BIOLOGICAL ASSESSMENT
IN SUPPORT OF GREENHOUSE GAS PERMITTING FOR REQUIRED WEST POWERHOUSE BOILERS NO_X CONTROLS

INVISTA S.à r.l.
Victoria County, Texas

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 6
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AA	Action Area
AWBP	Aransas-Wood Buffalo population
BA	Biological Assessment
CFR	Code of Federal Regulations
CO	carbon monoxide
ESA	Endangered Species Act
ESLs	effects screening levels
GHG	greenhouse gas
km	kilometer
INVISTA	INVISTA S.à r.l.
m	meter
mm	millimeter
NH_3	ammonia
NMFS	National Marine Fisheries Service
NO_x	nitrogen oxides
NWR	National Wildlife Refuge
PSD	Prevention of Significant Deterioration Program
SILs	Significant Impact Levels
SO_2	sulfur dioxide
TCEQ	Texas Commission on Environmental Quality
TNDD	Texas Natural Diversity Database
TPWD	Texas Parks and Wildlife
USC	United States Code
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency Region 6
USFWS	U.S. Fish and Wildlife Service
WPH	West Powerhouse

EXECUTIVE SUMMARY

INVISTA S.à r.l. (INVISTA) submitted a greenhouse gas (GHG) permit application to U.S. Environmental Protection Agency (USEPA) Region 6 to obtain a Prevention of Significant Deterioration (PSD) permit authorizing the installation of nitrogen oxide (NO_x) controls required by a USEPA Consent Decree and modifications to the existing boilers and fuel system piping at the INVISTA Victoria Plant West Powerhouse (WPH).

USEPA's issuance of a GHG PSD permit to INVISTA is an action subject to the consultation requirements of Section 7 of the Endangered Species Act (ESA). This Biological Assessment was performed to assess the potential effects of this project on Federally listed endangered or threatened species and designated critical habitat.

An Action Area (AA) boundary was established based on the direct impacts from construction and operation of the facility. The AA boundaries for construction and operation include the existing WPH process areas and structures and the associated construction laydown area. INVISTA considered whether the AA should be expanded based on indirect impacts from air emissions. Air dispersion modeled impacts of increased allowable air emissions from the project are below Federal Significant Impact Levels (SILs) and Texas Effects Screening Levels (ESLs). Accordingly, the AA associated with project construction and operation was not expanded by project-related air emissions increases and is therefore limited to the project construction and operation area.

The AA for the project is entirely contained within the industrial area of the INVISTA Victoria Plant. The AA is absent of habitat, including designated critical habitat, suitable for any Federally listed threatened, endangered, or candidate species. Further, no such species are currently or have been historically present in the AA. However, the AA is within the migratory flyway for whooping cranes. Although extremely unlikely, whooping cranes, disoriented by weather or other factors, could fly within the project area and be exposed to project related construction equipment. Considering the design of the project, the construction best management practices to be implemented during project construction and the extremely unlikely chance that a whooping crane would be exposed to construction equipment, the likelihood of effects from the project are insignificant and discountable.

Accordingly, for purposes of Section 7 of the ESA, EPA's action in issuing a PSD permit to INVISTA for the West Powerhouse project at its Victoria, Texas facility: (1) may affect, but is not likely to adversely affect, the Federally listed endangered whooping crane; and (2) will have no effect on threatened or endangered species other than the whooping crane.

1. PROJECT DESCRIPTION

1.1 PROJECT LOCATION AND SCOPE

The INVISTA S.à r.l. (INVISTA) Victoria Plant is a nylon intermediates plant located at 2695 Old Bloomington Highway North, south of the city of Victoria in Victoria County, Texas. The plant is situated in a rural area approximately 10 miles south of the city of Victoria at Latitude 28°40'41" North, Longitude 96°57'17" West (Figure 1-1). The West Powerhouse (WPH) at the plant includes four existing boilers that generate steam to support manufacturing process operations. The WPH boilers are fired with a mixture of liquid and gaseous waste fuels (referred to herein as "fuels"), in addition to natural gas as needed to meet steam demand as authorized under Texas Commission on Environmental Quality (TCEQ) Air Quality Permit Number 812 and other existing environmental permits issued to the plant.

A 28 July 2009 Federal judicial Consent Decree between INVISTA, the USEPA, the U.S. Department of Justice, and various State plaintiffs (not including Texas) required INVISTA to install nitrogen oxide (NO_x) controls at the four existing WPH boilers. The Consent Decree was entered, among other things, to resolve an alleged failure to procure Clean Air Act Prevention of Significant Deterioration (PSD) permits for projects affecting the WPH emission units that occurred before INVISTA acquired the site in April 2004. The requirements of the Consent Decree and the resulting installation of NO_x control technologies for the WPH boilers were also incorporated into a 31 March 2010 Compliance Agreement between INVISTA and TCEQ. The Consent Decree requires that the installation of NO_x controls on the first boiler be completed by 31 December 2013, on a second boiler by 31 December 2015, and on the remaining two boilers by 31 December 2016. To meet these Consent Decree deadlines, INVISTA must begin construction of the project by 1 May 2013.

Retrofitting the existing WPH boilers with the required new NO_x control systems and the other boiler and fuel system modifications will increase greenhouse gas (GHG) emissions from the WPH and trigger PSD permitting requirements for GHGs. Consequently, INVISTA submitted a GHG PSD permit application to USEPA on 16 March 2012. That application seeks approval for the following: 1) the installation of air pollution controls to reduce NO_x emissions from the four existing WPH boilers, including selective non-catalytic reduction systems to meet Consent

Decree and TCEQ Compliance Agreement requirements, as well as low-NO_x burners for additional NO_x reductions; 2) modifications to the existing WPH boilers, including re-tubing, operational flexibility and efficiency improvements, and boiler modernization, as necessary; and 3) associated modifications to fuel system piping. Details of the project were presented in the INVISTA West Powerhouse Greenhouse Gas Permit Application submitted to USEPA in March 2012.

1.2 PURPOSE FOR BIOLOGICAL ASSESSMENT

USEPA Region 6 is the Federal agency with authority over GHG PSD permitting in Texas, and is subject to certain Federal environmental requirements including those pursuant to Section 7(a)(2) of the Endangered Species Act (ESA), 16 U.S.C.§ 1536(a)(2), and its implementing regulations at 50 C.F.R. Part 402. As a result, the USEPA is required to ensure that USEPA's issuance of a GHG PSD permit is not likely to jeopardize the continued existence of any Federally listed endangered or threatened species or result in the destruction or adverse modification of such species' designated critical habitat (DOI, 2008). The purpose for creating and submitting this BA is to support USEPA Region 6 in its compliance with Section 7 of the ESA. This BA analyzes the impacts, if any, of the Project on any relevant species and critical habitat.

LEGEND

- INVISTA Victoria Plant Operating Area
- West Power House Area

N

0 4 8

Miles

SOURCE: (c) 2010 Microsoft Corporation and its data suppliers

WESTON SOLUTIONS

FIGURE 1-1
PLANT LOCATION MAP
INVISTA S.à r.l.
VICTORIA COUNTY, TEXAS

DATE	PROJECT NO	SCALE
DECEMBER, 2012	13393.017.002.0020	AS SHOWN

2. EVALUATION AND IDENTIFICATION OF THE ACTION AREA

As defined by 50 C.F.R. § 402.02, an AA is defined as "all areas to be affected directly or indirectly by the Federal action and not only the immediate areas involved in the action." The evaluation of biological resources potentially affected by EPA's action is limited to impacts within the project AA. For both direct and indirect effects analyses, the AA should include not only the limits of physical disturbance for construction and operation of the project, but also any natural resources impacted by the project. For projects like this that involve primarily air pollutant emissions, the evaluation of geographic limits of the AA must consider the projected emissions concentrations as most practicably demonstrated by air dispersion modeling.

The evaluation of the project effects on biological resources compares the existing or environmental baseline conditions within the AA with the conditions after the implementation of the proposed project. Baseline conditions include "the past and present impacts of all Federal, State, or private actions and other human activities in an Action Area, the anticipated impacts of all proposed Federal projects in an Action Area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process" (50 C.F.R. § 402.02). By comparing the baseline with the proposed future conditions, the effects of the proposed project on species, suitable habitat, or their designated critical habitat are measured independently of other effects, and the incremental effects of the proposed action on designated species or habitat are isolated.

2.1 ACTION AREA DELINEATION METHOD

The geographic boundaries of the AA were established using an evaluation of the direct impacts due to construction and operation of the project and the evaluation of air emissions dispersion modeling results for indirect effects. A description of the effects due to the direct and indirect factors is provided in the following sections.

2.1.1 Construction and Operating Area Analysis

INVISTA evaluated the proposed project for direct impacts associated with construction and operation of the project. This project installs emissions controls (low NOx burners and selective

non-catalytic reduction (SNCR) technology on four existing boilers, as well as refurbishes the existing boilers.

2.1.1.1 Construction Impacts

Construction associated with the project is limited to existing process and operations (*e.g*., multi-use contractor parking / equipment laydown) and structures, and will not result in an increase to the overall footprint of the current WPH facility, nor result in an increase to the height of the facility. Visually, the WPH facility will remain an industrial process area, with no changes to the overall size and height of the facility. The construction-related activities associated with this project, including dust and traffic, will not vary from those typical of normal maintenance and turnaround activities for the INVISTA Victoria Plant and the WPH area. The construction-related activities will take place on approximately 12-acres within existing facilities and on existing concrete slabs and gravel-paved areas. No digging or ground disturbance outside the already developed, previously disturbed plant footprint will be associated with the project.

Construction activities will take place 24 hours a day with approximately four to six month duration to complete construction for each boiler. The construction will include the use of various small earth moving equipment, trucks, and cranes, similar in size and functionality to equipment in use at the facility for other projects and routine maintenance and turnaround activities on various process units at the INVISTA Victoria site. A preliminary, non-exclusive list of major construction equipment is included below:

- *Approximate 350- ton Crane:* Approximately 149 feet high, with a reach of 232 feet high when fully extended (which is lower than the nearby 235 feet high AOP stack)
- *Cherry Pickers 100-ton cranes:* 150 feet high with fully extended boom
- *Hydraulic RT (Rough Terrain*) *15 – 100 Tons Cranes:* the majority will be 15-35 ton with typical boom length of 50 to 150feet high
- *Portable generators:* to provide power to construction equipment
- *Flatbed and fork trucks:* to transport materials to/from the construction area and laydown area.
- *Cement mixing trucks:* primarily for the large pad to be poured for SNCR equipment.

With the exception of the large crane, the construction cranes for the project will be less than 150 feet in height when extended, and therefore will not be taller than existing structures within the project area. The Cherry Picker and Hydraulic RT cranes are mobile and will be retracted to less than 50 feet in height when crane activities have ceased for the day. One large crane with a maximum height of 232 feet when fully extended will be used throughout the project. Although the crane is taller than existing structures within the project area, a taller structure is present within the INVISTA plant in the vicinity of the project area. As such, the crane will not be the tallest structure in the vicinity. When not in use, the crane will be retracted to 149 feet, below the tallest structures within the project area. Construction activities will be implemented with best management practices (BMP) regarding use of all of the construction cranes throughout the duration of the project, the BMPs include:

- Retracting cranes when crane activities have ceased for the day, and when feasible during the work, consistent with worker safety and construction requirements; and
- Marking all construction equipment above 50 feet tall, including cranes, at their maximum height with flagging and/or lighting.

Prior to the use of cranes, INVISTA will ensure that all personnel responsible for crane erection, operation, maintenance, and disassembly will receive INVISTA's Migratory Bird Treaty Act training, and will be provided additional information related to the whooping crane.

2.1.1.2 Ambient Impacts

The noise volume and light levels generated through the project construction and operation will not exceed those associated with typical daily facility activities. The project is sited within an existing industrial facility. Current noise volume and lighting levels will be not be increased by this project.

2.1.1.3 Water Impacts

Water impacts associated with the construction and operation of the project are expected to be equivalent to those due to routine operations associated with the current facility. Water usage and discharges associated with this project are evaluated below for impacts to the source and

receiving water bodies. The water source and receiving water body is the Guadalupe River, which is unimpaired.

A small increase in water usage and contact storm water will result from project operations. The INVISTA Victoria site currently withdraws approximately 18-22 million gallons per day from the Guadalupe River, of which approximately 60-70% is returned through a permitted outfall. The increase in water usage from this project (~30 gpm/boiler) is associated with dilution of urea as part of the SNCR control technology, and is within the daily variation in the amount of water withdrawn currently by the INVISTA Victoria site. This water will be vaporized as part of the SNCR control process and emitted as water vapor from the boiler stacks.

The site storm water system will remain the same as it exists today; where contact storm water is routed to the wastewater treatment plant and non-contact storm water is routed via storm water outfalls to the Victoria Barge Canal. The design capacity of the storm water system is based on 9 inches of rain within a 24 hour period. As part of this project, an area of approximately 7600 sq. ft. will be paved and, as such, storm water collected in this area will be treated as contact storm water, rather than non-contact storm water, and routed to the existing wastewater treatment system prior to discharge to the Guadalupe River. The overall volume of storm water generated and ultimately discharged will not increase.

Wastewater volumes will be consistent with current volumes and characteristics of typical wastewater generated through normal maintenance and other routine activities associated with the INVISTA Victoria facility. No additional process wastewater will be generated due to the project. Maintenance wastewater generated due to the project is expected to be limited to approximately 200 additional gallons a month and would be routed via existing trenches to the area process wastewater sump, which is pumped to the wastewater treatment plant. The INVISTA Victoria site discharges 10-18 million gallons of wastewater per day, depending upon rainfall. The additional wastewater generated by this project is expected to be less than 0.002% of site wastewater discharges on any given day and will have no impact on wastewater discharge temperature or quality. No modification to the site's TPDES permit will be required due to this project.

2.1.2 Air Emissions Analysis

INVISTA also evaluated whether the AA should be expanded as a consequence of effects from air pollution emissions.

The project triggers PSD for GHG only and, as such, PSD modeling for criteria pollutants is not required. Nonetheless, with respect to non-GHG emissions, INVISTA has voluntarily evaluated the results of air modeling based upon State air permitting requirements to assist EPA in defining the AA. As a consequence of the project, permitted allowable emissions of sulfur dioxide (SO_2) on an annual basis, carbon monoxide (CO) on annual and hourly basis, ammonia (NH_3) on annual and hourly basis, and nitrous oxide (N_2O) on annual and hourly basis will increase. The increases in allowable emission rates (*i.e.*, future allowable emission rates less existing allowable emission rates) were modeled in accordance with TCEQ minor NSR modeling protocols. This approach ensures that the incremental effects of the proposed project were evaluated.

The modeling results show that neither Significant Impact Levels (SILs) nor Effects Screening Levels (ESLs) were exceeded at any location.

2.2 DETERMINATION OF ACTION AREA

The potential for effects related to this project is limited to approximately 12-acres in which construction and operation will take place. Increases in noise, dust, traffic, light, or wastewater and stormwater discharges are not expected during the construction or operation associated with the project. As described in Section 2.1.2, all projected emission impacts of the project are below established SILs or ESLs for each modeled air pollutant, and there is only a *de minimis* change in the projected air emission concentrations when compared to existing concentrations. Therefore, air emissions do not result in an expansion of the AA beyond the project construction area. Furthermore, because impacts from noise, dust, traffic, light, wastewater and storm water discharges during the construction or operation phases of the project are expected to be equivalent to those of routine operations of the current facility, these factors do not result in expanding the definition of the AA beyond the project construction area. Accordingly, the AA is the project construction area as set forth in Figure 2-1.

LEGEND

- INVISTA Victoria Plant Operating Area
- West Power House Project Action Area

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Miles

SOURCE: (c) 2010 Microsoft Corporation and its data suppliers

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FIGURE 2-1
ACTION AREA
INVISTA S.à r.l.
VICTORIA COUNTY, TEXAS

DATE	PROJECT NO	SCALE
JUNE, 2012	13393.017.002.0020	AS SHOWN

3. REGIONAL SETTING

Victoria County is located in southeastern Texas on the Coastal Plain and comprises 887 square miles. According to the U.S. Department of Agriculture (USDA) Soil Conservation Service, the project area falls within the Lake Charles – Urban land complex of soils (NRCS, 2012). The underlying geology of the project area is Quaternary-aged Beaumont Formations composed of clay, silt, sand, and gravel deposited along waterways within the past 2.6 million years. The formations vary from mainly clay and silt, to mainly clay and mud (BEG, 1992).

The local region is characterized by level to gently rolling prairies that support bluestems (*Andropogon sp*.) and tall grasses, oak forests, huisache (*Acacia farnesiana*), mesquite (*Prosopis glandulosa*), and prickly pear (*Opuntia sp*.) along with other vegetation. Most of the regional native coastal prairie is now pastureland, cropland, or residential, urban, commercial, and industrial development. As observed during the 2012 site visits, the area surrounding the INVISTA facility is primarily undeveloped brush land associated with rangeland and abandoned or active agricultural lands. The Victoria barge canal is directly west and southwest of the INVISTA operating area. The Guadalupe River is over 2,000 meters (m) from the WPH project area (see Figure 2-1). The river flows approximately 30 river miles from the INVISTA Victoria plant to the San Antonio Bay, which begins approximately six miles to the northeast of the Aransas National Wildlife Refuge. The upland areas adjacent to the Guadalupe River are forested with some disturbed areas. Common tree species associated with the woodlands include pecan (*Carya illinoinensis*), oaks (*Quercus sp*.), box elder (*Acer sp*.), cedar elm (*Ulmus crassifolia*), red buckeye (*Aesculus pavia*), and dogwood (*Cornus virginiana*). To the north, south, and east of the facility, the land is agricultural or previously agricultural land mixed with disturbed hardwood forest stands. Photographs of the land in the vicinity of the INVISTA facility are provided in Appendix B.

3.1 SITE VISITS

Site visits were conducted of the facility and surrounding area in March 2012 and June 2012 by biologists. Project biologist biographies are provided in Appendix C. A review of available habitat surrounding the INVISTA facility was performed. The vegetative communities observed were consistent with those described above. The nearest undeveloped areas were observed for

vegetative community and associated available habitats. The closest non-maintained vegetated areas are approximately 1,000 to 2,000 meters from the WPH and include altered grasslands and forest areas (Figure 2-1). Habitats were observed to be highly fragmented by roads, maintained landscapes, and fence lines. Woodlands and brush lands were present but appeared to be on previously disturbed land. Unique vegetative communities were not observed.

3.2 ACTION AREA BIOLOGICAL RECEPTORS

The AA for the project is entirely contained within the industrial area of the INVISTA Victoria facility. With the exception of a gravel-covered area adjacent to the WPH, the entire AA contains concrete or other impervious cover. No vegetation is present, and the project does not include the addition of vegetation within the AA (or otherwise). The AA is absent of any Federally listed threatened and endangered species (listed species) or suitable habitat.

3.3 REGIONAL FEDERALLY LISTED THREATENED, ENDANGERED, OR CANDIDATE SPECIES

Although there are no are no listed species, or suitable habitat within the AA, a review was performed of the USFWS Federally listed threatened, endangered and candidate species for Victoria County, Texas for the potential of listed species and habitat within the vicinity of the proposed project. The listed species are provided in Table 3-1.

Table 3-1
Federally Listed Threatened, Endangered, and Candidate Species
Victoria County, Texas

Birds		
Attwater's Prairie-Chicken	*Tympanuchus cupido attwateri*	Listed Endangered
Interior Least Tern	*Sterna antillarum athalassos*	Listed Endangered
Sprague's Pipit	*Anthus spragueii*	Candidate Species
Whooping Crane	*Grus americana*	Listed Endangered
Mammals		
Louisiana Black bear	*Ursus americanus luteolus*	Listed Threatened
Red Wolf	*Canis rufus*	Listed Endangered
Mollusks		
Golden Orb	*Quadrula aurea*	Candidate for Listing
Texas Pimpleback	*Quadrula petrina*	Candidate for Listing

Source: Texas Parks & Wildlife Dept. Annotated County Lists of Rare Species Last Revision: 10/10/2011

The following is a discussion of the USFWS designated (Federally listed) threatened and endangered species listed for Victoria County, Texas. None of the below listed species are present or expected to be present in the AA. The AA in its entirety is contained within developed industrial area, and does not contain suitable habitat for biological resources.

The Attwater's prairie chicken (*Tympanuchus cupido attwateri)* is a small, ground-dwelling bird, heavily barred with dark brown, cinnamon, and pale buff, with a short rounded tail. Both males and females have elongated dark neck feathers. The bird habitat is coastal prairie dominated by tall dropseed (*Sporobolus asper*), little bluestem (*Schizachyruim scoparium*), sumpweed (*Cyclachaena sp*), broomweed (*Scoparia dulcis*), switchgrass (*Panicum sp*), and big bluestem (*Andropogon gerardii*) (TPWD, 2012a). Short grasses are used for courtship and feeding. Tall grasses are used for nesting and feeding (Matthews and Moseley, 1990). The Attwater's prairie chicken typical habitat spans from near sea level to 200 above mean sea level along the coastal plain on the upper two-thirds of the Texas coast. The proposed project area is within the historic range of the Attwater's prairie chicken, although they have not been reported locally since 1992 (USFWS, 2011a). The Attwater's Prairie Chicken is now only known to be present primarily in

nature refuges, including the Attwater's Prairie Chicken National Wildlife Refuge (Austin and Colorado Counties, USFWS 2011a) and the Texas City Prairie Preserve in Galveston County (USFWS, 2011a).

The whooping crane (*Grus Americana*) is a large, predominantly white bird with a long neck, long legs, and red facial skin. It stands approximately 5 feet tall and has a wing span of approximately 7 feet. The crane has black wing tips that are noticeable when it is in flight (TPWD, 2012b). Their diet consists of large insects, crustaceans, mollusks, frogs, fish, small mammals, other birds, and berries. Typically, whooping cranes prefer isolated areas away from human activities. The whooping crane migrates between their summer breeding grounds of extensive wetland-pothole complexes within Wood Buffalo National Park in northern Canada to their wintering grounds in the coastal marshes within and around Aransas National Wildlife Refuge and Matagorda and St. Joseph's Islands in Aransas, Calhoun, and Matagorda counties, Texas.

Critical habitat has been designated at five sites in four U.S. states and is proposed in Canada (TPWD, 2012b). These sites include the wintering grounds at and adjacent to the Aransas National Wildlife Refuge (NWR) in Texas, and four stopover aquatic habitats on public lands in Kansas, Nebraska, and Oklahoma (USFWS, 2007). The cranes typically migrate through the Great Plains and include migratory paths in Texas, Oklahoma, Kansas, Nebraska, South Dakota, North Dakota, and Montana, as well as the Canadian Provinces of Saskatchewan, Alberta, and Southwestern Manitoba. Within Texas, their normal migration corridor stretches from the panhandle to the east-central portion of the state to the Aransas National Refuge area. Their route can take them near Victoria, Texas, as well as large metropolitan complexes including Dallas and Austin (TPWD, 2012b).

The interior least tern (*Sterna antillarum athalassos*) is gray and white with a black cap, nape, and eye stripe. They are approximately 9 inches in length and are the smallest North American terns. They are migratory birds that breed along inland river systems in the United States and winter in Central and South America (Sibley, 2000). Nesting shorebirds are adapted to lacustrine and riverine sandbar and gravel beach habitats of relatively large drainage systems for inland breeding sites. The interior least tern is listed only when inland (more than 50 miles from a

coastline) (TPWD, 2012c). It nests along sparsely vegetated sand, shell, and gravel beaches, sandbars, islands, and salt flats associated with rivers and reservoirs. The tern feeds on small fish and crustaceans within a few hundred feet of the colony (TPWD, 2012c).

The Sprague's pipit **(***Anthus spragueii)* is a buff-colored, sparrow-sized songbird with a slender bill and prominent dark eyes and a pale face. It inhabits open grasslands and feeds and nests exclusively on the ground. It breeds and winters in open grassland with good drainage and no shrubs and trees. The pipit's summer breeding territory is in the northern central U.S. and central Canada. The Pipit's diet consists primarily of insects and spiders along with seeds. The bird is only in Texas during winter migration, between mid-September to early April. In Texas, the bird is strongly tied to native upland prairie, can be locally common in coastal grasslands, but is rare farther west. The bird is rare in fragmented habitats, and it avoids habitat edges. (USFWS, 2012b)

The Louisiana black bear (*Ursus americanus luteolus*) has black hair and a short, well-haired tail. The muzzle is yellowish-brown with a white patch sometimes present on the lower throat and chest (Mammals of Texas Online, 2012). Adult males may weigh 300 to 400 pounds, and adult females 120 to over 180 pounds. The Louisiana black bear's head is long, narrow, and flat when compared to other bears. The bear was once a common inhabitant of forested regions of eastern Texas, Louisiana, and Mississippi. It is habitat generalist. Males have large home ranges and are usually solitary. The breeding period occurs during summer (Mammals of Texas Online, 2012). Only approximately 300 Louisiana black bears are left in Louisiana, restricted to the Tensas and Atchafalaya river basins. In Texas they are considered a possible transient, potentially within bottomland hardwoods and large tracts of inaccessible forested areas. (USFWS, 2012c)

The red wolf (*Canis rufus*) is mainly gray with blackish hairs and occasional reddish or yellowish hairs (Mammals of Texas Online, 2012). It is smaller and more slender than the gray wolf. The red wolf historically ranged throughout the southeastern U.S., from the Atlantic coast to central Texas. The wolf typically travels and forages in small family groups or alone. The species was declared extinct in the wild. Formerly, density was likely 1 wolf per square mile. The suitable habitat included upland and lowland forests, shrub lands, coastal prairies, and

marshes or other areas of heavy vegetative cover. Experimental populations have been reintroduced in North Carolina and Tennessee. (NatureServe, 2011)

The golden orb (*Quadrula aurea*) is a mussel usually less than 82 millimeters (mm) (3.2 inches) with an oval to nearly round, smooth, and unsculptured shell. It is yellow-brown, gold, or orange-brown to dark brown or black. Its historic range includes nearly the entire lengths of the Guadalupe, San Antonio, and Nueces-Frio River basins in central Texas. Currently, it is only known to inhabit Lake Corpus Christi and the Guadalupe, lower San Marcos, and lower San Antonio Rivers. (Hammontree, 2012)

The Texas pimpleback (*Quadrula petrina*) is a large pimpleback mussel that may grow up to 90 mm in size. It lives in mud, gravel, and sand substrates, generally in areas with slow flow rates in medium-sized streams and rivers (50 C.F.R. Part 17). It is yellow brown in color and square to round in shape. Its historical range includes the Colorado and Guadalupe river Basins. The Texas pimpleback has declined significantly range-wide, and only four streams—the San Saba River, Concho River, Guadalupe River, and San Marcos River—are known to harbor persisting Texas pimpleback populations. These populations are disjunctive, small, and isolated. The species has been extirpated from the remainder of its historical range (50 C.F.R. Part 17).

4. ENVIRONMENTAL EFFECTS ANALYSIS

Section 9 of the ESA prohibits any person from '"taking" a listed species' 16 U.S.C. § 1538. "Take" is defined as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in any such conduct" 16 U.S.C. § 1532. "Harm" is defined as actually killing or injuring wildlife, and includes such harm resulting from significant habitat modification where the modification results in death or injury to a member of a listed species, including by significantly impairing essential behavioral patterns such as breeding, feeding, or sheltering 50 C.F.R. § 17.3.

No impacts from the proposed project on listed species are present due to the lack of available habitat within the AA. The AA is located within an industrial facility with no vegetation or wildlife habitat present. Several Federally listed endangered or threatened bird species could occasionally pass over the AA but suitable habitat is not present for any of the listed bird species to be permanent residents. Additionally, there is no increase in the footprint or height of the WPH facility associated with the project.

Although no listed species are present within the AA, listed species for Victoria County were reviewed. Habitat fragmentation has left much of the region in habitat patches too small to be suitable for the listed species. Based on a review of the Texas Parks and Wildlife Department (TPWD) Natural Diversity Database (TNDD), no known documented occurrences of Federally listed threatened or endangered species are documented on the INVISTA plant. No suitable habitat for Federally listed threatened or endangered species was identified within three kilometers of the INVISTA plant.

Victoria is approximately 30 km from coastal waters; therefore, the coastal species listed on the county Threatened and Endangered Species list are not expected to be present within the vicinity of the INVISTA Victoria plant. The TNDD was searched for species occurrence records and a field survey of the project and surrounding area was conducted. The review of the database records did not indicate any known occurrences of Federally listed species within the AA or surrounding available habitats. The results of the TNDD search are provided in Appendix D.

Specific information regarding each of the listed or candidate species for Victoria County is provided below:

Attwater's Prairie Chicken

Habitat for the Attwater's prairie chicken consists of coastal prairie with short grass areas utilized for courtship and feeding and tall grass areas utilized for bird nesting and feeding. There is no suitable habitat for the Attwater's prairie chicken within the AA. The Attwater's prairie chicken is not expected to be present within the INVISTA Victoria facility region. The prairie chicken is currently limited to two ranges, one in Galveston on the Texas City Prairie Reserve, and one in Austin, and Colorado counties on the Attwater's Prairie Chicken Nation Wildlife Refuge (USFWS, 2011a). The closest current range for the Attwater's Prairie Chicken is on the National Wildlife Refuge approximately 100 miles Northeast from the INVISTA Victoria facility.

Whooping Crane

Typically, whooping cranes prefer isolated areas away from human activities. They winter in the coastal marshes of Aransas, Calhoun, and Refugio counties. Habitat for the whooping crane is not present within the AA. Suitable or critical habitat for the whooping crane has not been identified on or adjacent to the INVISTA Victoria plant. The only remaining self-sustaining flock is the Aransas-Wood Buffalo population (AWBP), which included approximately 300 individuals as of December 2012 (USFWS, 2012). The migratory route of this flock stretches from Northwest Territories in Canada to the Aransas National Wildlife Refuge on the Gulf of Mexico coast (Figure 4-1). Although the migratory pathway for the flock encompasses the Victoria area (Figure 4-2), the whooping crane migratory stopover locations are generally isolated from human activity. The migratory stopover locations for the fall 2011 and spring 2012 seasons are shown on Figures 4-3 and 4-4. The project site does not occur on a major aquatic feature and is within a developed area. For these reasons, whopping cranes would not be expected to stop near the INVISTA facility (USFWS, 2012a).

There are no documented occurrences of the whooping crane within the AA (TNDD, 2012). A constructed wetland is present within the INVISTA Victoria facility, located approximately 1,000 meters from the WPH. A full-time wetland educator is employed at the INVISTA

wetlands. According to the facility wetlands educator, no whooping cranes, or other crane species, have ever been reported at the wetlands. The closest recorded sighting of a whooping crane occurred on the southwest shore of Green Lake approximately 13 miles to the southeast of the INVISTA Victoria facility on 16 January 2012 (eBird, 2012).

Even if a whooping crane were to venture unexpectedly near the facility, because the overall footprint and the vertical extent of the WPH will not change due to the project (no new structures will be erected other than a small, fixed roof urea tank), the project presents no increases in the potential for collisions. During construction activity, a construction crane will extend up to 70 ft above the surrounding stacks, but will not extend above the tallest permanent structure within the INVISTA plant. Due to the temporary presence of the construction crane and the implementation of best management practices regarding construction cranes, there is an insignificant and discountable increase in the possibility of effects to the whooping crane due to the project construction.

Interior Least Tern

Interior least terns are adapted to lacustrine and riverine sandbar and gravel beach habitats of relatively large drainage systems for inland breeding sites. Nesting habitat for the terns consists of sparsely vegetated sand, shell, and gravel beaches, sandbars, islands, and salt flats associated with rivers and reservoirs (TPWD, 2012c). There is no suitable habitat for the interior least tern within the AA. The stretch of the Guadalupe River in the vicinity of the INVISTA Victoria facility is heavily vegetated with erosional or nearly vertical banks and does not contain sand bars or other suitable habitat for the tern. There are no reported sightings of the interior least tern in the vicinity of the INVISTA Victoria facility (TNDD, 2012). In Texas, the interior least terns are currently found along the Rio Grande River, on the Canadian River in the Texas panhandle, and along the Red River (TPWD, 2012c). The closest interior least tern sighting to the INVISTA Victoria facility occurred on 13 June 1998, approximately 35 miles to the southeast in Aransas National Wildlife Refuge (eBird, 2012).

Sprague's Pipit

The Sprague's pipit primarily inhabits open grasslands and feeds and nests exclusively on the ground. In Texas, the bird is strongly tied to native upland prairie, can be locally common in

coastal grasslands, but is rare farther west. The bird is rare in fragmented habitats, and it avoids habitat edges (USFWS, 2012b). There is no suitable habitat for the Sprague's Pipit within the AA. The Sprague's Pipit is not expected to be present within the INVISTA Victoria facility region. Upland prairies and coastal grasslands are not present in the local region. Additionally, the surrounding area is highly fragmented and not suitable for Pipit habitat. There are no reported sightings of the Sprague's pipit in the immediate vicinity of the INVISTA Victoria facility (TNDD, 2012). The closest reported sighting of the Sprague's pipit to the INVISTA Victoria facility was recorded on 18 March 2010, approximately 13 miles to the southeast of the facility on the southwest shore of Green Lake (eBird, 2012).

Louisiana Black Bear

Though historically Victoria County was known to have Louisiana Black Bear populations, it is thought that the population was extirpated prior to 1905 (USFWS, 1992). There is no habitat for the Louisiana black bear within the AA. Furthermore, the black bear is not expected to use habitat in the vicinity of the INVISTA Victoria facility. In Texas, the rare transient bear is only expected to use large tracks of heavily vegetated land, primarily in bottomland hardwoods of East Texas (USFWS, 1992). The preferred habitat is not present within the vicinity of the INVISTA Victoria facility. There are no reported sightings of the Louisiana black bear in the vicinity of the INVISTA Victoria facility (TNDD, 2012). The closest reliable sighting of the Louisiana black bear occurred in San Jacinto County in East Texas, over 150 miles away from the INVISTA Victoria facility (USFWS, 1992). There have been no reliable sightings of black bears in Victoria County since before 1905 (USFWS, 1992). A black bear sighting in Victoria County in August of 2012 was thought to have been an individual animal from a Mexican population that crossed the Rio Grande River to enter Texas (Houston Chronicle, 2012).

Red Wolf

There is no habitat for the red wolf within the AA. The red wolf is extirpated and therefore not present within the vicinity of the INVISTA Victoria facility.

Golden Orb Mussel

The golden orb mussel is currently only known in Lake Corpus Christi and the Guadalupe, lower San Marcos, and lower San Antonio Rivers. There is no habitat for the golden orb within the AA.

Regionally, there may be suitable habitat within the Guadalupe River, but the orb would be limited to shallow areas and is likely to be rare. There are no reported sightings of the golden orb within the vicinity of the INVISTA Victoria facility. The closest reported sightings were in the Guadalupe River and Lake Wood near Gonzalez, Texas, more than 60 miles upstream of the INVISTA Victoria facility, during 2005 and 2006 surveys (Burlakova, 2011).

Texas Pimpleback Mussel

The Texas pimpleback has declined significantly range-wide, and only four streams—the San Saba River, Concho River, Guadalupe River, and San Marcos River—are known to harbor persisting Texas pimpleback populations (50 C.F.R. Part 17). There is no habitat for nor reported sightings of the Texas Pimpleback within the AA. Historically, the Pimpleback inhabited the Guadalupe River; however, more recent studies have not identified the mussel in the Guadalupe River (Burlakova, 2011). The only reported sightings of the Texas Pimpleback within Texas have been in the Concho River near San Angelo and Paint Rock, TX in 2008 surveys (Burlakova, 2011).

LEGEND

- Designated Critical Habitat
- Whooping Crane Migration Path and Wintering Areas
- Site Location
- Reintroduction Population Migration Route

N

0 140 280 420 560 700

Miles

SOURCE: Cornell Lab of Ornithology and is based on information from the USFWS.

WESTON SOLUTIONS

FIGURE 4-1
WHOOPING CRANE REGIONAL
MIGRATION PATH
INVISTA
VICTORIA COUNTY, TX

DATE	PROJECT NO	SCALE
DEC 2012	15089.001.001	AS SHOWN

FILE: I:\GIS Project Files\13393_Invista\017_Victoria\mxd\Figure Whooping Crane Range.mxd 11:15:40 AM 12/4/2012 herrinm

Bryan
Sam Houston NF
Big Thicket NPRES
Austin
Beaumont
Port Arthur
Houston Metro Area
Baytown
Louisiana
Texas
San Antonio
Texas City
Galveston
INVISTA Plant
Victoria
Closest Recorded Sighting to Facility
Aransas NWR
Corpus Christi
Laredo
Gulf of Mexico

LEGEND
- Designated Critical Habitat
- Whooping Crane Migration Path and Wintering Areas
- Property Boundary

NM OK MO AR TX LA
Victoria County

N

0 10 20 30 40 50
Miles

SOURCE: Cornell Lab of Ornithology and is based on information from the USFWS.

WESTON SOLUTIONS

FIGURE 4-2
WHOOPING CRANE REGIONAL MIGRATION PATH
INVISTA
VICTORIA COUNTY, TX

DATE	PROJECT NO	SCALE
DEC 2012	15089.001.001	AS SHOWN

FILE: I:\GIS Project Files\13393_Invista\017_Victoria\mxd\Figure Whooping Crane_Plant site.mxd 11:15:26 AM 12/4/2012 herrinm

LEGEND

- Whooping Crane Stopover Site Locations
- Designated Critical Habitat

N

0 60 120

Miles

SOURCE: United States Geologic Survey, Northern Prairie Wildlife Research Center (NPWRC)

WESTON SOLUTIONS

FIGURE 4-3
WHOOPING CRANE TRAVEL
STOPOVER SITES
SEPTEMBER-NOVEMBER 2011
INVISTA
VICTORIA COUNTY, TX

DATE	PROJECT NO	SCALE
JAN 2013	13393.017.002.0001	AS SHOWN

FILE: I:\GIS Project Files\13393_Invista\017_Victoria\mxd\Figure 4-3 Whooping Crane StopOver in Texas Fall 2011.mxd 2:20:20 PM 1/25/2013 wilderj

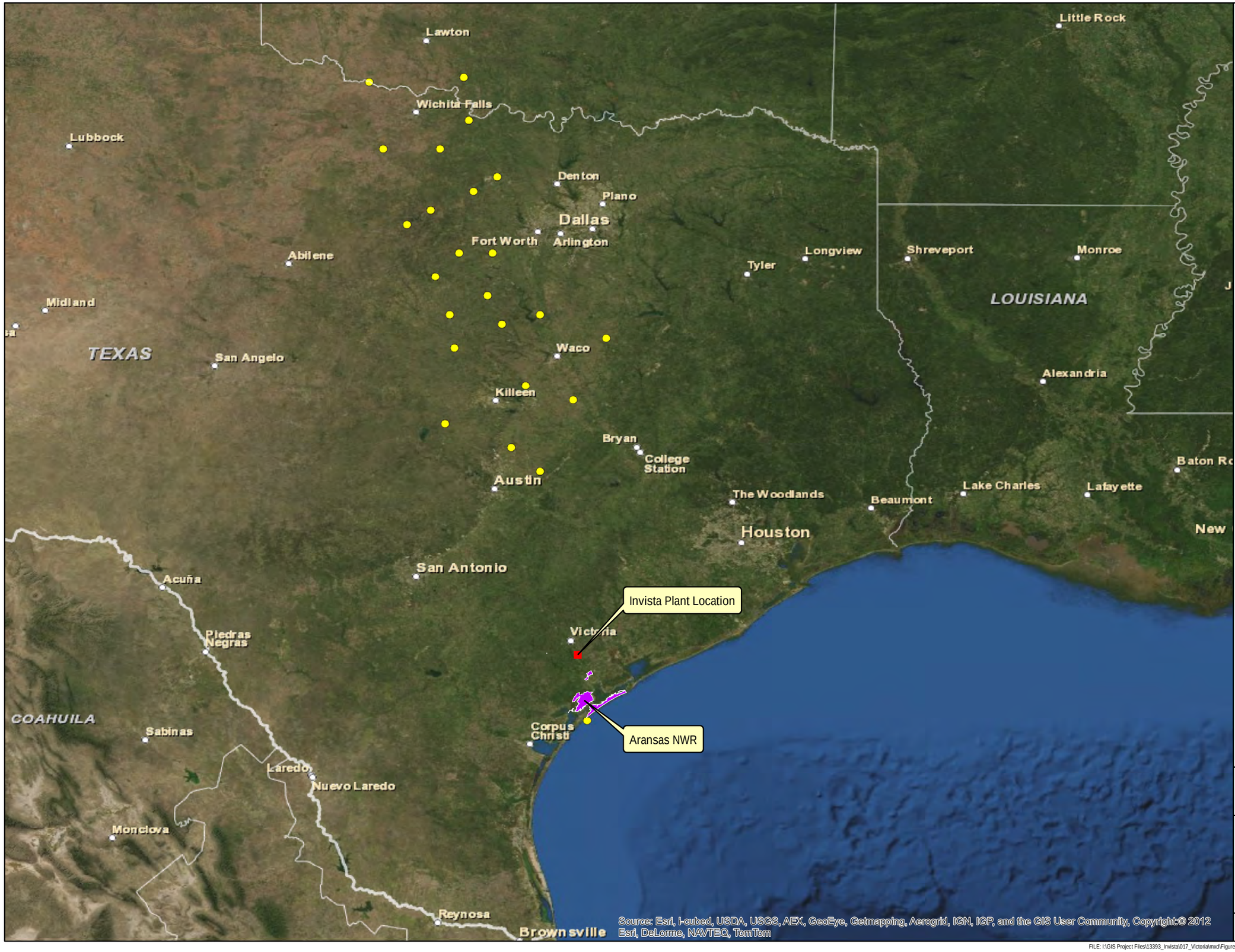

FIGURE 4-4
WHOOPING CRANE TRAVEL
STOPOVER SITES
MARCH-MAY 2012
INVISTA
VICTORIA COUNTY, TX

DATE	PROJECT NO	SCALE
JAN 2013	13393.017.002.0001	AS SHOWN

FILE: I:\GIS Project Files\13393_Invista\017_Victoria\mxd\Figure 4-4 Whooping Crane StopOver in Texas Spring 2012.mxd 2:19:28 PM 1/25/2013 wilderj

5. EFFECTS DETERMINATION AND SUMMARY

The AA for the project is entirely contained within the industrial area of the INVISTA Victoria Plant. The AA is absent of any vegetation or habitat for wildlife species. There is no increase in the footprint or height of the WPH facility associated with the project. Local and regional traffic, noise, and viewshed qualities will not change as a result of the project.

Whooping Crane Effects Determination

Potential effects on the whooping crane were evaluated in the preparation of this BA. No sightings of, or suitable habitat or designated critical habitat for, the whooping crane are located within the AA, or within the vicinity of the AA. The AA is, however, within the migratory flyway for whooping cranes. Although extremely unlikely, whooping cranes, disoriented by weather or other factors, could fly within the project area and be exposed to project-related construction equipment. Considering the design of the project, the construction best management practices for the project and the extremely unlikely chance that a whooping crane would be exposed to construction equipment, the likelihood of effects from the project are insignificant and discountable. Accordingly, for purposes of Section 7 of the ESA, EPA's action in issuing a PSD permit to INVISTA for the West Powerhouse project at its Victoria, Texas facility may affect, but is not likely to adversely affect, the Federally listed endangered whooping crane.

Effects Determination for All Other Species

Regional Federally listed threatened and endangered species, other than the whooping crane, were evaluated in the preparation of this BA. No other Federally listed threatened or endangered species, suitable habitat, or their designated critical habitat are located within the AA of the project, or within the vicinity of the AA. Accordingly, for purposes of Section 7 of the ESA, EPA's action in issuing a PSD permit to INVISTA for the West Powerhouse project at its Victoria, Texas facility will have no effect on threatened or endangered species other than the whooping crane because no other Federally listed threatened or endangered species, suitable habitat, or their designated critical habitat are within the AA of the project.

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APPENDIX A
MODELING RESULTS

AIR QUALITY ANALYSIS
INVISTA S.A R.L. ▪ VICTORIA, TEXAS

WEST POWER HOUSE UNIT

IN SUPPORT OF GREENHOUSE GAS PERMITTING

Prepared by:

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August 2012

Trinity Consultants

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1. PROJECT IDENTIFICATION INFORMATION

INVISTA S.A R.L. (INVISTA) owns and operates a synthetic organic chemical manufacturing plant located in Victoria County, Texas (Victoria Plant). The West Power House (WPH) at the Victoria Plant is authorized under TCEQ Permit Number 812. In March 2012, INVISTA submitted a greenhouse gas (GHG) Prevention of Significant Deterioration permit application to the United States Environmental Protection Agency (U.S. EPA) to authorize the installation of technologies to reduce emissions of oxides of nitrogen (NO_x) from the WPH boilers as well as other modifications to the WPH boilers and fuel system piping.

This Air Quality Analysis was performed in support of the Biological Assessment associated with the GHG permitting effort to determine whether permitted allowable increases in emissions of carbon monoxide (CO), sulfur dioxide (SO_2), ammonia (NH_3) and nitrous oxide (N_2O), as documented in Tables A-4 through A-7 in Appendix A of this report, would result in impacts within or outside of the proposed action area or area of potential effect. The maximum modeled concentrations of the criteria pollutants (CO and SO_2) were compared to their corresponding Significant Impact Levels (SILs) and the maximum modeled concentrations of the non-criteria pollutants (NH_3 and N_2O) were compared to their corresponding Effects Screening Levels (ESLs).[1] As noted in Section 11 of this report, the results for the Air Quality Analysis for each of the pollutants are significantly below the corresponding thresholds.

The modeling methodologies used in the modeling analysis are consistent with current TCEQ and United States Environmental Protection Agency (U.S. EPA) guidelines. The results of the air dispersion analysis conducted are provided in this report and are prepared in accordance with the *Guideline on Air Quality Models (Revised)*, and the TCEQ *Air Quality Modeling Guidelines*.[2,3]

[1] "Effects Screening Levels are screening levels used in TCEQ's air permitting process to evaluate air dispersion modeling's predicted impacts. They are used to evaluate the potential for effects to occur as a result of exposure to concentrations of constituents in the air. ESLs are based on data concerning health effects, the potential for odors to be a nuisance, and effects on vegetation. If predicted airborne levels of a constituent **do not exceed** the screening level, adverse health or welfare effects are not expected. If predicted ambient levels of constituents in air exceed the screening levels, it does not necessarily indicate a problem but rather triggers a review in more depth." *Available at http://www.tceq.texas.gov/toxicology/esl (emphases in original)*.

[2] Code of Federal Regulations, Title 40–Protection of Environment, Part 51, Appendix W, November 9, 2005.

[3] TCEQ, *Air Quality Modeling Guidelines*, RG-25 (Revised), New Source Review Permits Division, Austin, TX, February 1999.

In performing the air quality analysis, a preliminary impacts determination, which considers emissions increases associated with the affected sources at the facility, was performed to determine whether the proposed emissions increases of carbon monoxide (CO), sulfur dioxide (SO_2), ammonia (NH_3), and nitrous oxide (N_2O) will impact the action area or area of potential effect. Table 2-1 provides a summary of the permitted allowable emissions increases of these pollutants by facility.

TABLE 2-1. SUMMARY OF INCREASES IN ALLOWABLE EMISSIONS

FIN	CO		SO_2		N_2O		NH_3	
	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
15BLR001, 15BLR002	29.90	32.49	0	1.47	46.28	68.28	4.60	19.03
15BLR003, 15BLR004	39.72	44.24	0	1.31	47.67	98.08	6.04	26.17
15FUG	0.21	0.94	0	0	0.54	2.37	0	0

The maximum modeled ground-level concentrations (GLC_{max}) for each criteria pollutant were compared to the corresponding SILs (provided in Table 2-2) and the above mentioned non-criteria pollutants were compared to their corresponding ESLs to determine whether the modeled ground-level concentrations at any receptor are above the corresponding threshold. Because the allowable hourly emissions for SO_2 are decreasing as a result of the project, only the annual SO_2 allowable increases were evaluated to determine potential impacts.

TABLE 2-2. SCOPE OF PROJECT REVIEW

Pollutant	Regulatory Thresholds[1] ($\mu g/m^3$)		
	1-hr	8-hr	Annual
CO	2,000	500	--
SO_2	--	--	1
NH_3	170	--	17
N_2O	4,500	--	450

[1] The regulatory thresholds represent the SIL values for the modeled criteria pollutants and represent the short-term and annual ESL values for the modeled non-criteria pollutants. [4]

The results of the Air Quality Analysis can be found in Section 11.

[4] The latest version of the TCEQ ESL list (3/22/12) was downloaded from http://www.tceq.texas.gov/toxicology/esl/list_main.html#esl_1.

A plot plan depicting the locations of the project affected sources considered in the modeling analysis is provided in Figure 3-1. Figure 3-2 depicts an enlarged portion of the plot plan to provide additional source location detail.

3.1 UTM COORDINATE SYSTEM

In all air quality dispersion modeling analysis input and output data files, the location of emission sources, structures, and receptors are represented in the Universal Transverse Mercator (UTM) coordinate system. The U.S. EPA and the TCEQ require that coordinates for permits and air quality dispersion modeling analysis be represented in the UTM system. The UTM grid was originally created by the Defense Mapping Agency of the United States as a special grid for military use throughout the world.[5] In this grid, the world is divided into 60 north-south zones, each covering a strip 6° wide in longitude. The Victoria Plant is located in UTM Zone 14. In each zone, coordinates are measured north and east in meters. The northing values are measured continuously from zero at the Equator, in a northerly direction. A central meridian through the middle of each 6° zone is assigned an easting value of 500,000 meters (m). Grid values to the east of this central meridian, as in the case of the Victoria Plant, are greater than 500,000. The center of the Victoria Plant is located near UTM coordinates 700,070 m East and 3,173,451 m North, based on the North American Datum (NAD) of 1927.

3.2 SOURCE LOCATIONS

All emission sources at the Victoria Plant included in the analysis are represented as point or volume sources. A detailed discussion of the emission calculations used for each of the emission sources is provided in Section 5 of this report. Documentation of the modeled source IDs, locations, and parameters for the sources included in the Air Quality Analysis is provided in Appendix A of this report.

[5] U.S. Department of the Interior and the U.S. Geological Survey Earth Science Information Center (ESIC), The Universal Transverse Mercator (UTM) Grid Fact sheet, May 1993.

Figure 3-1. Modeled Source Locations

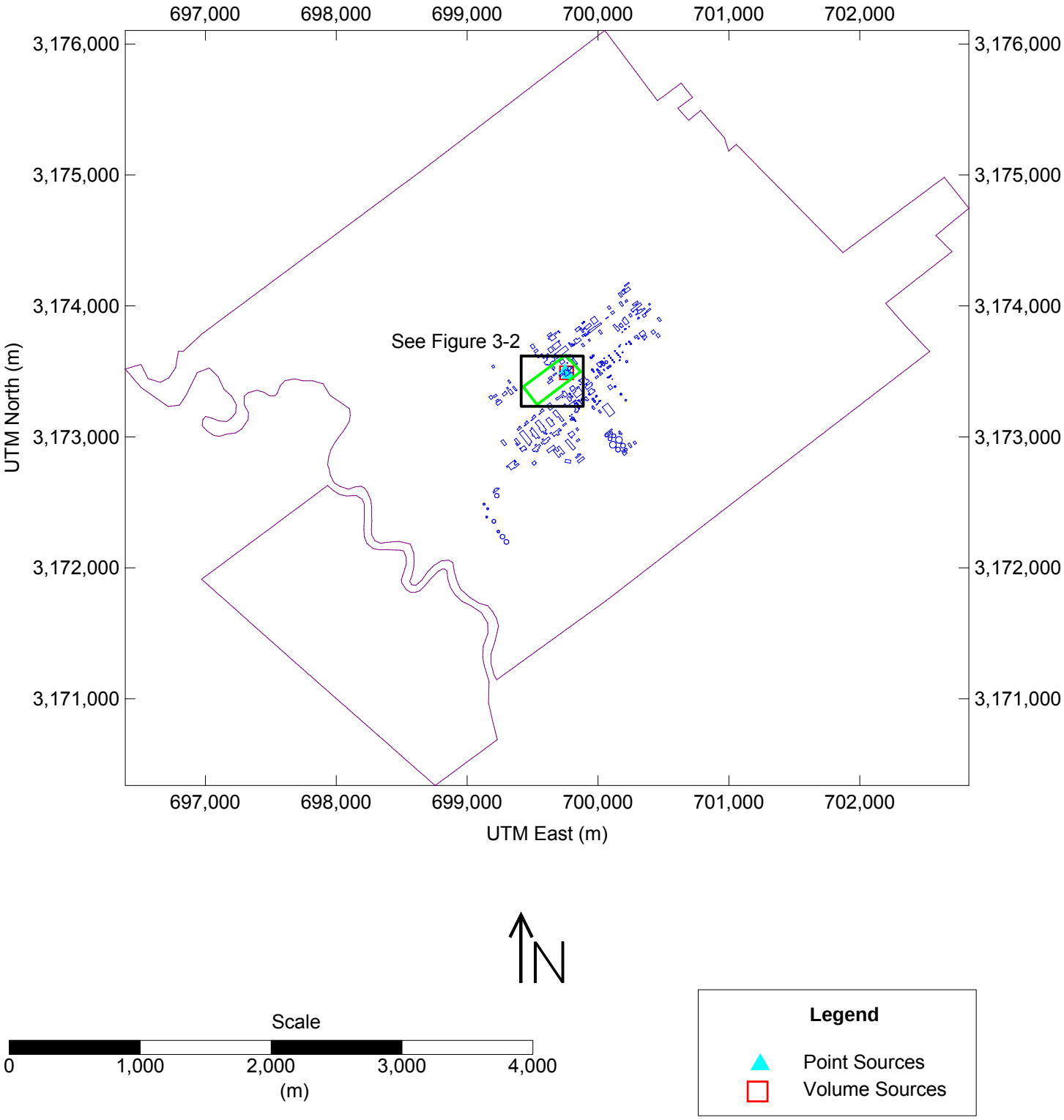
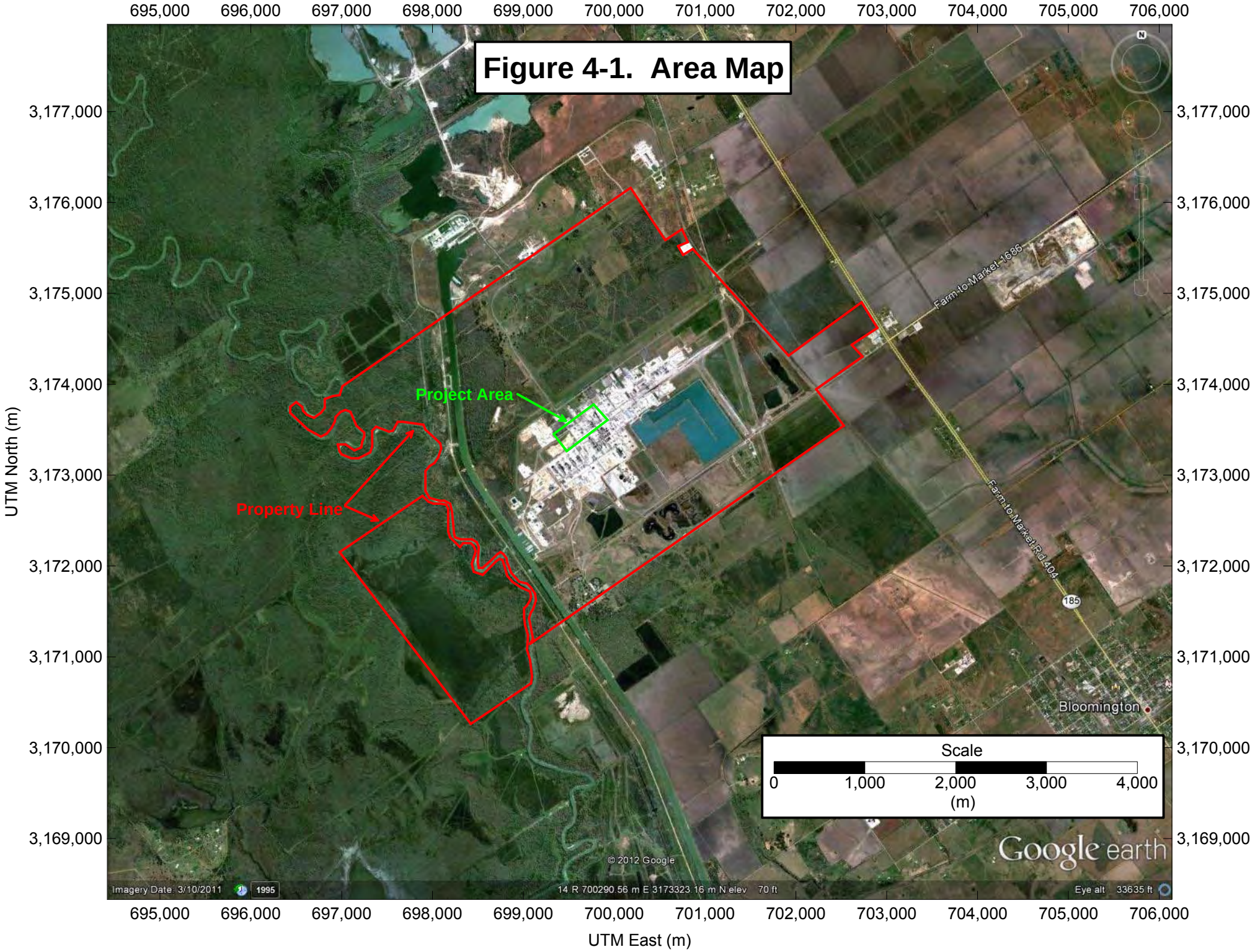


Figure 3-2. Detailed View of Modeled Source Locations

4. AREA MAP

An area map of the INVISTA property line overlaid on the most recent United States Geological Survey (USGS) 1:24,000 scale (7.5-minute series) topographical map is provided in Figure 4-1. The area map depicts the property line with respect to the surrounding topography and predominant geographic features (such as highways, roads, streams, railroads, etc). Additionally, the area map depicts the Project Area, which includes the WPH boiler operating area and associated construction area.

Figure 4-1. Area Map



Source parameters and locations for the sources included in the Air Quality Analysis are provided in Appendix A. The sources included in this analysis are classified as point or volume sources. The point sources utilize stack parameters as specified in Table A-1, located in Appendix A of this report, which is consistent with the stack parameters provided in the TCEQ permit application submitted in April 2012. The details for the volume sources considered in the analysis are provided below. The increases in allowable emission rates for each of the pollutants are provided in Table 2-1.

The fugitive emissions increases associated with this project occur due to potential leakages from process piping and equipment located in the west powerhouse building and are represented as a volume source. Table 5-1 provides the basis for the volume source dimensions.

TABLE 5-1. VOLUME SOURCE DIMENSION CRITERIA

Fugitive Source Location	Horizontal Dimension	Vertical Dimension
Process or piping fugitives (including MSS) inside a building	Building length and width	Building height

The volume source parameters are calculated as follows:

- Effective vertical dimension of the volume source (D):

  $D = H_{max} - H_{min}$

- Release height of the volume sources ($H_{release}$):

  $$H_{release} = \left(H_{min} + \frac{D}{2} \right)$$

- Initial horizontal dimension of the volume sources (σ_{yo}):

  - If the volume source is part of a series of volume sources in a pipeline, vent header or a building,

    $$\sigma_{yo} = \frac{W}{2.15}$$

- If the volume source is a standalone source,

$$\sigma_{yo} = \frac{W}{4.3}$$

- Initial vertical dimension of the volume sources (σ_{zo}):

  - If the volume source is elevated,

$$\sigma_{zo} = \frac{D}{4.3}$$

  - If the volume source is on or adjacent to a building or at ground level,

$$\sigma_{zo} = \frac{D}{2.15}$$

where,

H_{min} = Minimum height of the volume source,
H_{max} = Maximum height of the volume source,
D = Effective vertical dimension of the volume source,
W = Width of the volume source,
$H_{release}$ = Release height of the volume source,
σ_{yo} = Initial horizontal dimension of the volume source, and
σ_{Zo} = Initial vertical dimension of the volume source.

Detailed calculations of the volume source parameters are provided in Table A-3, which is provided in Appendix A of this document.

6. SELECTION OF MODEL OPTIONS

The latest version of the AERMOD air dispersion model (version 12060) was used to estimate maximum ground-level concentrations of the pollutants considered in the analysis.

In this analysis, modeling was performed using the regulatory default options, which include stack heights adjusted for stack-tip downwash, buoyancy-induced dispersion, and final plume rise. Ground-level concentrations occurring during "calm" wind conditions are calculated by the model using the calm processing feature. Regulatory default values for wind profile exponents and vertical potential temperature gradients are used since no representative on-site meteorological data are available. As per U.S. EPA requirements, direction-specific building dimensions are used in the downwash algorithms. Table 6-1 summarizes the AERMOD model options employed in this air quality dispersion modeling analysis.

TABLE 6-1. SUMMARY OF AERMOD MODEL OPTIONS

```
*** AERMOD - VERSION  12060 ***
***  INVISTA S.a r.l. - Victoria Plant West Power Plant; AERMOD***        07/23/12
***  SSB88A.ami SO2, Annual, 4/2012, All Grids                 ***        17:40:46

PAGE   1
 **MODELOPTs:  RegDFAULT CONC                                              ELEV


***     MODEL SETUP OPTIONS SUMMARY       ***
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 **Model Is Setup For Calculation of Average CONCentration Values.

   --  DEPOSITION LOGIC  --
 **NO GAS DEPOSITION Data Provided.
 **NO PARTICLE DEPOSITION Data Provided.
 **Model Uses NO DRY DEPLETION.  DRYDPLT  =  F
 **Model Uses NO WET DEPLETION.  WETDPLT  =  F

 **Model Uses RURAL Dispersion Only.

 **Model Uses Regulatory DEFAULT Options:
        1. Stack-tip Downwash.
        2. Model Accounts for ELEVated Terrain Effects.
        3. Use Calms Processing Routine.
        4. Use Missing Data Processing Routine.
        5. No Exponential Decay.

 **Model Assumes No FLAGPOLE Receptor Heights.

 **Model Calculates PERIOD Averages Only

 **Model Set To Continue RUNning After the Setup Testing.

 **Output Options Selected:
         Model Outputs Tables of PERIOD Averages by Receptor
         Model Outputs External File(s) of High Values for Plotting (PLOTFILE
Keyword)
         Model Outputs Separate Summary File of High Ranked Values (SUMMFILE
Keyword)

 **NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                 m for Missing Hours
                                                                 b for Both Calm and
Missing Hours

 **Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =    36.00 ;  Decay
Coef. =    0.000     ;  Rot. Angle =     0.0
Emission Units = GRAMS/SEC                                    ;
Emission Rate Unit Factor =   0.10000E+07
Output Units   = MICROGRAMS/M**3
```

The Victoria Plant is located south of Victoria, Texas just west of Highway 185 in Victoria County. The terrain surrounding the Victoria Plant varies in elevation from 0 feet (0 meters) to 108 feet (33 meters) within 10 km of the Plant.[6] The average elevation at the Victoria Plant is approximately 69 feet (21 meters) above mean sea level.

AERMOD uses advanced terrain characterization to account for the effects of terrain features on plume dispersion and travel. AERMOD's terrain pre-processor, AERMAP, imports digital terrain data and computes a height scale for each receptor from Digital Elevation Model (DEM) data files. A height scale is assigned to each individual receptor and is used by AERMOD to determine whether the plume will go over or around a hill.

The receptor terrain elevations input into AERMAP are the highest elevations extracted from United States Geological Survey (USGS) 1:24,000 scale (7.5-minute series) DEM data for the area surrounding the facility. For each receptor, the maximum possible elevation within a box centered on the receptor of concern and extending halfway to each adjacent receptor was chosen. This is a conservative technique for estimating terrain elevations in that it ensures that the highest terrain elevations are accounted for in the analysis. Source and building elevations are extracted in the same manner, using interpolated elevation values.

[6] Based on USGS Digital Elevation Model (DEM) data used in the analysis.

8.1 BUILDING DOWNWASH DETERMINATION

The emission sources are evaluated in terms of their proximity to nearby structures. The purpose of this evaluation is to determine if stack discharges might become caught in the turbulent wakes of these structures. Wind blowing around a building creates zones of turbulence that are greater than if the building was absent.

Direction-specific building dimensions and the dominant downwash structure parameters used as inputs to the dispersion models are determined using the *BREEZE-WAKE/BPIP* software, developed by Trinity Consultants, Inc. This software incorporates the algorithms of the U.S. EPA-sanctioned Building Profile Input Program with PRIME enhancement (BPIP-PRIME), version 04274. BPIP-PRIME is designed to incorporate the concepts and procedures expressed in the GEP Technical Support document, the Building Downwash Guidance document, and other related documents.

The output from the BPIP-PRIME downwash analysis lists the names and dimensions of the structures, and the emission unit locations and heights. In addition, the output contains a summary of the dominant structure for each emission unit (considering all wind directions) and the actual building height and projected widths for all wind directions. This information is then incorporated into the data files for the AERMOD model.

8.2 BUILDING PARAMETERS

A table which details each structure that is considered in the downwash analysis and its corresponding height is provided in Appendix C. Figure 8-1 is a plot plan depicting the location of the buildings located at the Victoria Plant. Figure 8-2 depicts an enlarged portion of the plot plan showing detailed locations of buildings not captured in Figure 8-1.

Figure 8-1. Location of Nearby Downwash Structures Considered in the Analysis

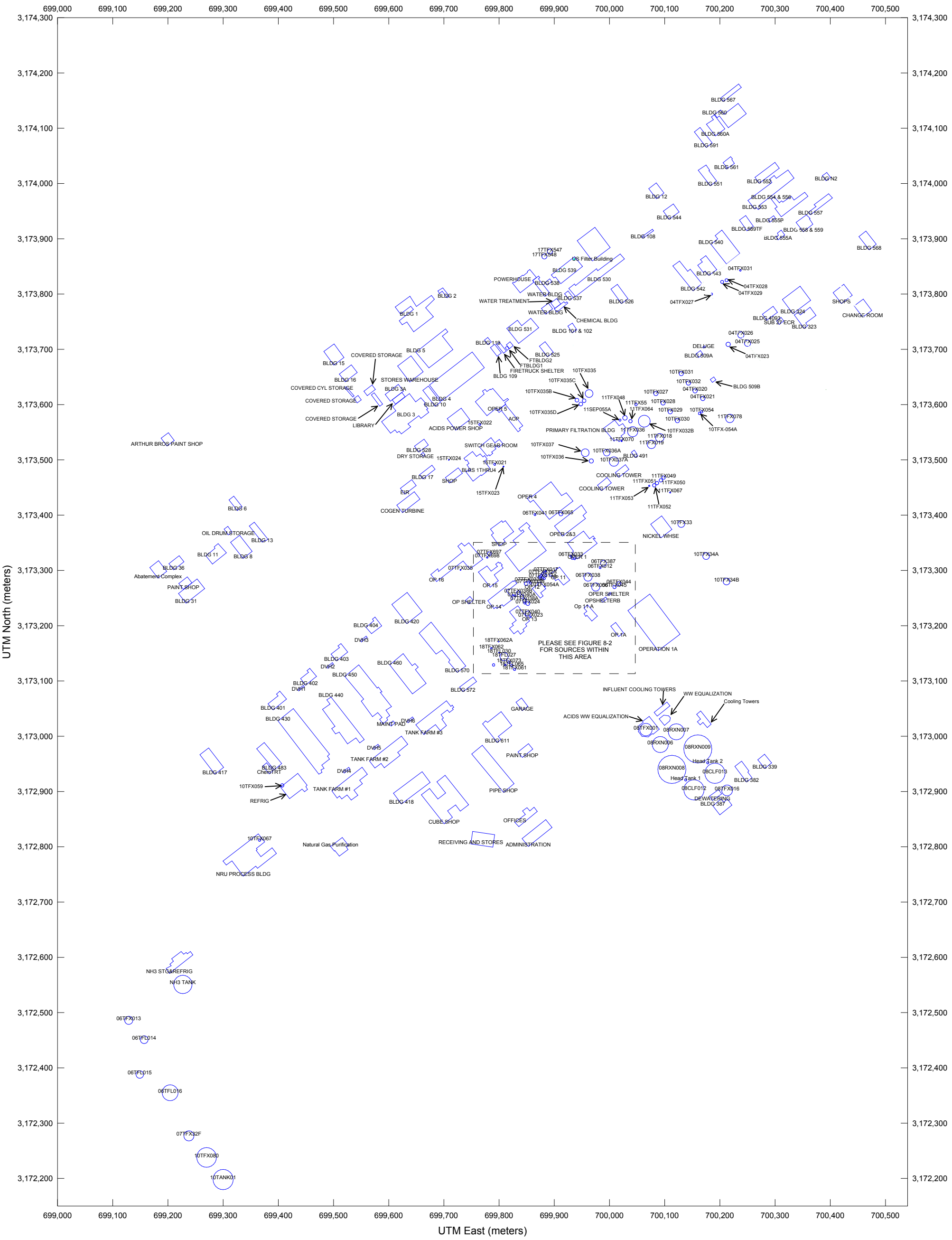
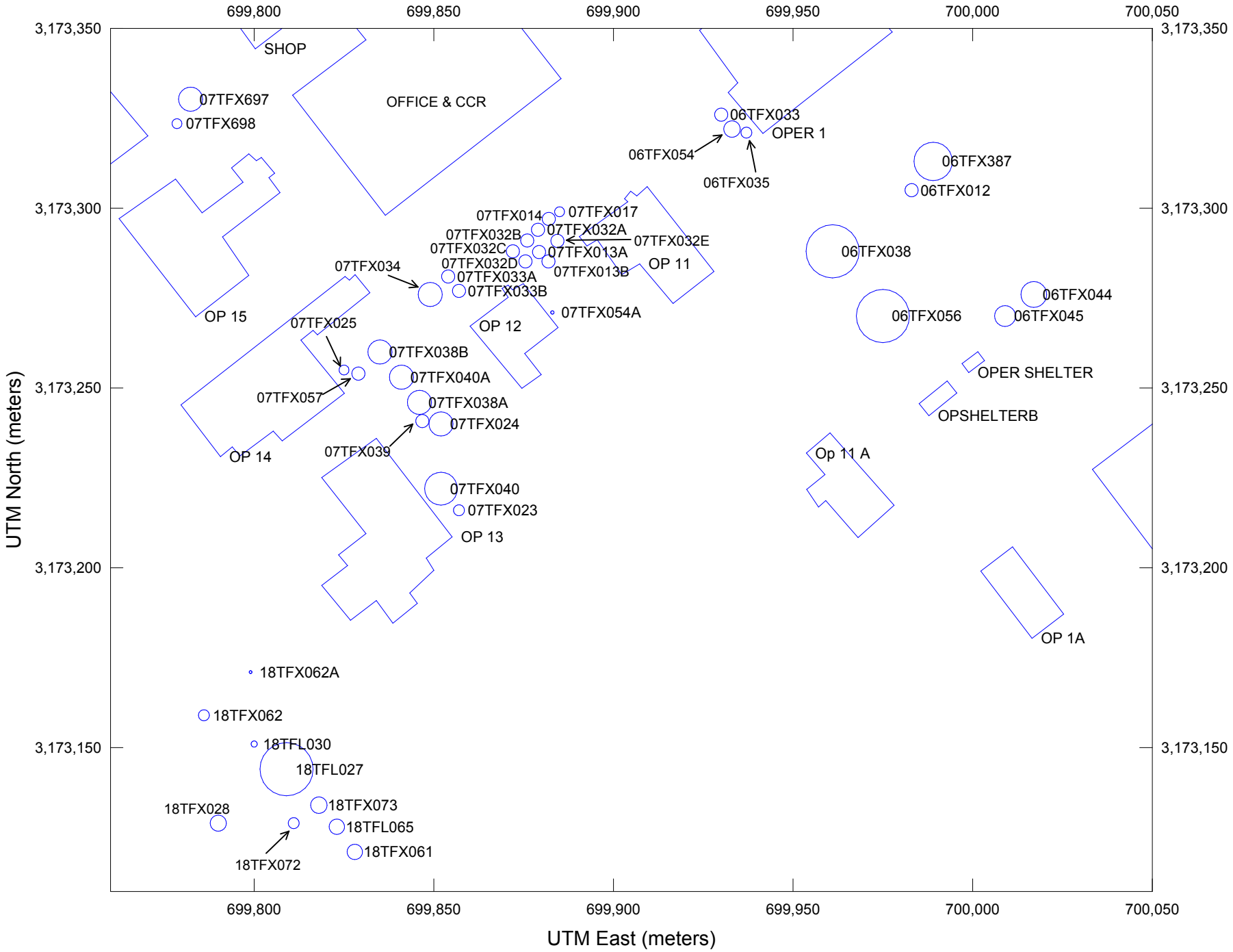


Figure 8-2. Location of Nearby Downwash Structures Considered in the Analysis - Detail



9. RECEPTOR GRIDS

For this Air Quality Analysis, the modeled ground-level concentrations are determined within four main Cartesian receptor grids. These four grids cover the INVISTA Victoria Plant property as well as a region extending at least 5 km beyond the Victoria Plant sources. The grids are defined as follows:

1. The "on-site grid" is a discrete receptor grid with the receptors spaced at 25 m intervals and located inside the INVISTA property line.

2. The "property line grid" is a discrete receptor grid with the receptors spaced at 25 m intervals along the INVISTA property line. Note that the property line grid also includes receptors spaced at 25 m along the roads within the INVISTA property that are accessible by the public.

3. The "fine grid" contains 100-m spaced receptors extending at least 1 km from the project sources, excluding the receptors within the on-site and property line grids.

4. The "medium grid" contains 500-m spaced receptors extending 5 km from the project sources, excluding the receptors within the on-site, property line, and fine grids.

5. The "river receptors" is a subset of the property line receptor grid with the receptors spaced at approximately 25 m intervals along the banks and within the river which flows through the INVISTA property. Included in the river receptors are two receptors associated with a historic bridge (Archeological Site 41VT113), which were analyzed separately.

Figures 9-1 through 9-3 illustrate the receptor locations and elevations for these four receptor grids.

Figure 9-1. Location and Elevations of the Property Line and Onsite Grids

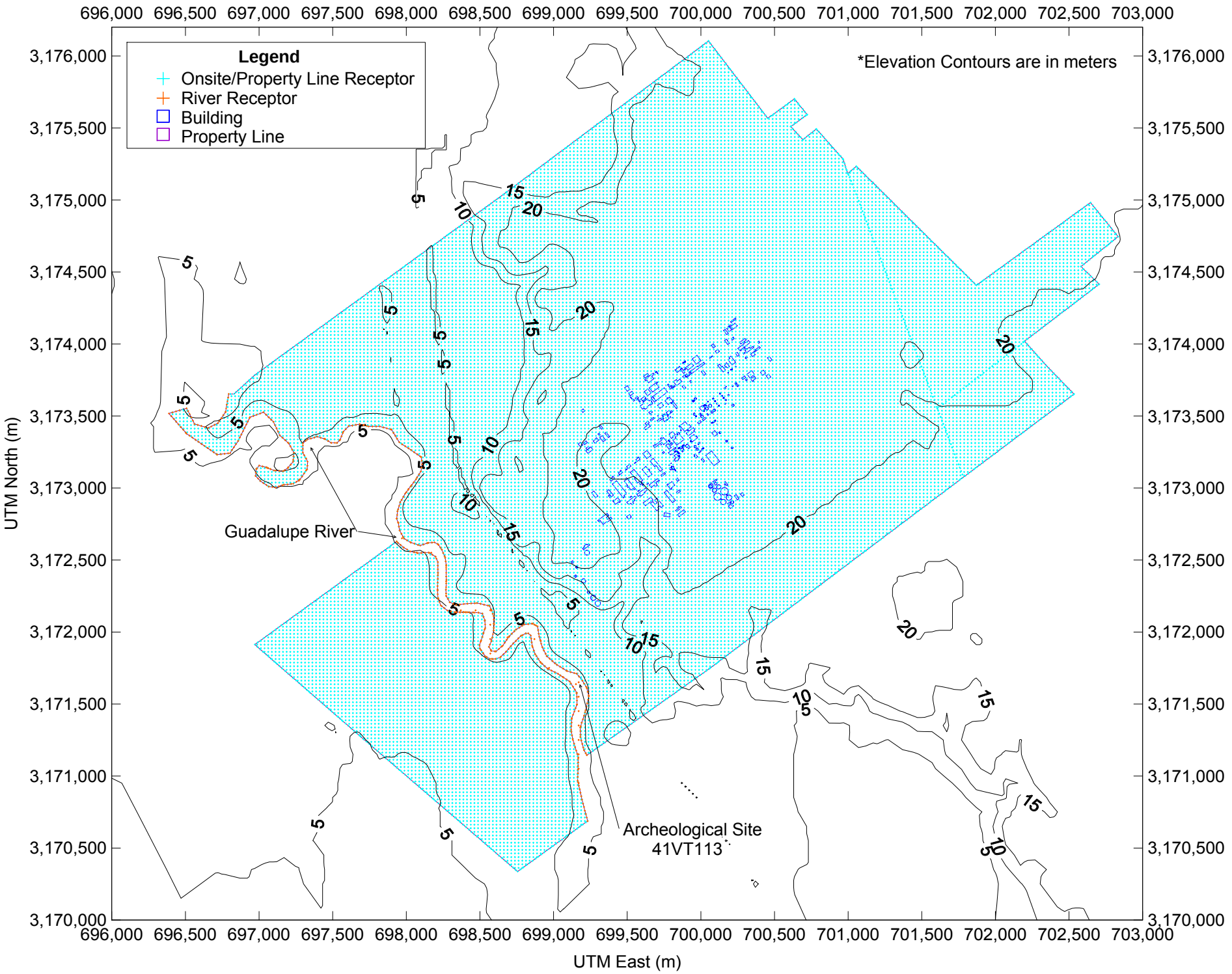


Figure 9-2. Location and Elevations of the Fine Grid Receptors

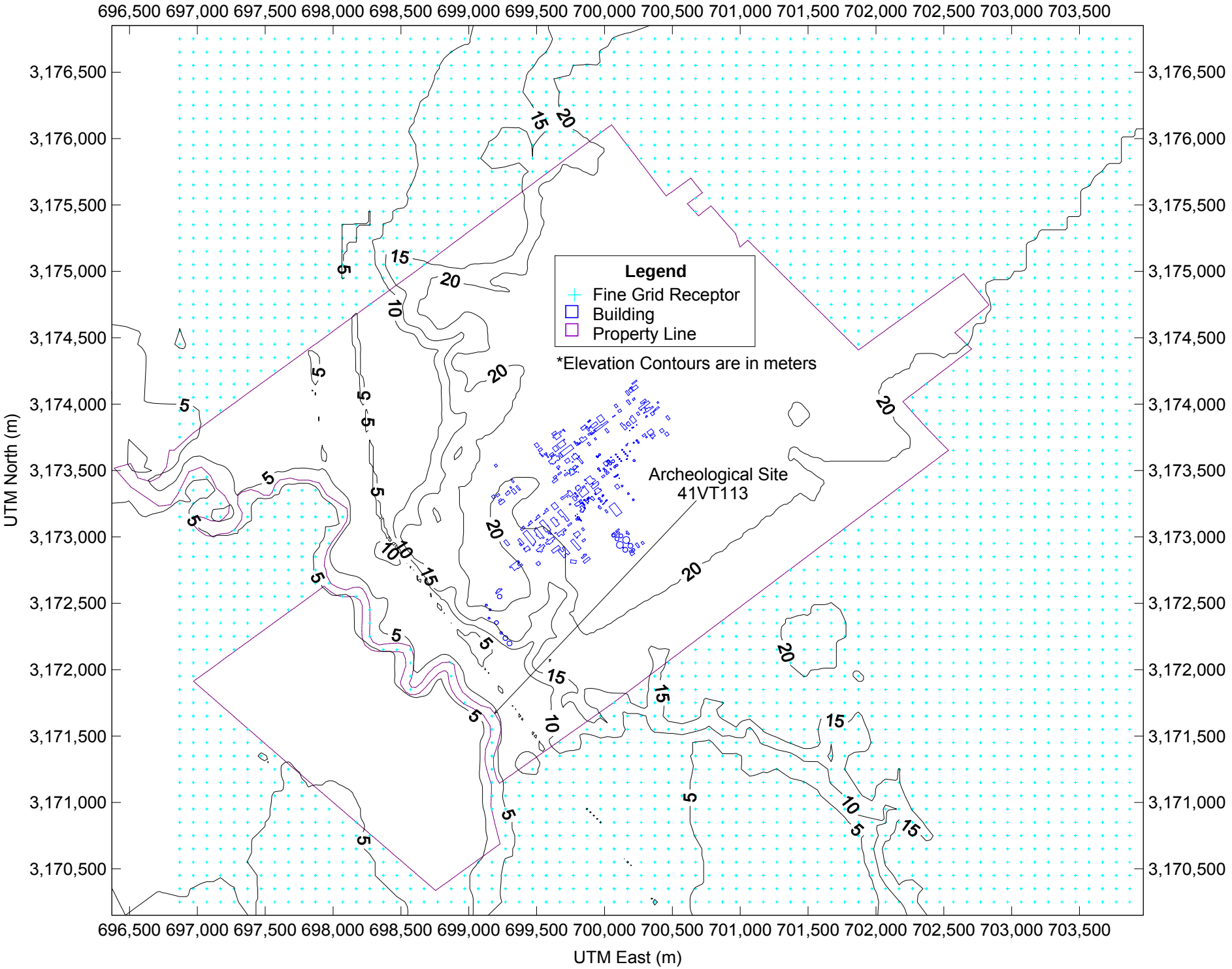
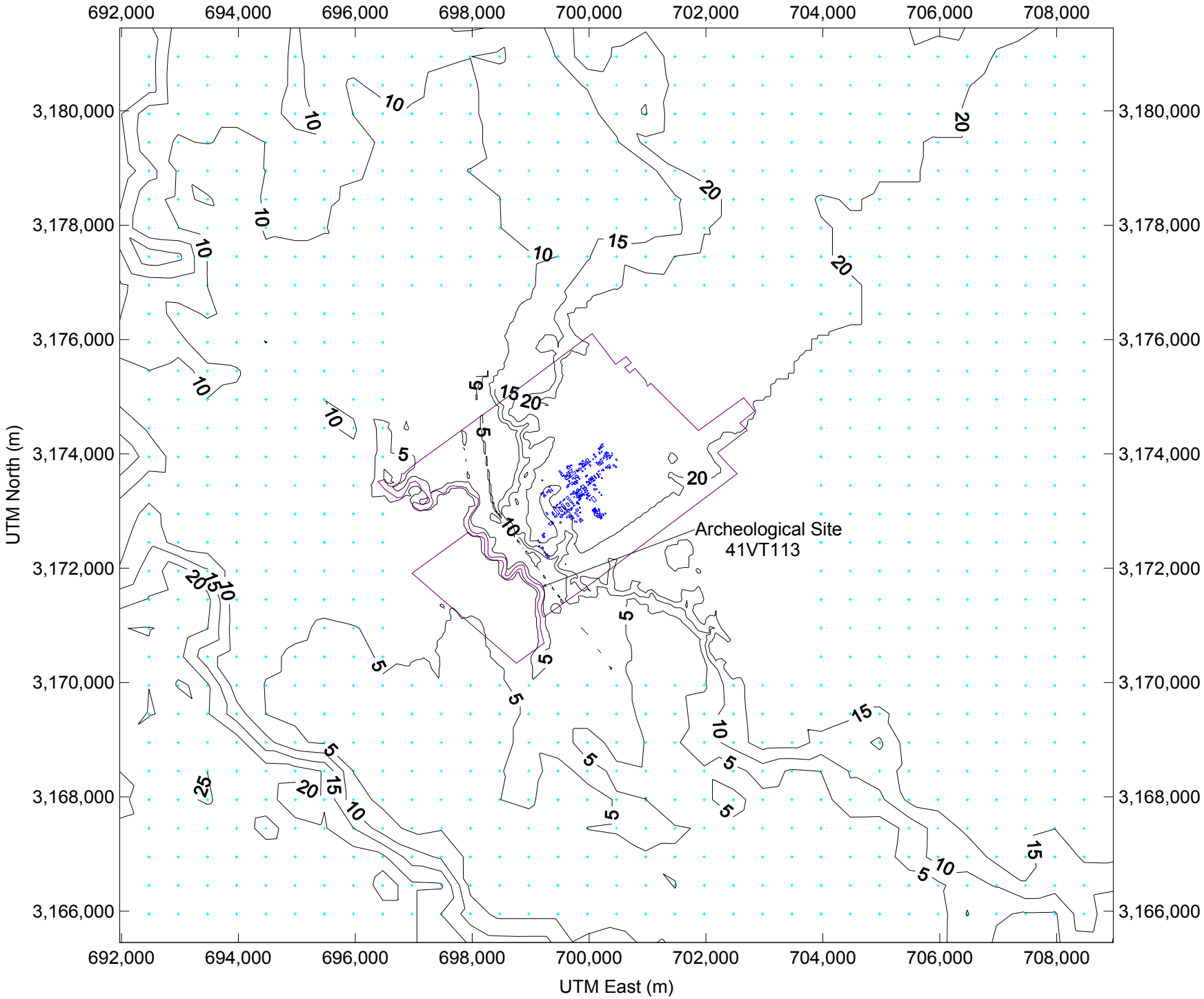


Figure 9-3. Location and Elevations of the Medium Grid Receptors



Legend Medium Grid Receptor | Building | Property Line

*Elevation Contours are in meters

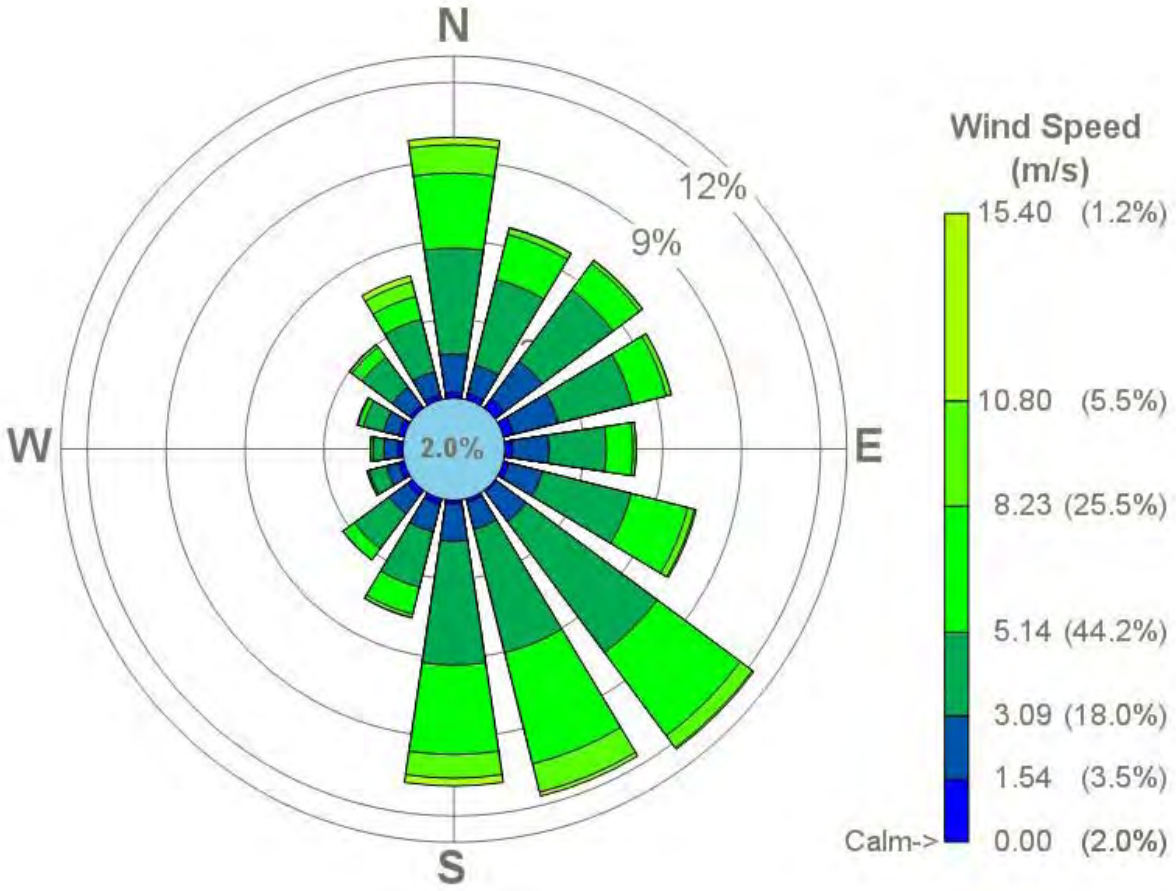
As recommended by the TCEQ for modeling in Victoria County, pre-processed meteorological data files for the year 1988 based on surface and upper air observations taken from Victoria, Texas (NWS station number 12912) were obtained from the TCEQ. The base elevation at the Victoria NWS station during the period of interest was 36 meters. The windrose for Victoria from 1988, provided as Figure 10-1, was used to supplement the meteorological data used in the modeling analysis.

According to the EPA AERMOD Users Guide, a landuse analysis must be conducted to properly define surface characteristics, such as albedo, Bowen ratio, and surface roughness length, for input into the AERMET meteorological pre-processor. The AERMOD Users Guide provides surface characteristic parameters based on seasons and the following landuse characteristics: water (fresh and sea), deciduous forest, coniferous forest, swamp, cultivated land, grassland, urban, and desert shrub land.[7]

Pre-processed meteorological files obtained from the TCEQ allow the choice of varying roughness length (i.e., short, medium, and long) based on the land use surrounding the facility under evaluation. A review of surrounding land use using the U.S. EPA's AERSURFACE tool indicates that the area surrounding the Victoria Plant is predominantly cultivated land, grassland and deciduous forest. Therefore, the TCEQ meteorological file containing medium surface roughness parameters was used in this analysis. The AERSURFACE output data is provided in Appendix C.

[7] Section 4.7.7 of the EPA's *AERMOD User Guide*, Draft Version, January 1999.

FIGURE 10-1. FREQUENCY OF WIND SPEED AND DIRECTION FOR METEOROLOGICAL YEAR 1988



This section summarizes the results of the Air Quality Analysis for the WPH allowable emissions increases at the Victoria Plant.

The proposed increases in allowable emissions from project sources were evaluated to determine if the resulting modeled concentrations exceed the SILs for the criteria pollutants and the ESL for the non-criteria pollutants.[8] The highest modeled concentration (H1H) for each pollutant and each averaging period is presented below. Table 11-1 provides the maximum modeled impacts of the criteria pollutants. Table 11-2 provides the maximum modeled impacts of the non-criteria pollutants.

TABLE 11-1. MAXIMUM MODELED IMPACTS OF THE CRITERIA POLLUTANTS

Pollutant	Averaging period	Type of Receptor	UTM East (m)	UTM North (m)	GLC_{max} Value ($\mu g/m^3$)	SIL ($\mu g/m^3$)	Percent of SIL
CO	1-hr	Offsite	700,835	3,172,346	6.55	2,000	2.50%
		Onsite	699,738	3,173,488	**49.95**		
		River	698,102	3,173,214	5.69		
		Bridge	699,152	3,171,638	4.80		
	8-hr	Offsite	699,238	3,171,561	4.13	500	4.43%
		Onsite	699,738	3,173,488	**22.17**		
		River	699,238	3,171,561	4.13		
		Bridge	699,152	3,171,638	3.65		
SO_2	Annual	Offsite	699,119	3,175,390	0.00281	1	0.80%
		Onsite	699,613	3,174,088	**0.00798**		
		River	699,221	3,171,620	0.00169		
		Bridge	699,470	3,171,151	0.00158		

[1] Concentrations in bold represent maximum predicted concentrations for each pollutant and averaging period.

[8] TCEQ, *Air Quality Modeling Guidelines*, RG-25 (Revised), New Source Review Permits Division, Austin, TX, February 1999.

TABLE 11-2. MAXIMUM MODELED IMPACTS OF THE NON-CRITERIA POLLUTANTS

Pollutant	Averaging period	Type of Receptor	UTM East (m)	UTM North (m)	GLC_{max} Value ($\mu g/m^3$)	ESL ($\mu g/m^3$)	Percent of ESL
NH_3	1-hr	Offsite	700,835	3,172,346	1.00	170	1.64%
		Onsite	699,488	3,173,788	**2.79**		
		River	698,102	3,173,214	0.87		
		Bridge	699,152	3,171,638	0.73		
	Annual	Offsite	699,079	3,175,359	0.04	17	0.76%
		Onsite	699,613	3,174,088	**0.13**		
		River	699,226	3,171,610	0.03		
		Bridge	699,238	3,171,388	0.03		
N_2O	1-hr	Offsite	700,835	3,172,346	8.89	4,500	2.88%
		Onsite	699,738	3,173,488	**129.72**		
		River	698,102	3,173,214	7.75		
		Bridge	699,152	3,171,638	6.53		
	Annual	Offsite	699,079	3,175,359	0.18	450	1.51%
		Onsite	699,738	3,173,513	**6.78**		
		River	699,226	3,171,610	0.11		
		Bridge	698,738	3,172,338	0.10		

[1] Concentrations in bold represent maximum predicted concentrations for each pollutant and averaging period.

As provided in the tables above, the maximum modeled concentrations of CO and SO_2 are significantly below their corresponding SILs and the maximum modeled concentrations of NH_3 and N_2O are significantly below their corresponding ESLs.

APPENDIX A: SOURCE PARAMETERS AND EMISSION RATES

Table A-1. Modeled Project Point Source Location and Parameters

Source ID	EPN	Description	UTM E	UTM N	Stack Height		Stack Temperature		Stack Exit Velocity		Stack Exit Diameter	
			(m)	(m)	(ft)	(m)	(F)	(K)	(ft/s)	(m/s)	(ft)	(m)
15STK05	15STK05	Boiler 1 & 2 Stack	699748	3173504	150.00	45.72	400	477.59	47.00	14.33	12.3	3.75
15STK06	15STK06	Boiler 3 & 4 Stack	699772	3173473	150.00	45.72	400	477.59	51.00	15.54	13.7	4.18

Table A-2. Modeled Project Volume Source Location and Parameters

Source ID	EPN	Description	UTM East	UTM North	Release Height		Initial Vertical Dimension		Initial Vertical Dimension	
			(m)	(m)	(ft)	(m)	(ft)	(m)	(ft)	(m)
15FUG	15FUG	APH Fugitives	699759	3173489	31.50	9.60	28.61	8.72	26.51	8.08

Table A-3. Detailed Volume Source Calculation

Parameter	Source ID
	15FUG
Building Height [ft]	60
Building Length (approx.) [ft]	123
Building Width (approx.) [ft]	123
Ratio (No. Vol Sources)	1
H_{min} [ft]	3
D [ft]	57
Release Height [m]	9.6
Sigma Y $[m]^2$	8.72
Sigma Z $[m]^3$	8.08

Table A-4. Maximum Modeled Short Term Criteria Pollutant Emission Increases

Type of Source	EPN	Model ID	CO	
			1- hour and 8- hour Averaging Period	
			(lb/hr)	(g/s)
Point	15STK05	15STK05	29.90	3.768
Point	15STK06	15STK06	39.72	5.004
Volume	15FUG	15FUG	0.21	0.02604

Table A-5. Maximum Modeled Annual Criteria Pollutant Emission Increases

Type of Source	EPN	Model ID	SO_2	
			Annual Averaging Period	
			(tpy)	(g/s)
Point	15STK05	15STK05	1.47	0.04216
Point	15STK06	15STK06	1.31	0.03769
Volume	15FUG	15FUG	0	0.00000

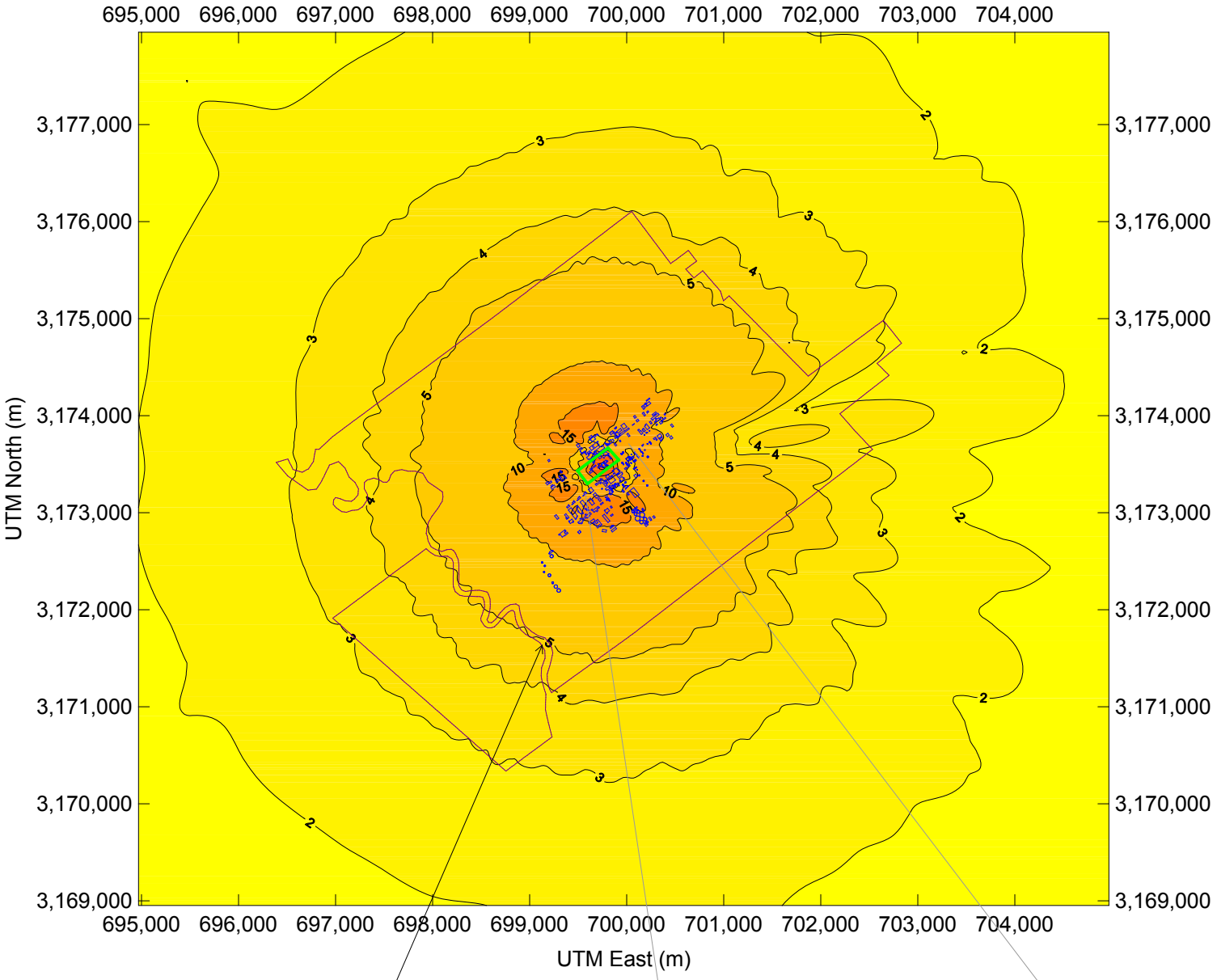
Table A-6. Maximum Modeled Short Term Non-Criteria Pollutant Emission Increases

Model ID	N_2O		NH_3	
	1- hour Averaging Period		1- hour Averaging Period	
	(lb/hr)	(g/s)	(lb/hr)	(g/s)
15STK05	46.28	5.831	4.60	0.5799
15STK06	47.67	6.006	6.04	0.7604
15FUG	0.54	0.06762	0.00	0.00

Table A-7. Maximum Modeled Annual Non-Criteria Pollutant Emission Increases

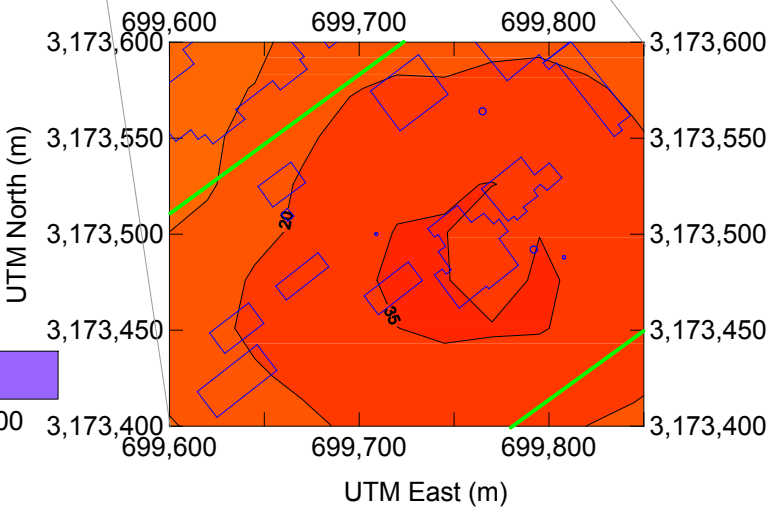
Model ID	N_2O		NH_3	
	Annual Averaging Period		Annual Averaging Period	
	(tpy)	(g/s)	(tpy)	(g/s)
15STK05	68.28	1.964	19.03	0.5473
15STK06	98.08	2.821	26.17	0.7528
15FUG	2.37	0.06809	0	0

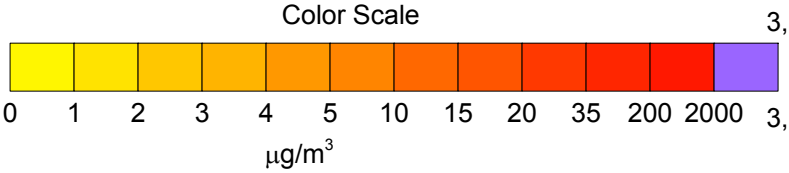
Carbon Monoxide 1-hr Concentration Plot



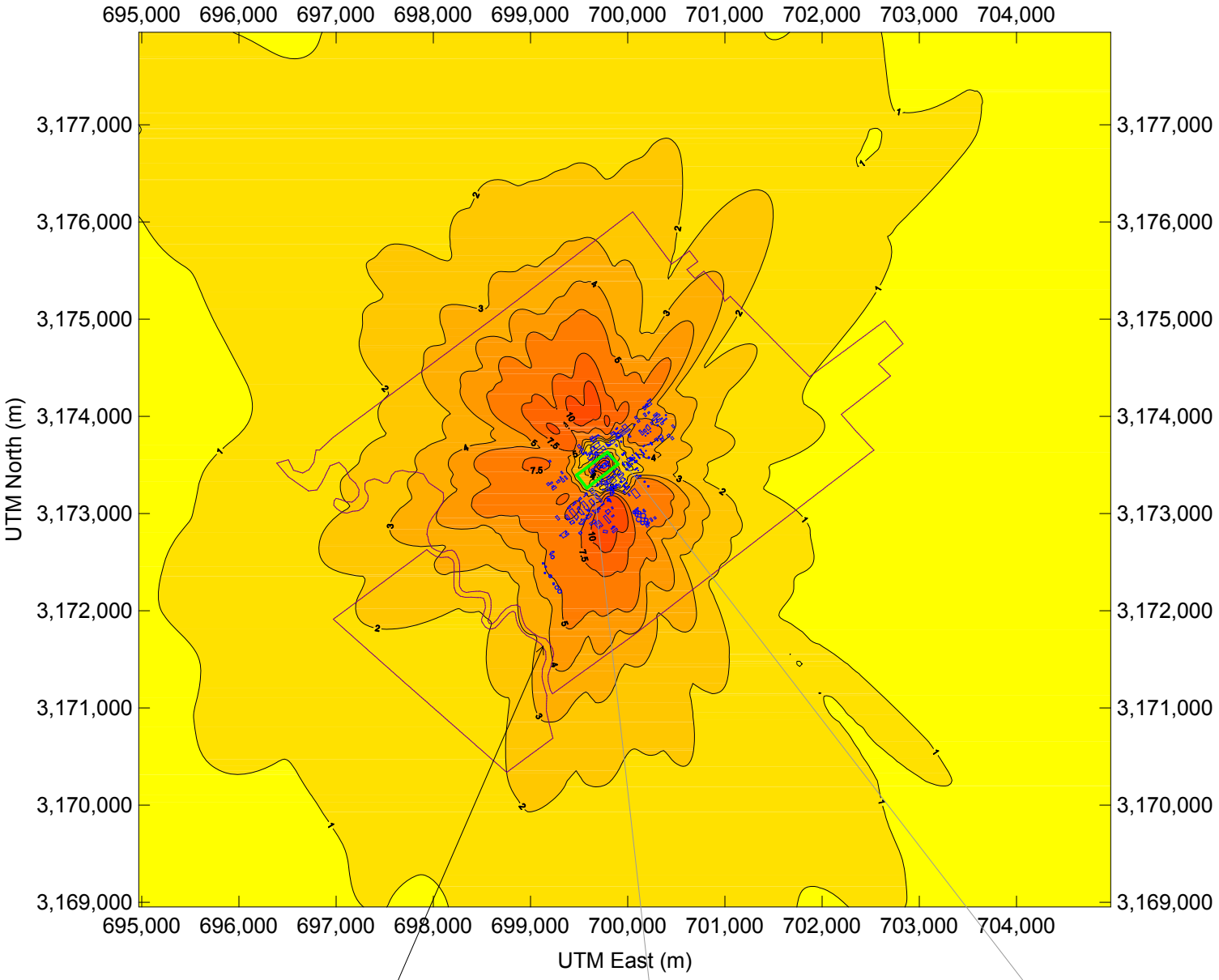
Concentration at Historic Landmark : 4.8 μg/m^3

Max Concentration : 49.95 μg/m^3
(SIL = 2,000 μg/m^3)



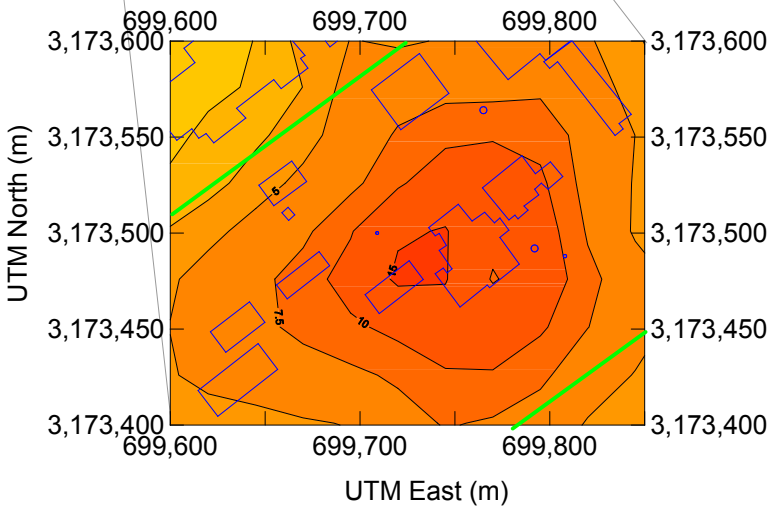


Carbon Monoxide 8-hr Concentration Plot

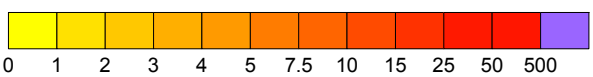


Concentration at Historic Landmark : 3.65 μg/m^3

Max Concentration : 22.17 μg/m^3
(SIL = 500 μg/m^3)

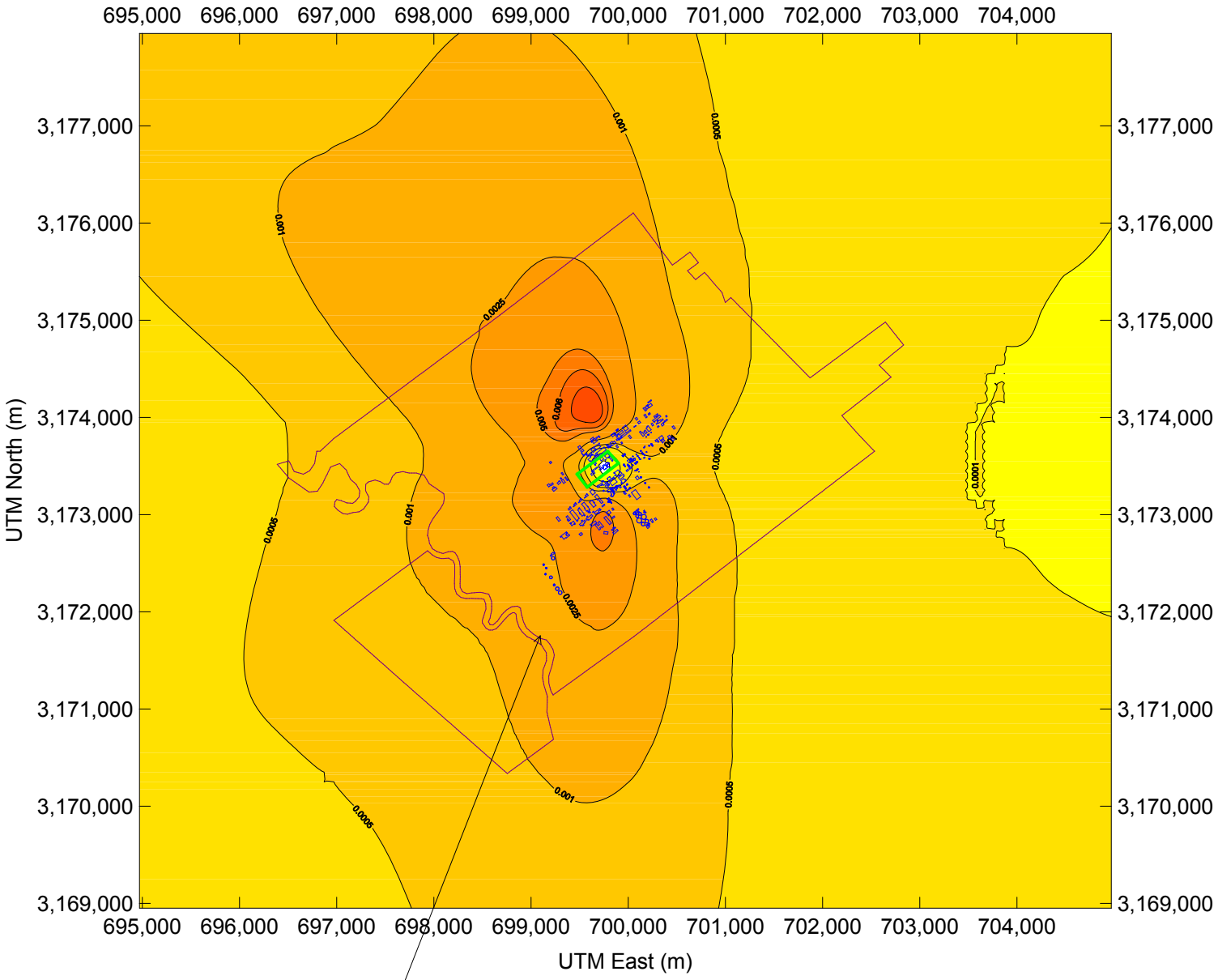


Color Scale



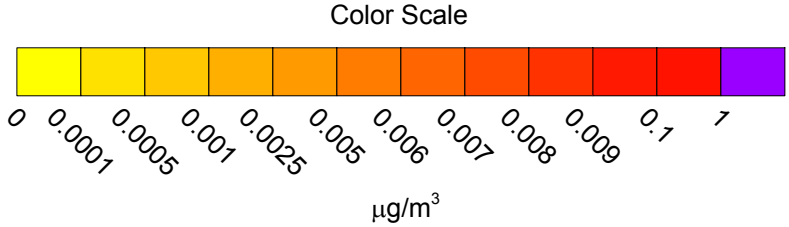
μg/m^3

Sulfur Dioxide Annual Concentration Plot

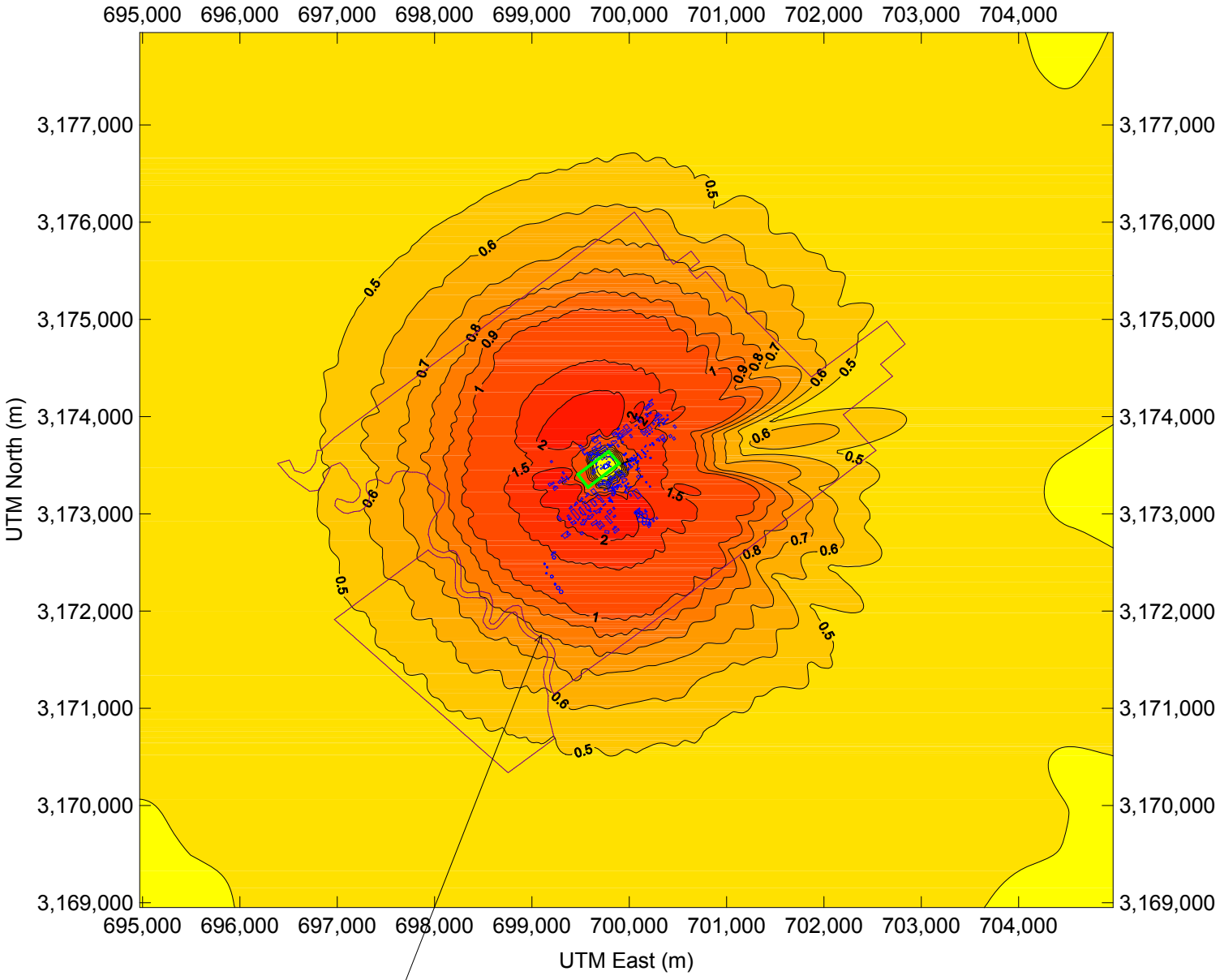


Concentration at Historic Landmark : 0.0016 μg/m^3

Max Concentration : 0.008 μg/m^3
(SIL = 1 μg/m^3)



Ammonia 1-Hour Concentration Plot



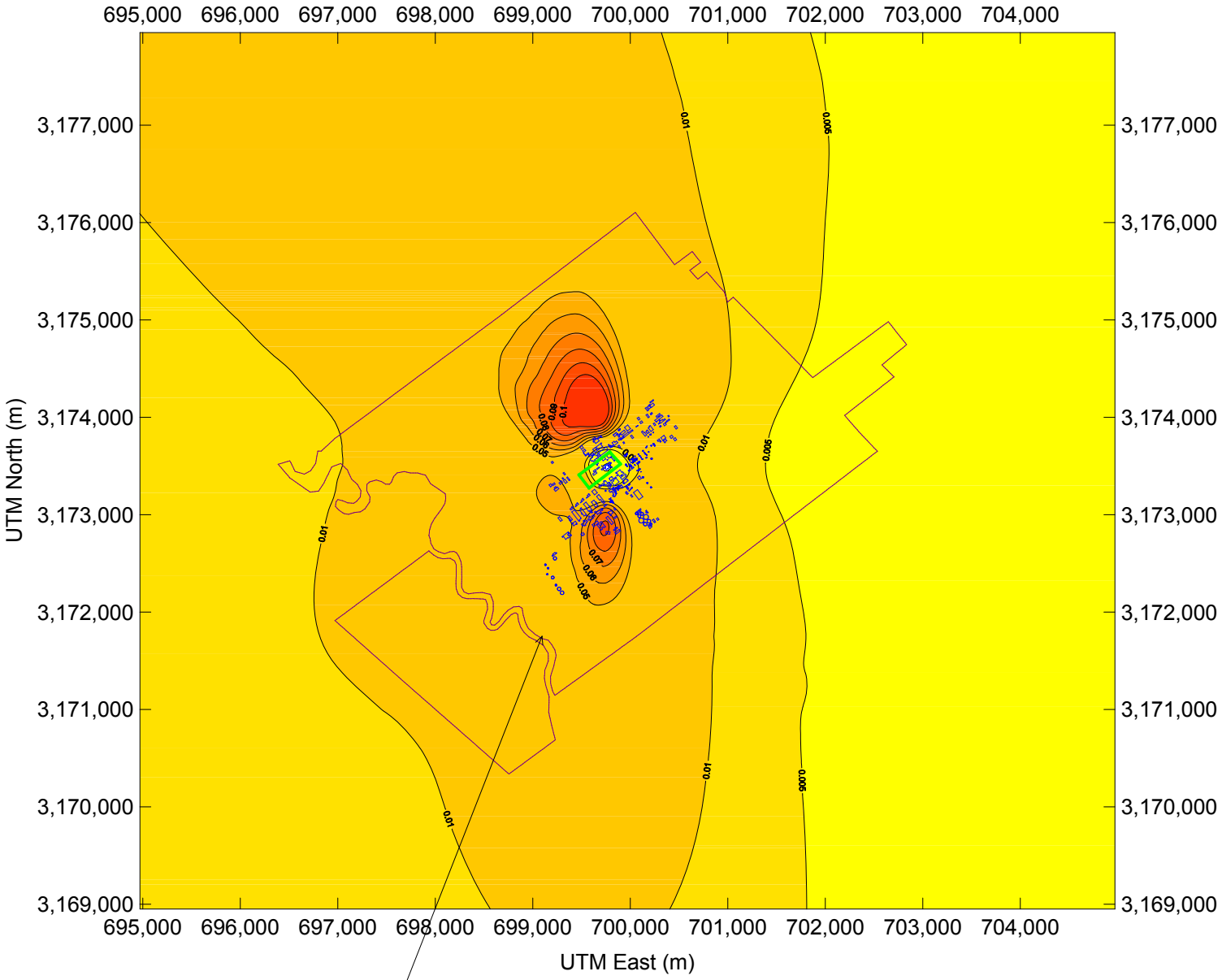
Concentration at Historic Landmark : 0.73 μg/m^3

Max Concentration : 2.79 μg/m^3
ESL = 170 μg/m^3

Color Scale

μg/m^3

Ammonia Annual Concentration Plot



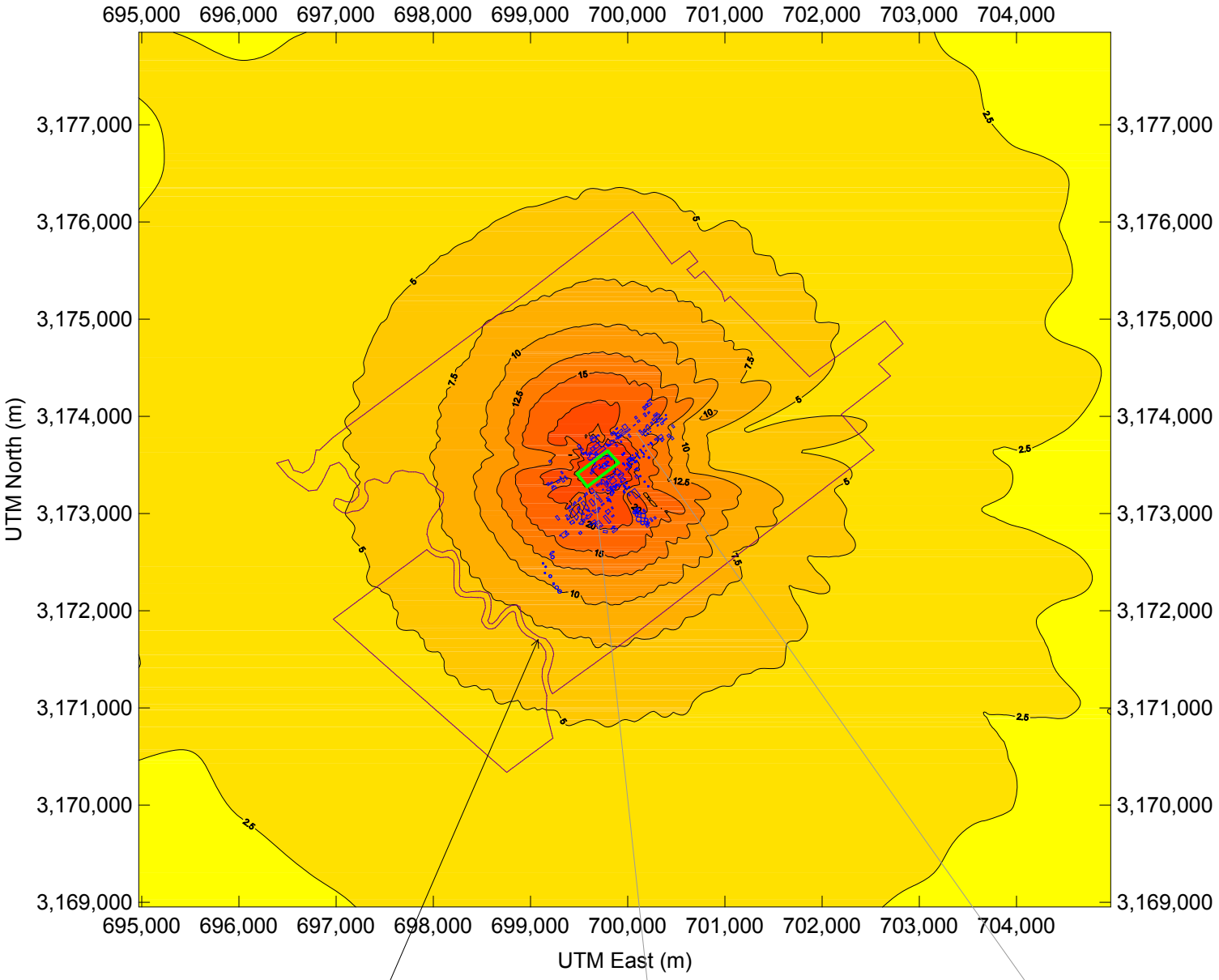
Concentration at Historic Landmark : 0.025 μg/m^3

Max Concentration : 0.13 μg/m^3
ESL = 17 μg/m^3

Color Scale

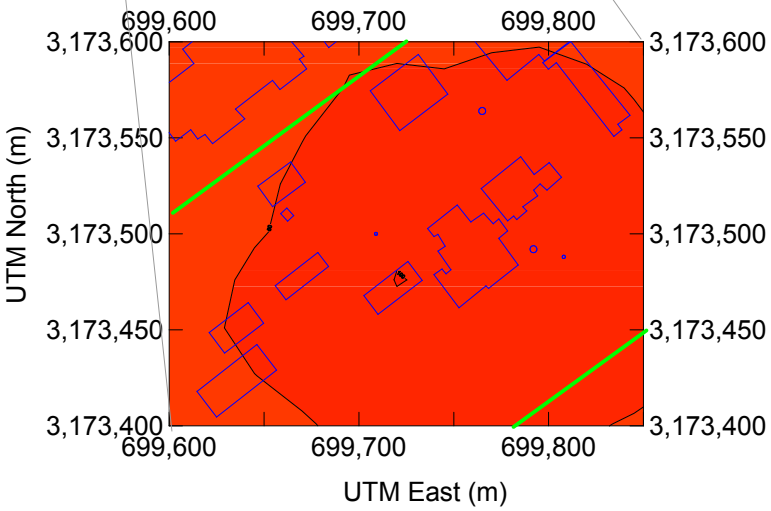
μg/m^3

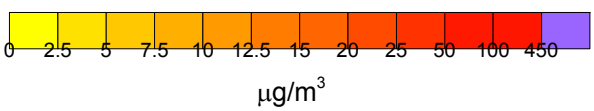
Nitrous Oxide 1-hr Concentration Plot



Concentration at Historic Landmark : 6.53 μg/m^3

Max Concentration : 129.72 μg/m^3
ESL = 4,500 μg/m^3





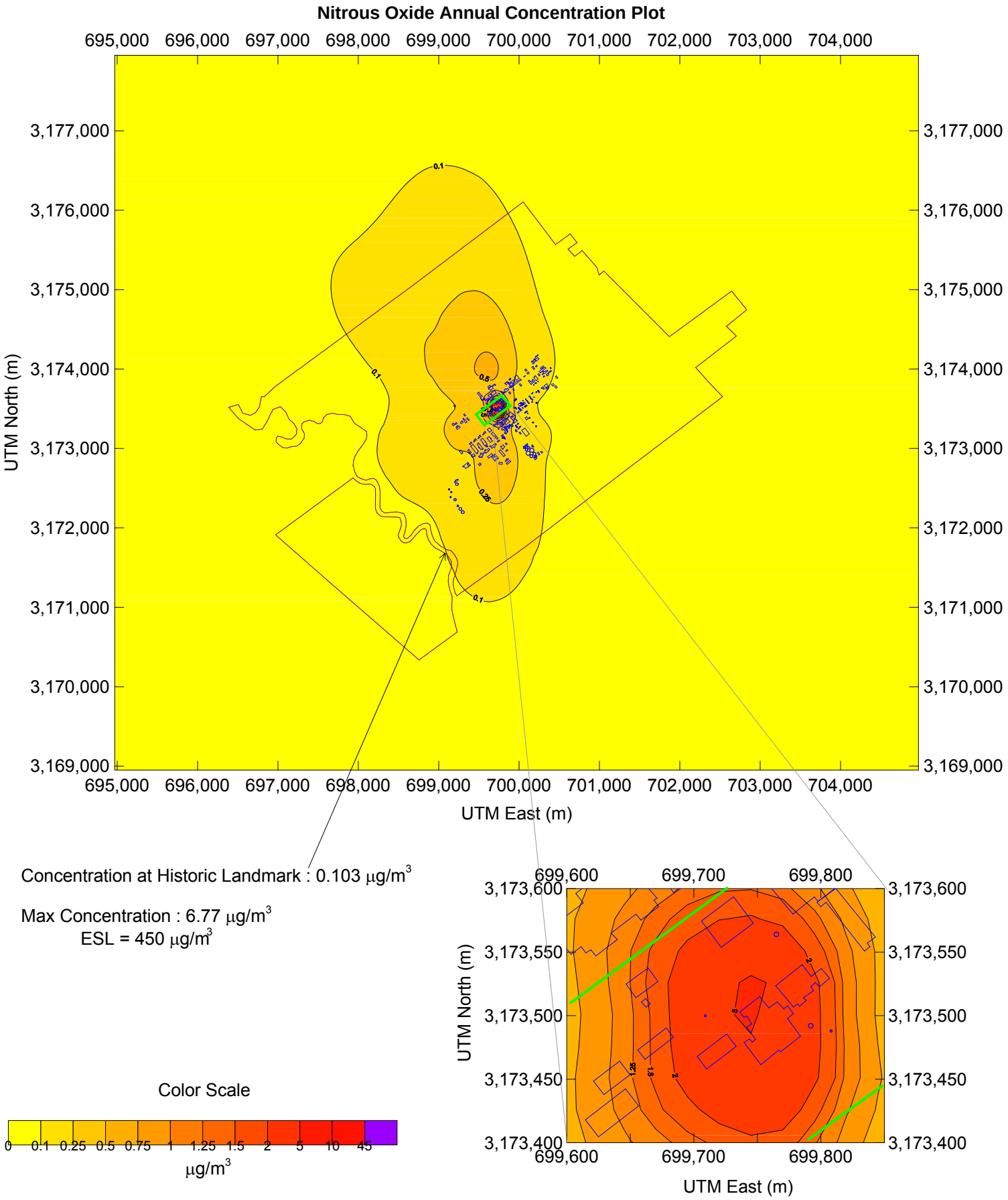

Nitrous Oxide Annual Concentration Plot
695,000
696,000
697,000
698,000
699,000
700,000
701,000
702,000
703,000
704,000
3,177,000
3,176,000
3,175,000
3,174,000
3,173,000
3,172,000
3,171,000
3,170,000
3,169,000
UTM North (m)
UTM East (m)
0.1
0.5
0.25
Concentration at Historic Landmark : 0.103 µg/m3
Max Concentration : 6.77 µg/m3
ESL = 450 µg/m3
699,600
699,700
699,800
3,173,600
3,173,550
3,173,500
3,173,450
3,173,400
2
5
1.25
1.5
2
Color Scale
0 0.1 0.25 0.5 0.75 1 1.25 1.5 2 5 10 45
µg/m3

TABLE C-1. DESCRIPTION AND HEIGHT OF BUILDINGS IN DOWNWASH ANALYSIS

Building ID	Description	Height (m)	Height (ft)
BLD1	04TFX020	7.01	23.00
BLD2	Natural Gas Purification	9.27	30.41
BLD3	BLDG 483	5.18	16.99
BLD4	BLDG 11	7.28	23.88
BLD5	ChemTRT	5.18	16.99
BLD6	04TFX021	7.01	23.00
BLD7	DVH1	11.77	38.62
BLD8	DVH2	5.18	16.99
BLD9	DVH3	5.09	16.70
BLD10	DVH4	5.52	18.11
BLD11	04TFX025	7.01	23.00
BLD12	DVH5	5.18	16.99
BLD13	04TFX026	7.01	23.00
BLD14	MAINT PAD	5.91	19.39
BLD15	04TFX027	7.01	23.00
BLD16	BLDG 1	4.27	14.01
BLD17	DVH6	4.57	14.99
BLD18	TANK FARM #3	12.5	41.01
BLD19	TANK FARM #2	12.31	40.39
BLD20	BLDG 531	5.43	17.81
BLD21	TANK FARM #1	15.36	50.39
BLD22	CUBE SHOP	9.6	31.50
BLD23	OP 15	14.02	46.00
BLD24	OP 14	20.97	68.80
BLD25	BLDG 530	4.39	14.40
BLD26	BLDG 539	16.37	53.71
BLD27	OPSHELTERB	5.03	16.50
BLD28	OPER SHELTER	5.79	19.00
BLD29	INFLUENT COOLING TOWERS	5.79	19.00
BLD30	04TFX028	7.01	23.00
BLD31	Abatement Complex	2.44	8.01
BLD32	BLDG 36	4.45	14.60
BLD33	BLDG 8	6.61	21.69
BLD34	04TFX029	7.01	23.00
BLD35	BLDG 6	5.88	19.29
BLD36	BLDG 15	5.09	16.70
BLD37	BLDG 16	5.18	16.99
BLD38	BLDG 10	5.18	16.99

TABLE C-2. DESCRIPTION AND HEIGHT OF BUILDINGS IN DOWNWASH ANALYSIS (CONTINUED)

Building ID	Description	Height (m)	Height (ft)
BLD39	BLDG 4	11.77	38.62
BLD40	BLDG 2	2.8	9.19
BLD41	WW EQUALIZATION	9.24	30.31
BLD42	BLDG 109	5.18	16.99
BLD43	BLDG 119	5.09	16.70
BLD44	BLDG 525	5.52	18.11
BLD45	BLDG 101 & 102	5.18	16.99
BLD46	BLDG 537	5.91	19.39
BLD47	BLDG 538	4.57	14.99
BLD48	BLDG 526	5.03	16.50
BLD49	ACIDS WW EQUALIZATION	15.03	49.31
BLD50	BLDG 12	5.79	19.00
BLD51	BLDG 544	5.79	19.00
BLD52	BLDG 551	6.71	22.01
BLD53	BLDG 561	19.81	64.99
BLD54	BLDG 591	5.49	18.01
BLD55	COOLING TOWERS	5.52	18.11
BLD56	BLDG 560A	7.62	25.00
BLD57	BLDG 560	5.49	18.01
BLD58	BLDG 567	4.27	14.01
BLD59	BLDG 420	5.12	16.80
BLD60	BLDG 570	4.21	13.81
BLD61	BLDG 404	7.38	24.21
BLD62	BLDG 460	22.86	75.00
BLD63	BLDG 403	7.38	24.21
BLD64	BLDG 450	19.66	64.50
BLD65	BLDG 402	7.28	23.88
BLD66	BLDG 440	32.77	107.51
BLD67	BLDG 401	7.28	23.88
BLD68	BLDG 430	38.28	125.59
BLD69	REGRIG	14.05	46.10
BLD70	BLDG 418	6.74	22.11
BLD71	COOLING TOWER	5.49	18.01
BLD72	COOLING TOWER	4.27	14.01
BLD73	PIPE SHOP	8.23	27.00
BLD74	OFFICES	3.57	11.71
BLD75	ADMINISTRATION	4.72	15.49
BLD76	RECEIVING AND STORES	6.4	21.00

TABLE C-3. DESCRIPTION AND HEIGHT OF BUILDINGS IN DOWNWASH ANALYSIS (CONTINUED)

Building ID	Description	Height (m)	Height (ft)
BLD77	PAINT SHOP	5.79	19.00
BLD78	BLDG 611	4.57	14.99
BLD79	BLDG 552	6.71	22.01
BLD80	BLDG 491	4.15	13.62
BLD81	SWITCH GEAR ROOM	5.43	17.81
BLD82	BLDG 324	7.04	23.10
BLD83	DRY STORAGE	5.12	16.80
BLD84	BLDG 323	7.53	24.70
BLD85	SHOPS	6.1	20.01
BLD86	CHANGE ROOM	4.57	14.99
BLD87	BLDG 568	5.49	18.01
BLD88	OPER 4	27.22	89.30
BLD89	OPER 2&3	25.36	83.20
BLD90	OPER 1	44.78	146.92
BLD91	BLDG 3A	6.74	22.11
BLD92	BLDG 3	4.45	14.60
BLD93	LIBRARY	8.23	27.00
BLD94	OFFICE & CCR	7.07	23.20
BLD95	COVERED STORAGE	4.72	15.49
BLD96	COVERED DRUM STORAGE	6.4	21.00
BLD97	COVERED STORAGE	5.79	19.00
BLD98	COVERED CYL STORAGE	6.71	22.01
BLD99	OP 16	27.61	90.58
BLD100	OP SHELTER	3.9	12.80
BLD101	BLDG 572	3.96	12.99
BLD102	08TFX001	12.43	40.78
BLD103	08RXN006	9.75	31.99
BLD104	BLDG 5	9.42	30.91
BLD105	08RXN008	9.75	31.99
BLD106	08CLF012	5.49	18.01
BLD107	08RXN007	9.75	31.99
BLD108	STORES WAREHOUSE	7.04	23.10
BLD109	08RXN009	9.75	31.99
BLD110	FIRETRUCK SHELTER	6.1	20.01
BLD111	08CLF013	5.49	18.01
BLD112	FTBLDG1	4.57	14.99
BLD113	08TFX016	8.53	27.99
BLD114	DEWATERING	7.19	23.59

TABLE C-4. DESCRIPTION AND HEIGHT OF BUILDINGS IN DOWNWASH ANALYSIS (CONTINUED)

Building ID	Description	Height (m)	Height (ft)
BLD115	BLDG 387	15.24	50.00
BLD116	BLDG 382	7.44	24.41
BLD117	BLDG 339	5.61	18.41
BLD118	BLDG 417	4.57	14.99
BLD119	NH3 TANK	33.53	110.01
BLD120	NH3 STG&REFRIG	10.67	35.01
BLD121	06TFX013	11.28	37.01
BLD122	06TFL014	11.28	37.01
BLD123	FTBLDG2	5.49	18.01
BLD124	06TFL015	11.28	37.01
BLD125	06TFL016	11.28	37.01
BLD126	10TFX080	14.63	48.00
BLD127	CHEMICAL BLDG	4.15	13.62
BLD128	10TANK01	8.78	28.81
BLD129	07TFX32F	8.78	28.81
BLD130	COGEN TURBINE	19.51	64.01
BLD131	EIR	6.49	21.29
BLD132	WATER TREATMENT	3.9	12.80
BLD133	SHOP	7.62	25.00
BLD134	BLDG 17	9.63	31.59
BLD135	BLRS 1THRU4	18.29	60.01
BLD136	OPER 5	22.4	73.49
BLD137	SHOP	7.62	25.00
BLD138	04TFX031	7.01	23.00
BLD139	WATER BLDG	3.96	12.99
BLD140	WATER BLDG	5.09	16.70
BLD141	OP 13	18.84	61.81
BLD142	OP 12	16.64	54.59
BLD143	OP 11	16.25	53.31
BLD144	OP 1A	4.79	15.72
BLD145	17TFX547	9.14	29.99
BLD146	OPERATION 1A	16.76	54.99
BLD147	06TFX012	6.1	20.01
BLD148	NICKEL WHSE	6.1	20.01
BLD149	POWERHOUSE	18.35	60.20
BLD150	PRIMARY FILTRATION BLDG	14.51	47.60
BLD151	BLDG 509B	10.06	33.01
BLD153	BLDG 509A	8.23	27.00

TABLE C-5. DESCRIPTION AND HEIGHT OF BUILDINGS IN DOWNWASH ANALYSIS (CONTINUED)

Building ID	Description	Height (m)	Height (ft)
BLD154	04TFX023	6.1	20.01
BLD155	BLDG 542	15.2	50.00
BLD156	BLDG 543	6.71	22.01
BLD157	DELUGE	5.61	18.41
BLD158	SUB 27 ECR	4.57	14.99
BLD159	ARTHUR BROS PAINT SHOP	4.57	14.99
BLD160	BLDG 4093	9.57	31.40
BLD161	GARAGE	6.1	20.01
BLD162	BLDG 528	15.88	52.10
BLD163	AOP	22.4	73.49
BLD164	ACIDS POWER SHOP	2.44	8.01
BLD165	BLDG 540	24.44	80.18
BLD166	BLDG 108	4.45	14.60
BLD167	BLDG 553	13.72	45.01
BLD168	BLDG 554 & 556	6.1	20.01
BLD169	BLDG N2	6.61	21.69
BLD170	BLDG 558 & 559	27.43	89.99
BLD171	BLDG 557	6.1	20.01
BLD172	BLDG 589TF	5.88	19.29
BLD173	BLDG 555A	5.49	18.01
BLD174	BLDG 555B	5.09	16.70
BLD175	BLDG 31	19.51	64.01
BLD176	PAINT SHOP	6.49	21.29
BLD177	OIL DRUM STORAGE	7.62	25.00
BLD178	BLDG 13	4.45	14.60
BLD179	NRU PROCESS BLDG	38.28	125.59
BLD180	06TFX033	6.1	20.01
BLD181	06TFX035	4.27	14.01
BLD182	06TFX038	11.28	37.01
BLD183	06TFX041	6.1	20.01
BLD184	06TFX044	9.75	31.99
BLD185	06TFX045	7.32	24.02
BLD186	06TFX054	6.1	20.01
BLD187	06TFX056	11.28	37.01
BLD188	06TFX065	6.1	20.01
BLD189	10TFX027	7.32	24.02
BLD190	10TFX028	7.32	24.02
BLD191	10TFX029	7.32	24.02

TABLE C-6. DESCRIPTION AND HEIGHT OF BUILDINGS IN DOWNWASH ANALYSIS (CONTINUED)

Building ID	Description	Height (m)	Height (ft)
BLD192	10TFX030	7.32	24.02
BLD193	10TFX031	6.1	20.01
BLD194	10TFX032	6.1	20.01
BLD195	10TFX035	6.1	20.01
BLD196	10TFX035B	9.14	29.99
BLD197	10TFX035C	9.14	29.99
BLD198	10TFX035D	9.14	29.99
BLD199	10TFX036	6.1	20.01
BLD200	10TFX036A	12.19	39.99
BLD201	10TFX037	6.1	20.01
BLD202	10TFX037A	17.07	56.00
BLD203	10TFX054	8.84	29.00
BLD204	10TFX059	7.62	25.00
BLD205	10TFX067	7.62	25.00
BLD206	10TFX33	10.98	36.02
BLD207	10TFX34A	10.98	36.02
BLD208	10TFX34B	10.98	36.02
BLD209	11TFX036	7.62	25.00
BLD210	11TFX019	9.76	32.02
BLD211	11TFX018	9.76	32.02
BLD212	11TFX078	9.97	32.71
BLD213	11TFX55	4.27	14.01
BLD214	11TFX064	2.74	8.99
BLD215	11TFX048	7.62	25.00
BLD216	11SEP055A	1.83	6.00
BLD217	11TFX070	1.22	4.00
BLD218	1TFX067	12.43	40.78
BLD219	11TFX053	9.75	31.99
BLD220	Head Tank 1	11.28	37.01
BLD221	11TFX052	9.75	31.99
BLD222	11TFX051	5.49	18.01
BLD223	11TFX050	9.75	31.99
BLD224	11TFX049	9.75	31.99
BLD225	15TFX021	5.49	18.01
BLD226	15TFX023	8.53	27.99
BLD227	Head Tank 2	11.28	37.01
BLD228	15TFX022	33.53	110.01
BLD229	15TFX024	11.28	37.01

TABLE C-7. DESCRIPTION AND HEIGHT OF BUILDINGS IN DOWNWASH ANALYSIS (CONTINUED)

Building ID	Description	Height (m)	Height (ft)
BLD230	18TFX028	11.28	37.01
BLD231	18TFX062	14.63	48.00
BLD232	18TFX062A	8.78	28.81
BLD233	18TFL030	8.78	28.81
BLD234	18TFL027	7.01	23.00
BLD235	18TFX072	7.01	23.00
BLD236	10TFX-054A	7.32	24.02
BLD237	18TFX073	7.01	23.00
BLD238	18TFL065	7.01	23.00
BLD239	18TFX061	7.01	23.00
BLD240	07TFX023	7.01	23.00
BLD241	07TFX040	7.01	23.00
BLD242	07TFX025	7.01	23.00
BLD243	07TFX057	6.1	20.01
BLD244	07TFX038B	6.1	20.01
BLD245	07TFX040A	4.27	14.01
BLD246	07TFX038A	11.28	37.01
BLD247	97TFX024	6.1	20.01
BLD248	07TFX034	9.75	31.99
BLD249	07TFX033A	7.32	24.02
BLD250	07TFX033B	6.1	20.01
BLD251	07TFX032C	11.28	37.01
BLD252	07TFX032D	6.1	20.01
BLD253	07TFX032B	7.32	24.02
BLD254	07TFX032A	7.32	24.02
BLD255	07TFX032E	7.32	24.02
BLD256	10TFX032B	6.1	20.01
BLD257	06TFX387	7.62	25.00
BLD258	07TFX039	5.79	19.00
BLD259	07TFX697	5.49	18.01
BLD260	07TFX013A	3.05	10.01
BLD261	07TFX013B	3.05	10.01
BLD262	07TFX014	2.74	8.99
BLD263	07TFX017	6.1	20.01
BLD264	07TFX698	6.1	20.01
BLD265	07TFX035	1.83	6.00
BLD266	07TFX054A	0.76	2.49
BLD267	Op 11 A	7.62	25.00
BLD268	17TFX548	9.14	29.99

```
** Generated by AERSURFACE, dated 08009
** Center UTM Easting (meters):    700070.0
** Center UTM Northing (meters):  3173451.0
** UTM Zone:  14    Datum: NAD27
** Study radius (km) for surface roughness:   1.0
** Airport? N, Continuous snow cover? N
** Surface moisture? Average, Arid region? N
** Month/Season assignments? Default
** Late autumn after frost and harvest, or winter with no snow: 12 1 2
** Winter with continuous snow on the ground: 0
** Transitional spring (partial green coverage, short annuals): 3 4 5
** Midsummer with lush vegetation: 6 7 8
** Autumn with unharvested cropland: 9 10 11
**
   FREQ_SECT  ANNUAL  1
   SECTOR   1    0  360
**                    Sect    Alb      Bo        Zo
   SITE_CHAR    1       1     0.16     0.41     0.148
```

APPENDIX B
PHOTOGRAPHS

PHOTOGRAPH NO. 1

Date: 06/21/2012

Direction: W

Description:

Forested area adjacent to the Guadalupe River, approximately 2,000 meters west of the WPH.

PHOTOGRAPH NO. 2

Date: 06/21/2012

Direction: S

Description:

Guadalupe River approximately 2,000 meters west of the WPH.

PHOTOGRAPH NO. 3

Date: 06/21/2012

Direction: S

Description:

Constructed ship canal west of the INVISTA facility, and east of the Guadalupe River.

PHOTOGRAPH NO. 4

Date: 06/21/2012

Direction: N

Description:

Maintained fields south of the INVISTA facility.

PHOTOGRAPH NO. 5

Date: 06/21/2012
Direction: S

Description:

Former agricultural fields south of the INVISTA facility.

PHOTOGRAPH NO. 6

Date: 06/21/2012
Direction: N

Description:

Maintained fields adjacent to the INVISTA facility.

PHOTOGRAPH NO. 7

Date: 06/21/2012

Direction:

Description:

View of West Powerhouse, existing tank slab, column footings, and paved roadway.

PHOTOGRAPH NO. 8

Date: 06/21/2012

Direction:

Description:

View of existing flare, cogeneration unit, column footings, and paved roadway

APPENDIX C
PROJECT BIOLOGIST BIOGRAPHIES

Qualifications Summary

- Eleven years of experience performing environmental consulting in the fields of biological and ecological sciences, environmental investigation, and planning.
- Experience in sustainability planning and implementation.
- Experience performing Natural Resource Damage Assessment.
- Experience performing wetlands evaluations.
- Experience performing vegetation analyses and surveys.
- Experience performing ecological risk assessments.
- Experience performing NEPA assessment and documentation.
- Experience performing Phase I ESAs.
- Experience with the closure of industrial properties under the Risk Reduction Rules and Texas Risk Reduction Program.

KATHLEEN G. MITTMANN

PROJECT MANAGER

Fields of Competence

Ecological risk assessment, natural resource damage assessment, wetlands delineation and restoration; Section 404 and Section 10 permitting; vegetation analysis; biological and ecological sciences; National Environmental Policy Act (NEPA) process and documentation; sustainability plan development and implementation; property assessments (including Phase I environmental site assessments [ESAs]); Texas Commission on Environmental Quality (TCEQ) (formerly TNRCC) environmental regulations; TCEQ Voluntary Cleanup Program (VCP); site closure; environmental investigation planning; environmental sampling; site investigations; remediation oversight; data management, interpretation, and reporting; remedial alternatives evaluation; and health and safety.

Credentials

M.S., Biology, Aquatic Ecology Emphasis—Southwest Texas State University (1998)
B.S., Biology—Santa Clara University (1994)
Natural Resource Management Training, NW Environmental Training Center (2009)
Section 404 Wetlands Permitting Training, American Society of Civil Engineers (2004)
NEPA Process Training, The Shipley Group/EPA (2001)
Wetland Delineation Training, Wetlands Training Institute (2000)
40-Hour HAZWOPER Training, Environmental Options (2000)
Wetland Plant Identification Training, The Whitenton Group, Inc. (2004)
8-Hour OSHA HAZWOPER Refresher, WESTON (2008)

Employment History

2000-Present	WESTON
1999-2000	Science Applications International Corporation
1996-1998	Southwest Texas State University (Research Assistant/Teaching Assistant)

Key Projects

Key Projects (Continued)

National Environmental Policy Act (NEPA)

NEPA Environmental Impact Statement, Lake Texoma USACE Land Transfer, Dennison, TX, Resource Specialist. Currently serving as a resource specialist for biological, visual/scenic and the soil resources associated with the conveyance of 635 acres of federal land in Grayson County Texas to the City of Dennison for private development. Assessment includes evaluation of all habitats including wetlands, terrestrial and the aquatic/terrestrial interface. Evaluation includes the assessment of all species potentially affected by the transfer of land and associated development. The soil and visual evaluation includes the development of specific BMPs, and evaluation of cumulative impacts due to the presence of highly erosive soil and steep slopes near and adjacent to the Lake Texoma shoreline, and the associated development within the proposed conveyance area and regionally on the lake. Project responsibilities include coordination with resource agencies, mitigation and permitting plan development, evaluation of cumulative effects, public input, compilation of administrative record and evaluation of alternatives.

NEPA Environmental Impact Statement, Lake Texoma USACE Land Transfer, Kingston OK, Resource Specialist. Currently serving as a resource specialist for biological, visual/scenic and the soil resources associated with the conveyance of 1,100 acres of federal land in Marshal County Oklahoma to the Oklahoma Tourism and Recreation Department for private development. The assessment includes evaluation of all habitats including wetlands, terrestrial and the aquatic/terrestrial interface. Evaluation of all species potentially affected by the transfer of land and associated development is being performed. Project responsibilities include evaluation of cumulative effects, public input, compilation of administrative record and evaluation of alternatives.

NEPA Environmental Assessment, Texas National Guard Ft Wolters TX, Resource Specialist. Evaluated the biological, aquatic and soil resources associated with the expansion of a landing strip and drop zone requiring the clearing of 200 acres of upland forest in areas designated as highly erosive soils, and the potential filling of two acres of wetlands. The assessment included evaluation of all habitats (aquatic and terrestrial), soil and water resources and species potentially affected by the proposed action. Project responsibilities include evaluation of cumulative effects resulting from the land clearing and drop zone development, public input, compilation of administrative record and evaluation of alternatives.

NEPA Environmental Assessment, Building 8, Corpus Christi Army Depot, Corpus Christi, TX, Resource Specialist. Served as biological, water, and earth resource specialist for preparation of the Environmental Assessment (EA) for relocation of Building 8. As a tenant of Naval Air Station Corpus Christi, the Corpus Christi Army Depot (CCAD) occupies over 2,000,000 SF of industrial work space in 41 buildings/hangars and 17 other structures, totaling 154 acres out of the 2,594-acre total base area. CCAD makes a major contribution to defense readiness through its repair, overhaul, and maintenance of a wide variety of helicopters, as well as related engines and components. The assessment identifies and evaluates the environmental, cultural, social, and economic aspects of the operations of the Building 8 at Corpus Christi Army Depot (CCAD) in relation to the relocation/construction of the new Building 8 and determines if an Environmental Impact Statement (EIS) is required for the site.

Key Projects (Continued)

Environmental Assessments for South Congress Park-and-Ride Development, Austin, TX, Capital Metropolitan Transportation Authority, Project Biologist. Performed an endangered species habitat survey for the Golden-cheeked Warbler. The presence/absence survey was completed following the USFWS guidance for *Conducting Presence/Absence Surveys and Habitat Assessments for Endangered Golden-cheeked Warblers*. The results of the survey were included in a NEPA Categorical Exclusion of an undeveloped 47 acre property in Austin Texas.

Environmental Assessment (EA) and Bird Survey at A Confidential Military Installation, TX, U.S. Air Force Air Education Training Command (AETC), Project Team Leader. Completing an environmental site assessment under the National Environmental Policy Act (NEPA) regulations for the expansion of AETC artillery training facility. Responsibilities included conducting a bird call survey for the endangered Black-capped Vireo following the USFWS surveying and reporting requirements, meeting with the client to establish the scope of the investigation, collection of cartographic and environmental information, development of habitat maps based on a field survey and review of aerial photography, review of appropriate agency information including endangered species, archeological sites, wetlands, and agricultural interests, document research and preparation, and client correspondence. The final report and public participation process are being considered pending approval of the expansion project.

Environmental Assessment, Tar Creek State Superfund Site, OK, U.S. Army Corps of Engineers, Project Scientist. Completed an Environmental Assessment under the National Environmental Policy Act (NEPA) regulations for six restoration demonstration projects within the Tar Creek Superfund Site. Responsibilities included meeting with the client to establish the scope of the investigation, collection of cartographic and environmental information coordination with appropriate state and federal agencies and document research and preparation.

Environmental Assessment, Oklahoma City, OK, Federal Aviation Administration (FAA) – Mike Monroney Aeronautical Center (MMAC), Project Team Leader. Completed an environmental assessment under NEPA regulations for the construction of a building on FAA property. Responsibilities included site analysis, document research and preparation, and client correspondence.

Ecological Evaluation/Restoration

Natural Resource Damage Assessment (NRDA) and Injury Assessment Plan Services, National Park Service, Shoreline Assessment Team, Project Biologist/Ecologist. **S**erved as a representative of the National Park Service (NPS) in NRDA assessment of gulf coast shorelines. The NPS is a trustee for public lands including National Parks, National Seashores, Historical Preserves and Historical Monuments. These public lands are home to extensive natural resources including terrestrial and aquatic vegetation that provides prime habitat for both birds and marine life. In response to the Mississippi Canyon 252 Incident (Deepwater Horizon Oil Spill) the NPS has initiated NRDA data collection and assessment activities. As a trustee responsible for assessing and restoring damage to natural resources, the NPS serves as a member of Technical Working Group (TWG) teams deployed to NPS lands in the Gulf Coast Region from Texas to Florida. The TWG teams are composed of NPS, NOAA, FWS, State and responsible party representatives. Responsibilities included evaluation of shorelines for presence/absence of visible oil, visual observations of habitat and species presence/absence, observations of species

Key Projects (Continued)

attributes, observations of impacts of response activities, and coordination with data managers. Assessments require coordination and concurrence with all trustees and responsible party representatives.

Integrated Natural Resources Management Plan (INRMP) Update, Little Rock Air Force Base, Little Rock AR, U.S. Air Force Air Education Training Command (AETC), Project Manager. Little Rock Air Force Base (AFB) has been designated as a Category I Natural Resources Installation and is required to maintain an Integrated Natural Resources Management Plan (INRMP). Currently responsible for the completion of an update to the Little Rock Air Force Base INRMP following AETC guidance documents for an active Air Force Base. Responsibilities include proposal preparation, budgeting, team coordination and scheduling, providing written status updates, client coordination and reporting. The final INRMP will include updated cartographic and environmental information, updating maps, updates to and inclusion of new base management plans, updated appropriate agency information including endangered species, archeological sites, and wetlands, management recommendations, goals and objective and the details of specific project to support the goals and objective.

Habitat Equivalency Analysis (HEA), Camp Bullis, Former Lanfills, San Antonio TX, Project Leader. Currently performing a HEA following the National Oceanic and Atmospheric Administration (NOAA) Damage Assessment and Restoration Program Department *Habitat Equivalency Analyses: An Overview* guidance document. The results of the HEA will help evaluate the appropriate compensatory mitigation requirements for the presence of lead affected soil remaining in place at concentrations above ecological protective concentrations in an area of known federally listed endangered Golden-cheeked Warbler and Black-capped Vireo habitat. Responsibilities include coordination with trustees and the client, evaluation and quantification of habitat qualities and injury, calculation of interim loss, establishment of baseline conditions, development of compensatory mitigation plan and final document preparation.

Watershed Management Plan, Little Rock Air Force Base, Little Rock, AR, Project Biologist, Team Leader. Developed a watershed management plan for the watersheds associated with the base lakes and golf course ponds on Little Rock Air Force Base. The watershed management plan was developed to improve the aquatic habitat on base used by a local population of the State and Federally listed endangered least tern. Project included seasonal site visits, personnel interviews, historical research, and development of alternatives. The final report included detailed recommendations for the preservation of the watersheds and associated lakes and ponds.

USACE San Francisco Bay Environmental Impact Statement (EIS) and Regional Dredged Material Management Plan (DMMP), USACE San Francisco, CA, Biologist. Assisted with technical review of portions of the San Francisco Bay Regional Dredge Material Management Plan and Environmental Impact Statement/Environmental Impact Report. This DMMP and EIS/EIR is being prepared in support of the USACE San Francisco District Maintenance Dredging Program for current use through the year 2035.

USACE Houston-Galveston Navigation Channel Multiple Site Repairs, USACE Galveston, TX, Biologist. Provided technical review of the Environmental Protection Plan (EPP), submitted to the USACE Galveston District.

Key Projects (Continued)

Urban Stream Evaluation, Dallas, TX, Confidential Client, Project Biologist. Performed focused fish and sediment sampling in an urban stream in compliance with a Texas Commission on Environmental Quality (TCEQ) Agreed Order. Project included sampling sediment at various depths from a boat, and performing fish collection using various techniques including electro-fishing, seining, gill nets, trout lines, and cast nets. Sediment and fish were analyzed for pesticides. Results were presented in a Stream Evaluation report. Project also included delineation of adjacent wetlands and ordinary high water mark mapping.

Integrated Natural Resources Management Plan (INRMP), Little Rock Air Force Base, Little Rock AR, U.S. Air Force Air Education Training Command (AETC), Project Biologist. Completed an INRMP following AETC guidance documents for an active Air Force Base. Responsibilities included, collection of cartographic and environmental information, development of habitat maps and riparian zone maps based on a field survey and review of aerial photography, review of base management plans, review of appropriate agency information including endangered species, archeological sites, and wetlands, providing management recommendations, document preparation, and client correspondence.

Site Restoration and Landscape Design for Landfill Cap, Corpus Christi, TX, Confidential Client, Project Biologist. Designed the landscape plan for a closed and capped petroleum refinery landfill. The plan included surface contouring, erosion prevention, vegetation selection, and landscape design. The vegetation was selected based on the regional climate, potential for erosion control, the likelihood of successful colonization, the local wildlife, and site-specific conditions including the thickness of the cap, soil composition of the cap, and surface contour of the cap and surrounding area. Only native plant species were selected for the landscape design, identified for their value to wildlife, low maintenance, and aesthetic value.

Environmental Assessment of a Road Extension Right-of-Way, Austin, TX, City of Austin, Project Biologist. Performed an environmental assessment of project area, including a vegetation survey; endangered species and wetland analyses; and identification of critical environmental features, environmentally sensitive areas, critical water quality zones, flood plains, and steep slopes. The assessment included a qualitative evaluation of habitat types, the potential impacts of road expansion on area biological resources and federally listed threatened and endangered species, and recommendations for avoiding or mitigating the loss of habitat.

Environmental Evaluation of Disturbed, Undeveloped Private Property, Morgan's Point, TX, Confidential Client, Project Team Leader. Performed an environmental evaluation of undeveloped private property that was disturbed by unauthorized clearing of vegetation. Evaluation included wetlands delineation, vegetation survey, slash pile survey, endangered species analysis, and erosion effects. Project documentation also included restoration recommendations.

Wetlands

Wetlands Delineation and Endangered Species Habitat Evaluation, Aransas Pass, TX, City of Aransas Pass, Lead Project Biologist. Performed a delineation, submitted required documentation, and coordinated with the USACE Galveston District to receive Jurisdictional Determination (JD) for a coastal property in Texas evaluated for wetlands and other waters of the United States under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. The delineation included the mapping of high tide, mean tide and floodplains using GIS in the

Key Projects (Continued)

project area. Wetlands and other special aquatic sites, along with the shoreline were delineated following the 1987 Corp of Engineers Wetlands Delineation Manual. Wetland hydrology, vegetation, and hydric soils were identified along the shoreline and throughout the property along transect lines. The delineation was submitted to Army Corps of Engineers for Jurisdictional Determination, and a final JD was approved. In addition to the Wetlands Delineation an evaluation of the habitat for state and federally listed threatened and endangered species was performed. The threatened and endangered species evaluation included coordination with the US Fish and Wildlife Service and Texas Parks and Wildlife Department.

Wetland Delineation, Gulf Coast Refinery, Confidential Refinery, Project Manager and Lead Project Biologist. Performed wetlands delineation of five separate coastal pipeline and refinery properties. Each delineation included coordination local USACE office on Jurisdiction Determination (JD) and permitting issues. Delineations followed the 1987 Corp of Engineers Wetlands Delineation Manual. Final delineation reports were prepared. Project responsibilities included proposal preparation, work plan development, execution of delineations, budgeting, client coordination, scheduling of work, and reporting.

LDH Energy Wetland Assessment, Various s Sites, TX, Project Biologist. Assisted LDH Energy is determining whether or not properties chosen for future development contained wetlands along with the type and extent of wetlands on-site. Performed wetlands delineations following the 1987 Corp of Engineers Wetlands Delineation Manual as necessary, and prepared a request for Jurisdictional Determination by the USACE as required.

Wetland Delineation, Missouri City, TX, Confidential Client, Project Biologist. Performed a wetlands delineation of an undeveloped property. Wetlands were delineated following the 1987 Corp of Engineers Wetlands Delineation Manual. Prepared a document for submittal to the Army Corps of Engineers to request Jurisdictional Determination.

Wetland Delineation, Benbrook, TX, Confidential Client, Project Biologist. Performed a wetlands delineation of an undeveloped property. Wetlands were delineated following the 1987 Corp of Engineers Wetlands Delineation Manual. Prepared a document for submittal to the Army Corps of Engineers to request Jurisdictional Determination.

Wetland Delineation, San Angelo, TX, Goodfellow Air Force Base, Lead Project Biologist. Performed a wetlands delineation of base property following the 1987 Corp of Engineers Wetlands Delineation Manual. Prepared the final delineation report. The delineation was submitted to Army Corps of Engineers for Jurisdictional Determination (JD), and a final JD was approved.

Wetland Delineation, Tyler, TX, Snoke Chemical Plant, Project Biologist. Project responsibilities included performing wetlands delineation of a property enrolled in TRRP, and coordinating with the U.S. Army Corps of Engineers (USACE) for project construction permitting.

Wetlands Restoration, Vegetation Research, and Environmental Education Center Planning, San Marcos, TX, Spring Lake, Southwest Texas State University, Graduate Student. Performed research experiments involving native and non-native plant species to evaluate the success of native species, and the necessary planting conditions required for native species success in the presence of aggressive non-native species. Designed and implemented initial phase of a restoration plan for Spring Lake wetlands involving the restoration of native plant species and the

Key Projects (Continued)

elimination of three prominent non-native undesirable species. Design incorporated educational kiosks and other learning tools for use by the public.

Sustainability

Sustainability Strategic Plan, Various Locations, U.S. Army Medical Command, Team Member. Currently serving as a team member for the development of a comprehensive sustainability strategy plan for all U.S. Army hospitals in the United States. U.S. Army Medical Command (MEDCOM) provides world class, innovative healthcare. While succeeding in this mission, MEDCOM also strives to act in a manner that is both environmentally and socially responsible. When implemented, this plan will enable MEDCOM to sustain readiness, improve quality of life, strengthen community relationships, and help reduce total costs of operation and ownership by suggesting sound environmental and social investments to promote Army sustainability. The project involves crafting the MEDCOM sustainability policy, developing strategic communication vehicles to educate MEDCOM personnel on the sustainability policy, benchmarking private hospitals to determine level of sustainability practices, conducting internal surveys of MEDCOM hospitals to determine baseline data, and developing specific, targeted, measurable goals to make U.S. Army medical care more sustainable.

Ecological Risk Assessments

Ecological Risk Assessment, Confidential Client, Laredo, TX. Project Risk Assessor. Performed a Tier 2 Ecological Risk Assessment under the State of Texas Ecological Risk Assessment Guidance. Based on the conclusions of the Tier 2 assessment a Tier 3 Risk assessment was recommended. Currently performing a Tier 3 assessment to evaluate the potential for risk to benthic invertebrates species in an Urban creek with antimony affected sediment. The Tier 3 evaluation included laboratory toxicity analyses of site sediment for survival, growth and reproduction of *Hylella azteca*, and benthic invertebrate community analyses. Final conclusions of the Tier 3 risk assessment will include a site specific protective concentration of antimony in sediment, and recommendations for further research or response actions.

Ecological Risk Assessment, Former Imperial Refinery Superfund Site, OK, Project Risk Assessor. Performed Baseline Ecological Risk Assessment under the State of Oklahoma Department of Environmental Quality and State Environmental Protection Agency Guidance. Project included preparation of a work plan, ecological sampling including fish, plants, soil for 28-day survival and bioaccumulation testing, and sediment for macroinvertebrate toxicity testing, the development of exposure pathways for numerous constituents of concern in soil, water and sediment, ecosystem analysis, food web and habitat modeling, hazard analysis, risk evaluation and uncertainty analysis, and regulatory agency correspondence.

Ecological Risk Assessment, Ft. Bliss, NM, McGregor Ammunitions Range, Corps of Engineers, Project Risk Assessor. Performed a Tier 3 Ecological Risk Assessment under the State of New Mexico Hazardous and Radioactive Materials Bureau. Project included the development of exposure pathways for numerous constituents of concern in an oxidation pond through environmental and tissue sampling and ecosystem analysis, food web and habitat modeling, hazard analysis, risk evaluation and uncertainty analysis, and regulatory agency correspondence.

Ecological Risk Assessment, Port Heiden, AK, Former United States Air force Base, Project Risk Assessor. Performed an Ecological Risk Assessment under the State of Alaska Risk

Key Projects (Continued)

Assessment Procedures Manual. Project includes the development of exposure pathways for numerous constituents of concern in the soil, sediment, surface water and groundwater in both a marine and freshwater environment and terrestrial environments through environmental sampling and ecosystem analysis, food web and habitat modeling, endangered species evaluation, hazard analysis, risk evaluation and uncertainty analysis, report preparation, and regulatory agency correspondence.

Ecological Risk Assessment, Camp Bullis, TX, Former Lanfills, Project Biologist. Performed Tier 2 Ecological Risk Assessments under the State of Texas Ecological Risk Assessment Guidance for two sites within Camp Bullis property boundary. Projects included the development of exposure pathways for numerous constituents of concern in the soil through environmental sampling and ecosystem analysis, food web and habitat modeling, endangered species evaluation, karst habitat evaluation, hazard analysis, risk evaluation and uncertainty analysis, report preparation, and regulatory agency correspondence. Camp Bullis contains habitat for two federally listed endangered bird species. Recommendations of the risk assessments included the development of an Ecological Services Agreement (EAS). Responsibilities included preparing the ESA documentation and providing coordination and support between Camp Bullis, TCEQ, EPA and Texas Parks and Wildlife Department.

Ecological Risk Assessment, Force Road State Superfund Site, Brazoria County, TX, TCEQ, Project Risk Assessor. Performed a Tier 2 Ecological Risk Assessment under the State of Texas Ecological Risk Assessment Guidance. Project included the development of exposure pathways for numerous constituents of concern in the soil, water and sediment through environmental sampling and ecosystem analysis, food web and habitat modeling. Exposure pathways were used to perform species evaluations, hazard analysis, risk evaluation and uncertainty analysis. Additional responsibilities included final report preparation, and regulatory agency correspondence.

Ecological Risk Assessment, Spector Salvage State Superfund Site, Orange, TX, TCEQ, Project Risk Assessor. Performed a Tier 2 Ecological Risk Assessment under the State of Texas Ecological Risk Assessment Guidance. Project included the development of exposure pathways for numerous constituents of concern in the soil and sediment through environmental sampling and ecosystem analysis, food web and habitat modeling. Project area included wetlands. Exposure pathways were used to perform endangered species evaluations, hazard analysis, risk evaluation and uncertainty analysis. Additional responsibilities included final report preparation, and regulatory agency correspondence.

Ecological Risk Assessment, San Angelo, TX, Goodfellow AirforceBase, Project Biologist. Performing a Tier 2 Ecological Risk Assessment under the State of Texas Ecological Risk Assessment Guidance for multiple firing ranges. Project includes the development of exposure pathways for metals and PAHs through environmental sampling and ecosystem analysis, food web and habitat modeling, hazard analysis, risk evaluation and uncertainty analysis, and regulatory agency correspondence.

Ecological Risk Assessment, Camp Barkeley, TX, Small Arms Training Range, Project Risk Assessor. Performed a Tier 2 Ecological Risk Assessment under the State of Texas Ecological Risk Assessment Guidance. Project included the development of exposure pathways for numerous constituents of concern in the soil through environmental sampling and ecosystem analysis, food

Key Projects (Continued)

web and habitat modeling, endangered species evaluation, hazard analysis, risk evaluation and uncertainty analysis, report preparation, and regulatory agency correspondence.

Ecological Risk Assessment, Houston TX, Former Confidential Chemical Plant, Project Risk Assessor. Performed a Tier 2 Ecological Risk Assessment under the TCEQ Texas Risk Reduction Program (TRRP) for a former chemicals plant. Project included the development of exposure pathways for constituents of concern in the groundwater to surface water pathway through environmental sampling and ecosystem analysis, food web and habitat modeling, hazard analysis, risk evaluation, uncertainty analysis, report preparation, and regulatory agency correspondence.

Ecological Risk Assessment, Grapevine, TX, Confidential Client, Project Risk Assessor. Performed a Tier 2 Ecological Risk Assessment under the TCEQ TRRP for a former plating facility. Project included the development of exposure pathway of chromium in the sediments of an urban stream through environmental sampling and ecosystem analysis, food web and habitat modeling, hazard analysis, risk evaluation, uncertainty analysis, report preparation, and regulatory agency correspondence.

Ecological Risk Assessment, Tyler, TX, Snoke Special Products Plant, Project Risk Assessor. Performed a Tier 2 Ecological Risk Assessment under the TCEQ TRRP for a former chemicals plant. Project includes the development of exposure pathway in the sediments, surface water and groundwater of a stream and adjacent groundwater through environmental sampling and ecosystem analysis, food web and habitat modeling, hazard analysis, risk evaluation, uncertainty analysis, report preparation, and regulatory agency correspondence.

Preliminary Ecological Risk Assessment, Seaholm Power Plant, Austin, TX, City of Austin, Project Biologist. Completed an ecological risk assessment in a creek adjacent to the decommissioned city power plant, including sediment sampling, habitat modeling, hazard analysis, and regulatory agency correspondence.

Tier 2 Ecological Risk Assessment, Confidential Rubber Chemicals Complex, Project Risk Assessor. Performed a Tier 2 Ecological Risk Assessment under the TCEQ TRRP for a former rubber chemicals plant. Project included the development of exposure pathways for numerous constituents of concern through environmental sampling and ecosystem analysis, food web and habitat modeling, hazard analysis, risk evaluation and uncertainty analysis, and regulatory agency correspondence.

APPENDIX D
FEDERALLY THREATENED AND ENDANGERED SPECIES

VICTORIA COUNTY

AMPHIBIANS		Federal Status	State Status
Black-spotted newt	*Notophthalmus meridionalis*		T

can be found in wet or sometimes wet areas, such as arroyos, canals, ditches, or even shallow depressions; aestivates in the ground during dry periods; Gulf Coastal Plain south of the San Antonio River

BIRDS		Federal Status	State Status
American Peregrine Falcon	*Falco peregrinus anatum*	DL	T

year-round resident and local breeder in west Texas, nests in tall cliff eyries; also, migrant across state from more northern breeding areas in US and Canada, winters along coast and farther south; occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands.

Arctic Peregrine Falcon	*Falco peregrinus tundrius*	DL	

migrant throughout state from subspecies' far northern breeding range, winters along coast and farther south; occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands.

Attwater's Greater Prairie-Chicken	*Tympanuchus cupido attwateri*	LE	E

this county within historic range; endemic; open prairies of mostly thick grass one to three feet tall; from near sea level to 200 feet along coastal plain on upper two-thirds of Texas coast; males form communal display flocks during late winter-early spring; booming grounds important; breeding February-July

Bald Eagle	*Haliaeetus leucocephalus*	DL	T

found primarily near rivers and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds

Brown Pelican	*Pelecanus occidentalis*	DL	E

largely coastal and near shore areas, where it roosts and nests on islands and spoil banks

Henslow's Sparrow	*Ammodramus henslowii*		

wintering individuals (not flocks) found in weedy fields or cut-over areas where lots of bunch grasses occur along with vines and brambles; a key component is bare ground for running/walking

Interior Least Tern	*Sterna antillarum athalassos*	LE	E

subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony

Mountain Plover	*Charadrius montanus*		

breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous

VICTORIA COUNTY

BIRDS

		Federal Status	State Status
Peregrine Falcon	*Falco peregrinus*	DL	T

both subspecies migrate across the state from more northern breeding areas in US and Canada to winter along coast and farther south; subspecies (F. p. anatum) is also a resident breeder in west Texas; the two subspecies' listing statuses differ, F.p. tundrius is no longer listed in Texas; but because the subspecies are not easily distinguishable at a distance, reference is generally made only to the species level; see subspecies for habitat.

Reddish Egret *Egretta rufescens* T

resident of the Texas Gulf Coast; brackish marshes and shallow salt ponds and tidal flats; nests on ground or in trees or bushes, on dry coastal islands in brushy thickets of yucca and prickly pear

Sprague's Pipit *Anthus spragueii* C

only in Texas during migration and winter, mid September to early April; short to medium distance, diurnal migrant; strongly tied to native upland prairie, can be locally common in coastal grasslands, uncommon to rare further west; sensitive to patch size and avoids edges.

Western Burrowing Owl *Athene cunicularia hypugaea*

open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows

White-faced Ibis *Plegadis chihi* T

prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats

White-tailed Hawk *Buteo albicaudatus* T

near coast on prairies, cordgrass flats, and scrub-live oak; further inland on prairies, mesquite and oak savannas, and mixed savanna-chaparral; breeding March-May

Whooping Crane *Grus americana* LE E

potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties

Wood Stork *Mycteria americana* T

forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960

FISHES

		Federal Status	State Status
American eel	*Anguilla rostrata*		

VICTORIA COUNTY

FISHES

		Federal Status	State Status

coastal waterways below reservoirs to gulf; spawns January to February in ocean, larva move to coastal waters, metamorphose, then females move into freshwater; most aquatic habitats with access to ocean, muddy bottoms, still waters, large streams, lakes; can travel overland in wet areas; males in brackish estuaries; diet varies widely, geographically, and seasonally

INSECTS

		Federal Status	State Status
A mayfly	*Tortopus circumfluus*		

mayflies distinguished by aquatic larval stage; adult stage generally found in shoreline vegetation

Texas asaphomyian tabanid fly	*Asaphomyia texensis*		

globally historic; adults of tabanid spp. found near slow-moving water; eggs laid in masses on leaves or other objects near or over water; larvae are aquatic and predaceous; females of tabanid spp. bite, while males chiefly feed on pollen and nectar; using sight, carbon dioxide, and odor for selection, tabanid spp. lie in wait in shady areas under bushes and trees for a host to happen by

MAMMALS

		Federal Status	State Status
Louisiana black bear	*Ursus americanus luteolus*	LT	T

possible as transient; bottomland hardwoods and large tracts of inaccessible forested areas

Plains spotted skunk	*Spilogale putorius interrupta*		

catholic; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie

Red wolf	*Canis rufus*	LE	E

extirpated; formerly known throughout eastern half of Texas in brushy and forested areas, as well as coastal prairies

White-nosed coati	*Nasua narica*		T

woodlands, riparian corridors and canyons; most individuals in Texas probably transients from Mexico; diurnal and crepuscular; very sociable; forages on ground and in trees; omnivorous; may be susceptible to hunting, trapping, and pet trade

MOLLUSKS

		Federal Status	State Status
Creeper (squawfoot)	*Strophitus undulatus*		

small to large streams, prefers gravel or gravel and mud in flowing water; Colorado, Guadalupe, San Antonio, Neches (historic), and Trinity (historic) River basins

False spike mussel	*Quadrula mitchelli*		T

VICTORIA COUNTY

MOLLUSKS		Federal Status	State Status

possibly extirpated in Texas; probably medium to large rivers; substrates varying from mud through mixtures of sand, gravel and cobble; one study indicated water lilies were present at the site; Rio Grande, Brazos, Colorado, and Guadalupe (historic) river basins

Golden orb *Quadrula aurea* C T

sand and gravel in some locations and mud at others; found in lentic and lotic; Guadalupe, San Antonio, Lower San Marcos, and Nueces River basins

Texas pimpleback *Quadrula petrina* C T

mud, gravel and sand substrates, generally in areas with slow flow rates; Colorado and Guadalupe river basins

REPTILES		Federal Status	State Status

Cagle's map turtle *Graptemys caglei* T

endemic; Guadalupe River System; shallow water with swift to moderate flow and gravel or cobble bottom, connected by deeper pools with a slower flow rate and a silt or mud bottom; gravel bar riffles and transition areas between riffles and pools especially important in providing insect prey items; nests on gently sloping sand banks within ca. 30 feet of water's edge

Texas diamondback terrapin *Malaclemys terrapin littoralis*

coastal marshes, tidal flats, coves, estuaries, and lagoons behind barrier beaches; brackish and salt water; burrows into mud when inactive; may venture into lowlands at high tide

Texas horned lizard *Phrynosoma cornutum* T

open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive; breeds March-September

Texas tortoise *Gopherus berlandieri* T

open brush with a grass understory is preferred; open grass and bare ground are avoided; when inactive occupies shallow depressions at base of bush or cactus, sometimes in underground burrows or under objects; longevity greater than 50 years; active March-November; breeds April-November

Timber/Canebrake rattlesnake *Crotalus horridus* T

swamps, floodplains, upland pine and deciduous woodlands, riparian zones, abandoned farmland; limestone bluffs, sandy soil or black clay; prefers dense ground cover, i.e. grapevines or palmetto

PLANTS		Federal Status	State Status

Shinner's sunflower *Helianthus occidentalis ssp plantagineus*

mostly in prairies on the Coastal Plain, with several slightly disjunct populations in the Pineywoods and South Texas Brush Country

VICTORIA COUNTY

PLANTS

Federal Status State Status

Welder machaeranthera *Psilactis heterocarpa*

Texas endemic; grasslands , varying from midgrass coastal prairies, and open mesquite-huisache woodlands on nearly level, gray to dark gray clayey to silty soils; known locations mapped on Victoria clay, Edroy clay, Dacosta sandy clay loam over Beaumont and Lissie formations; flowering September-November