APPENDIX C

Comparison of Climatology and Land Use for Surface Air Met Station Data

APPENDIX C
Comparison of Climatology/Meteorology and Land Use/Cover for Surface Air Met Station Data Use in AERMOD

1.0 AERMOD METEOROLOGICAL DATA REVIEW

A correlation of climatology/meteorology and land use/cover was performed for two surface air stations, Westchester County Airport (HPN), also referred to as White Plains Airport, and LaGuardia Airport (LGA), to determine the most representative meteorological surface data for input to the AERMET meteorological pre-processor for modeling in the vicinity of the Palisades Point Site (Site).

1.1 Site Description

The Palisades Point Site (Site) is located along the Hudson River waterfront in Yonkers, Queens County, New York. Palisades Point is comprised of two parcels totaling ± 6.39 acres along the Hudson River, bounded by the Hudson River to the west and residential/urban land use to the east. The length of the project area shoreline is approximately 837 feet. Two 25 story residential towers are proposed for development. The approximate geographic coordinates are 40.935682 Latitude and -73.903093 Longitude. Elevation at the Site is approximately 3.4 meters (11 feet) above sea level.

1.2 AERMOD

The AMS/EPA Regulatory Model (AERMOD) is a steady-state plume model that is robust in estimating design concentrations. With the capability to treat a wide range of conditions continuously, it is easily implemented, modified, and updated. It is applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources. The model is comprised of 3 separate codes including a meteorological pre-processor, a terrain pre-processor, and a dispersion code. The meteorological pre-processor (AERMET) provides the model with the meteorological information needed to characterize the planetary boundary layer (PBL). The main purpose of the AERMET pre-processor is to organize and process meteorological measurements to compute boundary layer parameters needed to estimate profiles of wind, turbulence and temperature for dispersion calculations in AERMOD. Data is processed to develop the necessary boundary layer parameters and produce the input for AERMOD. The calculated parameters include surface sensible heat flux, friction velocity, and the Monin Obukhov length. With these calculated parameters, the model can then estimate the height of the mixed layer, the convective velocity scale, vertical profiles of turbulence, temperature and wind speed, and other boundary layer and dispersion parameters. The boundary layer algorithms require site-specific surface

characteristics including the noon-time albedo, daytime Bowen ratio, and surface roughness length.

1.3 Two Stations for Comparison

The two weather stations included in this comparison are the New York LaGuardia Airport station and the Westchester County Airport station. Both stations are located in New York State and are situated in the NY-04-Coastal climate division.

1.3.1 LaGuardia Station

The New York LaGuardia Airport Station (LGA) is located in the Borough of Queens, Queens County. The station has the following identifications:
Call Sign: LGA
WBAN: 14732
COOP ID: 305811
WMO ID: 72503

1.3.2 Westchester Station

The Westchester County Airport (HPN) is located in White Plains, Westchester County. The station has the following identifications:
Call Sign: HPN
WBAN: 94745
COOP ID: 309140 (309405)
WMO ID: Not Applicable

2.0 CLIMATOLOGY/METEOROLOGY

A climatological review has been performed of these two weather stations to identify the location that is the most representative weather station for use of surface air meteorological data in the AERMOD modeling of the Yonkers Site. The climatological review is based on station characteristics, data quality, and micrometeorology.

2.1 Station Characteristics (Location and Details)

2.1.1 Distances and Direction From Site

LGA, with the approximate coordinates of 40.783333 Latitude and -73.883333 Longitude, is located approximately 17.02 kilometers (10.58 miles) south, southeast of the Site. HPN, with the approximate coordinates of 41.066667 Latitude and -73.7 Longitude, is located approximately 22.42 kilometers (13.93 miles) northeast of the Site. LGA is at an elevation of 3.4 meters (11 feet) above sea level. HPN is at an elevation of 115.5 meters (379 feet) above sea level.

The Site is approximately 3.4 meters (11 feet) above sea level. The LGA station elevation is representative of the Site elevation; the HPN has a difference in elevation with the Site of greater than 100 feet. According to the U.S. Geological Survey topographic survey of 1988 (Terra Server USA; http://terraserver.microsoft.com), the HPN station is located at a peak in the local topography; to the west the topography greatly slopes downward toward Rye Lake and to the east the topography slopes downward toward the state of Connecticut. The LGA station is located on the East River waterfront having very little topographic variation and is considered similar terrain to the Site.

2.1.2 Station Types

The LGA station is an ASOS-NWS cooperative station that is defined by the National Climatic Data Center (NCDC) as an Automated Surface Observing System (ASOS) that is a joint effort of the National Weather Service (NWS), the Federal Aviation Administration (FAA), and the Department of Defense (DOD). According to the NCDC these systems ‘serve as the nation’s primary surface weather observing network and are designed to support weather forecast activities and aviation operations and, at the same time, support the needs of the meteorological, hydrological, and climatological research communities. The LGA station is also associated with the World Meteorological Organization (WMO) which according to the NCDC, is ‘used for international weather data exchange and station documentation’. The LGA station is also the only First Order weather station in proximity to the Site, with data available that is suitable for use with the AERMOD meteorological pre-processor program (AERMET), and representative of the Site area.

The HPN station is an ASOS-FAA cooperative station, also referred to as the Automated Weather Observing System (AWOS) by the NCDC. According to the NCDC these stations: *'measure, collect and broadcast weather data to help meteorologists, pilots and flight dispatchers prepare and monitor forecast, plan flight routes, and provide necessary information for correct take-offs and landings'*.

2.2 Data Quality

2.2.1 Quality Control

The NCDC Local Climatological Data (LCD) system uses an automated quality control system on certified meteorological data. Weather stations in the LCD system have at least a level of "Version 2" quality controlled data which have been processed through the "extensive automated quality control system". The HPN station is a "Version 2" station.

Data from approximately 480 stations in the United States undergo a greater level of quality control labeled as "Version 3". These stations have both an interactive and manual quality control system in place in addition to the Version 2 automated system. The LGA station is a "Version 3" station with an extra level of quality control.

2.2.2 Data Gaps and Service Changes

The LGA weather station went into service on August 1, 1935. On May 1, 1996 the LGA station changed from a basic cooperative weather station to an ASOS station. NCDC cooperative summary of the day climatological inventory holdings for the LGA station are available from May of 1948 to the present with approximately 5 days of missing data spread over that time period.

The HPN weather station went into service on August 1, 1946. On April 25, 2001 the HPN station changed from a basic cooperative weather station to an AWOS station. NCDC cooperative summary of the day climatological inventory holdings for the HPN station are available from August 1948 to April 2001 with numerous months of missing data.

2.3 Micrometeorology

2.3.1 Sea Breeze Effect

A sea breeze effect is unique to locations along significant water bodies, as seasonal temperatures increase while a water body is still cool. Sea breeze effect happens as the land area on the immediate coast starts to warm up during the day and hot air rises creating an area of lower pressure on the land. At the same time, air situated over the cooler water sinks creating higher pressure over water. The difference in pressure between the high pressure air over water and the the area of low pressure air on land creates a strong, cool breeze on what would have been a warm stagnant day. Inland areas feel very little, if any, of this effect. A station

affected by a sea breeze effect would show a major difference in daily climate data, in particular to air temperatures, wind speed, and wind direction as compared to a station not affected by a sea breeze effect. The Site is located on the Hudson River and would receive a sea breeze effect. The LGA station is also located on a water body, the East River, and would also receive the sea breeze effect. The HPN station is located in proximity, but not directly adjacent to, a water body, and may not experience a sea breeze effect of the same intensity or frequency.

2.3.2 Westerly Storm Systems and Fronts

The United States is situated in the "Westerlies", therefore the prevailing weather systems come from the west. However, weather/storm fronts and strong pressure systems can approach from any direction. Weather systems and fronts approaching from the west drop precipitation as they move across a geographic area. The weather station most representative of the Site should not only be in close proximity, but in a close longitudinal plane due to the concept of the prevailing westerlies. The HPN station is northeast of the Site, at a farther distance to the east of the Site, and would receive storm systems at a later time and the possibility of receiving a differing amount of daily precipitation in relation to a single storm event. The LGA station is almost due south of the Site, in a close longitudinal plane, and will experience similar affects from "westerly" storm systems.

2.3.3 City Precipitation "Consistent Spread"

According to the NCDC, "the average annual precipitation and snowfall totals are reasonably uniform within the New York City area but show a consistent increase to the north and west with lesser amounts along the south shores". The HPN station is located north of the site and, according to the NCDC, on average would receive more annual precipitation. The LGA station is located south of the Site and would receive slightly less precipitation. Due to the reasonably uniform precipitation within the New York City area, both the HPN station and the LGA station can be considered representative of the Site.

2.3.4 Urban Heat Island Effect

The Urban Heat Island (UHI) effect occurs in dense and developed city areas due to the covering of ground surfaces and the generation of heat by the use of energy. An UHI is significantly warmer than its surroundings especially at night and during the winter. This effect lessens at greater distances from the Urban Heat Island. The Site will experience the Urban Heat Island effect due to its location in downtown Yonkers and proximity to New York City. The LGA station is located approximately 8 miles away from Manhattan and is within the confines of the Urban Heat Island effect. The HPN station is a significantly farther distance from Manhattan (approximately 30 miles), towards the northeast bordering Connecticut, and less likely to experience the UHI effect.

2.3.5 Coastal Relative Humidity

According to the NCDC, "relative humidity averages about the same over the metropolitan area, except that the immediate coastal areas are more humid than inland locations". The LGA station and the HPN station can both be considered representative stations.

2.3.6 Elevation and Lifting

Orographic lifting occurs when air is forced into higher elevations due to terrain. As air is lifted, it decreases in temperature. Further, the air may reach saturation due to vapor pressure, condense to form clouds and precipitation may occur. Due to the prevailing westerly pattern, air will move from the west to east and be forced upward with an increase in elevation. The HPN station is located approximately 379 feet above sea level on a sharp slope to the east from Rye Lake. The HPN station would experience cooler temperatures, more cloud cover and the potential for increased precipitation. The LGA station, located within an area of mostly uniform flat land, is representative of Site conditions with respect to the effects of orographic lifting.

2.3.7 Early Winter Water Temperatures and Snow

An opposite mechanism of the sea breeze effect occurs in early winter. Unless there is significant cloud cover, land temperatures in the morning are colder than surrounding water bodies. The warmer, rising air is over the water, while the colder, sinking air is over the land. The land air under higher pressure wants to 'rush' over the surface of the water and replace the lower pressure air. Warmer air aloft from the water will be forced towards the land, reinforcing the heat island effect. Areas close to the city have higher temperatures, while the coastal regions have the warm air influence of the warmer water temperatures. According to the NCDC, "low temperatures are often 10-20 degrees lower in the inland suburbs than in the central city". The warm coastal water temperatures also delay the start of winter snows as well. The LGA station would receive this early winter effect, similar to the Site. The HPN station is located further inland and not likely to be significantly influenced by the nearby water body.

3.0 AUER LAND USE COMPARISON

Meteorologically significant land cover characteristics can create local meteorological anomalies in the vicinity of the project Site, therefore specific details of population, aerial extent and type of metropolitan land cover must be considered in estimating the potential for inadvertent weather modification. A land use typing method to classify land as urban or rural, based on work published in 1978, is used by the United States Environmental Protection Agency. This method is the Auer Land Use method.

Auer Land Use Classification Methodology

The U.S. Environmental Protection Agency (EPA) recommends the use of the Auer Meteorological Land Use Classification System (Auer 1978) to determine "meteorologically significant" land cover characteristics. The Auer methodology identifies land by use and proportion of vegetative cover, as presented in Table 1. This classification method can be illustrated in a comparison between the heavy industrial, I1 class, where grass and tree growth is extremely rare, with less than 5 percent vegetation, and the R3 compact residential classification, which is an older multi-family residential area with limited lawn sizes, old established shade trees, and less than 35 percent vegetation. Auer concluded that certain types of land use can create surface characteristics of an urban area as it pertains to urban meteorology. The lack of evaporating surfaces in these "urban" land uses (I1, I2, C1, R2 and R3) differ from rural areas. Rural areas are characterized by a dominance of vegetative cover such as grassed areas, woodland, and undeveloped vegetated areas. The abundance of vegetation in rural areas allows the cooling effect of evaporation, in combination with increased radiational cooling, to influence the local meteorology.

Anderson Classification System

The Anderson et al. 1976 (modified 1999) classification system is a hierarchical Land Use Classification system that is based on four digits to represent one to four levels of land use classification i.e., general, descriptive, detailed, and most detailed (Table 2). The Anderson land use and land cover classification system includes generalized first and second level categories with additional third and fourth levels with further refinement of more extended and varied land uses and covers. It provides a standardized system of land use and land cover classification for national and regional studies and at the more generalized levels it provides a land use and land cover classification for use in land use planning and management activities. It provides a systematic and uniform approach to the presentation of land use and land cover information in map form with a color-coding scheme.

Urban/Rural Classification (Auer Analysis)

The land use and land cover within a three (3) km radius of each surface meteorological station and of the Site was mapped according to the Anderson land use classification. These Anderson Land Use classified areas have been listed according to the corresponding Auer Land Use Classification and grouped as Urban or Rural according to Auer. Auer Urban Land Use types are (I1+I2+C1+R2+R3) and Rural Land Use types are (R1+R4+A1+A2+A3+A4+A5). The land use approach considers four primary land use types: industrial (I), commercial (C), residential (R), and agricultural (A). Within these primary classes, subclasses are identified, as shown in Table 1. The goal is to estimate the percentage of the area within a 3-km radius that is urban type and the percentage that is rural type. Industrial and commercial areas are classified as urban; agricultural areas are classified as rural.

Three separate Auer analyses were performed; one for each surface air data meteorological station and one for the Palisades Point Site. The Auer Land Use (Auer, 1978) designation of an area is based on a majority (> 50 %) of either urban or rural specified land use groupings in a study area, within a 3 km radius of the site.

The various land use types in each 3.0 km radius area were identified on a USGS map of the areas as shown in Figures 1, 2 and 3. The different segments of the various land use types found in each 3.0 km radius area were broken down into measured units of acres. Tables 3, 4 and 5 present the approximate coverage areas (areas and percent of total) for each of the various Auer land use categories for the Palisades Point Site, LaGuardia Airport and Westchester County Airport, respectively. The percent of urban land use was calculated as 63% for the Palisades Point 3.0 km radius area. Results of the Auer analysis indicate that the Site is considered urban for modeling purposes. The percent of urban land use was calculated as 75.6% for LaGuardia Airport and 30.4% (< 50 %) for Westchester County Airport for each 3.0 km radius area, indicating that the LaGuardia airport meteorological data is more representative of the Site area than the Westchester County Airport meteorological data.

Table 1

Auer Meteorological Land Use Classification System

Urban /Rural	Auer Classification		Land Use Class	Land Cover - Vegetation
Urban	C1	Commercial	Office and apartment buildings, hotels; > 10 story heights, flat roofs	Limited grass and trees; < 15% vegetation
	I1	Heavy Industrial	Major chemical, steel and fabrication industries; generally 3-5 story buildings, flat roofs	Grass and tree growth extremely rare; < 5% vegetation
	I2	Light-Moderate Industrial	Rail yards, truck depots, warehouses, industrial parks, minor fabrications; generally 1-3 story buildings, flat roofs	Very limited grass, trees almost total absent; < 5% vegetation
	R2	Compact Residential	Single, some multiple, family dwelling with close spacing; generally < 2 story, pitched roof structures; garages (via alley), no ashpits, no driveways	Limited lawn sizes and shade trees; < 30% vegetation
	R3	Compact Residential	Old multi-family dwellings with close (< 2m) lateral separation; generally 2 story, flat roof structures; garages (via alley) and ashpits, no driveways	Limited lawn sizes, old established shade trees; < 35% vegetation
Rural	A1	Metropolitan Natural	Major municipal, state, or federal parks, golf courses, cemeteries, campuses; occasional single story structures	Nearly total grass and lightly wooded; > 95% vegetation
	A2	Agricultural Rural	Agricultural Land	Local crops (e.g., corn, soybean); > 95% vegetation
	A3	Undeveloped	Uncultivated; wasteland	Mostly wild grasses and weeds, lightly wooded; > 90% vegetation
	A5	Water Surfaces	Rivers, lakes	
	R1	Common Residential	Single family dwelling with normal easements; generally one story, pitched roof structures; frequent driveways	Abundant grass lawns and light-moderately wooded; > 70% vegetation
	R4	Estate Residential	Expansive family dwelling on multi-acre tracts	Abundant grass lawns and lightly wooded; > 80% vegetation

Notes:

(a) The Auer Land Use (Auer, 1978) designation of an area is based on a majority (> 50 %) of either urban or rural specified land use groupings in a study area, within a 3 km radius of the Site.

(b) Auer Land Use Classification grouped as Urban or Rural according to Auer. Auer Urban Land Use types are (I1+I2+C1+R2+R3) and Rural Land Use types are (R1+R4+A1+A2+A3+A4+A5).

TABLE 2

U.S. Geological Survey Land Use and Land Cover Classification System (for Use with Remote Sensor Data)

Level I	Level II	
1	**Urban or Built-up Land**	
	11	Residential
	12	Commercial and Services
	13	Industrial
	14	Transportation, Communications, and Utilities
	15	Industrial and Commercial Complexes
	16	Mixed Urban or Built-up Land
	17	Other Urban or Built-up Land
2	**Agricultural**	
	21	Cropland and Pasture
	22	Orchards, Groves, Vineyards, Nurseries, and Ornamental Horticultural
	23	Confined Feeding Operations
	24	Other Agricultural Land
3	**3 Rangeland**	
	31	Herbaceous Rangeland
	32	32 Shrub and Brush Rangeland
	33	33 Mixed Rangeland
4	**Forest Land**	
	41	Deciduous Forest Land
	42	42 Evergreen Forest Land
	43	43 Mixed Forest Land
5	**Water**	
	51	Streams and Canals
	52	52 Lakes
	53	53 Reservoirs
	54	54 Bays and Estuaries
6	**Wetland**	
	61	Forested Wetland
	62	62 Nonforested Wetland
7	**Barren Land**	
	71	Dry Salt Flats.
	72	72 Beaches
	73	73 Sandy Areas other than Beaches
	74	74 Bare Exposed Rock
	75	75 Strip Mines Quarries, and Gravel Pits
	76	76 Transitional Areas
	77	77 Mixed Barren Land
8	**Tundra**	
	81	Shrub and Brush Tundra
	82	82 Herbaceous Tundra
	83	83 Bare Ground Tundra
	84	84 Wet Tundra
	85	85 Mixed Tundra
9	**Perennial Snow or Ice**	
	91	Perennial Snowfields
	92	92 Glaciers

Notes:

Land Use Data taken from GIRAS Spatial Data of CONUS in BASINS, EPA - Office of Water/OST, 1998

Sources of land use compilation data are NASA high-altitude aerial photographs, and National High-Altitude Photography (NHAP) program photographs. The land use and land cover is compiled to portray the level II categories of the land use and land cover classification system documented by Anderson and others (1976). To provide the data in digital form, the Geographic Information Retrieval and Analysis System (GIRAS) has been used.

Table 3
PALISADES POINT
Land Use / Land Coverage Areas - Auer Land Use Classification (a)

Land Use								
Auer	Clasification			Land Use Description (c)	Area		Total Area	
Type	Auer	Anderson (b)		Four Primary Land Use Types	(Acres)	(%)	(Acres)	(%)
	Urban Land Use							
Urban	R2	111	Residential (Medium High Density)	Residential	10.4	34.4	19	63.0
	R3	111	Residential (High Density)					
	C1	112	Commercial and Services	Commercial and Services	2.8	9.2		
	I1	113	Industrial	Industrial	5.87	19.4		
	I2	117	Other Urban or Built-up					
	I2	114	Trans, Comm., Util.					
	I2	116	Mixed Urban or Built-up					
	Rural Land Use							
Rural	A1	443	Mixed Forest Land	Agricultural (e)	11.19	37	11	37.0
	A1	441	Deciduous Forest Land					
	A2	221	Cropland and Pasture					
	A5	552	Lakes					
	A5	553	Reservoirs					
	A5	554	Bays and Estruaries					
	A5	551	Canals					
	A5	551	Streams					
						Totals	**30.26**	**100**

Notes:

(a) The Auer Land Use (Auer, 1978) designation of an area is based on a majority (> 50 %) of either urban or rural specified land use groupings in a study area, within a 3 km radius of the Site. In this analysis, the majority of land use types in the study are associated with an Urban Auer Land Use Classification.

(b) The Anderson (et al. 1976, modified 1999) Land Use Classification system is a hierarchical land use classification system that is based on four digits to represent one to four levels of land use classification i.e., general, descriptive, detailed, and most detailed.

(c) Anderson Land Use classified areas have been listed according to the corresponding Auer Land Use Classification and grouped as Urban or Rural according to Auer. Auer Urban Land Use types are (I1+I2+C1+R2+R3) and Rural Land Use types are (R1+R4+A1+A2+A3+A4+A5). The land use approach considers four primary land use types: Industrial, Commercial, Residential and Agricultural.

(d) Sources of land use compilation data are NASA high-altitude aerial photographs, and National High-Altitude Photography (NHAP) program photographs. The land use and land cover is compiled to portray the level II categories of the land use and land cover classification system documented by Anderson and others (1976). Land Use Data taken from GIRAS Spatial Data of CONUS in BASINS, EPA - Office of Water/OST, 1998.

(e) The majority of the agricultural land use type is comprised of water bodies.

Table 4
LAGUARDIA AIRPORT
Land Use / Land Coverage Areas - Auer Land Use Classification (a)

Land Use								
Auer	**Clasification**			**Land Use Description (c)**	**Area**		**Total Area**	
Type	**Auer**	**Anderson (b)**		**Four Primary Land Use Types**	**(Acres)**	**(%)**	**(Acres)**	**(%)**
	Urban Land Use							
Urban	R2	111	Residential (Medium High Density)	Residential	21.52	36.3	**45**	**75.6**
	R3	111	Residential (High Density)					
	C1	112	Commercial and Services	Commercial and Services	9.4	15.9		
	I1	113	Industrial	Industrial	13.83	23.4		
	I2	117	Other Urban or Built-up					
	I2	114	Trans, Comm., Util.					
	I2	116	Mixed Urban or Built-up					
	Rural Land Use							
Rural	A1	443	Mixed Forest Land	Agricultural (e)	14.48	24.4	**14**	**24.4**
	A1	441	Deciduous Forest Land					
	A2	221	Cropland and Pasture					
	A5	552	Lakes					
	A5	553	Reservoirs					
	A5	554	Bays and Estruaries					
	A5	551	Canals					
	A5	551	Streams					
						Totals	**59.23**	**100**

Notes:

(a) The Auer Land Use (Auer, 1978) designation of an area is based on a majority (> 50 %) of either urban or rural specified land use groupings in a study area, within a 3 km radius of the Site. In this analysis, the majority of land use types in the study are associated with an Urban Auer Land Use Classification.

(b) The Anderson (et al. 1976, modified 1999) Land Use Classification system is a hierarchical land use classification system that is based on four digits to represent one to four levels of land use classification i.e., general, descriptive, detailed, and most detailed.

(c) Anderson Land Use classified areas have been listed according to the corresponding Auer Land Use Classification and grouped as Urban or Rural according to Auer. Auer Urban Land Use types are (I1+I2+C1+R2+R3) and Rural Land Use types are (R1+R4+A1+A2+A3+A4+A5). The land use approach considers four primary land use types: Industrial, Commercial, Residential and Agricultural.

(d) Sources of land use compilation data are NASA high-altitude aerial photographs, and National High-Altitude Photography (NHAP) program photographs. The land use and land cover is compiled to portray the level II categories of the land use and land cover classification system documented by Anderson and others (1976). Land Use Data taken from GIRAS Spatial Data of CONUS in BASINS, EPA - Office of Water/OST, 1998.

(e) The majority of the agricultural land use type is comprised of water bodies.

Table 5
WESTCHESTER COUNTY (WHITE PLAINS) AIRPORT
Land Use / Land Coverage Areas - Auer Land Use Classification (a)

Land Use								
Auer	**Clasification**			**Land Use Description (c)**	**Area**		**Total Area**	
Type	**Auer**	**Anderson (b)**		**Four Primary Land Use Types**	**(Acres)**	**(%)**	**(Acres)**	**(%)**
	Urban Land Use							
Urban	R2	111	Residential (Medium High Density)	Residential	6.7	12.5	**16**	**30.4**
	R3	111	Residential (High Density)					
	C1	112	Commercial and Services	Commercial and Services	1.26	2.4		
	I1	113	Industrial	Industrial	8.27	15.5		
	I2	117	Other Urban or Built-up					
	I2	114	Trans, Comm., Util.					
	I2	116	Mixed Urban or Built-up					
	Rural Land Use							
Rural	A1	443	Mixed Forest Land	Agricultural (e)	37.22	69.6	**37**	**69.6**
	A1	441	Deciduous Forest Land					
	A2	221	Cropland and Pasture					
	A5	552	Lakes					
	A5	553	Reservoirs					
	A5	554	Bays and Estruaries					
	A5	551	Canals					
	A5	551	Streams					
						Totals	**53.45**	**100**

Notes:

(a) The Auer Land Use (Auer, 1978) designation of an area is based on a majority (> 50 %) of either urban or rural specified land use groupings in a study area, within a 3 km radius of the Site. In this analysis, the majority of land use types in the study are associated with a Rural Auer Land Use Classification.

(b) The Anderson (et al. 1976, modified 1999) Land Use Classification system is a hierarchical land use classification system that is based on four digits to represent one to four levels of land use classification i.e., general, descriptive, detailed, and most detailed.

(c) Anderson Land Use classified areas have been listed according to the corresponding Auer Land Use Classification and grouped as Urban or Rural according to Auer. Auer Urban Land Use types are (I1+I2+C1+R2+R3) and Rural Land Use types are (R1+R4+A1+A2+A3+A4+A5). The land use approach considers four primary land use types: Industrial, Commercial, Residential and Agricultural.

(d) Sources of land use compilation data are NASA high-altitude aerial photographs, and National High-Altitude Photography (NHAP) program photographs. The land use and land cover is compiled to portray the level II categories of the land use and land cover classification system documented by Anderson and others (1976). Land Use Data taken from GIRAS Spatial Data of CONUS in BASINS, EPA - Office of Water/OST, 1998.

(e) The majority of the agricultural land use type is comprised of deciduous forest land.

4.0 SUMMARY

Results of the comparison between climatology/meteorology and land use/cover for the two surface air stations, Westchester County Airport (HPN) and LaGuardia Airport (LGA), and the Site have been compared:

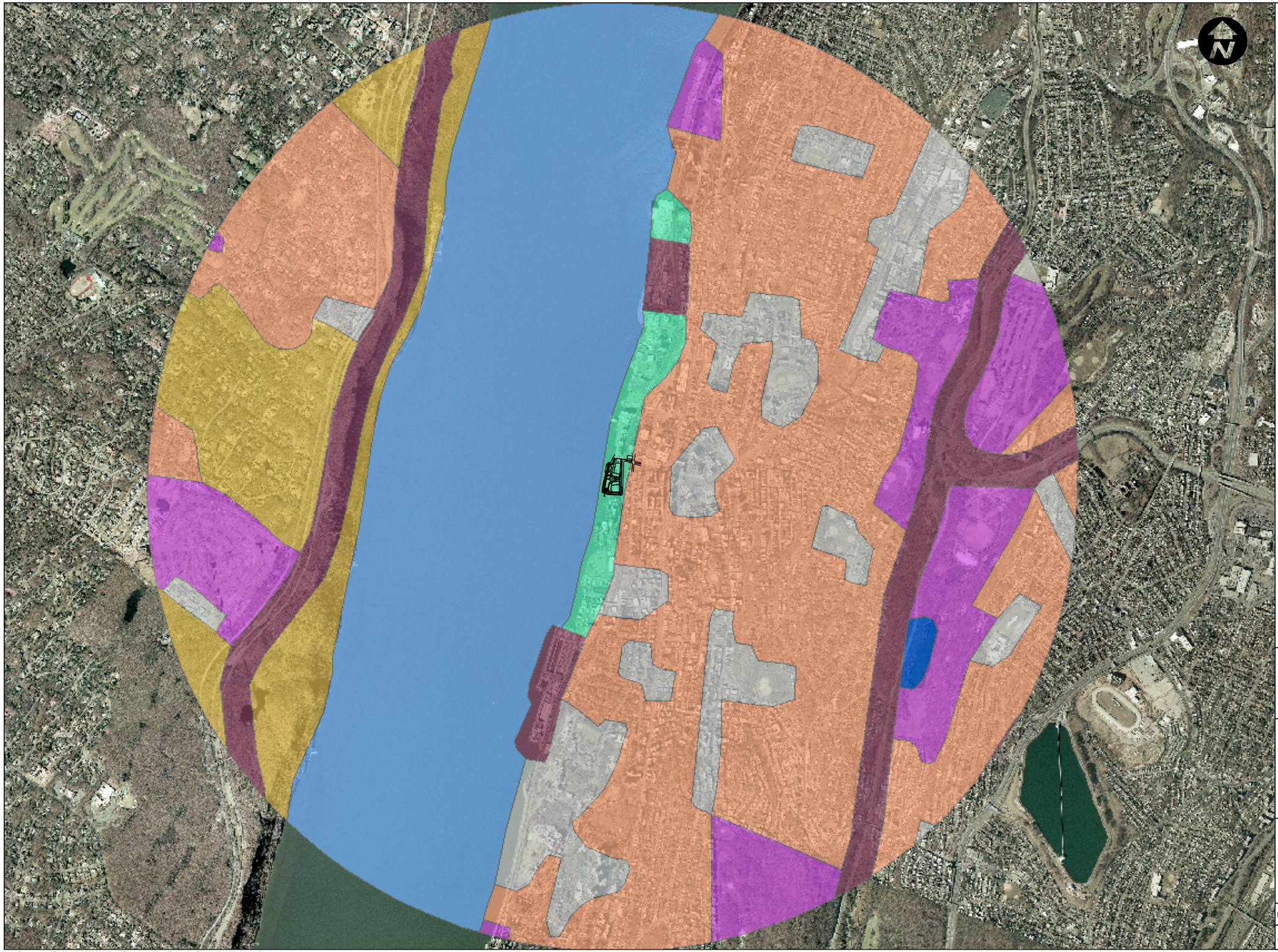
Item	Site	LGA	HPN
Elevation	3.4 meters (11 feet) above sea level	3.4 meters (11 feet) above sea level	115.5 meters (379 feet) above sea level
Station Type	---	ASOS-NWS (First Order station)	ASOS-FAA
QA/QC Data	---	"Version 3" quality control station	"Version 2" quality control station
Data Gaps	---	Day climatological inventory holdings for the LGA station are available from May of 1948 to the present with approximately 5 days of missing data	Day climatological inventory holdings for the HPN station are available from August 1948 to April 2001 with numerous months of missing data
Sea Breeze Effect	Yes	Yes	Less likely to experience a sea breeze effect of the same intensity or frequency.
Westerly Storm System Effects	---	Will experience similar affects from "westerly" storm systems	Would receive storm systems at a later time and the possibility of receiving a differing amount of daily precipitation in relation to a single storm event.
City Precipitation	Due to the reasonably uniform precipitation within the New York City area, both the HPN station and the LGA station are representative of the Site	LGA station is located south of the Site and may receive slightly less precipitation	HPN station is located north of the site and, according to the NCDC, on average would receive more annual precipitation
Urban Heat Island Effect	Yes	Yes	No
Representative of coastal relative humidity	Yes	Yes	Yes
Experience Effects of Orographic Lifting	No	No	Yes
Influence from Warm Coastal Water Temps	Yes	Yes	Not Likely
Auer Land Use	Urban	Urban	Rural

5.0 CONCLUSION

A comparison of various characteristics and features of climatology/meteorology and land use/cover was performed for the two closest surface air stations, Westchester County Airport (HPN) and LaGuardia Airport (LGA), to determine the most representative meteorological surface data of the Site for input to the AERMET meteorological pre-processor for atmospheric dispersion modeling in the vicinity of the Palisades Point Site. The LGA station is considered more representative of the meteorological conditions of the Palisades Point Site area based on the greater similarities of various characteristics of both locations (Site and LGA).

Urban land uses comprise the majority of the Palisades Point Site study area and LaGuardia Airport, while rural land uses comprise the majority of the Westchester County Airport (White Plains Airport). The results of these analyses indicate that the LaGuardia airport meteorological data is more representative than the Westchester County Airport meteorological data.

The meteorological data available from LGA has been used in this atmospheric dispersion modeling analysis. The data was obtained from the New York State Department of Environmental Conservation (NYS DEC) in a format suitable for use in the AERMET meteorological pre-processor.



Legend

Land Use Classification

- Commercial And Services
- Deciduous Forest Land
- Industrial
- Lakes
- Other Urban or Built-Up
- Residential
- Steams and Canals
- Trans, Comm, Util

Note:
Land use classifications shown are within a 3 kilometer radius of the site.

Source:
1:250,000 Scale Quadrangles of Landuse/ Lancover, GIRAS Spatial Data of CONUS in BASINS, EPA - Office of Water/OST, 1998.
Aerials Express, 2006.

0 1,500 3,000 Feet

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PALISADES POINT
CITY OF YONKERS
WESTCHESTER COUNTY,
NEW YORK

PALISADES POINT
LAND USE COMPARISON

Drn By: RS	Scale: 1" = 2,000'	Project: 03113.003.014
Ch'kd By: MH	Date: 12/19/07	Figure No. 1

Map Document: (P:\03113\003\Y\N\Maps\Fig1_LandUse_PalisadesPoint_121907_02.mxd)
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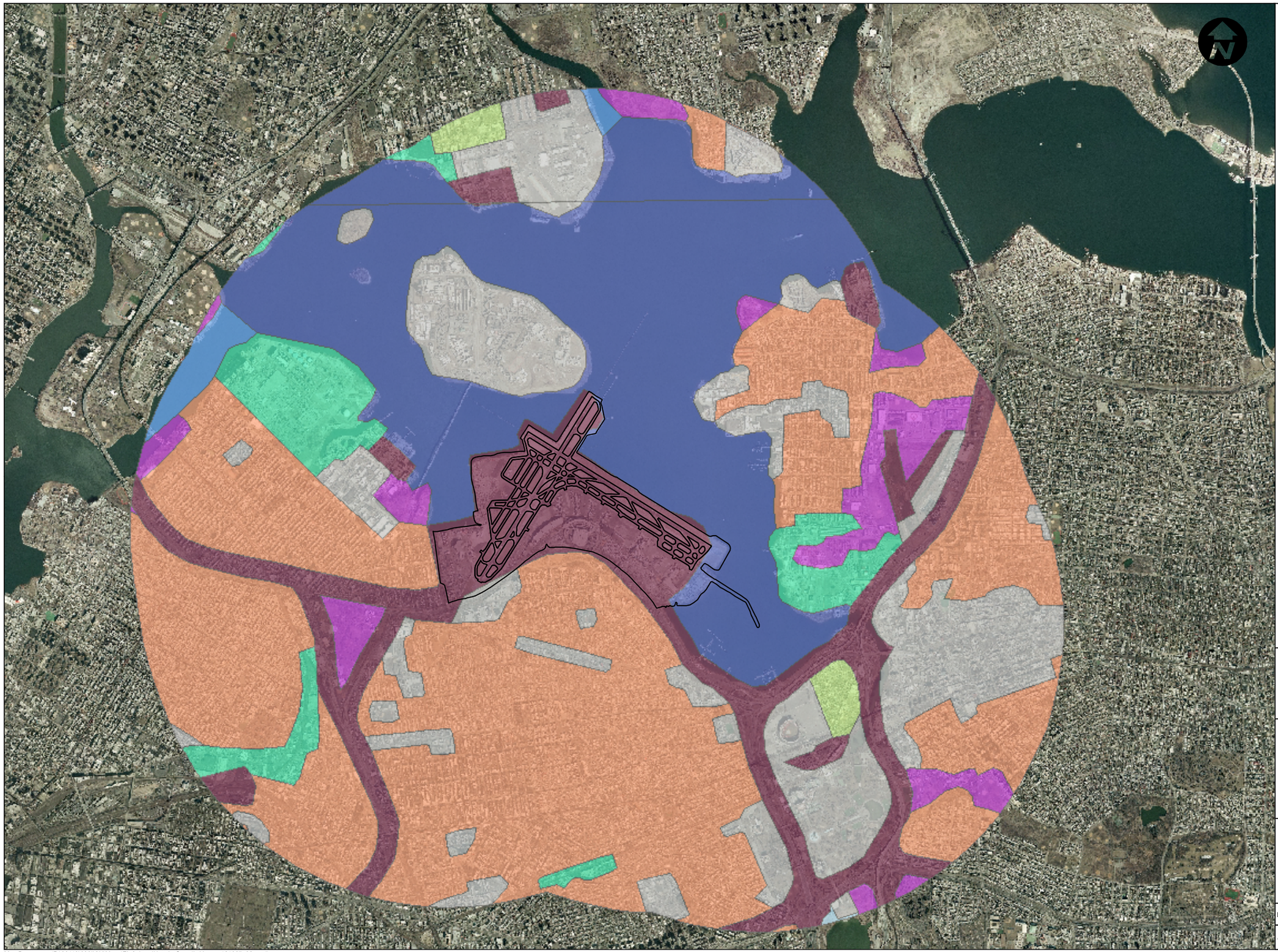

Legend

Land Use Classification

- Bays and Estuaries
- Commercial and Services
- Industrial
- Mixed Urban or Built-Up
- Other Urban or Built-Up
- Reservoirs
- Residential
- Streams and Canals
- Trans, Comm, Util

Note:
Land use classifications shown are within a 3 kilometer radius of the site.

Source:
New York Land Cover, U.S. Geological Survey (USGS), January 1997.
Aerials Express, 2006.

0 1,500 3,000 Feet

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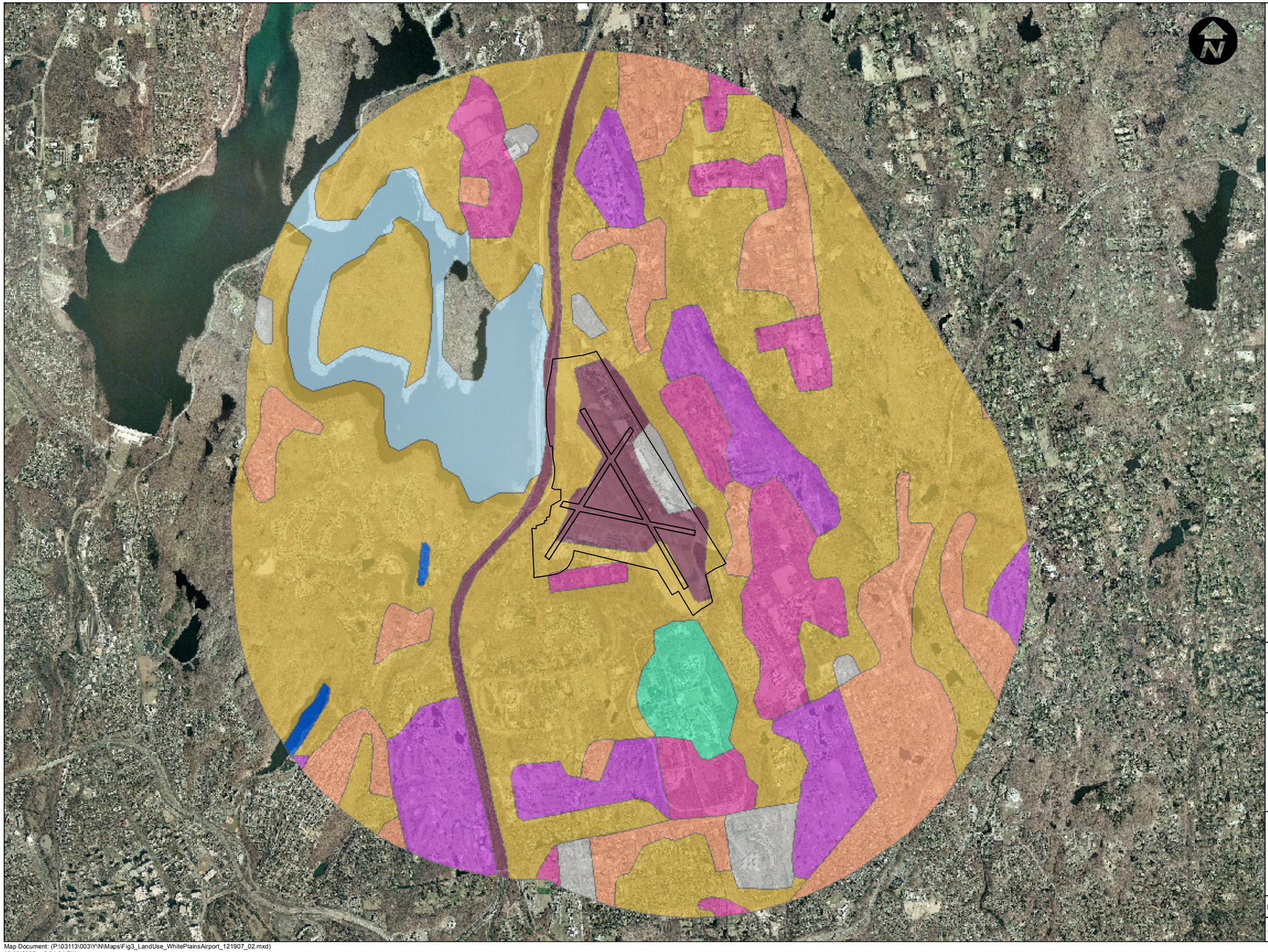
NEW YORK

LAGUARDIA AIRPORT
LAND USE COMPARISON

Drn By: RS	Scale: 1" = 3,000'	Project: 03113.003.014
Ch'kd By: MH	Date: 12/19/07	Figure No. 2

Map Document: (P:\03113\003\Y\N\Maps\Fig2_LandUse_LaGuardiaAirport_121907_02.mxd)
12/19/2007 -- 2:34:07 PM



Legend

Land Use Classification

- Commercial and Service
- Cropland and Pasture
- Deciduous Forest Land
- Industrial
- Lakes
- Other Urban or Built-Up
- Reservoirs
- Residential
- Trans, Comm, Util

Note:
Land use classifications shown are within a 3 kilometer radius of the site.

Source:
1:250,000 Scale Quadrangles of Landuse/ Lancover, GIRAS Spatial Data of CONUS in BASINS, EPA - Office of Water/OST, 1998.
Aerials Express, 2006.

0 1,500 3,000 Feet

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WESTCHESTER COUNTY,
NEW YORK

WHITE PLAINS AIRPORT
LAND USE COMPARISON

Drn By: RS	Scale: 1" = 3,000'	Project: 03113.003.014
Ch'kd By: MH	Date: 12/19/07	Figure No. 3

Map Document: (P:\03113\003\Y\N\Maps\Fig3_LandUse_WhitePlainsAirport_121907_02.mxd)
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