experience the effects of increased noise levels.

No-Build Strategy

The No-Build Strategy may increase noise levels for existing residences and businesses along I-70 as traffic and congestion continues to grow over time. For a comparison, the noise receptors adjacent to the existing highway were estimated in **Table 3.10.3**.

Table 3.10.3 Existing Noise Impacts

	Residential	Commercial	Community Facilities
Downtown Sub-Area	34	32	12
Urban Sub-Area	164	42	6
I-435 Sub-Area	42	18	1
Suburban Sub-Area	232	24	2
I-470 Sub-Area	44	8	3
Total	**516**	**124**	**24**

Improve Key Bottlenecks Strategy

Noise levels may increase for residents and businesses along the corridor with the Improve Key Bottlenecks Strategy. By improving the bottlenecks, more traffic will be able to move along I-70 at a higher rate of speed, increasing the noise levels. The areas likely to be affected the most are the residential areas in the Urban and Suburban Sub-Areas that are next to I-70. These Sub-Areas have a high concentration of residences both single-family and multi-family that are located close to the existing I-70 right of way. However, the Improve Key Bottlenecks Strategy noise impacts would affect fewer residences, businesses, and community facilities than the No-Build Strategy. **Table 3.10.4** lists the number of residences, businesses, and community facilities that are within 150 feet of the proposed improvements and have the highest probability of an increase in noise levels from the Improve Key Bottlenecks Strategy.

Table 3.10.4 Improve Key Bottlenecks Noise Impacts

	Residential	Commercial	Community Facilities
Downtown Sub-Area	29	25	12
Urban Sub-Area	129	25	5
I-435 Sub-Area	32	10	0
Suburban Sub-Area	155	11	1
I-470 Sub-Area	24	5	2
Total	**369**	**76**	**20**

The majority of community facilities within 150 feet of the proposed improvements are park and recreation areas, but it also includes one community center, seven churches, one school, and a homeless assistance facility.

Add General Lanes Strategy

The Add General Lanes Strategy is expected to increase noise levels for some residents and businesses near I-70. By increasing capacity on I-70, more traffic will be able to move through the Study Area at a higher rate of speed, increasing the noise levels. Like the Improve Key Bottlenecks Strategy, this strategy will likely affect the residential areas next to I-70 in the Urban and Suburban Sub-Areas the most. However, because this strategy will require more relocations, see **Section 3.4**, there are fewer residences, businesses, and community facilities within 150 feet of the proposed improvement that would be affected by noise than the No-Build or Improve Key Bottlenecks Strategies. **Table 3.10.5** lists the number of residences, businesses, and community facilities that are within 150 feet of the proposed improvement and have the highest probability of an increase in noise levels from the Add General Lanes Strategy.

Table 3.10.5 Add General Lanes Noise Impacts

	Residential	Commercial	Community Facilities
Downtown Sub-Area	24	22	11
Urban Sub-Area	74	18	5
I-435 Sub-Area	28	6	1
Suburban Sub-Area	105	27	1
I-470 Sub-Area	6	5	2
Total	**237**	**78**	**20**

Transportation Improvement Corridor Strategy

The Transportation Improvement Corridor Strategy is expected to increase noise levels for some residents and businesses near I-70. Like the other Build Strategies, this strategy will likely impact the residential areas next to I-70 in the Urban and Suburban Sub-Areas the most. However, because this strategy will cause more relocations, see **Section 3.4**, there are fewer residences, businesses, and community facilities within 150 feet of the proposed improvement impacted by noise than the other Build Strategies. **Table 3.10.6** lists the number of residences, businesses, and community facilities that are within 150 feet of proposed improvement that have the highest probability of an increase in noise levels from the Transportation Improvement Corridor Strategy.

Table 3.10.6 Transportation Improvement Corridor Noise Impacts

	Residential	Commercial	Community Facilities
Downtown Sub-Area	29	29	11
Urban Sub-Area	72	8	5
I-435 Sub-Area	35	4	1
Suburban Sub-Area	66	4	1
I-470 Sub-Area	10	5	2
Total	**212**	**50**	**20**

Identified Preferred Strategy

The Identified Preferred Strategy is expected to increase noise levels for some residents and businesses near I-70 as traffic will be able to move at a higher rate of speed, increasing the noise levels. The areas likely to be impacted the most are the residential areas in the Urban and Suburban Sub-Areas that are next to I-70. These Sub-Areas have a high concentration of residences both single-family and multi-family that are located close to the existing I-70 right of way. **Table 3.10.7** lists the number of residences, businesses, and community facilities that are within 150 feet of the proposed improvements and have the highest probability of an increase in noise levels from the Identified Preferred Strategy. The noise assessment is based on the widest potential footprint between east of I-435 and I-470.

Table 3.10.7 Identified Preferred Strategy Noise Impacts

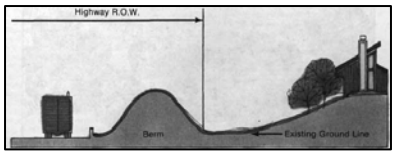
	Residential	Commercial	Community Facilities
Downtown Sub-Area	29	25	12
Urban Sub-Area	129	25	5
I-435 Sub-Area	32	10	1
Suburban Sub-Area	105	27	1
I-470 Sub-Area	6	5	2
Total	**301**	**92**	**21**

The majority of community facilities within 150 feet of the proposed improvements are park and recreation areas, but it also includes one community center, seven churches, one school, and a community assistance facility.

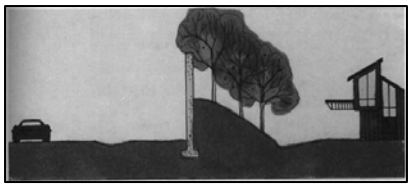
How will Noise Levels be Assessed and Mitigated in the Second Tier Studies?

The Second Tier studies will further evaluate and refine the noise impacts that the Identified Preferred Strategy will cause. As a part of the Second Tier studies, the Identified Preferred Strategy will be finalized and its footprint will be refined.

The MoDOT Noise Policy will dictate the evaluation and assessment methods used as the project proceeds. If a selected strategy requires significant changes in horizontal or vertical alignment or an increase in the number of through lanes, then noise measurements and modeling will be completed using FHWA approved models and a preliminary assessment of needed mitigation will occur. The use of noise abatement measures such as walls and berms will be assessed if mitigation of noise is needed as indicated by measurement and modeling.



FHWA Drawing showing an Earth Berm



FHWA Drawing showing an Earth Berm with a Noise Wall

3.11 Air Quality

This section discusses the potential affects of I-70 improvements on air quality. Air quality is regulated by the U.S. Environmental Protection Agency (EPA) under jurisdiction of the Federal Clean Air Act of 1970 and its amendments. Three sets of air pollutants would be of concern with regards to the I-70 FTEIS: Criteria pollutants regulated under the National Ambient Air Quality Standards (NAAQS), Mobile Source Air Toxics (MSATs), and general carbon emissions from motor vehicles.

What are the National Ambient Air Quality Standards (NAAQS)?

The NAAQS were formulated to protect public health, safety, and welfare from known or anticipated air pollutants. The most recent amendments to the Clean Air Act contain criteria for sulfur dioxide (SO_2), particulate matter (PM_{10}, ten-micron, and smaller; and $PM_{2.5}$, 2.5 micron, and smaller) carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), and lead (Pb). **Table 3.11.1** shows the NAAQS as of December 2008.

Locations that do not meet these standards are designated by the EPA as "nonattainment" areas for each pollutant that does not meet the standards. Amendments to the Clean Air Act have established time schedules for the states to reduce pollutant levels to comply with the NAAQS in nonattainment areas.

For transportation projects, ground-level ozone, carbon monoxide, and particulate matter are the most important pollutants to consider. These pollutants are monitored on a regional level from several stations around the Kansas City Metropolitan Area.

What Measuring Units are Used for Air Quality Measurements?

When chemical compounds are in tiny concentrations, they are often represented with one of the following:

Parts Per Million (ppm): This is a ratio of the number of molecules of a pollutant compared to a million molecules of air. So 3 ppm concentration of CO means 3 CO molecules per million air molecules.

Parts Per Billion (ppb): This is a ratio of the number of molecules of a pollutant compared to a billion molecules of air.

Micrograms (µg): A microgram is a millionth of a gram. $\mu g/m^3$ is shorthand for micrograms per cubic meter. (Similarly, mg/m^3 is milligrams per cubic meter; one thousandth of a gram.)

Microns: are millionths of a meter. The classes of particulate pollution of concern are particulate matter smaller than ten microns in size (PM_{10}) and particulates smaller than 2.5 microns in size ($PM_{2.5}$).

Table 3.11.1 National Ambient Air Quality Standards (NAAQS) as of December 2008

Pollutant	Averaging Time	Primary Standard[1]	Secondary Standard[2]
Sulfur Dioxides (SO_2)	Annual (Arithmetic Mean)	0.03 ppm (80 μg/m^3)	
	24 – Hour	0.14 ppm (365 μg/m^3)*	
	3 – Hour		0.5 ppm (1300 μg/m^3)*
Particulate Matter ($PM_{2.5}$)	Annual (Arithmetic Mean)	15 μg/m^3	Same as Primary
	24 – Hour	35 μg/m^3	Same as Primary
Particulate Matter (PM_{10})	24 – Hour	150 μg/m^3*	Same as Primary
Carbon Monoxide	8 – Hour	9 ppm (10 mg/ m^3)*	No Secondary Standard
	1 – Hour	35 ppm (40 mg/ m^3)*	No Secondary Standard
Ozone (O_3)	8 – Hour[3] (1997 std)	0.08 ppm (157 μg/m^3)	Same as Primary
	8 – Hour (2000 std)	0.075 ppm	Same as Primary
Nitrogen Dioxide (NO_2)	Annual (Arithmetic Mean)	0.053 ppm (100 μg/m^3)	Same as Primary
Lead (Pb)	Quarterly Average	1.5 μg/m^3	Same as Primary

[1] Primary Standard means the level of air quality, which provides protection for public health with an adequate margin of safety.
[2] Secondary Standard means the level of air quality, which may be necessary to protect welfare from unknown or anticipated adverse effects.
[3] The 8 – hour primary and secondary are met when the 3-year average of the 4th highest average concentration is less than or equal to 0.08 ppm (1997 std).
* Concentration not be exceeded more than once per year.
* Source: United Environmental Protection Agency, www.epa.gov/air/criteria.html, December 2008

Ozone

Ozone is of substantial concern for transportation projects in the Kansas City region. Ozone occurs naturally in the upper levels of the atmosphere, about ten to 30 miles above the earth's surface and blocks out harmful ultraviolet radiation from the sun. However, ground-level ozone is a man-made pollutant that irritates the respiratory system and can cause serious health problems.

Ground-level ozone forms when volatile organic compounds (VOC) mix with nitrogen oxides in the presence of heat and sunlight. Both VOC and nitrogen oxides are products of vehicle exhausts among other sources and thus of concern on highway projects that may encourage additional driving and/or reducing congestion and vehicle idling.

EPA's eight-hour ozone standard of 0.075 parts per million (ppm) is designed to protect against longer ozone exposure periods. The one-hour primary standard was revoked by the EPA June 15, 2005. As the existing environmental regulations are modified or new environmental regulations are put in place, MoDOT will address those ramifications for this study accordingly. The effects of new air quality regulations may be addressed in the final FTEIS or the second tier documents depending on when the new regulations go into effect.

Carbon Monoxide and Particulate Matter

Although ozone concentrations are of substantial concern in the Kansas City region, projects developed along I-70 will also have to undergo other air quality analyses. Traffic volumes on all segments of I-70 already exceed the threshold of an average daily traffic volume of 54,000 for federally funded projects that require a detailed air quality analysis according to an interagency agreement developed by MoDOT, Missouri Department of Natural Resources (MoDNR) and FHWA. This analysis would likely include detailed modeling of expected emissions and concentrations of carbon monoxide and particulate matter at worst case locations along proposed improvements.

Carbon monoxide is a colorless and odorless gas which is the product of incomplete combustion, and is the major pollutant from gasoline-fueled motor vehicles. Carbon monoxide is harmful because it reduces oxygen delivery to the body's organs and tissues. It is most harmful to those who suffer from heart and respiratory disease. Carbon monoxide emissions are greatest from vehicles operating at low speeds and prior to complete engine warm-up (within approximately eight minutes of starting), particularly in colder winter months. Congested urban intersections tend to be the principal problem areas for carbon monoxide.

Particulate matter is the term for solid or liquid particles suspended in the air. Some particles are large or dark enough to be seen as soot or smoke, but fine particulate matter is generally not visible to the naked eye. Two types of particulate matter are of concern. PM_{10} (ten microns or smaller) particulates are coarse particles, such as windblown

What Other Vehicular Air Pollutants are covered by the NAAQS but not Discussed at Length?

Lead: Lead (Pb), a toxin, has steadily declined since the 1970s with the introduction of unleaded fuels.

VOC: Volatile Organic Compounds (VOC) come from vehicles and industrial sources. The term VOC encompasses thousands of compounds, including petroleum constituents as well as industrial thinners, solvents, etc. VOC are of interest primarily from their role in ozone formation, a regional pollutant and a precursor of $PM_{2.5}$.

NO_x: The term "Oxides of Nitrogen" (NO_x) covers a number of chemical compounds containing both nitrogen and oxygen. Like VOC, NO_x also are ozone and $PM_{2.5}$ precursors and are generated by motor vehicles. NO_2 (nitrogen dioxide) is a specific type. NO (nitric oxide) is also an irritant and ozone precursor, which reacts with oxygen to form NO_2.

SO_2: SO_2 (sulfur dioxide) is the main product from the combustion of sulfur compounds. It is produced by volcanoes and in various industrial processes. Since coal and petroleum contain various amounts of sulfur compounds, their combustion generates SO_2.

dust from fields and unpaved roads. $PM_{2.5}$ (2.5 microns or smaller) covers finer particulates smaller than 2.5 microns in size. $PM_{2.5}$ particulates are generally emitted from activities such as industrial and residential combustion and from vehicle exhaust. $PM_{2.5}$ is a health concern because fine particles can reach the deepest regions of the lungs. Health effects include asthma, difficult or painful breathing, and chronic bronchitis, especially in children and the elderly.

What Air Toxics are of the Most Concern?

Six air toxins have been called out as "priority toxins":

Benzene is a known human carcinogen.

Acrolein's carcinogenicity has not been determined based on inadequate data on oral inhalation exposure

Formaldehyde is a probable human carcinogen, based on limited evidence in humans, and sufficient evidence in animals.

1,3-butadiene is carcinogenic to humans by inhalation.

Acetaldehyde is a probable human carcinogen based on tumors in lab rats and hamsters after inhalation exposure.

Diesel exhaust (DE) is likely to be carcinogenic to humans by inhalation. DE is the combination of diesel particulate matter and diesel exhaust organic gases. DE is also likely associated with chronic respiratory and pulmonary problems.

What are Mobile Source Air Toxics (MSATs)?

MSATs are becoming an air quality issue of increasing concern for major transportation projects. MSATs are a subset of the 188 air toxics defined by the Clean Air Act. MSATs are compounds emitted from highway vehicles and non-road equipment. Some are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Others are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or impurities in oil or gasoline.

The EPA and other agencies have several programs to improve gasoline and lower vehicle emissions. These programs are helping to lower the sulfur content of fuel, especially diesel fuels, and are lowering the emissions of key MSATs. Between 2000 and 2020, FHWA projects that even with a 64 percent increase in vehicle miles traveled (VMT), these programs will reduce on-highway emissions of key MSATs by 57 to 87 percent.

On February 3, 2006 FHWA issued Interim Guidance of Air Toxic Analysis in NEPA Documents, which outlines procedures for addressing air toxic analysis in the absence of a comprehensive and technically sound modeling approach. Improvements to I-70 will require MSATs analysis that conforms to these guidelines and any future requirements for MSATs analysis.

Why are Carbon Emissions from Vehicles a Concern?

The burning of fuel by vehicles releases carbon dioxide, a greenhouse gas, into the atmosphere. Greenhouse gases trap heat in the atmosphere, which contributes to climate change. Decreasing the time vehicles spend on I-70 because of congestion and delays will decrease the amount of CO_2 released into the atmosphere. During the Second Tier studies new emissions standards may be in effect and will be considered.

What is the Current Status of Air Quality?

The Kansas City area air quality monitoring region is currently designated a maintenance area for ozone. This includes Platte, Clay and Jackson counties in Missouri. However, the region's attainment status for ozone may be removed in 2009 and 2010 due to exceeding the current standard for ozone and future more stringent standards for eight-hour ozone concentrations. The Kansas City region has a history of not meeting ozone standards. In 1978, the EPA designated the region as nonattainment for ground level ozone. The region did not meet the ozone standards in place at the time until 1992. Intermittent violations continued to occur throughout the 1990s. In 1997, the EPA introduced a new, more stringent health based standard for ground level ozone. This standard established an upper limit of 0.08 parts per million over an eight-hour period. Due to EPA rounding conventions a reading below 0.085 ppm meets the standard. Under the EPA guidelines, the three-year average of the fourth highest reading at any single air quality monitor in the region cannot exceed 0.085 ppm. The three year average value is also called the design value. The Kansas City region avoided exceeding the standard in the mid-2000s primarily due to cool summers. In June 2007, the area had a violation of the 0.8 ppm ozone standard at the Rock Creek monitor.

On March 12, 2008, the EPA announced that it was tightening the primary eight-hour ozone standard to 0.075 ppm or 75 ppb. This means that design values of 0.08 ppm will represent exceeding of the new standard. As this standard is being reconsidered, the current implementation schedule is subject to change. Under the Clean Air Act, states were required to

submit recommendations for non-attainment areas under these new standards by March 2009. EPA will make nonattainment designations in March 2010. States must have approved state implementation plans to address nonattainment areas in 2013 and areas will be required to meet the new standard between 2013 and 2020.

Part of the new regulations will include compliance of the soon to developed 2040 Long Range Transportation Plan (LRTP) with targets for regional emission reductions. Individual proposed projects such as improvements on I-70 will be required to demonstrate through air quality modeling that they conform to the Long Range Transportation Plan's emission forecasts and requirements. In addition, the Long Range Transportation Plan has to conform to the State Implementation Plan and its emission budgets. MARC has continued to do conformity analyses for projects because of the continued likelihood of future violations of air quality standards. However, with a non-attainment designation and the more stringent ozone standards, the overall emission goals of the LRTP may become more restrictive on the types of future transportation improvements allowed. Priority and funding will flow towards projects that reduce congestion and reduce vehicle miles traveled in order to reduce emissions. Future I-70 improvements will require clearance within this more restrictive regulatory environment.

In 2005, the Mid-America Regional Council (MARC) and its partners prepared a Clean Air Action Plan (CAAP) which represented a comprehensive, community-based voluntary strategy for reducing ground-level ozone pollution in the Kansas City Metropolitan Area. A key purpose of the plan was to help keep the region in compliance with air quality standards, especially ozone.

Monitor readings in 2008 indicate that Kansas City has violated the new eight-hour standard for ozone of 75 ppb, but not the existing standard of 80 ppb. **Table 3.11.2** lists the fourth highest values and the design values for ozone concentrations at monitors in the Kansas City region.

As **Table 3.11.2** shows, the 2006-2008 design values exceed the 75 ppb standard for eight-hour ozone at the Liberty, Watkins Mill, Rocky Creek, and Trimble monitors.

Table 3.11.2 Fourth-High Readings and Design Values, 2003-2008

	Fourth-High Eight-Hour Values (PPB)						Design Values - 3-Year Average (PPB)			
Station	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**03-05**	**04-06**	**05-07**	**06-08***
Liberty	88	71	88	93	81	66	82	84	87	**80**
Watkins Mill	85	67	79	91	73	69	77	79	81	**77**
Rocky Creek	88	69	87	87	89	69	81	81	87	**81**
Richards-Gebaur	82	61	81	78	72	66	74	73	77	72
Trimble	N/A	71	87	85	83	70	N/A	81	85	**79**
JFK (KCK)	84	63	79	81	73	63	75	74	77	72
Heritage Park	81	66	81	76	71	62	76	74	76	69
Leavenworth	82	67	77	73	80	64	75	72	77	72

Source: 2008 Ozone Season Report for the Kansas City Region, Mid-America Regional Council
*The 2008 eight-hour monitored ozone readings have not been quality assured and may contain errors. Readings in **bold** represent design values above the 75 ppb standard.

Based on 2008 monitoring, the Kansas City region is unlikely to be able to meet the new standard by 2009/2010. This means the EPA may designate the region as nonattainment and a new regulatory plan for reducing emissions could be put in place. A new regulatory plan could substantially affect the Strategies developed and the requirements for environmental clearance for future improvements to I-70.

Potential improvements to I-70 would also need to be evaluated for temporary construction related emissions that could affect concentrations of ozone, carbon monoxide, and particulate matter including fugitive dust.

Locations of Air Quality Monitors

How will the Strategies Affect Air Quality?

Both VOC and nitrogen oxides are ingredients in ozone formation. VOC emissions increase when cars are sitting in traffic while NOx emissions increase when traffic speeds are high and consistent. An increase in traffic flow would cause a higher emission of NOx and could worsen ozone levels in the Kansas City metropolitan area.

No-Build Strategy

The No-Build Strategy will be worse for air quality when compared to any of the Build Strategies. This is due to an increase in traffic, congestion, and delays in the No-Build Strategy. Although the No-Build Strategy would be worse for air quality than any of the Build Strategies, air quality will likely improve over time due to improvements in vehicle efficiency and reduction in emissions between now and 2030.

Improve Key Bottlenecks Strategy

The Improve Key Bottlenecks Strategy is expected to maintain air quality by removing the existing bottlenecks which create congestion and stop and go traffic flows. The improved traffic flow will allow vehicles to move more efficiently. In addition, vehicle efficiencies and emission reductions will help to improve air quality over time.

Add General Lanes Strategy

The Add General Lanes Strategy is expected to maintain air quality by improving the traffic flows which will allow vehicles to move more efficiently. The Add General Lanes Strategy also indicates a moderate increase in the number of vehicles using the corridor compared to the No-Build or the Improve Key Bottlenecks Strategy. Increased vehicle use along I-70 may offset some of the benefits from reduced congestion and improvement in vehicle emissions. In addition, vehicle efficiencies and emission reductions will help to improve air quality over time.

Transportation Improvement Corridor Strategy

The Transportation Improvement Corridor Strategy is expected to maintain air quality by removing the existing bottlenecks which create congestion and stop and go traffic flows. In addition, a separated transportation corridor between the downtown loop and east of Lee's Summit Road would also assist in improved traffic flows. Vehicle efficiencies and emission reductions will help to improve air quality over time. However, the Transportation Improvement Corridor Strategy also indicates a moderate increase in the

number of vehicles using the corridor compared to the No-Build or the Improve Key Bottlenecks Strategy. Increased vehicle use along I-70 may negate some of the air quality benefits from reduced congestion and improvement in vehicle emissions.

Identified Preferred Strategy

The Identified Preferred Strategy is expected to improve air quality by removing existing bottlenecks which create congestion and stop and go traffic flows. The improved traffic flow will allow vehicles to travel more efficiently. In addition, anticipated vehicle fuel mileage efficiency increases and emission reductions will also improve air quality over time. Depending on the options selected for the Identified Preferred Strategy in the Second Tier studies, a moderate increase in the number of vehicles on I-70 is possible. Increase vehicle use along I-70 may negate some of the air quality benefits.

What are the Next Steps in Analyzing Air Quality?

The Second Tier studies will finalize the improvement strategy between east of I-435 and I-470. The Second Tier studies will further evaluate the impacts the Identified Preferred Strategy will have on air quality and will include air quality modeling using FHWA improved model and conformance analysis through MARC. In addition, the Second Tier studies will further consider the affects of the project on carbon and other green house gas emissions per anticipated guidelines.