



Indirect Impacts Technical Report

North Houston Highway Improvement Project
From US 59/I-69 at Spur 527 to I-45 at Beltway 8 North
Harris County, Texas
CSJ: 0912-00-146

Prepared by: TxDOT Houston District
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The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by TxDOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated December 9, 2019, and executed by FHWA and TxDOT.

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1.0 Introduction

The Texas Department of Transportation (TxDOT) proposes to construct improvements to Interstate Highway 45 (I-45) in the northern portion of the City of Houston. The proposed project, referred to as the North Houston Highway Improvement Project (NHHIP), begins at the interchange of I-45 and Beltway 8 North and continues south along I-45 to Downtown Houston where it terminates at the interchange of U.S. Highway (US) 59/I-69 and Spur 527 south of Downtown Houston. The project area also includes portions of I-10 and US 59/I-69 near Downtown Houston. The project area is composed of three study segments, Segments 1 through 3 (Exhibit 1).

This indirect impacts technical report supports the Final Environmental Impact Statement (Final EIS) that evaluates the social, economic, and environmental impacts potentially resulting from the Preferred Alternative for the proposed project.

2.0 Project Description

2.1 Existing Facility

2.1.1 Segment 1: I-45 from Beltway 8 North to north of I-610 (North Loop)

I-45 within this segment consists of eight general purpose lanes (i.e., mainlanes; four lanes in each direction), four to six frontage road lanes (two to three lanes in each direction), and a reversible high occupancy vehicle (HOV) lane in the middle, all within a variable right-of-way (ROW) width of 250 to 300 feet. The existing posted speed limit along the general purpose lanes and reversible HOV lane is 60 miles per hour (mph). The existing posted speed limit for the frontage roads is 45 mph. The length of Segment 1 is approximately 8.8 miles, and the area of the existing ROW is approximately 349 acres.

2.1.2 Segment 2: I-45 from north of I-610 (North Loop) to I-10 (including the interchange with I-610)

I-45 within this segment primarily consists of eight at-grade general purpose lanes (four lanes in each direction), four to six frontage road lanes (two to three lanes in each direction), and a reversible HOV lane in the middle, all within a variable ROW width of 300 to 325 feet. Segment 2 also includes a depressed section that consists of eight general purpose lanes (four lanes in each direction) and a reversible HOV lane in the middle, all below grade, within a 245-foot ROW. The frontage road lanes associated with the depressed section are located at-grade. The existing posted speed limit is 60 mph along the general purpose lanes, 55 mph along the reversible HOV lane, and 40 mph along the frontage road lanes. The I-45 and I-610 frontage roads are discontinuous at the I-45/I-610 interchange. The length of Segment 2 is approximately 4.5 miles, and the area of the existing ROW is approximately 220 acres.

2.1.3 Segment 3: Downtown Loop System (I-45, US 59/I-69, and I-10)

The Downtown Loop System consists of three interstate highways that create a loop around Downtown Houston. I-45 forms the western and southern boundaries of the loop and is known locally as the Pierce Elevated because it partially follows the alignment of Pierce Street. I-10 forms the northern boundary of the loop, and US 59/I-69 forms the eastern boundary of the loop. The loop includes three major interchanges: I-45 and I-10, I-10 and US 59/I-69, and US 59/I-69 and I-45. The interchange of US 59/I-69 and Spur 527 is located southwest of Downtown Houston.

I-45 along the western and southern sides of Downtown consists of six elevated general purpose lanes (three lanes in each direction) within a variable ROW that is typically 205 feet to 320 feet wide. I-10 north of

Downtown, between I-45 and US 59/I-69, consists of six general purpose lanes (three lanes in each direction) within an existing ROW width of 420 feet. US 59/I-69 along the east side of Downtown consists of six general purpose lanes (three lanes in each direction) within an existing ROW width of 225 feet. US 59/I-69 south of Downtown from I-45 to Spur 527 has eight general purpose lanes (four in each direction). Generally, local streets serve as one-way frontage roads within Segment 3, except near the I-10 and US 59/I-69 interchange, where the frontage roads are discontinuous. The length of Segment 3, which includes the Downtown Loop System, is approximately 13.1 miles, and the existing ROW is approximately 638 acres.

2.2 Proposed Facility

The Preferred Alternative for the proposed project is described below, by study segment. The Preferred Alternative includes changes to the Recommended Alternative (for each segment) presented and evaluated in the Draft Environmental Impact Statement. Section 2.0 of the Final EIS discusses the design changes, including the proposed locations of storm water detention areas.

2.2.1 Segment 1: I-45 from Beltway 8 North to north of I-610 (North Loop)

The Preferred Alternative would widen the existing I-45 primarily on the west side of the roadway to accommodate four managed express (MaX) lanes. The proposed typical section would include eight to ten general purpose lanes (four to five lanes in each direction), four MaX lanes (two lanes in each direction), and four to six frontage road lanes (two to three lanes in each direction). The general purpose lanes and MaX lanes would be at-grade except at major cross streets, where they would be elevated over the intersecting streets. Approximately 200 to 225 feet of new ROW would be required for the roadway widening, mostly to the west of the existing I-45. New ROW would also be required on the west side of I-45 for proposed storm water detention areas. New ROW would be required to the east of the existing I-45 ROW at intersections with major streets and between Crosstimbers Street and I-610. Approximately 246 acres of new ROW would be required in Segment 1.

2.2.2 Segment 2: I-45 from north of I-610 (North Loop) to I-10 (including the interchange with I-610)

The Preferred Alternative would widen the existing I-45 to accommodate four MaX lanes. The proposed typical section would include ten general purpose lanes (five lanes in each direction), four MaX lanes (two lanes in each direction), and four to six frontage road lanes (two to three lanes in each direction). From north of Cottage Street to Norma Street, the general purpose lanes and the MaX lanes would be depressed, while the frontage road lanes would be at-grade. The proposed I-45 and I-610 frontage roads would be continuous through the I-45/I-610 interchange. New ROW would be required from both the east and west sides of the existing I-45. The new ROW would include proposed storm water detention areas on the east side of I-45, south of Patton Street. Approximately 44 acres of new ROW would be required in Segment 2.

The Preferred Alternative provides a structural “cap” over a portion of the depressed lanes of I-45 from north of Cottage Street to south of N. Main Street. Future use of the structural cap area for another purpose would require additional development and funding by entities other than TxDOT.

2.2.3 Segment 3: Downtown Loop System (I-45, US 59/I-69, and I-10)

The Preferred Alternative would reconstruct all the existing interchanges in the Downtown Loop System and reroute I-45 to be parallel to I-10 on the north side of Downtown and parallel to US 59/I-69 on the east side of Downtown. Access to the west side of Downtown would be provided via “Downtown Connectors” that would consist of entrance and exit ramps for various Downtown streets. A section of the Downtown Connectors would be below-grade (depressed) between approximately W. Dallas Street to Andrews Street. The existing elevated I-45 roadway along the west and south sides of Downtown would be removed, as would the portion of I-45 (Pierce Elevated) between Brazos Street and US 59/I-69. Community groups have expressed an interest in

having the Pierce Elevated left in place for future use and redevelopment; however, this use for the structure is not proposed by TxDOT, and is not evaluated in the Final EIS. In the event that these groups make keeping the Pierce Elevated in place a viable option, TxDOT would then conduct a reevaluation and solicit public input to evaluate the impacts of leaving it in place.

To improve safety and traffic flow in the north and east portions of Segment 3, portions of both I-10 and US 59/I-69 would be realigned (straightened) to eliminate the current roadway curvature. I-45 and US 59/I-69 would be depressed along a portion of the alignment east of Downtown. South of the George R. Brown Convention Center, the rerouted I-45 would begin to elevate to tie to existing I-45 southeast of Downtown, while US 59/I-69 would remain depressed as it continues southwest toward Spur 527. US 59/I-69 would be widened from eight to twelve general purpose lanes between I-45 and SH 288, and would be reconstructed to ten general purpose lanes from SH 288 to Spur 527.

The four proposed I-45 MaX lanes in Segments 1 and 2 would terminate/begin in Segment 3 at Milam Street/Travis Street, respectively. I-10 express lanes (two lanes in each direction) would be located generally in the center of the general purpose lanes within the proposed parallel alignment of I-10 and I-45 on the north side of Downtown. The I-10 express lanes would vary between being elevated and at-grade.

New ROW to the east of the existing US 59/I-69 along the east side of Downtown would be required to accommodate the proposed realigned I-45. A new continuous southbound access road would be provided adjacent to US 59/I-69 and would tie to existing Hamilton Street on the south side of the Convention Center. The existing St. Emanuel Street would serve as a northbound access road. The project ROW would include areas to be developed as storm water detention. Approximately 160 acres of new ROW would be required, the majority of which would be for the I-10 and US 59/I-69 realignments (straightening) and to construct the proposed I-45 lanes adjacent to US 59/I-69 along the east side of Downtown.

The Preferred Alternative provides a structural “cap” over the proposed depressed lanes of I-45 and US 59/I-69 from approximately Commerce Street to Lamar Street. There would also be a structural cap over the depressed lanes of US 59/I-69 between approximately Main Street and Fannin Street, and in the area of the Caroline Street/Wheeler Street intersection. Future use of the structural cap areas for another purpose would require additional development and funding by entities other than TxDOT.

3.0 Indirect Impacts

Transportation projects that provide new or improved access to adjacent land could induce development of undeveloped land or redevelopment of land to more intensive uses. This section provides an analysis of potential induced growth impacts that could be attributed to the proposed North Houston Highway Improvement Project (NHHIP).

3.1 Induced Growth

This induced growth analysis was developed using the Texas Department of Transportation's (TxDOT) July 2016 *Guidance on Indirect Impacts Analysis*. The proposed NHHIP was evaluated using TxDOT's *Risk Assessment Tool* questionnaire, which serves as an initial step to evaluate whether a proposed project could induce growth and would warrant further analysis. Based on the results of the *Risk Assessment Tool*, TxDOT determined that an induced growth analysis would be necessary for the proposed NHHIP. This determination that further analysis was needed was based on the following factors:

- Availability of land for development/redevelopment

- Added capacity from proposed project action
- Substantial increase in access and mobility in the project area
- Existing population and economic growth in the project area

The following six steps are addressed in the induced growth impact analysis:

1. Define the methodology.
2. Define the AOI and study time frame.
3. Identify areas subject to induced growth in the AOI.
4. Determine if growth is likely to occur in the induced growth areas.
5. Identify resources subject to induced growth impacts.
6. Identify mitigation, if applicable.

3.1.1 Step 1—Define the Methodology

A planning judgment approach, supported by planning assumptions and land use projections from the Houston-Galveston Area Council of Governments (H-GAC), City of Houston, Harris County, and management districts within the project area, was used to identify areas of potential growth, development trends, and the probability of the proposed project to influence local land use decisions within the Area of Influence (AOI).

The methodology for the induced growth analysis was developed using the TxDOT 2016 *Indirect Impacts Analysis Guidance*, which is based on the 2002 National Cooperative Highway Research Program (NCHRP) Report entitled *NCHRP Report 466: Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects* (NCHRP 2002) and the American Association of State Highway and Transportation Officials (AASHTO) *Practitioner's Handbook 12: Assessing Indirect and Cumulative Impacts Under NEPA* (AASHTO 2016). Additional guidance utilized throughout the analysis includes the NCHRP Project 25-25 Task 22 report entitled *Forecasting Indirect Land Use Effects of Transportation Projects* (NCHRP 2007).

The following indirect impact analysis is based on several central definitions. In addition to direct effects, major transportation projects may also have indirect effects on land use and the environment. As defined by the Council on Environmental Quality (CEQ), indirect effects are “caused by an action and occur later in time or farther removed in distance but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems” (40 Code of Federal Regulations [CFR] §1508.8). It should be noted that guidance documents use different terms, including “indirect effects” (AASHTO guidance) and “indirect impacts” (TxDOT guidance). For the purpose of this analysis, both terms are used and the meanings are the same.

NCHRP Report 466 (2002) identifies three broad categories of indirect effects:

1. **Encroachment alteration effects:** These effects may result from changes in ecosystems, natural processes, or socioeconomic conditions that are caused by the proposed action but occur later in time or are farther removed in distance. One example of this type of effect would be a change in habitat or flow regime downstream resulting from installation of a new culvert.
2. **Project-influenced development effects:** These are sometimes called induced growth or the “land use effect.” For transportation projects, induced growth effects are most often related to changes in

accessibility of an area, which in turn affects the area's attractiveness for development. Indirect impacts associated with induced development are also similar to direct impacts but would occur in association with future land use development undertaken by others over the development horizon within a larger study area beyond the direct footprint of the proposed project.

3. **Effects related to project-influenced development:** These are impacts to the natural or human environment that may result from project-influenced changes in land use.

Probability is important in providing a distinction between direct and indirect effects because direct effects are generally inevitable, while indirect effects are merely probable. According to NCHRP Report 466 (2002), the term "reasonably foreseeable" means that effects are "sufficiently likely to occur that a person of ordinary prudence would take them into account in making a decision;" such effects are probable, not just possible. Further, "effects that can be classified as possible but not probable may be excluded from consideration" (NCHRP 2002).

According to TxDOT's *Indirect Impacts Analysis Guidance* (TxDOT 2016), "whether an impact is substantial is a function of the context, the likelihood of the impact, and the reversibility of the impact." TxDOT guidance defines the term "significant" as it has been interpreted under the National Environmental Policy Act (NEPA) and its related regulations. See 43 Texas Administrative Code (TAC) 2.5 (25). That interpretation includes the definition used in 40 CFR 1508.27, which focuses on context and intensity considerations. An agency must examine the context or setting in which the action occurs (e.g., national, regional, affected interests, and locality) and consider short- and long-term effects of the action. An agency must also analyze the intensity or severity of the impact. In doing so, the agency must consider: beneficial and adverse impacts to public health and safety; unique geographical characteristics; controversy related to effects on human environment, uncertainty, or unknown risks involved; precedent that may be set; relatedness of the action to other actions that would collectively create a cumulative impact that may be significant (significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment—and significance cannot be avoided by terming an action temporary or by breaking it down into small component parts); impacts to or loss of scientific or cultural resources; endangered species impacts; and any other violation of any other environmental protection law.

Encroachment alteration effects are discussed in some of the resource-specific technical reports as well as in the direct impacts sections of the Final EIS. In addition to encroachment alteration effects, indirect impacts could also occur as a result of induced development associated with the proposed project. Project-influenced development effects are discussed in Section 3.1.4. Effects related to project-influenced development are discussed within the section on indirect effects potentially resulting from induced growth (Section 3.1.5). Potential minimization and mitigation measures are a focus of the TxDOT guidance and the AASHTO guidance and are discussed in Section 3.1.6.

Local expert interviews conducted through the use of questionnaires, planning judgment, and cartographic techniques were employed in this analysis. In order to obtain specific information from local experts, detailed questionnaires were developed and administered. These customized questionnaires were sent to agencies, organizations, and governmental jurisdictions within the project's AOI (Attachment B). The questionnaire and AOI map were emailed to each organization listed in Table 1. Follow-up emails were sent to organizations that had not replied by December 15, 2017, as noted in Table 1. Follow-up calls or emails were also placed during January 2018. More detailed information about questionnaire results is provided in Section 3.1.4.3.

Table 1: Induced Growth/Land Development Questionnaire Respondents

Agency/District Name	Initial Outreach	Follow-up Emails/Phone Calls	Response Received
Planning Agencies			
Houston-Galveston Area Council	11-27-2017	-	12-14-2017
Harris County Engineering	11-27-2017	-	12-14-2017
City of Houston Planning and Development	11-27-2017	-	12-27-2017
City of Houston Parks and Recreation	11-27-2017	12-13-2017	-
City of Houston Public Works and Engineering	11-27-2017	12-13-2017	-
City of Houston Housing and Community Development	11-27-2017	12-13-2017, 1-17-2018	12-14-2017 (indicated may not have time to respond after Hurricane Harvey)
Houston Independent School District (ISD) Real Estate Department	11-27-2017	-	12-14-2017
Aldine ISD Facilities Planning and Construction Department	11-27-2017	-	11-28-2017, 1-29-2017
Houston Housing Authority			
Houston Housing Authority	11-27-2017	12-13-2017	-
Management Districts			
Airline Improvement District	12-1-2017	12-18-2017	-
East Downtown Management District	12-1-2017	12-18-2017	-
Greater East End Management District	12-1-2017	-	12-19-2017
Greater Northside Management District	12-1-2017	-	12-20-2017
Greater Southeast Management District	12-1-2017	12-18-2017	-
Houston Downtown Management District	12-1-2017	-	12-15-2017
Midtown Management District	12-1-2017	12-18-2017	-
Montrose Management District	12-1-2017	12-18-2017	-
North Houston District (formerly Greater Greenspoint Management District)	12-1-2017	12-18-2017, 12-20-2017	1-3-2018
Harris County Flood Control District			
Operations Division	11-27-2017	-	12-8-2017

As noted in the NCHRP guidance, “[i]ndirect effects can be linked to direct effects in a causal chain” (NCHRP 2002). This analysis operates under the assumption that a proximate cause-effect relationship with the proposed project must be present in order for an indirect effect to occur. In cases where the proposed project would potentially contribute—but not be causally linked—to a potential effect, the contribution of the proposed project to this potential effect, when added to other past, present, and reasonably foreseeable future actions by others, is considered further in Section 6 of the Final EIS (Cumulative Impacts).

3.1.2 Step 2—Define the Area of Influence and Study Timeframe

The AOI for the induced growth analysis represents the geographical area where indirect effects related to project-influenced development and land use changes would most likely occur. The NCHRP Report 466 states that “development effects are most often found up to one mile around a freeway interchange, up to two to five

miles along major feeder roadways to the interchanges, and up to one-half mile around a transit station.” This is a general guideline, and individual projects must be analyzed case-by-case.

The AOI for the induced growth analysis encompasses approximately 103,536 acres in north Houston and in the Downtown inner loop, which includes areas of potential growth and redevelopment (Exhibit 1). Several considerations were factored into the development of the AOI boundary:

- Consideration of political and geographic boundaries (existing roadways, natural features, jurisdictional limits, and census tracts);
- Consideration of the initial corridor study area as basis of study area;
- Consideration of U.S. Census Bureau data. The AOI coincides with census tracts within an approximate 1-to-2-mile radius of the I-45 corridor. U.S. Census tracts were used to facilitate data collection of population and employment projections;
- Consideration of the general travelshed for the NHHIP corridor;
- Consideration of future land development. The AOI includes areas of potential growth based on HGAC future land use maps, vacant developable areas within 1-to-2-mile radius of the I-45 corridor;
- Consideration of redevelopment trends. The AOI includes areas of potential redevelopment surrounding the downtown area based on recent trends (e.g. the inner loop); and
- Consideration that the area surrounding the project is mostly urbanized and nearly built-out.

The AOI extends north along the I-45 corridor to FM 1960, between SH 249 and the Hardy Toll Road, and south to Brays Bayou between Shepherd Drive and I-610 East. From I-45, the eastern limit extends to the Hardy Toll Road; south of I-10, the eastern boundary extends to I-610 East. The western limit extends from I-45 to SH 249/West Montgomery Road between FM 1960 and Tidwell Road and then to Shepherd Drive between Tidwell Road and Brays Bayou.

One questionnaire respondent suggested extending the AOI boundary farther north to include the Springwoods Village development/Exxon campus that is located immediately west of I-45 and north of the AOI northernmost boundary; however, research confirmed this area was analyzed in the Grand Parkway Segment F-2 Final EIS as part of the indirect impacts analysis. Due to the proximity of this suggested AOI expansion area to the Grand Parkway Segment F-2 (which opened in February 2016), it is assumed the influence of Grand Parkway on this area would eclipse the proposed improvements to I-45. Therefore, no modifications to the AOI have been made.

The temporal boundary for the induced growth effects analysis is from 2016 to 2040, which is the planning horizon year for the Houston-Galveston Area Regional Transportation Plan (RTP). The year 2040 is also utilized in other components of the Final EIS analyses.

3.1.3 Step 3—Identify Areas Subject to Induced Growth in the AOI

Vacant land and undevelopable areas (such as waterbodies, floodplains, parklands, and existing development) were identified to determine where induced growth could occur in the AOI and where development would be limited; this analysis used H-GAC’s land use GIS data files (H-GAC 2018a). Input from the induced growth questionnaire respondents was also utilized to confirm or update recent development trends. Future land use plans and local planning regulations were reviewed to identify projected areas of growth, areas of

redevelopment, and policies that may encourage or restrict development. Future land use data in this analysis was derived from H-GAC's 2045 land use GIS data files (H-GAC 2018b).¹

Approximately 2,812 acres in the AOI are undeveloped property (vacant and developable land; H-GAC 2018a). This acreage represents approximately 2.7 percent of the 103,536-acre AOI and has decreased since the preparation of the Draft EIS; this decrease can be attributed to updated H-GAC land use data and the fact that development is continuing throughout the region. Large tracts of vacant land are located in the northern portion of the AOI (between Beltway 8 and The Woodlands) and in the northwest corner of the central portion of the AOI (between Beltway 8 and I-610). Smaller vacant lots are scattered throughout existing residential areas in the central portion of the AOI, particularly near the Acres Home and Independence Heights neighborhoods. The southern portion of the AOI (south of I-610) is densely populated and has minimal land available for new development; areas of potential growth are more suitable to redevelopment and infill development. The total acreage of potentially developable and undevelopable land in the AOI is provided in Table 2 and illustrated in Exhibit 1.

Table 2: Potentially Developable and Undevelopable Land in the AOI

Land Type	Acres	Percent of Total AOI*
Existing Development	67,743	65.4
Undevelopable	5,758	5.6
Vacant Developable (includes farming)	2,812	2.7
Water/ROW/Railway*	23,901	23.1
Park/Open Space	1,924	1.9
Undetermined/Unknown Land Uses	1,397	1.3
Total AOI	103,536	100

Source: H-GAC 2018a

*These land use types are not specifically provided in the current H-GAC dataset but were deduced from its data; therefore, this is an approximate collective estimate for these land uses based on GIS analysis from a representative sample.

Most of the undeveloped property in the northern portion of the AOI is located in the unincorporated area of Harris County or within the extra-territorial jurisdiction (ETJ) of Houston. The larger tracts of vacant land in the central AOI are located in the unincorporated area of Harris County; however, the vacant properties south of West Gulf Bank Road, which include Acres Home, are within the city limits of Houston. The southern portion of the AOI is mostly within the Houston city limits. Neither the City of Houston nor Harris County have zoning regulations, so development is mostly regulated through the subdivision platting process or by individual health and nuisance codes and ordinances. The City of Houston maintains subdivision approval authority within its ETJ. The local regulations provide few restrictions on development that would influence whether induced growth is likely to occur. New floodplain regulations adopted by Harris County in December 2017 impose new regulations within the 500-year floodplain.

The H-GAC's 2045 Regional Growth Forecast projections show population and employment growth throughout the suburban areas of Harris County for the year 2045, including the north and west part of the county, as well as in the Downtown area (H-GAC 2018b). Land use and growth projections estimated in the 2040 RTP include the proposed NHHIP (H-GAC 2016). Information obtained from local experts about announced developments

¹ The current future land use data available from the H-GAC was released in early 2018 and forecasts through the year 2045. The data set extends past the temporal boundary for this analysis (2040) but is considered the best available source for this type of data.

helps analysts understand what is already happening (existing conditions) and identify the areas that could potentially experience new induced development. This also helps identify areas for potential redevelopment.

The questionnaire responses submitted by agencies, organizations, and governmental jurisdictions within the project's AOI included information related to substantial proposed developments (varying degrees of detail were provided). These planned developments include schools, hospitals, medium- to high-density residential, commercial, retail, industrial, hotel, University of Houston expansions, and medical offices, for example. A small portion of the planned developments would involve the redevelopment of previously developed parcels. Quantified information provided by the H-GAC respondent regarding announced developments indicates that approximately 1,777 announced developments are located within the AOI. Table 3 and the Announced Developments (2015–2045) map provided in Attachment B summarize and illustrate the announced developments located within the AOI that are tracked by the H-GAC.

Table 3: Announced Developments within the AOI

	Land Use	Number of Developments	Housing Units
	Residential	1,592	7,943
	Commercial	108	-
	Government/Medical/Education	21	-
	Industrial	33	-
	Multiple	17	2,369
	Other	6	-
	Total	1,777	10,312

Source: H-GAC 2017 Regional Growth Forecast (H-GAC 2017)

The small percentage of vacant developable land within the AOI and the number of announced developments in the AOI indicate that the AOI is nearing build-out and has a limited potential for new construction. Redevelopment is considered a potential real estate trend given the density of existing development throughout the AOI.

3.1.4 Step 4—Determine if Growth is likely to Occur in Induced Growth Areas

Improvements in transportation infrastructure that increase mobility or reduce travel times may attract development, and new roadways can provide access that leads to new development. Redevelopment and changes in land use patterns may also occur as a result of right-of-way acquisition and the displacement of businesses and residences. In addition to transportation improvements, several factors affect where growth may occur: suitability of land, available utilities, physical constraints, favorable planning policies, and development trends.

This step presents information on development trends and community goals within the AOI. Following this discussion, areas of potential future development are identified and quantitatively and qualitatively evaluated. As noted in *NCHRP Report 466: Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects*, “[i]ndirect effects can be linked to direct effects in a causal chain” (NCHRP 2002). Reasonably foreseeable effects are “sufficiently likely to occur that a person of ordinary prudence would take them into account in making a decision” (NCHRP 2002). Reasonably foreseeable events must be probable, not just possible. Probability also helps distinguish indirect effects from direct effects: direct effects are often inevitable, while indirect effects are simply probable. The NCHRP Report 466 notes that “[e]ffects that can be classified as possible but not probable may be excluded from consideration.” Therefore, this section seeks to determine whether project-induced development or redevelopment in the AOI is probable by discussing existing trends.

3.1.4.1 Regional and Local Trend Data

North and Central AOI

The northern portion of the AOI has steadily grown since the 1970s and is largely developed. Historic aerials from 1978 to 2016 show continuous development along I-45 between FM 1960 and Beltway 8 (Google Earth 2016). Some of the larger tracts of land on the west side of I-45 and south of FM 1960 that are currently vacant developable areas (Exhibit 1) are projected to become residential by 2045 (Exhibit 2; H-GAC 2018b). Another large tract of vacant undeveloped land located in the southwest corner of the I-45 and Beltway interchange is the future Pinto Business Park, which has already been identified as the location for a future industrial business park (Smith 2017). Some of the larger tracts of land on the east side of I-45 and south of FM 1960 that are currently vacant developable areas (Exhibit 1; H-GAC 2018a) are projected to develop as residential, industrial, and mixed-use development by 2045 (Exhibit 2; H-GAC 2018b). Questionnaire responses identified the Tan Oak Business Park as one major development in this area; it is an example of an under-developed tract that has the potential to continue developing through 2040 (Smith 2017; Beeler 2017). In the central portion of the AOI, developable areas between SH 249 and Veterans Memorial Drive are located within or adjacent to floodplain areas, which may limit or restrict development. Acres Home neighborhood has higher a concentration of vacant lots, but the area is partially within a floodplain. Future land use projections indicate minimal to no change in development in this area (H-GAC 2018b).

Properties adjacent to land that would be acquired for new right-of-way on I-45 may redevelop or change use as a result of displacements. For example, the displacement of commercial property along the frontage roads would bring the I-45 corridor closer to some of the single-family residential areas. Over time, these residential areas may redevelop into commercial use—a type of use that is more common along frontage roads—shifting residential growth to other developable areas or encouraging increased medium- to high-density residential redevelopment.

South AOI

The Preferred Alternative proposes changes in roadway alignments or access through the Downtown area that would have different indirect impacts to land use and development in the southern portion of the AOI and the northern portion of the AOI. The removal of Pierce Elevated between West Dallas Street and US 59/I-69, would eliminate a visual barrier between the central Downtown area and neighborhoods on the south and west side of Downtown. Removal of the Pierce Elevated could encourage more high-density, mixed-used redevelopment to extend from Downtown into these neighborhoods. The Preferred Alternative also includes depressing a portion of US 59/I-69 from Commerce Street to Spur 527, and the depressed section from Commerce Street to Lamar Street would be capped by a structure between the frontage roads and could be used as a green space. (As currently designed, TxDOT would construct the structure above the depressed lanes.) A potential capped green space (which would require additional development and funding by entities other than TxDOT) would improve connectivity between central Downtown and neighborhoods to the east, which may encourage commercial and retail redevelopment and mixed use residential redevelopment in the immediate vicinity as well as further east. To reiterate, this potential green space cap is conceptual and not part of the proposed project, and it would require separate development and funding.

Proposed changes in roadway alignments and new right-of-way requirements through the Downtown area may also create barriers that disconnect the surrounding neighborhoods from Houston's central business district, potentially reducing future growth and redevelopment in these areas. The Preferred Alternative proposes additional northbound lanes on the east side of US 59/I-69, which would widen the separation between central Downtown and east Downtown. Widening the separation and reducing access between central Downtown and

east Downtown could further isolate communities to the east that are experiencing residential and commercial redevelopment and discourage future development. The existing Hamilton Street would be realigned to be adjacent to US 59/I-69 to serve as the southbound frontage road, and the existing St. Emanuel Street would serve as the northbound frontage road. This area is generally depicted in Exhibits 3a and 3b. Similarly, the Preferred Alternative includes elevated lanes along the realignment of I-45 that could create a barrier and isolate neighborhoods north of I-10 from the central business district.

Historic and Projected Population Growth

According to historic and current growth data produced by the U.S. Census Bureau and presented in Table 4, the populations of the City of Houston and Harris County increased approximately 36.8 and 57.3 percent (respectively) between 1990 and 2016.

Table 4: Current and Historic Population Growth

City or County	Total Population by Year				% Change Between 1990–2016
	1990	2000	2010	2016	
City of Houston	1,637,859	1,953,631	2,099,451	2,240,582	36.8
Harris County	2,818,199	3,400,578	4,092,459	4,434,257	57.3

Sources: Texas State Historical Association 2018a, 2018b; U.S. Census Bureau 2010, 2016, American Community Survey 2012–2016.

The H-GAC develops a Regional Growth Forecast, including population, employment, and land use, for an eight-county area (Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties). As shown in Table 5, according to the H-GAC projections for households and jobs, the area bound by the AOI is expected to see continued, strong growth between 2015 and 2045. (This information was provided as part of the H-GAC’s questionnaire response and was tailored for the AOI.)

Table 5: 2015–2045 Projected Household and Job Growth within the AOI

Growth Indicator	2015	2045	Change Between 2015 and 2045	% Change Between 2015 and 2045
Household Population	746,755	921,691	174,936	23.4
Households	278,635	373,354	94,719	34.0
Jobs	657,243	806,193	148,950	22.7

Source: H-GAC 2017 Regional Growth Forecast (H-GAC 2017)

Based on these land use development and projected demographic trends, it can be concluded that there is an *existing* moderate to strong potential for future growth in the AOI. The range of moderate to strong is used because some areas of the AOI are more densely built out compared to others.

3.1.4.2 Local Plans and Ordinances

A variety of plans and ordinances promote, guide, and monitor development activity in Houston and Harris County. A brief description of the most influential aspects of local plans and ordinances in relation to the proposed project and the AOI is presented. Any potential induced development or redevelopment would take place against the backdrop of these plans and ordinances. In a developed city such as Houston, both anticipated and unanticipated projects happen in the context of these plans, which provide some level of safeguards to the community. They may have a mitigative effect on future development.

Regional Plans

H-GAC 2040 Regional Transportation Plan

The proposed project area is within the planning area of the H-GAC RTP. The 2040 RTP guides transportation planning projects in the eight-county region. The recommended investments in the plan amount to approximately \$88 billion and are based on goals to improve safety, manage and mitigate congestion, ensure strong asset management and operations, strengthen regional economic competitiveness, and conserve and protect nature and cultural resources (H-GAC 2016). Two of the goals in the RTP that are relevant to the proposed project are “Improve Safety” and “Manage and Mitigate Congestion” (H-GAC 2016). The proposed project would help achieve both of those goals, as the additional capacity is expected to alleviate congestion, increase evacuation effectiveness, and update the roadway to current TxDOT design standards. The proposed project is included in this plan.

Urban Houston Framework Study

H-GAC’s Urban Houston Framework Study is intended to help integrate land use and transportation planning by coordinating development standards with transit investments (H-GAC 2013). The study envisions “Urban Centers” throughout the city—vibrant centers where people of all ages and backgrounds can live, work, and play. The study is considered the first phase in developing a set of regulatory incentives that the City and its regional partners can use to encourage dense, sustainable neighborhoods (H-GAC 2013).

Harris County Flood Control District Ordinance

Due to flooding caused by Hurricane Harvey, the Harris County Commissioners Court adopted new floodplain regulations in December 2017 for future development in unincorporated areas; the new regulations went into effect January 1, 2018. The new regulations increase the height that new homes must be elevated and impose development standards within the 500-year floodplain. Previously, regulations were limited to 100-year floodplains (Harris County Engineering Department 2018; Zaveri 2017).

City of Houston Plans

Plan Houston

Adopted in 2015, Plan Houston is the City of Houston’s first general plan, a long-range planning document that describes a community vision and identifies goals and core strategies to help achieve the vision (City of Houston 2017a). The plan is intended to improve coordination between government agencies and help the City prepare for future anticipated growth. In 2017, residents identified three priorities the City should focus on in the next budget year: crime and public safety, flooding, and potholes and street congestion. The plan’s Steering Committee (which includes representatives of organizations with a broad planning focus) ranked transportation options, affordable housing, and walkable streets as the highest priorities. City leaders are using both of these survey results to make decisions for each fiscal year (City of Houston 2017a).

Major Thoroughfare and Freeway Plan

The City of Houston maintains a Major Thoroughfare and Freeway Plan (MTFP), which guides mobility within Houston’s city limits and areas of Harris, Fort Bend, Liberty, Montgomery, and Waller Counties. The plan is a component of the Complete Streets and Transportation Plan. According to the Urban Houston Framework Study, the MTFP was first published in 1942 and has served to coordinate thoroughfare and highway improvement efforts among various state and local governmental agencies. Annual amendments incorporate citizen feedback about traffic congestion, general mobility issues, and development plans that may affect the functionality of Houston’s Street Hierarchy System (City of Houston 2017b). Streets are categorized as Principal Thoroughfares, Thoroughfares, Collector Streets, or Local Streets based on the length of the road, existing/projected traffic volumes, character of nearby properties, and the possibility of future expansion,

including man-made/natural barriers (City of Houston 2017b). The MTFP map shows roadways that have sufficient width, roadways that need to be widened, and roadways that need to be developed. The determination of sufficient width refers only to right-of-way width, rather than the existing number of lanes. I-45 within the proposed project limits is depicted as a Freeway/Expressway of sufficient width (City of Houston 2017b).

Complete Streets and Transportation Plan

Under the umbrella of Plan Houston is the City's Complete Streets and Transportation Plan. The plan originated from a City Executive Order recognizing complete streets—public roadways that take into account all users and all modes of transportation (City of Houston 2013). The plan provides a framework for coordination and integration of revisions to a number of citywide multimodal transportation plans, including the Bicycle Master Plan and the Major Thoroughfare and Freeway Plan. The City issues annual reports providing updates on the implementation of these plans as well as other indicators identified in the Executive Order (linear miles of new/reconstructed sidewalks and new/restriped on-street bicycle facilities, among others; City of Houston 2016).

Houston Bike Plan

The City of Houston's Bike Plan, also a component of the Complete Streets and Transportation Plan, is the product of a multi-year planning effort that was adopted by the City Council in March 2017. It aims to improve safety, increase access and ridership, and develop and maintain facilities for the bicycling community (City of Houston 2017c).

Parks Master Plan

The Parks Master Plan divides the City of Houston into 21 Park Sectors, identifying and prioritizing park facility and land needs by sector (City of Houston 2015). The plan utilizes a standard that analyzes parkland acreage per thousand people by sector. Recommendations in the plan help determine and prioritize the expenditure of fees garnered through the City's Parks and Open Space Ordinance as well as future bond elections (the Ordinance applies to residential development and gives developers the option to either dedicate land for park purposes or pay a fee-in-lieu of dedication). I-45 serves as a boundary for multiple sectors.

City of Houston Code of Ordinances

Although the City of Houston does not have zoning regulations that control land use (residential versus commercial, for example), the City reviews and approves platting proposals to ensure that proposed developments are properly subdivided based on City code. The City's Code of Ordinances Chapter 42: Subdivisions, Development and Platting governs development activity and applies to areas within the ETJ. This chapter of City code establishes minimum lot sizes and minimum building lines and ensures that new development or redevelopment projects respect existing community character. Many developers in Houston employ private covenant and deed restrictions that function like zoning; the City also plays a role in ensuring that these restrictions are enforced.

Specific Area Plans

Bayou Greenways 2020 (Houston Parks Board)

Bayou Greenways 2020 is a plan to transform 3,000 underutilized acres of land along Houston's bayous into linear parks, connecting 150 miles of hike-and-bike trails to parks and communities. It is led by a public-private partnership between the Houston Parks Board and the Houston Parks and Recreation Department, in close collaboration with the Harris County Flood Control District. Bayou Greenways 2020, named for its anticipated completion date, is one phase of the Bayou Greenways Initiative: the overarching, long-range vision of developing connected green corridors with hike-and-bike trails along the bayous across the greater Houston

area. Bayou Greenways 2020 is the portion of the Bayou Greenways Initiative that is located within Houston's city limits (Houston Parks Board 2018).

Halls Ahead (Harris County Flood Control District)

Halls Ahead is a flood damage reduction study led by the Harris County Flood Control District for the Halls Bayou watershed (HCFCD 2018), which cuts across the northern limits of Segment 1 (Exhibit 1). The District is currently developing the draft plan, which has not yet been presented to the public. Flooding along Halls Bayou is common; the study will provide a concept for how the bayou and its tributaries can provide a drainage outlet for flood-prone areas in the watershed (HCFCD 2013).

Plan Downtown

Plan Downtown is a 20-year vision plan produced by the Houston Downtown Management District and Central Houston, Inc. It outlines recommendations for short-term and long-term planning, aiming to improve the business climate, livability, and connectivity of downtown Houston (Downtown District 2017). The plan discusses numerous opportunities for downtown, including the "Green Loop," a 5-mile trail network of public parks, public spaces, and active streetscapes that would potentially be facilitated by the anticipated availability of new public land from the relocation of a portion of existing I-45.

H-GAC Livable Centers Program

H-GAC's Livable Centers Program works with local communities to facilitate the creation of walkable, mixed-use places that provide multimodal transportation options, improve environmental quality, and promote economic development (H-GAC 2018c). The program envisions neighborhoods that are compact and mixed use, walkable, and connected and accessible. The program funds studies and implementation projects; the following are studies that were completed within the AOI and that likely would be affected by the proposed project.

Downtown/East Downtown (EaDo)

In conjunction with H-GAC, the Downtown/EaDo study was sponsored by the Houston Downtown Management District and the East Downtown Management District (H-GAC 2011). It provides recommendations for an area of downtown bounded by Pease, St. Charles, Commerce, and Austin Streets. Among other recommendations, the study identifies how to provide housing options close to downtown for a range of incomes and households.

Northside

Completed in partnership with the Northside Management District, the Northside study provides recommendations for the Northside area (north of downtown Houston), bounded by I-10, I-45, Patton Street, and Elysian Street. Recommendations are focused on overall neighborhood structure, connectivity and circulation, pedestrian and bicycle amenities, parks and open space, and design guidelines (H-GAC 2018c).

Independence Heights-Northline

The study provides recommendations for the area west of I-45 and the Northline Commons area. Partners include the Greater Northside Management District and the Independence Heights Redevelopment Council (H-GAC 2018c).

Airline Improvement District

The study provides recommendations for the Airline Drive corridor, approximately eight miles north of downtown and roughly bounded by West Road and Aldine Mail Route, Canino Road and Carby Road, Hardy Toll Road, and Sweetwater Street. Partners include the Harris County Community Services Department and the Airline Improvement District (H-GAC 2018c).

Cypress Creek Parkway

Provides recommendations for the area near the intersection of Cypress Creek Parkway (FM 1960) and Kuykendahl Road; partners include the Ponderosa Forest Utility District, the Houston Northwest Chamber of Commerce, and the Cypress Creek Parkway Property Owner's Association (H-GAC 2018c).

3.1.4.3 Potential for Induced Development

The preceding summaries of planning studies, documents, and ordinances indicate that there are numerous initiatives underway to direct development throughout the AOI. Further analysis of the potential induced growth impacts of the Preferred Alternative was performed during preparation of the Final EIS. TxDOT consulted with local planning officials and agencies with knowledge and/or responsibilities for land use planning to seek their input on whether the proposed project improvements could increase the rate of development or attract additional development in the AOI.

The preceding sections have demonstrated an *existing* moderate to strong potential for growth and established the planning framework within which that growth would occur in the AOI during the analysis period of 2016–2040. This section will evaluate the nature of this potential for growth and attempt to determine whether it can be causally linked to the proposed NHHIP project. The evaluation of whether the proposed project is likely to result in project-induced land use change is patterned after the development trends presented in NCHRP Project 25-25, Task 22. When reviewing the analysis presented in this section, it is important to remember that **project-induced land use change can include project-induced development, the redevelopment of previously developed land, or a change in the rate of development/redevelopment**. In order to make reasonable judgments about potential project-induced impacts, the Planning Judgment forecasting tool incorporated data collected via questionnaires with planning professionals in the project vicinity, and ultimately incorporated data collected from numerous professionals with relevant expertise.

Questionnaire Results

As described previously, a customized questionnaire was sent to agencies, organizations, and governmental jurisdictions within the project's AOI. The questionnaire and AOI map, provided in Attachment B, were emailed to each organization listed in Table 1 on November 27 and December 1, 2017. Follow-up emails were sent to organizations that had not replied by December 15, 2017. Follow-up calls or emails were also placed in January 2018.

The planning experts were asked where development is expected to occur and whether the proposed project would induce growth. Specifically, the interviewees were asked the following questions:

Planning Agencies (H-GAC, Harris County, City of Houston, Houston ISD, Aldine ISD)

- Are you aware of any substantial proposed land developments within your jurisdiction or area? If so, please mark the areas on the attached map and provide the location, type, and size (e.g., acres, density, number of units) of any planned developments. Also, please indicate if any of the proposed land developments that you identified on the attached map have been platted.
- On the attached map, please identify areas (if any) that you think would likely be developed by 2040 as a result of the proposed project that would not otherwise be developed. *(Please distinguish from developments identified in question 1.)*
- Would the proposed project affect the rate of land development in your jurisdiction?
- Is the proposed project consistent with local planning efforts (i.e., master or comprehensive plans, growth management plans, zoning or land use policies, etc.)?

- Are there other capital improvement projects—such as water or sewer infrastructure, school or hospital construction—that are planned for the area which might affect development in the project vicinity?
- Are there any factors that could limit growth in the area, such as floodplains, current development, conservation easements, protected lands, etc.?
- Do you have any comments on the proposed AOI, or do you think it is a reasonable study area for an assessment of induced development that may result from the proposed project? If you think a different boundary would be more appropriate, please mark the attached map and provide a written description why you believe a different AOI boundary would be more suitable.
- To what extent do you believe that the proposed highway improvement project would induce redevelopment? Are there specific parcels that would be attractive to redevelopment after the project is complete? Please provide any available details.
- How do you believe that the removal of the Pierce elevated roadway might influence growth patterns?
- Do you anticipate that the types and density of development would change as a result of this project? Please explain.

Houston Housing Authority

- Are you aware of any substantial proposed land developments within this mapped study area? Is the Houston Housing Authority (HHA) aware of particular housing needs or issues within this study area? If so, please mark the areas on the attached map and provide relevant information (the location, type, and size of areas/developments.)
- Are you aware of other capital improvement projects—such as water or sewer infrastructure, school or hospital construction—that are planned for the area which might affect development or the current housing situation in the project vicinity?
- Are there any factors that could limit growth in the area, such as floodplains, current development, conservation easements, protected lands, etc.?
- Do you have any comments on the proposed AOI or do you think it is a reasonable study area for an assessment of induced development that may result from the proposed project? What insights can the HHA provide about the state of development and housing needs within this area?
- To what extent do you believe that the proposed highway improvement project would induce redevelopment? Are there specific parcels that would be attractive to redevelopment after the project is complete? Please provide any available details.
- How do you believe that the removal of the Pierce elevated roadway might influence growth patterns?
- Do you anticipate that the types and density of development would change as a result of this project? Please explain.
- Beyond direct impacts such as displacements, please provide any information about how this project may result in indirect or induced growth in the study area. What indirect effects may occur to affordable housing or housing availability?

Management Districts

- Within your management district, are you aware of any substantial proposed land developments? If so, please mark the areas on the attached map (or provide separate plans and/or maps) and provide relevant information (the location, type, and size of areas/developments.)

- Are you aware of other capital improvement projects—such as water or sewer infrastructure, school or hospital construction—that are planned for the area which might affect development in the project vicinity?
- Are there any factors that could limit growth in the area, such as floodplains, current development, conservation easements, protected lands, etc.?
- To what extent do you believe that the proposed highway improvement project would induce development or redevelopment? Are there specific parcels in your management district that would be attractive to redevelopment after the project is complete? Please provide any available details.
- How do you believe that the removal of the Pierce Elevated roadway (I-45 along the west and south sides of Downtown Houston) might influence growth patterns?
- Do you anticipate that the types and density of development would change as a result of this project? Please explain.

Harris County Flood Control District

- Is the Harris County Flood Control District aware of particular flooding problems in the area that have affected housing needs or land development? Are you aware of any substantial proposed land developments within this mapped study area? If so, please mark the areas on the attached map and provide relevant information (the location, type, and size of areas/developments.)
- Are you aware of other capital improvement projects—such as water or sewer infrastructure, school or hospital construction—that are planned for the area which might affect development or the current housing situation in the project vicinity?
- Are there any factors that could limit growth in the area, such as floodplains, current development, conservation easements, protected lands, etc.?
- Do you have any comments on the proposed AOI or do you think it is a reasonable study area for an assessment of induced development that may result from the proposed project? What insights can the Harris County Flood Control District provide about the state of development and housing needs within this area?
- To what extent do you believe that the proposed highway improvement project would induce redevelopment? Are there specific parcels that would be attractive to redevelopment after the project is complete? Please provide any available details.
- How do you believe that the removal of the Pierce elevated roadway might influence growth patterns?
- Do you anticipate that the types and density of development would change as a result of this project? Please explain.
- Beyond direct impacts such as displacements, please provide any information about how this project may result in indirect or induced growth in the study area. What indirect effects may occur to flood-prone areas within this geographic area?

Respondents provided information on reasonably foreseeable future developments; Attachment B contains detailed response summaries tables. These reasonably foreseeable future developments were considered during the induced growth analysis and will also be discussed in Section 6 of the Final EIS (Cumulative Impacts). Survey responses had several common threads (refer to Exhibits 1 and 3 for general locations):

- Many future development and transportation projects are currently underway or are planned within the AOI.

- Factors limiting growth include general floodplain regulations, land values and property assemblage costs, and potential access changes in downtown Houston resulting from the proposed improvements (notably the realignment of I-45 along US 59/I-69).
- Recent loss of structures due to Hurricane Harvey and other past flooding events is expected to influence the redevelopment market and discourage development depending on market conditions, proximity to the 100- and 500-year floodplains, and introduction of new 500-year floodplain development regulations in unincorporated Harris County. An example of this is the Independence Heights neighborhood (Exhibit 1).
- The number and location of potential displacements adjacent to bayous (e.g., Little White Oak Bayou) associated with the proposed project would result in remnant land that would be difficult or prohibited from future development. Potentially displaced structures north of I-610 may not be replaced because of floodway impacts post-Hurricane Harvey (Exhibit 1).
- No specific projects were identified by any of the questionnaire respondents that would likely develop as a result of the proposed project. However, general areas for potential induced redevelopment were identified by respondents.
- Some respondents stated that the proposed project would negatively impact the potential for future development within specific areas of the AOI.
- Some respondents stated that the proposed project will align with specific local planning efforts only if certain criteria are met (e.g., City of Houston's General Plan and Complete Streets and Transportation Plan [City of Houston 2017a, 2016a], H-GAC's Downtown/EaDo Study [H-GAC 2011]).
- Respondents indicated that the removal of the Pierce Elevated would be beneficial to the adjacent communities and would enhance property values, improve local connectivity, and improve the quality of life.

Questionnaire responses have been summarized in a table format and are provided in Attachment B. Key points made by specific respondents to the questionnaires are provided below; refer to Exhibits 1 and 3 for general locations and response specifics.

- Aldine ISD
 - No responses were provided beyond the identification of two future (2018) school completions within the AOI (West Mount Houston Middle School and Dr. Archie L. Blanson Career and Technical Education High School).
- Houston ISD
 - No responses were provided that factored into the analysis.
- City of Houston Planning and Development Department
 - Respondent identified areas of the city that are currently redeveloping.
 - Respondent disclosed that the city is generally unable to predict future rate of development patterns because economic factors are more important than transportation improvements. However, the city representative stated that the proposed project would likely induce redevelopment within approximately 0.25 mile on both sides of I-45 between I-610 and Beltway 8 (Exhibits 3a and 3c). This forecast of potential redevelopment mimics the redevelopment that occurred following the expansion of I-10 between I-610 and Beltway 8.

- Respondent acknowledged that, although most of the AOI within the city limits is developed, much of the existing development is low-density and can accommodate additional growth. New development should be expected to occur along the reconstructed I-45; however, the exact type, location, timing, and density of future development is unknown at this time. Respondent also mentioned that land use can change without restraint because of the lack of zoning regulation.
 - Respondent explained that Downtown and Midtown have seen a resurgence in growth and development in the recent past. The respondent thinks the removal of the Pierce Elevated would help reconnect the existing communities and would help improve local access and traffic circulation. The quality of life for the residents of the neighborhoods adjacent to the Pierce Elevated is expected to improve (Exhibits 3a and 3b).
 - Respondent suggested that if the proposed project is designed in a way that is context sensitive to adjacent neighborhoods and communities, it has the potential to increase development types and densities in the AOI. Better project design would result in better development or redevelopment opportunities.
- Harris County Engineering Department
 - The respondent did not identify any areas of potential induced development or areas of increased/decreased rate of development. Respondent acknowledged that many factors influence development patterns and rates.
 - Respondent provided details about a few areas, noted future development locations on the land use map, and brought attention to the City of Houston's Plat Tracker tool for accessing platting information within the AOI.
 - The respondent agreed that the proposed project is consistent with the Houston Major Thoroughfare and Freeway Plan, which is Harris County's guide for major thoroughfare development.
 - Details about the recently adopted (December 2017) floodplain management regulations were shared that apply to future development in unincorporated areas. The new rules would impose regulations in the 500-year floodplain in addition to the 100-year floodplain. However, the respondent disclosed that these regulations may or may not have a distinguishable effect on the pace of future development in the AOI.
 - H-GAC—Community and Environmental Planning
 - The respondent provided a map and accompanying spreadsheet highlighting announced developments that the H-GAC is tracking (2015–2045; Attachment B). Population and employment forecast data was also provided for the AOI (data provided in Table 5).
 - The respondent did not identify any areas of potential induced development or redevelopment.
 - Regarding the proposed project's potential influence on the rate of development in the AOI, the respondent does not think the proposed project would have an overall effect on the rate of development within the H-GAC region but does think the project is likely to have localized impacts.
 - The respondent thinks the proposed project is not consistent with the Downtown/EaDo study, which envisions an active, pedestrian-oriented environment of St. Emmanuel Street (Exhibit 3b).
 - Greater East End Management District
 - The respondent provided limited details about development projects within the district.

- Regarding the potential for the proposed project to induce growth or redevelopment, the respondent stated that the project could have a negative impact to the provided listing of future developments because of changes in access. The respondent is concerned about the elimination of two access points that connect the East End to downtown (Runnels and Polk Streets) and general changes of access to major development parcels in the East End that are located west of Lockwood Drive (Exhibit 3b). The proposed project could cause lower-density development because of the restricted access to downtown.
 - The respondent explained that the District's 2011 Master Plan (H-GAC 2011) for this area anticipated over \$1 billion in new development and also assumed there would be no further changes of access to downtown and the existing freeways. The district thinks that modifications to the proposed project should be made to enhance access to downtown from the East End and to improve access to the existing freeways. Two solutions to enhance connections were provided with corresponding map illustrations.
 - The respondent stated that the removal of Pierce Elevated would remove a barrier between Midtown and Downtown and encourage higher-density development in Midtown that would greatly increase property values (Exhibits 3a and 3b). No specifics regarding potential future developments were provided.
- Greater Northside Management District
 - The respondent provided limited details about development projects within the district; some are already under construction and others are still being designed. Major capital improvement projects were also disclosed, including the Elysian Viaduct Reconstruction, the Hernandez Tunnel Reconstruction, and the Bayou Greenways 2020 project.
 - The respondent expressed concerns that the proposed project could limit growth along Segment One and the southern side of I-10 along the realignment. Other areas of potentially limited growth resulting from the proposed project include the area of potentially displaced businesses along the Little White Oak Bayou on the west side of I-45 north of I-610 (Exhibit 1). According to the respondent, the potentially displaced development north of I-610 may not be replaced because of floodway impacts post-Hurricane Harvey.
 - The respondent thinks the realignment of I-10 would create a barrier between the Northside and Central Business District and could increase noise and visual pollution in this area. The respondent was also concerned that the proposed project could adversely influence the future Hardy Yards development (Exhibits 1 and 3b) and that the loss of properties in Independence Heights due to potential displacements and previous flooding impacts would not be replaced by future development (Exhibits 1 and 3c).
 - With regard to the removal of Pierce Elevated, the respondent thinks the removal could increase noise and visual impacts to the Northside due to the relocation of traffic demands and capacity (Exhibits 3a and 3b).
 - The respondent shared concerns about creating detention pond areas without considering the ponds to be amenities. Future development and/or redevelopment could be inhibited if the future greenspace/detention ponds are not designed in a way to be usable or attractive.
 - Houston Downtown Management District
 - The respondent provided a detailed map that identifies future build-out across all development sectors over a long-term horizon. He explained it is unreasonable to attribute all of this development to the proposed project; however, on the map he indicated specific parcels for which potential redevelopment can be anticipated in response to the proposed project (Exhibits 3a and 3b).

- Major capital improvement projects were identified on the map provided by the respondent, including street improvement projects and two utility projects (new sanitary sewer and water line replacements).
 - The respondent explained that the primary factor affecting downtown development is land values. On the western and northern edges of downtown, adjacent to Buffalo Bayou, 100- and 500-year floodplains limit development (Exhibit 1).
 - The recently completed Plan Downtown document (Downtown District 2017) was referenced as a source of information about both public and private development opportunities that have been initially identified relative to the NHHIP. Specific developments in this document are relevant to TxDOT's proposed project (e.g., the concept of Downtown's Green Loop, a 5-mile trail network of public parks, public spaces, and active streetscapes). The respondent noted the district anticipates that, upon completion of the proposed project, induced development benefits would be realized along most of Downtown's edges. Additionally, the District expects the network effect of the proposed Green Loop to equal or exceed the cumulative economic benefit created by the development of highway-adjacent parcels.
 - With regard to the removal of Pierce Elevated, the respondent thinks the removal would benefit Downtown and Midtown, as development opportunities would expand into the area of the existing I-45 right-of-way. He further explained that proposals to preserve portions of the Pierce Elevated and repurpose the highway infrastructure as a cultural and tourism attraction would potentially entail significant economic benefit (Exhibits 3a and 3b).
 - Overall, the District would anticipate and promote a mix across all sectors of development and redevelopment of downtown civic facilities. A portion of the new development across Downtown could be partially catalyzed by the proposed project, but attempts to attribute specific developments to the project inherently involve conjecture.
- North Houston Management District
 - The respondent provided a map that identifies the general location of the Pinto Business Park, a 1,000-acre industrial park that is currently under development. Locations of roadway improvements associated with the industrial park were also indicated, along with the locations of future Aldine ISD school locations.
 - The respondent acknowledged that the planned acquisition of right-of-way on the west side of I-45 would impact existing retail development.
 - No other responses were provided that factored into the analysis.

3.1.4.4 Summary of Induced Development Potential

Based on demographic and land use trends detailed in the preceding sections, it can be concluded that there is an *existing* moderate to strong potential for future growth in the AOI during the analysis period of 2016-2040. Local plans reflecting a variety of planning scales exist within the AOI to promote, guide, and monitor various development opportunities in the City of Houston and unincorporated Harris County. Information obtained from questionnaire responses from agencies, organizations, and governmental jurisdictions was used to confirm the validity of the AOI boundary (which was developed during the preparation of the Draft EIS) and to identify the following potential induced growth assessments that may be attributed to this project:

- Potential areas of redevelopment exist throughout the Downtown Management District (Exhibit 3b)
- Potential redevelopment is expected within a 0.25-mile buffer along I-45 from I-610 to Beltway 8 (Exhibit 3c)

- Areas where the rate of development may be slowed due to access changes imposed by the proposed project exist within the Greater East End Management District and the future Hardy Yards development (Exhibit 3b)
- Areas where the rate of development may be slowed due to complications with anticipated displacements that are located within or near 100-year or 500-year floodplains exist north of I-610 and west of I-45 (e.g., Independence Heights neighborhood; Exhibit 3c)
- Potential redevelopment and increased community cohesion is expected to result from the removal of Pierce Elevated (Exhibit 3b)

Digitized boundaries of the delineated redevelopment areas associated with the 0.25-mile buffer along I-45 and the Downtown Management District are illustrated on Exhibits 3a–3c. The combined areas of potential redevelopment within these two general locations total approximately 4,804 acres, which is approximately 5 percent of the 103,536-acre AOI. The exact type, location, timing, and density of redevelopment potential within these two general locations, along with the potential redevelopment within the Pierce Removal limits cannot be definitively calculated. Calculating acreages of areas that may experience slowed rates of development is not possible at this time because development is dependent on many economic factors beyond the improvements to I-45. This assessment and any other captures only a snapshot of development at a particular point in time.

3.1.5 Step 5—Identify Resources Subject to Induced Growth Impacts

Through interview questionnaires and cartographic assessment, the analysis has revealed that a minimum of approximately 4,804 acres of land has indirect induced growth potential (in the form of redevelopment) within the AOI. This area identified for potential redevelopment includes land that has already been developed, which is identified as “Existing Development” in Table 2 and illustrated on Exhibit 1.

Data from the Ecological Mapping Systems of Texas (EMST) was used to determine which resources are present in the areas identified for potential redevelopment. Table 6 summarizes the characteristics of resources present in these areas that are essentially boundaries of potential redevelopment.

Table 6: Resource Characteristics in Areas of Potential Development and Redevelopment

EMST Vegetation Type	Areas of Potential Redevelopment in Downtown Management District (acres)	Areas of Potential Redevelopment along I-45 between I-610 and Beltway 8 (acres)
Open Water	4.4	-
Urban High Intensity	114.6	1,855.3
Urban Low Intensity	10.5	2,283.1
Barren	-	32.1
Grass Farm	-	9.9
Gulf Coast: Coastal Prairie	-	236.8
Gulf Coast: Coastal Prairie Pondshore	-	2.8
Native Invasive: Deciduous Woodland	-	212.0
Native Invasive: Huisache Woodland or Shrubland	-	15.4
Post Oak Savanna: Live Oak Motte and Woodland	-	19.8

EMST Vegetation Type	Areas of Potential Redevelopment in Downtown Management District (acres)	Areas of Potential Redevelopment along I-45 between I-610 and Beltway 8 (acres)
Post Oak Savanna: Post Oak – Redcedar Motte and Woodland	-	7.7
Total	129.4	4,675.0

Source: MoRAP 2013

Table 7 lists the resources present in the two general areas (the 0.25-mile buffer along I-45 and the Downtown Management District) that could be redeveloped and identifies the potential for indirect impacts to each resource from induced redevelopment.

Table 7: Resources Analyzed for Induced Growth Impacts

Resource	Could the resource be indirectly impacted by potential induced growth?	Is this resource at risk?
Community Resources (includes Neighborhoods/Public Facilities and Environmental Justice)	Yes; property values could be either positively or negatively influenced by future redevelopment. The proposed project may cause travel pattern and access changes that could result in adverse impacts to business operations, including more circuitous routes in some locations. Proposed changes in roadway alignments and new right-of-way requirements through the downtown area may create barriers that disconnect surrounding neighborhoods from Houston's central business district, potentially reducing future growth and redevelopment in these areas.	<p>Yes; redevelopment could result in denser commercial, retail, and residential developments along the I-45 corridor, which could alter the character of the community.</p> <p>Although the City of Houston does not have zoning regulations that control land use (residential versus commercial, for example), the City reviews and approves platting proposals to ensure that proposed developments are properly subdivided based on City code. The City's Code of Ordinances Chapter 42: Subdivisions, Development and Platting governs development activity and applies to areas within the ETJ. This chapter of the City code establishes minimum lot sizes and minimum building lines and ensures that new development or redevelopment projects respect existing community character. Many developers in Houston employ private covenant and deed restrictions that function like zoning; the City also plays a role in ensuring that these restrictions are enforced.</p> <p>Environmental justice individuals/populations could be adversely impacted by increased property values, increased traffic noise, permanent and temporary visual impacts due to roadway design, construction activities, and potential displacement of homes, businesses, and places of worship in their communities.</p>

Resource	Could the resource be indirectly impacted by potential induced growth?	Is this resource at risk?
Businesses/Jobs	<p>Yes; displaced businesses could result in a loss of tax revenue and temporary or permanent job losses. Beneficial impacts related to the proposed project include increased modal choices for individuals traveling along I-45 or local streets. Localized economic growth could be caused by increases in land value and redevelopment activities associated with increased visibility and improved access.</p> <p>Additional tax revenue would be generated by potential redevelopment. Tax revenue could also be negatively impacted if rates of development are slowed as a result of the proposed project.</p>	No; based on demographic and land use trends, there is an existing moderate to strong potential for future growth in the AOI. Local plans reflecting a variety of planning scales exist within the AOI to promote, guide, and monitor various development opportunities in the City of Houston and unincorporated Harris County. Furthermore, potential adverse economic impacts to businesses and individuals from the proposed project are viewed in the context of the potential long-term economic benefits of increased mobility and accessibility for the region overall.
Transportation Facilities	<p>Yes; I-45 is an established interstate that is highly interconnected with multi-modal transportation facilities throughout the City of Houston. Transportation facilities in the project corridor include roadways, bicycle routes, bus routes and bus stops, light-rail train routes, rail stations, transit centers, Park & Ride lots, and pedestrian sidewalks and trails. The future of transportation facilities within the AOI is guided by a variety of adopted plans, including the H-GAC 2040 RTP, the Major Thoroughfare and Freeway Plan, the Complete Streets and Transportation Plan, and the Houston Bike Plan.</p>	No; a variety of adopted plans provide for the effective management of new and existing multi-modal transportation facilities. TxDOT will continue to coordinate with local jurisdictions to ensure the continuation of transportation network operations.
Air Quality	<p>Yes; industrial land uses could occur within the areas of potential redevelopment per the H-GAC's future land use projections.</p>	No; any increased air pollutant or MSAT emissions resulting from the potential redevelopment of the area must meet regulatory emissions limits established by the TCEQ and the EPA. In addition, with cleaner fuels, improved emission technologies, alternative modes of transportation, and regional clean air initiatives, the air quality in the area should continue to improve over time.
Waters of the U.S., including Wetlands	<p>Unknown; approximate acreages of National Wetland Inventory (NWI) wetlands within the areas of potential redevelopment along I-45 and Downtown are 170 and 3 acres, respectively.</p> <p>Approximate National Hydrography Dataset (NHD) stream lengths within the areas of potential redevelopment along I-45 and Downtown are 11 and 0.2 miles, respectively.</p>	No; any potential redevelopment of the area affecting wetlands would be required to comply with Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act (if applicable).

Resource	Could the resource be indirectly impacted by potential induced growth?	Is this resource at risk?
Floodplains	<p>Yes; approximately 1,393 acres of the 100-year floodplain and 617 acres of the 500-year floodplain are located within the areas of potential redevelopment along I-45.</p> <p>Approximately 17 acres of the 100-year floodplain and 7 acres of the 500-year floodplain are located within the areas of potential redevelopment in Downtown.</p>	No; future construction within the 100-year and 500-year floodplains would be in compliance with appropriate City of Houston and Harris County permitting and general land use policies.
Vegetation and Wildlife Habitat	<p>Yes; the areas of potential redevelopment are vegetated to varying degrees and provide wildlife habitat. The majority of vegetation within the existing I-45 right-of-way is classified as urban low intensity and consists mainly of maintained grasses and landscaped assemblages of trees and shrubs along roadway medians. The proposed I-45 right-of-way and areas beyond are a mixture of native and non-native invasive vegetation that is best described as unmaintained mixed Chinese Tallow (<i>Triadica sebifera</i>) forests, native and non-native mixed woodlands along riparian edges, maintained right-of-way grasses and forbs, and disturbance grasslands. These habitat types are not considered rare or important remnant vegetation as mapped by the Texas Conservation Action Plan (TCAP).</p>	Yes; however, public and private redevelopment would be regulated by the City of Houston Code of Ordinances, which include ordinances related to land development regulations, site development, and tree protection/preservation. Harris County regulations would regulate redevelopment within unincorporated areas.

Resource	Could the resource be indirectly impacted by potential induced growth?	Is this resource at risk?
Threatened and Endangered Species	<p>Yes for state-listed species; the project is within range with suitable habitat present for several Species of Greatest Conservation Need (SGCNs) and for the state-threatened Alligator snapping turtle (<i>Macrochelys temminckii</i>), timber rattlesnake (<i>Crotalus horridus</i>), Louisiana pigtoe (<i>Pleurobema riddellii</i>), sandbank pocketbook (<i>Lampsilis satura</i>), Texas pigtoe (<i>Fusconaia askewi</i>), Rafinesque's bigeared bat (<i>Corynorhinus rafinesquii</i>), Wood stork (<i>Mycteria americana</i>), and creek chubsucker (<i>Erimyzon oblongus</i>).</p> <p>Potential impacts to state-listed species or SGCNs would be possible, but the potential for encountering these species during construction is low. Any impacts to species would be limited to individuals within the construction area.</p> <p>A review of the Texas Natural Diversity Database (TXNDD) did not indicate any records of state or federally listed species occurring within 1.5 miles of the project area.</p> <p>No for federally listed species; No suitable habitat for any federally listed threatened or endangered species was identified within or adjacent to the proposed project area; therefore, no effect to any federally listed species is anticipated as a result of the proposed project.</p>	<p>Yes for state-listed species; however, the Endangered Species Act affords protection for federally listed threatened/endangered species and their habitats; the U.S. Fish and Wildlife Service (USFWS) and Texas Parks and Wildlife Department (TPWD) maintain lists of potential occurrences for listed species in each Texas county. State regulations prohibit harm to state-listed species. All redevelopment, whether public or privately funded, is subject to state and federal regulations.</p>
Soils and Geology	<p>No; no prime or unique farmland soils, or soils of statewide importance occur within the project area. The majority of the soils within the areas of potential redevelopment are mapped as urban soil units.</p>	<p>No; the project area is underlain by the Beaumont Formation and the Lissie Formation. Neither is known to contain sensitive geologic features.</p>
Archeological Resources	<p>Unknown; formal surveys have not yet been conducted throughout the full extent of the areas of potential redevelopment. Preliminary consultation with TxDOT-developed potential archeological liability maps (PALM) indicates generally small and limited areas of medium potential for archeological impacts for these areas of potential redevelopment.</p>	<p>Unknown; the Antiquities Code of Texas requires notification (to the Texas Historical Commission) if public agencies sponsor ground-disturbing activity on public land. Archeological resources listed or eligible for listing on the National Register of Historic Places (NRHP) are protected by state and federal regulations for publicly funded projects. However, these state and federal regulations do not apply to privately funded projects. The City of Houston does provide minimal protection for those properties that are archeological sites through its Historic Preservation code.</p>

	Resource	Could the resource be indirectly impacted by potential induced growth?	Is this resource at risk?
	Historic Resources [including Section 106 and Section 4(f) resources]	Yes; several historic resources are present within downtown Houston (e.g., Downtown Management District) and area of potential redevelopment along I-45 between I-610 and Beltway 8. These resources are documented in the historic survey that has been prepared for the proposed NHHIP.	Yes; resources that are 50 years of age or older are potentially historic. NRHP-listed or -eligible historic resources are protected by state and federal regulations for publicly funded projects. However, no state or federal regulations protect cultural resources for privately funded projects. The City of Houston does provide minimal protection for those properties that are City of Houston landmarks or protected landmarks through its Historic Preservation code. The City of Houston Planning and Development Department manages the Certificate of Appropriateness process to help maintain the historic significance of designated properties.

3.1.6 Step 6—Identify Mitigation

In summary, the overall consensus from the questionnaire responses is that the proposed project would have an influence on redevelopment patterns and rates of redevelopment within the AOI, particularly in Downtown and along I-45 from I-610 to Beltway 8. The areas of potential redevelopment associated with the proposed project have been considered and assessed by the H-GAC's future planning documents and the City of Houston's corresponding land use objectives.

This step of the indirect impacts analysis assesses the consequences of the expected induced growth impacts and considers/develops strategies or mitigation measures available as part of the existing regulation regimes that would apply to potential development projects. The potential areas of indirect induced growth (approximately 4,804 acres of redevelopment potential) account for approximately 5 percent of the AOI (103,536 acres).

Future land development activities would generally be private ventures regulated by the City of Houston's Code of Ordinances. The regulations in the Code address environmental and social impacts by requiring mitigation as part of site design and construction such that development is in accordance with overall City objectives. In addition, the agencies and programs that would guide any development of a potential project would be similar to the typical mitigation and permitting measures required of TxDOT. For example, all development (public or private developers) must comply with flood control regulations under Federal Emergency Management Agency (FEMA) and the local floodplain administration, the Endangered Species Act, the CWA, CWA Section 401 Water Quality Certification requirements, CWA Section 404 permits for projects impacting waters of the U.S., and other regulations requiring mitigation if there are effects on species habitat.

Ultimately, because the proposed project is not anticipated to conflict with City of Houston or Harris County development goals or cause substantial negative indirect induced growth impacts, the requirement for mitigation of environmental impacts would be limited to mitigating only the direct impacts associated with this proposed project. Any mitigation for project-induced land development impacts that may arise after construction of the proposed project would be overseen by the City of Houston and/or Harris County and would be the responsibility of the land developer. Mitigation for indirect induced growth impacts would not be required of the proposed project sponsors based on the analysis presented herein.

3.2 Conclusion

Most of the AOI is already developed and developable land within the AOI is relatively limited. The proposed project is expected to induce redevelopment in two general locations. The proposed project may also slow development rates in areas that would experience access changes or access limitations resulting from the proposed improvements or in areas that would be physically impacted (e.g., proposed displacements). Such slowdowns may be compounded by redevelopment in areas flooded during Hurricane Harvey and increasing floodplain regulations. The proposed project would add capacity to existing facilities and would not induce development to the same degree as a new roadway. The Downtown area and the surrounding neighborhoods are experiencing various degrees of redevelopment, and growth trends identified in questionnaire responses indicate that redevelopment would continue independent of the proposed improvements to existing facilities. Additionally, several roadway projects are planned or under development throughout the Houston area and coincide temporally with the proposed NHHIP improvements; these projects could influence growth and, therefore, the proposed NHHIP project may contribute to induced growth impacts as one of many factors affecting growth in the area.

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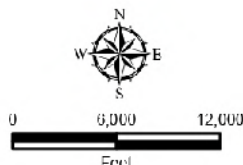
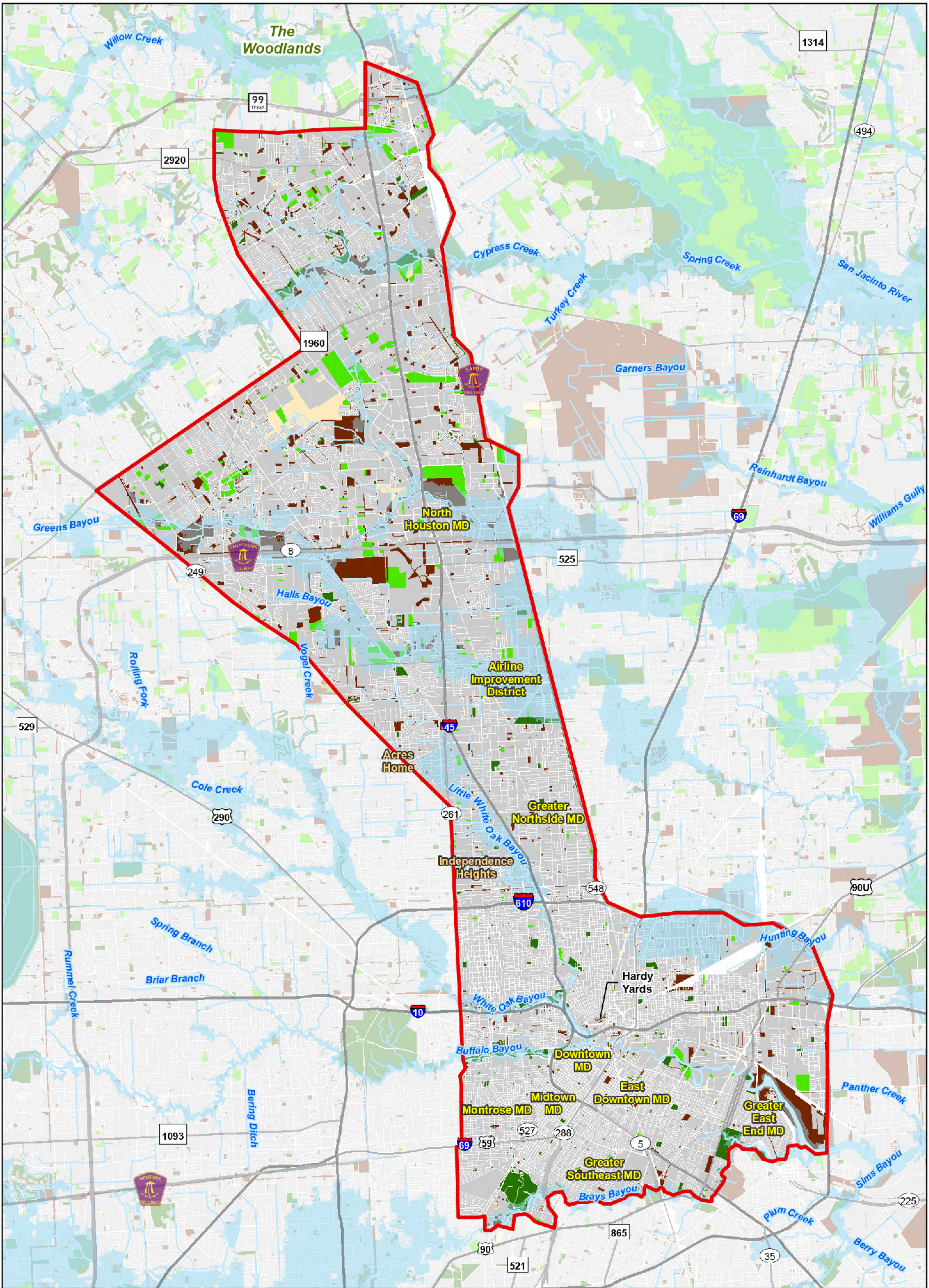
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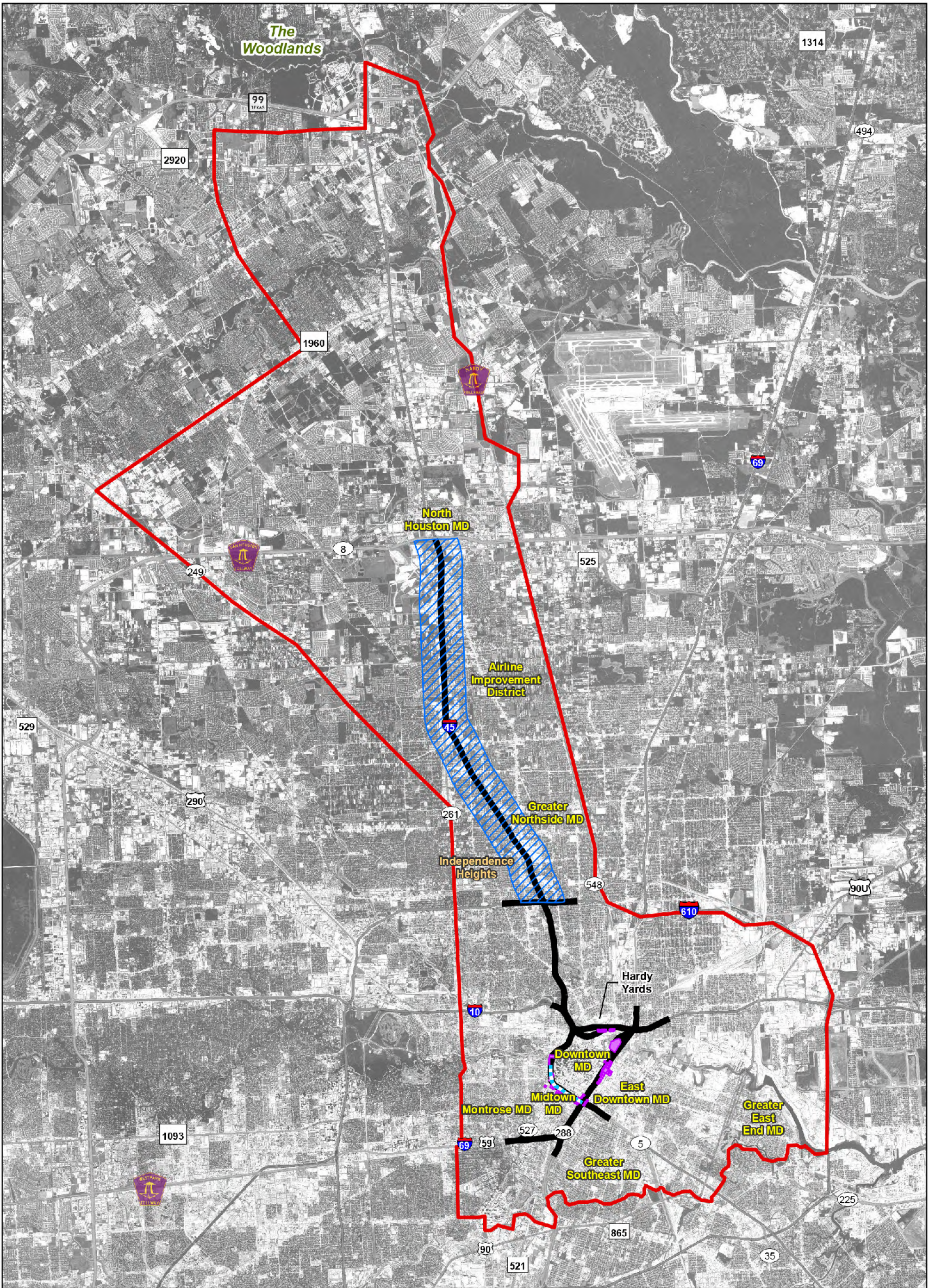
Attachment A

Exhibits



- | | | |
|-------------------|--------------------------------|---------------------------------------|
| Area of Influence | Existing H-GAC Land Use | Parks/Open Spaces |
| Project Limits | Existing Development | Undevelopable |
| | Unknown | Vacant Developable (includes Farming) |
| | | 100-Year Flood Zone |

North Houston Highway Improvement Project	
Developable and Undevelopable Land in the Area of Influence	
Texas Department of Transportation © 2018	
Date: March 2018	Exhibit 1



- Area of Influence


Project Limits
- Area of Potential Downtown Redevelopment (see Exhibit 3b)

Pierce Elevated Removal (Area of Potential Redevelopment) (see Exhibit 3b)

Area of Potential Redevelopment along I-45 (see Exhibit 3c)

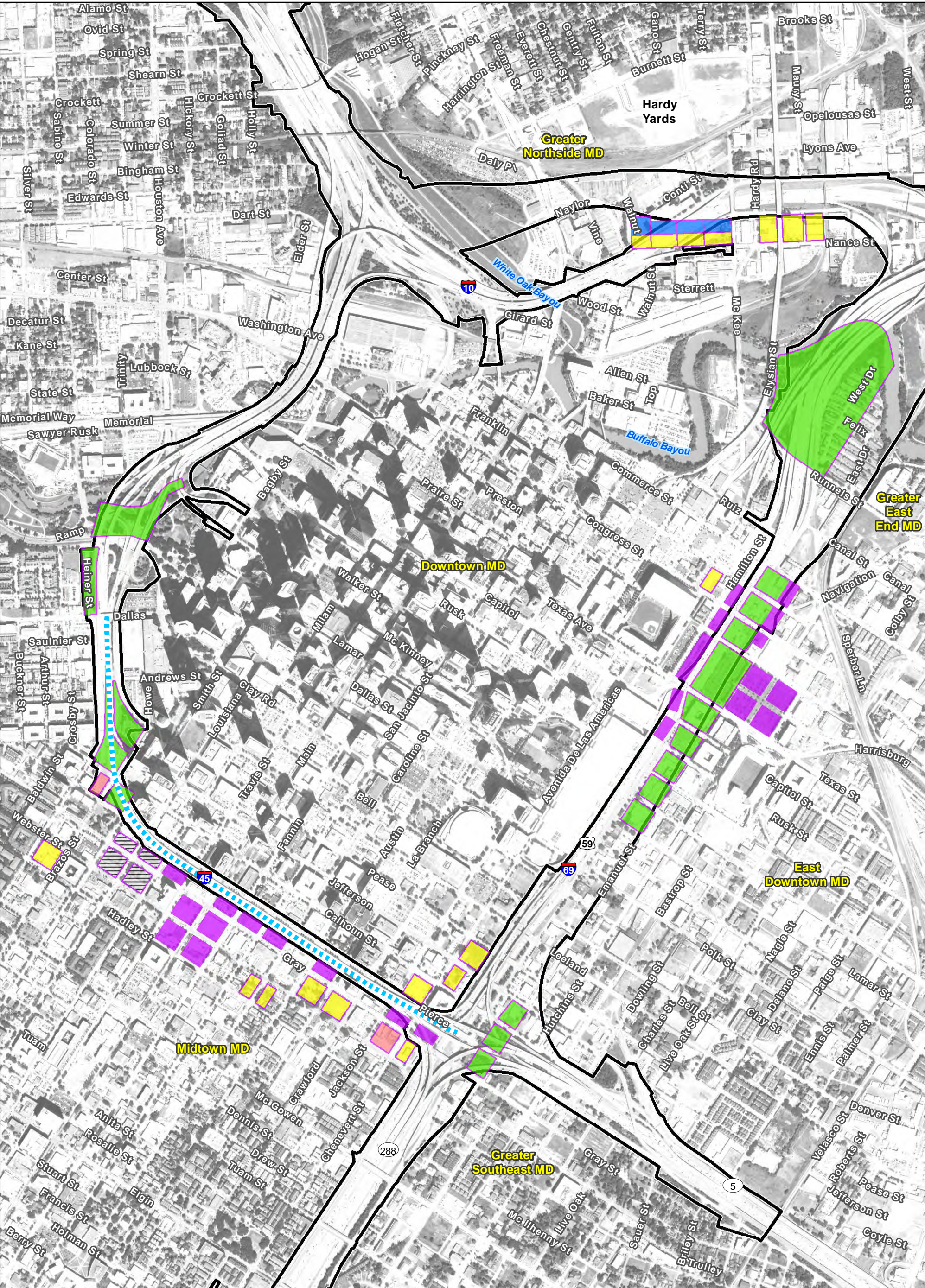
North Houston Highway Improvement Project



Areas of Potential Redevelopment within the Area of Influence

Texas Department of Transportation







Date: March 2018

Exhibit 3a



 Project Location
 Pierce Elevated Removal
(Area of Potential
Redevelopment)

**Area of Potential Redevelopment
Downtown Management District Future Land Use**

	Civic
	Hotel
	Mixed
	Office
	Parks
	Residential

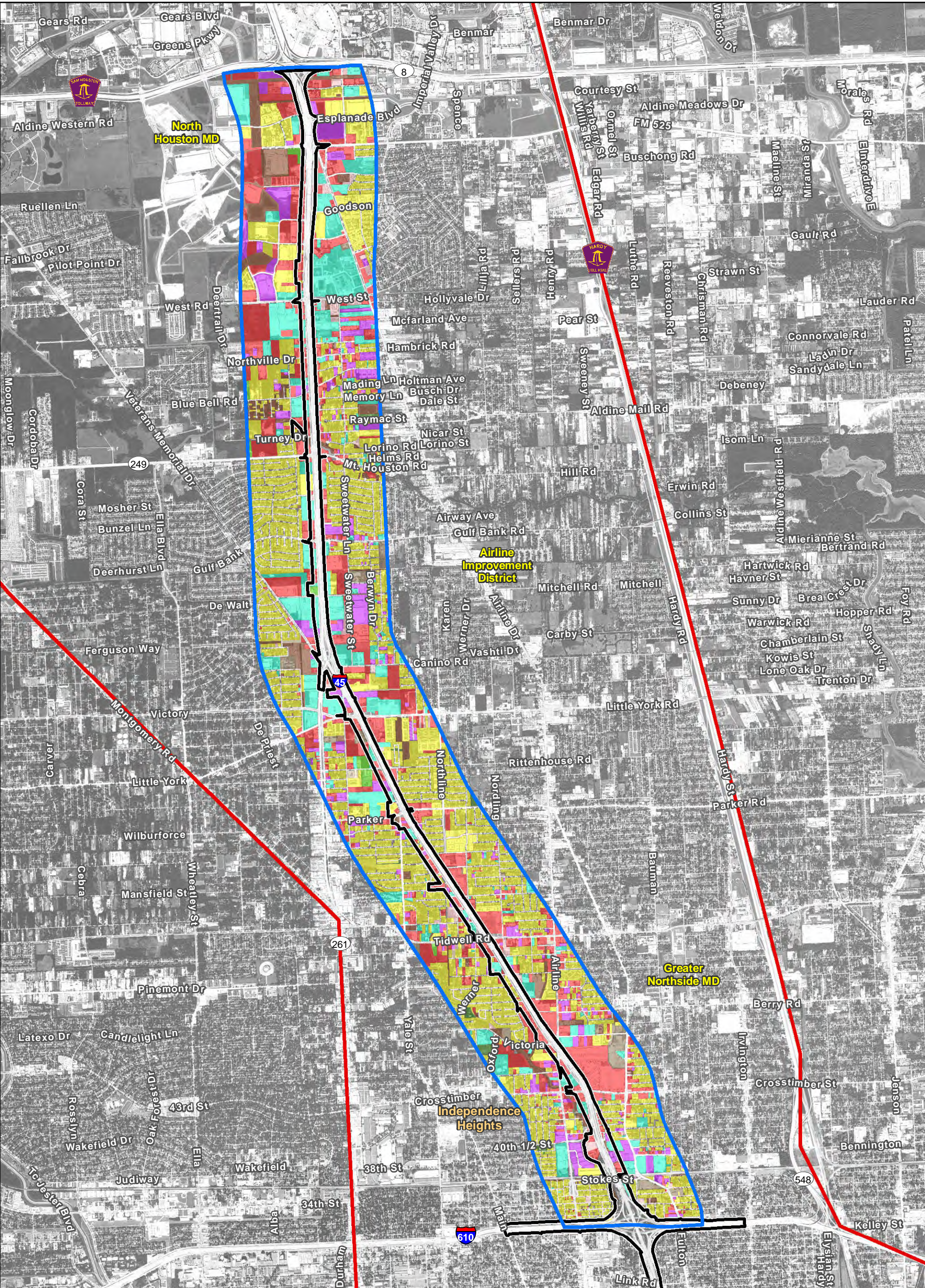
**North Houston
Highway Improvement Project**

**Areas of Potential Redevelopment
within the Area of Influence**



Date: March 2018

Exhibit 3b



- Area of Influence
- Project Location
- Area of Potential Redevelopment

- 2045 H-GAC Land Use**
- Commercial
 - Gov/Med/Edu
 - Industrial
 - Multiple
 - Other

- Parks/Open Spaces
- Residential
- Undevelopable
- Unknown
- Vacant Developable (includes Farming)

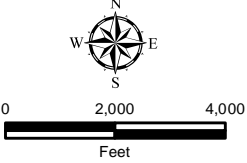
**North Houston
Highway Improvement Project**

**Areas of Potential Redevelopment
within the Area of Influence**



Date: March 2018

Exhibit 3c



Attachment B

Questionnaires and Results

Planning Agencies Questionnaire

NHHIP Indirect Impacts: Induced Growth Questionnaire

Respondent Information

Name: _____

Email: _____

Title: _____

Phone: _____

Agency: _____

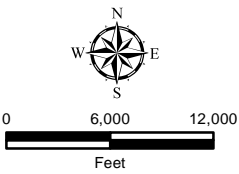
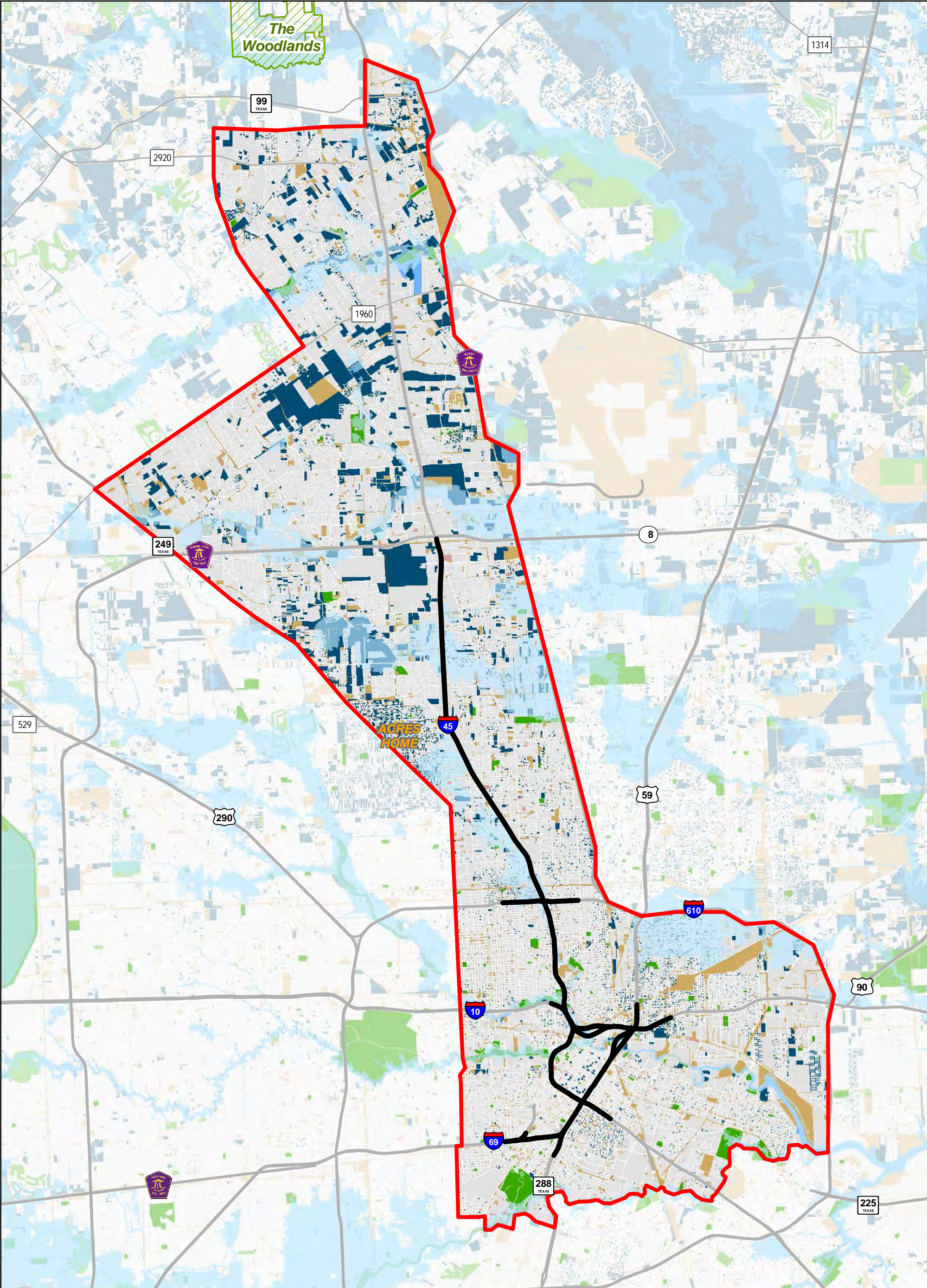
Date: _____

Questions

1. Are you aware of any substantial proposed land developments within your jurisdiction or area? If so, please mark the areas on the attached map and provide the location, type, and size (e.g. acres, density, number of units) of any planned developments. Also, please indicate if any of the proposed land developments that you identified on the attached map have been platted.
2. On the attached map, please identify areas (if any) that you think would likely be developed by 2040¹ as a result of the proposed project that would not otherwise be developed. *(Please distinguish from developments identified in question 1).*
3. Would the proposed project affect the rate of land development in your jurisdiction?
4. Is the proposed project consistent with local planning efforts (i.e. master or comprehensive plans, growth management plans, zoning or land use policies, etc)?

¹ 2040 is the horizon year for the Houston-Galveston Area Regional Transportation Plan.

5. Are there other capital improvement projects – such as water or sewer infrastructure, school or hospital construction – that are planned for the area which might affect development in the project vicinity?
6. Are there any factors that could limit growth in the area, such as floodplains, current development, conservation easements, protected lands, etc?
7. Do you have any comments on the proposed Area of Influence or do you think it is a reasonable study area for an assessment of induced development that may result from the proposed project? If you think a different boundary would be more appropriate, please mark the attached map and provide a written description why you believe a different AOI boundary would be more suitable.
8. To what extent do you believe that the proposed highway improvement project would induce redevelopment? Are there specific parcels that would be attractive to redevelopment after the project is complete? Please provide any available details.
9. How do you believe that the removal of the Pierce elevated roadway might influence growth patterns?
10. Do you anticipate that the types and density of development would change as a result of this project? Please explain.



Legend

- Area of Influence
- Project Limits

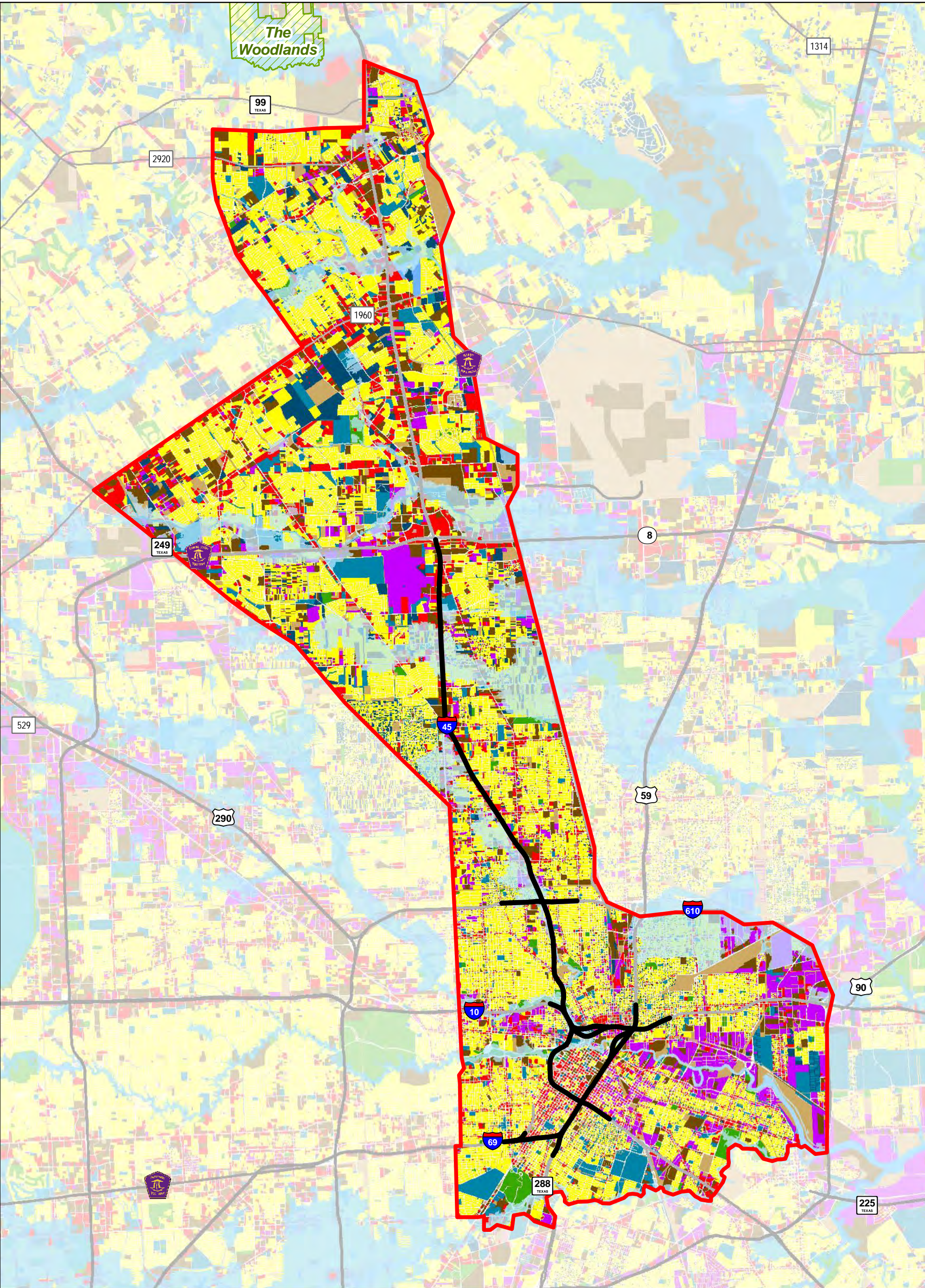
- Existing Land Use**
- Existing Development
 - Unknown
 - Parks/Open Spaces

- Undevelopable
- Vacant Developable
- Water
- 100-Year Floodplain

North Houston
Highway Improvement Project

Developable and Undevelopable Land
in the Area of Influence





Legend

- Area of Influence
- Project Limits
- 100-Year Floodplain

- Land Use
- Commercial
 - Public Use/Institutional
 - Industrial
 - Multiple
 - Undetermined/Unknown

- Parks/Open Spaces
- Residential
- Undevelopable
- Vacant Developable
- Water

North Houston
Highway Improvement Project

2040 Land Use in the Area of Influence



Houston Housing Authority Questionnaire

NHHIP Indirect Impacts: Induced Growth Questionnaire

Respondent Information

Name: _____

Email: _____

Title: _____

Phone: _____

Agency: _____

Date: _____

Questions

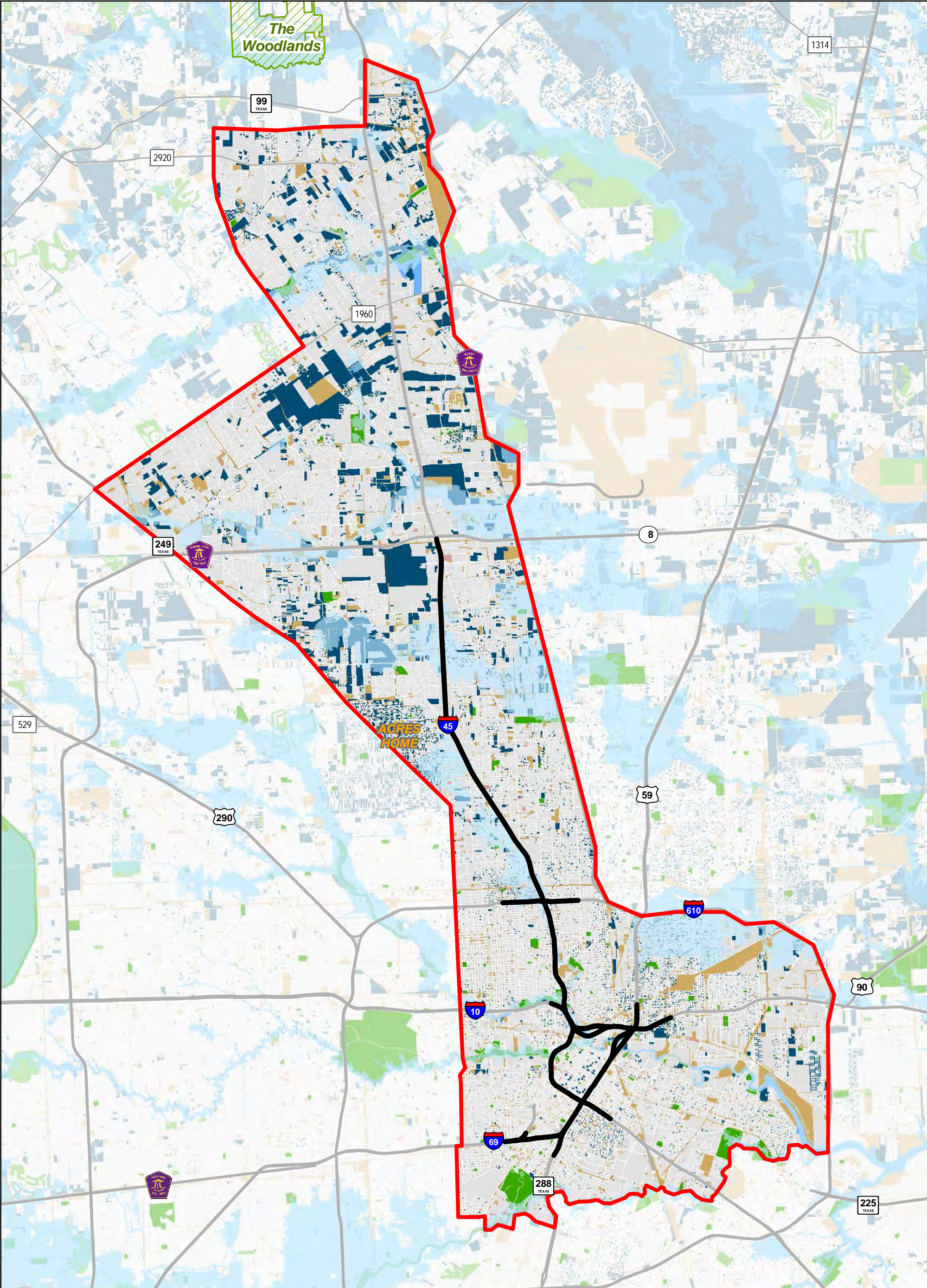
1. Are you aware of any substantial proposed land developments within this mapped study area? Is the Houston Housing Authority (HHA) aware of particular housing needs or issues within this study area? If so, please mark the areas on the attached map and provide relevant information (the location, type, and size of areas/developments.)

2. Are you aware of other capital improvement projects – such as water or sewer infrastructure, school or hospital construction – that are planned for the area which might affect development or the current housing situation in the project vicinity?

3. Are there any factors that could limit growth in the area, such as floodplains, current development, conservation easements, protected lands, etc?

4. Do you have any comments on the proposed Area of Influence or do you think it is a reasonable study area for an assessment of induced development that may result from the proposed project? What insights can the HHA provide about the state of development and housing need within this area?

5. To what extent do you believe that the proposed highway improvement project would induce redevelopment? Are there specific parcels that would be attractive to redevelopment after the project is complete? Please provide any available details.
6. How do you believe that the removal of the Pierce elevated roadway might influence growth patterns?
7. Do you anticipate that the types and density of development would change as a result of this project? Please explain.
8. Beyond direct impacts such as displacements, please provide any information about how this project may result in indirect or induced growth in the study area. What indirect effects may occur to affordable housing or housing availability?



Legend

- Area of Influence
- Project Limits

- Existing Land Use
- Existing Development
 - Unknown
 - Parks/Open Spaces

- Undevelopable
- Vacant Developable
- Water
- 100-Year Floodplain

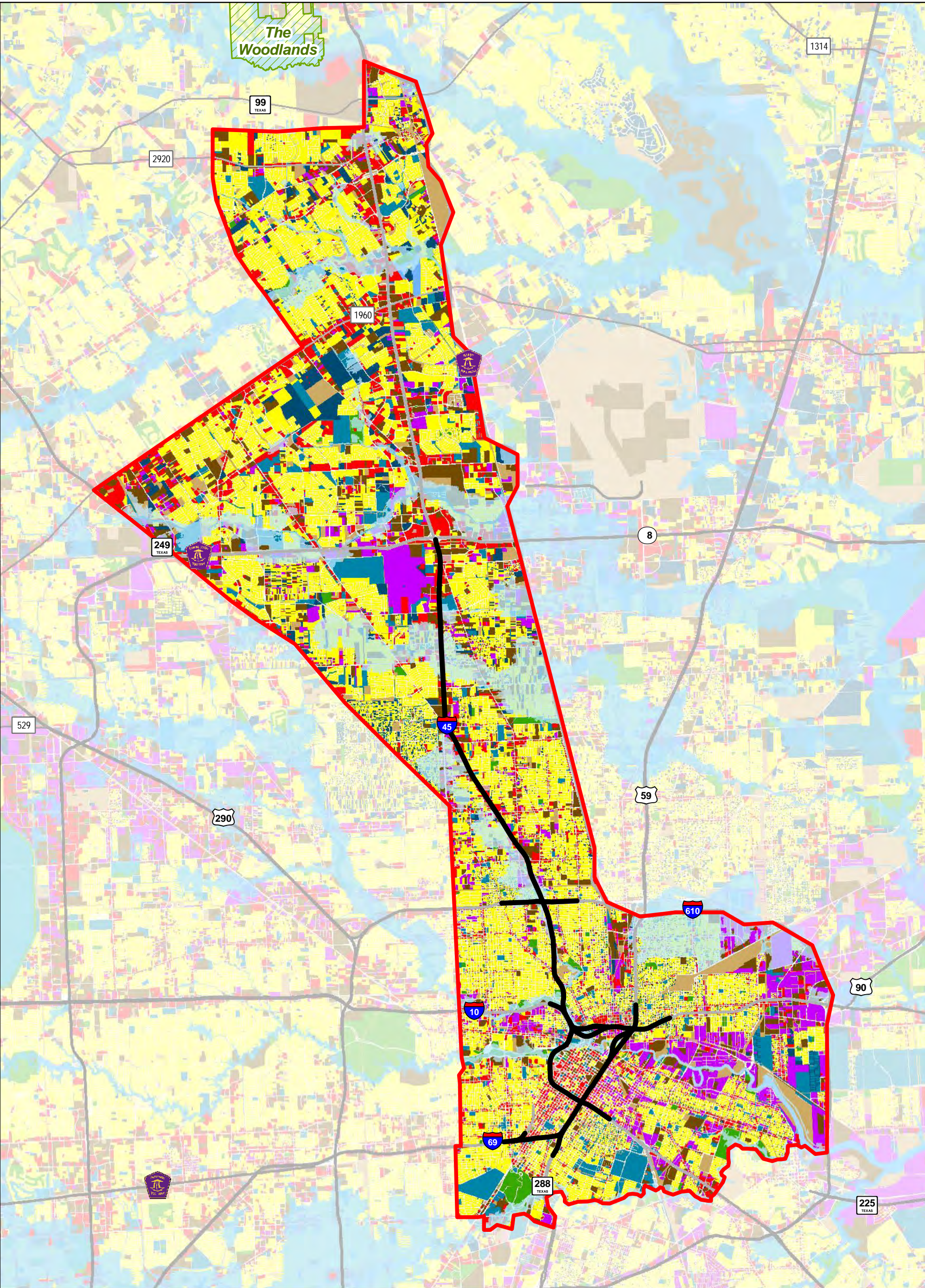
North Houston
Highway Improvement Project

Developable and Undevelopable Land
in the Area of Influence



Date: April 2017

Exhibit 1



0 6,000 12,000
Feet

Legend

Area of Influence

Project Limits

100-Year Floodplain

Land Use

Commercial

Public Use/Institutional

Industrial

Multiple

Undetermined/Unknown

Parks/Open Spaces

Residential

Undevelopable

Vacant Developable

Water

**North Houston
Highway Improvement Project**

2040 Land Use in the Area of Influence

Texas Department
of Transportation

Date: April 2017

Exhibit 2

Management Districts Questionnaire

NHHIP Indirect Impacts: Land Development Questionnaire

Respondent Information

Name: _____

Email: _____

Title: _____

Phone: _____

Agency: _____

Date: _____

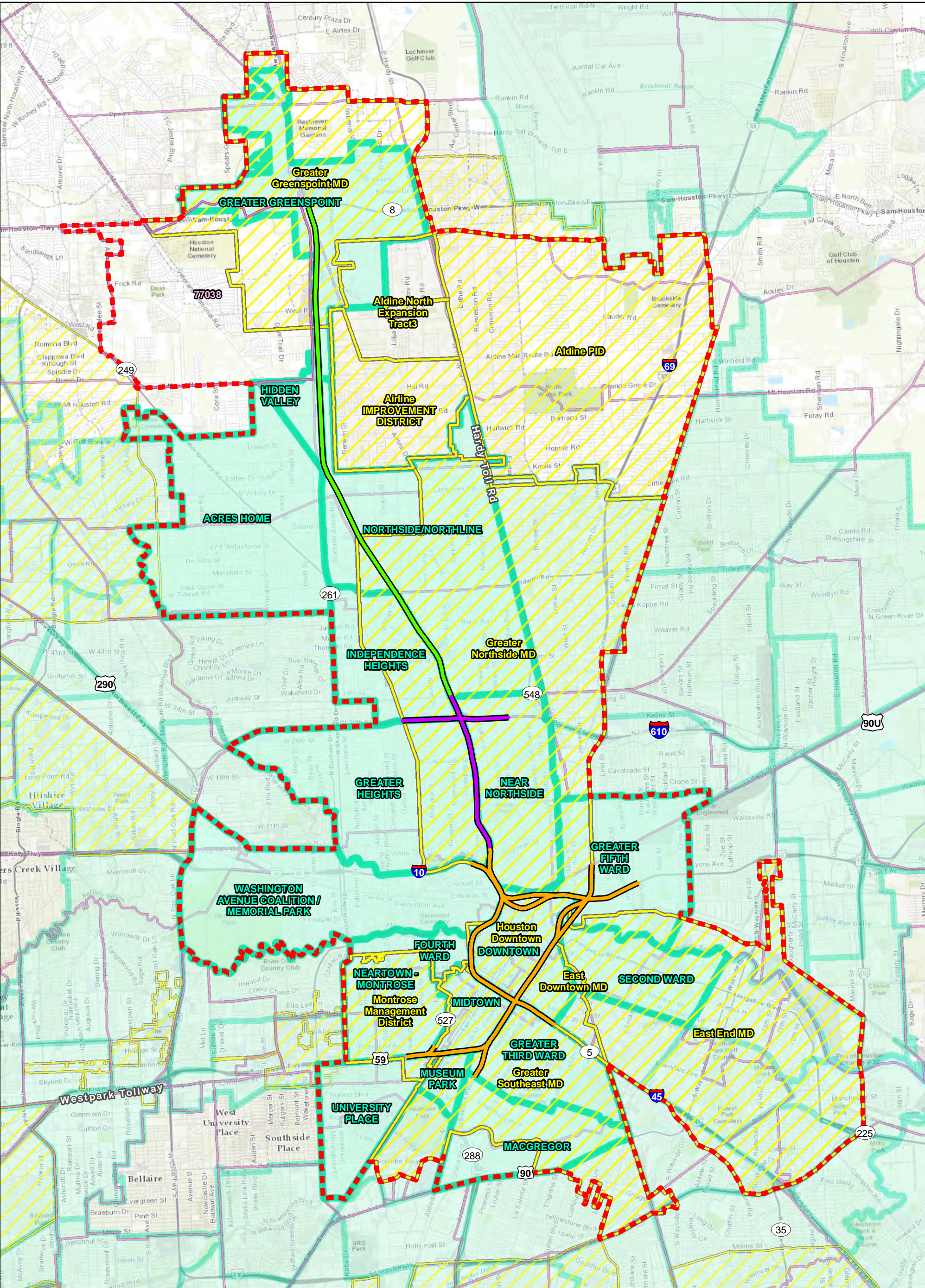
Questions

1. Within your management district, are you aware of any substantial proposed land developments? If so, please mark the areas on the attached map (or provide separate plans and/or maps) and provide relevant information (the location, type, and size of areas/developments.)
2. Are you aware of other capital improvement projects – such as water or sewer infrastructure, school or hospital construction – that are planned for the area which might affect development in the project vicinity?
3. Are there any factors that could limit growth in the area, such as floodplains, current development, conservation easements, protected lands, etc.?

4. To what extent do you believe that the proposed highway improvement project would induce development or redevelopment? Are there specific parcels in your management district that would be attractive to redevelopment after the project is complete? Please provide any available details.

5. How do you believe that the removal of the Pierce Elevated roadway (I-45 along the west and south sides of Downtown Houston) might influence growth patterns?

6. Do you anticipate that the types and density of development would change as a result of this project? Please explain.



Segment 1

Segment 2

Segment 3

Zip Codes

Management Districts

Super Neighborhoods

Resource Study Area (RSA)

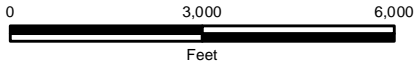
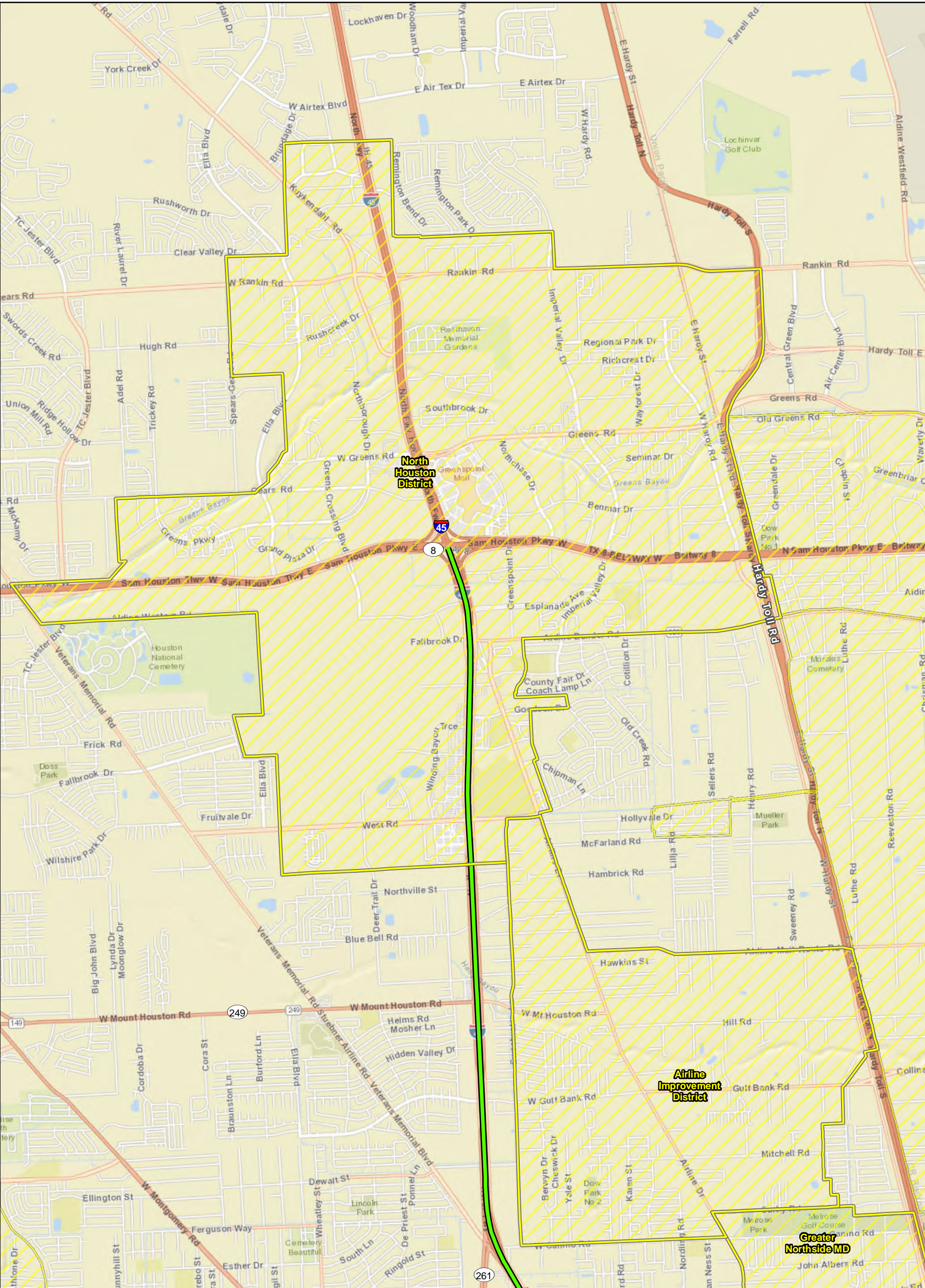
North Houston Highway Improvement Project

Resource Study Area - Community Resources

Texas Department of Transportation

Date: April 2017

Exhibit 3



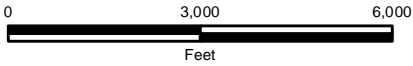
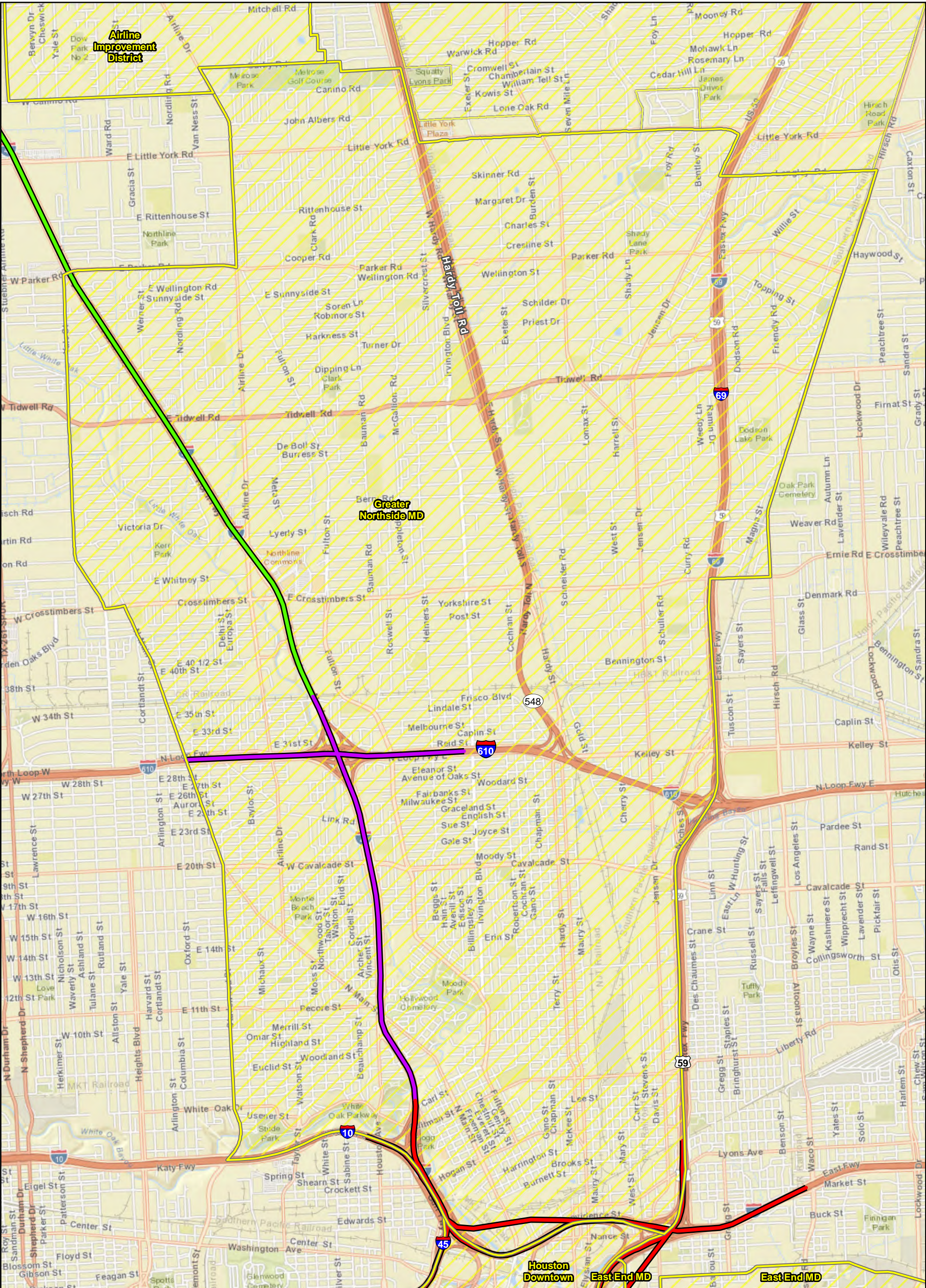
- Segment 1
- Management Districts

North Houston Highway Improvement Project

Management Districts



Date: November 2017



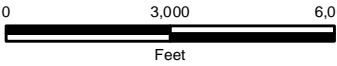
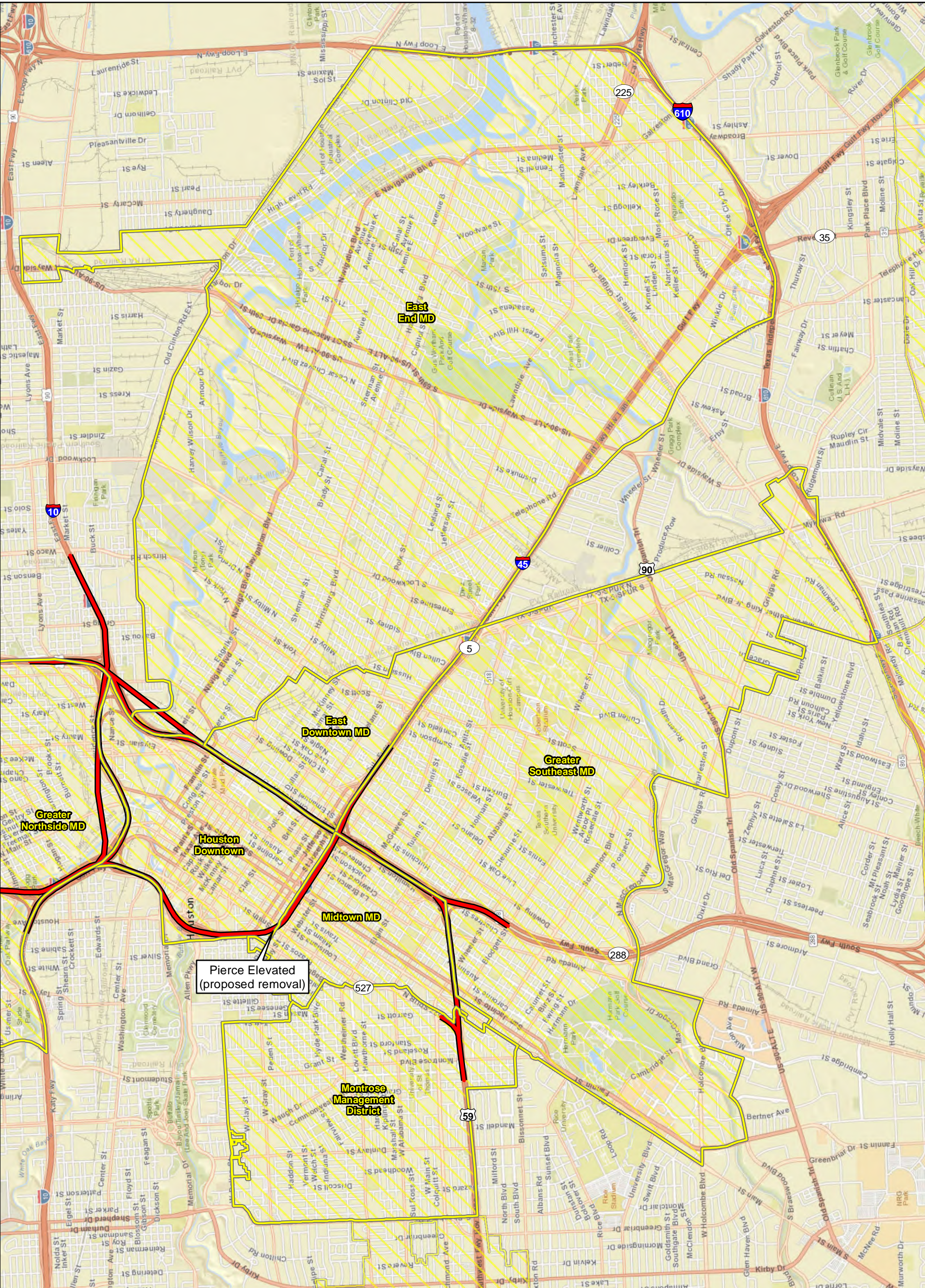
- Segment 1
- Segment 2
- Segment 3
- Management Districts

North Houston
Highway Improvement Project

Management Districts



Date: November 2017



- Segment 3
- Management Districts

North Houston
Highway Improvement Project

Management Districts



Date: November 2017

Harris County Flood Control District Questionnaire

NHHIP Indirect Impacts: Induced Growth Questionnaire

Respondent Information

Name: _____

Email: _____

Title: _____

Phone: _____

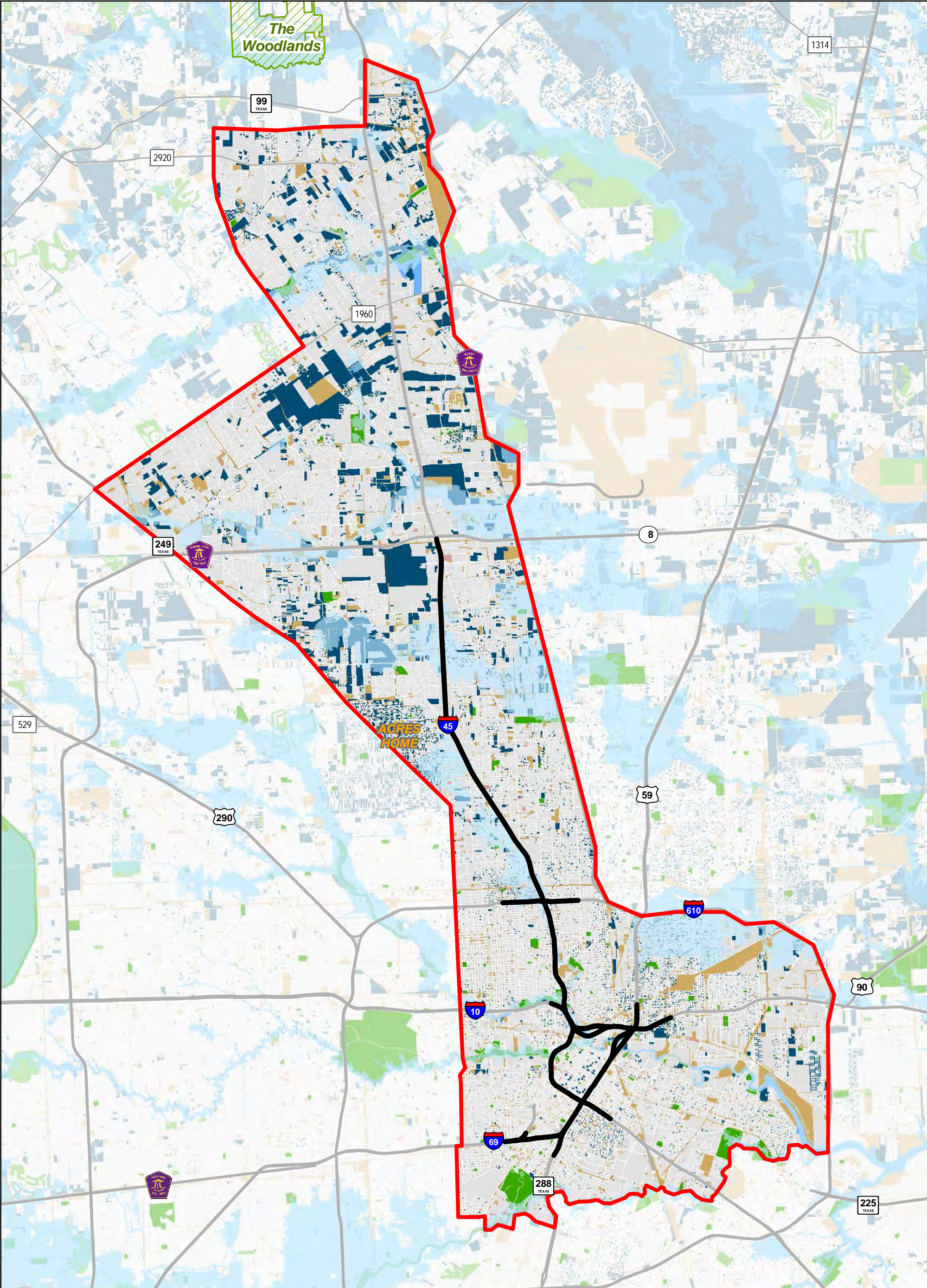
Agency: _____

Date: _____

Questions

1. Is the Harris County Flood Control District aware of particular flooding problems in the area that have affected housing needs or land development? Are you aware of any substantial proposed land developments within this mapped study area? If so, please mark the areas on the attached map and provide relevant information (the location, type, and size of areas/developments.)
2. Are you aware of other capital improvement projects – such as water or sewer infrastructure, school or hospital construction – that are planned for the area which might affect development or the current housing situation in the project vicinity?
3. Are there any factors that could limit growth in the area, such as floodplains, current development, conservation easements, protected lands, etc?
4. Do you have any comments on the proposed Area of Influence or do you think it is a reasonable study area for an assessment of induced development that may result from the proposed project? What insights can the HHA provide about the state of development and housing need within this area?

5. To what extent do you believe that the proposed highway improvement project would induce redevelopment? Are there specific parcels that would be attractive to redevelopment after the project is complete? Please provide any available details.
6. How do you believe that the removal of the Pierce elevated roadway might influence growth patterns?
7. Do you anticipate that the types and density of development would change as a result of this project? Please explain.
8. Beyond direct impacts such as displacements, please provide any information about how this project may result in indirect or induced growth in the study area. What indirect effects may occur to flood prone areas within this geographic area?



Legend

Area of Influence

Project Limits

Existing Land Use

Existing Development

Unknown

Parks/Open Spaces

Undevelopable

Vacant Developable

Water

100-Year Floodplain

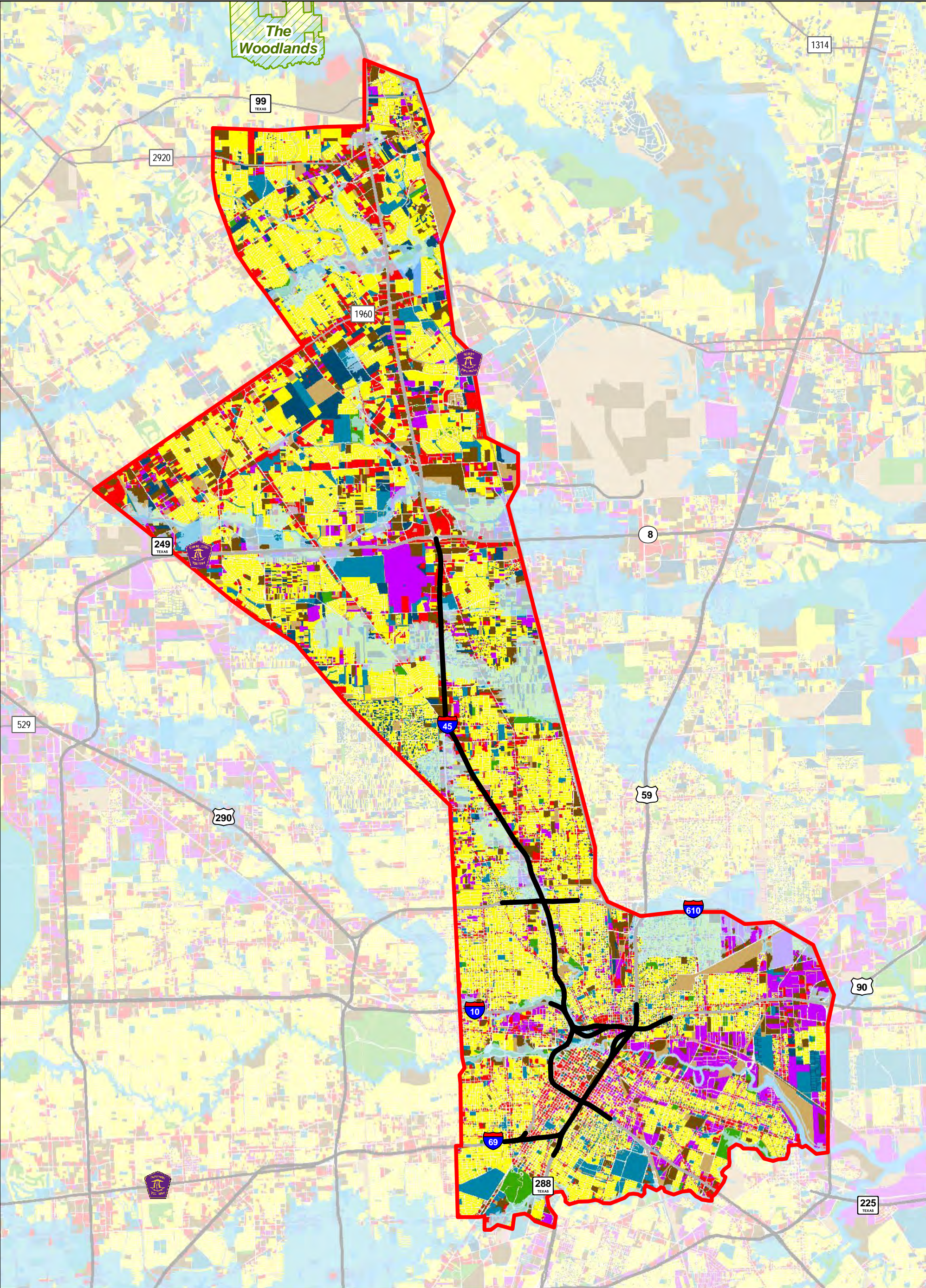
**North Houston
Highway Improvement Project**

**Developable and Undevelopable Land
in the Area of Influence**

Texas Department
of Transportation

Date: April 2017

Exhibit 1



Legend

- Area of Influence
- Project Limits
- 100-Year Floodplain

- Land Use
- Commercial
 - Public Use/Institutional
 - Industrial
 - Multiple
 - Undetermined/Unknown

- Parks/Open Spaces
- Residential
- Undevelopable
- Vacant Developable
- Water

North Houston
Highway Improvement Project

2040 Land Use in the Area of Influence

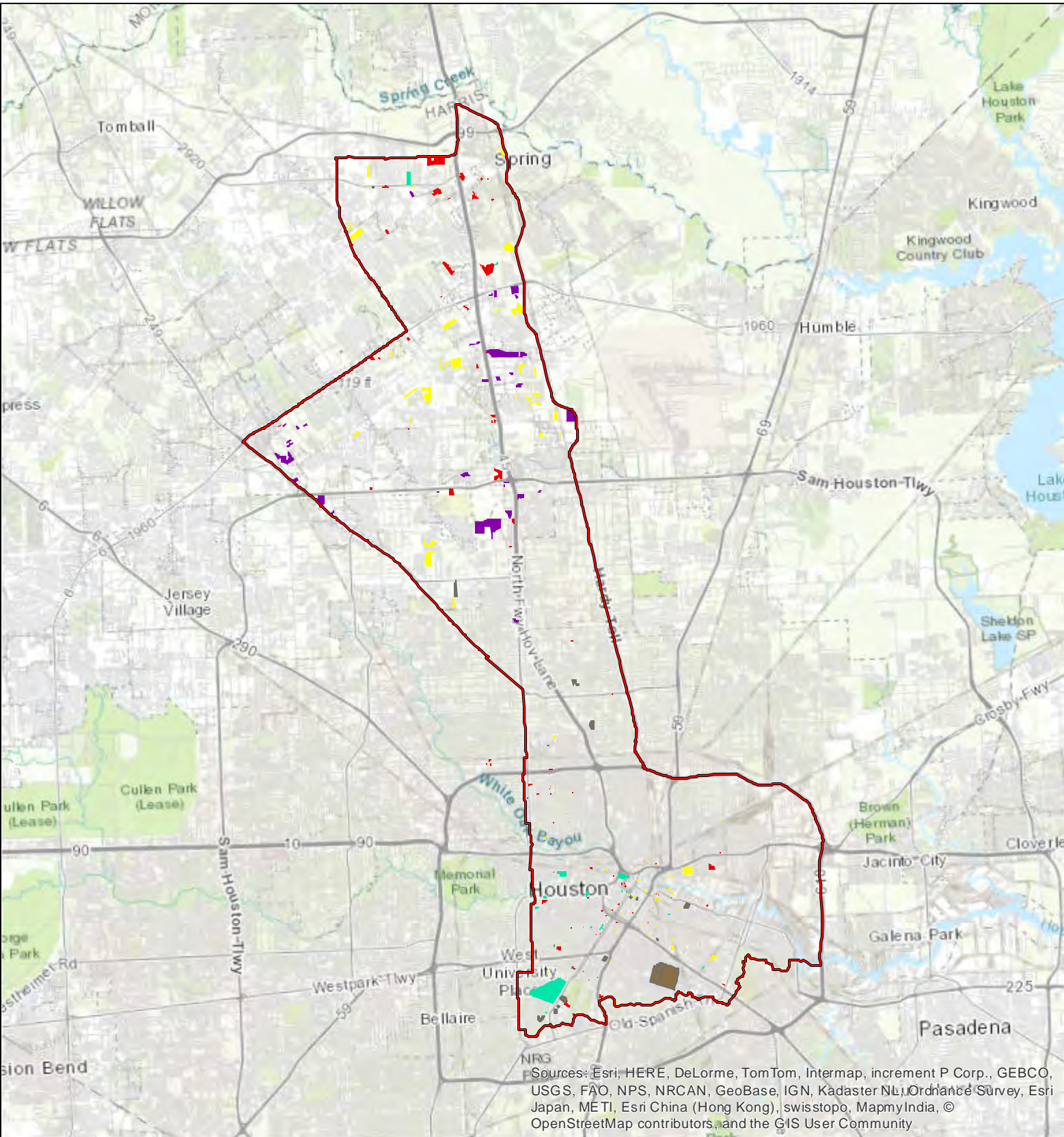


Date: April 2017

Exhibit 2

H-GAC Announced Developments (2015-2045) Map

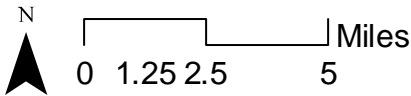
Announced Developments (2015-2045)



Legend

NHHIP Boundary	Residential	Vacant Developable (includes Farming)
Announced Developments	Government/Medical/Education	Undevelopable
Announced_Changed	Multiple	Unknown
Commercial	Other	Undetermined
Industrial	Parks/Open Spaces	

Source: 2017 H-GAC Regional Growth Forecast



Response Summaries Tables

Induced Growth Questionnaire Questions	Responses Summaries – Planning Agencies				
	Aldine ISD	City of Houston Planning & Development	Harris County Engineering	H-GAC	Houston ISD
Questionnaire Respondent	Tim Pampell Senior Project Manager Facility Planning & Construction Received 11/28/2017	Melissa Beeler Transportation Planner I Received 12/27/2017	Lloyd Smith, P.E. Assistant County Engineer Received 12/14/2017	Jeff Taebel Director, Community & Environmental Planning Received 12/14/2017	Leesa Love Real Estate Acquisition Specialist Received 12/13/2017
1. Are you aware of any substantial proposed land developments within your jurisdiction or area? If so, please mark the areas on the attached map and provide the location, type, and size (e.g. acres, density, number of units) of any planned developments. Also, please indicate if any of the proposed land developments that you identified on the attached map have been platted.	Two schools within the AOI are currently under construction and are planned for completion in 2018. Addresses of the two schools were provided.	Provided a map identifying locations of substantial development activity within the AOI since 2014; a spreadsheet accompanied the map that includes the developments names, type, acreage, number of units, plat status, etc. Several plats from hospitals and schools within the AOI indicates potential significant capital improvements within the area. Also referenced the city’s online resource (Consolidated Transportation Plan interactive map) that tracks platting activity since 2014 and provided a link to the interactive map.	Suggested using the City of Houston’s Plat Tracker app for platting information. Also provided details about a few notable areas and noted locations on land use maps. Will need to coordinate a few mapping edits to reflect this information.	Provided two maps and an accompanying spreadsheet highlighting announced developments (2015-2045) that the H-GAC is tracking. The announced developments and population/employment changes within the AOI are reflected in the 2017 H-GAC regional growth forecast.	Unknown.
2. On the attached map, please identify areas (if any) that you think would likely be developed by 2040 ¹ as a result of the proposed project that would not otherwise be developed. <i>(Please distinguish from developments identified in Question 1).</i>	N/A	Explained the city is not able to make the requested prediction because development is dependent on economic factors, property assemblage, and employment opportunities that are beyond the proposed highway improvements. Provided descriptions of areas currently redeveloping that the city is aware of: Midtown to Texas Medical Center; I-45 at N. Sam Houston Parkway W (Pinto Business Park); Exxon Campus (I-45 to Grand Parkway); East River development (150-acre site on east side of Buffalo Bayou – former	No areas identified. Confirmed that land use maps appear to have captured existing and future conditions to a reasonable accuracy (except for the few discrepancies noted in response to Question 1).	No areas identified. Provided spreadsheet with forecasted population and job growth within the AOI. Provided link to the H-GAC’s online Regional Land Use Information System (RLUIS).	Unknown.

¹ 2040 is the horizon year for the Houston-Galveston Area Regional Transportation Plan.

Induced Growth Questionnaire Questions	Responses Summaries – Planning Agencies				
	Aldine ISD	City of Houston Planning & Development	Harris County Engineering	H-GAC	Houston ISD
		KBR site at Clinton/Hirsch); and East End near Emancipation Street.			
3. Would the proposed project affect the rate of land development in your jurisdiction?	N/A	Explained the city is generally unable to predict future rate of development patterns because economic factors weigh in more heavily compared to highway improvements. However, the respondent believes the proposed project would likely induce redevelopment within approximately ½ mile on either side of I-45 between I-610 and Beltway 8. This would mimic the redevelopment that occurred following the expansion of I-10 between I-610 and Beltway 8.	No opinion. Acknowledged the many factors that influence development patterns and pace.	The proposed project won't have an overall effect on the rate of development within the H-GAC region, but the project is likely to have localized impacts.	Unknown.
4. Is the proposed project consistent with local planning efforts (i.e. master or comprehensive plans, growth management plans, zoning or land use policies, etc.)?	N/A	<p>The respondent explained that it depends if the project employs a context sensitive design approach incorporating transit, bike, and pedestrian-friendly considerations along all frontage roads, adjoining local streets and intersections. If this design approach is utilized, then the project would likely be consistent with the Houston General Plan and Complete Streets and Transportation Plan.</p> <p>Also referred to the city's comments provided on July 26, 2017 regarding the DEIS.</p>	Yes – the project is consistent with the Houston Major Thoroughfare and Freeway Plan, which is the County's guide for major thoroughfare development.	The proposed project is not consistent with the Downtown/EaDo study, which envisions an active, pedestrian-oriented environment of St. Emmanuel Street. Other Livable Centers studies would also be affected by the project: Near Northside, Independence Heights/Northline, Airline Improvement District, and Cypress Creek Parkway.	Unknown.
5. Are there other capital improvement projects – such as water or sewer infrastructure, school or hospital construction – that are planned for the area which might affect development in the project vicinity?	N/A	<p>A link to the city's "Rebuild Houston" website was provided (www.Rebuildhouston.org) for all water, wastewater, street, and drainage infrastructure projects under construction or planned up to 2022.</p> <p>The respondent also suggested to contact appropriate management districts and</p>	No planned future County facilities in the AOI would be significant at this scale of analysis.	Does not know.	Not at this time. Possibly, if HISD has a future bond.

Induced Growth Questionnaire Questions	Responses Summaries – Planning Agencies				
	Aldine ISD	City of Houston Planning & Development	Harris County Engineering	H-GAC	Houston ISD
		TIRZs in the AOI regarding their capital improvement projects.			
6. Are there any factors that could limit growth in the area, such as floodplains, current development, conservation easements, protected lands, etc?	N/A	Apart from existing historic districts located mostly west of the project within/near the I-610 loop, land use can change without restraint due to a lack of zoning regulation. Although most of the AOI is developed, the respondent explained that much of the development is relatively low-density and can accommodate additional growth. New development should be expected to occur along the reconstructed I-45.	<p>Yes – on 12/12/17, Harris County adopted new floodplain management regulations that apply to future development in unincorporated areas. The new rules would impose regulations in a 500-year floodplain instead of a 100-year floodplain.</p> <p>Whether or not these regulations will have a distinguishable effect on the pace of future development in the AOI is unknown, however.</p>	The AOI is largely developed and there is significant floodplain; it is expected that in the short term, growth would be concentrated in the large, developable tracts depicted in the AOI map.	Unknown.
7. Do you have any comments on the proposed Area of Influence or do you think it is a reasonable study area for an assessment of induced development that may result from the proposed project? If you think a different boundary would be more appropriate, please mark the attached map and provide a written description why you believe a different AOI boundary would be more suitable.	N/A	The proposed AOI looks fine.	Response asked for the Springwoods Village development /Exxon campus to be considered for inclusion within the AOI. This area is located at the northern end of the AOI, north of SH 99 (which is immediately adjacent to Grand Parkway Segment F-2) and south of The Woodlands municipal boundary.	The proposed AOI boundary looks reasonable.	Unknown.
8. To what extent do you believe that the proposed highway improvement project would induce redevelopment? Are there specific parcels that would be attractive to redevelopment after the project is complete? Please provide any available details.	N/A	The proposed project would likely induce development within approximately ½ mile on either side of I-45 between I-610 and Beltway 8, mimicking the redevelopment that occurred following the expansion of I-10 between I-610 and Beltway 8.	No opinion. Same reasoning as response to Question 3.	The project would have some effect on redevelopment, particularly on parcels immediately adjacent to the roadway. Further away, this effect would be limited considering the existing land use, block patterns, infrastructure, floodplain, and market conditions.	Unknown.

Induced Growth Questionnaire Questions	Responses Summaries – Planning Agencies				
	Aldine ISD	City of Houston Planning & Development	Harris County Engineering	H-GAC	Houston ISD
9. How do you believe that the removal of the Pierce elevated roadway might influence growth patterns?	N/A	Downtown and Midtown have seen a resurgence in growth and development. The construction of I-45 separated Fourth Ward, Midtown, and Downtown neighborhoods. Removal of the Pierce Elevated roadway would stitch the communities back together again; would help improve connectivity and local circulation; and would improve the quality of life for the residents of these neighborhoods.	No opinion.	The improved sense of connection between Downtown and Midtown with the removal of the Pierce Elevated will likely spur additional residential and retail development in Midtown.	Unknown.
10. Do you anticipate that the types and density of development would change as a result of this project? Please explain.	N/A	If the project is designed in a way that is context sensitive to the neighborhoods and surrounding communities, then it could increase development types and density in the AOI. Better project design would result in better development opportunities. Referred to July 26, 2017 comments on the DEIS for specific recommendations to improve the NHHIP project.	No opinion.	The project is likely to stimulate higher density and more pedestrian-oriented mixed-use development in the Midtown area. The project may dampen the prospects for such development in East Downtown, depending on impacts to St. Emmanuel Street and whether a project/funding partner can be found to implement the vision of the park/deck. Coordinating plans with the City, Management Districts, and other local partners will be very important. Going further north in the AOI, the proposed increased capacity will not likely create additional demand for higher density development.	Unknown.

Induced Growth Questionnaire Questions	Responses Summaries – Management Districts			
	Greater East End	Greater Northside	Houston Downtown	North Houston District
Questionnaire Respondent	Patrick Ezzell Managing Director of Economic Development and Infrastructure Received 12/19/2017	Rebecca C. Reyna Executive Director Received 12/20/2017	Lonnie Hoogeboom Director Planning, Design & Development Received 12/15/2017	Bart Baker Executive VP and COO Received January 3, 2018
1. Within your management district, are you aware of any substantial proposed land developments? If so, please mark the areas on the attached map (or provide separate plans and/or maps) and provide relevant information (the location, type, and size of areas/developments.)	<p>Provided limited details about development projects and acreage details. Included: Midway Development project on 150 acres in the NE quadrant of Jenson and Buffalo Bayou; additional 200 acres of post-industrial land in the area west of Lockwood to the south of Buffalo Bayou; North of Harrisburg and east of I-59 will likely be developed with medium to high density housing, commercial, and retail developments; and an estimated 200 acres of land that is currently occupied by functionally obsolete structures.</p>	<p>Provided limited details about several substantial proposed land developments, some are already under construction and others are still under design.</p> <p>Developments include: Wilson Industries (proposed); Fulton Station on Cavalcade (under construction); Hardy Yards (in process); Residences of Hardy Yard (under construction); TOD developments in N. Main area [beer garden in Glen Park (in process), restaurant (proposed), multi-family development (proposed)]; public private partnership (proposed); University of Houston – Downtown [Science Building (under construction), Sports Field (proposed), Student Life Center (proposed)]; Saint Arnold’s Brewing Co. Beer Garden (under construction); Holiday Inn Express at N. Main (proposed, in permitting process; Houston Foam and Plastics (under construction); Forty-Five Parker Plaza (Doctor’s Hospital) New Office Building (under construction); and Airline Farmer’s Market (redevelopment).</p>	<p>The respondent provided a map that identifies future build-out across all development sectors over a long-term horizon. It is unreasonable to attribute all of this development to the proposed project; however, parcels identified with a black dot could be anticipated as potential development in response to the proposed project.</p>	<p>The respondent provided limited details about Pinto Business Park (1,000-acre industrial park) continuing development. As part of that development, Fallbrook Drive (east/west corridor) has been extended through the site and Ella Boulevard (north/south corridor) has been extended through the site and will be connected to West Road soon.</p>
2. Are you aware of other capital improvement projects – such as water or sewer infrastructure, school or hospital construction – that are planned for the area which might affect development in the project vicinity?	No.	<p>Provided the following details:</p> <ul style="list-style-type: none"> Harris County Flood Control is buying some homes in Independence Heights. Extension of Hardy Toll Road, which at one time was studied to review the possibility of sharing capacity with I-45. The proposed Gulf Coast Rail District Project, a grade separation on Lyons. Elysian Viaduct Reconstruction (under construction). Hernandez Tunnel Reconstruction – will begin construction in early 2018. 	<p>Potential street improvement project were identified on the attached map. The respondent explained the district is aware of only two current utility projects adjacent to the NHHIP:</p> <ul style="list-style-type: none"> New sanitary sewer adjacent to the former downtown Post Office site Current City of Houston project to replace a 72-inch water line on Chenevert in Downtown (This utility project crosses I-69 on Clay Street and crosses I-45 into Midtown at Chevert and Pierce Streets.) 	<p>Provided details about two Aldine ISD schools that are under construction. Aldine High School is also under expansion. Blanson Career and Technical Education High School will open in Fall 2018. A map was provided indicating the locations of these schools in relation to Pinto Business Park.</p>

Induced Growth Questionnaire Questions	Responses Summaries – Management Districts			
	Greater East End	Greater Northside	Houston Downtown	North Houston District
		<ul style="list-style-type: none"> Bayou Greenways 2020 and Bayou Greenways Beyond. Street and drainage improvements – Lorraine: Houston Ave. to Jensen Dr. 		
3. Are there any factors that could limit growth in the area, such as floodplains, current development, conservation easements, protected lands, etc.?	No, the land in the district and adjacent to Buffalo Bayou is outside of the floodplain.	<p>The district does have concerns that the project could limit growth, particularly along Segment One and the southern side of I-10 along the realignment.</p> <p>Potentially displaced businesses would not be replaced along the (Little White Oak) Bayou on the west side of I-45 along Segment One because much of the land would be left in the floodplain and difficult or prohibited from future development.</p> <p>Potentially displaced development north of I-610 may not be replaced because of floodway impacts post-Hurricane Harvey.</p> <p>The impacts associated with the realignment of I-10 would create a barrier between Northside and the Central Business District, and could increase noise and visual pollution in this area. The proposed project would also adversely influence the future Hardy Yards development.</p> <p>There is also a considerable potential loss of properties in Independence Heights which due to previous flooding and proximity to the bayou will not be able to be replaced with future development.</p>	<p>The respondent explained the primary factor affecting Downtown development is land values. On the western and northern edges of Downtown, adjacent to Buffalo Bayou, floodplains limit development (100-year and 500-year floodplains are shown on the provided map).</p>	None known along I-45 and south of Beltway 8.
4. To what extent do you believe that the proposed highway improvement project would induce development or redevelopment? Are there specific parcels in your management district that would be attractive to redevelopment after the project is complete? Please provide any available details.	Described how two access points (of 9 open streets that connect the East End to downtown) are proposed to be cut off (Runnels and Polk). The district believes that this would have a negative impact to the previously described future developments. The project may restrict access to major development parcels in the East End that are west of Lockwood. The District’s 2011 Master Plan for this area anticipated over \$1 billion in new development, but also assumed there would	<p>The respondent believes the proposed project may have more of the opposite effect. There may be some sites that would be attractive to redevelopment, but it depends on how the project improves access to the area.</p> <p>Descriptions of several areas of proposed access improvements were provided, including the proposed “CAP” park, an</p>	The recently completed <i>Plan Downtown</i> document was referenced as a source of both public and private development opportunities that have been initially identified relative to the NHHIP. Sections of this document were pointed out as being beneficial or critical for TxDOT’s purposes (e.g. the concept of Downtown’s Green Loop, a 5-mile trail network of public parks, public spaces, and active	The respondent explained the planned acquisition of right-of-way on the west side of I-45 would impact existing retail development that would need to be replaced.

Induced Growth Questionnaire Questions	Responses Summaries – Management Districts			
	Greater East End	Greater Northside	Houston Downtown	North Houston District
	<p>be no further restriction of access to downtown and the existing freeways. The district believes this project should be adjusted to enhance access to downtown from the East End and to improve access to the existing freeways.</p> <p>Also provided two solutions to enhance connections to downtown and corresponding map illustrations.</p>	<p>area directly east of North Street Bridge, and Love’s Truck Stop on Patton and I-45. Concerns about creating detention pond areas without considering it to be an amenity were voiced; development and/or redevelopment could be inhibited if the future greenspace/detention ponds are not designed in a way to be usable or attractive.</p>	<p>streetscapes). The respondent noted the district anticipates that upon completion of the proposed NHHIP project, induced development benefits would be realized along most of Downtown’s edges. Additionally, the District expects the network effect of the proposed Green Loop to equal or exceed the cumulative economic benefit for the development of highway adjacent parcels.</p>	
<p>5. How do you believe that the removal of the Pierce Elevated roadway (I-45 along the west and south sides of Downtown Houston) might influence growth patterns?</p>	<p>The barrier removal between Midtown and Downtown would encourage higher density development in Midtown and would greatly increase property values.</p>	<p>The respondent believes the capacity of the removed Pierce Elevated roadway would relocate that capacity to the Northside, which could increase visual and noise impacts. There is also a concern that the existing greenspace in Northside would be covered by multiple lanes of freeway, which would lessen the positive impact of these amenities.</p>	<p>The removal of the elevated structure would benefit Downtown and Midtown, as development opportunities would expand into the area of the existing I-45 ROW. However, proposals to preserve portions of the Pierce Elevated and repurpose the highway infrastructure as a cultural and tourism attraction would potentially entail significant economic benefit.</p>	<p>The respondent explained that portion of the proposed project would not impact the North Houston District.</p>
<p>6. Do you anticipate that the types and density of development would change as a result of this project? Please explain.</p>	<p>Yes; as currently planned with restricted access to downtown and existing freeways, this proposed project would cause lower density development. However, if access is improved, the district believes this project would continue to encourage higher density development in areas adjacent to downtown.</p>	<p>Yes; the project would have an impact due to the amount of area it covers and the barrier it is creating. If it becomes harder to access the existing neighborhoods in Northside, or developable land is limited then the respondent anticipates a lower density of development along the freeway. There are also concerns that if there is a lack of access or ease of that access, then desirable developments would look elsewhere.</p>	<p>The District would anticipate and promote a mix across all sectors of development, including residential, office, hospitality, with a focus on advancing the development of educational facilities and the redevelopment of Downtown Civic Facilities.</p> <p>A portion of the new development across Downtown could be partially catalyzed by the proposed NHHIP, but attempts to attribute specific developments to the project inherently involve conjecture. The inclusion of four MaX lanes on I-45 promotes the sort of regional express commuter transit service necessary to sustain the density of development customary in Downtown.</p>	<p>N/A</p>

Induced Growth Questionnaire Questions	Responses Summaries – Harris County Flood Control District (HCFCD)
Questionnaire Respondent	<p style="text-align: center;">Matthew Zeve Director of Operations Received 12/8/2017</p>
<p>1. Is the Harris County Flood Control District aware of particular flooding problems in the area that have affected housing needs or land development? Are you aware of any substantial proposed land developments within this mapped study area? If so, please mark the areas on the attached map and provide relevant information (the location, type, and size of areas/developments.)</p>	<p>Details related to two watersheds were provided (summarized below), in addition to four maps (FEMA Effective Floodplains, FEMA Repetitive and Severe Repetitive Losses, Hurricane Harvey Flooded Structures, and Voluntary Buyout Areas of Interest).</p> <p>Little White Oak Bayou Watershed (HCFCD Unit No. E101-00-00):</p> <ul style="list-style-type: none"> At the I-610 North crossing, the existing roadway crossing constricts the channel and there has been a history of flooding along the Little White Oak Bayou upstream of I-610. The HCFCD believes there has been a desire by the City of Houston to improve drainage conditions in the neighborhoods east of I-45 in the Little White Oak Bayou Watershed; however, they are limited in providing improvements by the current depth and capacity in the HCFCD channels. Improving the tributaries, possibly including the crossing structures at I-45, would help provide better drainage for those neighborhoods. <p>Halls Bayou Watershed (HCFCD Unit No. P118-00-00):</p> <ul style="list-style-type: none"> During a previous HCFCD planning study (Halls Ahead), it was recommended that the I-45 northbound and southbound frontage roads be widened along Halls Bayou. The bridge crossing for the main lanes was not identified as needing to be widened or elevated. <p>No responses were provided regarding specific substantial proposed land developments.</p>
<p>2. Are you aware of other capital improvement projects – such as water or sewer infrastructure, school or hospital construction – that are planned for the area which might affect development or the current housing situation in the project vicinity?</p>	<p>No, HCFCD is not aware of other capital improvement projects for the area.</p>

3. Are there any factors that could limit growth in the area, such as floodplains, current development, conservation easements, protected lands, etc.?	HCFCFCD does not have any conservation easements or protected lands in the AOI. A HCFCFCD right-of-way map was provided and referenced for existing flood control rights-of-way in the AOI. However, HCFCFCD is aware of at least one conservation easement in the AOI that is held by the Bayou Lands Conservancy along Cypress Creek at the Hardy Toll Road called the Ashton Gardens Preserve.
4. Do you have any comments on the proposed Area of Influence or do you think it is a reasonable study area for an assessment of induced development that may result from the proposed project? What insights can the HHA provide about the state of development and housing need within this area?	No comment.
5. To what extent do you believe that the proposed highway improvement project would induce redevelopment? Are there specific parcels that would be attractive to redevelopment after the project is complete? Please provide any available details.	No comment.
6. How do you believe that the removal of the Pierce Elevated roadway might influence growth patterns?	No comment.
7. Do you anticipate that the types and density of development would change as a result of this project? Please explain.	No comment.
8. Beyond direct impacts such as displacements, please provide any information about how this project may result in indirect or induced growth in the study area. What indirect effects may occur to flood prone areas within this geographic area?	Indirect project impacts have the potential to significantly influence flooding and drainage in the AOI. The project also has the potential to impact maintenance access of existing flood control infrastructure, thereby affecting flood prone areas. HCFCFCD appreciates the opportunity to be involved in any planning and design of roadway drainage outfalls, detention basins, and other drainage improvements that affect flood control channels and rights-of-way.