Public Draft
Site-Specific Environmental Assessment
Houston National Cemetery
Phase V Expansion Project
Houston, Harris County, Texas

Prepared for

Department of Veteran's Affairs
National Cemetery Administration

Prepared by

ECS Southwest, LLP

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Executive Summary and Conclusions

This Draft Site-Specific Environmental Assessment (SEA) evaluates the environmental, physical, cultural consequences of the Proposed Action to construct and operate an approximately 42-acre expansion of the United States Department of Veterans Affairs (VA), National Cemetery Association (NCA) Houston National Cemetery (HNC) located at 10410 Veterans Memorial Drive, Houston, Texas. The cemetery expansion would extend the longevity of the Houston National Cemetery and allow the VA to continue providing burial opportunities needed by Veterans and their families in southern Texas. The cemetery expansion would provide additional casket, columbarium, and in-ground cremation sites, as well as expanded infrastructure including roadways, irrigation, landscaping, and stormwater management systems.

Purpose and Need

The ***purpose*** of the Proposed Action is to expand and improve the Houston National Cemetery in the eastern portion of the existing cemetery property to enable NCA to continue providing interment benefits to eligible Veterans and their families by further extending the longevity of HNC by approximately 10 years.

The Proposed Action is ***needed*** to serve projected Veteran needs and avoid depleting cemetery internment sites, thus meeting the NCA's goal of providing eligible Veterans with reasonable access to VA interment options.

Alternatives

The alternatives considered are the preferred alternative and the No-Action alternative. The preferred alternative consists of the planned Phase V expansion and renovation activities and anticipated future expansions of the HNC, all of which would occur on undeveloped land owned by the VA and located immediately adjacent to the existing cemetery. The Phase V expansion would encompass approximately 42 acres and provide increased burial capacity, maintenance facilities, installation of a new entrance along Aldine-Western Road, and irrigation infrastructure within the HNC; future expansions would eventually occupy the entire HNC property. The No-Action alternative would not expand the HNC into the undeveloped acreage, would not provide the necessary burial sites to allow the VA to continue providing burial services to veterans at the HNC, and would not provide needed infrastructure improvements within the developed areas of the HNC.

The following table summarizes the potential environmental impacts of the Proposed Action and the No Action alternatives.

Resource / Issue	Proposed Action	No Action
Meets Purpose of and Need for Action	Yes.	Adverse impact, by not being able to serve the veterans in the community around the 75 mile radius.
Aesthetics	Minor, short-term adverse impact from presence of heavy equipment during construction. Receptors limited to visitors in the existing portion of the National Cemetery.	No impact.
Air Quality	Minor, short-term adverse impact from particulate emissions during construction, which are below *de minimis* threshold levels.	No impact.
Cultural Resources	No significant adverse impact. No cultural resources identified in the expansion area. VA will comply with the Native American Graves Protection and Repatriation Act (NAGPRA), coordinate with the State Historic Preservation Officer (SHPO) and the Tribes if artifacts or remains are uncovered during construction, and follow proper management procedures.	No impact.
Geology, Topography, and Soils	No impact on geology. Potential for minor, short-term impact on soils due to potential for soil erosion during construction. No prime farmland is present.	No impact.
Hydrology and Water Quality	Minor, short-term adverse impact due to potential sedimentation of runoff, and potential groundwater quality impacts from accidental release of construction vehicle operating fluids. As irrigation from wells has been used in previous phases, no additional impacts from the use of groundwater are anticipated.	No impact.
Wildlife and Habitat	No significant impact. While the Proposed Action area was previously used for cattle grazing, it may present habitat for listed species. However, no listed flora or fauna are known to occur	No impact.

Noise	Minor, short-term adverse noise impacts due to heavy machinery associated with clearing and grading during construction. Receptors limited to Houston National Cemetery visitors and a few nearby residents	No impact.
Land Use	No impact. Expansion is consistent with existing zoning and land use conditions.	No impact.

Resource / Issue	Proposed Action	No Action
Floodplains, Wetlands, and Coastal Zone Management	No impact to wetlands or jurisdictional Waters of the U.S. No floodplains present at the expansion site. No Coastal Zone Management areas within project area.	No impact.
Socioeconomics	Minor, short-term, localized beneficial impact to employment if outside contractors are utilized for grading and cemetery construction. No impact during operation.	Negligible adverse impact due to increased costs for families and visitors once existing burial capacity is reached at Houston National Cemetery, requiring burial at a private cemetery or travel to a National Cemetery outside of Commuting area of Houston.
Community Services	Long-term, significantly beneficial impact by extending the longevity of the Houston National Cemetery, benefiting veterans and their families throughout southern Texas.	Potential long-term, adverse impact because longevity will not be extended, requiring South Texans to travel longer distances for burial and visitation. Not in compliance with *Service Members Civil Relief Act*.
Solid and Hazardous Materials	Minor, short-term increase in solid waste generation (excess construction materials that cannot be recycled) during construction. New potential waste streams include remediation of pesticide-impacted soils, as well as potential asbestos-containing building materials (ACM) and lead-based paint (LBP in Building 3006. Minor, short-term potential impact to soil quality in the event of an accidental release of construction vehicle operating fluids.	Potential long-term impact associated with leaving pesticide-impacted soils at Building 3006 in place. Also, potential asbestos-containing building materials (ACM) and lead-based paint (LBP in Building 3006.

Transportation and Parking	Minor, short-term adverse impact from increased construction traffic traveling on Aldine-Western Road. No operational transportation or parking impact.	No impact.
Utilities	Negligible to minor adverse impact and short-term, direct, less-than-significant adverse impact due to increase in electrical utility use for irrigation water pumps, and increased groundwater use. The projected total use of groundwater for the Phase V Expansion and future expansions is 102,757,649 gallons per year, which is below the 120,000,000 gallons per year permitted by the Harris-Galveston Subsidence District.	No impact.
Environmental Justice	Not anticipated to have an impact on the population directly affected by Environmental	No impact.
Potential for Generating Substantial Controversy	No objections anticipated.	Potential adverse reaction if expansion is not implemented, causing a decrease in longevity of the Houston National Cemetery.

Environmental Consequences of the No-Action Alternative

The No-Action alternative would not result in any adverse impacts to aesthetics, noise levels, air quality, biological resources, cultural or historical resources, geology and soils, hazardous materials, or land use. The No-Action alternative would not provide the needed upgrades and maintenance to the existing cemetery facilities and would force veteran families to seek alternative burial options distant from their desired location.

Environmental Consequences of the Preferred Alternative

Aesthetics and Noise

The Proposed Action would result in a change in the aesthetics of the undeveloped portion of the HNC property by incorporating design features consistent with the existing cemetery. No long-term adverse impacts would result from the cemetery expansion. Temporary increases in noise levels and aesthetics resulting from construction activities during Phase V and future expansions would be minimized through the use of best management practices and controlled construction vehicle access to the expansion area to limit adverse impacts to cemetery visitors and nearby businesses.

Air Quality

The Proposed Action would not result in any long-term adverse impacts to air quality. Construction activities could result in short-term temporary increases in dust generation, nuisance odors, or *de minimis* emissions from diesel powered construction vehicles which would be mitigated through best management practices to minimize any adverse impacts to cemetery visitors and adjacent properties.

Biological Resources

The Proposed Action would not result in adverse impacts to threatened and endangered species or their habitat. There is no habitat for any threatened or endangered species within the existing cemetery, the Phase V expansion area, or the remainder of the undeveloped property. The Phase V expansion would result in a conversion of areas from improved and grazed pasture grasses to turf grasses and cemetery landscaping. Specific details regarding endangered or special-status species can be found in Appendix B.

Cultural and Historical Resources

The Proposed Action would not adversely impact any known cultural or historical resources. Pedestrian archaeological surveys conducted within the Phase V expansion area found no evidence of impacts to culturally or historically significant sites. A copy of the reports were submitted to the Texas Historical Commission (THC) / State Historic Preservation Office (SHPO). THC / SHPO replied that the Proposed Action would have no effect on historic properties. Cultural resources information can be found in Appendix C.

Geology and Soils

The Proposed Action would not adversely impact geological or soil resources. The Woodgate Fault crosses through the HNC property. Movement along the fault poses little seismic risk to the HNC, but could result in long-term damages to roadways, drainage culverts, and other structures. The Proposed Action does not include development or construction of structures within 400 feet of the approximate fault location.

The Proposed Action would not result in a significant increase in groundwater use at the HNC and would therefore not be expected to increase the rate of land surface subsidence. Specific details regarding groundwater use can be found in Sections 3.9 and 4.9.

Hazardous Materials

The Phase V and future expansions would not result in an increase in hazardous materials used or stored at the HNC. Minor spills of hazardous materials or petroleum products (such as oil or hydraulic fluid) could occur from heavy equipment used onsite during construction activities. One (1) former residential structure and two (2) farm structures, identified collectively as Building 3006, will be demolished as part of the Phase V expansion. VA conducted previous environmental investigations of the Building 3006 area and recognized environmental conditions (RECs) were identified. The RECs included the following:

The “Milk House” on the north side of Building 3006 contained several bottles of regulated pesticides/herbicides such as Amine 4 (2,4-D) weed killer and a jug of

Chlordane. The improper storage of regulated substances has resulted in staining along the concrete floor near a floor drain found within the Milk House. Additionally, a septic system with a drain field is located on the subject property; although the exact location of the drain field was unknown at the time of the Phase I ESA. The potential for contaminants to migrate from Building 3006's drains and deposit contaminants in soil presented a REC for the subject property.

The "Shed" on the south side of Building 3006 contained several bottles and drums of petroleum products, and staining was visible on the wooden floor of the building. It was believed that a crawlspace underlies the building with exposed soil directly underneath the floor. The potential for contaminants to leach from Building 3006's floors to the underlying soil presented a REC for the subject property.

VA conducted soil and groundwater sampling (Phase II Environmental Site Assessment [ESA]) during November 2018 to address the RECs previously identified. The Phase II ESAs identified the following environmental concerns:

Analysis of the two soil samples collected from beneath the floor of the Shed (2601-SS-1 and 2601-SS-2) yielded results indicative of a release of Dieldrin, a pesticide, to surface soil. These results exceeded the Texas Commission on Environmental Quality's (TCEQ's) Protective Concentration Levels (PCLs) for residential soil. Sample 2501-SS-2 also exceeded the commercial PCL for Dieldrin.

4-Chlorophenyl phenyl ether, a semi-volatile organic compound (SVOC), was detected above the residential PCL in all soil samples collected during the initial Phase II ESA, and above commercial PCLs in four of the samples (2501-SS-3, 2501-SS-4, 2501-SS-5, and 2501-SS-6). 4-Bromophenyl phenyl ether was detected above the residential PCL at four sample locations (2501-SS-3, 2501-SS-4, 2501-SS-5, and 2501-SS-6), and above the commercial PCL in Sample 2501-SS-6. Hexachlorobenzene was also detected above the residential PCL at four sample locations (2501-SS-3, 2501-SS-4, 2501-SS-5, and 2501-SS-6).

VA conducted an Expanded Phase II ESA from May 21 to 22, 2019 to further characterize the site. To delineate the exceedances observed during the initial Phase II ESA, 69 soil samples were collected from 23 locations and analyzed for SVOCs and pesticides.

Groundwater grab samples were collected from six locations around the site via the installation of temporary PVC wells.

The analytical data obtained during the Expanded Phase II ESA indicate that the contamination discovered during the initial Phase II ESA appears to be confined to the footprint of the shed building of Building 3006. Based on the analytical results of the Expanded Phase II ESA, Booz Allen recommends the following actions at the subject property:

Remedial action to bring the Dieldrin impacted soil identified during the initial Phase II ESA into compliance is required. Remedial actions would include the excavation and disposal of the top 2 feet of soils at the locations where contamination is present. The remedial action will occur concurrently with the Phase V expansion. Building 3006 may contain asbestos-containing building materials (ACM) or lead-based paint. Prior to demolition of Building 3006, VA will conduct ACM and LBP surveys. Any ACM or building materials coated with LBP will be abated and disposed of in accordance with federal, state and local requirements prior to demolition. Hazardous materials-related information can be found in Appendix F.

Land Use

The Phase V expansion and future expansions would result in a change of land use from pasture to cemetery use. This change in land use was anticipated in the HNC's Master Plan and is consistent with the land use of the existing cemetery.

Socioeconomics

The Proposed Action would not result in disproportionately adverse impacts to minority and/or low income populations. The Phase V expansion would have beneficial impacts on traffic flow within the HNC, as well as potential vehicular back up on surface roads outside of HNC, through the installation of a new gate along Aldine-Western Road.

Water Resources

Surface Water - Adverse impacts to surface water could occur during construction of the Phase V and future expansions from discharges of pollutants or increased sediment in storm water runoff. Discharges of storm water to surface water bodies, including drainage ditches and ponds, during construction activities would be authorized under a

Texas Pollutant Discharge Elimination System (TPDES) Construction General Permit for Stormwater Discharges Associated with Construction Activities (TXR150000) from the Texas Commission on Environmental Quality (TCEQ). A Stormwater Pollution Prevention Plan (SWPPP) would be prepared and implemented during construction activities to identify potential sources of pollution resulting from construction activities and to minimize discharge of pollutants in storm water.

Groundwater - The Phase V and future expansions of the cemetery would increase the landscaped acreage at the HNC that requires regular irrigation obtained from groundwater sources using the onsite water wells, as well as the installation and development of a new irrigation well. The new well would be permitted by the Harris Galveston Subsidence District (HGSD). The irrigation system upgrades during the Phase V expansion would result in greater efficiency and would be expected to reduce the amount of water used per acre and offset the additional demand from the increased irrigable area. Sprinkler spacing for the burial sections is selected to provide the most efficient water application. Computer software is used to select the most efficient pressure, sprinkler, nozzle combination. The efficiency metrics used for selection are the Distribution Uniformity (DU) and Scheduling Coefficient (SC). The higher the DU percentage, the greater the application efficiency. The closer the SC is to 1.0, the higher the application efficiency. Spacing for block style sprinklers will be selected to achieve a minimum DU of 80% and a SC of 1.2 or less. Spacing of sprinkler alleys in the burial sections is coordinated with the Cemetery Planner. For example, Rain Bird 8005 sprinklers at 63’x63’ spacing have a DU of 84% and SC of 1.2 and at a 52’x52’ spacing have a DU of 83% and SC of 1.2. Groundwater-related information can be found in Sections 3.9 and 4.9.

The potential for groundwater contamination resulting from infiltration of onsite chemical use and leachate from casketed remains would be minimized through the use of pre-placed crypts and drainage systems that would collect water from beneath the burial section and divert it to the retention ponds. Additionally, modern mortuary practices have discontinued the use of toxic embalming fluids, which will minimize any potential for contamination.

Floodplains - The proposed Phase V and future expansions would not result in adverse impacts to areas located within floodplains. Storm water runoff would be channeled to the network of ponds, which retain storm water and only discharge to the municipal storm sewer system during extreme flooding events and would not result in adverse impacts to floodplains within or downstream of the HNC.

Wetlands - The proposed Phase V expansion would not result in impacts to jurisdictional wetlands within the expansion area. Wetlands information can be found in Appendix D.

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List of Acronyms

CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	Carbon Monoxide
dB	Decibel
EA	Environmental Assessment
ESA	Endangered Species Act of 1973
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact (on the human environment, as defined in CEQ Regulations 1508.14)
HGSD	Harris-Galveston Subsidence District
HNC	Houston National Cemetery
LEED	Leadership in Energy & Environmental Design
NAAQS	National Ambient Air Quality Standards
NAVD	North Atlantic Vertical Datum
NCA	National Cemetery Administration
NEPA	National Environmental Policy Act of 1969
NO_x	Nitrous Oxides
NRCS	Natural Resource Conservation Service
OSHA	Occupational Safety and Health Administration

PM2.5	Particulate Matter less than 2.5 Micrometers
PM10	Particulate Matter less than 10 Micrometers
PST	Petroleum Storage Tank
ROG	Reactive Organic Gasses
SEA	Site-Specific Environmental Assessment
SHPO	State Historic Preservation Office
SOx	Sulphur Oxides
SPCC	Spill Prevention, Control, and Countermeasures
SWPPP	Storm Water Pollution Prevention Plan
TARL	Texas Archeological Research Laboratory
TCEQ	Texas Commission on Environmental Quality
THC	Texas Historical Commission
TPDES	Texas Pollutant Discharge Elimination System
TPWD	Texas Parks and Wildlife Department
TxDOT	Texas Department of Transportation
USACE	United States Army Corps of Engineers
USEPA	U. S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VA	Department of Veterans Affairs
VOCs	Volatile Organic Compounds

1. Purpose and Need for the Proposed Project

1.1 Introduction

The Department of Veterans Affairs (VA) National Cemetery Administration (NCA) provides burial services for eligible veterans and their dependents in national cemeteries at no cost to the family. The NCA maintains 130 national cemeteries and 33 soldier's lots and monument sites throughout the United States and Puerto Rico to serve veterans and their families.

The Houston National Cemetery (HNC) in Houston, Texas (Figure 1-1) was dedicated in December 1965 and provides burial services for veterans in the greater Houston area and southeast Texas. The 75-foot carillon tower known as the Hemicycle, which serves as the central focal point of the cemetery, was dedicated on May 30, 1970. Since the completion of the Hemicycle, the cemetery has been expanded three times (Phase II, Phase III and Phase IV). Phase II included expansion of the site to the east that retained the original radial planning concept. Phase III, completed in 2009, retained the basic radial concept by further expanding the cemetery to the east. Phase IV, which was completed immediately adjacent to the Phase III expansion, provided additional capacity for burial service and allowed the VA to meet the needs of eligible veterans and their dependents for an estimated period of ten years and was anticipated in the cemetery's original Master Plan.

The HNC is located on 417.5 acres of land owned by the State of Texas and the VA, of which approximately 213 acres are currently developed as part of the cemetery. The remaining land is improved pastureland reserved for future cemetery expansion and currently utilized for cattle grazing. Phase V would encompass approximately 42 acres of the remaining 206 undeveloped acres within the HNC property. Subsequent expansions would eventually encompass the entire 417.5 acres (Figure 1-2).

All comments on the Draft SEA are requested within 30 days of the publication of the Notice of Availability (NOA). Please address all comments to Mr. Fernando L. Fernández, U.S. Department of Veterans Affairs, Office of Construction & Facilities Management, 425 I (eye) Street, NW, Room 6W317d, Washington, DC, 20001; (202)

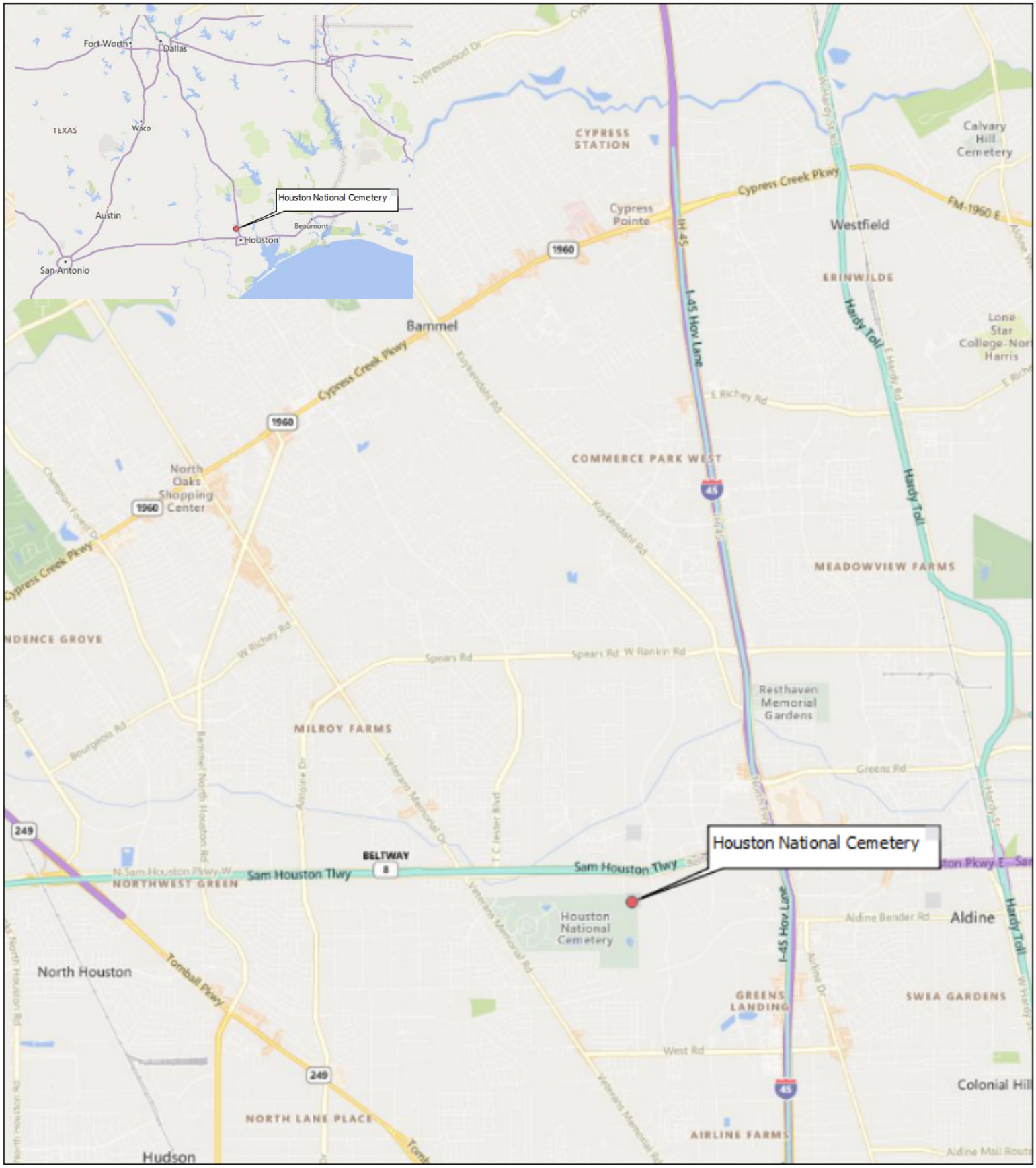

Figure 1-1 Vicinity Map

Houston National Cemetery
Phase V Expansion
10410 Veterans Memorial Drive
Houston, Texas
ECS Project 51-1474

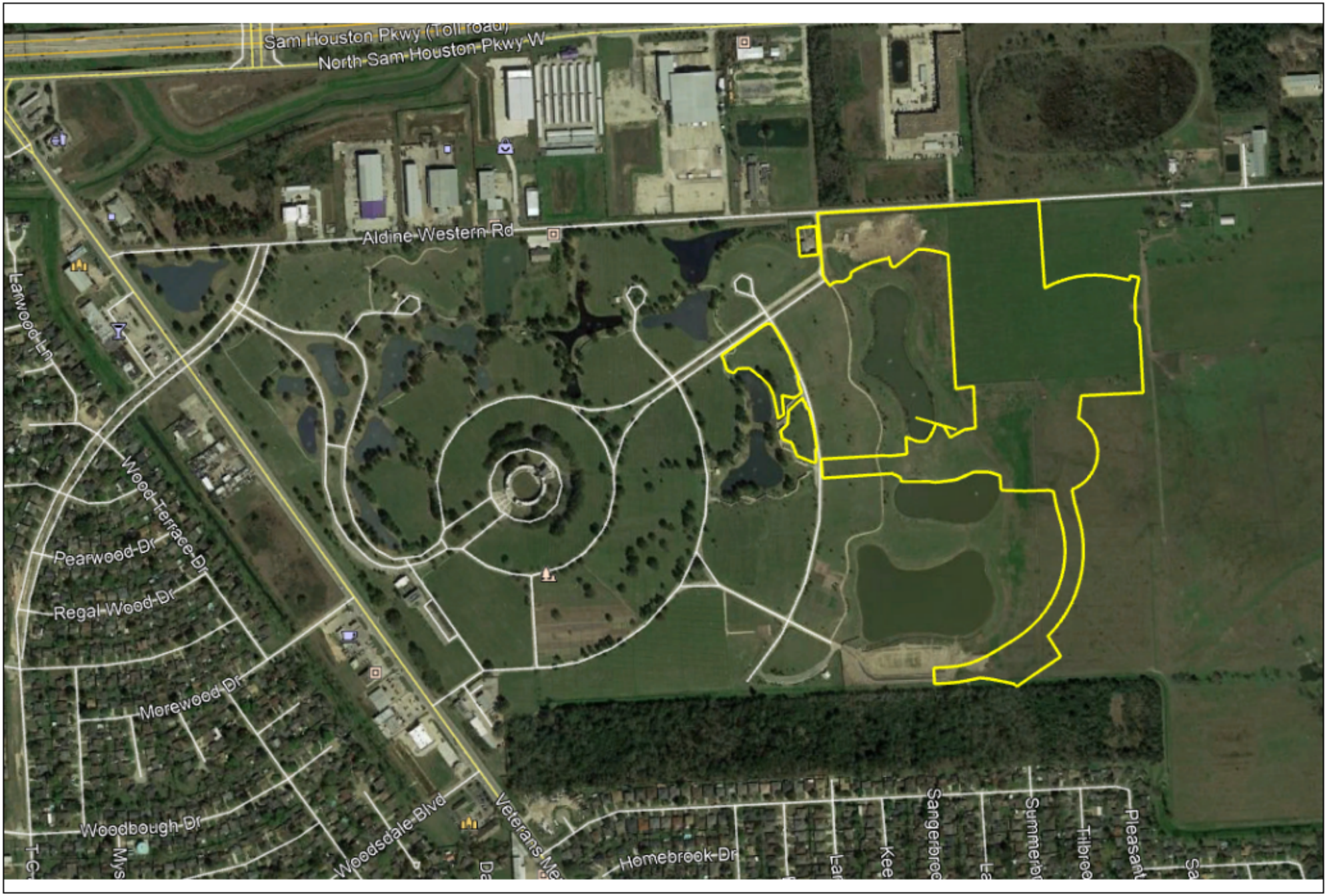

Figure 1-2 Aerial View of Proposed Action

Houston National Cemetery
Phase V Expansion
10410 Veterans Memorial Drive
Houston, Texas
ECS Project 51-1474

632-5529; or fernando.fernandez@va.gov. Please reference "Houston National Cemetery" in all correspondence.

1.2 Purpose and Need for the Proposed Project

The NCA provides burial services, including gravesites, grave markers, and gravesite maintenance, for eligible veterans and their dependents. One of the NCA's goals is to provide veterans access to burial in a state or national veterans cemetery within 75 miles of their residence. The HNC serves veterans in the greater Houston metropolitan area and southeast Texas. The HNC estimates an average of 2,700 burials per year for the next 20 years. The Phase V expansion is necessary to expand the capacity of the cemetery to continue to provide burial services for an estimated ten years. Future expansions will also follow a phased development approach until full capacity is achieved at its existing location, which is anticipated by 2050. Renovations to existing HNC facilities are also required to upgrade the utility infrastructure, provide necessary facilities for employees and visitors, and maintain the wetland mitigation ponds and storm water drainage system.

This Environmental Assessment (EA) has been prepared in compliance with the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] 1500-1508), and VA Regulations, (38 CFR 26.4 [a]), which require the VA NCA to evaluate the impacts of cemetery development and operations on the environment.

2. Description of Project Alternatives

2.1 Proposed Action

The proposed expansion would develop approximately 42 acres of HNC property east of the existing cemetery to provide additional burial space and services in a manner consistent with the cemetery's Master Plan. Upgrades and new construction to improve infrastructure, utilities, and existing facilities within the cemetery would also be included in the Phase V expansion. The upgrades and construction within the existing portions of the cemetery include maintenance and upgrades to the chapel and hemicycle, improved parking and traffic flow through the cemetery, as depicted in Figure 2-1. The Phase V expansion would consist of burial sections including pre-placed crypts, columbaria niches, and a committal shelter and associated infrastructure. Drainage, landscaping, pathways, roadway extensions, parking, signage, and electrical service and other utilities are incorporated into the expansion design to provide an experience consistent with the existing portions of the cemetery. Specifically, the Phase V expansion will consist of:

- Burial site expansion of approximately 14,000 pre-placed crypt full casket gravesites, approximately 8,000 columbaria niches, and approximately 2,000 traditional in-ground cremains. The Proposed Project will also include a hybrid natural (Green) burial section located within the open naturalized field area to accommodate 300 total burial sites sized 5'x10' with the following types of green burial: no vault burial, no casket burial, biodegradable casket burial and cremation with no urn burial. This area shall be naturalized landscaping, non-irrigated, and non-mowed.
- Extension of Veterans Memorial Drive within the cemetery property to the expansion area. The Proposed Project would also provide a new limited use cemetery entrance and gate at Aldine Western Road;
- Landscaping improvements;
- Irrigation system improvements and expansion;
- Demolition of existing, non-contributing structures and remediation of pesticide-impacted soils at Building 3006, as well as potential abatement of asbestos-containing building materials and lead-based paint.
- Utility and infrastructure improvement and expansion.

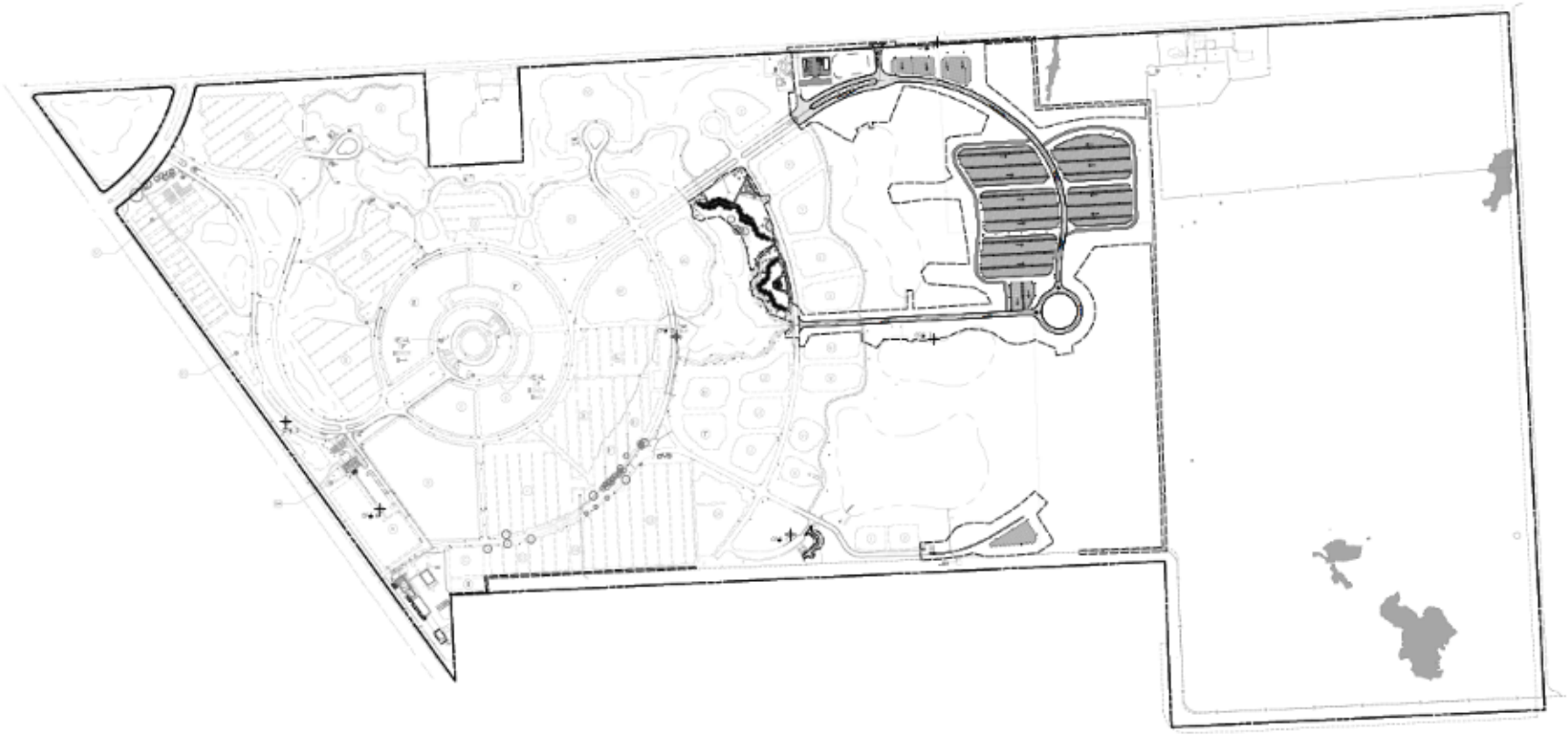

Figure 2-1 Phase V Expansion Site Plan

Houston National Cemetery
Phase V Expansion
10410 Veterans Memorial Drive
Houston, Texas
ECS Project 51-1474

No site alternatives were considered for the proposed expansion because the Proposed Action would be located on land owned by the VA for the purpose of cemetery expansion. The location is part of the 417.5-acre tract of land set aside for cemetery development and is immediately adjacent to the existing cemetery facilities.

2.2 Future Expansions

The Proposed Action is expected to provide burial space at the HNC for an estimated ten years, following the NCA's phased approach to cemetery planning and design. Future expansions would continue to expand the cemetery to the east within the 417.5-acre tract of land owned by the VA. Each expansion would include burial sections and associated infrastructure designed to provide an estimated ten years of burial service, similar to the proposed Phase V expansion. Design plans for the future expansions would be developed as each phase is determined necessary and would incorporate design features to maximize available burial space while providing an experience consistent with the overall design plan of the HNC.

2.3 No-Action Alternative

Under the No-Action alternative, the HNC would not increase available burial space at the HNC. No construction would occur and the remaining acreage at the HNC property would remain unimproved pastureland.

The No-Action alternative would not be consistent with the NCA's mission to provide eligible veterans reasonable access to VA burial options within 75 miles of a veteran's home. The nearest available burial options for Houston-area veterans would be Fort Sam Houston National Cemetery and San Antonio National Cemetery (cremated remains only), located in San Antonio, approximately 200 miles away or the Dallas-Fort Worth National Cemetery, approximately 225 miles away.

3. Affected Environment

This section describes the existing conditions at Houston National Cemetery and presents an analysis of the potential environmental consequences of the Proposed Action and No Action alternative. Each alternative was evaluated for its potential impacts on physical, biological, and socioeconomic resources in accordance with the CEQ regulations at 40 CFR 1508.8.

The specific criteria for evaluating the potential environmental impacts of the Proposed Action and the No Action alternative are described in the following sections. The significance of an action is also measured in terms of its context and intensity. The potential environmental impacts are described in terms of duration, whether they are direct or indirect, the magnitude of the impact, and whether they are adverse or beneficial, as summarized in the following paragraphs:

Short-term or long-term. In general, short-term impacts are those that would occur only with respect to a particular time-lined activity, for a finite period, or only during the time required for construction or installation activities. Long-term impacts are those that are more likely to be persistent and chronic.

Direct or indirect. A direct impact is caused by an action and occurs around the same time at or near the location of the action. An indirect impact is caused by an action and might occur later in time or be farther removed in distance but still be a reasonably foreseeable outcome of the action.

Less-than-significant (negligible, minor, moderate), or significant. These relative terms are used to characterize the magnitude or intensity of an impact. Negligible impacts are generally those that might be perceptible but are at the lower level of detection. A minor impact is slight, but detectable. A moderate impact is readily apparent. Significant impacts are those that, in their context and due to their magnitude (severity), have the potential to meet the thresholds for significance set forth in the CEQ regulations (40 CFR 1508.27) and, thus, warrant heightened attention and examination for potential means for mitigation to fulfill the policies set forth in NEPA. Significance criteria by resource area are presented in the following sections.

Adverse or beneficial. An adverse impact is one having unfavorable or undesirable outcomes on the man-made or natural environment. A beneficial impact is one having positive outcomes on the man-made or natural environment.

3.1 Aesthetics and Noise

3.1.1 Aesthetics

The HNC property consists of the currently developed cemetery and the undeveloped acreage reserved for cemetery expansion.

The existing cemetery is generally a peaceful landscape composed of gravesites, shade trees, expansive green lawns, and attractive ponds, all fully visible across the cemetery's 3,500' of frontage on Veterans Memorial Drive between Aldine Western Road and Woodsdale Drive. The cemetery's original Master Plan was developed around a radial concept emanating from a large circular structure in the center of the site known as the Hemicycle. The Hemicycle is comprised of a 75-foot carillon tower, chapel, and pedestrian plaza. The Hemicycle serves as the cemetery's visual and ceremonial focal point and is visible throughout the cemetery. Subsequent expansions have incorporated and retained the radial concept with design features compatible with the original sections of the cemetery. Three committal shelters located within the burial sections of the cemetery provide open covered pavilions for committal services with seating for immediate family and uncovered paved areas for additional overflow attendees. Burial areas include sections of in-ground burials marked by both flat marker and upright headstones and columbaria sites. Site furnishings, including signage, benches, flower watering stations, trash receptacles, fencing, flagpoles, and drinking water fountains are placed throughout the cemetery and are characteristic and standard elements of the national cemetery setting. Non-public areas include the maintenance complex, pump houses, administrative offices, and a storage shed, which are visible from portions of the cemetery.

The undeveloped acreage within the HNC property is improved pastureland. This area is used for cattle grazing with low grassy cover and stock ponds on the property.

3.1.2 Noise

Background noise levels are generally elevated in the vicinity HNC resulting from traffic on the adjacent Veterans Memorial Drive and the close proximity to the Sam Houston Tollway and Interstate 45, particularly in the morning and in the late afternoon. Ceremonies conducted at the HNC often are accompanied by music, particularly the traditional playing of “Taps.” However, noise from activities within the HNC is generally not heard outside cemetery boundaries due to the nature of cemetery activities and the elevated background noise levels from the adjacent traffic.

3.2 Air Quality

The U. S. Environmental Protection Agency (USEPA) established National Ambient Air Quality Standards (NAAQS) for ozone, lead, carbon monoxide, sulfur dioxide, nitrogen dioxide, and respirable particulate matter. The Texas Commission on Environmental Quality (TCEQ) classifies the air quality status of each county with respect to NAAQS as attainment, non-attainment, maintenance, or unclassified. Non-attainment indicates that the air quality exceeds NAAQS for a specified pollutant or pollutants. Harris County, in which the HNC is located, is classified as a "non-attainment" area for ozone. It is in attainment for all other NAAQS. Ozone is not emitted directly into the air but is formed through chemical reactions between natural and man-made emissions of volatile organic compounds (VOCs) and nitrogen oxides (NO_x) in the presence of sunlight. Ozone pollution is the periodic increase in the concentration of ozone in the ambient air. When temperatures are high, sunshine is strong, and winds are weak, ozone can accumulate at ground level to unhealthful levels.

The General Conformity Provision of the Clean Air Act (CAA) of 1970 (42 USC 7401 et seq.; 40 CFR Parts 50-87) Section 176(c), including the USEPA’s implementation mechanism, the General Conformity Rule (40 CFR Part 51, Subpart W), prohibits the Federal government from conducting, supporting, or approving any actions that do not conform to a USEPA-approved State Implementation Plan (SIP). A SIP is a state's self-authored blueprint for achieving and maintaining compliance with the goals of the CAA. Federal agencies prepare written Conformity Determinations for Federal actions in or affecting NAAQS non-attainment areas or maintenance areas when the total direct and indirect emissions of non-attainment pollutants (or their precursors) exceed specified thresholds. Conformity with the SIP is demonstrated if project emissions fall below

threshold values. According to the USEPA Green Book, dated December 2017, the Houston, Texas area is currently designated as a moderate non-attainment area for the 2008 eight-hour ozone NAAQS and marginal for the 2015 eight-hour ozone NAAQS.

The primary sources of air pollution at HNC are mobile sources including motor vehicles and construction and maintenance equipment. Air emissions may result from any boilers, furnaces, or other sources of combustion onsite.

3.3 Biological Resources

3.3.1 Vegetation and Wildlife Habitat

The vegetation and ecological communities at HNC generally consist of landscaped areas, pasture, wetland habitat and open water (ponds). However, TPWD has mapped distinct ecosystems, vegetative communities and existing wildlife habitat types within the HNC that consist of the following: Texas-Louisiana coastal prairie, urban low intensity, open water, barren, Texas-Louisiana Coastal Prairie pondshore, native invasive: deciduous woodland, urban high intensity, and East-Central Texas prairie Post oak savannah and woodland (Figure 3-1).

Landscaped Areas

The existing cemetery at HNC is a highly manicured landscape and is consistent with other national cemeteries of this size. As is the case with most national cemeteries, well-maintained turf, primarily Bermuda grass (*Cynodon dactylon*) with St. Augustine grass (*Stenotaphrum secundum*) in shade or partly shaded areas, is the primary and most visible element of the landscape at HNC. The use of shrubs and groundcovers are intentionally limited to highly visible areas or for screening purposes in order to reduce maintenance. A variety of trees well adapted to the Houston climate, including water oak (*Quercus nigra*), live oak (*Quercus virgiana*), loblolly pine (*Pinus taeda*), southern magnolia (*Magnolia grandiflora*), bald cypress (*Taxodium distichum*), crape myrtle (*Lagerstroemia indica*), and sweetbay magnolia (*Magnolia virginiana*), are located throughout the cemetery, primarily along driveways and also interspersed among burial areas.

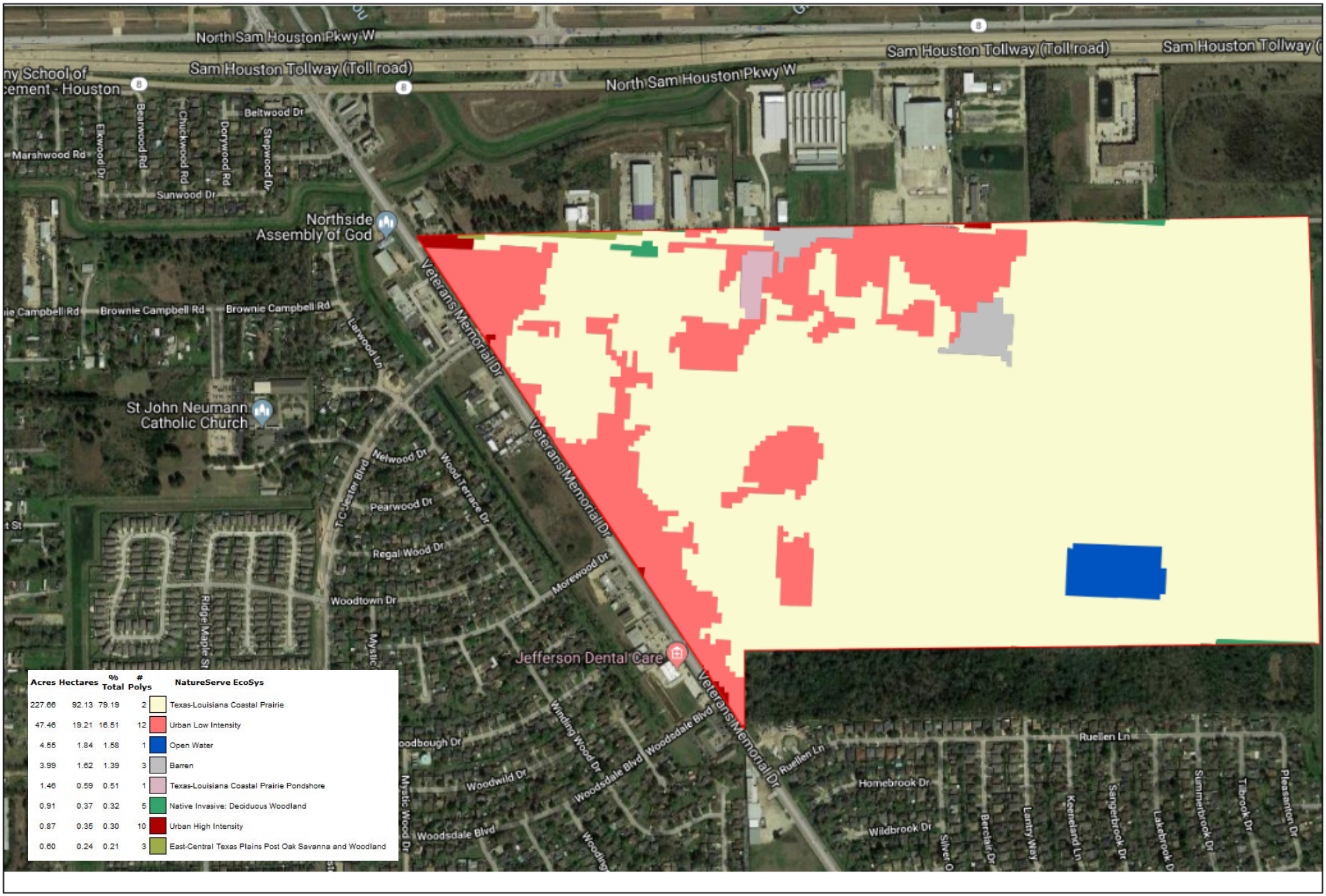

Figure 3-1 TPWD Ecosystems

Houston National Cemetery
Phase V Expansion
10410 Veterans Memorial Drive Houston, Texas
ECS Project 51-1474

Pasture

The undeveloped area adjacent to the existing cemetery is predominantly an upland pasture interspersed with concave features that appear to impound rainfall and surface flow for brief periods in the early and late growing seasons. These temporal impoundments of rainwater did not represent potentially jurisdictional waters of the U.S. or wetlands. The vegetation is dominated by Bahia grass (*Paspalum notatum*), and Bermuda grass (*Cynodon dactylon*), and subordinated by white clover (*Trifolium repens*), smut grass (*Sporobolus indica*), St. Augustine grass (*Stenotaphrum secundum*), powderpuff flower (*Mimosa strigillosa*), giant cone flower (*Rudbeckia maxima*), and other minor constituents.

Wetland Habitat

Herbaceous wetlands located within the existing operational cemetery facilities are limited to those areas around the sixteen (16) storm water ponds created as compensatory mitigation for wetland impacts associated with a previous expansion phase. These communities exist within the narrow littoral zones that partially, and in some cases, entirely surround these ponds. The typical constituents of the vegetative assemblages include: wild taro (*Colocasia esculenta*), cattail (*Typha spp.*), bull rush (*Scirpus spp.*), smartweed (*Polygonum spp.*), blue flag iris (*Iris virginica shrevei*), maidencane (*Panicum hemitomon*), and red ludwigia (*Ludwigia repens*).

Areas of herbaceous wetland habitat are present within undeveloped expansion area, where they are found primarily in depressional landforms that are common throughout the regional landscape. The typical vegetation in these systems include: alligator weed (*Alternanthera philoxeroides)*, soft rush (*Juncus effuses*), cone flower (*Echinacea purpurea*), curly dock (*Rumex crispus*), flat sedge (*Cyperus sp.*) and beak rush (*Rhynchospora sp.*). These pasture wetlands were observed to be significantly denuded as a result of continuous cattle grazing activities. Of these two wetland variants, those associated with the storm water ponds appear to reflect higher level of structure, wildlife utilization and functional quality. However, due to primary management objectives, grounds maintenance in the cemetery, grazing throughout the pasture and overall access limitations, none of these wetlands represent a high level of ecological utility beyond storm water attenuation and foraging sites for transient waterfowl and wading birds.

A forested wetland is present in the southeastern-most portion of the property. The canopy is approximately 80 percent closed and contains a number of large trees dominated by sugarberry (*Celtis laevigata*). Additional species, including green ash (*Fraxinus pennsylvanica*), eastern cottonwood (*Populus deltoides*), winged elm (*Ulmus alata*), and American elm (*Ulmus americana*), are found within the canopy and subcanopy. Dwarf palmetto (*Sabal minor*) is predominant in the shrub stratum. The herbaceous stratum is sparse except in the interior where dense accumulations of smartweed (*Polygonum puncatum*), flat sedge (*Cyperus virens*) are the dominant species. In the portions of this wetland dominated only by herbaceous vegetation, associations of green flat sedge (*Cyperus virens*), panic grass (*Panicum sp.*), and jointed flat sedge (*Cyperus articulatus*) make up the primary constituents of these assemblages.

Open Water (Ponds)

Open water habitat at the HNC consist of a series of storm water ponds within the cemetery facilities and agricultural stock tanks in the adjacent pasture. The storm water ponds, particularly those that have well vegetated wetland margins, provide some habitat for small rodents, several amphibian species, passerine birds, as well as transient waterfowl and wading birds. While relatively small and shallow, these ponds are artificially aerated; a practice that enhances water quality, particularly in shallow impoundments where dissolved oxygen levels can dramatically fluctuate during the summer months. In contrast, the three agricultural stock tanks exhibit greatly reduced habitat function and quality. Intensive use by cattle and water quality impacts associated with nutrient loading from manure appear to represent the most deleterious impact to these features. Almost no emergent vegetation appears in the littoral zones and substantial wetland fringe communities are mostly absent. Aquatic vegetation is virtually non-existent. Observations made of the carcasses of common carp, a herbivorous fish species, in the near shore zones of the pasture would seem to indicate that during periods of flooding these fish risk, and often succumb to, stranding to gain access to terrestrial herbaceous vegetation.

Texas-Louisiana Coastal Prairie

This system is generally coincident with the distribution of the Pleistocene Beaumont and Lissie Formations. This ecosystem is typically located on level to gently rolling landscapes, with slopes generally less than 5%. Microtopography plays an important

role in local variation in the system, with ridges, swales, mounds, depressions, mima (or pimple) mounds, and gilgai leading to a mosaic of drier and wetter plant communities.

This mid- to tallgrass prairie occupies Pleistocene surfaces of the Texas and Louisiana coast, on non-saline soils of level to gently rolling topography. It is dominated by graminoid species, such as *Schizachyrium scoparium* (little bluestem), *Sorghastrum nutans* (Indiangrass), *Paspalum plicatulum* (brownseed paspalum), *Panicum virgatum* (switchgrass), *Andropogon gerardii* (big bluestem), *Sporobolus compositus* (tall dropseed), *Paspalum setaceum* (thin paspalum), *Fimbristylis puberula* (hairy fimbry), *Dichanthelium oligosanthes* (fewflower panicgrass), *Rhynchospora spp.* (beaksedges), *Paspalum floridanum* (Florida paspalum), *Muhlenbergia capillaris* (Gulf muhly), *Tridens strictus* (longspike tridens), *Bouteloua curtipendula* (sideoats grama), *Andropogon glomeratus* (bushy bluestem), and *Tripsacum dactyloides* (eastern gamagrass). *Axonopus spp.* (Carpetgrasses), *Sporobolus indicus* (rat-tail smutgrass), *Andropogon virginicus* (broomsedge bluestem), *Bothriochloa laguroides ssp. torreyana* (silver bluestem), and *Nassella leucotricha* (Texas wintergrass) may be particularly noticeable on over-grazed sites. Non-native graminoids that may be conspicuous to dominant components include *Cynodon dactylon* (bermudagrass), *Cyperus entrerianus* (deep-rooted sedge), *Bothriochloa ischaemum var. songarica* (King Ranch bluestem), *Dichanthium spp.* (old world bluestems), *Lolium perenne* (Italian ryegrass), *Schedonorus phoenix* (tall fescue), *Paspalum notatum* (bahiagrass), and *Paspalum dilatatum* (dallisgrass). Forbs that may often be encountered include *Liatris spp.* (gayfeathers), *Sabatia campestris* (meadow pink), *Ambrosia psilostachya* (western ragweed), *Euphorbia bicolor* (snow-on-the-prairie), *Solidago spp.* (goldenrods), *Rudbeckia hirta* (Blackeyed Susan), *Ruellia humilis* (low wild petunia), *Asclepias viridis* (green milkweed), *Chamaecrista fasciculata* (partridge pea), *Helianthus angustifolius* (narrowleaf sunflower), *Euthamia spp.* (goldentops), *Ratibida columnifera* (Mexican hat), *Symphyotrichum ericoides* (heath aster), *Silphium laciniatum* (compass plant), *Baptisia spp.* (wild indigos), *Iva angustifolia* (narrowleaf sumpweed), *Eryngium yuccifolium* (button snakeroot), *Boltonia diffusa* (smallhead doll's daisy), and *Neptunia lutea* (yellow neptunia). Woody species may invade this typically herbaceous vegetation, including *Rosa bracteata* (Macartney rose), *Acacia farnesiana* (huisache), *Triadica sebifera* (Chinese tallow), *Baccharis halimifolia* (baccharis), *Celtis laevigata* (sugar hackberry), and *Prosopis glandulosa* (honey mesquite) (TPWD, 2019).

Urban Low Intensity

This ecosystem generally consists or urbanized areas with less than 70% impervious cover. Typical examples include residential areas, cemeteries, and parks.

Open Water

The Open Water is an open aquatic ecosystem that exhibits little to no emergent vegetation. Typical examples include lakes, ponds, and reservoirs.

Barren

The Barren ecosystem is one with little or no vegetation year-round. Typical examples of this ecosystem include river beds, quarries, areas cleared for development, and rural roads.

Texas-Louisiana Coastal Prairie Pondshore

This system occurs on the coastal Pleistocene terraces, including the Beaumont and Lissie Formations with localized topographic lows such as ponds and swales within the generally level landscape. Soils tend to be fine-textured, or are characterized by a relatively impermeable subsurface horizon.

This system occurs as ponds or swales within the coastal prairie matrix. Soils are poorly-drained, and surface water from rainfall and local runoff is retained for much of the year (except for periods of high evapotranspiration). Occurrences are wetter than the *Tripsacum dactyloides* (eastern gamagrass) or *Panicum virgatum* (switchgrass) dominated prairie sites of the Texas-Louisiana Coastal Prairie. These wetlands are primarily herbaceous, sometimes with sparse woody cover, and are composed of various species, such as *Eleocharis quadrangulata* (squarestem spikesedge), Fuirena squarrosa (hairy umbrellasedge), *Cyperus haspan* (sheathed umbrellasedge), *Cyperus virens* (green flatsedge), Rhynchospora spp. (beaksedges), *Leersia hexandra* (clubhead cutgrass), *Steinchisma hians* (gaping panicum), *Panicum virgatum* (switchgrass), *Andropogon glomeratus* (bushy bluestem), *Xyris jupicai* (Richard's yellow-eyed grass), *Centella erecta* (erect centella), *Sagittaria papillosa* (nipplebract arrowhead), *Sagittaria longiloba* (longlobe arrowhead), Ludwigia glandulosa (Torrey water- primrose), *Ludwigia linearis* (narrowleaf water-primrose), Bacopa spp. (waterhyssops), Hydrocotyle spp.

(pennyworts), *Symphyotrichum subulatum* (hierba del marrano), and Sesbania spp. (rattleboxes). Large areas of some of the occurrences may be relatively homogeneous, dominated by one or a few species. Areas of open water within the ponds may contain floating and submerged aquatic species, including *Stuckenia pectinata* (sago pondweed), Ceratophyllum demersum (coontail), *Brasenia schreberi* (Schreber watershield), *Nymphoides aquatica* (largeleaf floating heart), and *Nelumbo lutea* (yellow lotus) (TPWD, 2019)

Native Invasive: Deciduous Woodland

This broadly-defined ecosystem may have *Celtis laevigata* (sugar hackberry), *Quercus nigra* (water oak), *Ulmus crassifolia* (cedar elm), *Liquidambar styraciflua* (sweetgum), *Ulmus alata* (winged elm), *Ilex vomitoria* (yaupon), *Acacia farnesiana* (huisache), *Fraxinus* spp. (ashes), or *Prosopis glandulosa* (honey mesquite) among the dominants. To the south and west, species such as *Celtis ehrenbergiana* (granjeno), *Zanthoxylum fagara* (colima), and *Diospyros texana* (Texas persimmon) are more common. *Quercus stellata* (post oak), *Quercus virginiana* (coastal live oak), and *Quercus fusiformis* (plateau live oak) may be important (TPWD, 2019).

Urban High Intensity

This ecosystem generally consists or urbanized areas with greater than 70% impervious cover. Typical examples include city centers, shopping malls, expansive parking areas, and highways.

East-Central Texas Prairie Post Oak Savannah and Woodland

This system is typical on sedimentary formations of Tertiary age, including Eocene sands such the Queen City, Sparta, and Carrizo Sands, as well as the Wilcox and Claiborne groups. The system also occupies other Teritary formations such as the Goliad and Willis, as well as portions of the Quaternary Willis Formation. This system occupies gently rolling to hilly topography and is moderately dissected by drainages.

This system represents a transition from the woodlands and forests of East Texas to the prairies to the west, specifically the Blackland Prairie. Savannas and woodlands are typically dominated by *Quercus stellata* (post oak), *Quercus marilandica* (blackjack oak), and *Carya texana* (black hickory). Large areas of woodland, particularly in the south and

east, are dominated or co-dominated by *Quercus fusiformis* (plateau live oak) or *Quercus virginiana* (coastal live oak, east of the Brazos River). Other species, such as *Quercus incana* (bluejack oak) (on more xeric sites), *Ulmus alata* (winged elm), *Ulmus crassifolia* (cedar elm), *Quercus nigra* (water oak), *Juniperus virginiana* (eastern redcedar), *Celtis laevigata* (sugar hackberry), and *Prosopis glandulosa* (mesquite), can also be present in the overstory. To the east, *Quercus falcata* (southern red oak), *Quercus nigra* (water oak), *Liquidambar styraciflua* (sweetgum), *Pinus echinata* (shortleaf pine), *Pinus taeda* (loblolly pine), and *Carya alba* (mockernut hickory) may be conspicuous in the overstory. Shrubs may attain significant cover in the understory, with species including *Ilex vomitoria* (yaupon) (often dominant), *Callicarpa americana* (American beautyberry), *Sideroxylon lanuginosum* (gum bumelia), *Crataegus spp.* (hawthorn), *Ilex decidua* (possumhaw), *Toxicodendron radicans* (poison ivy), *Smilax bona-nox* (saw greenbrier), *Juniperus virginiana* (eastern redcedar), and *Symphoricarpos orbiculatus* (coral-berry). To the south, this system grades into vegetation more characteristic of south Texas, with *Quercus fusiformis* (plateau live oak) and *Prosopis glandulosa* (honey mesquite) becoming the primary overstory components, and shrubs of south Texas such as *Acacia rigidula* (blackbrush), *Forestiera angustifolia* (desert olive), *Condalia hookeri* (brasil), *Colubrina texensis* (Texas hogplum), *Eysenhardtia texana* (Texas kidneywood), *Opuntia engelmannii var. lindheimeri* (Lindheimer pricklypear), and *Diospyros texana* (Texas persimmon) becoming increasingly conspicuous understory components. To the east, *Vaccinium arboreum* (farkleberry), *Morella cerifera* (wax-myrtle), *Diospyros virginiana* (common persimmon), and *Cornus florida* (flowering dogwood) may be common components of the understory. On some sites, *Ilex vomitoria* (yaupon) can form nearly continuous, sometimes impenetrable, dense shrub layer. Mid- and tallgrass species including *Schizachyrium scoparium* (little bluestem), *Sorghastrum nutans* (Indiangrass), and *Panicum virgatum* (switchgrass) are frequent in the understory where light penetration supports herbaceous cover, and also form prairie patches within the savanna, particularly on tighter soils. Other grasses present include *Andropogon gerardii* (big bluestem), *Bothriochloa laguroides ssp. torreyana* (silver bluestem), *Paspalum plicatulum* (brownseed paspalum) (to the south), *Nassella leucotricha* (Texas wintergrass), *Dichanthelium spp.* (rosette grasses), *Aristida spp.* (threeawn), and *Sporobolus cryptandrus* (sand dropseed). Non-native grass species such as *Bothriochloa ischaemum var. songarica* (King Ranch bluestem), *Paspalum*

notatum (bahiagrass), and *Cynodon dactylon* (bermudagrass) may dominate some sites. Forbs are often conspicuous, and may include species such as *Croton capitatus* (hog croton), *Gaillardia pulchella* (Indian blanket), *Monarda punctata* (spotted beebalm), *Rudbeckia hirta* (blackeyed Susan), *Phlox drummondii* (Drummond phlox), *Commelina erecta* (erect dayflower), *Acalypha radians* (cardinal's feather), *Verbesina virginica* (frostweed), *Aphanostephus skirrhobasis* (lazy daisy), *Froelichia gracilis* (slender snake cotton), *Cnidoscolus texanus* (Texas bull-nettle), and many others. Drought, grazing, and fire are the primary natural processes that affect this system. Much of this system has been impacted by conversion to improved pasture or crop production. Overgrazing and fire suppression have led to increased woody cover on most extant occurrences and the invasion of some areas by problematic brush species such as *Juniperus virginiana* (eastern redcedar) (to the north) and *Prosopis glandulosa* (mesquite) (to the south) (TPWD, 2019).

3.3.2 Threatened and Endangered Species

Species that are listed by the Federal government as Threatened and Endangered are protected under the Endangered Species Act of 1973, as amended (ESA) (16 U.S.C. 1531-1543), which requires Federal agencies to ensure that any action they authorize, fund, or carry out does not jeopardize the "continued existence" of listed species or result in the destruction or adverse modification of habitat designated as critical to their existence. The U.S. Fish and Wildlife Service (USFWS) reviews federal actions that may result in a negative impact on federally listed plants or animals.

Texas Parks and Wildlife Department (TPWD) regulations prohibit the taking, possession, transportation, or sale of any of the animal species designated by state law as endangered or threatened without the issuance of a permit. State laws and regulations prohibit commerce in threatened and endangered plants and the collection of listed plant species from public land without a permit issued by TPWD.

The USFWS and TPWD maintain lists of Federal and State Threatened and Endangered species that may occur within Harris County. The potential or documented occurrence of a listed species in the county does not necessarily mean the species is present within the HNC. In addition to this, suitable habitat must be present within the area to speculate on the presence of a listed species. This review was intended to determine the potential

for occurrence of endangered species (animals and plants) within the HNC based on available habitat. A review of available data from USFWD and TPWD indicates the presence of five (5) federally listed species and 13 species of State concern that have the potential to occur at the Proposed Project. The listed species are described in Table 3-1, below:

Table 3-1: Special-Status Species

Common Name	Scientific Name	Federal Status	State Status
Mammals			
West Indian Manatee	*Trichechus manatus*	T	NL
Birds			
Least Tern	*Sterna manatus*	E	NL
Piping Plover	*Charadrius melodus*	T	T/SGCN
Red Knot	*Caldaris canutus rufa*	T	T/SGCN
Amphibians			
Cajun Chorus Frog	*Pseudacris fouquettei*	NL	NL/SGCN
Southewrn Crawfish Frog	*Lithobates areolatus*	NL	NL/SGCN
Stecker's Chorus Frog	*Pseudacris streckeri*	NL	NL/SGCN
Woodhouse's Toad	*Anaxyrus woodhousii*	NL	NL/SGCN
Crustaceans			
Houston Burrowing Crayfish	*Fallicambarus houstonensis*	NL	NL/SGCN
Reptiles			
Slender Glass Lizard	*Ophisaurus attenuatus*	NL	NL/SGCN
Western Box Turtle	*Terrapene ornata*	NL	NL/SGCN
Plants			
Coastal Gay-feather	*Liatris bracteata*	NL	NL/SGCN
Houston Daisy	*Rayjacksonia aurea*	NL	NL/SGCN
Indianola Breakrush	*Rhynchospora indianolensis*	NL	NL/SGCN
Shinner's Sunflower	*Helianthus occidentalis ssp. plantagineus*	NL	SGCN
Texas Windmill Grass	*Chloris texensis*	NL	NL/SGCN

Notes: T = Threatened; E = Endangered; NL = Not Listed; SGCN = Species of Greatest Conservation Need

3.3.2.1 Least Tern *(Sterna antillarum)*

Least Terns are the smallest North American terns. Adults average 8 to 10 inches in length, with a 20-inch wingspan. Their narrow, pointed wings make them streamlined flyers. Males and females are similar in appearance. Breeding adults are gray above and white below, with a black cap, black nape and eye stripe, white forehead, yellow bill with

a black or brown tip, and yellow to orange legs. Hatchlings are about the size of ping-pong balls and are yellow and buff with brown mottling. Fledglings (young birds that have left the nest) are grayish brown and buff colored, with white heads, dark bills and eye stripes, and stubby tails. Young terns acquire adult plumage after their first molt at about 1 year, but do not breed until they are 2 to 3 years old. The Least Tern's call has been described as a high pitched "kit," "zeep," or "zreep."

Nesting habitat of the Interior Least Tern includes bare or sparsely vegetated sand, shell, and gravel beaches, sandbars, islands, and salt flats associated with rivers and reservoirs. The birds prefer open habitat and tend to avoid thick vegetation and narrow beaches. Sand and gravel bars within a wide unobstructed river channel, or open flats along shorelines of lakes and reservoirs, provide favorable nesting habitat. Nesting locations are often at the higher elevations away from the water's edge, since nesting usually starts when river levels are high and relatively small amounts of sand are exposed. The size of nesting areas depends on water levels and the extent of associated sandbars and beaches. Highly adapted to nesting in disturbed sites, terns may move colony sites annually, depending on landscape disturbance and vegetation growth at established colonies. For feeding, Interior Least Terns need shallow water with an abundance of small fish. Shallow water areas of lakes, ponds, and rivers located close to nesting areas are preferred. As natural nesting sites have become scarce, the birds have used sand and gravel pits, ash disposal areas of power plants, reservoir shorelines, and other manmade sites.

There are three subspecies of the Least Tern recognized in the United States. The subspecies are identical in appearance and are segregated on the basis of separate breeding ranges. The Eastern or Coastal Least Tern *(Sterna antillarum antillarum)*, which is not federally listed as endangered or threatened, breeds along the Atlantic coast from Maine to Florida and west along the Gulf coast to south Texas. The California Least Tern *(Sterna antillarum browni)*, federally listed as endangered since 1970, breeds along the Pacific coast from central California to southern Baja California. The endangered Interior Least Tern *(Sterna antillarum athalassos)* breeds inland along the Missouri, Mississippi, Colorado, Arkansas, Red, and Rio Grande River systems. Although these subspecies are generally recognized, recent evidence indicates that terns hatched on the Texas coast sometimes breed inland. Some biologists speculate

that the interchange between coastal and river populations is greater than once thought.

The Interior Least Tern is migratory, breeding along inland river systems in the United States and wintering along the Central American coast and the northern coast of South America from Venezuela to northeastern Brazil. Historically, the birds bred on sandbars on the Canadian, Red, and Rio Grande River systems in Texas, and on the Arkansas, Missouri, Mississippi, Ohio and Platte River systems in other states. The breeding range extended from Texas to Montana and from eastern Colorado and New Mexico to southern Indiana. It included the braided rivers of Oklahoma and southern Kansas, salt flats of northwest Oklahoma, and alkali flats near the Pecos River in southeast New Mexico.

Today, the Interior Least Tern continues to breed in most of the major river systems, but its distribution is generally restricted to the less altered and more natural or little disturbed river segments. In Texas, Interior Least Terns are found at three reservoirs along the Rio Grande River, on the Canadian River in the northern Panhandle, on the Prairie Dog Town Fork of the Red River in the eastern Panhandle, and along the Red River (Texas/Oklahoma boundary) into Arkansas.

As this species only needs to be considered for wind-related projects within the species migratory route, the proposed project is expected to have no impact to the Interior Least tern or its habitat.

3.3.2.2 Piping Plover *(Charadrius melodus)*

The Piping Plover is a small shore bird, about 7 1/4 inches long with a 15-inch wingspan. Distinguishing characteristics include sandy-colored feathers with grayish-brown crowns and backs, white foreheads, and dark bands across their crowns. Dark, but incomplete rings encircle their necks. These little birds have yellow-orange legs, black bands across their foreheads from eye to eye, and black rings around the base of their necks. They are small, stocky, sandy-colored birds that resemble sandpipers, with short, stubby bills.

Piping Plovers reach sexual maturity at one year, and mate from late March through April. Males compete against each other for females' attention. They perform elaborate flights, and then scrape nests in the sand, tossing shells and small stones and twigs into

them with their beaks. To create a nest, they scrape a shallow depression in the sand about 1 by 2.5 inches (2.5 by 6 cm). After their nests are built, they stand beside them with their wings partially spread and tails fanned. The males repeat this behavior until a female indicates interest. Once he has her attention, he begins a high-stepping "dance," continuing the courtship ritual. Females will lay about four gray to pale sand-colored eggs with a few dark spots. After an incubation period of 25 days, the young hatch within four to eight hours of each other and fledge 30 to 35 days later. Although both sexes share responsibility for incubating the eggs, females commonly leave the young when the hatchlings are 14 to 20 days old. Males often remain with them until they can fly.

The chicks can move freely from their nests within hours of drying off. When predators or intruders come close, the young squat motionless on the sand while the parents attempt to attract the attention of the intruders to themselves, often by feigning a broken wing. Gulls, crows, raccoons, foxes and skunks are threats to the eggs and falcons may prey on the adult birds. The young plovers and adult plovers generally return to the same nesting area year after year. Plovers often run short distances, pausing to stare at the ground with a slightly tilted head, before picking a food item from the sand.

There are just over 5,000 known pairs of breeding Piping Plovers. Texas is the wintering home for 35 percent of the known population of Piping Plovers. They begin arriving in late July or early August and will remain for up to nine months. The Piping Plover's diet includes marine worms, beetles, spiders, crustaceans, mollusks and other small marine animals. Their life span is less than five years, but on occasion, up to 14 years.

Piping Plovers migrate through the Great Lakes along the river systems through the Bahamas and West Indies. They are currently found along the Atlantic Coast from Canada to North Carolina and along the shorelines of Lakes Michigan and Superior. Gulf Coast beaches from Florida to Mexico, and Atlantic coast beaches from Florida to North Carolina provide winter homes for plovers.

Habitat alteration and destruction are the primary causes for the decline of the Piping Plover. Loss of sandy beaches and lakeshores due to recreational, residential, and commercial development has reduced available habitat on the Great Lakes, Atlantic Coast, and the Gulf of Mexico. Reservoir construction, channel excavation, and

modification of river flows have eliminated sandbar nesting habitat along hundreds of miles of the Missouri and Platte Rivers. Winter habitats along the Gulf coast are threatened by industrial and urban expansion and maintenance activities for commercial waterways.

On the breeding grounds, reproductive success can be curtailed by human disturbance. Vehicular and foot traffic destroys eggs and chicks. The presence of people on beaches and sandbar islands inhibits incubation and other breeding behavior. Changes in land use such as agricultural development, urbanization, and use of beaches has brought an increase in the number of unleashed pets and other predators.

Increased recreational use of Gulf beaches may also threaten the quality of wintering sites. Beach traffic, including vehicles and ATV's, as well as the activities of unleashed dogs, can disturb birds and degrade habitat. Beach raking, a practice associated with high recreational use, removes driftwood, seaweed, and other debris used by roosting plovers, and may disrupt nutrient cycles and remove prey organisms from foraging areas.

In 2001, the total population of Piping Plovers in North America was estimated to be 5,945 breeding adults. The Texas Gulf Coast had the highest wintering population, with about 1,042 individuals detected. This represents about 44% of birds detected on the wintering grounds during the 2001 International Piping Plover Census. Most of the plovers that winter on the Texas coast are found in the lower Laguna Madre, where tidal flats are extensive and productive.

As this species only needs to be considered for wind-related projects within the species migratory route, the proposed project is expected to have no impact to the Piping plover or its habitat.

3.3.2.3 Red Knot *(Calidris canutus rufa)*

The Red Knot is a medium-sized shorebird. During breeding season, it has a rust colored face, chest and undersides and dark brown wings. In winter, it has a gray head,

chest and upperparts and a white belly. It has long greenish legs and a pointed black bill. Males and females look similar.

The Red Knot breeds on islands in the Arctic regions of Canada. It winters along both the Pacific and Atlantic coasts from California and Massachusetts south to South America. The Red Knot is also found in Europe and Asia. The Red Knot breeds on the tundra. During migration and in the winter, it can be found on tidal flats, rocky shores and beaches.

In its breeding territory, the Red Knot eats the seeds of sedges, horsetails and grass shoots. It may also poke around in snow-free areas for invertebrates. It also eats beetles and cutworm larvae. In its winter range, it eats marine worms, grasshoppers, horseshoe crab eggs and other invertebrates.

As this species only needs to be considered for wind-related projects within the species migratory route, the proposed project is expected to have no impact to the Red knot or its habitat.

3.3.2.4 Texas Prairie Dawn-flower (*Hymenoxys texana*)

The Texas prairie dawn (*Hymenoxys texana*) is a delicate annual that ranges in size from 1-6 inches in height. It produces small yellow flower heads less than ½ inch in diameter. The Texas prairie dawn grows in sparsely vegetated areas, at the base of pimple mounds and other barren areas on slightly saline soils within coastal grassland communities. This plant has been documented in Harris County and on the outskirts of Houston. However, no critical habitat has been designated for this species. The subject property does not present suitable habitat for the Texas Prairie Dawn-flower. Therefore, the proposed project is expected to have no effect on the species or its habitat.

3.3.2.5 West Indian Manatee *(Trichechus manatus)*

This is a slow-moving mammal with a rounded body, gray to brown skin with fine sparse hair, small head, squarish snout with a deeply split upper lip, valvular nostrils, small eyes, flexible flippers, and a large rounded horizontally flattened tail. Adults usually are about 10-13 feet (300-400 cm) in total length. Newborn calves are about 3-4 feet (1 meter) long. Habitat includes shallow coastal waters, estuaries, bays, rivers, and lakes;

throughout most of the range, manatees appear to prefer rivers and estuaries over marine habitats (Lefebvre et al. 1989). Manatees are not averse to traveling through dredged canals or using quiet marinas. They apparently are not able to tolerate prolonged exposure to water colder than 20 C. In the north during October-April, manatees congregate in warmer water bodies (spring-fed rivers, outfalls from power plants). They prefer waters at least 1-2 meters in depth; along the coast manatees often are in water 3-5 meters deep, usually in areas lacking strong current (NatureServe, 2018; USFWS, 2019). The subject property does not present suitable habitat for the West Indian Manatee. Therefore, the proposed project is expected to have no effect on the species or its habitat.

In summary, due to the urbanization, and the residential and commercial land uses around the HNC, and the lack of pine flatwoods, coastal areas, and appropriate soils, there is not likely suitable habitat for any of the Federal or State-listed species. Although species-specific surveys were not conducted, the HNC provides for less than ideal conditions in which endangered species may be found. A complete list of Federal- and State-listed threatened and endangered species that may occur in Harris County can be found in Appendix B.

3.4 Cultural and Historical Resources

A cultural resources baseline records review was conducted for the HNC utilizing the cultural resources files at the Texas Archeological Research Laboratory (TARL) and the Texas Historical Commission (THC) on-line Restricted Sites Atlas. The files at TARL were used to identify previously recorded archaeological sites within the proposed project boundaries. The THC's on-line data base was used to determine if any National Register of Historic Places listed properties, State Archeological Landmark sites, or State Historical Markers were located within the project area boundaries. Houston National Cemetery is a National Register District (Reference No. 100000697) and was listed on February 29, 2017.

Three (3) archeological / cultural resources studies were prepared for the Proposed Action. Moore Archeological Consulting, Inc. (MAC) conducted an Archeological Assessment of the Proposed Action during March 2019. MAC concluded that the overall environmental conditions were not conducive for retaining shallow or deeply buried and

intact historic or prehistoric cultural resources (Moore, 2019). Komatsu Architecture (Komatsu) prepared an Architecture / Historic Preservation Report for the Proposed Action (Komatsu, 2019), and Row 10 Historic Preservation Solutions, LLC (Row 10) prepared an Initial Cultural Resource Impact Prediction for a portion of the Proposed Action (Row 10, 2019). The cultural resources reports were submitted to THC /SHPO. THC / SHPO responded that the Proposed Action would have no effect on historic properties.

3.5 Geology and Soils

3.5.1 Geology

The HNC is underlain by the upper Lissie Formation, sometimes denoted as the Montgomery Formation. The upper Lissie Formation is heterogeneous, containing interbedded layers of clay, sand, and silt. It was deposited in mid-Pleistocene epoch in shallow coastal river channels and flood plains. Clay present in the formation has been preconsolidated by a process of desiccation. Numerous wetting and drying cycles have produced a network of randomly oriented and closely-spaced joints, which are sometimes slickensided. Slickensided joints or fractures within the soil mass have a shiny appearance when exposed. Joint patterns can influence the engineering behavior of the soil mass. Sand and silt layers, seams, pockets, and lenses vary in density from loose to very dense, and in thickness from a fraction of an inch to many feet due to an irregular depositional environment. The sand composition is variable. Sand particles vary from subrounded to subangular, and coarse to very fine. Zones of sand may be poorly-graded (mostly the same size particles) to well-graded (fine to coarse gradation). Silt is also often found within the sand matrix (Bureau of Economic Geology, 1982).

The Gulf Coast coastal plain is latticed by non-tectonic growth faults resulting from compaction of underlying sediment and subsidence. One hundred and thirty faults (active and inactive) extend over 300 kilometers (200 miles) in Harris County. Ground movement at these faults is generally gradual rather than episodic as with earthquakes; however, damage to pavement and buildings may occur in urban areas. These faults are generally oriented NE-SW, parallel to the coastline. One mapped fault, known as the Woodgate Fault, crosses the HNC property (Figure 3-2). The Woodgate Fault is approximately 3 miles long and may experience vertical movement of up to 0.5-1 inch per year.

Figure 3-2 Approximate Location of Woodgate Fault

Houston National Cemetery
Phase V Expansion
10410 Veterans Memorial Drive Houston, Texas
ECS Project 51-1474

Land surface subsidence is a common problem in the Houston-Galveston area, primarily due to withdrawal of groundwater. Approximately 3-4 feet of land surface subsidence has occurred in the HNC area, from 1906-2000 (Zilkoski, et al., 2001). Since 1975, the withdrawal of groundwater in Harris County has been regulated by the Harris-Galveston Subsidence District (HGSD) to limit continued land surface subsidence. The rate of subsidence has significantly decreased in many areas throughout the Houston area due to reductions in groundwater pumping.

3.5.2 Soils

The soils located within the HNC are of the Clodine-Addicks-Gessner association and include the Clodine fine sandy loam, Addicks loam, and Cyfair-Urban land complex mapping units as primary constituents (Figure 3-3). Clodine and Addicks soils generally exist on level terraces. It should be noted that soil surveys published by the National Resource Conservation Service (NRCS) are generally accurate to about 4 acres and smaller inclusions of other mapping units present within the master unit often remain unmapped.

The NRCS identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. These designations identify the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978. The Clodine fine sandy loam is not listed as prime farmland. Addicks loam is considered farmland of statewide importance. None of the soils within the HNC are identified as unique farmland.

3.6 Hazardous Materials

The TCEQ Petroleum Storage Tank (PST) registration database has record of two historical underground PSTs at the HNC. A review of the TCEQ Central Registry Online Database indicated that one 1,000-gallon steel tank used for storage of gasoline was installed in 1965 and removed from the ground in 1993 (TCEQ 2019). A second 2000-gallon steel tank used to store diesel was installed in 1976 and removed from the ground in 1993. There are no records of violations or releases of petroleum products to the environment resulting from these storage tanks.

Figure 3-3 NRCS Soil Types

Houston National Cemetery
Phase V Expansion
10410 Veterans Memorial Drive
Houston, Texas
ECS Project 51-1474

One (1) former residential structure and two (2) farm structures, identified collectively as Building 3006, will be demolished as part of the Phase V expansion. VA conducted previous environmental investigations of the Building 3006 area and recognized environmental conditions (RECs) were identified (Booz Allen Hamilton 2018, 2019) (Appendix F). The RECs included the following:

The “Milk House” on the north side of Building 3006 contained several bottles of regulated pesticides/herbicides such as Amine 4 (2,4-D) weed killer and a jug of Chlordane. The improper storage of regulated substances has resulted in staining along the concrete floor near a floor drain found within the Milk House. Additionally, a septic system with a drain field is located on the subject property; although the exact location of the drain field was unknown at the time of the Phase I ESA. The potential for contaminants to migrate from Building 3006’s drains and deposit contaminants in soil presented a REC for the subject property.

The “Shed” on the south side of Building 3006 contained several bottles and drums of petroleum products, and staining was visible on the wooden floor of the building. It was believed that a crawlspace underlies the building with exposed soil directly underneath the floor. The potential for contaminants to leach from Building 3006’s floors to the underlying soil presented a REC for the subject property.

VA conducted soil and groundwater sampling (Phase II Environmental Site Assessment [ESA]) during November 2018 to address the RECs previously identified. The Phase II ESAs identified the following environmental concerns:

Analysis of the two soil samples collected from beneath the floor of the Shed (2601-SS-1 and 2601-SS-2) yielded results indicative of a release of Dieldrin, a pesticide, to surface soil. These results exceeded the Texas Commission on Environmental Quality’s (TCEQ’s) Protective Concentration Levels (PCLs) for residential soil. Sample 2501-SS-2 also exceeded the commercial PCL for Dieldrin.

4-Chlorophenyl phenyl ether, a semi-volatile organic compound (SVOC), was detected above the residential PCL in all soil samples collected during the initial Phase II ESA, and above commercial PCLs in four of the samples (2501-SS-3, 2501-SS-4, 2501-SS-5, and 2501-SS-6). 4-Bromophenyl phenyl ether was detected above the residential PCL at four

sample locations (2501-SS-3, 2501-SS-4, 2501-SS-5, and 2501-SS-6), and above the commercial PCL in Sample 2501-SS-6. Hexachlorobenzene was also detected above the residential PCL at four sample locations (2501-SS-3, 2501-SS-4, 2501-SS-5, and 2501-SS-6).

VA conducted an Expanded Phase II ESA from May 21 to 22, 2019 to further characterize the site. To delineate the exceedances observed during the initial Phase II ESA, 69 soil samples were collected from 23 locations and analyzed for SVOCs and pesticides. Groundwater grab samples were collected from six locations around the site via the installation of temporary PVC wells.

The analytical data obtained during the Expanded Phase II ESA indicate that the impacted soil discovered during the initial Phase II ESA appears to be confined to the footprint of the shed building of Building 3006. Based on the analytical results of the Expanded Phase II ESA, Booz Allen recommends the following actions at the subject property:

Remedial action to bring the Dieldrin impacted soil identified during the initial Phase II ESA into compliance is required. Remedial actions would include the excavation and disposal of the top 2 feet of soils of impacted soil. The remedial action will occur concurrently with the Phase V expansion. Building 3006 may contain asbestos-containing building materials (ACM) or lead-based paint. Prior to demolition of Building 3006, VA will conduct ACM and LBP surveys. Any ACM or building materials coated with LBP will be abated and disposed of in accordance with federal, state and local requirements prior to demolition.

3.7 Land Use

The HNC has been in operation since 1965. Since then, land use at the HNC has not varied. The cemetery is landscaped with areas for burials, memorial headstones, and numerous columbarium areas. In addition to this, there are several committal shelters on-site utilized for burial services and ceremonies. In the middle of the property, the Hemicycle contains a chapel, carillon, and speaker's stand that is utilized for ceremonies. One administrative building and one maintenance building are located on-site. Several detention ponds and intensively landscaped areas provide serene visual displays and storage for surface water and storm water.

Outside of the existing cemetery facilities, the HNC property is primarily comprised of improved pastureland that is currently utilized for cattle grazing. One farmhouse is present on the expansion property. The HNC leases the land to an individual who grazes cattle in the expansion area. Improvements to the leased property consist of the farmhouse, a cattle shed, storage building, work building, and six-strand barb wire fencing. The overall topography of the area is relatively flat and slopes gently to the southeast. The pastureland within the expansion area also contains three stock tanks that provide water to grazing cattle.

The HNC is surrounded by mixed use commercial, light industrial, and residential areas to the north, south, east, and west. The area is bounded to the north by light industrial / commercial businesses, to the south by residential areas, to the west by residential and commercial areas, and to the east by undeveloped pastureland.

3.8 Socioeconomics

3.8.1 Demographics

The HNC is located in Houston, Texas, the fourth largest city in the United States. The greater Houston area encompasses ten counties with a total population of over seven million people and a large veteran population. Demographic and economic statistics for the Houston metropolitan area are summarized in Table 3 -2.

Table 3-2: Demographic and Economic Statistics for the Houston Metropolitan Area

County	Total Population	Veteran Population	White	Hispanic	African American	Asian	Poverty	Median Household Income
Harris	**4,698,619**	163,317	29.7%	43.0%	19.7%	7.3%	15.9	$57,791
Chambers	**42,454**	2,128	67.0%	22.3%	8.4%	1.4%	9.5%	74,368
Fort Bend	**787,858**	26,736	33.2%	24.5%	21.1%	20.4%	8.0%	93,645
Brazoria	**370,200**	23,952	47.3%	30.6%	14.2%	6.8%	9.0%	76,426
Galveston	**337,890**	20,662	57.3%	24.6%	13.4%	3.5%	12.0%	65,702
Montgomery	**590,925**	30,556	66.2%	24.1%	5.3%	3.1%	8.9%	74,323
Liberty	**86,323**	5,107	63.3%	24.8%	10.2%	0.6%	15.5%	48.344
Waller	**53,126**	1,906	42.9%	30.1%	25.4%	1.1%	15.5%	53,506
Austin	**29,989**	1,577	62.0%	27.1%	9.5%	0.7%	10.7%	62,614
San Jacinto	**28,719**	2,168	74.8%	13.1%	9.8%	0.5%	18.2%	43,421
Total	**7,026,103**	**317,285**						

Sources: U.S. Census Bureau, Population Estimates July 1, 2018 (V2018), 2013-2017 American Community Survey 5-Year Estimates.

Harris County has a high minority population and high percentage of people living below the poverty line. Locally, the HNC is located in the Aldine Independent School District (ISD) in Harris County. The Aldine ISD student population is predominantly Hispanic (72.5% based on 2016-2017 estimates) with over 86% of students considered economically disadvantaged (AISD Student Demographics 2019).

3.8.2 Transportation, Traffic, and Parking

Vehicular Traffic and Parking

The Texas Department of Transportation (TxDOT) maintains saturation counts for urban area, which represent the traffic counts measured at a given location over a 24-hour period, Monday through Friday. The counts are collected every five years and based on the number of axels divided by two and therefore are not corrected for large trucks, trailers, or other vehicles with more than two axels. There are three TxDOT monitoring locations in the vicinity of the HNC. Traffic counts at the Morewood and Woodsdale locations decreased from 2006 to 2012, while counts for the Veterans Memorial monitoring site increased (Table 3-2).

Table 3-3: 24-Hour Saturation Traffic Counts for HNC-area Roadways

Location	**2006**	**2012**	% change
2200 Morewood Drive	1,610	1,470	-8
2200 Woodsdale Blvd	1,700	1,480	-12
10600 Veterans Memorial	17,330	28,920	+66

Source: Houston-Galveston Area Council, 2019

The HNC has one main entry for visitors and staff located on T.C. Jester Blvd. approximately 350’ northeast of Veterans Memorial Drive. The intersection at T.C. Jester Boulevard and Veterans Memorial Drive has a signaled left turn, which provides safe access from Veterans Memorial Drive and sufficient stacking space for large groups of vehicles entering the site. Off-site access to the Maintenance Building, 500’ south of the Administration Building, is provided by a gated service entry on Veterans Memorial Drive located approximately 0.4 miles south of T. C. Jester Boulevard. Additional access, limited to service and construction, is located on Aldine Western Road to the north. Bus service on Veterans Memorial Drive, provided by METRO, is available in both inbound and outbound routes (Metro Route 108) at Morewood Drive, directly in front of the Administration Building, and at the intersection of T. C. Jester Boulevard. Rail service is not available in the area.

Motorists arriving at the cemetery enter along a curvilinear one-way asphalt drive, separated from outbound lanes by a broad variable-width landscaped median and several ponds. The roadway curves gently to the southeast and arrives at the cortege lane and Administration Building on axis with a broad tree-lined drive leading directly to the Hemicycle. The inner loop drive (200' radius) circumnavigates the Hemicycle entirely and provides access to the north and east Hemicycle parking areas. The intermediate loop (500' radius) provides access to in-ground burial areas and to a northeasterly extension of the axial drive that connects to the outer loop drive (1000' radius), columbaria, the maintenance facilities at its southern end, and the construction entry at Aldine Western Road near a cul-de-sac at its northern terminus. A short internal drive along east side of the Administration Building provides direct access to staff and visitor parking behind the Administration Building and to the Maintenance Building. Parking for maintenance staff is provided in the gated and enclosed maintenance yard. The cortege lane, immediately in front of the Administration Building, provides space for approximately 30 vehicles and is considered adequate for most funeral corteges.

A new, limited, access point will be constructed along Aldine-Western Road proximate to the existing maintenance entrance. Use of the new entrance will be limited to large events such as Veteran's Day, Memorial Day, and Flags across America.

Pedestrian Traffic

Pedestrian access to the cemetery via paved walks on Veterans Memorial Drive is available near the intersection of Morewood Drive and Veterans Memorial Drive and provides direct access from the Metro transit bus stop to the Administration Building and parking area. A walk located on the northeast side of the Administration Building provides direct pedestrian access to the Hemicycle. There are also pedestrian walks and plazas in and around the Hemicycle area. Committal shelters are all accessible with nearby on-street parking and paved walking surfaces providing direct access to the shelters. Columbaria are accessed along curvilinear walkways. There are numerous walks around and through the burial areas near the main entry and the lakes in the northwestern corner of the site. In areas without paved pedestrian access, the cemetery and its burial areas are turf and are generally flat and accessible.

3.8.3 Utilities

The HNC site is currently served by electrical, communications, potable water, sanitary sewer, and storm water drainage utilities. Potable water and sanitary sewer services are provided by the local Municipal Utility District.

The electrical and communication systems onsite consist of the existing primary and low voltage power distribution systems which utilize original equipment installed in 1965, in addition to some newer equipment installed in the mid-1990s. Typically, commercial grade power distribution equipment has a design life of 20 to 25 years. A majority of the existing equipment does not meet current electrical and safety codes. In addition, the current system does not have adequate power metering, which will allow the monitoring of power usage to comply with mandatory energy reductions and Leadership in Energy and Environmental Design (LEED) recommendations.

The irrigation system at HNC, initially installed in 1965, is a traditional irrigation system designed around a non-potable subsurface water supply pumped directly from the two water wells onsite. The system utilizes two large vertical water well pumps, located in secured and fenced concrete block buildings along the north edge of the site, to deliver 1,550 gallons/minute of water to the surface for distribution through a conventional system of rotary sprinkler heads. Since the site contains few shrubs and groundcover

beds, the use of other sprinkler head types (spray heads, bubblers, drip emitters) is very limited on this site. Significant surface water resources (three (3) ponds) are present at the site and are being utilized to provide irrigation water.

The two (2) existing irrigation wells serving the cemetery are currently out of service due to mechanical failures. Part of the Proposed Action is to install a new irrigation well proximate to Aldine-Western Road. The new well will be permitted by the Harris-Galveston Subsidence District and is not expected to create a significant impact to groundwater resources in the area.

3.9 Water Quality

3.9.1 Surface Water

Surface water within the HNC property includes 16 storm water retention ponds within the existing cemetery facilities and three agricultural stock tanks contained within the adjacent improved pasture. The storm water retention ponds were designed to serve the primary functions of storm water attenuation and wetland function, along with the ancillary benefit of landscape enhancement. Nearly all these features exist within the north half of the existing cemetery facilities and are roughly situated in a semi-circular arrangement consistent with the original design layout. These ponds range in approximate size from 0.16 to 1.49 acres. The ponds are separated into two groupings. Nine of the ponds are linked together by overflow piping that eventually allows storm water in the ponds to level out and overflow if necessary, to the northwest and offsite into Harris County Flood Control District storm drain system located along Veterans Memorial Boulevard. That storm drain system eventually outflows into Greens Bayou to the north of the cemetery. The other ponds are linked together by overflow piping that eventually allows storm water in the ponds to level out and overflow if necessary, towards the south into an offsite drainage channel that discharges to Halls Bayou.

Of the three agricultural stock tanks, the most significant is the approximately 6.18-acre tank in the southwest corner of the pasture. Observations suggest that during prolonged storm events this feature discharges to the south and into a ditch that flows east, eventually discharging into Halls Bayou. The remaining two stock tanks total to less than 3 acres and during events of severe rainfall, are believed to drain to the east.

3.9.2 Groundwater

The Beaumont Formation, along with the underlying Lissie Formations, comprises the Chicot Aquifer, which extends approximately 400 feet below surface in the area of the Property. The Evangeline Aquifer is approximately 600 feet thick and extends from the base of the Chicot Aquifer to approximately 1,000 feet below surface (Baker, 1979). Shallow groundwater can typically be encountered at a depth of 10 to 20 feet below the surface in the Harris County area. The Chicot and Evangeline Aquifers are the principal sources of groundwater in the Houston area. Groundwater flow direction in both the Chicot and Evangeline Aquifers is highly dependent upon localized effects from recharge and pumping. In general, the natural direction of groundwater flow in Harris County would be expected to be toward the southeast.

The HNC maintains two water wells that are permitted by the HGSD. Well #1 was not operational at the time of the investigative site visit due to a broken pump shaft. The well log shows an initial installation in 1964 to a depth of 698-feet. HGSD information shows that the year the well was drilled as 1990 and to a depth of 1300-feet. So, it appears that this well was deepened or modified around 1990 although the well log for this could not be found on the Department of Water Resources website. Past documentation shows that the well should provide 1100 GPM at 80 PSI. HNC staff indicated the current available flow is closer to 800 GPM. A new VFD control has been installed to mitigate pressure surges that were causing mainline breakage. In 2016 the well was jetted to remove residue and encrustation that had developed on the well casing. Well #1 has two (2) sand separators, two (2) Yardney filters and a small surge tank. According to Cemetery staff, the sand separators are not operational. The Yardney filters are set to automatically flush at the end of each irrigation cycle. The surge tank is too small to be useful.

Well log for Well #2 shows an initial installation in 1964 to a depth of 560-feet. Past documentation shows the well provides 450 GPM at 85 PSI. There is a VFD control package on the well. The control package on Well #2 is to be updated with a radio so that it can communicate with Well #1 to automatically coordinate operation. Cemetery staff explained that it is intended that Well #2 be the lead pump to handle low flow conditions and Well #1 is the lag pump to handle full irrigation operation. Pump operation is coordinated with irrigation system demand via pressure transducers at each well. The

radio communication upgrade has not yet been installed. Well #2 was also jetted in 2016 with Well #1.

Wells #1 and #2 are connected to a looped mainline the supplies water to the existing cemetery west of Patriot Drive. The mainline is mostly sized 6- and 8-inch with interconnecting sections of 3- and 4-inch. If the irrigation operation is programmed for distributed flow, i.e., simultaneous operation spread throughout the cemetery, the mainline pipe sizing is adequate. The BlackMax pump system is connected to an irrigation system mainline that is intended to supply water to existing and future burial sections east of Patriot Drive. The systems are connected at several locations by mainline that runs under Patriot Drive. The mainline east of Patriot Drive was installed in the Phase 4 expansion. It consists of a 10- inch mainline that is routed south to north along the east side of burial sections V-Y1. This 10- inch mainline is stubbed-out at both the north and south ends for future expansion. The BlackMax pump system has a capacity of 1100 GPM. The existing 10-inch mainline is adequately sized to carry this flow.

The Cemetery reports annual irrigation water use to the Harris-Galveston Subsidence District. Wells #1 and #2 have water meters and Cemetery staff reports the individual water meter readings. The water use report received from the Subsidence District shows that Well #1 began reporting water use in 1989 and Well #2 began reporting in 1997. An observation about the documentation is since 2000 the reported water use for Wells #1 and #2 is identical. The current irrigated area was determined using digital orthorectified aerial imagery and found to be approximately 162 acres. Phase 5 will add 16.3 irrigated acres and as master planned, the remainder of the east expansion adds approximately 92 acres.

Floodplains

The northwestern portions of the existing developed cemetery are located within the 100-year floodplain (FEMA Flood Zone AE) or within the 500-year floodplain (FEMA Flood Zone X with special hazard) as shown in Figure 3-4. No buildings at the HNC are located within the mapped floodplain. No other areas of the property are located within a floodplain.

Figure 3-4 FEMA Flood Zones

Houston National Cemetery
Phase V Expansion
10410 Veterans Memorial Drive
Houston, Texas
ECS Project 51-1474

3.9.3 Wetlands

A wetland delineation was conducted for the entire HNC Phase V Expansion Area property during October 2018. The wetlands identified consisted of the ponds within the existing cemetery, forested wetland, herbaceous wetlands, and agricultural stock tanks. The wetlands were categorized as non-jurisdictional; however, the U.S. Army Corps of Engineers has not yet provided a Jurisdictional Determination. However, in a letter dated February 12, 2010, USACE that the site did not contain waters of the U.S., including wetlands. USACE also stated that project site is not subject to Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act and the discharge of fill material into the tract does not require a Department of the Army Permit. Non-jurisdictional wetlands identified during the October 2018 Wetland Delineation within the HNC Phase V Expansion Area are shown in Figure 3-5 and summarized in Table 3-3.

Table 3-4: Wetland Features Located on the Proposed Project

Feature	Classification	Width at Ordinary High Water Mark	Depth at Ordinary High Water Mark	Length	Surface Area
Wetland 1a	Non-jurisdictional	N/A	N/A	N/A	0.65 acres
Wetland 1b	Non-jurisdictional	N/A	N/A	N/A	1,907 sq. ft.
Wetland 2	Non-jurisdictional	N/A	N/A	N/A	0.51 acres
Wetland 3	Non-jurisdictional	N/A	N/A	N/A	1,349 sq. ft.
Wetland 5	Non-jurisdictional	N/A	N/A	N/A	1.72 acres
Wetland 6	Non-jurisdictional	N/A	N/A	N/A	0.34 acres
Wetland 7	Non-jurisdictional	N/A	N/A	N/A	N/A
Wetland 8	Non-jurisdictional	N/A	N/A	N/A	0.17 acres
Wetland 9	Non-jurisdictional	N/A	N/A	N/A	7.0 acres
Wetland 10	Non-jurisdictional	N/A	N/A	N/A	2.98 acres
Wetland 11	Non-jurisdictional	N/A	N/A	N/A	4.1 acres

Figure 3-5 Wetland Map

Houston National Cemetery
Phase V Expansion
10410 Veterans Memorial Drive
Houston, Texas
ECS Project 51-1474

The sixteen (16) ponds within the existing cemetery grounds, totaling 11.76 acres, were designed to serve as wetland mitigation areas for wetland impacts associated with a prior expansion phase and represent the only wetlands within the existing cemetery facilities, as permitted under Department of the Army Permit No. 20136 (Appendix B). Most contain an herbaceous fringe supporting a variety of emergent vegetative assemblages. These mitigation ponds serve multiple functions, most noticeably as aesthetically pleasing aquatic communities providing additional habitat and scenic diversity. They also serve as storm water management facilities constructed with a network of culverts that interconnect each pond to retain storm water and attenuate discharges into the Harris County Flood Control District municipal storm sewer system. Because these areas were created as compensatory mitigation, they were delineated as wetlands.

A forested wetland totaling approximately 5.31 acres is present in the southeastern-most portion of the property. The canopy is approximately 80 percent closed and contains a number of large trees dominated by sugarberry (*Celtis laevigata*), a poorly developed shrub stratum dominated by dwarf palmetto (*Sabal minor*), and a generally sparse herbaceous stratum with dense accumulations of smartweed (*Polygonum puncatum*) and flat sedge (*Cyperus virens*). This system appears to be of higher quality than other wetlands within the expansion area and the structural development and vegetative components appear to indicate a relatively normal level of functional stability. However, landscape support has a tremendous impact on the functional quality of ecological systems and the surrounding supporting landscape in the form of ditches and cattle grazing operations present many barriers to optimal aggregate wetland function. These diminished functions include: storm water attenuation, organic compound and nutrient sequestration, and wildlife utilization.

The herbaceous wetlands associated with the undeveloped portion of the property consist of depressional features dominated almost exclusively by herbaceous species. The dominant species encountered include: soft rush (*Juncus effuses*), alligator weed (*Alternanthera philoxeroides*), flat sedge (*Cyperus virens*), curly dock (*Rumex crispus*), giant cone flower (*Rudbeckia maxima*), beak rush (*Rhynchospera sp.*), and coin wort (*Centella asiatica*). Many of these wetlands exhibit significant concavity and appear to maintain wetland hydrology for extended periods throughout a portion of the growing

season. Others appear to maintain hydrology for only brief periods, generally in the early and later portions of the growing season when evapo-transpirations rates moderate sufficiently to allow saturation to persist at or near the surface. Most of these wetlands are significantly degraded due to the effects of long term grazing on the property. As with many agricultural operations, the property has been managed to facilitate the discharge of storm water. As such, several of the features appear to discharge storm water into ditches along the southern and eastern boundary of the pasture.

Three stock tanks were identified within the expansion area. These features currently serve as impoundments for water required for cattle that graze the surrounding pasture. The largest stock tank is located just east of the existing cemetery and is situated on a low terrace devoid of any littoral shelf and associated emergent wetlands. The exception to this is some small and adjoining herbaceous wetlands extending outward from the northeast and southeast corners of the pond. Each appears to receive and collect laminar flow resulting from extended high intensity storm events. Dominant wetland species observed included: flat sedge (*Cyperus virens*), alligator weed (*Alternantha philoxeroides*), giant cone flower (*Rudbeckia maxima*), curly dock (*Rumex crispus*), and beak rush (*Rhynchospora sp.*). A second, medium-sized stock tank is located directly north of the forested wetland system and is similar to the larger tank in function. The smallest of the three stock tank features is located in the far eastern edge of the pasture and is similar to the larger tank in vegetative assemblages and function. It appears that this feature may discharge to the adjacent north/south ditch to the east in response to flooding.

4. Environmental Consequences

This section evaluates the consequences of the proposed Phase V expansion and future expansions at the HNC to assess the impacts that may occur on the human environment. Both adverse and beneficial impacts that may result from the Phase V expansion, future expansions, and the No-Action alternative are considered here.

4.1 Aesthetics and Noise

4.1.1 Phase V Expansion

The Phase V expansion would result in a change in aesthetics, as the unimproved pastureland would be converted to cemetery use. The overall design, burial areas, columbaria, landscaping, and site features would be similar to the existing cemetery and consistent with the HNC Master Plan.

Short-term aesthetic impacts to visitors to the cemetery would occur during construction activities. Most of the cemetery build-out would occur on the undeveloped acreage east of the existing cemetery or at the Maintenance Building, which are not frequented by visitors to the HNC. Construction vehicles would access the expansion area via an entrance to be constructed from Aldine Western Road, and a construction staging area would be located adjacent to the entrance, minimizing construction vehicular traffic and materials staging that would be visible to visitors. However, construction activities related to construction of the Public Information Center and the maintenance dredging of the storm water ponds would be visible to visitors to the HNC. These impacts would be short term during construction activities.

Long-term noise levels would be similar to the existing noise levels. The Phase V expansion area would be east of the existing cemetery and may receive less noise from Veterans Memorial Drive but would still be expected to receive traffic noise from the Sam Houston Tollway, which contributes the greatest noise impact to the HNC. The number of burial ceremonies conducted per day at the HNC would not be expected to increase due to the expansion; therefore, there would be no increase in the frequency at which the noise generating activities are conducted.

Short-term adverse noise impacts to cemetery visitors and adjacent commercial and residential properties could result during construction due to operation of heavy machinery and construction vehicular traffic. The HNC has received complaints about noise levels during construction of the Phase III expansion from businesses along the northern edge of the cemetery. A noise mitigation program would be implemented, and construction activities limited to permissible hours to minimize adverse noise impacts to adjacent properties. As described above, construction vehicles would enter and exit the Phase V expansion area directly from Aldine-Western Road, minimizing construction-related traffic through the HNC.

Construction activities involving repetitive, high-level impact noise would be restricted to working hours of 6:00 a.m. to 6:00 p.m. Repetitive impact noise on the property would not exceed the following decibel (dB) limitations:

Time Duration of Impact Noise	Sound Level in dB
More than 12 minutes in any hour	70
Less than 30 seconds of any hour	85
Less than 3 minutes of any hour	80
Less than 12 minutes of any hour	75

In the event that repetitive noise exceeds the above-listed levels, noise abatement measures including sound deadening devices such as mufflers and silencers on equipment, soundproof enclosure for noise producing equipment, and sound deadening linings in bins and hoppers, may be implemented ensure that construction equipment noise is minimized. Sound levels would be monitored for noise exposure due to the construction at least once every five successive working days while work is being performed above 75 dB (A) noise level.

4.1.2 Future Expansions

Future expansions would result in similar aesthetic changes as Phase V with overall design features consistent with the current cemetery development. Short-term aesthetic impacts to cemetery visitor could occur during construction activities and would be minimized to the extent practicable.

Long-term noise levels would be similar to existing noise levels. Short-term noise levels would be expected to increase during construction of future expansion phase, projected to occur approximately every ten years until the cemetery reaches its full build-out. Noise abatement measures similar to those implemented during the Phase IV expansion would be used to minimize construction noise impacts to the existing cemetery and surrounding residences and businesses.

4.1.3 No-Action Alternative

The No-Action alternative would result in no change to aesthetics or noise levels.

4.2 Air Quality

4.2.1 Phase V Expansion

The Phase V expansion would not include any permanent stationary sources of air emissions. Mobile emission sources from vehicular traffic to the site would be similar to existing conditions, consisting of visitor traffic, funeral corteges, and cemetery staff and operational equipment. The expansion activities would not be expected to increase the daily number of funeral corteges at the HNC. The TCEQ provided a response indicating that emissions of VOCs and NO_x in excess of 100 tons per year (ozone) resulting from the Proposed Action would trigger a general conformity analysis within the Houston-Brazoria-Galveston non-attainment area to comply with the State Implementation Plan.

Non-road construction vehicles would emit criteria pollutants during construction of the expansion. Criteria pollutant emissions from construction equipment were calculated assuming the use of four tractors/loaders/backhoes/trenchers, two rubber-tired dozers, and two pickup trucks operating for approximately eight hours per day for a total of 960 workdays. Emissions were estimated using the United States Environmental Protection Agency Motor Vehicle Emissions Simulator (MOVES) version 2014b for Harris County, Texas. Table 4-1 presents the estimated operational hours and days for non-road construction equipment. Tables 4-2 through 4-4 show estimated annual emissions, projected equipment operating hours, and equipment emission factors, while Table 4-5 shows the total emissions for the 18-month construction period. Emissions of sulfur oxides (SO_X), nitrous oxides (NO_X), volatile organic compounds (VOCs), carbon monoxide (CO), and lead are below de minimis thresholds; therefore, a General Conformity Determination is not required.

Table 4-1 Estimated Total operational Hours for Construction Equipment

Equipment Type	Number	Hours/Day	Total Days	Total Hours
Tractors/Loaders/Backhoes/Trenchers	4	8	240	7680
Rubber Tired Dozers	2	8	360	5760
Pickup Truck	2	8	360	5760

Table 4-2 Total Emissions (grams)

Equipment Type	VOC/ROG	CO	NOx	SOx	CO_2	PM10	PM2.5
Tractors/Loaders/Backhoes /Trenchers	202,130	1,004,003	1,183,313	1,796	222,432,194	157,172	152,457
Rubber Tired Dozers	116,886	831,405	2,135,456	5,928	803,154,314	134,876	130,830
Pickup Truck	61,831	651,937	49,805	570	84,859,508	1,273	1,132
Total	380,847	2,487,345	3,368,575	8,294	1,110,446,016	293,321	284,419

Table 4-3 Estimate of Annual Non-Road Emissions of Criteria Pollutants During Construction (pounds)

Equipment Type	VOC/ROG	CO	NOx	SOx	CO_2	PM10	PM2.5
Tractors/Loaders/Backhoes/ Trenchers	446	2,213	2,609	4.0	490,382	346.5	336.1
Rubber Tired Dozers	258	1,833	4,708	13.1	1,770,661	297.4	288.4
Pickup Truck	136	1,437	110	1.3	187,084	2.8	2.5
Total	840	5,484	7,426	18.3	2,448,127	646.7	627.0

Table 4-4 Fleet Average Emission Factors (lbs/hr)

Equipment Type	VOC/ROG	CO	NOx	SOx	CO_2	PM10	PM2.5
Tractors/Loaders/Backhoes/Trenchers	0.0000	0.0001	0.0001	0.000000	0.0246	0.0000	0.0000
Rubber Tired Dozers	0.0001	0.0009	0.0023	0.000006	0.8646	0.0001	0.0001
Pickup Truck	0.0237	0.2495	0.0191	0.000218	32.4799	0.0005	0.0004

Table 4-5 Total Criteria Pollutant Emissions from Non-Road Construction Vehicles (pounds)

Equipment Type	VOC/ROG	CO	NOx	SOx	CO_2	PM10	PM2.5
Tractors/Loaders/Backhoes/Trenchers	446	2,213	2,609	4.0	490,382	346.5	336.1
Rubber Tired Dozers	258	1,833	4,708	13.1	1,770,661	297.4	288.4
Total	703	4,046	7,317	17.0	2,261,043	643.9	624.5

4.2.2 Future Expansions

Future expansions would not include any permanent stationary sources of air emissions. Mobile emission sources from vehicular traffic to the site would be similar to existing conditions. Temporary adverse impacts from dust and construction equipment could occur during constriction of future phases and would be minimized through the use of best management practices.

4.2.3 No-Action Alternative

The No-Action alternative would not result in any permanent impacts to local or regional air quality. There would be no increase in mobile or stationary emissions sources.

4.3 Biological Resources

4.3.1 Phase V Expansion

Vegetation and Wildlife Habitat

The proposed Phase V expansion would convert approximately 42 acres of pastureland, with a dominant vegetative cover of Bahia grass and Bermuda grass, and herbaceous wetland areas also used for grazing, to landscaped grounds. There is sufficient available pastureland on the remaining acreage to support the herd of cattle that graze in the Phase V expansion area.

Landscape plantings would be consistent with the existing vegetation at the HNC. This landscaping would not result in a significant change to plant diversity or the quantity or quality of wildlife habitat found at the HNC.

Threatened and Endangered Species

There is no suitable habitat onsite for any Federal- or State-listed threatened or endangered species that are listed in Harris County. Therefore, no adverse impacts to threatened and endangered species or their habitat would be anticipated as a result of the proposed Phase V expansion.

4.3.2 Future Expansions

Vegetation and Wildlife Habitat

Future expansions would convert the remaining pastureland, herbaceous wetlands, stock tanks, and one forested wetland area to landscaped grounds. This would result in a loss of available acreage for cattle grazing; however, this acreage has been designated for cemetery use since 1965. Since that time, the area around the HNC has changed from rural to a more suburban/urban setting. Future expansions would be expected to incorporate similar landscaping including trees, shrubs, and wetland and pond areas that would provide wildlife habitat within this increasingly urban setting.

Threatened and Endangered Species

There is no suitable habitat onsite for any Federal or State-listed threatened or endangered species that are listed in Harris County. Therefore, no adverse impacts to threatened and endangered species or their habitat would be anticipated as a result of future cemetery expansions.

4.3.3 No-Action Alternative

The No-Action alternative would result in no impacts to vegetation and wildlife habitat and would not adversely impact any Federal- or State-listed threatened or endangered species or their habitat.

4.4 Cultural and Historical Resources

4.4.1 Phase V Expansion

No cultural or historical sites were identified within the Phase V expansion area. The THC /SHPO issued letters of concurrence indicating no impacts to cultural or historical resources would be expected to result from the Phase V expansion activities (Appendix C). If cultural material is located during construction, work would be halted and a qualified professional archeologist would assess the findings before work continues.

4.4.2 Future Expansions

Future expansions would be on a land contiguous with and sharing a common land use history with the Phase V expansion. No impacts to cultural or historical resources would be expected to result from the future expansion activities. If cultural materials are located during construction, work would be halted and a qualified professional archeologist would assess the findings before work continues.

4.4.3 No-Action Alternative

The No-Action alternative would result in no adverse impacts to cultural or historical resources.

4.5 Geology and Soils

4.5.1 Phase V Expansion

The Woodgate Fault crosses through the Phase V expansion area. No permanent structures will be constructed within 400 feet of the fault line.

Some areas of the Phase V expansion are underlain by soils that could be considered prime farmland if drained. Public lands, such as national cemeteries, are not considered available for farming use by the NRCS and are not considered prime farmland, regardless of the suitability of the underlying soil.

The Phase V expansion would change the physical landform of the property. Burial sections with pre-placed crypts would be elevated 3-4 feet above the existing, surrounding grade to allow for the subsurface storm water systems necessary to maintain adequate drainage.

4.5.2 Future Expansions

The Woodgate Fault crosses through the undeveloped HNC property for future expansions. Future expansion activities would likely involve roadways and structures that could suffer damage due to movements along the fault. Future expansion designs would be expected to incorporate a buffer zone around the surface expression of the Woodgate fault to minimize potential for damages.

The future expansion area of the HNC is underlain by soils that could be considered prime farmland if drained. Public lands, such as national cemeteries are not considered available for farming use by the NRCS and are not considered prime farmland, regardless of the suitability of the underlying soil.

4.5.3 No-Action Alternative

Under the No-Action alternative there would be no impact to site geology or soils. If there were no future expansions to the HNC, the remaining acreage could be sold to private parties. Due to the increasingly urban/suburban setting around the HNC and the decreasing availability of undeveloped land, the anticipated land use would be commercial or residential, and would result in a loss of acreage that could be prime farmland.

4.6 Hazardous Materials

4.6.1 Phase V Expansion

The proposed Phase V expansion activities would not result in an increase in hazardous materials used or stored at the HNC. Minor spills of hazardous materials or petroleum

products (such as oil or hydraulic fluid) could occur from heavy equipment used onsite during construction activities. Any minor spills would be cleaned up immediately. The construction contractors would be required to handle and dispose of all solid and chemical wastes in compliance with Federal, State, and local requirements.

One (1) former residential structure and two (2) farm structures, identified collectively as Building 3006, will be demolished as part of the Phase V expansion. VA conducted previous environmental investigations of the Building 3006 area and recognized environmental conditions (RECs) were identified (Appendix F). The RECs included the following:

- The “Milk House” on the north side of Building 3006 contained several bottles of regulated pesticides/herbicides such as Amine 4 (2,4-D) weed killer and a jug of Chlordane. The improper storage of regulated substances has resulted in staining along the concrete floor near a floor drain found within the Milk House. Additionally, a septic system with a drain field is located on the subject property; although the exact location of the drain field was unknown at the time of the Phase I ESA. The potential for contaminants to migrate from Building 3006’s drains and deposit contaminants in soil presented a REC for the subject property.

The “Shed” on the south side of Building 3006 contained several bottles and drums of petroleum products, and staining was visible on the wooden floor of the building. It was believed that a crawlspace underlies the building with exposed soil directly underneath the floor. The potential for contaminants to leach from Building 3006’s floors to the underlying soil presented a REC for the subject property.

VA conducted soil and groundwater sampling (Phase II Environmental Site Assessment [ESA]) during November 2018 to address the RECs previously identified. The Phase II ESAs identified the following environmental concerns:

Analysis of the two soil samples collected from beneath the floor of the Shed (2601-SS-1 and 2601-SS-2) yielded results indicative of a release of Dieldrin, a pesticide, to surface soil. These results exceeded the Texas Commission on Environmental Quality’s (TCEQ’s) Protective Concentration Levels (PCLs) for residential soil. Sample 2501-SS-2 also exceeded the commercial PCL for Dieldrin.

4-Chlorophenyl phenyl ether, a semi-volatile organic compound (SVOC), was detected above the residential PCL in all soil samples collected during the initial Phase II ESA, and above commercial PCLs in four of the samples (2501-SS-3, 2501-SS-4, 2501-SS-5, and 2501-SS-6). 4-Bromophenyl phenyl ether was detected above the residential PCL at four sample locations (2501-SS-3, 2501-SS-4, 2501-SS-5, and 2501-SS-6), and above the commercial PCL in Sample 2501-SS-6. Hexachlorobenzene was also detected above the residential PCL at four sample locations (2501-SS-3, 2501-SS-4, 2501-SS-5, and 2501-SS-6).

VA conducted an Expanded Phase II ESA from May 21 to 22, 2019 to further characterize the site. To delineate the exceedances observed during the initial Phase II ESA, 69 soil samples were collected from 23 locations and analyzed for SVOCs and pesticides. Groundwater grab samples were collected from six locations around the site via the installation of temporary PVC wells.

The analytical data obtained during the Expanded Phase II ESA indicate that the contamination discovered during the initial Phase II ESA appears to be confined to the footprint of the shed building of Building 3006. Based on the analytical results of the Expanded Phase II ESA, Booz Allen recommended the following actions at the subject property:

Remedial action to bring the Dieldrin impacted soil identified during the initial Phase II ESA into compliance is required. Remedial actions will include the excavation and disposal of the top 2 feet of soils at the locations where contamination is present. The remedial action will occur concurrently with the Phase V expansion.

In the event that renovations or repairs within existing structures involves disturbing asbestos-containing building materials (ACM) or lead-based paint (LBP), VA will conduct surveys to assess the asbestos or lead content of building materials. In the event that building materials or paint meet the criteria of asbestos-containing building material (ACBM) or LBP, VA will abate any materials prior to disturbance.

4.6.2 Future Expansions

Future expansions would not result in an increase in hazardous materials used or stored at the HNC. The VA would conduct a survey to determine the presence of asbestos-containing materials or lead-based paints prior to architectural renovations to any buildings which could contain these materials.

4.6.3 No-Action Alternative

The No-Action alternative would result in no impacts to hazardous materials used or stored at the HNC. However, pesticide-impacted soils and potential ACM and LBP would remain at Building 3006.

4.7 Land Use

4.7.1 Phase V Expansion

The Phase V expansion would convert approximately 22 acres of the undeveloped acreage at the HNC from pastureland used for cattle grazing to cemetery use. The Proposed Action would also result in the demolition of the farm structures located within the expansion area. This change in land use has been planned since the inception of the HNC. The remaining acreage would continue to be leased for cattle grazing.

4.7.2 Future Expansions

Future expansions would eventually develop the entire 417.5-acre property to cemetery use, consistent with the planned land use since the development of the HNC in 1965. Expansion activities would result in the demolition of a former private residence on the HNC property. Based on the location of the residence, the HNC anticipates that displacement would not be required until a Phase VI expansion that would not occur for an estimated 15-20 years.

4.7.3 No-Action Alternative

Under the No-Action alternative, the remaining acreage at the HNC would remain undeveloped pastureland used for cattle grazing. The resulting loss of cemetery land would require the HNC to eventually close to future burials and veterans and their families in the greater Houston metropolitan area and southeast Texas would not have reasonable access to burial in a national cemetery.

4.8 Socioeconomics

4.8.1 Phase V Expansion

Environmental Justice

Executive Order 12898, entitled "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires Federal agencies to evaluate Proposed Actions to identify activities that may have disproportionately high and adverse human health or environmental effects on minority and low-income populations.

The HNC is located in an area with both high minority and high economically disadvantaged populations. Impacts from the Phase V expansion would be generally limited to HNC property and would not be expected to result in adverse human health or environmental effects on minority and low-income populations.

Transportation, Traffic, and Parking

The Phase V expansion would result in adverse impacts to transportation or traffic outside the HNC. Traffic entering the HNC is generally comprised of the following categories: funeral corteges, cemetery and gravesite visitors, cemetery employees, business support traffic, and construction traffic. The Phase V expansion would not result in an increase in the number of internments per year or the expected number of cars visiting the HNC.

The proposed Phase V expansion would result in long-term beneficial impacts to traffic flow and parking within the HNC. Currently, funeral corteges assemble at the Administration Building where there is a pull-off lane which can accommodate approximately 30 vehicles. Extension of Veterans Memorial Drive, as well as the installation of a limited-use entrance along Aldine-Western Road would allow a fuller flow of traffic.

Construction activities during the Phase V expansion would result in temporary adverse impacts to traffic flow and parking within the HNC due to proposed improvements to existing roadways. All construction activities would be coordinated with the HNC director and staff to respect the ongoing operation of the cemetery. Traffic re-routes and

temporary cortege lanes would be established to maintain traffic flow within the HNC. A Construction Sequencing Plan would be implemented to minimize disruption to services and operations.

Construction access to the Phase V expansion area would be limited to the existing construction access located on Aldine Western Road. This access point minimizes construction traffic on T. C. Jester, reduces on-site visibility of construction traffic, and minimizes potential conflicts between construction activity and on-going burial services in the cemetery. Construction access to the Maintenance Building site would be at the maintenance drive on Veterans Memorial Drive only.

Utilities

The proposed Phase V expansion would have a beneficial impact on the utility infrastructure at the HNC by increasing the efficiency of the irrigation system, expanding utility service into the Phase V expansion area.

4.8.2 Future Expansions

Environmental Justice

Impacts from future expansions would be generally limited to HNC property and would not be expected to result in adverse human health or environmental effects on minority and low-income populations.

Transportation, Traffic, and Parking

Future expansions would incorporate roadways, sidewalks, curb, gutter, drainage, and parking facilities, as needed to support the needs of the HNC. Future expansion activities would not be expected to result in long-term adverse impacts to traffic flow or parking within the HNC or on the surrounding roadways.

Utilities

Future expansions would include installation of utilities, such as electrical, potable water, and irrigation, necessary to serve the expansion areas. Future expansions may also include upgrades to existing utilities within the HNC and would have a beneficial impact on the utility infrastructure within the HNC.

4.8.3 No-Action Alternative

Environmental Justice

The No-Action alternative would result in no adverse human health or environmental effects on minority and low-income populations in the vicinity of the HNC. However, the under the No-Action alternative, the HNC would not be able to continue providing burial services to minority and low-income veterans in southeast Texas. Minority and low-income veterans would be required to travel a greater distance to be buried in a National Cemetery, which could pose additional economic hardship to the veteran's family.

Transportation, Traffic, and Parking

The No-Action alternative would not provide the increased cortege lanes at the HNC. The lack of sufficient cortege staging and parking already results in traffic congestion within the HNC. The No-Action alternative would not require any temporary road closures within the HNC.

Utilities

The No-Action alternative would result in adverse impacts to the utility infrastructure at the HNC. The existing irrigation system is inoperable and results in a significant amount of wasted water each year. Under the No-Action alternative, these systems would not receive necessary upgrades.

4.9 Water Quality

4.9.1 Phase V Expansion

Surface Water

Existing Stormwater detention pond A will be enlarged from approximately 3.640 surface acres to 6.967 surface acres to accommodate the expanded impervious cover areas. The enlarged Stormwater detention pond will be landscaped to match the existing hydrophytic vegetation found on the existing pond. Adverse impacts to surface water could occur from discharges of pollutants or increased sediment in storm water runoff. Pesticides and fertilizers are used to maintain the turf grasses within cemetery and could be present in storm water runoff. Water infiltrating the burial sections would be limited from contacting casketed remains by the use of pre-placed crypts; however some leachate containing anaerobic microbes, formaldehyde, and nitrogen, from interred remains, as well as varnishes, sealants, and heavy metals from caskets, could be present. The subsurface drainage system within the crypt field would collect and channel infiltrated storm water from sub-base material underlying the pre-placed crypts to the storm water ponds and could result in accumulation of these chemicals in the ponds. Aerators installed in the ponds would maintain an aerobic environment. This would limit the proliferation of anaerobic microbes and may result in loss of organic compounds through volatilization. Retention of storm water in the ponds would prevent release of any chemicals to surface waters outside the HNC, except during extreme storm/flooding events.

During construction of Phase V, discharges of storm water to surface water bodies, including drainage ditches and ponds, during construction activities would be authorized under a TPDES Construction General Permit (TXR150000) from the TCEQ. A Stormwater Pollution Prevention Plan (SWPPP) would be prepared to identify potential sources of pollution resulting from construction activities and to minimize erosion of sediment and exposed topsoil and discharge of pollutants in storm water. Erosion and sediment control best management practices, including the use of silt fencing, stabilized construction entrances, inlet protection, and fiber logs, would be implemented during construction activities to prevent discharge of material in storm water runoff.

Groundwater

The Phase V expansion would increase the landscaped acreage at the HNC that requires regular irrigation. HNC requires irrigation from March through October. During the months of November through February, precipitation exceeds evapotranspiration and irrigation is not required. The Phase V irrigation system would require an estimated 86,000 gallons per day (GPD) with an estimated seasonal annual total use of 6.2 million gallons per year.

Table 4-6 Peak Season Design and Annual (Seasonal) Water Use

PEAK SEASON DESIGN AND ANNUAL WATER REQUIREMENTS								
		EXISTING		PHASE 5		FUTURE		Totals
AREA , acres		162.00		16.30		92.00		270.30
PEAK SEASON DESIGN								
PLANT WATER REQUIREMENT, inches/day		0.13	(4)	0.13	(5)	0.13	(6) (7)	0.38
OPERATING LOSS, inches	(1)	0.07		0.07		0.07		0.20
TOTAL DAILY APPLICATION REQUIREMENT, inches		0.19		0.19		0.19		0.58
TOTAL DAILY APPLICATION REQUIREMENT, acre*ft		2.62		0.26		1.49		4.37
TOTAL DAILY APPLICATION REQUIREMENT, gallons		854,038		85,931		485,009		1,424,978
SEASONAL PLANT WATER REQUIREMENTS, inches		32.94		32.94		32.94		98.82
SEASONAL EFFECTIVE PRECIPITATION, inches	(3)	23.84		23.84		23.84		71.52
TOTAL SEASONAL IRRIGATION APPLICATION, inches	(1)	14.00		14.00		14.00		42.00
TOTAL SEASONAL IRRIGATION APPLICATION, acre*ft		189.00		19.02		107.33		315.35
TOTAL SEASONAL IRRIGATION APPLICATION, gallons		61,586,160		6,196,632		34,974,856		102,757,649
IRRIGATION FLOW REQUIREMENT WITH AN IRRIGATION WINDOW OF 8 HOURS, 7 DAYS A WEEK (gpm)	(2)	2372		239		1347		3958
IRRIGATION FLOW REQUIREMENT WITH AN IRRIGATION WINDOW OF 10 HOURS, 7 DAYS A WEEK (gpm)	(2)	1898		191		1078		3167
IRRIGATION FLOW REQUIREMENT WITH AN IRRIGATION WINDOW OF 12 HOURS, 7 DAYS A WEEK (gpm)	(2)	1582		159		898		2639

NOTES:

1. IRRIGATION SYSTEM APPLICATION EFFICIENCY IS ASSUMED TO BE 65%.
2. IRRIGATION SYSTEM TAP UTILIZATION EFFICIENCY IS ASSUMED TO BE 75%. TAP UTILIZATION EFFICIENCY IS DEFINED AS THE AVERAGE DESIGN FLOW/AVERAGE AVAILABLE FLOW.
3. A SEASONAL PRECIPITATION OF 47.7 INCHES IS USED AND IS BASED ON *http://texaset.tamu.edu/ (Average Rainfall) DATA PRECIPITATION IS ASSUMED TO BE 50% EFFECTIVE.
4. PEAK SEASON PLANT WATER REQUIREMENT OF 0.13 IN/DAY IS ASSUMED FOR EXISTING AND IS BASED ON *http://texaset.tamu.edu/ (Average Rainfall) DATA AND A CROP COEFFICIENT OF 60%.
5. PEAK SEASON IRRIGATION REQUIREMENT OF 0.13 IN/DAY IS ASSUMED FOR PHASE 5 AND IS BASED ON *http://texaset.tamu.edu/ (Average Rainfall) DATA AND A CROP COEFFICIENT OF 60%.
6. PEAK SEASON IRRIGATION REQUIREMENT OF 0.13 IN/DAY IS ASSUMED FOR FUTURE AND IS BASED ON *http://texaset.tamu.edu/ (Average Rainfall) DATA AND A CROP COEFFICIENT OF 60%.
7. PEAK SEASON IRRIGATION REQUIREMENT OF 0.13 IN/DAY IS ASSUMED FOR FUTURE AND IS BASED ON *http://texaset.tamu.edu/ (Average Rainfall) DATA AND A CROP COEFFICIENT OF 60%.

The expansion includes upgrades to the existing irrigation system, including implementation communication between Wells #1 and #2, replacing the central control unit, installing zone and isolation valves, standardizing the sprinkler heads in use, the installation of surge tanks, as well as the installation of a new well within Phase V. The new well would be permitted through HGSD. These upgrades, as well as use of irrigation from on-site retention basins would result in greater efficiency and would be expected to reduce the amount of water used per acre. The projected total use of groundwater for the Phase V Expansion and future expansions is 102,757,649 gallons per year, which is below the 120,000,000 gallons per year permitted by the Harris-Galveston Subsidence District.

The land surface within the burial sections would be elevated with fill material approximately 3-5 feet above the existing grade to both ensure that the base of the pre-placed crypts are above the highest anticipated groundwater level and ensure positive drainage of the crypt field. As described above, seepage from crypt fields may contain anaerobic microbes, formaldehyde, and nitrogen, from interred remains, as well as varnishes, sealants, and heavy metals from caskets. Fertilizers and pesticides applied to maintain the landscaping could also infiltrate the soil column. These chemicals may also pose a potential risk of migration through the unsaturated soil column to groundwater. The use of pre-placed crypts would limit direct contact of infiltrated water with casketed remains. In addition, the burial sections would have a drainage system in the sub-base material underlying the pre-placed crypts that would collect and channel water to the storm water ponds, reducing the potential for leachates and surface-applied chemicals to reach groundwater. Modern mortuary practices have discontinued the use of toxic embalming fluids.

Floodplains

The Phase V expansion of HNC would occur in areas of the property not located within the 100-year or 500-year floodplain.

Wetlands

The proposed Phase V expansion would not result in temporary or permanent impacts to wetlands or jurisdictional waters of the U.S. However, the existing, manmade stormwater detention pond A will be enlarged from approximately 3.640 surface acres to 6.967

surface acres to accommodate the expanded impervious cover areas. The enlarged manmade stormwater detention pond will be landscaped to match the existing hydrophytic vegetation found on the existing pond in accordance with Executive Order 11990.

4.9.2 Future Expansions

Surface Water

Future expansions may include maintenance dredging of surface water ponds to maintain the storm water retention functionality. Construction of future expansion phases would be expected to disturb greater than 5 acres and would require a Construction General Permit (TXR150000) to discharge storm water to surface water bodies, including drainage ditches and ponds. A SWPPP would be prepared and implemented during construction activities to identify potential sources of pollution resulting from construction activities and to minimize discharge of pollutants in storm water.

Groundwater

Future expansions would increase the acreage of irrigated land at the HNC, resulting in an increase in groundwater use from the HNC water wells. Available system improvements and design features, such as surface water use from onsite retention ponds, may be incorporated to minimize increased irrigation water use from the HNC water wells. Installation, development and use of a new groundwater well would require permitting from the HGSD.

Floodplains

Future expansions at the HNC would build-out portions of the property not located within the 100-year or 500-year floodplain. Future expansions would include storm water drainage and retention features similar to the existing cemetery areas and would not result in adverse impacts to floodplains within or downstream of the HNC.

Wetlands

Future expansions would result in permanent impacts to wetlands. The HNC has applied for an Approved Jurisdictional Determination for the expansion area. This Jurisdictional Determination would be valid for five years from the date of issuance. The VA would renew the Jurisdictional Determination every five years, otherwise, future expansion

activities conducted after the expiration of the Jurisdictional Determination encompassing areas where the wetlands occur would require a new Jurisdictional Determination from the USACE. To ensure compliance with Executive Order 11990, the VA would mitigate any impacts to wetland resulting from future expansion activities, regardless of USACE jurisdictional status or permitting requirements.

4.9.3 No-Action Alternative

Surface Water

The No-Action alternative would result in no direct impacts to surface water bodies. The onsite ponds would not be dredged which could reduce their water-retaining capacity and results in greater quantities of storm water released to the municipal storm sewer system.

Groundwater

Under the No-Action alternative there would be no additional acreage that would require irrigation and there would be no upgrades to the HNC irrigation system. The existing system is inefficient, aging, and would require increasing repairs. The existing system would be expected to require more groundwater use to irrigate the existing acreage in the future if the proposed system upgrades are not installed.

Floodplains

There would be no impact to floodplains under the No-Action alternative.

Wetlands

The No-Action alternative would result in no impacts to wetlands. The existing herbaceous wetlands and stock ponds at the HNC would continue to be heavily impacted by cattle grazing activity and there would be no impacts to forested wetlands.

5. Cumulative and Indirect Impacts

The evaluation of the cumulative and indirect impacts of the Proposed Action on the human environment must account for impacts resulting from other concurrent development and impacts that may result from reasonably foreseen actions undertaken in response to the Proposed Action.

5.1 Cumulative Impacts

The Proposed Action includes current and future expansion of the HNC within the existing property boundaries. There would be no long-term impacts, adverse or beneficial, to air quality, noise levels, biological resources (including threatened and endangered species and their habitat), cultural and historical resources, geology, soils that could be considered prime farmland, or socioeconomic conditions as a result of the Proposed Action. Therefore, when considered in context with other development, the Proposed Action would not contribute to cumulative impacts to these resources.

The Proposed Action would result in a change of land use from pastureland to cemetery and contribute to the cumulative loss of pasture and grazing land in the greater Houston area. The HNC predates most of the residential and commercial development that has occurred in the immediate area. Given the land use of the surrounding area, a large undeveloped tract of land, such as the HNC expansion area, would likely have been converted to residential or commercial use if it were not already public land, as agricultural land use within an increasingly urban environment is generally economically unsustainable.

The proposed Phase V expansion would contribute to a cumulative increase groundwater use; however, the increase in use is within the volume currently permitted by HGSD. Future expansion activities may contribute to increases in regional groundwater use as more irrigable cemetery land is developed. Future irrigation system designs may minimize these impacts.

5.2 Indirect Impacts

Indirect impacts are those reasonably foreseen impacts that may result from the Proposed Action that are farther removed in time or distance. These may include induced growth and associated environmental, land use, and socioeconomic impacts.

The proposed expansion would not be expected to increase the number of yearly visitors to the HNC or result in changes in development or land use outside the HNC that would result in indirect impacts to the human environment. Expansion of the cemetery onto the full 417.5-acre property precludes future residential, commercial, or industrial use of the land, all of which could reasonably result in adverse future impacts to traffic congestion, air quality, and vegetation and wildlife habitat. The Proposed Action would preserve the area as open space and contributes a cultural and historical resource for future generations.

6. Management and Minimization Measures

This section summarizes the management and minimization measures, if any, identified in Section 3 that are proposed to reduce and avoid potential adverse effects of the Preferred Action Alternative. In addition, any unforeseen adverse cumulative effects would be offset or minimized through consultation and compliance with statutory and regulatory processes already in place in the State of Texas. Section 11.0 includes a list of regulations and environmental permits that would apply to the Proposed Action.

Anticipated avoidance, minimization, and management measures for the Preferred Action, based on the analysis in this EA, are presented below and are summarized in Table 6-1. “Management measures” are defined as routine BMPs and/or regulatory compliance measures that are regularly implemented as part of proposed activities, as appropriate, across Texas. Per established protocols, procedures, and requirements, VA (and VA's design and construction contractors) would implement BMPs and would satisfy all applicable regulatory requirements in association with the design, construction, and operation of the Preferred Action.

In general, implementation of management measures, as identified in Table 5, would maintain effects at acceptable levels for all resource areas analyzed. These are different from “minimization measures,” which are defined as project specific requirements, not routinely implemented as part of development projects; necessary to reduce identified potentially significant adverse environmental effects to less than significant levels. Table 6-1 provides a summary of potential BMPs/Environmental Protection Measures which could be incorporated in the Proposed Action to ensure potential adverse, minor effects are controlled and/or further reduced.

Table 6-1. Best Management Practices/Minimization Measures Incorporated into the Proposed Action

Technical Resource Area	Best Management Practice/Environmental Protection Measure
Air Quality	Use appropriate dust suppression methods during on-site construction activities. Available methods include application of water, dust palliative, or soil stabilizers; use of enclosures, covers, silt fences, or wheel washers; and suspension of earth moving activities during high wind conditions
	Maintain an appropriate speed to minimize dust generated by vehicles and equipment on unpaved surfaces
	Cover haul trucks with tarps
	Stabilize previously disturbed areas through revegetation or mulching if the area would be inactive for several weeks or longer
	Visually monitor all construction activities regularly, particularly during extended periods of dry weather, and implement dust control measures when appropriate
Cultural Resources	Cease work and contact a qualified archeologist and notify the Texas Historic Commission (THC) / SHPO in the event that human remains or items of cultural significance are found
Geology, Topography, and Soils	Maintain areas of the site for agricultural use (via lease) until the cemetery development phase is needed
	Design the proposed cemetery in concert with the natural topography and current drainage patterns
	Design paved areas to drain to a suitable, site-specific, and properly engineered and designed stormwater management system
	Install and monitor erosion prevention measures, such as silt fences and water breaks, detention basins, filter fences, sediment berms, interceptor ditches, straw bales, rip rap, and/or other sediment control structures; spread stockpiled topsoil; and seed/revegetate areas temporarily cleared of vegetation
	Retain on-site vegetation to the maximum extent possible
	Plant and maintain soil stabilizing vegetation on disturbed areas
	Use native vegetation to revegetate disturbed soils
Hydrology and Water Quality	Implement stormwater management facilities and other related stormwater management infrastructure for the Site
	Prepare and implement a Stormwater Pollution Prevention Plan (SWPPP)
	Develop a site design that prevents surface water runoff to the on-site and adjacent surface waters, and avoids interaction with on-site and adjacent surface waters

Technical Resource Area	Best Management Practice/Environmental Protection Measure
Wildlife and Habitat	Construction tree clearing and grading should be timed to avoid nesting periods of migratory birds on the Site, which are protected under the Migratory Bird Treaty Act (MBTA). This Act prohibits the taking of migratory birds, their nests, and eggs. Thus, it is recommended that tree removal and grading at the Site be conducted outside the migratory bird nesting seasons of April through July so that actively occupied nests in trees, shrubs and at ground level are not disturbed. If it is not practical to clear the site outside of this time frame, a qualified biologist should survey the site prior to clearing to ensure that no active nests are disturbed
	Native species would be used to the extent practicable when revegetating land disturbed by construction to avoid the potential introduction of non-native or invasive
Noise	Post signage, updated daily, at the entry points of the site provide current construction information, including schedule and activity
	Limit, to the extent possible, construction and associated heavy truck traffic to occur between 7:00 a.m. and 7:00 p.m. during normal, weekday work hours. Work on the weekend may be required, as dictated by the construction schedule. This measure would reduce noise effects during sensitive nighttime hours.
	Locate stationary equipment as far away from sensitive receptors as possible
	Select material transportation routes as far away from sensitive receptors as possible
	Shut down noise generating heavy equipment when it is not needed
	Maintain noisy equipment per manufacturer's recommendations
	Encourage construction personnel to operate equipment in the quietest manner practicable (e.g., speed restrictions, retarder brake restrictions, engine speed restrictions, etc.)
	Limit rifle salute noise effects from ceremonial rifle salutes by conducting salutes away from the site boundaries (near residential receptors) and limit salutes to normal daytime hours between 9:00 AM and 5:30 PM. However, there may be infrequent instances when salutes will be carried out outside of normal hours of operation.
Land Use	No project specific BMP measures are required
Floodplains and Wetlands	Avoid development within Waters of the US
	Maintain a buffer of undisturbed land around the identified Waters of the US where possible
	Develop a site design that avoids on-site and adjacent surface waters and floodplains to the maximum extent possible
	Coordinate with the Army Corps of Engineers, if needed
Solid and Hazardous Materials	Comply with existing Standard Operating Procedures and applicable Federal and State laws governing the use, generation, storage, or transportation of solid or hazardous materials

Technical Resource Area	Best Management Practice/Environmental Protection Measure
	Avoid or limit the use of hazardous materials, including building material products, during construction and operation of the National Cemetery. If hazardous materials are required during construction and/or operation of the National Cemetery, store in locations designated for hazardous materials (locked and labeled metal cabinets)
	If hazardous substances are released to the Site during construction or operation, these applicable Federal and State requirements must be followed in response and abatement/remediation/cleanup
Transportation and Parking	Coordinate with the Harris County to ensure that construction and operational traffic are considered in the planning of future transportation improvements in this vicinity
	Work with Harris County to identify and implement roadway improvements, as necessary, such as turn lanes and signals
	Ensure debris and/or soil is not deposited on local roadways during the construction period
	Ensure construction activities do not adversely affect traffic flow on local roadways; construction would be timed to avoid peak travel hours

7. Agency Coordination and Public Involvement

The following Federal, State, and local agencies and commissions were contacted on behalf of the HNC and VA and provided an opportunity to comment on the Proposed Action. Reponses and comments received from agencies are included in Appendix C.

U.S. Army Corps of Engineers
U. S. Army Engineer District, Galveston
CESWG-PE-R
P.O. Box 1229
Galveston, TX 77553-1229

U.S. Fish and Wildlife Service
Division of Ecological Services
17629 El Camino Real, Suite 211
Houston, Texas 77058

Texas Historical Commission
State Historic Preservation Officer
Texas Historical Commission
P.O. Box 12276
Austin, Texas 78711-2276

Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711

Texas Parks and Wildlife Department
Wildlife Habitat Assessment Program
4200 Smith School Road
Austin, Texas 78744-3291

National Resource Conservation Service
State Resource Conservationist
Ecological Sciences
Natural Resources Conservation Service
101 South Main
Temple, Texas 76501-7682

National Park Service
Planning and Environmental Quality
Intermountain Regional Office
National Park Service
12795 W. Alameda Parkway
Lakewood, Co. 80228

City of Houston Floodplain Management Office
Department of Public Works and Engineering
City of Houston
611 Walker
Houston, Texas 77002

Environmental Protection Agency
Regional Environmental Review Coordinator
EPA Region 6 (6ENXP)
1445 Ross Avenue
Dallas, Texas 75202-2733

Federal Emergency Management Agency
Insurance and Mitigative Division
Region VI
Federal Center
Denton, Texas 76201

Harris County Historical Commission
1218 Webster Street
The Benjamin Building
Houston, Texas 77002-8841

Harris-Galveston Subsidence District
1660 West Bay Area Blvd
Friendswood, Texas 77546

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9. List of Environmental Permits Required

It is anticipated that the following federal, state, and local permits, approvals and/or consultation activities will be required for the Proposed Action:

Table 6-1. Environmental Permits Required

Agency	Applicable Regulation	Requirements
Texas Commission on Environmental Quality	Stormwater Pollution Prevention Plan (SWPPP)	Construction General Permit – Notice of Intent (NOI). Submit via TCEQ STEERS at https://www.tceq.texas.gov/permitting/stormwater/WQ_electronic.html
Harris County Construction and Transportation Permits	Harris County Development Code	Submit via Harris County ePermits at https://epermits.harriscountytx.gov/Login.aspx?ReturnUrl=%2f

10. List of Preparers

ECS Southwest, LLP

14050 Summit Drive, Suite A-101

Austin, Texas 78728

Craig W. Hiatt, M.S., *Director of Environmental Services*: 24 years experience conducting environmental assessments, environmental site investigations, wetland delineations, special-status species assessment, and risk based assessments. 1995 B.S. Environmental Biology and Management, University of California at Davis; 2012 M.S. Environmental Planning, American Public University System.

Roger Will II, M.S., *Senior Environmental Project Manager:* 6 years experience in wetland delineation and permitting, ecosystem restoration, habitat evaluation, and environmental impact assessment. 2009 B. S. Biology, University of Georgia; 2013 M.S. Environmental Science, University of Texas – San Antonio.

Moore Arceological Consulting, Inc.

2313 Brun Street

Houston, Texas 77019

Ashley E. Jones, M.A., RPA, *Principal Investigator*: 4 years experience conducting cultural resources surveys, management of field investigations, and reporting for Section 106 of the National Historic Preservation Act. 2008 B.A. Anthropology, University of Virginia -- Charlottesville; 2014 M.A. Anthropology, University of Texas – San Antonio.

Trinity Consultants

3301 C Street, Suite 400

Sacramento, California 95816

Matthew Malchow, Ph.D., *Consultant*: 18 Years experience conducting stationary and mobile source emission inventories and quantification. 1995, B.S. Civil and Environmental Engineering, Duke University; 1996, M.S. Civil and Environmental Engineering, University of California, Berkeley; 2001, Ph.D. Civil and Environmental Engineering, University of California, Berkeley.