Woodtree Playground was not selected as a key observation point because its view toward the Project is obscured partially by an intervening structure.

As described in Section 4.5, visual impacts of the Project at these locations are not significant. The visual impact of the Project on Recreational Resources further away from the Project Site also is not significant. Both Project construction and operations are consistent with the industrial character of the visual setting surrounding these locations and will not significantly alter views from these resources.

Noise impacts at surrounding areas are evaluated in Section 4.8 of this Application. As shown in Figure 4.8-1, noise receptors were placed at several nearby locations, including the nearest publicly owned Recreational Resource, the Woodtree Playground. As provided in Section 4.8.4, operational noise impacts at Woodtree Playground will comply with the noise regulation contained in the New York City Administrative Code. Both Project construction and operations will comply with the NYDPS modified composite noise rating method. As a result, noise impacts will not be significant at this resource.

The noise analysis also confirms that noise levels from the Project will attenuate with distance. Consequently, because noise levels at the closest Recreational Resource, Woodtree Playground, are not significant, noise levels at Recreational Resources that are at similar distances or further from the Project also will not be significant.

As described in Section 4.3.2, after crossing Steinway Creek, the electric transmission interconnection extends over private property and does not cross, or interfere with, Recreational Resources. Construction of transmission towers for this interconnection is consistent with the industrial context of this area, and therefore, will not have significant visual impacts. Visual impacts will not be significant following construction because the new transmission towers associated with Project operations will be situated among, and will blend in with, other existing transmission towers and lines in this area. Noise levels from the construction and operation of the towers also will not be significant, because they generally will not be audible from areas outside of the Con Edison Complex.

The Con Edison natural gas interconnection line will be underground and will not result in visual or noise impacts. Construction will be short-term, up to approximately two months, and will have no impact on Recreational Resources because it will occur within Steinway Place/38th Street.

4.4 Terrestrial and Aquatic Resources

4.4 Terrestrial and Aquatic Resources

In accordance with PSL Sections 164(1)(a) and 164(1)(c), Section 1001.1(a), and 1001.3 of the Article X Regulations and Stipulation Nos. 9 and 12, this section: (i) characterizes the existing plant communities, wetlands, aquatic habitats, and wildlife present on the Project Site, within areas adjacent to the Project Site, in proposed construction support, areas and along the electric transmission and Con Edison natural gas interconnection routes; and (ii) analyzes potential impacts, if any, to these communities associated with the construction and operation of the Project. As set forth more fully herein, the Project Site, construction support area, and interconnection routes do not contain unusual or unique ecological communities. The Project Site is located within a highly developed industrial area containing minimal ecological resources. Furthermore, the Project will utilize air-cooled condensers rather than wet cooling technology and, thus, will avoid significant impacts to aquatic resources.

4.4.1 Methodology

Existing information pertaining to the Project Site and electric transmission and Con Edison natural gas interconnection routes, including wetland maps and documented occurrences of threatened, endangered, and species of special concern were reviewed by TRC before conducting a general site reconnaissance in the summer, 1999. The characterization of existing ecological resources on the Project Site and within the interconnection routes is based on visits conducted by TRC project team biologists beginning during the summer and fall of 1999 and continuing to date. TRC also contacted the New York State Department of Environmental Conservation (NYDEC) Natural Heritage Program, U.S. Fish and Wildlife Service (USFWS), and National Marine Fisheries Service (NMFS) regarding the occurrence of any State-listed or federal-listed rare species in the vicinity of the Project Site. See Appendix 4.4.

The Project Site inspections in summer, 1999, identified plant habitats present on the Project Site, adjacent to the Project Site, and within the electric transmission and the Con Edison natural gas interconnection routes by noting important features including dominant plant species present within each cover type. Pursuant to Stipulation No. 9, the composition and structural characteristics of each of the identified ecological communities were used to assign community classifications in accordance with the classification system presented in Ecological Communities of New York State (Reschke, 1990).

Pursuant to Stipulation No. 12, TRC inspected the Project Site and adjacent areas during June 1999 for the presence of wetlands as defined by the NYDEC (under both the Freshwater Wetlands and Tidal Wetlands Acts, and the U.S. Army Corps of Engineers (1987 Wetlands Delineation Manual). The NYDEC has mapped all regulated freshwater wetlands (greater than 12.5 acres in extent) as well as tidal wetland resource areas. The U.S. Army Corps of Engineers (ACOE) 1987 Manual uses three parameters to identify and delineate wetland boundaries: (i) evidence of wetland hydrology; (ii) presence of hydric soils; and (iii) predominance of hydrophytic plant species (as defined by the National Plant List Panel). Wetland indicators described in the ACOE Manual for each of the three parameters were examined in the field in June 1999 to determine whether any wetland resources were present on the Project Site or within the electric transmission and Con Edison natural gas interconnection routes.

Existing information pertaining to adjacent aquatic resources also was reviewed by TRC. In addition to contacting the NYDEC Natural Heritage Program, USFWS, and NMFS regarding the occurrence of any State-listed or federal-listed rare species near the Site, maps depicting the location of freshwater and tidal wetlands were obtained and information pertaining to the fisheries habitat within the adjacent East River was reviewed (LMS, 1994).

Wildlife present on the Project Site, and electric transmission and Con Edison natural gas interconnection routes was identified by TRC biologists during the summer and fall of 1999 through direct observation as well as through auditory calls and signs. A literature review also was conducted to identify additional species which are likely to use the habitats present on the Project Site and interconnection routes. The literature reviewed included published species accounts of habitat usage (DeGraaf et al., 1986) as well as range maps (including New York State Breeding Bird Atlas and Amphibian and Reptile Atlas) and descriptions (Bull, 1976; Burt and Grossenheider, 1976).

4.4.2 Laws, Policies and Regulations

The following laws, policies and regulations pertain to the Project and interconnection routes:

- Tidal Wetlands Act (6 NYCRR Part 661);
- Section 10 of Rivers and Harbors Act of 1899 (33 U.S.C. 403) and Section 404 of the Clean Water Act (33 U.S.C. 1344);
- New York State Coastal Management Program; and
- Section 7 of Endangered Species Act of 1973 (16 U.S.C. 1531).

In accordance with NYDEC Tidal Wetlands Land Use Regulations (6 NYCRR Part 661), activities subject to the jurisdiction of the Public Service Commission or the Siting Board do not require a tidal wetlands permit from the NYDEC. However, the Project must comply with the standards and requirements set forth therein. A brief discussion of development restrictions listed in 6 NYCRR Part 661, Section 661.6, and the manner in which the Project complies with these restrictions is provided in Table 4.4-1.

Steinway Creek and the East River are regulated under Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act which are administered by the ACOE. The ACOE has authorized nationwide permits that pertain to a variety of activities including proposed utility lines. Regional conditions have been proposed by the New York District of the ACOE for various nationwide permits including conditions pertaining to electric transmission lines that may provide an obstruction to a navigable water. These regional conditions became effective on June 5, 2000. The proposed ACOE New York District regional conditions that pertain to the Project are presented in Table 4.4-1.

TABLE 4.4-1:
COMPLIANCE WITH REGULATORY PROVISIONS PERTAINING TO TERRESTRIAL AND AQUATIC RESOURCES FOR THE PROJECT AND ELECTRIC TRANSMISSION AND CON EDISON NATURAL GAS INTERCONNECTIONS

Program/Standard	Compliance Status
Tidal Wetlands Act	
Minimum setback distance of 30 feet from tidal wetland	All proposed structures will be set back a minimum of 30 feet from tidal wetlands.
No more than 20 percent of adjacent area shall be covered by impervious surfaces.	Adjacent area does not extend into Project Site due to presence of existing bulkheads. No impervious surfaces are proposed in adjacent area for electric transmission and Con Edison natural gas interconnection routes.
Minimum lot size of 20,000 square feet for principal building.	Lot size exceeds 20,000 square feet at Project Site.
Minimum setback for drawings, roads, parking areas and utility line poles of 30 feet from tidal wetland.	All proposed impervious surfaces and utility poles will be set back a minimum of 30 feet from tidal wetlands.
Section 10 Rivers and Harbors Act of 1899/Section 404 Clean Water Act	
Nationwide permits are applicable to any utility line crossing of a wetland or navigable waters.	Permit required from ACOE.
Minimum clearance of electric transmission lines are required above navigable waters.	The electric transmission line design incorporates the minimum additional clearance required for a 138kV transmission line (24 feet) as well as the bridge clearance requirement (above 100-year flood elevation).
Construction best management practices must be implemented to minimize erosion and sedimentation.	Best management practices (BMPs) will be implemented during the construction of the Project.

New York State's Coastal Management Program (CMP) regulates activities within coastal resource areas. The Project is located within the area established under the State-approved New York City Waterfront Revitalization Program (NYCWRP). The CMP and NYCWRP are discussed in Section 4.2 of this Application.

Section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.) directs all Federal agencies to use their existing authorities to ensure that their actions do not jeopardize listed threatened and endangered species or adversely affect critical habitat. This applies to Federal approval of private activities through the issuance of Federal permits or other actions. Prior to receiving ACOE approval for the proposed electric transmission interconnection route, the U.S. Fish and Wildlife Service must be consulted if it appears that an endangered or threatened species is present in the proposed area.

4.4.3 Existing Conditions

The existing conditions within the Project Site, the electric transmission and Con Edison natural gas interconnection routes, and the proposed construction support areas are discussed separately in the following sections. Appendix 4.4 depicts the location of vegetative communities present, if any, within the Project Site and electric transmission and Con Edison natural gas interconnection routes.

4.4.3.1 Project Site

The Project Site, which consists of approximately 23 acres, is an entirely developed brownfield site that currently is occupied by a fuel oil storage and distribution terminal. The Project Site is surrounded by other highly industrialized uses, including other power plants and a wastewater treatment facility, and is within one mile of LaGuardia Airport. The Project Site is located adjacent to the East River (Rikers Island Channel) and Steinway Creek. The northern and western perimeters of the Project Site contain existing bulkheads adjacent to the East River and Steinway Creek, respectively.

4.4.3.1.1 Vegetation

Based on the June 1999 site inspection conducted by TRC, the Project Site consists only of highly developed areas comprised of buildings, tanks, pavement and gravel areas. No vegetated areas or unusual natural communities are present on the Project Site or adjacent areas.

4.4.3.1.2 Wetlands

No wetlands are present on the Project Site based on the NYDEC map of the area (see Appendix 4.4) and the June 1999 site inspection conducted by TRC. However, tidal wetland resources associated with the East River and Steinway Creek are adjacent to the Project Site. Two types of tidal wetland resources, "Littoral Zone" and "Coastal Shoal, Bar and Flat," are identified on the NYDEC Tidal Wetlands Map within 200 feet of the Project Site. These resource areas are defined by the NYDEC (NYDEC, 1995) as follows:

> **Coastal Shoals, Bars and Flats**: "The tidal wetland zone, designated SM on an inventory map, that (i) at high tide is covered by water, (ii) at low tide is exposed or is covered by water to a maximum depth of approximately one foot, and (iii) is not vegetated by low marsh cordgrass, Spartina alterniflora."
>
> **Littoral Zone**: "The tidal wetlands zone, designated LZ on an inventory map, that includes all lands under tidal waters which are not included in any other category... Provided, there shall be no littoral zone under waters deeper than six feet at mean low water. Pending determination by the commissioner in a particular case, the most recent, as of the effective date of this Part, national ocean survey maps published by the National Ocean Survey, National Oceanic and Atmospheric Administration shall be rebuttable presumptive evidence of such six foot depth."

The East River and Steinway Creek are identified on the NYDEC Tidal Wetlands Map as Littoral Zone while an area of Coastal Shoal, Bar and Flat is identified along the southwestern shoreline of Steinway Creek (opposite the Project Site). The locations of these tidal wetland resource areas are depicted in Figure 4.4-1. The location of the Coastal Shoal, Bar and Flat present along the western shoreline of Steinway Creek was confirmed during the June 1999 site reconnaissance by TRC. This resource area represents an unvegetated tidal flat. During low tides, the exposed flat consists of large cobbles, mud (primarily comprised of silt), and debris including scrap metal and wood. These areas function to support the invertebrate, fish and shorebird species characteristic of the City waterfront.

In addition to the tidal wetland resource areas, the NYDEC also regulates the buffer area adjacent to these wetland resource areas, which is classified as Adjacent Area and defined by NYDEC (NYDEC, 1995) as:

> **Adjacent Area**: "...any land immediately adjacent to a tidal wetland within whichever of the following limits is closest to the most landward tidal wetlands boundary, or such most landward tidal wetlands boundary is shown on an inventory map: (i) 300 feet landward of said most landward boundary of a tidal wetland, provided, however, that within the boundaries of the City of New York this distance shall be 150 feet; or (ii) to the seaward edge of the closest lawfully and presently existing (i.e., as of August 20, 1977), functional and substantial man-made structure (including, but not limited to, paved streets and highways, railroads, bulkheads and sea walls, and rip-rap walls) which lies generally parallel to said most landward tidal wetland boundary and which is a minimum of 100 feet in length as measured generally parallel to such most landward boundary, but not including individual buildings; or (iii) to the elevation contour of 10 feet above mean sea level, except when such contour crosses the seaward face of a bluff or cliff, or crosses a hill on which the slope equals or exceeds the natural angle of repose of the soil, then to the topographic crest of such bluff, cliff, or hill."

The perimeter of the Project Site contains existing bulkheads adjacent to both the East River and Steinway Creek. Therefore, Adjacent Area does not extend onto the Project Site beyond the limits of the existing bulkheads. The U.S. Army Corps of Engineers (ACOE) regulates certain work activities proposed within navigable waters under Section 10 of the Rivers and Harbors Act of 1899. In addition, the ACOE regulates the discharge of dredged or fill material into wetlands under Section 404 of the Clean Water Act. The ACOE (ACOE, 1987) defines these areas as:

> ***Navigable Waters:*** "...those waters of the United States that are subject to the ebb and flow of the tide shoreward to the mean high water mark and/or are presently used, or have been used in the past or may be susceptible to use to transport interstate or foreign commerce."

> ***Wetlands:*** "...areas that are periodically or permanently inundated or saturated by surface or ground water and support vegetation adapted for life in saturated soil. Wetlands include swamps, marshes, bogs, and similar areas...."

Based on the June 1999 site inspection, wetlands, as defined by the ACOE using indicators of wetland hydrology, soils and vegetation (ACOE, 1987), are not present on the Project Site. However, the East River and Steinway Creek both are regulated as navigable waters under Section 10 of the Rivers and Harbors Act of 1899. The limits of navigable waters are co-terminus with the limits of Littoral Zone (LZ) and Coastal Shoals, Bars and Flats (SM) depicted in Figure 4.4-1.

4.4.3.1.3 Aquatic Resources

The Project Site is located adjacent to the East River and Steinway Creek. The East River is a tidal strait connecting New York Harbor with Long Island Sound. The northeastern portion of the East River is fairly wide and contains shallow bays and marshes while the southwestern portion of the East River is narrow and appears more "river-like" in appearance. The Project Site is located southwest of Rikers Island within the northeastern portion of the East River. The shoreline of the East River at the Project Site and within the adjacent properties has been altered significantly by the placement of fill material for development and the construction of bulkheads.

The East River receives heavy commercial and recreational boat traffic as there are numerous piers and developed areas located along its length. Currently, approximately 40 ships or barges per week deliver oil to the Site during peak winter months. Untreated sewage from combined sewer outfalls (CSOs) is discharged into the East River during heavy storm events. NYDEC rates the water quality goal within the East River as "I" which is suitable for secondary contact recreation (i.e., non-swimming), fishing, and fish survival and propagation.

Previous fisheries investigations conducted in the general vicinity, within less than five river miles, of the Project Site have documented that a diversity of fish species inhabit the East River (Lawler, Matusky & Skelly, 1994). Over 60 species of fish were documented within the East

River with winter flounder *(Pseudopleuronectes americanus)*, Atlantic tomcod *(Microgadus tomcod)*, grubby *(Myoxocephalus aenaeus)*, bay anchovy *(Anchoa mitchilli)*, fourbeard rockling *(Enchelyopsus cimbrius)*, American sand lance *(Ammodytes americanus)*, northern pipefish *(Syngnathus fuscus)*, striped searobin *(Prionotus evolans)*, seaboard goby *(Gobiosoma ginsburgi)*, American herring *(Clupea harengus)*, and Conger eel *(Conger oceanicus)* the predominant species.

4.4.3.1.4 Wildlife

Due to the fact that the Project Site currently is used as a fuel oil storage and distribution terminal and is surrounded by an extensive amount of industrial development, the Project Site does not provide vegetated terrestrial habitat or function as a travel corridor for wildlife. The June 1999 site visit by TRC confirmed that unusual habitats are not present on the Site.

The buildings and gravel areas present on the Project Site provide suitable nesting or roosting habitat for those species adapted for highly urbanized areas. Species likely to reside permanently on the Project Site are limited to species which generally use buildings or structures for breeding such as the house mouse (*Mus musculus*), little brown bat (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*), rock dove (*Columba livia*) (observed), European starling (*Sturnus vulgaris*) (observed), and house sparrow (*Passer domesticus*) (observed). A list of potential wildlife that reasonably may be assumed to be present on the Project Site is presented in Table 4.4-2.

4.4.3.1.5 Threatened and Endangered Species

TRC contacted the NYDEC Natural Heritage Program, U.S. Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS) regarding the potential presence of state- or Federally-listed endangered, threatened, or species of special concern on, or adjacent to, the Project Site. These agencies confirm that no endangered, threatened or species of special concern previously have been documented on, or within the vicinity of, the Project Site (see Appendix 4.4). However, the USFWS has indicated that the peregrine falcon (*Falco*

TABLE 4.4-2:
POTENTIAL WILDLIFE SPECIES REASONABLY LIKELY TO BE PRESENT AT THE PROJECT SITE AND TRANSMISSION CORRIDORS.

Family	Common Name	Scientific Name	Guild (a)	Forage Method	Buildings On-Site	Urban Vacant Lot	Aquatic Habitats
Amphibians							
Bufonidae	Eastern American Toad	*Bufo a. americanus*	I	Ground Ambusher		X	
Birds							
Accipitridae	*Red-tailed Hawk	*Buteo jamaicensis*	C	Ground Pouncer		X	
Alaudidae	Horned Lark	*Eremophila alpestris*	G	Ground Gleaner		X	
Alcedinidae	Belted Kingfisher	*Ceryle alcyon*	P	Water Plunger			X
Anatidae	American Black Duck	*Anas rubripes*	O	Water Forager			X
	Black Scoter	*Melanitta nigra*	O	Bottom Forager			X
	Bufflehead	*Bucephala albeola*	O	Bottom Forager			X
	*Canada Goose	*Branta canadensis*	H	Ground Grazer		X	X
	Common Goldeneye	*Bucephala clangula*	O	Bottom Forager			X
	Greater Scaup	*Aythya marila*	O	Bottom Forager			X
	*Mallard	*Anas platyrhynchos*	G	Water Forager			X
	Red-breasted Merganser	*Mergus serrator*	P	Water Diver			X
	Surf Scoter	*Melanitta perspicillata*	O	Bottom Forager			X
	White-winged Scoter	*Melanitta fusca*	O	Bottom Forager			X

TABLE 4.4-2: (Cont.)
POTENTIAL WILDLIFE SPECIES REASONABLY LIKELY TO BE PRESENT AT THE PROJECT SITE AND TRANSMISSION CORRIDORS.

Family	Common Name	Scientific Name	Guild (a)	Forage Method	Buildings On-Site	Urban Vacant Lot	Aquatic Habitats
Apodidae	Chimney Swift	*Chaetura pelagica*	I	Air Screener	X	X	X
Ardeidae	Black-crowned Night-Heron	*Nycticorax nycticorax*	C	Water Ambusher			X
	Great Blue Heron	*Ardea herodias*	C	Water Ambusher			X
	Great Egret	*Egretta alba*	C	Water Ambusher			X
	Green-backed Heron	*Butorides striatus*	C	Water Ambusher			X
	*Snowy Egret	*Egretta thula*	C	Water Ambusher			X
Caprimulgidae	Common Nighthawk	*Chordeiles minor*	I	Air Screener		X	X
Charadriidae	*Killdeer	*Charadrius vociferus*	I	Ground Gleaner		X	X
Columbidae	*Mourning Dove	*Zenaida macroura*	G	Ground Gleaner		X	
	*Rock Dove	*Columba livia*	O	Ground Gleaner	X	X	
Corvidae	*American Crow	*Corvus brachyrhynchos*	O	Ground Gleaner		X	
Falconidae	Peregrine Falcon	*Falco peregrinus*	C	Air Hawker		X	X
Fringillidae	American Goldfinch	*Carduelis tristis*	O	Ground Gleaner		X	
	Chipping Sparrow	*Spizella passerina*	O	Ground Gleaner		X	
	Dark-eyed Junco	*Junco hyemalis*	G	Ground Gleaner		X	
	House Finch	*Carpodacus mexicanus*	O	Ground Gleaner	X	X	

TABLE 4.4-2: (Cont.) POTENTIAL WILDLIFE SPECIES REASONABLY LIKELY TO BE PRESENT AT THE PROJECT SITE AND TRANSMISSION CORRIDORS.							
Family	**Common Name**	**Scientific Name**	**Guild (a)**	**Forage Method**	**Buildings On-Site**	**Urban Vacant Lot**	**Aquatic Habitats**
Hirundinidae	*Barn Swallow	*Hirundo rustica*	I	Air Screener	X	X	X
Icterinae	Brown-headed Cowbird	*Molothrus ater*	O	Ground Gleaner		X	
	Common Grackle	*Quiscalus quiscula*	O	Ground Gleaner		X	
Laridae	Great Black-backed Gull	*Larus marinus*	C	Coastal Scavenger			X
	Herring Gull	*Larus argentatus*	C	Coastal Scavenger		X	X
	*Laughing Gull	*Larus atricilla*	C	Coastal Scavenger			X
	Ring-billed Gull	*Larus delawarensis*	C	Coastal Scavenger			X
Phalacrocoracidae	Double-crested Cormorant	*Phalacrocorax auritus*	P	Water Diver			X
Phasianidae	*Ring-necked Pheasant	*Phasianus colchicus*	O	Ground Gleaner		X	
Ploceidae	*House Sparrow	*Passer domesticus*	G	Ground Gleaner	X	X	
Scolopacidae	Spotted Sandpiper	*Actitis macularia*	O	Riparian Gleaner			X
	Greater Yellowlegs	*Tringa melanoleuca*	O	Water Prober			X
Sturnidae	*European Starling	*Sturnus vulgaris*	O	Ground Gleaner	X	X	
Turdidae	American Robin	*Turdus migratorius*	O	Ground Gleaner		X	X

TABLE 4.4-2: (Cont.)
POTENTIAL WILDLIFE SPECIES REASONABLY LIKELY TO BE PRESENT AT THE PROJECT SITE AND TRANSMISSION CORRIDORS.

Family	Common Name	Scientific Name	Guild (a)	Forage Method	Buildings On-Site	Urban Vacant Lot	Aquatic Habitats
Mammals							
Cricetidae	White-footed Mouse	*Peromyscus leucopus*	O	Ground Forager	X	X	
Leporidae	Eastern Cottontail	*Sylvilagus floridanus*	H	Ground Grazer		X	
Muridae	House Mouse	*Mus musculus*	O	Ground Forager	X	X	
	Norway Rat	*Rattus norvegicus*	O	Ground Forager	X	X	X
	Woodchuck	*Marmota monax*	H	Ground Grazer		X	
Vespertilionidae	Big Brown Bat	*Eptesicus fuscus*	I	Air Hawker	X	X	X
	Little Brown Bat	*Myotis lucifugus*	I	Air Hawker	X	X	X
Reptiles							
Colubridae	Northern Brown Snake	*Storeria d. dekayi*	I	Ground Ambusher		X	

* Species observed during site visits by TRC biologists (1999, 2000).
(a) Guilds include:
C: Carnivore G: Granivore I: Insectivore P: Piscivore
F: Frugivore H: Herbivore O: Omnivore

peregrinus), a former federally-listed endangered species, is known to occur in the surrounding area (see Appendix 4.4). The peregrine falcon also is a New York State-listed endangered species.

The peregrine falcon is a medium-sized raptor whose population was decimated by organochlorine pesticides (e.g., DDT and its metabolite DDE) during the late 1940s through the mid-1970s (USFWS, 1999a). The peregrine falcon population in the eastern United States was considered extirpated by the mid-1960s and in 1970, the bird was listed as endangered by the USFWS after passage of the Endangered Species Conservation Act of 1969 (USFWS, 1999a). The restrictions on organochlorine pesticide use (including the banning of DDT in 1972) and successful management actions (e.g., reintroduction of captive-bred and relocated hatchlings, protection of nest sites) have resulted in a remarkable comeback for the peregrine falcon. On August 25, 1999 the USFWS delisted the peregrine falcon (USFWS, 1999b). However, the USFWS will continue to monitor the peregrine falcon population for an additional 13 years (USFWS, 1999b).

In the general vicinity of the Project Site (i.e., New York City), typical peregrine falcon nesting habitat includes tall buildings and bridges. The nearest identified peregrine falcon nest sites are located on a building approximately four miles from the Project Site[1] (on Manhattan Island) and on a bridge approximately six miles from the Site. It is unknown whether falcons at the nearest active nest sites actually forage in the vicinity of the Project Site. The Project Site itself does not provide suitable nesting habitat nor important foraging areas. Potential foraging areas associated with Steinway Creek are discussed in Section 4.4.3.2.5.

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[1] B. Louckes, NYDEC Endangered Species Unit. Personal Communication with S. Heim, TRC Environmental Corporation. January 14, 2000.

4.4.3.2 Electric Transmission and Con Edison Natural Gas Interconnection Routes

The Con Edison natural gas interconnection route will run underground along Steinway Place within a highly urbanized area. The natural gas interconnection route does not contain vegetated areas, wetland resource areas, aquatic resources, vegetated wildlife habitats or habitat for endangered or threatened species. Therefore, this section focuses on the electric interconnection route.

4.4.3.2.1 Vegetation

The route of the electric transmission interconnection is approximately 3200 feet in length and will be located primarily within a disturbed area containing a mix of paved areas and grass vegetation that is maintained at a short height by frequent mowing. The location of plant communities within the electric interconnection is depicted in Figure 4.4-1. Vegetated areas within the electric transmission route are immediately adjacent to paved roadways. This area can best be described as an Urban Vacant Lot community within the Terrestrial Cultural Subsystem (Reschke, 1990). The community generally is associated with an open site in a developed, urban area that typically supports the prevalence of ruderal species adapted for disturbed areas. Based on the June 1999 site visit, vegetation within the community was dominated by unidentified grass species (no seed heads present due to mowing) and other herbaceous species including common dandelion (*Taraxacum officinale*) and common plantain (*Plantago major*). No trees are present within the electric transmission interconnection route.

4.4.3.2.2 Wetlands

As depicted on Figure 4.4-1, a tidal wetland resource area (Littoral Zone) associated with Steinway Creek is present within the electric transmission interconnection route. Based on the June 1999 site visit by TRC, additional wetland resource areas are not present within the electric transmission interconnection route. An existing bulkhead abuts the portion of Steinway Creek within the electric transmission interconnection route opposite the Project Site. Therefore, Adjacent Area does not extend within the electric transmission interconnection route at the crossing location.

4.4.3.2.3 Aquatic Resources

The electric transmission interconnection route crosses Steinway Creek, a tributary to the East River. Portions of Steinway Creek adjacent to the Project Site previously have been dredged to maintain depths of approximately 22.5 to 35 feet below mean low water for the berthing of fuel oil vessels. The NYDEC rates the water quality goal within the East River as "I" which is suitable for secondary contact recreation (i.e., non-swimming), fishing, and fish survival and propagation. Fish species documented within the East River are discussed in Section 4.4.3.1.3.

4.4.3.2.4 Wildlife

After it crosses Steinway Creek, the electric transmission interconnection route contains foraging habitat that is suitable for many of the species expected to be nesting or roosting at the Project Site (see Section 4.4.3.1.4) as well as additional herbivorous and insectivorous species which may forage on vegetation and insects, respectively, within the Urban Vacant Lot community. Although there is little cover provided by the short grass community present within the electric transmission interconnection route, adjoining areas containing some trees and scrub-shrub vegetation provide suitable cover for wildlife. Species identified or likely to use the Urban Vacant Lot community include ring-necked pheasant (*Phasianus colchicus*) (observed), killdeer (*Charadrius vociferus*) (observed), mourning dove (*Zenaida macroura*) (observed), American crow (*Corvus brachyrhynchos*) (observed), song sparrow (*Melospiza melodia*), Canada goose (*Branta canadensis*) (observed), red-tailed hawk (*Buteo jamaicensis*) (observed), brown-headed cowbird (*Molothrus ater*), eastern cottontail (*Sylvilagus floridanus*), woodchuck (*Marmota monax*), and northern brown snake (*Storeria dekayi*). A list of wildlife species that may utilize the Urban Vacant Lot community is provided in Table 4.4-2.

The aquatic habitats within Steinway Creek provide suitable habitat for several species of wildlife (see Table 4.4-2). Various gull species and double-crested cormorants (*Phalacrocorax auritus*) may be present within the deeper open water areas while areas of open water with shallower depths may be used by various waterfowl such as the American black duck (*Anas rubripes*) and overwintering seaducks (i.e., scaup and scoters). The coastal flat present in the southwestern portion of Steinway Creek provides limited habitat for various wading birds such as snowy egrets (*Egretta thula*) (observed) and shorebirds, particularly during periods of spring and fall migration.

4.4.3.2.5 Threatened and Endangered Species

As stated in Section 4.3.2.1.4, the State-endangered peregrine falcon has been identified as potentially occurring in the vicinity of the Project Site. Although potential nesting sites are not present either on the Project Site or in the immediate vicinity of the electric transmission interconnection route, peregrine falcons may forage on avian prey in suitable habitat near the electric transmission interconnection route. However, given the small size of the nearby coastal flat and the considerable distance this area is from the nearest falcon nests, it is unlikely that this area (including Steinway Creek) provides a significant portion of their dietary requirements. It should be noted that a number of electric transmission lines currently are present in close proximity to the new electric transmission route. Although the utility poles associated with these transmission lines may provide perching sites for peregrine falcons from which to search prey, raptors generally prefer poles with crossarms located perpendicular to the prevailing wind as perch sites (Anderson, 1975; Askham, 1991). The utility poles near the electric transmission interconnection route do not have crossarms.

4.4.3.3 Construction Support Areas

It is anticipated that developed/disturbed areas that do not support significant biological resources will be used as needed as off-site support areas for Project construction. Several such areas have been investigated and are expected to be readily available.

4.4.4 Potential Impacts and Proposed Mitigation

The following sections discuss the potential impacts, if any, to vegetation, wetlands, aquatic resources and wildlife (including listed species) from the construction and operation of the Project and the corresponding electric transmission and Con Edison natural gas interconnection routes. Because developed/disturbed areas that do not support significant biological resources will be used as construction support areas for Project construction on an as needed basis, no significant adverse impacts to terrestrial or aquatic resources are expected.

4.4.4.1 Potential Construction Impacts and Proposed Mitigation

4.4.4.1.1 Vegetation

No rare plant communities or endangered, threatened, or species of special concern plants have been reported to occur on the Project Site or the electric transmission and Con Edison natural gas interconnection routes. The construction of the Project on the Site will not result in impacts to vegetated cover types as the entire Project Site is currently developed and devoid of plant communities and trees. The Con Edison natural gas interconnection route will be located within existing streets situated in a highly urbanized area. Its construction also will not impact vegetated areas.

Construction of the electric transmission interconnection route will result in limited and temporary disturbance (less than 2 percent) to the Urban Vacant Lot community present within this immediate area. This temporary impact will result from the installation of utility poles which will require limited excavation and soil disturbance. However, plant species typical of the general vegetational community present or otherwise typical within the electric transmission interconnection route are expected to rapidly recolonize these small areas of disturbance. Therefore, no mitigation will be required for this activity.

4.4.4.1.2 Wetlands

As set forth above, the Project will be located outside the limits of the tidal wetlands (Littoral Zone) and navigable waters (i.e., Steinway Creek and East River). Due to the presence of the existing bulkheads along the western perimeter of the Site, the Project also will be located outside the limits of the Adjacent Area. Furthermore, indirect impacts to wetland resources have been minimized through incorporation of minimum setback distances (30 feet for buildings and impervious surfaces). In addition, appropriate erosion and sediment control measures will be used (see Section 4.9) to minimize loss of soil via stormwater runoff into adjacent wetland resource areas during Project construction.

The electric transmission interconnection route will cross Steinway Creek. Supporting utility poles will not be located within 30 feet of Steinway Creek and no fill material will be placed within wetland resource areas. The utility poles also will be placed outside of the limits of the Adjacent Area. Thus, no impacts to wetlands are anticipated from the construction of the electric transmission interconnection route. The Con Edison natural gas interconnection route is situated in existing streets in a highly urbanized area and also will not impact wetland resource areas. No construction support activities will occur in adjacent areas within 30 feet of Steinway Creek or other wetland resource areas. No construction support activities will occur in adjacent areas within 30 feet of Steinway Creek or other wetland resource areas.

4.4.4.1.3 Aquatic Resources

The Project and interconnection routes, will be located outside the limits of aquatic resource areas. The Project will utilize an air-cooled technology which will essentially eliminate impacts to the adjacent aquatic resource areas. In addition, appropriate erosion and sediment control measures (see Section 4.9) to minimize loss of soil via stormwater runoff into adjacent aquatic resource areas during the construction of the Project will be used.

4.4.4.1.4 Wildlife

The construction of the Project including the associated Con Edison natural gas and electric transmission interconnection routes is expected to result in negligible impacts to wildlife. The Project Site currently provides limited habitat for wildlife (primarily introduced species) that have adapted to a highly urbanized environment. The construction of the Project may result in a temporary disturbance to wildlife such as pigeons, mice and rats, which use buildings currently on the Project Site. During the construction of the Project, waterbirds such as gulls and Canada geese may avoid the area in the immediate vicinity of the Project Site due to the increased activity. Following completion of construction, wildlife is expected to resume use of the Site in a manner similar to existing conditions.

The Con Edison natural gas interconnection route will be located underneath existing streets and will not result in any impacts to wildlife. The electric transmission interconnection route will involve limited, temporary disturbances to the Urban Vacant Lot community. The electric transmission interconnection route temporarily will alter a small portion of the total area of this community (less than 2 percent). During construction, wildlife that typically forage within this area may move to adjacent undisturbed areas until the construction work has been completed. No long-term impacts are anticipated from the construction process associated with the utility poles and transmission lines. No long-term impacts to wildlife are anticipated from the temporary use of areas for construction support.

4.4.4.1.5 Threatened and Endangered Species

The only listed species identified as potentially present in the vicinity of the Project Site is the peregrine falcon. Peregrine falcons are not presently nesting in the vicinity of the Project Site. The nearest nesting location is approximately four miles west of the Project Site. It is possible that peregrine falcons forage in the vicinity of the Site, particularly near the coastal flat of Steinway Creek (when shorebirds are present). Although the construction of the Project, the electric transmission interconnection route and the Con Edison natural gas interconnection route is not expected to have a long-term impact on the habitat of potential peregrine falcon prey, the increased activity associated with this construction temporarily may displace prey species until the construction is completed. Such displacement could increase foraging success but to an insignificant extent. However, given the small size of the nearby coastal flat and the considerable distance from the Site to the nearest falcon nests, the Project Site and its environs (including Steinway Creek) is not likely to provide a significant portion of the local falcons' foraging requirements.

The placement of the electric transmission lines over Steinway Creek may pose a slight risk to peregrine falcons from collisions with the wires as they pursue prey. However, given the existing considerable extent of electric transmission lines present in the vicinity of the Site (and in closer proximity to known falcon nest sites) and the expected low importance of the Site and vicinity to foraging falcons, the risk from collisions is expected to be minimal. Peregrine falcons potentially may come into contact with grease or oil present on the top of equipment cranes used during the construction of the facility.[2] However, the placement of protective covers on the crane tops will prevent any potential impacts to falcons that may perch on the cranes. Overall, no significant adverse effects are expected to result to the peregrine falcon or its habitat.

4.4.4.2 Potential Operational Impacts and Proposed Mitigation

4.4.4.2.1 Vegetation

An analysis was conducted of air quality impacts on sensitive vegetation types (e.g., shade trees) that are present within areas that would potentially be exposed to maximum predicted emission concentrations associated with the Project. The evaluation of potential impacts on vegetation was conducted in accordance with *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals* (EPA, 1980). Predicted emission concentrations of various constituents from the Project were added to ambient background concentrations to provide a screening assessment regarding the potential for adversely impacting sensitive types of vegetation.

Screening concentrations used in this assessment represent the minimum ambient concentrations reported in the scientific literature (EPA, 1980) for which adverse effects (e.g., visible damage or growth retardation) to plants have been reported for the potential pollutants sulfur dioxide (SO_2), nitrogen dioxide (NO_2), and carbon monoxide (CO).

The primary vegetation of importance in this area are various species of shade trees. Screening concentrations generally are provided for sensitive plant species and resistant vegetation as well as intermediate plant species which fall between these two categories. Many of the designated

[2] C. Nadaredski, NYCDEP Personal Communication with S. Heim, TRC Environmental Corporation, February 3, 2000.

screening levels for sensitive plant species are similar to, or exceed, NAAQS and/or PSD concentrations. However, the 3-hour sensitive vegetation screening concentration for SO_2 is lower than the comparable NAAQS standard.

Table 4.4-3 presents a comparison of modeled concentrations from the Project (including ambient background levels) for several constituents (i.e., SO_2, NO_2, CO) with their respective vegetation screening concentrations. Maximum predicted NO_2 concentrations (including background levels) are presented for the 4-hour, 8-hour, 1-month, and annual averaging times while maximum predicted concentrations of SO_2 (including background concentrations) are presented for 1-hour, 3-hour and annual exposure scenarios. The maximum predicted CO concentration for the 1-week averaging time also is presented (including ambient background levels) as are the 1-month and 3-month averaging periods for beryllium and lead, respectively.

The predicted maximum concentrations (including existing ambient background concentrations) of NO_2 and SO_2 are at least an order of magnitude below their respective minimum vegetation screening thresholds for sensitive vegetation species. The maximum concentrations of CO, beryllium and lead (including the ambient background level) are also well below their vegetation sensitivity screening criteria. Therefore, Project operations will not result in adverse effects to vegetation present in this area.

TABLE 4.4-3:
COMPARISON OF PREDICTED AIR CONSTITUENT CONCENTRATIONS TO VEGETATION SCREENING CONCENTRATIONS

Air Constituent	Average Time	Vegetation Screening Concentration ($\mu g/m^3$)	Maximum Concentration ($\mu g/m^3$)
SO_2	1-hour	917	24.5
	3-hour	786	14.1
	Annual	18	0.351

TABLE 4.4-3: (Cont.) COMPARISON OF PREDICTED AIR CONSTITUENT CONCENTRATIONS TO VEGETATION SCREENING CONCENTRATIONS			
Air Constituent	Average Time	Vegetation Screening Concentration (μg/m³)	Maximum Concentration (μg/ m³)
NO_2	4-hour	3760	20.3
	8-hour	3760	15.4
	Month	564	1.7
	Annual	94	0.967
CO	Week	1,800,000	6.85[1]
Beryllium	Month	0.01	7.3 0E-06
Lead	3-Month	1.5	1.28E-03[2]

[1] Modeled with a 24-hour average impact.

[2] Modeled with a monthly average impact.

4.4.4.2.2 Wetlands

The operation of the Project is not expected to have significant adverse impacts on wetlands resources. The Project will not result in any additional dredging or discharge of fill material to wetland resource areas associated with Steinway Creek or the East River. Stormwater will be managed in accordance with applicable regulations. (See Section 4.9.) Two stormwater treatment basins will be built at the Project Site. The basins will be designed to retain the first 0.5 inches of precipitation associated with the "first flush". Discharges from the basins will be controlled and water released such that water treatment for suspended solids is obtained. Therefore, stormwater discharge to nearby wetland resource areas (e.g., Steinway Creek and East River) will not result in significant adverse impacts. Oil-related vessel traffic to the Site will decline compared to current conditions.

4.4.4.2.3 Aquatic Resources

The Project will avoid intake and discharge impacts to aquatic resources by utilizing air-cooled condensers as its cooling technology and discharging wastewater to the municipal sewer facility. In addition, as set forth in Section 4.4.4.2.2, stormwater will be managed appropriately. Thus, the operation of the Project is not expected to have significant adverse impacts to aquatic resources.

4.4.4.2.4 Wildlife

As set forth in Section 4.4.4.2.1, the operation of the Project will meet the applicable air quality screening thresholds. In addition, Project operations will not significantly increase noise levels, especially given the nearby proximity of LaGuardia Airport. In general, sound levels above 90 dBA may result in adverse effects to mammals and birds. (See Manci et al., 1988.) As detailed in Section 4.8, Project operations will not even approach this level. Moreover, urban wildlife are acclimated to the projected noise levels. Therefore, no significant adverse impacts to wildlife are expected from the operation of the Project.

4.4.4.2.5 Threatened and Endangered Species

The operation of the Project is not expected to significantly affect peregrine falcons which may be present occasionally in the vicinity (i.e., four to six miles) of the Project Site. As no adverse effects are anticipated to vegetation and to wildlife (see preceding sections), the abundance of falcon prey species is not expected to change significantly on, and within the vicinity of, the Project Site.

4.4.5 References

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4.5 Visual Resources

4.5 Visual Resources

4.5.1 Introduction

In accordance with PSL Sections 164(1)(a) and (c), Sections 1001.1(a) and 1001.3 of the Article X Regulations and Stipulation No. 11, this section: (i) sets forth the current visual conditions in a defined study area; and (ii) addresses the potential visual impacts of the Project on this study area. The Project will be constructed on the site of an existing fuel oil storage and distribution terminal located in the Bowery Bay/Steinway Industrial Area of the Astoria section of Queens.

In accordance with Stipulation No. 11, an area that extends to a one-mile distance from the Project Site was evaluated (Visual Study Area). Ten representative viewpoints in the Visual Study Area were selected in order to provide a mixture of views from the nearby industrial area and more distant residential areas. A viewpoint also was selected from the East River to simulate views that may be experienced by riders on the passenger water shuttle that runs from LaGuardia Airport to locations in Manhattan and the Bronx or occasional recreational boaters.

Information included in this section is based on a literature review, existing data, agency consultation and field surveys performed in accordance with Stipulation No. 11. Potential visual impacts of the Project were identified and evaluated using a study methodology that was based on a customized application of applicable aspects of the Visual Resources Assessment Procedure (VRAP) of the U.S. Army Corps of Engineers (ACOE) (Smardon, et al., 1988). The VRAP is an established and systematic method used to evaluate and classify existing aesthetic quality and measure visual impacts from a specific project. The procedure includes the identification of viewer groups, definition of Landscape Similarity Zones, selection of representative viewpoints, preparation of computer-assisted simulations of the completed Project and completion of comparative ratings of visual quality/impact.

In preparing this visual analysis, the following documents were used:

- NYDEC, DEC Aesthetics Handbook, 1996

- U.S. Forest Service, Landscape Aesthetics: A Handbook for Scenery Management, Agriculture Handbook Number 701, 1995
- Smardon, R.C. et al., Visual Resources Assessment Procedure for ACOE, Instruction Report EL-88-1

Impacts of the Project were evaluated using photo simulations to demonstrate potential new views of the Site from the selected representative viewpoints after completion of Project construction. As described more fully below, the evaluation shows that the Project is not expected to significantly alter the viewshed from any location in the Visual Study Area. In most cases, the change in view consists only of the addition of a stack flue structure. This stack flue structure is consistent with the heavy industrial character of the area, including the existing five sets of double stacks at the Con Edison Complex located to the west of the Site. From some viewpoints, the new stack flue structure does not clearly stand out in the photo simulations. Moreover, where views of the Project Site from some of the closer locations include more than the stack flue structure, the rest of the Project looks similar to buildings currently in the area around the Site. As a result, views from closer locations are not expected to produce significant adverse impacts.

4.5.2 Existing Conditions

4.5.2.1 Regional Landscape Identification/Study Area Overview

Figure 4.5-1 shows the Visual Study Area. The Project Site is located along the East River in northwestern Queens in the Bowery Bay/Steinway Industrial Area at the corner of Steinway Street and Berrian Boulevard in a manufacturing, heavy industry and utility district. Currently, the approximately 23 acre Site contains a fuel oil storage and distribution terminal where oil supply trucks obtain fuel oil for delivery to customers throughout the New York City metropolitan area. As many as 320 fuel oil truck trips can occur on a busy day with an average of approximately 160 fuel oil truck trips each day.

A pier extends from the northern edge of the Site into the East River. It is used for barge or ship transport of oil to the Site and can support up to three docked barges or ships. As many as 40 barges/ships currently dock at the Site during a busy month with an average of approximately 20 to 25 each month.

As described more fully in Section 4.2 of this Application, the area immediately adjacent to the Site is industrial and includes warehouses, auto repair shops and automobile-related uses, hauling companies, construction offices, manufacturing facilities and utility companies. Immediately to the east is the Bowery Bay Water Pollution Control Plant. This New York City Department of Environmental Protection facility extends for six blocks along Berrian Boulevard, and north to Bowery Bay. Access to the East River along Berrian Boulevard is entirely restricted by a chain-link fence. To the south, there is a mix of industrial/manufacturing uses. These uses include a construction company office and several auto maintenance and repair garages.

Immediately adjacent to the southern boundary of the Project Site is the Steinway and Sons piano manufacturing factory. This factory has operated for more than 100 years and extends along 19th Avenue for three blocks from Steinway Street to Steinway Creek. The factory is surrounded by a chain-link fence and includes a 125 foot stack that has been a visible feature of the factory for many years.

Across 19th Avenue to the south/west approximately three blocks from the Site, opposite the piano factory, is a Waldbaums supermarket and retail strip mall with parking and street access from 39th Street. As set forth in Section 4.3, the closest open space to the Site is Woodtree Playground, opposite the Waldbaums at 20th Avenue between 37th Street and 38th Street. As shown on Figure 4.5-1, the Con Edison natural gas interconnection route will extend underground directly through this area from 20th Avenue down Steinway Place to the Project Site.

The Con Edison Complex is located to the west of the Project Site and extends from the west side of Steinway Creek north and west to the East River. As described in Section 3.0, this site contains several electric transmission and generating facilities. Con Edison owns the Astoria

West Substation and the Astoria East Substation, the facility that will be used to connect the Project to the electric grid. As shown on Figure 4.5-1, the electric transmission interconnection route will cross Steinway Creek adjacent to the Project Site and extend through the Con Edison Complex to the Astoria East Substation. Three separate electric generating facilities also are located at the Con Edison Complex, including the NYPA Poletti Station. A transformer servicing area exists near the southeast corner of the Con Edison Complex. At the extreme southeast corner of the site, near the transformers, there are community fields containing several baseball diamonds.

LaGuardia Airport is located approximately 4,000 feet from the Project Site on the north shore of the Borough of Queens, fronting the waters of Bowery Bay, Flushing Bay and the East River. The airport covers 680 acres and contains two active runways and 72 aircraft gates. The facility has been operated by the Port Authority of New York and New Jersey under a lease with the City of New York since June, 1947. Approximately 950 flights arrive and depart from this airport each day.

The Riker's Island Detention Facility, operated by the New York City Department of Corrections, is located within a mile north of the Project Site on an island in the East River.

The residential portion of Astoria is separated from the Project Site by the industrial/manufacturing land uses described above. The residential area begins at 20th Avenue approximately a quarter of a mile to the south of the Site, and is bound by the East River to the west, LaGuardia Airport to the east, and the Grand Central Parkway to the south. The neighborhood consists of long established two- and three-story residential row-house structures, with both owner-occupied and rental units. Most of the apartment buildings and houses were built during the 1920's and 1930's. Most of these structures are set back from the street and have small fenced yards. A small commercial strip is located within the neighborhood along 31st Street between Astoria Boulevard and 21st Avenue. Secondary commercial areas are located along Ditmars Boulevard between 28th Street and 41st Street and along several parts of 21st Avenue.

A visually prominent feature running through the residential neighborhood is the Amtrak - Conrail, Hell Gate Line, which runs through Astoria from Wards Island to Sunnyside Yards to the south. The rail line is elevated approximately 125 feet high and follows a route parallel to Ditmars Boulevard to 35th Street where it takes a southern route, crossing the Grand Central Parkway toward Woodside.

The Metropolitan Transit Authority "N"-line also is a visually prominent feature in the Visual Study Area. It enters the neighborhood by passing beneath the Hell Gate Line on above-ground tracks to its final station at 31st Street and Ditmars Boulevard. The station is one of the most heavily traveled daily commuter locations in the area.

No visually sensitive resources of recognized scenic or recreational value were identified in the Visual Study Area. However, as described in Section 4.6, a small number of historic structures were identified in the Visual Study Area. This includes two potentially historic but previously unidentified structures adjacent to the Project Site. These structures were considered in the identification of representative viewpoints.

The Visual Study Area is generally homogeneous. It does not include viewers that are distinguishable for their unique character other than as part of the similarity zones described below. Thus, distinct viewer groups were not found in the Visual Study Area.

Landscape Similarity Zone Establishment

Within the regional landscape described above, similarity zones were established to provide a more specific framework to define and evaluate the visual resources of the Visual Study Area (Landscape Similarity Zones). Similarity zones have common characteristics in terms of land use characteristics and intensity, water resources, landform, etc. Figure 4.5-1 shows the following three Similarity Zones that were established for this Project:

- ***Urban Industrial***: This zone is known as the Bowery Bay/Steinway Industrial Area and contains manufacturing and heavy industry land uses, including the Steinway & Sons piano manufacturing factory, the Bowery Bay Water Pollution Control Plant, existing power generation facilities, warehouses, auto repair shops and automobile-related uses, hauling companies, and construction offices.

- ***Urban Residential***: This zone commences at 20th Avenue. The zone consists primarily of a dense residential area characterized by two and three story row houses interspersed by small commercial strips to serve local residents. The area also includes an elevated rail line and an elevated metropolitan transit line.

- ***East River:*** This zone comprises approximately 40% of the Visual Study Area and consists of the East River. This river is used primarily for industrial traffic, and in the vicinity of the Project Site, passes between the Bowery Bay/Steinway Industrial Area and the Riker's Island Detention Facility.

More detailed descriptions of land use, user activity, and visual characteristics of the Landscape Similarity Zones within the Visual Study Area are included in the Visual Impact Assessment (VIA) Report (Appendix 4.5).

The aesthetic quality of each Landscape Similarity Zone was evaluated by AKRF (see Appendix 4.5). Within each zone, six landscape components (landform, water resources, vegetation, land use, user activity, and special considerations) were described and assigned a quantitative rating, thus indicating its level of visual quality. This was accomplished using the Visual Resource Management Classification System (MCS) developed by ACOE (Smardon, et al., 1988). Using ACOE criteria, each Landscape Similarity Zone was rated as distinct, average, or minimal, and given a numerical score. The composite rating places each zone in one of five Resource Management Classifications defined by ACOE. The MCS is used to determine the degree and nature of visual change that is acceptable in a landscape. ACOE's five MCS classifications are summarized below:

- ***Preservation Class*** - These areas are considered to be unique and to have the most distinct visual quality in the region. They are highly valued and are often protected by federal and state policies and laws. These areas may include significant natural areas, portions of wild and scenic rivers and substantial historic sites and districts.

- ***Retention Class*** - These areas regionally are recognized as having distinct visual quality, but may not be institutionally protected.

- ***Partial Retention Class*** - These areas locally are valued for above average visual quality, but are rarely protected by institutional policies.

- ***Modification Class*** - These areas are not noted for their distinct qualities and are often considered to be of average visual quality.

- ***Rehabilitation Class*** - These areas are noted for their minimal visual quality and are often considered blighted areas.

The MCS classification of each Landscape Similarity Zone within the Visual Study Area was categorized by AKRF as follows:

Zone No.	Description	MCS Classification
1	Urban Residential	Modification
2	Urban Industrial	Modification
3	East River	Modification

These classifications show that the three Landscape Similarity Zones in the Visual Study Area do not have high quality visual character. Though different in underlying use, these zones do not display any distinctiveness visually. All of them are characterized by an urban industrial visual quality.

Specifically, the Urban Residential Similarity Zone is adjacent to an industrial area. Its visual character is influenced by the presence of industrial land uses in the vicinity. Heavy trucks travel through the area regularly and the presence of the rail line, the Con Edison Complex and LaGuardia Airport make this area visually unremarkable.

The Urban Industrial Similarity Zone consists of warehouses and heavy industry oriented structures, including existing power plants and transmission facilities. Even the historic structures in this zone are industrial in history and blend into the industrial character of the area (see Figure 4.5-1).

The East River Similarity Zone consists entirely of industrial views and Riker's Island. This zone has distinctly industrial views in the near field and is characterized by industrial river delivery traffic. This zone also has the most direct views of LaGuardia Airport runways with air traffic arrivals and departures occurring more than once every minute.

4.5.3 Visual Characteristics of the Project

4.5.3.1 Project

The visual study prepared by AKRF was based on the conceptual design plans for the Project that are presented in Section 3.0 of this Application.

The construction of the Project will include the construction of a 75 foot Turbine Building and four stack flues clustered together, located approximately 200 feet from the shoreline of the East River. These stack flues, the most prominent visual feature of the Project, are proposed to be approximately 269 feet above grade based upon preliminary review and analysis by the Federal Aviation Administration (FAA) and modeling of emission dispersion. By clustering, these stack flues will appear, in certain views, as one vertical column, rather than four individual flues. The Turbine Building will be situated toward the north side of the Site, and will be most visually prominent along the shoreline of the East River. Because of the Site's close proximity to the

Steinway & Sons piano manufacturing factory and the Bowery Bay Water Pollution Control Plant, the full view of the Project from the south will be limited to the Site entrance at Steinway Street and Berrian Boulevard. The view corridor looking directly north to the East River along Steinway Street from the Site entrance will remain open.

For the purposes of the visual study, it was assumed that Project buildings will be surfaced with smooth, non-reflective painted metal panels, typical of modern industrial buildings. Project lighting would be provided by pole-mounted lights along internal access roads and building-mounted lights. Flashing red warning lights were assumed to be located 5 feet below the top of the stack flues in anticipation of FAA requirements.

A visible water vapor exhaust plume from the stack flues is expected to be present less than 5 percent of the time. Modeling predicts that the plume will only be visible during winter months. Nevertheless, plume conditions were included in a selected viewpoint in order to reflect potential visible case conditions.

Due to the consistency of construction activities with the heavy industrial look of the Visual Study Area, a separate construction VRAP was not performed for the construction period. Indeed, until the stack flues and air cooled condensers are assembled, visual impacts from construction will merely consist of heavy truck deliveries and the presence of a crane extending above warehouses in the area. As delineated in Section 4.10 of the Application, the truck traffic will be less than the amount that currently arrives and departs the Site each day in connection with the Site's existing use as a fuel oil storage and distribution terminal. The presence of a crane, though different from existing conditions, is not sufficient to warrant a separate visual analysis, given that cranes are a common sight on the visual landscape in New York City.

4.5.3.2 Con Edison Natural Gas Interconnection Route

The Con Edison natural gas interconnection route will extend through the Urban Industrial Similarity Zone from 20th Avenue down Steinway Place to the Project Site. When completed, the pipeline will be underground and, therefore, will have no visual impact at all.

4.5.3.3 *Electric Transmission Interconnection Route*

The right-of-way for the electric transmission interconnection route will be 100 feet wide. It will extend for approximately one third of a mile commencing at the Site, extending west over Steinway Creek and then west and south across the Con Edison Complex to the Astoria East Substation. A number of transmission towers currently are present in this area which are visible in the photo simulations.

4.5.4 Potential Impacts and Proposed Mitigation

4.5.4.1 *Assessment of Potential Project Visibility*

In accordance with the methodology outlined in Stipulation No. 11, a visibility analysis for the Project was conducted to identify those locations where there is a relatively high probability that the Project will be visible. This analysis included creation of viewshed maps and field verification of visibility.

Viewshed Map

A viewshed map was prepared to identify areas where the Project could be visible based on topography and intervening structures. (See Figure 4.5-2.)

4.5.4.2 *Assessment of Potential Visual Impacts*

Project Selection of Representative Viewpoints

In accordance with Stipulation No. 11, field reconnaissance and review of maps and data regarding visually sensitive resources and intensive land use were used to identify representative viewpoints of the Project within the Visual Study Area. In selecting the various viewpoints, a number of considerations were used:

- The 1-mile viewshed is composed of a densely developed urban fabric, with an industrial zone extending several blocks to the East River, the densely developed Astoria residential community to the south of the industrial area and the open water of the East River. There are few vacant lands and few inland parks. There also is a generally mild topography, with a change in elevation over 1 mile of approximately 40 feet (a less than 1 percent grade change). Land use surveys were conducted in December 1999 in a criss-crossing pattern throughout the neighborhood. The surveys found few sightlines in the community with a view to the larger electric generating facilities located in the Con Edison Complex. As a result it is concluded that multi-family dwellings, schools and other structures obstruct the majority of sightlines from within the community, which is expected in a densely developed urban community such as Astoria.

- Views from the Rikers Island Detention Facility and LaGuardia Airport were not considered. The former is a correctional facility. The portion of the airport within the Visual Study Area is essentially runways.

- The Astoria neighborhood views to the Site found to be the most unobstructed are Viewpoints 1 and 2 on Figure 4.5-2. Viewpoint 1 is a station platform for the "N" Train. This viewpoint is located approximately 70 feet above the street. As shown in the photograph, at this distance, even the manufacturing buildings of the waterfront are not particularly visible. From Viewpoint 2, at the northern edge of the Astoria Community, there is a view to the Site across the Con Edison Complex. This viewpoint is from the Con Edison Seating Area.

- Based on the inventory of parks within the Visual Study Area, views from the three largest parks, the Con Edison ballfields, Steinway Park, and Elmjack Community Little League Fields (Viewpoints 3, 4 and 8), were selected to represent the greatest view impacts from parks. These parks are some of the largest open spaces in the area. They are located closer to the East River where the view to the Site is less obstructed than at locations in the interior blocks.

- Street corridor views are an important consideration in New York City. Viewpoint 5 was selected to identify street corridor views with a location proximate to the Project Site. This photograph was taken at 19th Avenue and Steinway Place, just west of the Project Site and represents the potential view impact along the street corridor. This also includes in the view a potentially historic but previously unidentified resource, the Steinway & Sons piano manufacturing factory.

- There are 5 designated historic resources in the Visual Study Area and two potentially historic but previously unidentified resources (see Section 4.6, Cultural Resources). The resources that were found to have the greatest potential for visual impacts were those nearest to the Site, namely: (i) the Shaft House of the New York City Water Supply System; (ii) the Steinway & Sons piano manufacturing factory; and (iii) the designated Steinway House which is a New York City State and National Register Landmark. Because the Steinway & Sons piano manufacturing factory is encompassed within Viewpoint 5, the Shaft House and the Steinway House were selected as Viewpoints 6 and 7, respectively. To represent a more distant location, Viewpoint 9 was taken from the Abraham Lent House, an 18th Century clapboard house type rare in New York City. Consideration was given to North Brother Island, which is in the north portion of the Visual Study Area. However, it is not inhabited, nor is it accessible to the general public. Moreover, the water viewpoint selected (see discussion below) demonstrates a similar visual impact. Therefore, this site was not given further consideration.

- A water viewpoint was selected as Viewpoint 10. Approximately 40% of the Visual Study Area is the East River. Therefore, a location was selected from a ferry service within the river to evaluate East River views of the Project.

The selected representative viewpoints are described below.

ELEVATED SUBWAY STATION PLATFORM (Figure 4.5-3: Viewpoint 1)

The station platform for the termination point of the "N-line" subway service is located at 31st Street and Ditmars Boulevard, approximately ¾-mile from the Project Site. From this elevated platform, the sightlines clear the top of most neighboring buildings and extend unencumbered toward the Site. The station platform is significant because several thousand commuters pass through this location on a daily basis.

CON EDISON SEATING AREA (Figure 4.5-4: Viewpoint 2)

As set forth in Section 4.3 of this Application, the Con Edison Seating Area is located along 20th Avenue at 26th Street and consists of bench seating beside the roadway and sidewalks where pedestrians wait for city bus service. From this location, it is possible to look to the north across the Con Edison Complex and see a heavily-developed industrial site containing transformers and transmission lines. This viewpoint was selected to provide a view of the electric transmission interconnection route which, when completed, will be among the existing system of transmission lines in this area. The Con Edison Seating Area is approximately ½-mile from the Site. There is very little vegetation at the site to mitigate the sightlines across the Con Edison Complex.

CON EDISON BALLFIELDS (Figure 4.5-5: Viewpoint 3)

As detailed in Section 4.3 of this Application, the Con Edison Ballfields are located at 20th Avenue and 35th Street, and consist of approximately 4.5 acres of recreation space that are used heavily during the spring, summer and autumn seasons. Although these fields are flanked by vegetation along the northern edge of the site, nearby industrial activities are visible when the summer foliage is not present. The ballfields are approximately ¼-mile from the Site and constitute a large open space within the Visual

Study Area. The ballfields are owned by Con Edison, but leased to the community for public use.

STEINWAY PARK (Figure 4.5-6: Viewpoint 4)

As set forth in Section 4.3 of this Application, Steinway Park is an active public open space in the Visual Study Area, located nearly ½-mile south of the Project Site between 20th Road and 20th Avenue on 38th Street. The park contains an outdoor seating area, racquetball courts, and basketball courts at the sparsely-vegetated site. The park is located in a naturally elevated location of the Visual Study Area, where 37th and 38th Streets climb from the Project Site to the top of a hill at 21st Avenue. The park is most heavily utilized after school hours, during weekends, and during the summer season. It has few extensive viewsheds toward the Project Site due to the visual barriers formed by nearby building structures.

INTERSECTION OF 19th AVENUE AND STEINWAY PLACE (Figure 4.5-7: Viewpoint 5)

The intersection of 19th Avenue and Steinway Place is an important intersection in the Visual Study Area because it is the location where a complete view of the entire Steinway & Sons piano manufacturing factory can be seen. As detailed in Section 4.6 of this Application, this factory, although not designated as a historic resource, has had a presence in Astoria since the early 1870's, and may be eligible for historic designation. Given this site's potential significance and the close proximity of the piano factory to the Project Site, the potential visual impacts of the Project on this adjacent property were evaluated.

SHAFT HOUSE (Figure 4.5-8: Viewpoint 6)

As set forth in Section 4.6 of this Application, the Shaft House is immediately adjacent to the Site, and is a two-story structure which is potentially eligible for designation as a historic resource. The Shaft House is located on Steinway Street near Berrian Boulevard, and is visible from a public street with the Project Site in the background.

STEINWAY HOUSE (Figure 4.5-9: Viewpoint 7)

As further detailed in Section 4.6, the Steinway House is a designated historic resource in the Visual Study Area which is both a New York City Landmark, and listed on the State and National Register of Historic Places. The house is located on 42nd Street, mid-block between 19th Avenue and Berrian Boulevard, approximately three blocks from the Project Site. It was constructed in 1858 and acquired by William Steinway, the local piano manufacturer, in 1870. Its historic importance and proximity to the Site warrants its inclusion in the visual analysis. The Steinway House is located on a hill above street grade.

ELMJACK COMMUNITY LITTLE LEAGUE FIELDS (Figure 4.5-10: Viewpoint 8)

As set forth in Section 4.3, the Elmjack Community Little League Fields are located on the north side of 19th Avenue, east of Hazen Street on land leased by the Port Authority of New York and New Jersey. The ballfields extend north to Bowery Bay but are surrounded by trees along the northwest side bordering the Riker's Island Detention Facility entrance. Many north-facing sightlines from low-rise buildings or open spaces east of Hazen Street include a view of a 50 foot high, fill site between 46th Street and Hazen Street on 19th Avenue. Most of the west-facing views from the Elmjack Community Little League Fields are obstructed by this 50 foot mound, except for the northernmost ball diamond. When the trees buffering the northwest edge lose their leaves, there is a clear view from the northernmost ball diamond to the Site.

ABRAHAM LENT HOUSE (Figure 4.5-11: Viewpoint 9)

Located between 19th Avenue and 19th Road, at the north end of 78th Street, the Abraham Lent House is a historic resource which is both a New York City Landmark, and on the

State and National Register of Historic Places. The stone structure was constructed in about 1729, and contains an open yard and family cemetery. Also located east of Hazen Street, views from the Abraham Lent House toward the Site include the 50 foot fill site.

NEW YORK WATERWAY DELTA SHUTTLE (Figure 4.5-12: Viewpoint 10)

The view from the New York Waterway Delta Shuttle considers the visual impact of the Project from the East River. The shuttle is a public means of water transportation running hourly from Queens to 62nd Street, 34th Street, and Wall Street stations. Because the Site borders the East River, sightlines from the East River to the Site are uninterrupted from the boat to the shore. The electric transmission interconnection route can also be seen from this location.

Simulation Preparation

High-resolution computer-enhanced image processing was used to create photographic simulations of the Project from each of the selected viewpoints to show anticipated visual changes associated with the Project. Simulations were developed by creating three-dimensional models of the Project, and superimposing these models on digitized photographs of the existing landscape. The alignment, elevations, and location of the visible elements of the Project were consistent with the design, size and location of the Project. To the extent possible, surface color, texture, and shading of the modeled facilities were selected to replicate the Project.

Visual Impact Analysis

As described in Section 4.5.1, the visual impact analysis is based on the ACOE, VRAP. The VRAP's Basic VIA Procedure was used for this analysis, which provides the impact assessment and evaluation information required for most ACOE studies. Detailed VIA Procedure is reserved for projects with unusual scale or visual significance.

The Project will be developed in an area that has been reserved for heavy industry, including power plants, for many years. The addition of a new electric generating facility to this heavily industrialized area will not constitute a project of unusual scale or visual significance in this context.

The Basic VIA Procedure begins with assigning management classifications to the landscape similarity zones identified in the preceding sections. The classification of each landscape similarity zone provides guidelines as to the degree and nature of visual change (as determined by the visual impact assessment) that is acceptable in a landscape. The threshold of allowable visual impact for projects in zones with each MCS classification should have the following visual impact assessment values:

Preservation Class; 0
Retention Class; 10 to -2
Partial Retention Class; 10 to -5
Modification Class; 10 to -7
Rehabilitation Class; 10 to -10

Two evaluators were used for the VIA, one of whom is a landscape architect. Each evaluator is particularly familiar with visual impact evaluations in New York City. Public input regarding the anticipated visual simulations was obtained at public meetings in August and December 1999.

Appendix 4.5 contains the series of forms used to complete the VIA. The VIA modifier ratings conclude that the Project will not significantly alter the visual landscape from most viewpoints. At those locations where the Project is considered a prominent visual aspect of the landscape, it is also compatible with surrounding landscapes and visual conditions. Similarly, the Project's composite visual impact assessment value is - 2.67. This value falls well within the allowable values for the "Modification Class", the overall classification for the Visual Study Area.

Based on the VIA, the evaluators determined that the Project overall will not be a prominent aspect of the visual landscape. Project operations will be consistent with an area containing several heavy industrial facilities, including power generation facilities and electric transmission and switching stations. Similarly, the evaluators concluded that Project construction impacts will also be consistent with the industrial character of the area. Indeed, from all but on-site views, visual impacts from Project construction will be consistent with impacts from Project operations, with the only difference at times during construction being the presence of a crane. Thus, the overall conclusion of the VIA is that impacts to the Visual Study Area from Project construction and operation will not be significantly adverse.

The following are descriptions by the evaluators of the views of the Project from each viewpoint:

ELEVATED SUBWAY STATION PLATFORM

The view from the elevated subway station platform on Ditmars Boulevard and 31st Street is one of the highest viewpoints in the Astoria residential neighborhood. At a distance of approximately ¾ of a mile from the Project Site, the north-facing view is unimpeded by surrounding building structures. Because most other locations at this distance from the Project Site are lower in elevation than this viewpoint, most views of the Project Site are blocked by intervening structures. As a heavily used commuter station, the subway platform view also represents a viewshed that is visible to a large number of residents on a daily basis. From this view, the gray stack flues will be visible on the horizon. However, because the stack flues are proportionate to the existing buildings and vegetation, they are not obtrusive, or overly distracting when compared to the rooftop structures of surrounding buildings. The addition of a new electric transmission interconnection for the Project will be difficult to see, if at all visible, from this distance (see Figure 4.5-2).

CON EDISON SEATING AREA

The Con Edison Seating Area at 20th Avenue and 26th Street shows a view approximately ½-mile from the Site from the northern limits of the Astoria residential neighborhood. The stack flues will be visible beyond the transmission lines and transformers. They will appear smaller than the transmission towers from this perspective. A view along 20th Avenue from almost any point adjacent to this site shows a similar context. Due to the functional nature of the land use, the stack flues do not appear out of context and do not independently draw attention as a distraction or prominent focal point. The electric transmission interconnection route is visible and consistent with the existing transmission lines on the site (see Figure 4.5-3).

CON EDISON BALLFIELDS

The Con Edison Ballfields are located approximately ¼-mile southwest of the Project Site and are used predominantly during the spring, summer, and autumn for recreational use. The vegetation along the northern edge of the site consists of trees and bushes that create a visual buffer between the industrial uses to the north and the site. The stack flues will be visible in the background behind the site most notably from the southern edge site boundary where the peripheral trees on the northern edge would cease to provide enough height to block them from view. From this viewpoint, the stack flues will be visible above the tree tops, but will not be visually massive or foreboding structures from the field. During the summer, the full vegetative cover and height of the trees will almost completely obscure the stack flues when situated near the northern portion of the field. It will visually temper the lower portion of the stack flues, thus making them appear to rise from the tops of the trees at a distance (see Figure 4.5-5).

A visible water vapor exhaust plume from the stacks flues is expected to be present less than 5 percent of the time. Modeling predicts that the plume will only be visible during winter months. Nevertheless, plume conditions were included in this viewpoint in order to reflect potential visible case conditions.

STEINWAY PARK

Steinway Park rises 30 feet above the surrounding area to the north, but is surrounded by several buildings, trees, and shrubs. The entire site is surrounded by a chain-link fence that visually filters off-site activities from the open space within the park. Located ½-mile south of the Project Site, the stack flues will be visible in winter months past the chain-link fence, and through the branches of the trees on the north side of the site. Because of the fence and the foliage, the stack flues will be barely noticeable in the background and will not visually tower above the height of the adjacent buildings in the foreground. In the summer, it is probable that from most viewpoints on the site, the leaves on the trees and the surrounding building structures will block many views of the stack flues from the site. Where they will remain visible, the stack flues will be seen through the weave of fence, and will not distract views on, or near, the park (see Figure 4.5-6).

INTERSECTION OF 19th AVENUE AND STEINWAY PLACE

The view looking north from the intersection of 19th Avenue and Steinway Place will show stack flues beyond the Steinway & Sons piano manufacturing factory. The flues will be an industrial element that will blend with the image of an already-industrial area. Due to the presence of the overhead transmission lines, chain-link fencing, large-scale colorless building structures, industrial equipment and machinery of the manufacturing and warehouse district, the stack flues will not alter this industrial context. Because the Steinway & Sons piano manufacturing factory has operated as a manufacturing function amidst many other manufacturing facilities in the area for years, the stack flues as another industrial element are consistent with the surrounding context. Although visually prominent in vertical scale from this viewpoint, the stack flues will not be visually massive enough to distract attention from other industrial buildings or functions in the foreground (see Figure 4.5-7).

SHAFT HOUSE

Located adjacent to the Project Site, the view looking north with the Shaft House in the foreground, at a distance of approximately 200 feet, will show the most prominent visual effects of the stack flues and the Turbine Building in terms of scale. However, the integrity of the Shaft House in this industrial context will not be jeopardized. The potential historic relevance of the industrial-style shaft house is due to its function as a utility building. It presently exists among warehouses and factories in an historically industrial area. Elements such as overhead transmission lines, chain-link fencing, and industrial equipment and machinery create visual elements for the viewer. The building detail and texture of the brick facade gives it visual prominence. The gray stack flues will be consistent with the absence of color of the surrounding structures and will not take visual precedence in the surrounding context (see Figure 4.5-8).

STEINWAY HOUSE

At a distance of about 1000 feet from the Project, the Steinway House is the designated historic resource nearest the Project Site. The house is entirely surrounded by industrial buildings and by itself, is noticeable only from street level because of its elevated position on a hill. The stack flues of the Project will appear behind the Steinway House, but will be barely visible due to high deciduous trees on that property. It is anticipated that during seasons other than late fall and winter the visual impact of the stack flues will be minimal or absent (see Figure 4.5-9).

ELMJACK COMMUNITY LITTLE LEAGUE FIELDS

The Elmjack Community Little League Fields are located approximately ¾ of a mile east of the Project Site and are used primarily in the summer season for youth recreational activities. The site is an elongated north-south site where west-facing views are obstructed by a 50-foot tree-covered fill site. Although it will be possible to see the stack flues and the Turbine Building from the northernmost field through the tree branches, maximum usage of the fields occurs during the summer season when full foliage exists. Because the visibility of the stack flues does not exceed the height of the trees on this site, the visual impact during the summer season will be minimal or absent. West-facing views from the southern playing fields are further obscured by the elevated vegetation on the 50 foot mound (see Figure 4.5.10).

ABRAHAM LENT HOUSE

The view from the open space surrounding the Abraham Lent House, a designated historic resource approximately ½-mile from the Project, shows that the stack flues will be most visible during the winter months. During the summer season, tree foliage will obscure most of the stack flues from most viewpoints. The stack flues will not be a substantially distracting visual feature on the horizon because of their scale. Unlike most open spaces in the Visual Study Area, the grounds of the Abraham Lent House are not publicly accessible. As a result, the number of people that are able to see the stack flues from this site will be minimal (see Figure 4.5-11).

NEW YORK WATERWAY DELTA SHUTTLE

The view from Bowery Bay/Upper East River provides the broadest view of the Project, and shows its scale relative to neighboring structures. Because the stack flues will be located behind the Turbine Building from this view, their visual impact will be minimized. In this view, approximately 1000 feet from the edge of the Project Site, the entire Astoria industrial district north shore is occupied by industrial uses. East of the Project Site is the Bowery Bay Water Pollution Control Plant. It contains large, above-grade pipes for sewage treatment that are visible from the East River. To the west, the electric transmission interconnection route is visible and consistent with the existing transmission line towers and generators at the Con Edison Complex. Behind the Project

Site, the Steinway & Sons piano manufacturing factory is a large, visible building mass. Each of these structures is industrial in design and function. The Project is similar to these uses. Although the Project is visually prevalent from this point of passage, it is compatible with the other large facilities within the surrounding context (see Figure 4.5-12).

4.5.4.3 Con Edison Natural Gas Interconnection Route

The Con Edison natural gas interconnection route will run underground approximately two blocks through the Urban Industrial Zone under Steinway Place. It is expected to be installed in approximately 2 months and will have no long term visual impacts.

4.5.4.4 Electric Transmission Interconnection Route

Viewpoints 1, 2 and 10 were in part selected because they offer a view of the electric transmission interconnection route. As these views show, the electric transmission interconnection route generally will not be visible from surrounding views due to distance and intervening structures. The route is most easily seen from the East River. The Project's transmission lines will be visible as they cross Steinway Creek (see Viewpoint 10) before they extend into the Con Edison Complex. The Project's electric transmission lines will be located among, and blend with existing transmission lines criss-crossing that location. Impacts from the East River are not significant as the transmission lines and Project are consistent with the existing similar uses and overall industrial character of the East River shore.

4.5.5 Mitigation

As set forth herein and explained more fully below, Astoria Energy has designed the Project to minimize its visual impacts, adopting, in whole or in part, a number of the measures set forth in Stipulation No. 11. As a result, the Project is not expected to significantly alter the viewshed in the Visual Study Area, and therefore, as set forth below, the remaining mitigation measures identified in Stipulation No. 11 are not required.

A discussion of each of the mitigation measures set forth in Stipulation No. 11 follows:

Professional Design and Siting: The Project Site has been selected to make productive use of a brownfield location. The existing fuel oil storage and distribution terminal is an industrial use and its regular fuel oil delivery traffic is a prominent element of the area. In addition, the Site is located in close proximity to electric generating and transmission facilities. As set forth more fully in Section 3.0, Project buildings will be neutral colored and designed to be consistent with the industrial character of the area. Lighting will be pole mounted and designed to reduce glare through shielding and use of low glare lighting elements (e.g., halogen). For these reasons, Project design will optimize its compatibility with local industrial conditions and minimize impacts on the community.

Screening: Screens are objects that conceal other objects from view. Due to the urban industrial setting of the Project, screening will not be required to minimize impacts.

Relocation: Where possible, a facility component may be relocated to another place within the Site to take advantage of the mitigating effects of topography and/or vegetation. The location of Project equipment has been optimized to fit the Site. While no significant visual issues exist, walls will be used to enclose some structures and the transformers have been placed back near Steinway Creek to reduce exposure of visible power plant components to the area.

Camouflage/Disguise: As described above and in Section 3.0, neutral colors will be used to minimize impacts.

Low Profile: Reducing the height of an object reduces its viewshed area. As set forth in Section 3.0, the Project buildings, e.g., the Turbine Building, will be roughly the same size as warehouses in the area. Moreover, the stacks for new combined cycle generating facilities such as the Project are substantially lower than traditional power plants.

Downsizing: Reducing the number, area or density of objects may reduce impacts. The combined cycle units employed by the Project are compact and efficient compared to traditional power plants.

Alternate Technologies: Substituting one technology for another may reduce impacts (e.g., dry cooling tower technology versus wet cooling tower technology). See discussion in Alternatives, Section 5.0.

Maintenance: How structures are maintained has aesthetic implications. Astoria Energy will maintain the Project in a manner that is consistent with the industrial character of the area.

Non-Specular Materials: As set forth in Section 3.0, neutral-colored materials will be used to minimize visual impacts. Project lighting will be in accordance with local zoning and building codes.

Lighting: With respect to structures which may require demarcation to protect air traffic, such as a combustion exhaust stack or radio tower, the FAA may require lighting for public transportation safety. These requirements will be followed.

Offsets: Correction of an existing aesthetic problem identified within the viewshed of a proposed project may qualify as an offset or compensation for project impacts. Because the Project will not have significant adverse visual impacts, it does not require offsetting.

Decommissioning: Removing an object after its useful life is over reduces the duration of a visual impact. While the Project will not have significant adverse visual impacts, information concerning Project decommissioning is set forth in Section 3.14 of this Application.

4.6 Cultural Resources

4.6 Cultural Resources

4.6.1 Introduction

In accordance with PSL Sections 164(1)(a) and (c), Sections 1001.1(a) and 1001.3 of the Article X Regulations, and Stipulation Nos. 2 and 11, this section: (i) identifies both designated historic resources and potentially historic but previously unidentified resources in a defined area; (ii) identifies archeological resources on the Project Site and along the electric transmission and Con Edison natural gas interconnection routes; and (iii) analyzes the impacts on cultural resources, if any, associated with the construction and operation of the Project. For purposes of this section, cultural resources include historic resources and archeological resources.

Pursuant to Stipulation No. 2, a study area of one mile around the Project Site was used for the historic resources analysis (Cultural Study Area). (See Figure 4.6-1.) The one mile area corresponds with the one mile viewshed analysis required by Stipulation No. 11 for the visual analysis set forth in Section 4.5 of this Application. In addition, archeological investigations also were performed at the Project Site, along the electric transmission interconnection route and along the Con Edison natural gas interconnection route.

As described more fully below, the Project will not have a significant adverse impact on cultural resources in the Study Area. No historic or archeological resources exist on the Site, and therefore, neither Project construction nor its operation will have an impact on cultural resources at the Site. Moreover, Project operations will not alter the industrial character of the area surrounding the Site nor will they degrade or otherwise adversely affect the historic significance of the Steinway House or any other listed or potential historic resource in the Cultural Study Area. Finally, the Site, the electric transmission interconnection route, and the Con Edison natural gas interconnection route are located on land that is graded, has been paved in most areas, and primarily is situated on top of an engineered fill extension of an earlier shoreline. As a result, it is highly unlikely that any meaningful archeological resource could be present on any of these areas. As set forth in Section 3.0, a large number of already disturbed sites potentially are

available in the vicinity of the Project that are suitable for construction support purposes. To the extent that construction support areas are used during Project construction, developed/disturbed areas will be chosen that will not have a significant adverse impact on natural or cultural resources.

4.6.2 Existing Conditions

4.6.2.1 Historic Resources

Buildings or structures that are designated for listing on the National or State Register of Historic Places (S/NR), or are determined eligible for such designation, constitute historic resources. Historic resources also include New York City Landmarks and Historic Districts. Properties are identified and determined eligible for listing on the S/NR Registers by the New York State Office of Parks, Recreation and Historic Preservation (OPRHP). New York City Landmarks (NYCL) and Historic Districts are identified and designated by the New York City Landmarks Preservation Commission.

In accordance with Stipulation No. 2, the Standards for Cultural Resource Investigations were consulted. In addition, the National Register of Historic Places, National Historic Landmark (NHL) listings and the New York City Landmarks Preservation Commission listing of New York City Landmarks were reviewed by Allee, King, Rosen, Fleming, Inc. (AKRF) in January, 2000.

4.6.2.1.1 Known Historic Resources

The Site primarily consists of a variety of aboveground and bunker oil tanks, a multi-bay fuel oil truck loading facility, and a marine loading pier. There are no known historic resources on the Project Site. Nor are there any structures on the Site that are eligible for designation as NYCLs or for listing on the S/NRs or the NHLs.

Five structures were identified in the Cultural Study Area that are designated historic resources or are eligible for designation as historic resources. These structures are listed in Table 4.6-1 below and shown on Figure 4.6-2. A description of each of these structures follows.

TABLE 4.6-1:
DESIGNATED HISTORIC RESOURCES*

Ref. No.	Name	Address	NYCL	SR	NR	NHL	Pending NYCL	S/NR Eligible
1	Steinway House	18-33 41st Street	X	X	X			
2	Lawrence Family Graveyard	Corner of 20th Road and 35th Street	X					
3	Electric Power House	20th Avenue and Shore Boulevard						X
4	Abraham Lent House & Cemetery	78-03 19th Road	X	X	X			
5	Marine Air Terminal	LaGuardia Airport	X		X			

Notes:
* See accompanying map.
NYCL: New York City Landmark.
SR: New York State Register of Historic Places.
NR: National Register of Historic Places.
NHL: National Historic Landmark.
Pending NYCL: Site has been calendared for a public hearing about its designation as a New York City Landmark or heard for designation as such.
S/NR Eligible: Site has been found eligible for listing on the New York State and National Registers of Historic Places.

The Steinway House is the closest designated historic resource to the Project Site identified in the Cultural Study Area (S/NR, NYCL). It is located to the east on a hill approximately three blocks south/southeast from the Project Site. (See Figures 4.6-2 and 4.6-3.) Built c. 1858 by Benjamin T. Pike, a manufacturer of scientific instruments, the house is an asymmetrical, Italianate stone villa defined by a tall square tower, cast iron porches, and a combination of classical and medieval elements. The house was acquired in 1870 by local piano manufacturer William Steinway. The Steinway family used the house in the summer until the 1920's. Since that time it has been sold to various private owners. Over the years, the house's exterior has fallen into disrepair. It remains occupied by its current primary owner and a tenant living in the back portion of the house.

Deciduous trees and other dense vegetation are located around the Steinway House. During the summer, leaves on the deciduous trees make the house difficult to see from some surrounding areas except for the house's tower cupola which barely extends above the treetops.

The house is situated in the middle of a heavily industrialized area with warehouses to the south and east, a truck wash facility and an auto parts recycling lot to the northwest, and a waste disposal company and the New York City Bowery Bay Water Pollution Control Plant to the North. Riker's Island is visible across the East River. The Project Site is visible to the north/northwest from the tower cupola.

The Lawrence Family Graveyard (NYCL), which was established in 1703, is located approximately one-half mile south of the Project Site at the southeast corner of 20th Road and 35th Street. (See Figures 4.6-2 and 4.6-3.) The small, half-acre plot family cemetery is the resting place of eighty-nine members of the Lawrence Family. These family members have a record of civic and military service that spans over two centuries, including Major Jonathan Lawrence, a soldier, statesman, and patriot who aided General George Washington in obtaining additional forces for the revolutionary army at Brooklyn. Oliver Lawrence, who died in 1975, was the last family member buried at the site. Due to a large number of intervening buildings, the Project Site is not visible from this resource.

The former Electric Powerhouse (S/NR - eligible) is located on 20th Avenue at Shore Boulevard, slightly less than one mile west of the Project Site. (See Figure 4.6-2.) Built by the Astoria Light, Heat and Power Company c. 1905, it was the first central plant located off Manhattan to supply New York City with gas and, later, electricity. The Powerhouse is architecturally significant as an early 20th century example of a powerhouse building designed in the Renaissance Revival style. It is a brick structure that includes an arched opening and decorative brickwork. The Powerhouse is located at the far end of several power company properties containing a variety of industrial buildings that obscure the view to the Project Site.

The Abraham Lent House (S/NR, NYLC) is located approximately 3,500 feet east of the Project Site on 19th Road. It is one of the few remaining dwellings in Queens built in the Dutch Colonial tradition. (See Figure 4.6-4.) Built c. 1729, the Abraham Lent House has rough stone walls with a steeply sloping roof. The property includes a family cemetery. The house was built by Abraham Lent, the grandson of Abraham Riker, and faces Riker's Island, once owned by the Riker family. The house was damaged by a fire in 1955 and subsequently has been restored. Currently, it is occupied by a single family. Due to its distance from the Project Site and the large number of intervening structures, the Project Site is not visible from the Abraham Lent House.

The Marine Air Terminal (S/NR, NYCL) at LaGuardia airport is located slightly less than one mile east of the Project Site. The terminal (see Figure 4.6-5) was designed by Delano & Aldrich and built in 1939-40. Built for Pan American Airline's large seaplanes that made the first transatlantic flights from LaGuardia in 1939, both the exterior and interior reflect aquatic themes, including an exterior frieze of stylized flying fish and a central rotunda encircled by a 12 foot high, 237 foot long mural, entitled "Flight." Located further east from the Site than the Abraham Lent House, the Project Site is not visible from the Marine Air Terminal.

4.6.2.1.2 Potentially Historic But Previously Unidentified Resources

In accordance with Stipulation No. 2, two types of field inspections were performed to identify potentially historic but previously unidentified resources. Pursuant to section 1(d) of Stipulation No. 2, AKRF conducted a structure by structure search in January, 2000 to identify structures located within one-quarter mile of the Project Site that may satisfy State and/or National Register criteria. OPRHP Building-Structure Inventory Forms were completed for the properties set forth below, and are included in Appendix 4.6.

Photo Not Available
-Private Property-

Electric Power House

Abraham Lent House and Cemetery

TRC

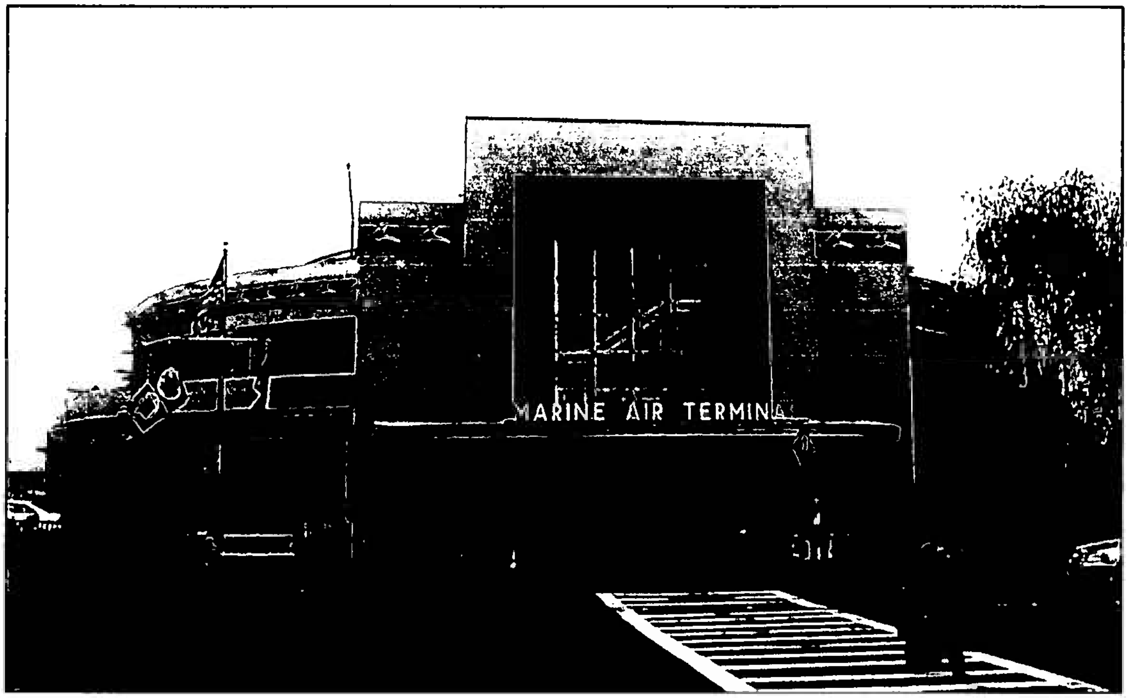
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

KNOWN HISTORIC RESOURCES

ASTORIA ENERGY LLC
QUEENS, NEW YORK

FIGURE 4.6-4	PROJ. NO. 26476

L99-452\FOLDER1K.PPT



La Guardia Air Terminal

TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

KNOWN HISTORIC RESOURCES

ASTORIA ENERGY LLC
QUEENS, NEW YORK

FIGURE 4.6-5	**PROJ. NO. 26476**

L99-452\FOLDER1\K.PPT

Pursuant to section 2(d) of Stipulation No. 2, AKRF also performed a street by street tour of the remaining portion of the one mile Cultural Study Area in April, 2000 to identify potentially historic but previously unidentified structures or districts that may satisfy State and/or National Register criteria. Individual structures that were observed as part of this tour were photographed. The results of these two field inspections are summarized below.

Two potentially historic but previously unidentified resources, the Steinway & Sons piano manufacturing factory and the Shaft House of the New York City Water Supply System, were identified within one-quarter mile of the Project. The Steinway & Sons piano manufacturing factory, located adjacent to the Project Site to the south (see 'A' on Figure 4.6-2), is a rambling complex of brick factory buildings of various ages. (See Figure 4.6-6.) In the 1860's, William Steinway began acquiring lands in Astoria, including the Steinway House described above, and the land on which the Steinway piano manufacturing factory is located. In 1873, the first factory buildings, a steam saw mill, an iron and brass foundry, boiler and engine house and a large building for the drilling and finishing on iron piano frames, were erected north of 19th Avenue between Steinway Creek and 36th Street. Subsequently, a giant piano case factory was built in 1879 and modern factory and office buildings were erected during the early and mid-20th century. While it is not clear if the original factory structures remain on the Steinway property, the Steinway & Sons piano manufacturing factory could be considered significant in the overall historic development of the area. Several factory structures have been retained. These structures are typified by corbeling and round arched windows that appear to date to the early 20th century. Currently, the piano manufacturing factory is situated in the middle of a heavily industrialized and manufacturing area, adjacent to the Castle fuel oil storage and distribution terminal (i.e., the Project Site) and across the street from a municipal solid waste collection company. The Project Site is visible from the Steinway & Sons piano manufacturing factory.

Located adjacent to the Project Site, the Shaft House, at the corner of Steinway Street and Berrian Boulevard (see 'B' on Figure 4.6-2), was built circa 1938 in conjunction with the construction of the Catskill Water System. (See Figure 4.6-6.) The two-story structure, consisting of a brick facade set above a rusticated granite base, is designed in the Renaissance Revival Style. It is defined by three keyed, large, arched windows at the second story, framed by

stone cartouches, and a prominent detailed cornice surmounted by a hipped tile roof. The Shaft House stands over Shaft 9A of Tunnel No. 2 of the present Catskill/Delaware System. It is one of several houses that were built along the tunnel which connect with surface water mains to deliver water to the distribution system. Like the Steinway piano manufacturing factory, the Shaft House also is surrounded by heavy industrial uses. The Project Site is visible from the Shaft House.

Within the remaining portion of the Cultural Study Area, seven potentially historic but previously unidentified resources - two historic districts and five individual structures - were identified during the street by street tour. These resources are shown on Figure 4.6-2. Additional information on these resources is found in Appendix 4.6.

The first potentially historic but previously unidentified resource is a district of Steinway Village houses located approximately one-half mile from the Project Site at a through block angle. Steinway Village was a company town built by Steinway in conjunction with the Steinway & Sons piano manufacturing factory to provide housing for factory workers. Rowhouses Nos. 20-12 through 20-34 along the western side of 41st Street, Nos. 40-12 through 40-20 along the southern side of 20th Avenue between Steinway Street and 41st Street, Nos. 41-02 through 41-20 along the southern side of 20th Avenue between 41st Street and 42nd Street are original workers' houses built by William Steinway in 1874. These two story brick rowhouses, which in most cases, include Italianate style details, are a unique group of residential buildings with 19th century architectural qualities. The thirty houses are largely intact except for a few minor alterations such as new windows or reconstructed stoops. In 1974, the New York City Landmarks Preservation Commission designated the houses as the Steinway Historic District based on its finding that the structures were historically and architecturally significant. The New York State Board of Estimate subsequently nullified the designation in 1975 due to growing opposition from the affected property owners. The houses continue to retain the architectural and historic qualities that made them eligible for designation as landmarks. Due to the large number of intervening industrial buildings, the Project Site cannot be seen from this potentially historic resource.

The next potentially historic but previously unidentified resource is the Steinway Reformed Church which is located beyond the Steinway Village houses more than one-half mile from the Project Site at a through block angle. Located on the northeast corner of the intersection of 41st Street and Ditmars Boulevard, this church was built in 1891 to accommodate the rapidly expanding population of Steinway Village and is a unique remnant of William Steinway's company town. It is architecturally significant as an example of the rural Gothic Revival style, exhibiting several defining characteristics of the style, such as cinquefoil arched windows, a bell tower with five copper-clapped spires, a steep pitched roof, and an asymmetrical entrance. Like the Steinway Village houses, the Project Site is not visible from this church.

Another potentially historic but previously unidentified resource is the 1902 Steinway & Sons factory building, which is located approximately one mile from the Project Site. The plant is a large, six and seven story brick H-plan building that fills the entire block between 45th and 46th Streets and between Ditmars Boulevard and 23rd Avenue. It was constructed by the Steinway family to relocate the remainder of its family's piano manufacturing business from Manhattan to Astoria and is one of only a few remaining turn-of-the-century industrial structures in the area. The building is largely unornamented except for ornamental parapets and Italianate details around the two entrance doors on the Ditmars Boulevard facade. Although the building is currently abandoned, it remains intact with only minor alterations. Its sight line to the Project Site is obscured by intervening buildings.

Located approximately three-quarters of a mile from the Project Site, a series of rowhouses constructed by the Arleigh Realty Company also constitute potentially historic but previously unidentified resources. In 1923, the Arleigh Realty Company built these rowhouses during the post-World War I housing boom when the Astoria area began to become fully urbanized. While much of the housing that was erected in Astoria during this time is not architecturally distinguished, the Arleigh Realty Company rowhouses represent an example of middle-class housing designed to provide aesthetic, physical and economic amenities to its residents. The development consists of over 100 three story, single family rowhouses and two five story apartment buildings which line both sides of 28th Street between Ditmars Boulevard and 21st Avenue, the west side of 29th Street (Nos. 21-78 to 21-12) Ditmars Boulevard and 21st Avenue and consist of Nos. 28-02 to 28-20 on the south side of 21st Avenue between 18th and 29th Streets and Nos. 27-04 to 27-20 on the south side of 21st Avenue between 27th and 28th Streets. Similar in height, setback, and in the arrangement of windows, the houses are differentiated from each other by the use of several roof types, and several combinations of brick and stucco facade treatments. The five story apartment buildings are brick with Tudor Style details. Despite some alterations, including the installation of new windows, recladding and the addition of metal awnings, the architectural integrity and character of the houses remain largely intact. Topography and intervening six-story apartment buildings block the view from the Arleigh Realty Company rowhouses to the Project Site.

The St. Francis of Assisi Roman Catholic Church, located on the south side of 21st Avenue between 45th and 46th Streets, more than one-half mile from the Project Site, also is a potentially historic but previously unidentified resource. The church, erected in 1930, is a two-story, wood-shingled structure with a steeply pitched roof. It is Latin Cross in plan. Each programmatic component of this structure (nave, transept, tower, chapel, side aisles and chancel) utilizes a different roof height so that different masses reference the distinct function of the various interior spaces. The church is only one of a few Shingle Style buildings in New York City. Situated at a through block angle to the Project Site, its view of the Project Site is obscured by intervening buildings.

Finally, a Phase 1A Cultural Resources Survey of the Con Edison Astoria Generating Station undertaken by John Milner Associates in 1995 for a separate and unrelated project identified two potentially historic but previously unidentified 1915 buildings located on this property. Both buildings were associated with the Astoria Gas Plant constructed by the Consolidated Gas Company in 1903, the East River gas tunnel, and the early 20th century technology that was used to supply New York City with manufactured gas. Both buildings are situated near the intersection of 20th Avenue and Shore Road to the south and southwest of the Con Edison administration building. Closest to the East River, the salt water pump house is a one story rectangular brick building with a pitched roof and large pedimental parapets on its two small sides. The other building is an L-shaped brick building that serves as a control and head house for the East River gas tunnel that supplies gas to Manhattan and the Bronx. Designed in the

Romanesque Revival style, this building has a pitched roof with clerestory windows and blind arcades with Romanesque corbeled arches. The Project Site is located approximately one mile from these structures and is obscured from view by intervening Con Edison buildings.

4.6.2.2 Archeological Resources

The archeological investigations were performed under the supervision of archeologists from TRC Garrow Associates, Inc., who meet the professional qualification standards set forth in 36 CFR 61. A Phase 1A archeological investigation of the Project Site, the electric transmission interconnection route, and the Con Edison natural gas interconnection route was conducted by TRC in December, 1999. A Phase IA investigation consists of a screening level search for the presence or likelihood of archeological resources on a particular location.

The Phase IA investigation began with a records search for previously recorded archeological resources within one-half mile of the Project vicinity, a distance that encompasses both interconnection routes (see Figure 4.6-1) and includes a buffer area that allows for conservative evaluation of the location or presence of past recorded archeology.

Environmental conditions within the study area, which may have influenced prehistoric and historic land uses and settlement patterns, also were identified. As specified in Stipulation No. 2, the Phase 1A records search included:

- Literature and historic maps regarding the history and archeology of the Project area and vicinity (see references below);
- OPRHP/SHPO Archeological Inventory Files and New York State Museum Archeological Site Files information on file at the New York City Landmarks Preservation Commission Office;

- Map Division resources, New York Public Library; and

- Prior cultural resource survey reports concerning other locations in the immediate vicinity of the Project.

Based on this review, no previously identified prehistoric archeological sites were reported on the Project Site, the electric transmission interconnection route, or the Con Edison natural gas interconnection route. Parker (1922) reported three sites (New York City Museum #s 4532, 4533, and 4539) and one area with "traces of occupation" within approximately one-half mile of the Project Site. These sites are shown on Figure 4.6-7. NYSM # 4532 is described as a mortuary site located on the former Riker and Titus estates near the end of Steinway Avenue (the former Bowery Road leading to the Steinway Estate and North Beach). NYSM # 4533 is described as a shell midden (including burnt shell) on the former Jackson property which is presently the area both north and south of the Grand Central Parkway. NYSM # 4539 is described as "traces of occupation" and a shell midden. The site area was near the Northeast Edge of Astoria Park and southwest of 20th Avenue. Parker (1922) also noted "traces of occupation" in the northwest corner (along the East River) of the Con Edison Complex.

No previously identified historic archeological sites were reported on the Project Site, the electric transmission interconnection route or the Con Edison natural gas interconnection route, or within one half mile of the Project Site.

Following the records search, the Project Site, the electric transmission interconnection route and the Con Edison natural gas interconnection route were surveyed on foot by TRC in December, 1999. The Project Site is a highly disturbed, almost completely paved, heavily developed area, which includes standing structures and storage tanks. In addition, as set forth more fully in Section 4.7 of this Application, the Site is situated on top of engineered fill. There are no areas where shovel testing can be undertaken on the Project Site. Based on historic research, no backhoe trenching is warranted.

Like the Project Site, the electric transmission interconnection route also is situated on ground that has been highly disturbed. A series of borings that have been taken on this property in the vicinity of this route has confirmed that the area is comprised of fill material. (See Section 4.7.) Several of these borings indicate that fill material continues to a depth of at least 15 to 20 feet below ground surface. Because the electric transmission interconnection route will be constructed on ground consisting of engineered fill material, shovel testing is not warranted.

The Con Edison natural gas interconnection route will extend underground from Con Edison's main gas line at 20th Avenue down Steinway Place to the Project Site. Steinway Place is paved and passes through a highly developed industrial area as it extends into the Site. The street is situated on top of land that has been created or embellished through extensive engineered fill material. Due to the highly disturbed nature of the paved street, no trenching or other type of subsurface investigation was warranted.

A Phase IB investigation was not deemed necessary in light of these results.

4.6.3 Potential Impacts and Proposed Mitigation

4.6.3.1 Historic Resources

As there are no historic resources located on the Project Site, the construction and operation of the Project will not have any on site impacts to historic resources.

4.6.3.1.1 Known Historic Resources

As shown on Figure 4.6-2, no designated historic resources are located adjacent to the Project Site. The closest resource, the Steinway House, is located approximately three blocks away from the Site. Due to distance, the presence of intervening industrial buildings and the Project construction's consistency with the existing industrial context of the area, there will not be significant adverse impacts on designated resources in the Cultural Study Area associated with Project construction. (See also Sections 4.5 and 4.8.)

Nor will Project operations have a significant adverse impact on designated historic resources in the Cultural Study Area. With the exception of the Steinway House, the Project Site is barely visible from any known historic resource. While the Project Site is visible from the Steinway House, the Steinway House currently is surrounded by mid- and late-20th century commercial and industrial development, including the Bowery Bay Water Pollution Control Plant, auto related facilities, and a short distance further to the west, the Con Edison Complex. Thus, Project operations will not alter the industrial context of the Project Site or its surrounding area.

4.6.3.1.2 Potentially Historic But Previously Unidentified Resources

The two potentially historic but previously unidentified resources within one-quarter mile area are located on properties adjacent to the Project Site. While both resources will be proximate to Project construction, disturbance will be temporary. (See Section 3.11.) Thus, Project construction will not have any long-term impacts on any potentially historic but previously unidentified resources.

Due to their proximity to the Site, the Project will be visible from both resources. However, converting the Site from a fuel oil storage and distribution terminal to a power generating facility will not alter the industrial context of the Project Site or its surrounding area. (See also Section 4.5, supra.) Thus, Project operations will not have significant adverse impacts on these potentially historic but previously unidentified resources.

An additional seven potentially historic but previously unidentified resources were found in the Cultural Study Area during the street by street tour. (See Figure 4.6-2.) Only partial views of the Project Site are available from any of these potentially historic but previously unidentified resources. Thus, neither Project construction nor operations will have a significant adverse impact on these resources.

4.6.3.2 Archeological Resources

The records search portion of the Phase IA investigation revealed that no previously identified prehistoric or historic archeological sites were present on the Project Site. The Site is situated on top of engineered fill material, and due to its highly disturbed condition, it is a low sensitivity area for archeological resources. Thus, no impacts on archeological resources are anticipated from the construction or operation of the Project on the Project Site.

Similarly, the records search portion of the Phase IA investigation further revealed that no previously unidentified prehistoric or historic archeological site exists along the electric transmission interconnection route or the Con Edison natural gas interconnection route. Due to their highly disturbed condition, both the electric transmission interconnection route and the Con Edison natural gas interconnection route also are low sensitivity areas for archeological resources. Thus, no impacts on archeological resources are anticipated from the construction of either of these interconnections. In accordance with Stipulation No. 2, however, an unanticipated discovery plan is set forth in Appendix 4.6.

Because the Project will not have a significant adverse impact on cultural resources, no mitigation measures are required.

4.6.3.3 Archeology References

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Walling, H.F. 1859. Topographical Map of the Counties of Kings and Queens, New York. Published by W.E. and A.A. Baker, New York.

4.7 Geology, Soils, and Seismology

4.7 Geology, Soils, and Seismology

4.7.1 Introduction

In accordance with PSL Sections 164(1)(a) and (c), Sections 1001.1(a) and 1001.3(b) of the Article X Regulations and Stipulation No. 8, this section: (i) sets forth existing conditions on the Project Site and along the electric transmission interconnection route and the Con Edison natural gas interconnection route; (ii) addresses potential impacts of the Project, including the electric transmission and Con Edison natural gas interconnection routes, on the geologic environment; and (iii) addresses potential impacts to the Project from seismic events. Clause 1 (t, u and v) of Stipulation No. 8, Wave Impacts and Erosion Control, is primarily addressed in Section 4.9 of this Application.

As set forth herein, construction and operation of the Project, the electric transmission interconnection route, the Con Edison natural gas interconnection route, and use of the construction support areas will not result in significant impacts to the geologic environment. Moreover, no site improvements or impacts to soils and geologic environment are expected to occur at any off-site construction support areas.

4.7.2 Laws, Regulations, and Policies

The following table identifies regulatory programs and standards that pertain to the Project and briefly summarizes the action proposed to comply with each program or standard.

TABLE 4.7-1:
REGULATORY PROGRAMS AND STANDARDS PERTAINING TO PROJECT GEOLOGY, SOILS, AND SEISMOLOGY

Program/ Regulation	Agency	Compliance Support
New York City Seismic Code, Local Law 17/95 § 27-569; Reference Standard.9-6	NYC Building Commissioner	Project will be constructed in accordance with the Code.
Beneficial Use Determination	NYDEC Waste Reduction and Recycling Program	Excavated soils will be reused as fill material.

4.7.3 Existing Conditions

4.7.3.1 Topography

The Project Site is a relatively flat parcel, adjacent to the East River and Steinway Creek. During the development of the property, fill material was placed on site, extending the natural shoreline into the adjacent waterways. Consequently, the majority of the relatively flat parcel was developed (man-made) to support the current site use. The electric transmission interconnection and Con Edison natural gas interconnection routes have similar flat to gently sloping topography (U.S.G.S, 1979).

Figure 4.7-1 presents a topographic map of the Project Site, the electric transmission interconnection route and the Con Edison natural gas interconnection route. Figure 4.7-2 presents a detailed topographic map of existing conditions at the Project Site with one-foot contours. Figure 4.7-3 presents a topographic map of the Project Site with the proposed structures and facilities of the Project. Post-construction topography will not change along the interconnection corridors, as original grade will be restored following installation.

4.7.3.2 Site Soils and Surficial Geology

The surficial geology of the Project Site consists of glacially derived deposits (Sanders and Merguerian, 1994). The surficial geology of the Project Site, the electric transmission interconnection route and the Con Edison natural gas interconnection route is documented as a variable texture till. This till material consists of clay, silty-clay and/or boulder clay that is relatively impermeable (loamy matrix) with a thickness ranging from 3 feet to 150 feet (D.H. Caldwell and others, 1989).

Subsurface soil borings and test pits were advanced on the Project Site and logged by a TRC geologist during August 1999. Three of the borings were advanced up to greater than 60 feet below ground surface.

At the Project Site, the subsurface soils include fill material of sand or larger particle size, interbedded with construction and demolition material including concrete blocks, bricks, boulders, and wood. Sand size particles are the major constituent of the fill material extending 0 to 15+ feet below ground surface (TRC, 2000a). Native soils were identified at approximately 10-15 feet below ground surface. An organic mat was identified directly below the fill material, underlain by a blue-gray marine clay layer up to 36 feet below ground surface. Below the clay layer, a fine to coarse sand, interbedded with silt and clay layers, was identified. Native soils atop of bedrock consist of a blue-green-black fine sand, with some silt, trace clay and angular gravel. Bedrock chips recovered during drilling were described as a mica-schist (TRC, 2000a).

Several of the soil samples were analyzed at an off-site laboratory for gradation, moisture, and density using American Society for Testing and Materials Standard Specifications. The results were certified by a New York State Licensed Professional Engineer. The Site soils are described as poorly graded sand and silty sand. In general, this material is moderately permeable, with an expected hydraulic conductivity range of 100 – 500 gallons per day per cubic foot (EPA, 1990). A site map of boring and test pit locations and the results of the geotechnical analysis are provided in Appendix 4.7.

Along the electric transmission route, analysis of subsurface borings indicate site soils consisting of sand with coal ash, slag, silt, brick fragments, wood, and other debris (ENSR, 1994). Foundations along this route will be driven and will not require soil excavation.

Along the Con Edison natural gas transmission route, which is located in existing streets, no site soils are visible at the surface due to asphalt and concrete paving. Native soils are not anticipated to be encountered along this route because it is an active subsurface utility area that is within a roadway with reworked fill material. The anticipated engineering grade soils along this route will be placed back into the excavation following installation of the natural gas pipeline.

Figure 4.7-4 presents a surficial geology (site soil) map of the Project Site, the electric transmission interconnection route, and the Con Edison natural gas interconnection route. Figures 4.7-5 and 4.7-6 illustrate cross-sections of the soil types at the Project Site in

representative areas to be disturbed for construction. As part of final design of the Project, an additional supplemental geotechnical investigation may be needed to support final design parameters at the Project Site. It is not anticipated that additional geotechnical investigations will be required to support final design parameters along the electric transmission interconnection route and the Con Edison natural gas interconnection route.

Additionally, approximately 2,750 cubic yards of stockpiled fill material from the original fuel terminal site development is located above grade in the southwest corner of the Site.

4.7.3.3 Bedrock Geology

The bedrock geology of the Project Site, the electric transmission interconnection route, and the Con Edison natural gas interconnection route is presented on the Geologic Map of New York, Lower Hudson area (1970), which is attached as Figure 4.7-7. It is defined as underlying bedrock geology unknown (D.W. Fisher and others, 1970; NYSGS, 1990; NYSU, 1991). TRC completed subsurface borings on the Project Site during August, 1999. The depth to bedrock across the Project Site was documented as ranging from 61 feet to greater than 75 feet below ground surface, increasing in depth toward the East River (TRC, 2000a).

Along the electric transmission interconnection and Con Edison natural gas interconnection routes, site geology is reported by Con Edison to be similar to the Project Site, with similar depth to bedrock documented along the electric transmission interconnection at 45-50 feet below ground surface (Con Ed, 2000). See Figures 4.7-5, 4.7-6.

4.7.3.4 Seismology

New York City primarily is composed of sediments that were metamorphosed during the Taconic and Acadian orogenies roughly 300 - 400 million years ago. The Project Site, electric transmission interconnection route, and Con Edison natural gas interconnection route are located in the Lower Hudson region which consists of a geologically complex area of bedrock formations which have been metamorphosed, folded, and faulted over-time (NYSU, 1991).

New York City is known to be highly faulted, including faults along Cameron's Line, which trends approximately northeast to southwest just west of the Project Site. Cameron's Line, a major geologic boundary, is a fault zone of numerous small fractures running from New York City to Massachusetts (NYSGS, 1990; NYSU, 1991).

This geologic area is located within the middle of the Americas tectonic plate, a continental plate. Earthquakes at plate boundaries are more frequent and more intense than earthquakes in the middle of a tectonic plate. However, moderate to large energy earthquakes are possible in mid-plate regions such as New York City. The New York City Seismic Code states that seismicity in New York City is "moderate." See NYC Building Code § 27-569; Reference Standard 9-6.

Earthquakes in the Project Site region dating back to 1730 have been recorded using the Modified Mercalli Intensity Scale[1]. This measurement of earthquake intensity identifies the effect of an earthquake at any given point on the Earth's surface. The Modified Mercalli Intensity Scale is based on intensity and observations at the surface of the earth. This scale has been utilized by the State University of New York to track regional earthquakes in the New York State area. (NYSU, 1991).

Figure 4.7-8 presents Modified Mercalli (MM) Intensity Scale epicenters within 50 miles of the Project Site during the years 1534-1980. Within 10 miles of the Project Site, no earthquake was recorded above an intensity factor VII, which corresponds to negligible damage in buildings of good design and construction. Within 50 miles of the Project Site, no earthquake was recorded above intensity factor VIII, which corresponds to slight damage in specially designed structures, with considerable damage in ordinary substantial buildings with partial collapse.

[1] Another common earthquake scale dating back to the 1930's is the Richter Scale. For reference purposes, the Modified Mercalli Intensity Scale factors VII and VIII correspond approximately to magnitudes 5 to 6 on the Richter Scale (NYSU, 1991). Earthquakes with magnitudes of 6 or greater are possible, though none have been recorded in New York (NYSGS, 1989; Jacob, 1993; U.S.G.S, 1999; U.S.G.S, 2000).

For the Project Area, the National Seismic Hazard Mapping Project of the United States Geological Survey has estimated a 2% probability of exceedance every 50 years of a peak ground acceleration at 0.25g, and a 0.2 sec spectral acceleration at 0.43g (USGS, 1999). Peak acceleration is a measure of the maximum force experienced by a small mass located at the surface of the ground during an earthquake. The buildings constructed to support this Project will be designed in accordance with seismic requirements contained in the building codes, which are based in part on ground acceleration hazard factors.

4.7.3.5 Tsunamis

Tsunamis can be generated when the sea floor abruptly deforms and vertically displaces the overlying sea water. Large vertical movements of the earth's crust can occur at plate boundaries such as those around the Pacific Ocean. In particular, subduction earthquakes at plate boundaries are particularly effective in generating tsunamis. As described above, the Lower Hudson region is located in a seismically active area located in a mid-plate region, with no active subduction zones or volcanoes nearby. Tsunamis also can be generated from landslides, volcanic eruptions, and cosmic collisions, which have a low potential of occurrence within the area of the Project Site, the electric transmission interconnection route and the Con Edison natural gas interconnection route.

The potential for earthquake-generated tsunamis, resulting from massive vertical displacement of the earth's crust, is low for the Project Site, the electric transmission interconnection and the Con Edison natural gas interconnection routes. A search of the National Oceanic and Atmospheric Administration (NOAA) world-wide database of historical tsunami impacts for New York City from 1500 to 1998 did not produce any recorded impacts. NOAA has stated that due to the wide continental shelf in the North Atlantic, it is unlikely that a large tsunami would have a major impact on the East Coast of the United States (NOAA, 1989).

4.7.4 Potential Impacts and Proposed Mitigation

4.7.4.1 Site Soils

The soils at the Project Site and along the interconnection routes are suitable to support construction of the Project, the electric transmission line and the natural gas pipeline. Site soils will be further evaluated as part of a geotechnical investigation to support final design of the Project foundations and grounding requirements. The load carrying capacity and uplift resistance of the soils will be confirmed at that time. The Project, including the electric transmission line and the natural gas pipeline, will be constructed in accordance with all applicable local, State, and federal building codes.

Excavation activities to support the bulk storage tank removals, electric transmission line and natural gas pipeline installations, and foundation work will reuse to the maximum extent possible all excavated Project Site soils. A preliminary calculation of the quantity of cut and fill necessary to construct the Project, the electric transmission interconnection route and the Con Edison natural gas interconnection route is provided in Table 4.7-2. An explanation of the calculations provided in Table 4.7-2 is provided in Appendix 4.7. The calculations set forth below include the amount of fill material to be brought onto the Project Site and interconnection routes, and the excavation soil to be removed from the Project Site and interconnection routes.

TABLE 4.7-2: SUMMARY OF APPROXIMATE EXCAVATION AND FILL ACTIVITIES ASTORIA ENERGY				
Location	**Excavation of Existing Soils (cubic yards)**	**Backfill Requirements (cubic yards)**	**Off-site Backfill Needed for Project (cubic yards)**	**Off-site Recycling of Materials Decommissioned**
Project Site	65,000	80,400	15,400	19,500
Electric transmission interconnection route	600	0	0	600
Con Edison natural gas interconnection route	4,000	4,650	650	0
TOTAL	**69,600**	**85,050**	**16,050**	**20,100**

Specifically, the removal of the bunker tank will result in a below grade opening 6 to 8 feet below ground surface. The engineered fill currently surrounding the bunker tank will be utilized as backfill. Other construction related excavations (e.g., foundation, stormwater piping) at the Project Site to support construction will result in the generation of additional material which will be used as backfill. The remaining stockpiled fill material above grade originating from the initial fuel terminal site development will be utilized as Project Site fill material. A net deficit of fill material is likely to be realized even though full reuse of excavated materials will be practiced at the Project Site as a mitigation measure.

Cut and fill activities will be completed with backhoes, excavators, and dump trucks. Cut material will be stockpiled at the southwest corner of the Site prior to backfilling. The backfilling of the excavated site soils will be completed in accordance with the self-implementing regulations governing Beneficial Use, 6 NYCRR Part 360-1.15(b)(8), regarding soil excavated as part of a construction project which is being used as a fill material. Based on discussions with a

NYDEC representative, because the regulations are self-implementing, a NYDEC case-specific Beneficial Use Determination will not be required to support this activity (TRC, 2000b).

The Con Edison natural gas interconnection route will require excavation and backfilling along Steinway Place, a public roadway. The excavated material will be backfilled following installation. Approximately 650 cubic yards of off-site material is projected to be required to support backfilling activities.

The electric transmission route foundations will be augered cast in place concrete caissons. This material will be characterized following excavation and is anticipated for Beneficial Use on the Site as fill material in accordance with 6 NYCRR Part 360-1.15(b)(7).

It is anticipated that if it is necessary up to 7,500 cubic yards of fill material at the active No. 6 fuel oil remediation area may be disturbed during construction. If the soil is identified as contaminated with petroleum, the material will be transported off-site for recycling, asphalt batching or similar reuse in full compliance with the existing NYDEC Stipulation Agreement. (See Section 3.0.) This material will be replaced with excavated site fill material or clean fill from an off-site source.

Soils that are excavated will be managed in accordance with a site specific soil and ground water management plan that will be completed following final design of the Project. Soil erosion control will be managed in accordance with the stormwater pollution prevention plan outlined in Section 4.9.5 and Appendix 4.9.

Dewatering of site soils may be required during excavation activities at the bunker tank area due to precipitation falling into the open excavation and the shallow ground water table in this area. Dewatering will be completed with well points and allowed to infiltrate at a Site constructed infiltration basin, as discussed in detail within Sections 4.9.4, Ground Water and 4.9.5 Storm Water. No facilities below grade will require continuous dewatering of site soils.

4.7.4.2 *Geology*

No impacts to the geologic environment from construction and operation at the Project Site, the electric transmission line, the Con Edison natural gas pipeline, or off-site construction support areas are projected.

Due to the known and presumed depth of bedrock below ground surface at the Project Site, the electric transmission interconnection route, and the Con Edison natural gas interconnection route, underlying bedrock will not impact construction activities and no blasting will be required. Therefore, a description of the characteristics, improvements, and suitability for construction of bedrock is not applicable to the Project.

4.7.4.3 *Seismology*

For the Project area, the National Seismic Hazard Mapping Project of the United States Geological Survey has estimated a 2% probability of exceedance every 50 years of a peak ground acceleration at 0.25g, and a 0.2 sec spectral acceleration at 0.43g (USGS, 1999). Peak acceleration is taken into account during the design of buildings. It will be considered in the design of Project buildings.

All Project buildings will be built to meet modern seismic design provisions contained in the applicable building codes.

For construction purposes, the New York State Seismic Building Code is separated along county lines to facilitate code administration. The State is divided into four seismic zones, A, B, C, and D, with assigned seismic zone factors equal to 0.09g, 0.12g, 0.15g, and 0.18g, respectively[2]. The seismic zone factors correspond to effective peak acceleration on rock/stiff soil conditions (shear wave velocities of approximately 2,500 ft/sec), which is an earthquake intensity factor. The Project Site is located in Zone C and must be designed using a seismic zone factor of 0.15g. The

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[2] "g" equals the force relative to gravity.

Seismic Zones for New York State are not probabilistic, but a consensus of the groups responsible for its development. (BSSC, 1995.)

All major equipment and building foundations will be set on bedrock. The Project will be constructed in accordance with the local building codes and in full accordance with the New York City Seismic Code, Local Law 17/ 95; NYC Administrative Code §27-569 and Reference Standard 9-6.

4.7.4.4 Tsunamis

The potential occurrence of tsunamis at the Project Site is extremely low. Therefore, as is appropriate for a New York City site, no potential impact or proposed mitigation analysis was necessary.

4.7.5 References

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4.8 Noise

4.8 Noise

4.8.1 Introduction

In accordance with PSL Sections 164(1)(a) and (c), Sections 1001.1(c) and 1001.3 of the Article X Regulations, and Stipulation No. 6, this section: (i) sets forth existing noise conditions in a defined study area; and (ii) presents the results of a noise assessment conducted in the defined study area to analyze potential noise impacts associated with the Project. In accordance with Stipulation No. 6, the study area consists of the area where the nearest noise receptors are located in relation to the Site, including the nearest residential and recreational receptors (Noise Assessment Study Area).

The noise assessment consists of three parts. First, an ambient noise monitoring program was performed in the Noise Assessment Study Area to characterize the existing noise environment. Next computer noise modeling was performed in order to calculate projected noise levels associated with Project operations. in the Noise Assessment Study Area. Finally, an impact assessment was performed using the modeling results and measured background levels. The results of the noise assessment are presented in this section. The supporting documentation is included in Appendix 4.8.

As set forth more fully herein, the results of the noise assessment show that, while noise levels in the Noise Assessment Study Area will increase, they will remain within NYDPS requirements and local noise regulations except for one local octave band level limit at the site entrance, and at the Bowery Bay Boat Club. As set forth more fully in Section 7.0 of this Application, Astoria Energy is seeking a waiver of the one octave band limit where compliance may not be achieved.

4.8.2 Laws, Policies, and Regulations

The following noise regulations and guidelines were used to evaluate noise impacts associated with the construction and operation of the Project.

New York City Zoning Resolution

Section 42-21 of the New York City Zoning Resolution limits noise levels from any on-site activity to decibel levels according to octave band. (See New York City Zoning Resolution § 42-21(1999)). Noise is defined as the sound pressure level resulting from any open or enclosed activity. The Project Site is located in a Heavy Manufacturing zone (M3-1). The decibel level limits which may not be exceeded at any point on any lot line, according to land use, are presented in Table 4.8-1 below.

TABLE 4.8-1:
NYC ZONING RESOLUTION NOISE STANDARD (DB)

Octave Band	Limits for M-3 District	Limits for M-3 District Adjoining a Residential District
20 to 75 cycles per second	80	74
75 to 150 cycles per second	75	69
150 to 300 cycles per second	70	64
300 to 600 cycles per second	64	58
600 to 1,200 cycles per second	58	52
1,200 to 2,400 cycles per second	53	47
2,400 to 4,800 cycles per second	49	43
Above 4,800 cycles per second	46	40

Source: New York City, City Planning Commission and City Planning Department (1998, Sections 42-213 and 42-214).

New York City Noise Code

Subchapter 6 of the New York City Administrative Code ("Code") establishes noise thresholds throughout the City. (See New York City Administrative Code § 24-243 (1992)). The noise thresholds are keyed to the various City zoning designations and are designed to create noise quality zones with characteristics applicable to the types of land uses in each zoning designation.

Three noise quality zones are contained in the Noise Assessment Study Area. As property located in the M3-1 zone, the Code sets the maximum acceptable noise threshold for the Project Site at 70 dBA both day (7 AM to 10 PM) and night (10 PM to 7 AM), measured at the property line.

Within the Noise Assessment Study Area, a high-density residential zone (R4 and R5) begins two blocks south of the Project Site. A strip of commercial zoning also exists along Steinway Street extending to the South beginning at 20th Avenue. Additional commercial zoning exists along Ditmars Boulevard, 23rd Avenue, and 31st Street. Under the Code, the maximum noise threshold for high-density residential zones is 65 dBA during the day (7 AM to 10 PM) and 55 dBA at night (10 PM to 7 AM). The Code sets noise levels for commercial land uses at a maximum of 70 dBA, both day (7 AM to 10 PM) and night (10 PM to 7 AM), measured at the receiving property line.

Based upon the parameters that are set forth in Section 24-243 of the Code, the Project is located within a commercial and industrial noise quality zone ("N-3") and residential receptors identified for the Project pursuant to Stipulation No. 6 are located in high density residential noise quality zone ("N-2"). This section of the Code provides that new activity in an N-3 zone may not cause the sound levels in the N-3 zone to exceed 70 dBA day or night. This section of the Code further provides that new activity may not cause the sound levels in the N-2 zone to exceed 55 dBA for any one hour at night and 65 dBA for any one hour during the day.

The Code does not establish maximum noise thresholds for construction activities, but limits construction activities to the weekday hours of 7 AM to 6 PM. The Code also prohibits generation of unreasonable noise when operating a construction device.

New York City CEQR

Though not applicable due to preemption by the Article X process, recommended noise guidelines set forth in the New York City CEQR Manual also were evaluated in accordance with Stipulation No. 6. The CEQR Manual recommends that the absolute noise level for sensitive receptors should not exceed 65 dBA during daytime hours (CEQR Manual Section 410). The CEQR Manual further establishes a guideline that an increase of 3 dBA typically would be considered significant during nighttime hours.

New York State Department of Public Service (NYDPS)

In accordance with NYDPS requirements, the modified Composite Noise Rating Method (CNR) was used to assess potential noise impacts. This methodology takes into account many factors including the expected sound levels from the Project, the existing sound levels, character of the noise (e.g., tonal, impulsive), duration, time of day and year, and subjective factors such as community attitude and history of previous exposure. The NYDPS historically has accepted a rating of "D," corresponding to a response of "sporadic complaints." However, the NYDPS currently is requesting a more stringent rating of "C" for new projects, corresponding to "no reaction although noise is noticeable."

4.8.3 Existing Ambient Noise Levels

In accordance with Stipulation No. 6, procedures established by the following documents guided the noise assessment methodology:

- Empire State Electric Energy Research Corporation, Prediction of Noise from Power Plant Construction, Bolt, Beranek and Newman, Inc., Report No. 3321 (1977);
- Edison Electric Institute, Electric Power Plant Environmental Noise Guide, Volumes 1 and 2 (1984);
- Noise source input data from equipment suppliers and published empirical equipment noise equations; and

- USEPA Model Community Noise Control Ordinance, USEPA Report EPA 550/9-76-003 September 1975.

Figure 4.8-1 shows the location of the representative noise receptors that were used for this noise assessment. Existing ambient noise levels at these receptor locations were quantified through an ambient noise monitoring program. Monitoring was conducted on December 21-22, 1999 and February 8-9, 2000. Monitoring consisted of 20-minute measurements at eight selected representative noise receptor locations. This included three representative sensitive receptors at selected locations in the residential zone starting at 20th Avenue and five other representative receptors at selected locations in the industrial zone near the Project Site. The representative receptor locations in the industrial zone included one residence whose presence is a nonconforming use in this industrial zone. Locations one through five detailed below were set forth in Stipulation No. 6. The additional receptors were added to assess compliance with industrial property line standards. Provided below is a list of the monitoring locations:

1. Corner of Berrian Boulevard and Steinway Street (industrial zone)
2. Apartment Building at 31st Street and 20th Avenue (residential zone)
3. Playground/Residential at 37th Street and 20th Avenue (residential zone)
4. Residential at 43rd Street and 20th Road (residential zone)
5. Steinway House at 41st Street (nonconforming residential use in industrial zone)
6. Steinway Factory Property Line (industrial zone)
7. Bowery Bay Boat Club (industrial zone)
8. Front Gate (industrial zone)

A Bruel & Kjaer (B&K) Model 2260 precision integrating sound level meter and octave band analyzer with an integral data logger was utilized for this program. The microphone was fitted with a windscreen to reduce wind generated noise and mounted on a tripod at a height of approximately five feet above the ground. The meter was programmed to measure the 1/3 octave band levels for a continuous period of 20 minutes at each location. The statistical parameters of L_{eq}, L_{90}, and L_{10} were calculated by the meter.

The L_{90} noise level, which is the level exceeded 90 percent of the measurement time, characterizes residual noise levels. The residual noise level is defined as the sound level that would be present in the absence of intrusive sources, such as barking dogs, intermittent traffic, and aircraft overflights. The L_{90} was used to characterize the existing ambient noise environment for this Project.

The measured daytime and nighttime residual (L_{90}) noise levels are presented in Table 4.8-2. Late night noise levels were used in this noise impact analysis to remain conservative.

TABLE 4.8-2:
RESIDUAL (L_{90}) NOISE LEVELS (dBA)

Receptor	Land Use	NYC Zone	Daytime	Late Night
1-Corner of Berrian Boulevard and Steinway Street	Industrial	M-3	51	48
2-Apartment Building at 31st Street and 20th Avenue	Residential	R-5	53	48
3-Playground/Residential at 37th Street and 20th Avenue	Residential	R-5	52	43
4-Residential at 43rd Street and 20th Road	Residential	R-4	48	41
5-Steinway House at 41st Street	Residential in Industrial	M-3	65	51
6-Steinway Factory Property Line	Industrial	M-3	67	57
7-Bowery Bay Boat Club	Industrial	M-3	52	51
8-Front Gate (Steinway Street)	Industrial	M-3	56	53

Existing noise sources in the area consist of a combination of industrial sounds, local traffic, aircraft, and natural sounds. Sounds of aircraft taking off and landing from LaGuardia Airport are particularly evident during daytime hours and in the evening until 10:00 PM. Though not reflected in the residual noise levels presented above, the constant sound of aircraft noise from LaGuardia causes episodic noise events in excess of 70 dBA. These noise events occur approximately once every minute and are a distinct feature of the Site noise environment.

4.8.4 Potential Impacts and Proposed Mitigation

Computer modeling was performed to project noise levels that would be generated by the Project. These levels were evaluated against the existing residual (or ambient) noise levels described above to determine potential impacts of the Project at the representative receptor locations.

As required by Stipulation No. 6, design goals were developed for the Project. The design goals, which are a function of the local noise standards and agency requirements, are described in Section 4.8.2. These noise goals are provided below in Table 4.8-3 for convenience and ease of reference.

TABLE 4.8-3:
NOISE DESIGN GOALS

Receptor	NYC Zoning Resolution	NYC Code	Modified CNR
1-Corner of Berrian Boulevard and Steinway Street	(1)	70	N/A[2]
2-Apartment Building at 31st Street and 20th Avenue	(1)	55	C
3-Playground/Residential at 37th Street and 20th Avenue	(1)	55	C
4-Residential at 43rd Street and 20th Road	(1)	55	C
5-Steinway House at 41st Street[3]	(1)	70	C
6-Steinway Factory Property Line	(1)	70	N/A[2]
7-Bowery Bay Boat Club	(1)	70	N/A[2]
8-Front Gate (Steinway Street)	(1)	70	N/A[2]

Notes:
(1) The octave band limits are detailed in Table 4.8-1.
(2) The CNR analysis is designed to determine potential impact at noise sensitive areas (e.g., residential). Therefore, they do not apply to the industrial locations.
(3) Location 5, though currently used for residential purposes, is a nonconforming use within the M-3 industrial zone. The 70 dBA standard therefore applies to this location.

4.8.4.1 Potential Noise Impacts Associated with Project Construction

As set forth in Section 3.11 of this Application, the Project will be constructed in phases which correspond to the following types of activities:

- Initial Grading and Excavation, including pile driving;
- Concrete Pouring;
- Building Assembly;
- Siding and machinery installation; and
- Exterior finish, and cleanup.

The construction equipment that will be utilized will differ from phase to phase. In general, heavy equipment (bulldozers, dump trucks, cement mixers) will be used during excavation and concrete pouring activities.

Computer modeling was used to project the noise levels that will be generated by Project construction. Modeling was conducted at the same residential receptors as where background monitoring was performed. Average noise levels were calculated for each construction phase. This was performed by incorporating a usage factor, which considers the average time a piece of construction equipment is expected to be used in any given construction phase (Barnes, 1977).

Because the construction sources will not be elevated, the intervening buildings separating the residential zone from the Site will act as effective noise barriers (FHWA, 1978). A 10 dBA barrier effect was therefore considered for this factor.

As set forth herein, the L_{90} level represents baseline noise levels. Correspondingly, the L_{eq} level represents a measure of the average of all noises that are present. Because construction noise is a combination of varying noises, it more closely is represented by the L_{eq} level. Table 4.8-4 below compares the calculated average daytime construction noise levels with the existing L_{eq} noise levels.

**TABLE 4.8-4:
COMPARISON OF CALCULATED AVERAGE DAYTIME CONSTRUCTION PHASE NOISE LEVELS TO EXISTING DAYTIME L_{EQ} NOISE LEVELS AT RESIDENTIAL RECEPTORS (dBA)**

	2-Apartment Building at 31st Street and 20th Avenue (2400 feet)[1]		3-Playground/ Residential at 37th Street and 20th Avenue (1600 feet)[1]		4-Residential at 43rd Street and 20th Road (2400 feet)[1]		5-Steinway House at 41st Street (600 feet)[1]	
Construction Phase	**ACN[2]**	**Leq[3]**	**ACN[2]**	**Leq[3]**	**ACN[2]**	**Leq[3]**	**ACN[2]**	**Leq[3]**
Initial Grading and Excavation	**48**	**66**	**50**	**63**	**46**	**60**	**55**	**67**
Concrete Pouring	**44**	**66**	**46**	**63**	**43**	**60**	**52**	**67**
Building Assembly	**43**	**66**	**45**	**63**	**42**	**60**	**51**	**67**
Siding and Machinery Installation	**43**	**66**	**45**	**63**	**42**	**60**	**51**	**67**
Exterior Finish and Cleanup	**45**	**66**	**47**	**63**	**44**	**60**	**53**	**67**

(1) Distances are measured from the Project Site property line.
(2) ACN = Average Construction Noise Level
(3) Leq = Measured Daytime Leq Noise Level

Table 4.8-4 shows that the calculated average construction noise levels will be well below the existing daytime L_{eq} levels at all residential receptor locations, including the Steinway House. Therefore, impacts due to average daytime construction noise levels will not be significant.

Project construction will include two shifts occurring between 7:00 AM and 12:30 AM. While the Code generally limits construction activities to specific daytime hours, Astoria Energy is seeking a waiver of this provision to move construction efficiently and shorten the overall construction schedule (See Section 7). Thus, nighttime construction levels also were calculated and compared to the late night ambient L_{eq} levels.

Astoria Energy will not conduct pile driving or jack hammering activities after 6:00 PM. The noise levels for nighttime construction are presented in Table 4.8-5 below.

TABLE 4.8-5:
COMPARISON OF CALCULATED AVERAGE NIGHTTIME CONSTRUCTION PHASE NOISE LEVELS TO EXISTING LATE NIGHT L_{EQ} NOISE LEVELS AT RESIDENTIAL RECEPTORS (dBA)

	2-Apartment Building at 31st Street and 20th Avenue (2400 feet)[1]		3-Playground/ Residential at 37th Street and 20th Avenue (1600 feet)[1]		4-Residential at 43rd Street and 20th Road (2400 feet)[1]		5-Steinway House at 41st Street (600 feet)[1]	
Construction Phase	ACN[2]	Leq[3]	ACN[2]	Leq[3]	ACN[2]	Leq[3]	ACN[2]	Leq[3]
Initial Grading and Excavation	43	53	45	47	42	48	51	54
Concrete Pouring	44	53	46	47	43	48	52	54
Building Assembly	43	53	45	47	42	48	51	54
Siding and Machinery Installation	43	53	45	47	42	48	51	54
Exterior Finish and Cleanup	45	53	47	47	44	48	53	54

(1) Distances are measured from the Project Site property line.
(2) ACN = Average Construction Noise Level
(3) Leq = Measured Late Night Leq Noise Level

The only activity with pile driving is the initial grading and excavation phase. As shown, the noise levels for this activity are therefore lower at night since pile driving will not occur at night. Average noise levels for the other phases remain the same. Nighttime noise levels are also shown to be at or below ambient L_{eq} levels and therefore are not significant.

The projected Project construction noise levels were also input to the modified CNR analysis. The analysis revealed that construction noise levels will result in a rating of "C" or better at all residential locations for all construction phases during the day and at night.

During the exterior finish and cleanup phase, short-term noise events will occur as a result of air/steam blows. Air/steam blows are required after erection and assembly of the feedwater and steam systems so that piping and tubing that comprise the steam path can be cleaned to prevent damage to the steam turbine.

Before the steam system is connected to the turbine, the steam line temporarily is routed to the debris trap and muffler and high pressure steam is vented through the tubing. This flushing action, referred to as a steam blow, cleans out the steam system and consists of a series of short steam blows, lasting a minute or two each, performed a few times over a period of approximately one to two weeks per unit. As a mitigation measure, Astoria Energy will use a portable, high performance muffler to attenuate this noise to a level of approximately 56 dBA at the nearest residential location (37th Street and 20th Avenue). To provide further mitigation, Astoria Energy will not perform this activity before 9:00 AM or after 5:00 PM at any time during the construction period

4.8.4.2 Noise Impacts Associated with Project Operations

In accordance with Stipulation No. 6, the NOISECALC computer model, developed by NYDPS, was used to calculate noise levels expected from operation of the Project. NOISECALC is a Hemispherical Free Field (HFF) noise prediction model that was developed by NYSDPS for predicting noise levels from power plants.

The NOISECALC model was configured to accept hemispherical spreading and atmospheric absorption for this analysis based on values from the *Electric Power Plant Environmental Noise Guide (1984)*. Standard conditions of 59° F and 70 percent relative humidity were assumed as recommended in the Noise Guide. Directivity effects for noise from the stack flues also were considered. No credit was taken for ground absorption. Modeling was conducted at the same locations where background monitoring was performed.

Information for expected noise levels from the major Project equipment was obtained from the following sources:

Equipment	Data Source
Gas Turbine Casing	GE/TRC files
Steam Turbine	Derived based on MW rating - EEI, 1984
Pumps (boiler feedwater, condensate)	Derived based on hp rating - EEI, 1984
HRSG Stack	GE/TRC files
HRSG Casing	GE/TRC files
Turbine Air Inlet	GE/TRC files
Transformers	Derived based on MVA rating - EEI, 1984
Air Compressor	Derived based on hp rating - EEI, 1984
Gas Compressor Building	Derived based on hp rating - EEI, 1984
Inlet Air Coolers	TRC files for similar unit
Air Cooled Condensers	GEA estimate

The modeling results are shown in Table 4.8-6 below.

TABLE 4.8-6:

PROJECTED OPERATIONAL NOISE LEVELS COMPARED TO NOISE STANDARDS (dBA)

Receptor	Modeled Level (dBA)	NYC Zoning Resolution	NYC Code Standard (dBA)	Calculated CNR	CNR Standard	CEQR(3)
1 – Corner of Berrian Boulevard and Steinway Street	62	(1)	70	N/A	N/A	N/A
2 – Apartment Building at 31st Street and 20th Avenue	47	(1)	55	B	C	48
3 – Playground/Residential at 37th Street and 20th Avenue	49	(1)	55	C	C	43
4 – Residential at 43rd Street and 20th Road	45	(1)	55	B	C	41
5 – Steinway House at 41st Street	56	(1)	70	C	C	51
6 – Steinway Factory Property Line	62	(1)	70	N/A	N/A	N/A
7 – Bowery Bay Boat Club	69	(1), (2)	70	N/A	N/A	N/A
8 – Front Gate (Steinway Street)	67	(1), (2)	70	N/A	N/A	N/A

(1) The octave band limits are detailed in Table 4.8-1.

(2) The calculated octave band levels exceed the zoning resolution standards for the M-3 district. See Appendix 4.8 for detailed data.

(3) Preempted by Article X, but evaluated in accordance with Stipulation No. 6.

New York City Zoning Resolution

Computer noise modeling of the major Project sources shows that the Project operational noise levels will be well below the octave band limits presented in Table 4.8-6 at all residential zones bordering the Site. The octave band limits are projected to be exceeded at the Bowery Bay Boat Club and the front gate of the Project Site. Neither of these locations is occupied regularly or by large numbers of people for extended periods of time. As set forth in Section 7.0, Astoria Energy is seeking a waiver of this regulation.

New York City Noise Code

Computer modeling of the major Project sources shows that Project noise levels will be below both the 55 dBA limit at representative sensitive (i.e., residential) receptors, and the 70 dBA limit at the industrial representative receptor locations. Thus, Project operations will comply with the Code.

NYDPS Modified CNR Analysis

The projected Project operational noise levels were input to the modified CNR analysis in accordance with the NYDPS requirements. This analysis shows that projected Project noise levels will produce a CNR rating at the representative sensitive (i.e., residential) receptor locations of "C" or better, in compliance with the NYDPS requirement.

4.8.4.3 Additional Noise Impact Assessments

In accordance with Stipulation No. 6, the following additional evaluations were made.

New York City CEQR

CEQR is preempted by the Article X process. Nevertheless, CEQR noise evaluation procedures are presented here pursuant to Stipulation No. 6. The CEQR manual contains a guideline that an increase of 3 dBA typically would be considered significant during nighttime hours. Modeling indicates that Project noise levels will exceed the existing late night background levels by more than 3 dBA at three of the four representative residential receptor locations. In this case, however, this impact is not considered significant because the increase occurs adjacent to a heavy industrial zone. This area is already subjected to commercial and industrial sounds. Moreover, as demonstrated in the noise impact analyses, the addition of the Project will not alter the overall noise characteristics of this area. This is reflected by the "B" and "C" ratings that were achieved at residential receptor locations under the CNR method described above. The CNR method recognizes that an increase of more than 3 dBA, when background levels are low and the new source does not alter the noise environment, is not significant. As a result, impacts are not considered significant using CEQR evaluation procedures.

Hearing Damage

Hearing damage will not occur as a result of construction or operation of the Project. Noise levels of 70 dBA or lower for sensitive receptors are considered within an adequate margin of safety to prevent hearing damage (EPA, 1974). Project noise levels at all sensitive residential receptors will be well below 70 dBA.

Sleep Interference

Studies have shown that there are no subjective effects on sleep at episodic noise events of 60 dBA when the number of noise events are below eight. An episodic noise event is considered to be a sudden occurrence of a noise level of a given magnitude. Further, episodic noise events of 45 dBA should not occur more than 10 to 15 times per night in order to avoid sleep interference (Berglund, 1995). Project operation is not expected to result in sleep interference for the following reasons:

- Project sound levels are steady, as opposed to episodic in nature; and
- Project noise levels are likely to be well below 40 dBA indoors for residential sensitive receptors.

Indoor and Outdoor Speech Interference

Relaxed conversation occurs with a voice level of 54-56 dBA at a distance of one meter. When background noise is equal to the speech level, sentence intelligibility is at 95 percent (Berglund, 1995). Ninety five percent sentence intelligibility usually permits reliable communication because of the redundancy in normal conversation (EPA, 1974). Project noise levels in residential areas will be within, or in most cases, well below the relaxed conversation level of 54-56 dBA. Sentence intelligibility will therefore approach 100 percent based on Project noise levels, and speech interference, indoors or outdoors, is not anticipated from normal Project operation. Outdoor speech interference will continue to be typical for the Project Site in the daytime due to frequent aircraft overflights.

Low Frequency Noise Annoyance

Low frequency noise levels will not be significant due to the nature of combined cycle operation.

Community Complaint Potential

The modified CNR analysis was conducted for the purpose of estimating community reaction to Project generated noise. The resulting rating of "C" calculated for the Project results in an expected response of "no reaction."

Potential for Structural Damage Due to Vibration

Combustion turbines are highly balanced and do not normally generate ground borne vibration or infrasound

4.8.5 Cumulative Impacts - Proposed NYPA Poletti Station

In accordance with Stipulation No. 6, a cumulative assessment of construction noise with the proposed NYPA Poletti station expansion was also performed. It was assumed that construction activities, and therefore, noise levels, would be the same for both projects at the same distances. Therefore, the analysis was conducted by extrapolating the estimated noise levels from the

Poletti station based on the distances to the respective receptors. Provided in Table 4.8-7 are the estimated contributions from both projects.

The greatest potential for a cumulative effect is at the residential area nearly equidistant from the two proposed projects. Little or no differences would be expected at the remaining locations. The cumulative impacts, if any, would be short term, and would remain well below the background daytime noise levels. Therefore, no significant adverse long-term impacts will result from the simultaneous construction of these two projects.

Stipulation No. 6 further requires that the cumulative effect of noise generated by the operation of the proposed NYPA Poletti station expansion and the Project be evaluated at the nearest sensitive receptor. Because no information is available regarding the projected noise levels from the proposed NYPA Poletti station, it is not possible to calculate a definitive cumulative level. However, assuming that the proposed NYPA Poletti station will comply with the Code (55 dBA at any residential zone), it is possible to extrapolate this noise level from the proposed NYPA Poletti station, and add it to the calculated noise levels for the Project.

TABLE 4.8-7: CUMULATIVE CONSTRUCTION NOISE LEVELS (dBA)															
	Grading/Excavation			**Concrete Pouring**			**Steel Assembly**			**Machinery Installation**			**Cleanup**		
Receptor	**Astoria**	**NYPA**	**Combined**	**Astoria**	**NYPA**	**Combined**	**Astoria**	**NYPA**	**Combined**	**Astoria**	**NYPA**	**Combined**	**Astoria**	**NYPA**	**Combined**
5-Steinway House at 41st Street	55	39	55	52	36	52	51	35	51	51	35	51	53	37	53
6-Apt. Building at 31st Street and 20th Avenue	48	45	50	44	41	46	43	40	45	43	40	45	45	42	47
7-Playground/ Residential at 37th and 20th	50	41	51	46	37	47	45	36	46	45	36	46	47	38	48
8-Residential at 43rd Street and 20th Road	47	40	48	43	36	44	42	35	43	42	35	43	44	37	45

Assuming that the proposed NYPA Poletti station does not exceed 55 dBA at the nearest residential area to that proposed station, which is approximately 1400 feet away, Table 4.8-8 below provides the estimated contribution from both electric generating facilities at the residential receptors evaluated herein.

TABLE 4.8-8:

CUMULATIVE OPERATION NOISE LEVELS

Receptor	Calculated Project (dBA)	Estimated NYPA (55 dBA at 1400 ft)	Cumulative Level
5 - Steinway House at 41st Street	56	46	56
6 - Apartment Building at 31st Street and 20th Avenue	47	50	52
7 - Playground/Residential at 37th Street and 20th Avenue	49	47	51
8 - Residential at 43rd Street and 20th Road	45	45	48

This table shows that the greatest potential for a cumulative effect is at the residential area nearly equidistant from the two electric generating facilities. However, the cumulative impact is not expected to be significant because the noise levels estimated for the proposed NYPA Poletti station are very conservative as, for instance, no credit was taken for existing barrier effects that exist at or adjacent to the NYPA property.

4.8.6 Post Construction Compliance Monitoring

An ambient noise monitoring program will be performed within 180 days following commercial startup of the Project.

4.8.7 *Mitigation Measures*

Substantial noise mitigation measures will be implemented in order to reduce noise levels associated with Project operations. Assumptions for the amount of noise reductions attributed to each of the following noise control features are included in Appendix 4.8. The noise mitigation measures include the following:

Tuned HRSG stack Silencers

Stack silencers are essentially mufflers which reduce stack noise. The silencers are designed (tuned) for each specific application. For example, a source which has excessive low frequency noise would have a silencer designed to be more effective against the low frequency noise.

Acoustically treated Turbine Building

The Turbine Building will include acoustical insulation on the interior. See Section 3.5.1. Additionally, the Turbine Building will be designed so that any openings are treated with acoustic louvers, or oriented away from residential areas.

Enclosures for the air and gas compressing stations

The barrier effect of buildings will reduce noise levels for this equipment.

Specially designed low-noise cooling condensers

Cooling condenser noise can be controlled up to a certain point through several methods that include reducing the fan speed, which requires additional cells, and low noise motors.

Construction Scheduling

No pile driving or jack hammering will take place after 6 PM.

4.8.8 References

Barnes, J.D., L. Miller, E. Wood. 1977. Prediction of Noise from Power Plant Construction. Prepared for Empire State Electric Energy Research Company.

Berglund, B., and T. Lindvall. 1995. Community Noise. Prepared for the World Health Organization. ISSN 1400-2817. ISBN 91-887-8402-9.

Bolt, Beranek and Newman, Inc. 1971. Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances.

Miller, L.N., E.W. Wood, R.M. Hoover, A.R. Thompson, and S.L. Patterson. 1984. Electric Power Plant Environmental Noise Guide. Prepared for Edison Electric Institute by Bolt, Beranek and Newman, Inc., Cambridge, Massachusetts

United States Environmental Protection Agency, 1978. Protective Noise Levels. Office of Noise Abatement & Control. Report Number EPA 550/9-79-100. Washington, D. C. 20460.

4.9 Water Resources

4.9 Water Resources

4.9.1 Introduction

In accordance with the requirements of PSL Section 164(1)(a) and (c), Section 1001.1(a) of the Article X Regulations, and Stipulation Nos. 8 and 12, this section addresses existing water conditions and the potential impact, if any, associated with the construction and operation of the Project. The surface water and aquatic resources aspects of Stipulation No. 12 are addressed in Section 4.4.

As set forth more fully herein, Astoria Energy will utilize the existing New York City municipal water and sewer infrastructure located adjacent to the Project Site to supply water to, and receive discharged wastewater from, the Project. The existing stormwater management system at the Project Site will be upgraded as part of redevelopment.

The Project has been designed to minimize impact to water resources. The Project will utilize air-cooled condensers to dissipate waste heat. The use of this technology not only will eliminate visible vapor plumes that are associated with evaporative cooling towers, it also significantly will reduce the water and wastewater requirements for the Project. Thus, the Project will not have a significant impact on municipal water or wastewater facilities.

As discussed in detail in this section, when operating at typical conditions (natural gas firing without the inlet air cooling system), the Project is projected to require approximately 116,544 gallons of water daily, or approximately 0.009 percent of the current daily consumption (1.3 billion gallons) of the New York City public water supply system (NYCDEP, 1999b; NYCDEP, 1999d). The typical daily water usage is approximately 90% less water usage than would be required if evaporative cooling towers were used rather than air cooled condensers. Moreover, the use of air cooled condensers rather than evaporative cooling towers also will result in less water consumption under other Project operating conditions.

The wastewater generated by the Project will not result in significant impacts on local publicly owned treatment works (POTW). The Project is projected to generate approximately 115,900 gallons of wastewater daily when operating under typical conditions, which is approximately 0.11 percent of the local POTW average daily influent (105-110 million gallons), and 0.08 percent of the available daily capacity (150 million gallons) of the local POTW (TRC, 1999b).

The Project is not expected to require new interconnection corridors or public infrastructure upgrades to support water and sewer utilities. Discussions with local water and sewer officials indicate that the Project water supply needs and wastewater effluent requirements are available from each authority without impact to the existing system or current users (TRC, 1999a; TRC, 1999b; TRC, 1999c; NYCCI, 1999a; TRC, 2000; NYCDEP, 2000).

The Project will be developed on an engineered fill above former for tideland and will not utilize ground water as a water source. No significant impact to ground water is projected.

There currently is an existing State Pollutant Discharge Elimination System (SPDES) Permit No. NY-02-8002 and a Best Management Practices (BMP) Plan for stormwater management at the Project Site. To support the discharge of stormwater during construction activities, a Notice of Intent (NOI) application will be submitted to NYDEC for a General Construction Activity Stormwater Permit (GCSP) prior to the start of construction. A modified SPDES application is being submitted (NYDEC Application Form "D") herein for the existing SPDES permit to support the discharge of stormwater from the modified operating facility in accordance with NYDEC recommendations (see Appendix 4.9).

4.9.1.1 Laws, Regulations, and Policies

The following table identifies regulatory programs and standards applicable to the Project not preempted by the Article X process and briefly summarizes the action proposed to comply with each program or standard.

TABLE 4.9-1: APPLICABLE NON-PREEMPTED REGULATORY PROGRAMS AND STANDARDS PERTAINING TO WATER RESOURCES		
Program/ Regulation	**Lead Agency**	**Comments**
Industrial Sewer Discharge Permit 40 CFR 403 & 423.17 RCNY Title 15, Chapter 19	NYCDEP	Following final design and pre-application presentation, an application will be submitted to NYCDEP.
SPDES General Permit	NYDEC	To support stormwater management during construction. A Notice of Intent will be submitted following final design and prior to the start of construction.
SPDES modification	NYDEC	To support stormwater management during operation of the facility. A modification application for the Site SPDES permit is submitted herein (Appendix 4.9).

4.9.2 Water Supply

4.9.2.1 Construction Requirements

During construction activities, the following consumptive water requirements are projected for the Project:

- Drinking Water: 300,000 gallons (peak of 1,000 gallons per day).
- Piping Hydrostatic Testing: 1.5 million gallons (over a three month period).
- Fuel Tank Hydrostatic Testing: 6.3 million gallons (over a two week period).
- Site Dust Control: 1.3 million gallons (estimated over the 33 month construction period projected for the Project).

The water source for each of the requirements identified above will be the New York City public water system.

4.9.2.2 Operational Water Requirements

The Project will require water for the power production process, potable water needs, and fire protection. However, by utilizing air-cooled condensers, the Project will not require water for cooling purposes, which typically is the largest water supply requirement for an electric generating facility.

As set forth in Section 3.0, the power production process will utilize a closed-loop, air-cooled condensing system in the Heat Recovery Steam Generators (HRSG). As part of the HRSG system, air-cooled condensers will be utilized. Air-cooled condensers receive exhaust steam from the HRSG, sending the steam through a duct of small tubes. Large fans pull air across these tubes and cool the steam from the HRSG until it condenses to water. The condensate is collected and pumped back to the HRSG process feedwater to be reheated into steam. This closed-loop system minimizes power production water loss. As such, water loss from power production activities only will occur during the following activities at the Project Site:

- HRSGs makeup water following blowdown;
- Urea to ammonia generation system;
- NO_x control via Combustion Turbine injection water (fuel oil only; 720 hours per year);
- Inlet air cooler makeup water (summer months);
- General service water (washdown, pump seal water, equipment cleanings); and
- Potable water needs.

The following water requirements for the Project have been calculated and conservatively projected over a year: (i) the typical daily water requirement when the Project is operating with natural gas and no inlet air cooling system (Typical Water Usage); (ii) the daily average water requirement (Average Water Usage); and (iii) the daily maximum water requirement when the

Project is operating, with low sulfur distillate fuel oil, NO_x control injection water, operating for 720 hours (Maximum Water Usage). The approximate water requirements are as follows:

- Typical Daily Water Requirement: 116,500 gallons.
- Average Daily Water Requirement: 480600 gallons.
- Maximum Daily Water Requirement: 1,649,100 gallons

Table 4.9-2 presents a full breakdown of water supply requirements for the Project for power production, potable water, and fire protection by hourly average, daily average, typical daily, peak requirements and monthly and annual requirements. Figures 4.9-1, 4.9-2, and 4.9-3 present Water Balance Diagrams for the Project illustrating water requirements for each usage level. The methodology utilized to prepare the water supply needs and minimum and maximum flow rate estimates for the Project are provided in Appendix 4.9.

TABLE 4.9-2:
ESTIMATED WATER SUPPLY REQUIREMENTS

	Water Uses			
Water Requirements	**Power Production**	**Potable Water**	**Fire Protection***	**Total**
Hourly Ave. (gal)	19,944	83	0	20,027
Ave. Daily (gal)**	478,646	1,992	0	480,638
Typical Daily (gal)	114,552	1,992	0	116,544
Daily Ave. (gal/min)	275	1	0	276
Peak Hourly (gal/ min)	1,225	25	1,500	1,250
Monthly Ave. (gal)	14,558,814	60,590	NA	14,619,404
Annual (gal)	174,705,768	727,080***	NA	175,432,848
Maximum Daily (gal)	1,647,082****	1,992****	NA	1,649,074

Notes:
* = This is an emergency water use.
NA = Not Applicable
** = The daily average water requirement conservatively is estimated to approximate Project usage when operating on natural gas and inlet air coolers.
*** = Annual consumption rates based on 720 hours of low sulfur distillate fuel oil firing and 8,040 hours of natural gas firing with inlet air cooling.
**** = Maximum 720 hours per year when firing low sulfur distillate fuel oil.

A summary of consumptive water uses is as follows:

The closed-loop HRSG system requires water blowdown (removal) to maintain cycle water chemistry in normal operating ranges. The blowdown water that is removed is replaced in the system and is identified as HRSG makeup water. The average HRSG makeup water consumptive need is approximately 82,000 gallons per day. The system sample panel drain requirements consume approximately 7,200 gallons per day. The demineralization system consumes an average of approximately 18,000 gallons per day during the regeneration process.

The selective catalytic reduction (SCR) process to control NO_x emissions requires ammonia to enhance the reaction with the catalyst. Rather than storing large quantities of ammonia on site, the Project will utilize a state-of-the-art urea to ammonia generating system. Urea will be utilized to produce ammonia on demand, by dissolving urea in water within a vessel heated by steam or hot water. Ammonia vapor is produced and is ready for injection into the SCR system. The urea system will consume an average of approximately 26 gallons per hour and 625 gallons per day of water.

Water also will be required for injection into each CT to control NO_x emissions when the Project is operating on low sulfur distillate fuel oil. Increased demand for water will be realized during this period. Water consumption associated with CT injection when firing low sulfur distillate fuel oil is estimated at an average of approximately 63,000 gallons per hour and 1,512,000 gallons per day, for up to 720 hours per year.

Inlet air coolers will be utilized during warm weather to cool intake air to increase relative electricity production. Within the inlet air cooling system, approximately 50% of the water is lost to evaporation. To maintain water chemistry within this system, blowdown water is removed. The inlet air coolers will consume an estimated average of approximately 10,800 gallons per hour and 259,200 gallons per day of water when in use.

General service water needs include activities such as washdowns, turbine cleaning, HRSG cleaning, air-cooled condenser fan rinse, and pump seal water losses, that will average approximately 300 gallons per hour and 7,200 gallons per day.

Potable water requirements will average approximately 83 gallons per hour and 1,992 gallons per day.

As set forth in Section 3.8, the fire suppression systems will utilize the public water supply via the raw water tank.

4.9.2.3 Water Supply Source

The Project will utilize water purchased from the New York City public water supply system through an existing 20-inch water supply line located adjacent to the Project Site in Steinway Street. Most of New York City's water is supplied from three source-water reservoir systems, comprised of a network of 18 reservoirs and three controlled lakes in a 1,969 square-mile water shed that extends 125 miles north of the City. The water supply system supplies 1.3 billion gallons of water to New York City daily (NYCDEP, 1999b). Additionally, a ground water system in southeastern Queens supplies 2% of the City's water supply on an emergency basis. Because the Project will tap directly into the existing water supply line located adjacent to the Site, no new interconnection corridor or updated infrastructure will be required.

The water chemistry of the public water supply is adequate for the Project requirements. A copy of the water quality analysis is provided in Appendix 4.9.

As presented on the water balance diagrams, Figures 4.9-1, 4.9-2, and 4.9-3, demineralized water will be required in the production process to prevent the scaling and corrosion of Project equipment caused by naturally occurring mineral impurities associated with raw water. The Project will demineralize a portion of the raw water supply entering the Site in an on-site demineralization system and, as needed, through the use of portable demineralization equipment mounted on trailers. Demineralized water generated on-site will be stored in a 1.8 million gallon on-site demineralized water storage tank.

The demineralization plant will have two 110 gallon per minute (gpm) trains each capable of producing 132,000 gallons (gross) between regeneration. After 20 hours of supplying treated, demineralized water, the demineralization system will require a regeneration period of up to four hours. During the regeneration period, water from the demineralization storage tank will provide the process water needed.

When operating using low sulfur distillate fuel oil, which will occur up to 720 hours per year, the water needs of the Project will outpace the production of demineralized water from the demineralization plant. During these periods, portable demineralization equipment mounted on trailers will be brought to the Project Site to supplement the Project's demineralization plant.

The mobile demineralization trailers will supply up to 1,100 gpm of demineralized water. A maximum of four portable trailers will be located adjacent to the water treatment building during these peak water needs. Because the vendor will replace the portable trailers when regeneration is required, no chemicals will be used on-site to support these trailers.

Other sources of water were analyzed at screening level by Astoria Energy, including the East River and ground water. Because Astoria Energy sought to minimize the impacts of the Project on aquatic resources, Astoria Energy eliminated East River water as a feasible consideration. Ground water was not considered a feasible alternative due to the Project location and salt water intrusion issues with the aquifer. See also Section 5, Alternatives, for further discussion of cooling alternatives.

4.9.2.4 Potential Water Resource Impacts and Proposed Mitigation

To minimize impacts to aquatic resources, the Project will obtain its water requirements from the existing municipal water supply system. To minimize impacts on this system, the Project will install air-cooled condensers. By utilizing air-cooled condensers rather than evaporative cooling towers, the Project will consume approximately 77% less water during Maximum Water Usage (distillate oil firing; 720 hours), approximately 90% less water during Average Water Usage and approximately 90% less water during Typical Water Usage (natural gas firing; no inlet air coolers). A breakdown of all water use projections and comparisons is presented in Appendix 4.9.

Astoria Energy has had several discussions with the New York City Department of Environmental Protection (NYCDEP) Water Supply Bureau to evaluate and define the details of water supply and interconnection. A 20-inch water supply line is located adjacent to the Project Site in Steinway Street. The Project will tap directly into the existing water supply line. No new interconnection corridor or updated infrastructure will be required.

The water supply system of New York City has a storage capacity of 550 billion gallons. As of May 22, 2000, the system has water storage at 98.9 % capacity. The system provides 1.3 billion gallons of water to New York City daily (NYCDEP, 2000A). Based on the operating conditions of the Project, the following amounts of water are estimated to be required daily from the municipal system:

- During Typical Water Usage, approximately 116,500 gallons or .009 percent of the current daily consumption;
- During Average Water Usage, approximately 480,600 gallons or .04 percent of the current daily consumption; and
- During Maximum Water Usage, approximately 1,649,100 gallons or 0.1 percent of the current daily consumption of New York City.

NYCDEP Water Supply Bureau representatives have stated that the Project readily can be served by interconnection to the 20-inch supply line, and that no impact to the system or other users will occur relative to quantity and quality. (TRC, 1999a; TRC, 1999c; NYCDEP, 1999a; NYCCI, 1999a; TRC, 2000; NYCDEP, 2000). It also is expected that the Project will have no impacts on pressure.

Raw water from the New York City water supply will continuously be utilized to maintain high storage levels in the raw water storage tank on site. The raw water storage tank will be utilized to support all on-site consumptive water needs and also will serve as a fire water storage tank to provide water for fire emergencies.

During periods of drought, electric generating facilities must continue to produce electricity. Because the Project will utilize air-cooled condensers rather than water for cooling and is designed to reduce the use of water it will minimize impacts to water sources during drought periods relative to other power generating facilities. Specifically, the utilization of air-cooled condensers greatly reduces the impact of Project operations during a drought period, as compared to electric generation facilities that must rely upon surface water for cooling purposes. Thus, the Project is better suited to operate during such conditions than facilities that utilize surface water cooling sources.

The New York City area has experienced six recent drought periods in 1999, 1995, 1985, 1980-1981, the 1960's, and 1949-1950 (Degaetano, A.T., 1999; TRC, 1999c). As a result, New York City recently has completed a Drought Management Plan to manage drought conditions, in conjunction with the New York State Drought Management Task Force and the New York State Disaster Preparedness Commission (NYCDEP, 1998).

The New York City Drought Management Plan is comprised of three phases, Drought Watch, Drought Warning, and Drought Emergency. These phases are invoked sequentially as drought conditions dictate. The Drought Emergency phase further is divided into four stages with increasing levels of water use restrictions. During recent drought conditions (1995, 1999), New York City did not declare a Drought Emergency with use restrictions. Astoria Energy has discussed the use restriction issue with a representative of New York City's Bureau of Water and Sewer, Distribution Division, who is familiar with water requirements of energy facilities in New York City (see Appendix 2.0).

Drought conditions generally are a summer condition and distillate firing generally is a winter condition. Therefore, it is unlikely that the higher Project water demand, which occurs during distillate firing, will coincide with drought conditions.

No cumulative significant adverse impact by the Project on other users of the water supply source, in regard to quantity or quality is projected.

There are no surface water supply intakes within at least a mile of the Site, and no Project process, surface water discharges. Therefore, no adverse impacts on surface water supplies are projected.

4.9.3 Wastewater

4.9.3.1 Operational Wastewater Requirements

The Project will generate wastewater as part of the electric generation process. Following pre-treatment on site, wastewater will be discharged to the New York City public sewer system. The Project will tie-in to the public sewer system adjacent to the Site as illustrated in Figure 3-5. The Bowery Bay Water Pollution Control Plant, which is adjacent to the Site, is the local POTW serving the Project area. Neither interconnection corridor construction nor public infrastructure improvements will be required to support the public sewer connection requirements of the Project.

Astoria Energy briefly considered wastewater discharge to the East River. Because Astoria Energy sought to minimize impacts of the Project on aquatic resources, however Astoria Energy eliminated the East River as a feasible wastewater option. As a result, no SPDES permit will be required to support process wastewater operations at the Project Site.

The Project will be designed to meet or exceed the applicable performance standards for wastewater discharge. Any pretreatment requirements of pH control, oil/water separators, and/or heat reduction for all wastewater will be completed near the point of generation. The Project will generate wastewater from the following operational processes:

- Demineralization plant regeneration;
- HRSG blowdown;
- Inlet air cooler blowdown;
- Equipment cleaning (e.g., HRSGs, CTs, ACC fans); and
- Sanitary waste.

The following wastewater requirements for the Project have been calculated and conservatively projected: (i) the typical daily wastewater discharge when the Project is operating with natural gas and no inlet air cooling system; (ii) the average daily wastewater discharge; and (iii) the maximum daily wastewater discharge when the Project is operating with natural gas utilizing the inlet air cooling system. The approximate wastewater requirements for each operating scenario of the Project are as follows:

- Typical Daily Wastewater Discharge: 115,900 gallons.
- Average Daily Wastewater Discharge: 236,600 gallons.
- Maximum Daily Discharge: 267,100 gallons.

Table 4.9-3 presents a full breakdown of wastewater generation projected for Project operations. Figures 4.9-1, 4.9-2, and 4.9-3 present Water Balance Diagrams for the Project illustrating wastewater generation for each operating scenario. The methodology utilized to prepare the wastewater generation rates for the Project is provided in Appendix 4.9.

TABLE 4.9-3: WASTEWATER SUMMARY			
	Wastewater Sources		
Estimated **Discharge**	**Power Production**	**Sanitary Wastewater**	**Total**
Daily Ave. (gal)	234,654	1,992	236,646
Typical Daily (gal)	113,928	1,992	115,920
Peak Hourly (gal/ min)	500	25	525
Annual (gal)	85,648,728	727,080	86,375,808
Maximum Daily (gal)	265,128	1,992	267,120

Industrial wastewater will be directed to the on-site industrial wastewater transfer sump prior to discharge. At this sump, wastewater characteristics will be monitored and flow will be controlled to ensure compliance with discharge limits. The industrial wastewater transfer sump will be equipped with two 100% capacity sump pumps, each with a nominal capacity of 500 gallons per minute. The transfer of the treated industrial wastewater automatically will be controlled based on the liquid level in the sump. Following treatment, the industrial wastewater will be discharged to the public sewer system. Sanitary wastewater will be collected in a dedicated sanitary lift station sump for direct discharge to the public sewer system.

A detailed presentation of wastewater sources and generation rates is provided in Appendix 4.9.

A summary of wastewater generation and treatment and the projected characterization of the industrial wastewater effluent resulting from the Project are estimated as follows.

Wastewater will be generated during the regeneration process in the demineralization system. The rinse wastewater and regeneration wastewater generated will be mixed thoroughly and neutralized as part of pretreatment in a lined sump in the water treatment building. The daily generation of neutralized wastewater then will be directed to the industrial wastewater transfer sump prior to discharge to the municipal sewer system. The portable demineralization equipment, which will be mounted on trailers, will be regenerated off-site by the vendor.

HRSG blowdown will consist of a continuous stream of wastewater, which allows for maintenance of boiler water quality. The blowdown will enter a flash tank where steam will be collected, routed to a deaerater and placed back into the system. The remainder of the blowdown will become process wastewater. Pretreatment of the blowdown will consist of temperature cooling via an air-cooled heat exchanger. The wastewater then will be directed to the industrial wastewater transfer sump prior to discharge to the public sewer system.

Inlet air cooler blowdown wastewater will be generated during warm weather when intake air is cooled to increase relative electricity production. Within the inlet air cooler process, approximately 50% of the water will be lost to evaporation. The remainder will become blowdown wastewater. The wastewater will be directed to the industrial wastewater transfer sump prior to discharge to the public sewer system.

Drains and sumps will capture wastewater generated primarily from washdowns, seal water drips from pump housings, water tank drainage, and general equipment cleaning including HRSGs, CTs and ACC fans. Drains located in equipment areas with the potential for oily contamination will be pretreated at an oil/water separator. This service-related wastewater will be routed to the industrial wastewater transfer sump prior to discharge to the public sewer system. Any oily water generated from the oil/water separator will be shipped off-site to a licensed recycling treatment and disposal facility. Additionally, HRSG and CT equipment cleaning wastewater will be characterized during each cleaning event prior to discharge. If found necessary after characterization, this wastewater also will be shipped to a licensed recycling treatment and disposal facility.

Table 4.9-4 provides estimates of the characteristics of the wastewater associated with Project operations based on the source water and the Project processes.

TABLE 4.9-4:

PROJECTED WASTEWATER CHARACTERISTICS

Parameter	Incoming Public Water Characteristics*	Wastewater Discharge		
		Industrial Discharge		Sanitary Discharge
	Average (mg/l)	Maximum (mg/l)	Average (mg/l)	Average (mg/l)
Biological Oxygen Demand	NA	NA	NA	150
Chemical Oxygen Demand	4.2	100	50	350
Total Suspended Solids	NA	100	30	160
Total Dissolved Solids	46	3,000	2,000	350
Oil and Grease	NA	20	15	NA
pH (S.U.)	6.6 - 7.8	5.0-11.0	5.0-11.0	NA
Ammonia	not detected	5	2.5	NA
Arsenic	not detected	NA	NA	NA
Barium	not detected	NA	NA	NA
Calcium	5.8	500	250	NA
Chloride	9.1	500	250	NA
Chromium	not detected	NA	NA	NA
Fluoride	1.07	10	5	NA
Total Iron	0.04	1.5	1	NA
Lead	<0.002	0.1	0.03	NA
Manganese	0.02	0.5	0.2	NA
Mercury	not detected	NA	NA	NA

TABLE 4.9-4: (Cont.)

PROJECTED WASTEWATER CHARACTERISTICS

ASTORIA ENERGY LLC

Parameter	Incoming Public Water Characteristics*	Wastewater Discharge		
		Industrial Discharge		Sanitary Discharge
	Average (mg/l)	Maximum (mg/l)	Average (mg/l)	Average (mg/l)
Nickel	not detected	NA	NA	NA
Nitrate, as N	0.18	3	1	NA
Phosphate, as P	1.74	10	5	NA
Sodium	7	1,000	300	NA
Sulfate	7.4	2,000	750	NA
Zinc	Not detected	NA	NA	NA
Temperature	NA	<150° F	<150° F	NA

Note:
NA = Not Applicable
* = Based on Catskill-Delaware System, See Appendix 4.9.

4.9.3.2 Potential Impacts and Proposed Mitigation

To minimize impacts to aquatic resources, the Project will utilize the existing municipal sewer system to discharge wastewater generated by the Project, rather than the adjacent surface water of the East River. To minimize impacts on the existing municipal system, Astoria Energy will install air-cooled condensers to limit the level of water used and wastewater generated by the Project. The Project will not have a significant impact on the New York City sewer system.

During construction activities, hydrostatic test water will be generated during quality control testing. This test wastewater will be directed to the raw water tank on-site, or to the stormwater management system for discharge under the appropriate SPDES permit for the existing or the newly constructed industrial sewer discharge system.

During Project operations, the Project wastewater discharged to the public sewer system will be treated at the local POTW, the Bowery Bay Water Pollution Control Plant, located adjacent to the Project Site on Steinway Street. The Bowery Bay Water Pollution Control Plant is designed to support an average daily influent of 150 million gallons and a maximum daily influent of 300 million gallons. Currently, the Bowery Bay Water Pollution Control Plant is receiving an average of 105 to 110 million gallons per day of influent (TRC, 1999b). The total daily average of wastewater generated by the Project is estimated at 236,600 gallons, 0.21 percent of the current influent load, and 0.16 percent of the daily capacity of the Bowery Bay Water Pollution Control Plant. Because of the very low quantities and acceptable quality of wastewater generated by the Project, no significant impacts to the Bowery Bay Water Pollution Control Plant or users of it are expected.

The wastewater generated by the Project will meet the standards for industrial discharges to the New York City sewer system (RCNY Title 15, Chapter 19). Astoria Energy and its representatives have had several discussions with NYCDEP concerning the municipal sewer system and the projected wastewater levels generated by the Project. NYCDEP representatives have stated that the low daily volume of the Project wastewater relative to the capacity of the Bowery Bay Water Pollution Control Plant and the needs of the current users will result in no significant impact to this facility or other users (TRC, 1999b; NYCCI, 1999a; NYCDEP, 2000; TRC, 2000).

Pursuant to the request of NYCDEP, following completion of final facility design and the selection of a builder and NYC Licensed Plumber, a wastewater discharge proposal will be provided to NYCDEP's Industrial Pretreatment Program, prior to submittal to the NYCDEP for an Industrial Wastewater Discharge Permit. The application will include the final facility design specifications, including detailed data on the pretreatment systems, state-of-the-art monitoring systems and the sampling points for discharge(s) (TRC, 1999a; NYCDEP, 1999c). Wastewater quality analysis will include electronic monitoring and recording at the Project industrial wastewater discharge sump.

Based on the availability of capacity and an expected insignificant quantity and quality impact on the local POTW, no further mitigation is considered necessary to address wastewater associated with Project operations.

4.9.4 Ground Water

4.9.4.1 Existing Conditions

In Queens, ground water is located immediately below the Project Site in the Upper Glacial Aquifer, which consists of glacial till deposited during the Pleistocene glacial events. Regional ground water quality has been impacted from various natural and man-made sources and limits potable water supplies on Long Island. Due to salt-water encroachment from over-withdrawal, and intense population and land use in western Long Island, the overburdened aquifer is not utilized to support public or private potable water needs in the area surrounding the Project Site. No public or private potable wells, well-heads or aquifer protection zones have been identified within a one-mile radius of the Project Site (U.S.G.S, 1995; ICS, 1995; U.S.G.S., 1997; NYCDEP, 1999).

Ground water flow direction in the local area is to the north/northeast. A map of the regional ground water table for the Project Site with contours and the location of the nearest regional ground water supply well (6 miles east of the Project Site) is provided as Figure 4.9-4.

Ground water monitoring wells were installed at the Project Site during August, 1999. Analysis by TRC of ground water in the shallow aquifer on-site during September, 1999 indicates a hydrologic connection to the tidally influenced East River. The tidal change in the surface water level of the East River impacts the level of ground water on-site. As set forth below, the highest ground water levels (shallowest depth to ground water) below ground surface on-site are

observed following high tide and the lowest ground water levels (greatest depth to ground water) are observed following low tide. The relative change in elevation of ground water at a given location on-site increases closer to the East River and decreases dramatically with distance away from the East River (TRC, 2000a).

Specifically, the depth to high ground water at the Project Site has been observed at a range of approximately 6.25 feet below ground surface at high tide, near the shoreline along the East River, and at approximately 9.87 feet below ground surface, near the center of the Project Site. At low-tide, the depth to ground water at the Project Site has been observed at a range of approximately 8.76 feet below ground surface near Steinway Creek and at 9.95 feet below ground surface near the bunker tank complex/center of the Site (TRC, 2000a). A map of the current Project Site illustrating depths to high and low ground water is presented as Figure 4.9-5.

Ground water is classified by NYDEC as GA to designate fresh ground waters; GSA to designate saline ground waters with uses as potable water supplies (post-treatment), potable mineral waters, or other raw material supplies; and GSB to designate saline ground water with best usage as a receiving water for disposal of wastes. Class GSB ground waters are defined as saline ground waters that have a chloride concentration in excess of 1,000 milligrams per liter (mg/l) or a total dissolved solids concentration in excess of 2,000 mg/l. However, the Class GSB ground water is not assigned to a location unless the NYDEC Commissioner finds that adjacent and tributary ground waters and uses will not be impaired by the classification (6 NYCRR 701.15, 16 &17). By default, ground water is classified as GA by NYDEC at the Project Site (6 NYCRR 701.15; TRC, 1999a).

During September, 1999, five ground water samples were collected by TRC from newly installed ground water monitoring wells at the Project Site. The ground water samples were sent to an off-site New York State certified laboratory and analyzed for the following parameters:

- Volatile organic compounds (VOCs) including methyl tert-butyl ether (MTBE), via EPA Method 8260;
- Semi-volatile compounds (SVOCs), via EPA Method 8270;
- Polychlorinated biphenyls (PCBs), via EPA Method 8082;
- Metals and cyanide, via EPA Methods 200.7, 245.1, 6010B, and 7471A; and
- Chloride, via EPA Method SW-846.

Analysis of the VOC, SVOC, and PCB results indicates no presence in ground water at the Project Site above method detection limits.[1]

The metals results indicate manganese, chloride, and sodium are above the most conservative NYDEC ground water quality standards for GA ground waters. Each of these elevated compounds are not related to the current or historical use of the property. Rather, they are likely to be an indicator of a saline ground water environment, consistent with the tidal influence of the East River and Steinway Creek on ground water elevations.

4.9.4.2 Potential Impacts and Proposed Mitigation

Ground water both surrounding the Project Site and hydrologically downgradient of the Project Site is not utilized as a drinking water source (EDRI, 1999; NYCDEP, 1999). Ground water will not be utilized for consumptive purposes as part of construction and operation of the Project. Public water supplies will be utilized for consumptive purposes.

[1] The area that was analyzed was outside of the active No. 6/ No. 2 fuel oil cleanup area described in Section 3.0 of this Application.

During construction activities, it is anticipated that dewatering of ground water via well points may be required. It is anticipated all ground water dewatered will be routed to a to-be-constructed detention pond for percolation back to ground water. This activity will be managed within the Storm Water Pollution Prevention Plan (Appendix 4.9).

Municipal water, not ground water, will be the water supply source for Project operations.

Based on a cumulative analysis of City system capacity and use and evaluation of all reasonable potential impacts from the construction and operation of the Project, no adverse impact to ground water resources is anticipated.

4.9.5 Stormwater Management and Soil Erosion Control

4.9.5.1 Existing Stormwater Conditions

New York State is a National Pollution Discharge Elimination System (NPDES) delegated State, with state administration of the SPDES program and governing regulations. Stormwater discharges occur following rain, snow melt, or similar events. Precipitation in contact with portions of the Project Site must be controlled to prevent migration to surface water. The existing conditions of the Project Site include approximately 23 acres of land with buildings, structures and a mixture of graveled areas and paved asphalt areas.

The existing topography, existing structures, and two existing off site outfalls are shown on Figure 4.9-6. The elevations as shown on the drawings are referenced to the Queens Borough Vertical Datum of 1929 (QBV datum). The Queens Borough Vertical Datum of 1929 is 2.725 feet above the National Geodetic Vertical Datum of 1929. The high point of the Site is located on the southern side of the Project Site with elevations varying from 10 to 11 feet (QBV datum). The Project Site slopes gently to the north, northeast and northwest with an approximate discharge elevation along the periphery of the Site at 6 feet.

There currently is an existing SPDES Permit No. NY-02-8002 and a Best Management Practices (BMP) Plan for the Project Site to address stormwater, including storm surge and tidal surge. The existing SPDES permit for the Project Site includes two existing oil/water separators and associated outfalls. Outfall No. 001 discharges to the East River/Bowery Bay. The oil/water separator for Outfall No. 001 collects stormwater that falls within the area between the existing bunker style tanks and the truck unloading facility. It has valving designed to ensure that no contaminated stormwater is discharged. Outfall No. 002 discharges to the East River/Steinway Creek. The oil/water separator for Outfall No. 002 collects stormwater falling within the steel containment structure surrounding the existing circular bulk oil storage tanks. It also has valving designed to ensure that no contaminated stormwater is discharged. Stormwater from the remainder of the Project Site is discharged to Steinway Creek and Bowery Bay by sheet flow.

The Project Site is located within a special flood hazard area designated by the Federal Emergency Management Agency (FEMA). FEMA has identified three flood zones for the Project Site, Zone A-8, Zone B, and Zone C (FEMA, 1983). New York City Administrative Code (Code) Section 27-316 requires construction in special flood hazard areas to be built in conformance with NYC Building Department regulations.

4.9.5.2 Potential Impacts and Proposed Mitigation

Stormwater Runoff and Erosion Control During Construction

To support the discharge of stormwater during construction activities, a separate NOI filing will be submitted for Stormwater Discharges Associated with Construction Activity Under the SPDES General Permit for the Project Site, the electric transmission interconnection route and the Con Edison natural gas interconnection route, respectively. In accordance with Stipulation Nos. 8 and 12, a Stormwater Pollution Prevention and Erosion Control Plan (SWPPP) is included as Appendix 4.9.

After submitting the NOI prior to the start of construction and receiving notification of coverage, the following items will be completed:

- The SWPPP will be implemented.
- A Monitoring Program will be developed and implemented.
- All records will be retained for a period of at least three (3) years after construction is completed.

As summarized herein and presented within the SWPPP, stormwater, storm surges, and tidal surges will be managed via structures, improvements, and hazardous material management techniques which will be designed to prevent impacts to the Project Site and the surrounding surface water during demolition and construction activities. These structures specifically will be designed to prevent stormwater from carrying contaminants and sediment loads from the Project Site to the abutting surface water and to maintain the bulkhead structures that currently exist on-site to prevent impacts from erosion. Erosion controls to stabilize stormwater management structures will be a primary feature of the SWPPP.

The preliminary SWPPP plan is designed to address the collection of stormwater runoff during the demolition and construction phases of the Project. Because demolition will be followed immediately with construction of the Project, a single control system will be installed to support both construction phases. The preliminary SWPPP will be updated, as needed, during the final design period to reflect any additional data and/or final designs.

The final SWPPP will include a combination of silt fences, hay bales, stone filter dikes, existing swales, and an unlined sediment trap/basin. The silt fences, hay bales, stone filter dikes, and a sediment trap/basin (infiltration/ detention basin), as required, will be constructed prior to the start of demolition. The sediment trap/basin will be modified as required to make it a part of the final site grading and drainage plan to be used for Project operations. Disturbance of the existing gravel covered undeveloped areas will be kept to a minimum, which will help to keep the flow rate and sediment transport to a minimum. Figure 4.9-8 presents the anticipated Project Site structures for managing stormwater during demolition and construction.

Stormwater runoff associated with the installation of the electric transmission towers will be controlled with the use of silt fences and hay bales surrounding the foundation installation. Each electric tower will sit atop a concrete caisson foundation. Once the caisson foundation is installed, the area will be regraded to establish the original drainage pattern.

Stormwater runoff associated with the installation of the Con Edison natural gas interconnection is expected to be controlled with the use of silt fences and hay bales surrounding the excavation pipe installation and backfilling operation. Once the pipe is installed and backfilled, the area will be regraded to establish the original drainage pattern.

During construction, the existing stormwater collection system will be permanently upgraded, after cut and fill and rough grading are completed. Hay bales, silt sacks, or other devices will be added around the new catch basin inlets to prevent sediments from entering the to-be-modified, permanent system. The operational stormwater collection system will be upgraded during construction as follows:

- A silt fence will be installed on the southern side of the sediment trap/basin (infiltration/ detention basin) and access into the sediment trap/basin for driving piles will be provided. A permanent concrete basin (Basin No. 1) will be constructed for controlling stormwater runoff during Project operations and will replace the sediment trap/basin.

- The new Basin No. 1 and a new Outfall No. 001 will be constructed. Stormwater collection pipes will be tied into the basin. The stormwater for the northern and eastern portion of the Project Site will be collected and directed to Basin No. 1.

- A new Basin No. 2 and an upgraded Outfall No. 002 will be constructed. The basin will have an impermeable liner.

- Stormwater catch basins will be constructed and an underground network of collection pipes will be tied into Basin No. 2. This system of collecting the stormwater for the western and southern portion of the Site will be utilized during a portion of construction and subsequently will become a functional part of the operational stormwater management system for the Project Site.

- A new oil/water separator for treating runoff within the ring containment of the remaining bulk oil storage tanks will be installed for discharge to new Basin No. 2.

A detailed description of the demolition of existing structures and construction of new and upgraded structures at the Project Site is presented in Section 3.0 of this Application and also is contained in the SWPPP.

Stormwater Control During Operation

There currently is an existing SPDES Permit No. NY-02-8002 and a Best Management Practices (BMP) Plan for stormwater management for the Project Site.

A modified SPDES application is being submitted (NYDEC Application Form "D") in Appendix 4.9 for the existing SPDES permit to support the discharge of stormwater from the Project in accordance with NYDEC recommendations. Supplement A, Form NY-2C, Cogeneration and Steam Generating Facilities, is not applicable to the Project as no SPDES cooling water is proposed. A complete presentation of the modified stormwater management structures is included within the SWPPP which also is provided in Appendix 4.9. Following completion of construction activities, the BMP Plan will be updated to support the redeveloped Site.

The stormwater management system design for the Project Site is divided into three drainage areas. For illustrative purposes, the Pre-Project Plan and Drainage Area are presented on Figure 4.9-6. The Post-Project Plan, divided into the three Drainage Areas, Nos. 1, 2, and 3, is presented on Figure 4.9-7.

The design of the permanent stormwater collection and treatment system will duplicate, to the maximum extent practicable, the existing stormwater runoff rates and patterns, including percolation. Figure 4.9-9 presents the intended control structures and improvements for controlling runoff, tidal and storm surges, and erosion during operation of the Project.

Drainage Area 1 consists of the northern portion of the Project Site and will include half of the Turbine Building and the air-cooled condenser area. Drainage Area 2 consists of the western portion of the Project Site and Drainage Area 3 consists of a small area located in the southwestern portion of the Project Site. Drainage Area 3 was established as a separate area because it will not be developed and it only will be used as a laydown area for construction. During post-construction stormwater management, this area will continue to be drained via sheet flow into Steinway Creek.

Impervious surfaces and resultant stormwater runoff will increase following construction. Permanent stormwater treatment basins are proposed to offset the increase in the rate of stormwater runoff and tidal surge events. The runoff from Drainage Area 1 will be collected in Basin No. 1 and the runoff from Drainage Area 2 will be collected in Basin No. 2.

Table 4.9-5 presents the hydraulic calculations of the existing and proposed conditions for the 2, 10, and 100-year storm events at the Project Site.

Stormwater falling on the Project's major structures will be collected in roof gutters and downspouts and collected in underground storm drain piping which ultimately will discharge to the new basins.

The runoff from the first one-half inch of precipitation, referred to as the "first flush," is independent of any specific reoccurrence storm. The volume of the "first flush" will be the design volume for stormwater retention. The two retention basins to be constructed as part of the upgraded stormwater management system at the Project Site will be designed to retain the runoff from the first one-half inch of precipitation. The required volume was calculated for each of the two basins based on the surface area times one half inch.

TABLE 4.9-5: HYDRAULIC ANALYSIS OF EXISTING AND POST-CONSTRUCTION CONDITIONS			
Existing Conditions Peak Runoff Summary			
Drainage Area	**Peak Runoff (cfs)**		
	2 year	**10 year**	**100 year**
Pre Industrial Area	39	67	102
TOTALS:	39	67	102
Post-Construction Peak Runoff Summary			
Drainage Area	**Peak Runoff (cfs)**		
	2 year	**10 year**	**100 year**
Area 1 (Basin #1)	18	32	50
Area 2 (Basin #2)	20	39	64
TOTALS:	38	71	114
Comparison of Existing Conditions and Post-Construction Peak Flows			
Drainage Area	**Peak Runoff (cfs)**		
	2 year	**10 year**	**100 year**
Pre- Project	39	67	102
Post- Project	38	71	114
Difference	**(1)**	**4**	**12**
Percentage Increase	**2.6% (Decrease)**	**+6% (Increase)**	**+11.8% (Increase)**

Discharge from the two new basins manually will be controlled, with stormwater released such that water treatment for suspended solids is obtained. Discharge flow rates will be considered as a whole for the Site when compared to pre-Project flow rates and will be similar to the pre-

Project peak flows. Details of the structural control measures to be used for the Project will follow the New York Guidelines for Urban Erosion and Sediment Control.
Pre-Project and post-Project stormwater runoff calculations were performed using the U.S. Department of Agriculture's Technical Release 55 (TR 55). This method is based on the soil type and vegetative cover of both the pre-Project and the post-Project conditions. Stormwater calculations are provided in Appendix 4.9.

As described in the SWPPP and presented on Figures 4.9-7 and 4.9-8, the Project will have several structures and improvements designed to prevent stormwater contamination by chemicals, fuel oil, or other contaminants from the storage facilities, product delivery, Project operations and maintenance, waste handling activities, and vehicles in parking lots and other areas.

Runoff from the paved roads and other outdoor areas that have potential oil contamination, such as the oil spill containment structures around the transformers and the oil storage tanks, will be directed to an oil/water separator for oil and grease removal and subsequently will be discharged to the stormwater collection system.

Flooding, Storm Surge, Tidal Surge

The National Flood Insurance Program defines flooding as a general and temporary condition during which the surface of normally dry land partially or completely is inundated. Flooding can be caused by:

- The overflow of inland or tidal water;
- The unusual and rapid accumulation or runoff of surface waters from any source, such as heavy rainfall;
- Mudslides, i.e., mudflows, caused by flooding, that could be described as a river of liquid and flowing mud; or

- The collapse or destabilization of land along the shore of a lake or other body of water, resulting from erosion or the effect of waves, or water currents exceeding normal, cyclical levels.

The Project Site is located within a special flood hazard area designated by FEMA. FEMA has identified three flood zones for the Project Site, Zone A-8, Zone B, and Zone C. Zone A-8 is an area within the 100-year flood zone with an established base elevation of 13 to 14 feet (NGVD of 1929). Zone B is comprised of: (i) an area between the limits of the 100-year flood boundary and the 500-year flood boundary; (ii) certain areas subject to 100-year flooding with average depths less than one-foot or where the contributing drainage area is less than one square mile; or (iii) areas protected by levees from the base flood (FEMA, 1983). Zone C is comprised of areas of minimal flooding (FEMA, 1983).

The Project Site is located adjacent to a tidal water. The electronic models utilized by FEMA to determine the flood zones for the Project Site are based on scenarios of flooding from storm surge and tidal surge. Thus, the flooding analysis includes tidal and storm surge considerations.

The Code provides that the Project must be constructed in accordance with the regulations of the NYC Building Department (Title 27 Section 316). Section 316.1 of the Code states that the following information must be provided concerning structures that are built within the special flood hazard area:

- The elevation in relation to mean sea level.
- The elevation in relation to mean sea level to which the structure will be flood proofed. Pursuant to the Code, the lowest floor elevation must be at or above the base flood elevation; or attendant utilities and sanitary facilities must be flood proofed up to the level of the base flood elevation.
- A certification from a registered architect or licensed professional engineer that heating, ventilation, air conditioning, plumbing, electrical, and other service facilities within the

structure will be located or constructed so as to prevent water from entering or accumulating within the components during conditions of flooding.

- A certification from a registered architect or licensed professional engineer that the flood proofing design and methods of construction of such structure are in accordance with Reference Standard 4-5 of the Code, and accepted standards of practice to make the structure water tight with walls substantially impermeable to the passage of water, and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effects of buoyancy.
- A description, where applicable, of the extent to which any proposed watercourse will be altered or relocated as a result of the proposed work.
- Demonstration of a design to protect against flood damage; flotation; collapse; lateral movement.
- Demonstration that construction methods will minimize flood damage; and all utilities will be located, elevated, and constructed to minimize or eliminate flood damage, and provide adequate drainage to reduce exposure to flood hazard.

The 100-year flood elevation for the Project Site is 11.28 feet (QBVD of 1929). The high point of the Project Site is located on the southern side of the Site with elevations varying from 10 to 11 feet. Under existing conditions, a majority of the Project Site without structures above the existing grade would have an anticipated covering of surface water during this flood event. See Figure 4.7-2. (A full size drawing of the figure is provided in Appendix 4.9.)

Following construction, the grading, paving, and road elevations for the Project Site closely will match the existing site elevations. However, the bottom of all major pieces of equipment will be located at elevation of 14 feet (QBVD of 1929), which is more than 2 feet higher than the 100 year flood elevation. The Turbine Building slab at grade will be at elevation 12 feet (QBVD of 1929). See Figure 4.9-8. (A full size drawing of the figure is provided in Appendix 4.9.)

During Project operations, erosion control (and consequently flood protection) of the Site will be maintained through continued use of the existing bulkhead at the East River and Steinway Creek and continued maintenance of paved and heavily graveled areas nearest the bulkhead. In addition, the Turbine Building slab at grade will be approximately 9 inches above the 100-year flood level and the major pieces of equipment will be more than 2 feet higher than the 100-year flood.

If structures are built in a flood plain, the space they occupy will no longer be available to hold water in a flood. Thus, the volume of floodwater displaced by the structure could potentially cause flooding in areas upstream where it would not have occurred before the structure was built. Following construction of the Project, water displaced due to structures and site improvements during a 100-year flood will decrease from 16,720 cubic yards to 13,730 cubic yards. Therefore, a relative decrease in impact is anticipated during a storm surge or 100-year flood event. The Project will comply with the Code requirements for construction of buildings in special flood hazard areas. Astoria Energy requests that the Siting Board include this finding in the Project's Certificate for flood insurance purposes. (See Section 7.0.)

Coastal Management Program

In accordance with Stipulation Nos. 8 and 12, Policies 11 through 17 of the New York State Coastal Management Program (CMP), which address flooding and erosion, were analyzed as part of preliminary design of the Project.

New York's coast faces coastal hazards such as floods and erosion. The New York City Local Waterfront Revitalization Program (LWRP) designates certain areas as coastal erosion hazard areas and coastal high hazard areas. Pursuant to the LWRP, no coastal erosion hazard areas or coastal high hazard areas are designated at the Project Site. (See also Section 4.2.5.) Erosion and flooding along the barrier island portions of Long Island are major emphasis of the CMP. The Project Site is not located on the barrier island portion of Long Island.

As set forth in Section 4.2.5 and in the SWPPP, the Project will include erosion and flood control techniques that will be designed to avoid adverse impact to the coastal resources of the East

River and Steinway Creek. Thus, to the extent that they are applicable to the Project, the Project will comply with the flooding and erosion policies set forth in the CMP.

Alternative Stormwater Control Techniques

This section presents several alternatives to the planned post-construction stormwater management proposed for the Project Site, and the reason for rejection. Astoria Energy considered stormwater to the sanitary sewer. However, discharge of stormwater to the sanitary sewer is not permitted (RCNY Title 15, Chapter 19-02).

In addition, retention and removal for off site release also was considered. However, storage facilities for the retained storm water would have to be significant, requiring additional area onsite or nearby for the additional retention structures, and no better location for offsite release is available.

Lastly, underground injection was considered. The disposal of stormwater through directed subsurface disposal, such as an injection well, requires that the subsurface must be able to accept the quantities of water to be discharged. The ground water table at the Project Site is relatively close to the ground surface and fluctuates due to tidal action. Thus, it is not feasible to dispose of the collected stormwater in this manner.

4.9.6 References

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4.10 Traffic and Transportation

4.10 Traffic and Transportation

4.10.1 Introduction

In accordance with PSL Section 164(1)(a), Sections 1001.1(a) and 1001.3 of the Article X Regulations and Stipulation No. 10, this section: (i) sets forth the existing traffic conditions; and (ii) analyzes the potential impacts on traffic and transportation resources associated with the construction and operation of the Project, the electric transmission interconnection, and the Con Edison natural gas interconnection.

The traffic and transportation analyses contained herein were performed consistent with traffic evaluation procedures used by the New York State Department of Transportation (NYDOT) and the New York City Department of Transportation. To establish existing baseline traffic conditions, TRC used information from local transportation agencies, manual and machine traffic counts and field observations. Computer traffic modeling was performed to project future traffic conditions that would be anticipated during construction and operation of the Project.

As described more fully herein, operation of the Project will result in a significant net reduction in daily traffic compared with the Site's current use as a fuel oil storage and distribution terminal. Current Site traffic volume can be up to 320 trips[1] a day due to arriving and departing fuel oil trucks during winter months. In comparison, 30 employees will operate the Project with approximately 5 to 10 deliveries each day. Even assuming that all 30 employees drive to the Site, Project operations will generate a maximum of 70 to 80 trips per day.

While traffic will be higher during construction than during Project operations, it still will be less than the traffic that currently arrives and departs the fuel oil terminal during busy winter days. A maximum of approximately 80 construction-related trucks could arrive at the Site each day during the peak construction period. In addition, while the Site is readily accessible by public transportation, a maximum impact scenario for construction employees was used which assumed that all employees drove their own cars to designated temporary offsite parking areas and were

[1] A trip is defined as travel in one direction. A truck arriving and departing the fuel oil terminal constitutes 2 trips.

bused to the Site. Even under this maximum condition, overall daily Site traffic volumes are not expected to exceed a combined 100 trucks and buses or a total of 200 trips, which is less than the current maximum fuel oil terminal condition of 320 trips per day during busy winter days.

This net reduction in Site traffic during both the construction and operation of the Project will have a beneficial effect on local traffic and transportation systems.

4.10.2 Laws, Policies and Regulations

All methodologies for traffic movements and activity were performed consistent with the New York State regulations governing vehicles.

4.10.3 Existing Conditions

4.10.3.1 Site Access and Vicinity Roadway Network

Figure 4.10-1 shows a regional map of the Site area. The Site is currently the location of an operating fuel oil storage and distribution terminal. A large number of fuel oil trucks arrive and depart from the Site each day. The Site is located in the Bowery Bay/Steinway Industrial area of the Astoria section of Queens, a manufacturing and heavy industrial district. This area contains warehouses and manufacturing facilities, including the Steinway and Sons piano manufacturing factory adjacent to the south of the Site and the Bowery Bay Water Pollution Control Plant adjacent to the east of the Site. Traffic in the Site area is largely industry-related. Heavy trucks making deliveries to area warehouses and manufacturing facilities are common. The entrance road to the Rikers' Island correctional facility is nearby to the east of the Site.

Figure 4.10-2 shows the Site and nearby streets. The Site has two main access gates that are immediately adjacent to one another at the end of Steinway Street where it meets Berrian Boulevard. The two gates allow for efficient separate Site entry and exit by the fuel oil trucks. Primary access to the Site area is from Astoria Boulevard up Steinway Street to its end approximately 1 mile to the north. Interstate 278 (Brooklyn/Queens Expressway) and the Grand Central Parkway also converge near the intersection of Steinway Street and Astoria Boulevard, allowing access to the metropolitan New York City area from that location. Other key roadways along Steinway Street include 23rd Avenue, 21st Avenue, 20th Avenue, 19th Avenue and Berrian Boulevard.

Marine access to the Site is available from the East River at Steinway Creek, which flows between the Site and the Con Edison Complex immediately to the west of the Site. The Site's existing fuel oil storage and distribution terminal utilizes a pier at the intersection of Steinway Creek and the East River to deliver fuel oil by barge and ship. During busy winter months, up to 12 barges or ships per week can deliver fuel oil to the Site. Throughout the year, the average barge traffic volume is about 4 barges per week.

The Con Edison Complex also receives barge and ship deliveries in connection with power generating operations at that location. The barges and ships dock at a bulkhead that extends along the Con Edison property at the edge of Steinway Creek, bending around and continuing along the portion of the Con Edison Complex that faces the East River. Barge/ship volume at the Con Edison Complex is approximately 3 to 5 barges/ships per week.

Barges also are utilized at the adjacent Bowery Bay Water Pollution Control Plant to remove sludge generated by water treatment activities for offsite disposal. Up to 1 or 2 barges are used each week.

4.10.3.2 Existing Roadway Geometry

Figure 4.10-3 presents a conceptual Site plan. Figure 4.10-4 presents a diagrammatic illustration of Steinway Street along with key intersecting roadways. These roadways are described below. All of the roadways have a posted speed limit of 30 mph and appropriate sight distance for urban roadways. Each of the roadways has sidewalks along both sides of the paved street and is under local public works jurisdiction.

Steinway Street

The main entrance and exit for the Site is located at the intersection of Steinway Street and Berrian Boulevard. Steinway Street is the direct access road to the Site. It is a designated route for heavy traffic into the Site. It is a two-lane roadway that runs in a general north/south direction and serves a variety of commercial and residential developments. Approximately 38 feet wide, Steinway Street extends from Northern Boulevard to Berrian Boulevard and has parallel parking on both sides of the street. This intersection is not signalized or under STOP control.

Berrian Boulevard

In addition to the Project, Berrian Boulevard also provides access to other properties, such as the adjacent Bowery Bay Water Pollution Control Plant. Berrian Boulevard is a two-lane roadway that runs in an east/west direction and serves as a collector roadway for the commercial developments north of 19th Avenue and Steinway Street. Approximately 42 feet wide, Berrian Boulevard has parallel parking on both sides of the street. The intersection of Steinway Street and Berrian Boulevard is under STOP control.

19th Avenue

19th Avenue is a two-lane roadway with parallel parking on both sides of the street. It runs in an east/west direction from 37th Street to 81st Street. The roadway is approximately 42 feet wide west of Steinway Street and 47 feet wide east of Steinway Street. The intersection of Steinway Street and 19th Avenue is under STOP control on all four approaches.

20th, 21st and 23rd Avenues

20th, 21st and 23rd Avenues are two-lane local roadways with parking, which extend from 19th Street to Hazen Street, 81st Street, and North Astoria Boulevard, respectively. The width of 20th Avenue is 46 feet and the width of 21st and 23rd Avenues is 38 feet. The intersections of Steinway Street with 20th, 21st and 23rd Avenues are all signalized.

Public Transportation

The Site is readily accessible by public transportation. Public transit to the Site area includes the M60 & Q19C (Triborough bus) routes which run every 15-20 minutes and connect to the "N" train line station. The Q101 bus route runs every 10-15 minutes and connects to the Steinway Station G & R train lines. The "N" train line terminal is within walking distance to the Site.

4.10.3.3 Traffic Counts and Field Observations

TRC conducted field observations and manual turning movement traffic counts on December 12, 1999. To obtain additional data regarding existing traffic volumes in the Project vicinity, TRC contacted the New York State, New York City and Queens County Departments of Transportation.

Data collected during field observations included roadway geometries, lane widths, traffic control devices and traffic flow characteristics. The field observations occurred from 6:30 A.M. to 9:30 A.M. and from 3:00 P.M. to 6:30 P.M. at the following key intersections and driveways in the vicinity of the Site (Study Locations):

- Location No. 1 - Steinway Street/Site Driveway and Berrian Boulevard
- Location No. 2 - Steinway Street and 19th Avenue
- Location No. 3 - Steinway Street and 20th Avenue
- Location No. 4 - Steinway Street and 21st Avenue
- Location No. 5 - Steinway Street and 23rd Avenue

The manual turning movement traffic counts registered at the Study Locations, including Peak Hour counts, are contained in Appendix 4.10.

In addition, manual turning movement traffic counts were supplemented with automated traffic recording (ATR) devices located on all approaches at the intersection of 19th Avenue and Steinway Street and on Steinway Street between Ditmars Boulevard and 23rd Avenue. ATR data was collected from Monday, December 6, 1999 through Sunday, December 12, 1999. Copies of the ATR traffic counts are included in Appendix 4.10.

A review of the traffic counts at the Site driveway and the Study Locations identified the following representative peak roadway hours:

- Peak A.M. Roadway Hour - 7:45 to 8:45 A.M.
- Peak P.M. Roadway Hour - 3:15 to 4:15 P.M.

Currently at the existing fuel oil storage and distribution terminal, there are 10 on site employees during the day shift and, collectively, an additional 5 employees for the swing and night shifts. A large number of fuel oil delivery trucks currently arrive and depart from the terminal each day. The number of oil delivery truck trips varies seasonally from approximately 162 to 320 daily trips during the winter months to 110 to 122 daily trips during the summer months. The trucks are directed to travel along Steinway Street, the recommended route for heavy trucks. The number of trucks that entered the existing terminal over a one year period is shown on Table 4.10-1 below:

TABLE 4.10-1:
NUMBER OF TRUCKS ENTERING FACILITY

Month	Number of Trucks (One Way)
1998 October	1,613
1998 November	2,212
1998 December	2,840
1999 January	3,189
1999 February	2,814
1999 March	2,856
1999 April	1,902

TABLE 4.10-1: (Cont.) NUMBER OF TRUCKS ENTERING FACILITY	
Month	**Number of Trucks (One Way)**
1999 May	1,167
1999 June	1,199
1999 July	1,096
1999 August	1,189
1999 September	1,219
1999 October	1,807

The results of the December 1999 Peak Hour traffic volume counts for vehicles entering and exiting the Site are shown on Figure 4.10-4.

4.10.3.4 Existing Levels of Service

Capacity analyses were performed at the Study Locations to determine the existing level of service for each location (Existing Traffic Volumes). Capacity analysis is a method by which traffic volumes are compared to the calculated roadway and intersection capacities to evaluate future conditions.

In accordance with Stipulation No. 10, the methodology utilized to perform this analysis is described in the 1994 Update to the 1985 Highway Capacity Manual published by the Highway Research Board (Manual). In general, the term, "Level of Service" is used to provide a qualitative evaluation based on certain quantitative calculations related to empirical values.

Levels of Service are measured on a scale from "A" to "F" for signalized and unsignalized intersections, and are defined in terms of average delay. Delay is used as a measure of driver discomfort, frustration, efficiency, etc. In general, Level of Service A represents the best traffic operating condition and Level of Service F represents the worst traffic operating condition. Levels of Service "A" through "D" are typically acceptable in the urban environment. See Manual. Table 4.10-2 summarizes the Level of Service ranges for signalized and unsignalized intersections:

TABLE 4.10-2:

LEVEL OF SERVICE SUMMARY

Level of Service	SIGNALIZED	UNSIGNALIZED
	Average Delay per Vehicle (seconds)	Average Delay per Vehicle (seconds)
A	5.0 or less	5.0 or less
B	5.1 to 15.0	5.1 to 10.0
C	15.1 to 25.0	10.1 to 20.0
D	25.1 to 40.0	20.1 to 30.0
E	40.1 to 60.0	30.1 to 45.0
F	60.1 or greater	45.1 or greater

Source: Highway Research Board 1994 Update to the 1985 Highway Capacity Manual.

Capacity analyses were performed for the Study Locations with the Existing Traffic Volumes utilizing Highway Capacity Software developed by the Federal Highway Administration (FHWA). Copies of the capacity analysis worksheets are contained in Appendix 4.10 of this Application.

Table 4.10-3 below summarizes the results of the capacity analyses for the Existing Traffic Volumes:

TABLE 4.10-3:
LEVEL OF SERVICE SUMMARY
EXISTING CONDITIONS

Intersection	Approach	LOS	A.M. Delay[(1)]	V/C	LOS	P.M. Delay[(1)]	V/C
Steinway Street at Berrian Boulevard	Eastbound Overall	a	2.7	--	a	3.0	--
	Westbound Overall	a	4.1	--	a	3.8	--
	Overall	a	2.0	--	a	2.2	--
Steinway Street at 19th Avenue	Eastbound Overall	a	1.6	0.13	a	2.1	0.20
	Westbound Overall	a	3.7	0.35	a	2.1	0.19
	Northbound Overall	a	2.9	0.28	a	2.7	0.26
	Southbound Overall	a	2.0	0.18	a	1.7	0.14
	Overall	a	3.0	--	a	2.2	--
Steinway Street at 20th Avenue	Eastbound Overall	A	5.0	0.269	B	6.3	0.495
	Westbound Overall	B	6.2	0.472	B	5.7	0.396
	Northbound Overall	C	22.0	0.542	C	22.0	0.544
	Southbound Overall	C	19.4	0.272	C	19.5	0.283
	Overall	B	10.7	0.493	B	10.6	0.510
Steinway Street at 21st Avenue	Eastbound Overall	C	18.5	0.589	C	19.8	0.662
	Westbound Overall	C	17.6	0.517	C	16.6	0.429
	Northbound Overall	A	4.2	0.272	A	4.2	0.285
	Southbound Overall	A	4.1	0.245	A	4.1	0.260
	Overall	B	11.8	0.389	B	12.1	0.424
Steinway Street at 23rd Avenue	Eastbound Overall	C	22.5	0.720	D	26.0	0.804
	Westbound Overall	C	24.0	0.764	C	21.0	0.655
	Northbound Overall	B	4.0	0.414	B	5.9	0.655
	Southbound Overall	A	3.9	0.414	A	4.4	0.501
	Overall	B	13.6	0.535	B	13.1	0.706

Note: Upper case letters indicate signalized intersections. Lower case letters indicate unsignalized intersections.
LOS = Level of Service
V/C = The ratio of demand flow rate to capacity
(1) Delay measured in seconds.

As shown above, all intersections currently operate at acceptable Levels of Service (A-D).

As indicated by the December, 1999 ATR counts, the average daily (weekday) traffic (total of both directions) along Steinway Street between Ditmars Boulevard and 23rd Avenue is approximately 11,100 vehicles. Existing Traffic Volumes drop dramatically at 20th Avenue where commercial and residential activity ends and the industrial area surrounding the Site begins (see Figure 4.10-5). A further decline in traffic occurs at 19th Avenue, with approximately 3,000 vehicles between 20th Avenue and 19th Avenue dropping to approximately 2,100 vehicles between 19th Avenue and Berrian Boulevard. Traffic on weekends in the Bowery Bay/Steinway Industrial Area is significantly lower than weekdays. Though late night counts were not taken, field observations indicate that nighttime traffic in the area is very low, both in the Bowery Bay/Steinway Industrial Area north of 20th Avenue and in the residential area between 20th Avenue and Astoria Boulevard.

4.10.3.5 Emergency Facilities and School Bus and Emergency Vehicle Routes

Based upon recent discussions (December, 1999) between TRC and representatives of the Fire and Police Departments, emergency vehicles have no set routes in the area. In the event of an emergency, all emergency vehicles travel to the emergency site by means of the quickest and shortest route possible, depending upon roadway conditions, time of day and location.

There are no school bus routes in the Bowery Bay/Steinway Industrial Area. There are also no hospitals, schools or day care centers on Steinway Street between the Site and Astoria Boulevard.

4.10.3.6 Data

NYDOT, the New York City Department of Transportation and County of Queens Department of Public Works were contacted to obtain Steinway Street accident data. NYDOT-Safety Information Management System data on the section of Steinway Street from 23rd Avenue to Berrian Boulevard for the period from January, 1996 through December, 1998 were reviewed and analyzed. The accidents are summarized into categories including year of the accident, probable cause and number of injuries (see Table 4.10-4 and Appendix 4.10).

TABLE 4.10-4: ACCIDENT SUMMARY ASTORIA, NY			
	Accident Type		
	Reportable	Non-Reportable	Total
Steinway St. @ 23^{rd} Ave.	10	21	31
Steinway St. between 23^{rd} Ave. & Ditmars Blvd.	8	17	25
Steinway St. @ Ditmars Blvd.	7	7	14
Steinway St. between Ditmars Blvd. & 21^{st} Ave.	1	11	12
Steinway St. @ 21^{st} Ave.	13	4	17
Steinway St. between 21^{st} Ave. & 20^{th} Rd.	1	3	4
Steinway St. @ 20^{th} Rd.	3	6	9
Steinway between 20^{th} Rd. & 20^{th} Ave.	0	2	2
Steinway St. @ 20^{th} Ave.	6	9	15
Steinway St. between 20^{th} Ave. & 19^{th} Ave.	0	6	6
Steinway St. @ 19^{th} Ave.	5	9	14
Steinway St. between 19^{th} Ave. & Berrian Blvd.	0	2	2
TOTAL	54	97	151

During the analyzed 3-year period on Steinway Street from 23^{rd} Avenue to Berrian Boulevard, a distance of approximately 0.95 miles, a total of 151 accidents occurred. Of the total accidents, 96 (64%) were nonreportable. According to the NYDOT[2], a nonreportable accident is defined as an accident where: (i) there is no personal injury and no motorist report; (ii) there is no dollar value of vehicular damage entered on the accident report; or (iii) there are damages that do not exceed $1,000. The majority of the reportable accidents were "failure to yield" and "driver

[2] J. Dearstyne, NYDOT. Personal communication with L. Casinelli, TRC Environmental Corporation.

inattention." According to the NYDOT, the accidents were primarily due to human error rather than problems with the roadway or traffic control. No accident resulted in a fatality.

4.10.3.7 Construction Support Areas

As described more fully in Section 3.11 of this Application, Astoria Energy has had discussions with several property owners in the New York City area concerning the use of locations for construction support areas. Astoria Energy has found that potential construction support areas are available in industrial areas in Queens and adjacent boroughs at all times, as local business conditions change and needs arise. Astoria Energy's discussions are ongoing, with several suitable locations identified and likely to be available. However, a final determination of construction support areas is not likely to be made until close to the time of actual construction. For example purposes, several representative sites have been identified where discussions have been promising or where space for these purposes is typically available. These sites are shown in Figure 4.10-5.

4.10.3.8 Con Edison Natural Gas Interconnection Route

The Con Edison natural gas interconnection route is shown on Figure 4.10-2. It will run underground from a Con Edison main on 20th Avenue down Steinway Place to the Project Site. Steinway Place contains much lower traffic volumes than Steinway Street. Traffic on Steinway Place primarily is associated with the Steinway & Sons piano manufacturing factory corresponding to the beginning and end of shift periods each day. Other delivery traffic throughout the day to warehouses on the street is sparse.

4.10.3.9 Electric Transmission Interconnection Route

The electric transmission interconnection route is shown on Figure 4.10-2. After crossing Steinway Creek, it will run entirely on private property owned by Con Edison.

4.10.3.10 La Guardia Airport

LaGuardia Airport begins approximately one mile from the Site. Steinway Street primarily will be used to access the Project Site. Steinway Street is not a direct access route to the airport.

4.10.3.11 Barge Access

There is barge access to the Site from the East River. The Site has a pier that is used for loading and unloading fuel oil. At present, the pier will allow up to three ships or barges to dock at one time. Traffic in the East River is primarily industrial. East River barge traffic activity is managed by the United States Coast Guard.

4.10.4 Potential Impacts and Mitigation

To evaluate potential traffic impacts associated with Project construction, the Project's anticipated construction vehicle trips were added to a projected background condition which was established based on conservative growth assumptions for the Study Locations (Peak Construction Condition). To be even more conservative, the existing December 1999 Castle traffic volumes were not removed from the roadway traffic counts for this Peak Construction Condition. Given the limited traffic associated with Project operations, these existing Castle traffic volumes (including the fuel oil trucks) were, by themselves, considered sufficient to represent vehicle trips generated by Project employees and the delivery of goods and materials to the Project Site. Therefore, to establish future Project operations conditions, the Existing Traffic Volumes were increased based on conservative growth factors for the Study Locations (2004 Future Traffic Condition).

4.10.4.1 2002 Future Traffic Volumes

To establish the traffic volumes for future conditions, a compounded growth rate of 1.5 percent per year was used as a background growth factor. This growth factor is based on two components. First, the *New York State Department of Transportation 1998 Traffic Volume Report* reported a growth rate of 1.2 percent for Grand Central Parkway Traffic in the last 3 years. Traffic growth rates for urban commercial and residential streets like those near the Site are very low because these urban environments are substantially developed. While the streets near the Site would not be expected to match the growth occurring on the Grand Central Parkway, the Grand Central Parkway growth rate was used to provide a conservative basis for potential general residential and commercial urban growth on Study Area streets.

Second, an additional growth component was assumed in order to account for potential construction traffic associated with proposed nearby industrial projects. While there are no approved future developments in the area at this time, two proposed developments publicly have been announced. NYPA has proposed an expansion to its Poletti power generation facility located within the Con Edison Complex. An extension of the "N" Subway line also has been proposed. Access to the Poletti facility is through the Con Edison complex entrance at 31st Street on 20th Avenue. The "N" Subway Line extension, if approved, would be constructed to continue down 31st Street until it reaches 20th Avenue and then will go underground and travel in an easterly direction under 20th Avenue to LaGuardia Airport.

Construction traffic generated by either of these proposed projects generally are not expected to utilize or substantially impact the same streets that will be used by the Project. Specifically, traffic associated with the proposed NYPA Poletti expansion is expected primarily to use 31st Street. Because "N" line construction will be underground, it is only expected to impact short above ground sections of 20th Avenue at any given time. However, to account for potential construction traffic impacts from these projects, an additional 0.3 percent was added to the Grand Central Parkway's 1.2 percent growth rate. Thus, a total of a 1.5 percent per year is collectively assumed as the overall yearly growth factor to predict local traffic conditions. Existing Traffic Volumes conservatively were projected to the Peak Construction Year 2002 by applying the 1.5 percent growth factor for three years for a total growth factor of 4.5 percent (2002 Projected Traffic Volumes).

4.10.4.2 2002 Projected Traffic Volumes

The resulting 2002 Projected Traffic Volumes are illustrated on Figure 4.10-6. Capacity analyses also were conducted for the 2002 Projected Traffic Volumes for the Study Locations. The results of the capacity analyses are summarized in Table 4.10-5.

TABLE 4.10-5:

LEVEL OF SERVICE SUMMARY

2002 PROJECTED TRAFFIC VOLUMES

Intersection	Approach	LOS	A.M Delay	V/C	LOS	P.M. Delay	V/C
Steinway Street at Berrian Boulevard	Eastbound Overall	a	2.7	--	a	2.9	--
	Westbound Overall	a	4.2	--	a	4.0	--
	Overall	a	2.0	--	a	2.3	--
Steinway Street at 19th Avenue	Eastbound Overall	a	1.7	0.14	a	2.2	0.20
	Westbound Overall	A7	4.0	0.36	a	2.2	0.20
	Northbound Overall	a	3.1	0.30	a	2.8	0.27
	Southbound Overall	a	2.1	0.19	a	1.7	0.14
	Overall	a	3.2	--	a	2.3	--
Steinway Street at 20th Avenue	Eastbound Overall	A	5.0	0.283	B	6.5	0.518
	Westbound Overall	B	6.5	0.501	B	6.0	0.429
	Northbound Overall	C	22.4	0.569	C	22.4	0.571
	Southbound Overall	C	19.5	0.254	C	19.6	0.297
	Overall	B	10.9	0.521	B	10.8	0.534

TABLE 4.10-5: (Cont.)

LEVEL OF SERVICE SUMMARY

2002 PROJECTED TRAFFIC VOLUMES

Intersection	Approach	LOS	A.M Delay	V/C	LOS	P.M. Delay	V/C
Steinway Street at 21st Avenue	Eastbound Overall	C	19.0	0.618	C	20.6	0.700
	Westbound Overall	C	18.0	0.547	C	16.9	0.453
	Northbound Overall	A	4.2	0.288	A	4.3	0.300
	Southbound Overall	A	4.1	0.257	A	4.2	0.274
	Overall	B	12.1	0.409	B	12.5	0.447
Steinway Street at 23rd Avenue	Eastbound Overall	C	23.8	0.759	D	28.5	0.846
	Westbound Overall	D	25.6	0.802	C	21.7	0.687
	Northbound Overall	B	4.1	0.438	B	6.7	0.707
	Southbound Overall	A	4.0	0.434	A	4.6	0.529
	Overall	B	14.4	0.564	B	14.1	0.755

Note: Upper case letters indicate signalized intersections. Lower case letters indicate unsignalized intersections.

LOS = Level of Service

V/C = The ratio of demand flow rate to capacity

As illustrated in the above table, all intersections will operate at acceptable Levels of Service (A-D).

4.10.4.3 Potential Construction Impacts

Construction is anticipated to occur over a 33 month timeframe, with a high activity period lasting for about 18 months. Figure 3-11 shows the construction schedule. Figures 4.10-7 and 4.10-8 show the anticipated delivery activities and workforce and during the construction period. In accordance with Stipulation No. 10, these figures each have overlays to show construction phasing. As described in Section 3.0, the construction phases are largely parallel, with similar types of construction traffic occurring throughout the construction period, especially during the 18 month high activity period. As a result, no further separation of construction impacts by phase was conducted. The following analyzes peak construction impacts.

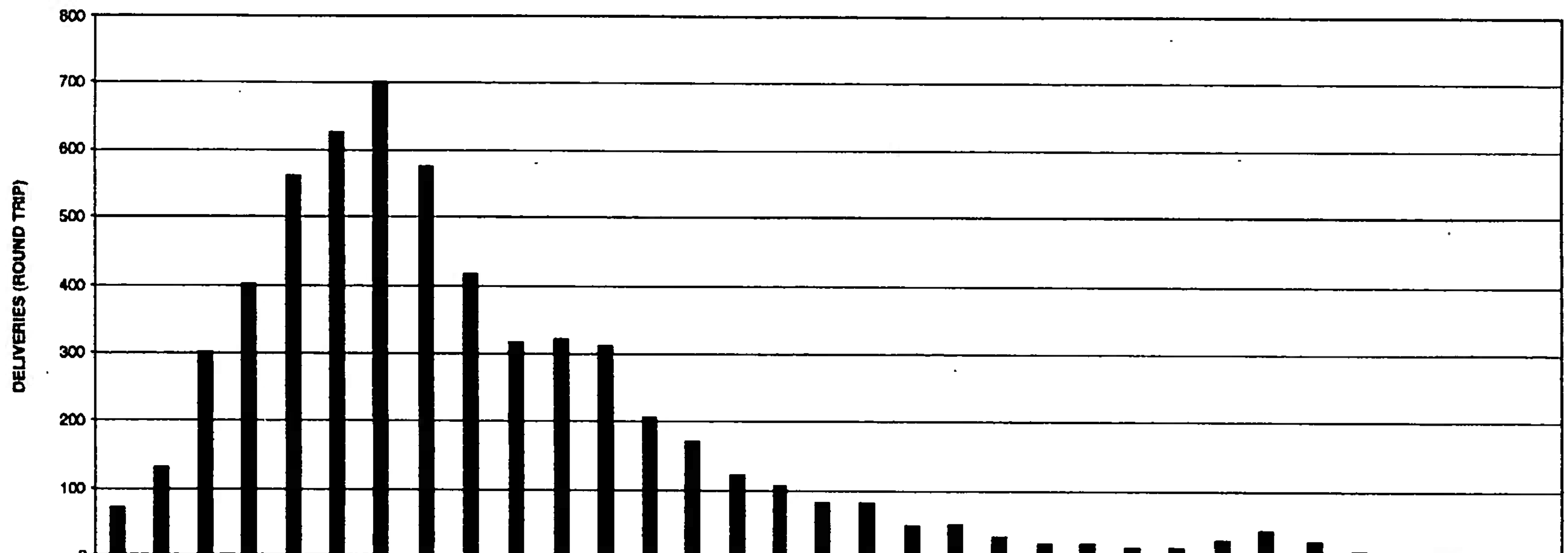
For purposes of this analysis, it was conservatively assumed that nearly all construction workers will travel to work using their personal vehicles (1.2 persons per vehicle). As shown in Figure 3-11, up to 550 workers will arrive for the day shift, and up to 250 workers will arrive for the night shift. The workers will travel to one or more designated offsite parking areas. Astoria Energy will utilize shuttle buses to transport construction workers from the designated off-site parking areas to the Project Site. Because construction workers will not travel directly to the Site, traffic impacts will be limited to the impacts associated with construction worker shuttle buses. Assuming 48 workers per bus, approximately 12 buses may be required for the day shift and 6 buses may be required for the night shift during the peak construction period.

The Project Site is readily accessible by public transportation. While the percentage of construction workers that will utilize public transportation cannot be predicted, it is expected to be significant given this urban environment. Thus, our assumption that all workers will require bus transportation from the designated offsite parking areas is conservative. Under actual construction conditions, a percentage of construction workers will likely use public transportation thereby reducing traffic impacts.

Our traffic analysis is based on peak delivery conditions from Figure 4.10-7. That figure shows that most deliveries will occur in the first six months of Project construction. The initial delivery activity is associated with the disassembly and removal of structures currently on site that will not be used for the Project. While it is anticipated that large pieces (e.g., from disassembled oil tanks) would be removed from the Site by barge, truck activity associated with removal of decommissioned material could reach as many as 40 or 50 round trips in a day. As Site decommissioning is completed, truck activity will increase for site preparation activities, including cut and fill activities and concrete pouring for the two power blocks. During this period, up to 80 trips in a day may occur. This is the maximum anticipated daily delivery condition and it is represented by the highest peak on Figure 4.10-7. Even under this maximum condition, 80 truck round trips per day would not occur for an entire month. At most, this condition would occur for up to a two week period. This is reflected in Figure 4.10-7 which shows that maximum truck round trips in any month during Project construction would not exceed 800. Nevertheless, a worst case truck delivery condition of 80 truck trips in a single day is assumed for this traffic analysis.

To summarize, we have assumed that 12 shuttle buses will arrive and depart the Site, generating 24 trips each morning during the Peak A.M. street volume period, and 18 buses will arrive and depart the Site during the Peak P.M. street volume period (12 for the day shift and 6 for the night shift who will start after the day shift is completed). Including Project employee buses during the morning peak is conservative because they will arrive at the Site before the morning peak starts. We have also assumed that 80 delivery trucks will arrive at the Site each day, generating 160 trips. To be conservative, 25 trucks generating 50 trips were assumed during the Peak A.M. street volume period, 25 trucks generating 50 trips were assumed during the Peak P.M. street volume period, and the remaining 30 trucks generating 60 trips were assumed for the rest of the day.

In addition, the existing fuel oil storage and distribution terminal December 1999 site-generated trips (both employee trips and current fuel oil truck trips) were not removed from baseline traffic conditions for this impact analysis. The number of fuel oil facility trips alone equals or exceeds anticipated Project construction trips for much of the construction schedule. (See Figure 4.10- 7.)



	MONTH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
NUMBER OF DELIVERIES(1)	Total	70	130	300	400	560	625	700	575	415	315	320	310	205	170	120	105	80

	MONTH	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
NUMBER OF DELIVERIES(1)	Total	80	47	48	31	20	20	15	15	25	40	24	10	5	5	5	5

TIME (MONTH OF ACTIVITY)

Note:
(1) It is estimated that the maximum amount of deliveries on any given day will be 80. However, as shown, there is no month during the scheduled construction where 80 deliveries per day will occur, at most, for more than a few days.

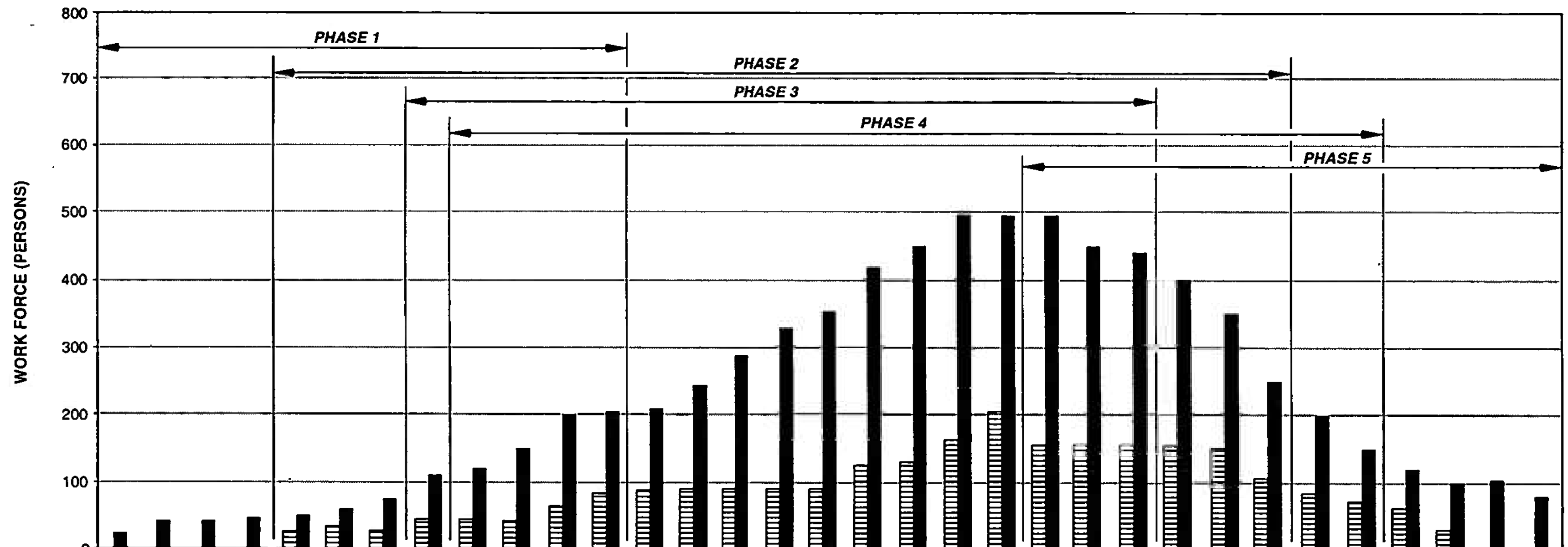
L99-452\FOLDER1M.PPT

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

CONSTRUCTION DELIVERY ACTIVITIES

ASTORIA ENERGY LLC
QUEENS, NEW YORK

FIGURE 4.10-7 | **PROJ. NO. 26476**



NUMBER OF WORKERS

MONTH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Project Second Shift (1)	0	0	0	0	26	34	27	44	44	42	64	83	88	90	90	90	90
Project Day Shift (1)	24	42	42	46	50	60	75	110	120	150	200	205	210	244	288	328	353

MONTH	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Project Second Shift (1)	125	130	163	205	155	155	155	154	150	106	84	72	62	30	0	0
Project Day Shift (1)	418	450	495	495	495	449	440	400	350	250	200	150	120	100	104	80

TIME (MONTH OF ACTIVITY)

LEGEND

- PROJECT SECOND SHIFT
- PROJECT DAY SHIFT

NOTE:
THE MANPOWER LOADING SHOWN HERE IS ASTORIA ENERGY'S ESTIMATE AS OF THE DATE OF THIS APPLICATION. TO BE CONSERVATIVE, HOWEVER, A MAXIMUM OF 550 CONSTRUCTION EMPLOYEES FOR THE DAY SHIFT AND 250 EMPLOYEES FOR THE NIGHT SHIFT IS ASSUMED FOR THE RESOURCE AREA ANALYSES AND IS PRESENTED IN THE TEXT.

SOURCE: SCS ENERGY

L99-452/1/P.AI

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

CONSTRUCTION MANPOWER CHART

ASTORIA ENERGY LLC
QUEENS, NEW YORK

FIGURE 4.10-8 | **PROJ. NO. 26476**

Thus, keeping the existing terminal site-generated trips in the model is conservative and will more than likely account for miscellaneous Project-related trips not otherwise specified.

Delivery of oversized equipment is planned to occur by barge. However, occasional truck delivery of oversized equipment may be required. In such event, these deliveries will be made during off-peak hours and will be coordinated with local officials. Therefore, traffic from oversized trucks will not have an impact upon the peak roadway hours and are not modeled with other Project traffic.

In general, few trucks will contain hazardous material during the construction of the Project. Any vehicles carrying hazardous materials will be instructed to travel from Astoria Boulevard along Steinway Street. No vehicles carrying dynamite will be used for the Project.

A shuttle bus will remain on site at all times to provide service to and from the temporary designated offsite parking areas throughout the day for emergencies. Construction employees will remain on site during the day and obtain lunch from lunch trucks that will be available for snacks or light meals. Thus, this traffic analysis assumes that no additional traffic will be generated by on site employees during the day associated with break activities. A small number of supervisory personnel are expected to arrive and depart the Site each day. This activity is accounted for by leaving existing Castle Oil traffic in the analysis of future conditions.

Estimated Construction-Generated Traffic Volumes during the Peak Construction Period are illustrated in Table 4.10-6:

TABLE 4.10-6: ESTIMATED SITE-GENERATED TRAFFIC VOLUME DURING PEAK CONSTRUCTION				
	Peak A.M.		**Peak P.M.**	
	Enter	**Exit**	**Enter**	**Exit**
Buses	12	12	18	18
Trucks	25	25	25	25
Total	37	37	43	43

The arrival/departure patterns for the Construction-Generated Traffic Volumes were determined based upon review of the existing roadway traffic network and patterns in the vicinity of the Site. Construction-Generated Traffic Volumes during the Peak Construction Period were distributed to the roadways using the assumption that heavy vehicles will be directed to travel to and from the Site along Steinway Street, the recommended access route to the Site for heavy vehicles. Construction-Generated Traffic Volumes are illustrated in Figure 4.10-9. To determine the traffic volumes associated with the peak construction period, the Construction-Generated Traffic Volumes were added to the 2002 Future Traffic Volumes (2002 Peak Construction Traffic Volumes). The 2002 Peak Construction Traffic Volumes are illustrated in Figure 4.10-10.

Capacity analyses were conducted for the Study Locations for the 2002 Peak Construction Traffic Volumes. Table 4.10-7 illustrates the results of these analyses:

TABLE 4.10-7:

LEVEL OF SERVICE SUMMARY

2002 PEAK CONSTRUCTION TRAFFIC VOLUMES

Intersection	Approach	LOS	A.M. Delay	V/C	LOS	P.M. Delay	V/C
Steinway Street at Berrian Boulevard	Eastbound Overall	a	2.8	--	a	2.9	--
	Westbound Overall	a	4.8	--	a	4.8	--
	Overall	a	2.0	--	a	2.1	--
Steinway Street at 19th Avenue	Eastbound Overall	a	1.8	0.16	a	2.6	0.25
	Westbound Overall	a	4.9	0.42	a	2.5	0.24
	Northbound Overall	a	3.7	0.34	a	3.3	0.32
	Southbound Overall	a	2.6	0.25	a	2.2	0.21
	Overall	a	3.8	--	a	2.7	--
Steinway Street at 20th Avenue	Eastbound Overall	A	5.0	0.283	B	6.5	0.518
	Westbound Overall	B	6.5	0.501	B	6.0	0.429
	Northbound Overall	D	25.2	0.695	C	24.9	0.691
	Southbound Overall	C	20.2	0.278	C	20.6	0.413
	Overall	B	12.4	0.559	B	12.3	0.570
Steinway Street at 21st Avenue	Eastbound Overall	C	19.0	0.618	C	20.6	0.700
	Westbound Overall	C	18.0	0.547	C	16.9	0.453
	Northbound Overall	A	4.4	0.341	A	4.5	0.363
	Southbound Overall	A	4.3	0.303	A	4.4	0.327
	Overall	B	11.6	0.443	B	11.9	0.487

TABLE 4.10-7: (Cont.) LEVEL OF SERVICE SUMMARY 2002 PEAK CONSTRUCTION TRAFFIC VOLUMES							
Intersection	**Approach**	**LOS**	**A.M. Delay**	**V/C**	**LOS**	**P.M. Delay**	**V/C**
Steinway Street at 23rd Avenue	Eastbound Overall	C	23.8	0.759	D	28.5	0.846
	Westbound Overall	D	25.6	0.802	C	21.7	0.687
	Northbound Overall	A	4.4	0.504	B	9.3	0.804
	Southbound Overall	A	4.2	0.478	B	5.1	0.592
	Overall	B	14.0	0.607	B	14.6	0.818

Note: Upper case letters indicate signalized intersections. Lower case letters indicate unsignalized intersections.
LOS = Level of Service
V/C = The ratio of demand flow rate to capacity

As indicated in the above table, all of the intersections will continue to operate at acceptable Levels of Service (A-D) under the 2002 Peak Construction Traffic Volumes.

4.10.4.4 2004 Future Traffic Volumes

As set forth in Section 3.0 of this Application, the first full year of Project operations is estimated to be 2004. To project traffic volumes for 2004, a total growth factor of 7.5 percent was applied to the Existing Traffic Volumes (2004 Future Traffic Volumes). The 2004 Future Traffic Volumes are illustrated on Figure 4.10-11.

The existing fuel oil storage and distribution terminal December 1999 site - generated trips, which were not removed from baseline traffic conditions for this impact analysis, together with the conservative 7.5 percent growth factor between 1999 and 2004 will more than account for permanent Project traffic. Specifically, December 1999 Site traffic consisted of 30 trips by Site employees and 214 trips by fuel oil trucks. As set forth in Section 3.0, during Project operations, traffic is projected to be 60 employee trips and a maximum of 20 delivery trips each day. Thus, trip generation for the Project is projected to be far less than that of the existing fuel oil storage and distribution terminal.

Even given all of these conservative assumptions, traffic conditions do not change significantly on Steinway Street. Moreover, if the December 1999 trips were replaced with anticipated permanent Project trip generation, traffic in 2004 would be expected to operate at least as well as current conditions, and possibly better. Capacity analyses for the 2004 Future Traffic Volumes were conducted for the Study Locations. Table 4.10-8 illustrates the results of these analyses:

TABLE 4.10-8:
LEVEL OF SERVICE SUMMARY
2004 FUTURE VOLUMES

Intersection	Approach	LOS	A.M. Delay	V/C	LOS	P.M. Delay	V/C
Steinway Street at Berrian Boulevard	Eastbound Overall	a	2.7	--	a	2.9	--
	Westbound Overall	a	4.2	--	a	4.0	--
	Overall	a	2.0	--	a	2.3	--
Steinway Street at 19th Avenue	Eastbound Overall	a	1.7	0.14	a	2.2	0.21
	Westbound Overall	a	4.2	0.37	a	2.2	0.21
	Northbound Overall	a	3.2	0.31	a	2.9	0.28
	Southbound Overall	a	2.1	0.19	a	1.7	0.15
	Overall	a	3.3	--	a	2.3	--
Steinway Street at 20th Avenue	Eastbound Overall	B	5.1	0.293	B	6.7	0.534
	Westbound Overall	B	6.7	0.521	B	6.2	0.452
	Northbound Overall	C	22.7	0.588	C	22.7	0.591
	Southbound Overall	C	19.5	0.292	C	19.6	0.303
	Overall	B	11.0	0.541	B	11.0	0.551

TABLE 4.10-8: (Cont.) LEVEL OF SERVICE SUMMARY 2004 FUTURE VOLUMES							
Intersection	**Approach**	**LOS**	**A.M. Delay**	**V/C**	**LOS**	**P.M. Delay**	**V/C**
Steinway Street at 21st Avenue	Eastbound Overall	C	19.3	0.638	C	21.2	0.722
	Westbound Overall	C	18.2	0.565	C	17.0	0.463
	Northbound Overall	A	4.3	0.298	A	4.3	0.311
	Southbound Overall	A	4.1	0.264	A	4.2	0.281
	Overall	B	12.2	0.423	B	12.7	0.463
Steinway Street at 23rd Avenue	Eastbound Overall	C	24.8	0.784	D	30.8	0.875
	Westbound Overall	D	27.0	0.827	C	22.2	0.707
	Northbound Overall	A	4.2	0.460	B	7.6	0.746
	Southbound Overall	A	4.1	0.447	A	4.8	0.554
	Overall	B	15.0	0.587	C	15.1	0.791

Note: Upper case letters indicate signalized intersections. Lower case letters indicate unsignalized intersections.

LOS = Level of Service

V/C = The ratio of demand flow rate to capacity

As indicated in the above table, all of the intersections will continue to operate at acceptable levels of service (A-D) with the 2004 Future Traffic Volumes.

4.10.4.5 Comparison of Analyses

Table 4.10-9 compares the 1999 Existing Condition, 2002 Projected Traffic Volumes, 2002 Peak Construction Condition and 2004 Future Traffic Condition Project analyses:

TABLE 4.10-9:

OVERALL LEVEL OF SERVICE COMPARISON

Intersection	LOS (Delay)							
	1999 Existing Condition		2002 Projected Traffic Volumes		2002 Peak Construction Condition		2004 Future Traffic Condition	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Berrian Boulevard at Steinway Street	a	a	a	a	a	a	a	a
	2.0	2.2	2.0	2.3	2.0	2.1	2.0	2.3
Steinway Street at 19th Avenue	a	a	a	a	a	a	a	a
	3.0	2.2	3.2	2.3	3.8	2.7	3.3	2.3
Steinway Street at 20th Avenue	B	B	B	B	B	B	B	B
	10.7	10.6	10.9	10.8	12.4	12.3	11.0	11.0
Steinway Street at 21st Avenue	B	B	B	B	B	B	B	B
	11.8	12.1	12.1	12.5	11.6	11.9	12.2	12.7
Steinway Street at 23rd Avenue	B	B	B	B	B	B	B	C
	13.6	13.1	14.4	14.1	14.0	14.6	15.0	15.1

Note: Upper case letters indicate signalized intersections. Lower case letters indicate unsignalized intersections.

LOS = Level of Service

V/C = The ratio of demand flow rate to capacity

As shown, there are no Level of Service (LOS) changes except for the 23rd Avenue and Steinway Street Study Location under the 2004 Future Traffic Volumes. However, the LOS change from a B to a C with a minimal increase in delay from the 1999 Existing Condition to the 2004 Future Traffic Volumes is due to the extremely conservative projected general background growth. Further, the 2004 Future Traffic Volumes continue to include the traffic previously associated with the operation of the decommissioned fuel oil storage and distribution terminal. However, as established herein, far less traffic will be generated from Project operations. Thus, roadway traffic conditions are expected measurably to improve due to the reduced traffic that will be associated with the Project.

4.10.5 Barge Deliveries

To the greatest extent possible, barges will be used to transport materials to the Site for construction. In addition, barges also will remain tied along the Site shore abutments for use as laydown during the construction period. It is anticipated that there may be up to three barge deliveries in a day for construction. During the majority of the construction period, however, barge traffic will average at most 3 barges per week, which is less than the average number of fuel oil shipments currently made to the Site. Use of barges for deliveries and laydown will reduce the volume of truck traffic associated with construction deliveries and reduce off site laydown requirements.

Industrial barge traffic is common on the East River in the Site area. The U.S. Coast Guard regulates barge traffic and safety on the East River. An average of up to three barges per day could deliver materials to the Site during Project construction. This condition is expected to occur infrequently. Because barge deliveries will be at the same level as, or less than, current barge deliveries to the Site, no significant adverse effects will result from Project construction.

During Project operations, very little barge traffic will occur. A small number of barges annually will be used for deliveries to the Site. This level is far less than currently occurs at the Site, the Con Edison Complex or the adjacent Bowery Bay Water Pollution Control Plant.

4.10.6 Con Edison Natural Gas Interconnection Route

A small portion (approximately 1,500 feet) of Steinway Place will experience partial traffic disruption for approximately two months associated with Con Edison's installation of the gas line for Project operations. The gas line will extend from 20th Avenue under Steinway Place to the Site at Berrian Boulevard. Current traffic on this portion of Steinway Place is light and is primarily associated with industrial deliveries along the street and employees traveling to these businesses. Local impacts to surrounding businesses will be temporary and are not expected to last longer than approximately one or two days at any given location.

A similar gas line was installed extending to the Steinway & Sons piano manufacturing factory in a two to three week time frame in 1996. Con Edison employees and local police used signs to direct traffic around the gas line trench as it was excavated. It is expected that the same traffic management activities will be followed by Con Edison for this gas line in coordination with local police. Due to the short duration of this activity, low traffic volumes on Steinway Place, and the expected use of localized traffic management, impacts -are not expected to be significant.

4.10.7 Electric Transmission Interconnection Route

This route is entirely on private property adjacent to the Project Site. Access to this route primarily will be by barge with limited truck deliveries. Truck deliveries are expected to be few in number and to occur over, at most, a four month period. Thus, this level of delivery traffic will not have a significant impact on local roadways.

4.10.8 Construction Support Areas

As set forth more fully in Section 3.11 of this Application, where possible, materials will be delivered on a just in time basis and stored in on site laydown areas. In addition, to the extent needed for Project construction, designated off site construction support areas will be chosen in areas where industrial delivery traffic to and from these locations can be accommodated with little disruption to local conditions.

Deliveries of materials to the construction support areas will be scheduled to allow for the most efficient use of these areas. Primary laydown usage is expected to occur for approximately 2 years. Daily traffic at the construction laydown areas is expected to be light with no more than 1 to 2 trucks per hour and a total of 30 trucks per week during the highest delivery truck activity period. With these low volumes and the selection of areas that are able to handle industrial traffic, impacts at the affected areas are not expected to be significant.

Construction support areas also will be used for off site parking for construction workers. Sites will be chosen in industrial or commercial areas. Their usage will vary by the size of each area. Morning traffic impacts associated with the use of off site parking areas are expected to take place prior to the morning peak road volume period. Afternoon impacts could occur at or near the afternoon peak road volume period. However, because sites will be chosen in industrial or commercial areas and will be used for a temporary period of time, traffic impacts associated with the use of these sites for off site parking are not expected to be significant. Final details of traffic management in any areas that are finally selected will be provided in a Construction Management Plan prior to commencement of construction.

4.10.9 Impacts on LaGuardia Airport

LaGuardia Airport begins approximately one mile from the Site. Thus, Project activities will not occur in the vicinity of LaGuardia Airport. Moreover, as set forth herein, Steinway Street primarily will be used to access the Project Site. Steinway Street is not a direct access route to the airport. Thus, the Project is not expected to have an adverse impact on the roadways that access this airport or any other aspect of airport operations.

4.11 Socioeconomic Conditions

4.11 Socioeconomic Conditions

4.11.1 Introduction

In accordance with PSL Sections 164(1)(a) and (c), Sections 1001.1(a) and 1001.3 of the Article X Regulations and Stipulation No. 7, this section (i) sets forth the existing socioeconomic conditions in a defined study area, including employment characteristics, property tax structure, and demographics; and (ii) analyzes the potential impacts associated with Project construction and operations.

In accordance with Stipulation No. 7, the socioeconomic study area encompasses the area within one mile of the Project Site (Socioeconomic Study Area) (See Figure 4.11-1.) The Socioeconomic Study Area encompasses fourteen census tracts in their entirety and is approximately contiguous with the New York State Department of Labor's statistical employment data for zip code 11105, which surrounds the Project Site. Direct and indirect impacts of public and/or private spending have been estimated by utilizing the Regional Input-Output Modeling System (RIMS II), prepared by the U.S. Department of Commerce, Bureau of Economic Analysis to reflect economic conditions in New York City and New York State.

As described more fully below, the Project will provide socioeconomic benefits to the Queens area and to the City and State of New York. Project construction will result in a major infusion of capital locally and in the State. Specifically, it is anticipated that the Project will generate construction jobs and sales tax revenue and provide stimulus to the local economy during the projected 33 month Project construction period. It also is expected that the Project will invest approximately $600 million in capital expenditures on Site infrastructure, power plant equipment and supplies. Approximately half of these materials are expected to be purchased in the State of New York.

Following the completion of construction, Project operations will continue to bring socioeconomic benefits to the region. There will be a net increase of approximately 15 jobs at this Site due to the Project. Goods and services needed to support Project operations primarily will be purchased locally and regionally. Moreover, increased long-term tax revenues to the community will result from the Project.

4.11.2 Laws, Policies and Regulations

The following laws, policies and regulations pertain to the socioeconomics analysis for the Project:

- New York City Administrative Code
- New York City Zoning Resolution
- New York City Rules and Regulations
- New York State Tax Code

4.11.3 Existing Conditions

The following is a discussion of existing socioeconomic conditions in the one-mile Socioeconomic Study Area. As shown in Figure 4.11-1, the Con Edison natural gas interconnection route and the electric transmission interconnection route are contained within the Socioeconomic Study Area. Because they, along with potential construction support areas, are not separate social or economic units, they are not discussed separately in this portion of the analysis. Potential impacts associated with the construction of these routes are discussed in Section 4.11.4.

4.11.3.1 Economic Conditions

Employment Characteristics

As shown in Table 4.11-1 below, total private employment in the Socioeconomic Study Area during 1998 was estimated at 5,705, which included jobs in construction, manufacturing, transportation, wholesale and retail trade, finance, insurance and real estate, service, and other industries. Overall, the Socioeconomic Study Area's current employment characteristics demonstrate a strong base of wholesale trade and construction-related employment.

TABLE 4.11-1:

1998 PRIVATE EMPLOYMENT BY INDUSTRY

Industry	Socioeconomic Study Area				Queens			
	Firms	Workers	Percentage of Firms	Percentage of Workers	Firms	Workers	Percentage of Firms	Percentage of Workers
Construction	148	1,486	21.5	26.0	3,234	33,716	9.2	7.7
Manufacturing	29	316	4.2	5.5	1,869	50,633	5.3	11.6
Transportation and Utilities	47	505	6.8	8.9	2,254	70,600	6.4	16.2
Wholesale Trade	44	1,205	6.4	21.1	3,028	26,838	8.6	6.1
Retail Trade	159	877	23.1	15.4	7,985	72,016	22.7	16.5
F/I/RE*	65	303	9.5	5.3	3,915	25,126	11.1	5.7
Services	152	950	22.1	16.7	11,222	154,327	32.0	35.3
Other	43	63	6.4	1.1	1,616	3,720	4.7	0.9
TOTAL	687	5,705	100.0	100.0	35,123	436,976	100.0	100.0

Notes: * Finance, insurance, and real estate

Source: New York State Department of Labor, Bureau of Research and Statistics

Specifically, the 148 construction-related businesses in the Socioeconomic Study Area (approximately 21 % of all businesses in this area) employ the greatest number of workers—1,486 or approximately 26 % of all jobs. The 44 wholesale trade firms in the Socioeconomic Study Area (approximately 6.4 % of all businesses in the Study Area) employ the second greatest number of workers, with 1,205 workers or 21 % of all jobs. The 152 service businesses and 159 retail firms employ 950 and 877 workers, respectively (approximately 17 and 15 % of all jobs in the Socioeconomic Study Area). Transportation and utility businesses in the study area total 47 firms and 505 employees, or approximately 7 % of all firms and 9 % of workers. The remainder of businesses in the Socioeconomic Study Area (137 firms in manufacturing, finance, insurance, real estate, and other industries) account for 682 workers or approximately 12 % of all employment in the Socioeconomic Study Area.

Compared to Queens as a whole, the Socioeconomic Study Area has a considerably higher proportion of employees in the construction sector, with 26 % compared to the borough-wide total of 7.7 %. Jobs in wholesale trade industries also are significantly higher, with 21 % compared to 6.1 % for Queens as a whole.

The following industries in the Socioeconomic Study Area employ a lower proportion of workers than the borough: services (16.7 % versus 35.3 %), manufacturing (5.5 % versus 11.6 %), and transportation and utilities (8.9 % versus 16.2 %). Employment characteristics for the Socioeconomic Study Area and Queens as a whole are similar in the areas of retail trade, finance, insurance and real estate, and other businesses.

Employment Trends

Table 4.11-2 shows types of employment for the Socioeconomic Study Area and Queens in both 1990 and 1998.

Overall, as shown in Table 4.11-2, estimated employment in the Socioeconomic Study Area decreased by approximately 1,000 jobs, or 15 %, between 1990 and 1998. Construction employment, while remaining the predominant employment sector, declined by approximately 11 % between 1990 and 1998. These losses partially were offset by increased employment in the service sector (which grew from 539 jobs in 1990 to 950 in 1998) and transportation and utilities (which grew from 448 to 505 in the same period). Employment in finance, insurance and real estate also experienced growth, with an increase of 32 jobs or almost 12 %.

TABLE 4.11-2: PRIVATE EMPLOYMENT TRENDS BY INDUSTRY, 1990 AND 1998								
Industry	**1990 Study Area**		**1998 Study Area**		**1990 Queens**		**1998 Queens**	
	Workers	**Percent**	**Workers**	**Percent**	**Workers**	**Percent**	**Workers**	**Percent**
Construction	1,673	24.9	1,486	26.0	35,984	8.4	33,716	7.7
Manufacturing	933	13.9	316	5.5	61,571	14.4	50,633	11.6
Transportation and Utilities	448	6.7	505	8.9	74,487	17.4	70,600	16.2
Wholesale Trade	1,270	18.9	1,205	21.1	29,528	6.9	26,838	6.1
Retail Trade	1,570	23.3	877	15.4	73,433	17.1	72,016	16.5
FIRE*	271	4.0	303	5.3	23,789	5.5	25,126	5.7
Services	539	8.0	950	16.7	127,981	29.8	154,327	35.3
Other	27	0.3	63	1.1	2,077	0.5	3,720	0.9
TOTAL	6,731	100.0	5,705	100.0	428,850	100.0	436,976	100.0

Note: * Finance, insurance, and real estate

Source: New York State Department of Labor, Bureau of Research and Statistics

New York City Property Tax

Real estate taxes are collected on all real property located in New York City, except property specifically exempted by law. The New York City Department of Finance assigns each piece of property a tax classification (identified by tax block and lot number). These tax classifications are shown in Table 4.11-3 below. The Project Site is identified as Queens block 814, lot 27 and currently is categorized by use as Class 4.

TABLE 4.11-3:

NEW YORK CITY REAL PROPERTY TAX CLASSIFICATIONS

Tax Class	Description
Class 1	Includes: • All primarily residential one-, two-and three-family homes; • Residential condominiums of three dwelling units or less which were classified as Class 1 property on a previous assessment roll; • Residential condominiums of three stories or less that originally were built as condominiums; • Single family homes on cooperatively owned land (bungalows); • Certain vacant land, zoned for residential use or adjoining improved Class 1 property (except vacant land in Manhattan, south of 110th Street).
Class 2	Includes all other primarily residential properties that are not in Class 1, including cooperatives, rental buildings and all other residential condominiums. This classification does not include hotels, motels or other similar commercial property.
Class 3	Includes all real property of utility corporations and certain telephone and telegraph equipment, excluding land and certain buildings.
Class 4	Includes all other properties, such as stores, warehouses, hotels and vacant land not classified as Class 1, Class 2 or Class 3.

Source: "Taxpayer Guide to Real Estate Taxes and Related Charges," City of New York Department of Finance, 1998.

The City's property tax rates are based on these classifications and range from \$8.282 to \$11.046 per \$100 of assessed value. The Site's total tax rate is \$10.164 per \$100 of assessed value as a Class 4 property (see Table 4.11-4). The Project Site received a partial exemption in 1999 of \$270,000. Total annual taxes assessed on the Project Site were approximately \$500,000 in 1999 based on an assessed value of 5.35 million. Overall, property tax revenues for New York City in fiscal year 1999 were approximately \$7.57 billion and are expected to rise to approximately \$7.9 billion in fiscal year 2000.

TABLE 4.11-4:

NEW YORK CITY REAL PROPERTY TAX RATES*

Tax Class	General Purpose Tax	School Purpose Tax	Total Tax Rate
Class 1	\$4.696	\$6.153	\$10.849
Class 2	\$4.733	\$6.313	\$11.046
Class 3	Does not apply		\$8.282
Class 4	\$4.355	\$5.809	\$10.164

Note: * Tax rate is per \$100 of assessed value.

Source: New York City Department of Finance, 1999.

4.11.3.2 Demographics

The following is a description of demographics in the Socioeconomic Study Area, based on an analysis of trends and indicators, including population, households, income, and poverty status. This analysis is summarized in tables contained in Appendix 4.11. The Socioeconomic Study Area encompasses 14 census tracts in their entirety. The Project Site is located in Census Tract 107, the largest of the study area tracts. The East River, Hazen Street and 20th Avenue (see Figure 4.11-1) bound Census Tract 107.

Population

As shown in Table A-1 (Appendix 4.11), the residential population in the Socioeconomic Study Area is currently approximately 38,800, which represents almost 2 % of the borough-wide population. In contrast to the borough, population in the Socioeconomic Study Area decreased between 1980 and 1990, but like Queens as a whole has increased since 1990. Between 1990 and 1999, the Socioeconomic Study Area experienced an increase in population of 1 % while the borough saw an increase in population of 2.8 %. The Socioeconomic Study Area's relatively stable population, particularly when compared to the borough's growth, is consistent with a largely developed neighborhood. See Appendix 4.11 Table A-1.

Income and Poverty Status

An important indicator of socioeconomic conditions is median household income. As shown in Table A-4 (Appendix 4.11), the Socioeconomic Study Area's median household income is lower than the borough's for each analysis year. However, the Socioeconomic Study Area income grew faster between 1979 and 1989 and declined less between 1989 and 1999 than the borough as a whole. In 1979, the Socioeconomic Study Area income was 13% less than the borough's overall average; by 1989, it rose to only 8% less than the borough's overall average, and remains at that level by 1999 estimates.

Overall, the median household income for the Socioeconomic Study Area ranges between $23,600 and $51,000, although most fall between $32,000 and $46,000. Approximately 15 % of the population received income support in 1998, approximately the same as the Borough of Queens overall and below the City-wide level of approximately 22 %.[1]

[1] Source: New York City Department of City Planning

Residential Construction

Table A-5 (Appendix 4.11) shows the breakdown of residential units in the Socioeconomic Study Area and Queens by date of construction. In both the Socioeconomic Study Area and the borough, the largest share of housing units were built before 1940, approximately 54 % and 35 %, respectively.

Between 1940 and 1950, approximately 22.4 % of the Socioeconomic Study Area's housing was built, compared to 19.5 % for the borough as a whole. Approximately 12.0 of the Socioeconomic Study Area's housing was constructed between 1950 and 1960, less than the 20.7 % for all of Queens. The periods between 1960 and 1970 and between 1970 and 1980 show continued contrast between the Socioeconomic Study Area and the borough as a whole; 6.3 % of the Socioeconomic Study Area's units were built between 1960 and 1970 and 15.5 % of the borough's housing units were built during the same time, while the period between 1970 and 1980 represents 2.6 % of the Socioeconomic Study Area's housing units and 5.6 of the borough's. The percentage of units constructed during the 1980-1990 period is relatively low for both the Socioeconomic Study Area (1.4 %) and the borough as a whole (4 %). Overall, therefore, the Socioeconomic Study Area has a significant proportion of older housing stock, with more than 50 % constructed before 1940 and more than 75 % built before 1950.

4.11.3.3 Proposed Large Construction Projects

Proposals to construct two additional large projects within the Socioeconomic Study Area publicly have been announced. NYPA has proposed to construct the 500 MW expansion to the Poletti station approximately one-half mile from the Site. If NYPA files an Article X application in the immediate future and the proposed Poletti station expansion subsequently is granted a Certificate by the Siting Board, its construction can be expected to take place before early 2004.

A proposal also has been announced to extend the Metropolitan Transit Authority's "N" Rapid Transit Line from its termination near the intersection of Ditmars Boulevard and 31st Street to LaGuardia Airport. Current plans for the extension, if approved, would continue the elevated portion of the "N" line north along 31^{st} Street to the intersection of 31^{st} Street and 20^{th} Avenue. From there, the "N" line would turn to the east and proceed underground below 20^{th} Avenue toward LaGuardia Airport. No projected construction schedule is available.

4.11.4 Potential Impacts and Proposed Mitigation

The Project will result in substantial economic benefits, both during its construction and during its ongoing operation.

4.11.4.1 Project Construction

The principal model used to estimate the effect of Project construction on the City's economy was the Regional Input-Output Modeling System (RIMS II), developed by the U.S. Department of Commerce, Bureau of Economic Analysis. The model contains data for New York City on more than 470 economic sectors and shows how the sectors affect each other as a result of a change in the quantity of a product or service. A similar RIMS II model for New York State, also developed by the U.S. Department of Commerce, was used to demonstrate the Project's effects on the State economy. The models have been adjusted to reflect the most recent changes in the New York metropolitan area price level. Using these models and the specific characteristics of the Project, the total economic benefits associated with the Project were projected for New York City and New York State.

4.11.4.1.1 Value of Construction

The Project will be financed by the private investment of funds. The anticipated private investment for construction of the Project is expected to be approximately \$600 million (in 2000 dollars). For purposes of this analysis, the assumption was used that approximately half of this amount, or \$300 million, will be invested in the State, which reflects the cost of physical improvements to the Site as well as off-site improvements such as the electric transmission and natural gas interconnections. Other values (such as financing, the value of the land, marketing, etc.) which are not directly part of the expenditures for construction, were not included.

4.11.4.1.2 Employment

The $300 million represents direct expenditures during the construction period. As a result of the direct expenditures, direct employment based on the RIMS II model is estimated at approximately 1,758 person-years of employment.[2]

In addition to direct employment, construction expenditures also will result in indirect and generated employment at business establishments that will provide goods and services to the contractors. Based on the model's economic multipliers for New York City industrial sectors, the Project will generate an additional 935 person-years of employment within New York City, bringing the total direct and generated jobs in New York City from the construction of the Project to a total of 2,693 person-years. (See Table 4.11-5).

TABLE 4.11-5:
ESTIMATED EMPLOYMENT AND FISCAL BENEFITS FROM CONSTRUCTION OF THE PROJECT

	Total New York City and New York State	New York City Share
Employment (Person-years)*		
Direct (Construction)	1,758	1,758
Indirect (Secondary and Induced)	1,654	935
Total	3,412	2,693
Wages and Salaries (Millions of constant 2000 dollars)		
Direct (Construction)	$97.84	$97.84
Indirect (Secondary and Induced)	$85.50	$50.20
Total	$183.34	$148.04

[2] A person-year is the equivalent of one employee working full-time for one year.

TABLE 4.11-5: EMPLOYMENT AND FISCAL BENEFITS FROM CONSTRUCTION OF THE PROPOSED PROJECT		
	Total New York City and New York State	**New York City Share**
Total Economic Output or Demand** (Millions of constant 2000 dollars)	$566.0	$449.5
	Amount	
Tax Revenues, Exclusive of Real Property Taxes* (Constant 2000 dollars)		
New York City Taxes	$11,991,500	
MTA Taxes	$736,700	
New York State Taxes	$19,517,900	
Total	$32,246,100	

Notes:

* A person-year is the equivalent of one person working full-time for a year.

** The economic output or total effect on the local economy derived from direct construction spending, including payroll and non-payroll expenditures.

*** Includes sales tax, personal income taxes, corporate and business taxes, and numerous other taxes on construction and secondary expenditures.

Source: The characteristics and construction cost of the development; the Regional Input-Output Modeling System (RIMS II), U.S. Department of Commerce, Bureau of Economic Analysis; and the tax rates by applicable jurisdiction.

In the larger New York State economy, the model estimates that the Project will generate 1,654 person-years of indirect employment. Thus, the total direct and generated jobs in New York City and New York State from construction of the Project is estimated at 3,412 person-years of employment.

Direct wages and salaries during the construction period are estimated at approximately $97.84 million. Direct and generated wages and salaries resulting in New York City from construction of the Project are estimated at approximately $148.04 million. Taking New York City together with the broader New York State economy, total direct and generated wages and salaries from construction of the Project are estimated at approximately $183.35 million.

4.11.4.1.3 Fiscal Impacts

Construction activity also will generate tax revenues. As described, total construction expenditures associated with the Project in New York State (excluding financing and similar costs) are estimated at approximately $300 million. Based on the U.S. Department of Commerce Bureau of Economic Analysis' RIMS II model for New York City and New York State, the total economic activity including indirect expenditures (those generated by the direct expenditures) and tax revenues that will result from construction of the Project is estimated at approximately $566 million in New York State, of which $450 million is projected to occur in New York City. (See Table 4.11-5.)

Specifically, the construction activity would produce associated sales tax revenues for New York City, the Metropolitan Transportation Authority (MTA) and New York State. Based on aggregate data on economic activity and tax receipts for New York City and New York State associated with development projects, it is estimated that City tax revenues resulting from construction of this type of project would equal approximately 2.67 % of the Project's total economic activity in New York City. New York State and the MTA (which collects a 0.25 % sales tax and tax surcharges on business and utilities taxes within the City and the MTA 12-county region) would receive revenues equal to approximately 3.58 % of the Project's total economic activity in the State. In total, the construction of the Project is estimated to generate approximately $32.25 million in tax revenues for New York City, MTA, and New York State. Of these tax revenues, the largest portion will come from sales tax, personal income taxes, and corporate, business, and related taxes on direct and induced economic activity. New York State and MTA would receive approximately $20.25 million (or 62.81 %) of the tax revenues generated by construction of the Project and New York City would receive approximately $11.99 million (or 37.9 %) of these tax revenues. In addition, New York City will receive real property-related revenues (real estate payments and any applicable mortgage recording fees, etc.).

4.11.4.1.4 Demand for Municipal Services

Due to measures that will be implemented by Astoria Energy throughout the construction phase, the construction of the Project is not anticipated to require a significant allocation of police, fire, emergency or other services. Specifically, Astoria Energy will utilize the existing fire suppression system during construction which includes hydrants, a pump house and foam suppression equipment. With the presence of this fire suppression system, little, if any, impact on local fire response services is expected from Project construction.[3] In addition, Astoria Energy will keep the security fence along the street in place and will maintain onsite security. As a result, Project construction is expected to place little, if any, fiscal impact on local police services. Finally, construction personnel will be required to undergo health and safety training prior to commencement of construction. Due to this safety training and the use of experienced local construction crews, little, if any, demand on emergency medical services is expected from Project construction.

4.11.4.2 Project Operations

4.11.4.2.1 Employment

The Project will employ approximately 30 full-time equivalent employees with annual wages and benefits of approximately $3.5 million. Employee positions are set forth in Table 4.11-6. Additional expenditures for routine maintenance and operations expenses (supplies, parts, cleanings, etc.) will total approximately $20 million annually, much of which is expected to be spent in New York City and/or State. These direct operating expenditures (for employment, wages and salaries, and annual operation and maintenance) have been used to estimate the secondary benefits of the Project to the City and State economies, based on the U.S. Department of Commerce Bureau of Economic Analysis' RIMS II model.

[3] October 26, 1999 meeting with the New York City Fire Department. <u>See</u> Appendix 2.0.

Based on this model, the Project will generate 51 person-years of employment within New York City, bringing the total direct and generated jobs in New York City associated with Project operations to 81 person-years of employment. In the larger New York State economy, the model estimates that the Project will generate 72 person-years of indirect employment. Thus, the total direct and generated jobs in New York City and New York State from operation of the Project is estimated at 102 person-years of employment. (See Table 4.11-7.)

TABLE 4.11-6

ESTIMATED PROJECT OPERATIONS EMPLOYMENT

Labor Category	Number of Personnel	Workshift	Additional Duties
Plant Operators	18	12 hour rotating shifts-4-5 operators per shift	
Operations Manager	1	M-F 8 hours per day	On call at all times
Maintenance Technicians-Mechanical and Electrical	5	M-F 8 hours per day	1 Mechanical technician and 1 electrical technician on call at all times
Maintenance Manager	1	M-F 8 hours per day	On call at all times
Administrative Personnel	4	M-F 8 hours per day	
Plant Manager	1	M-F 8 hours per day	On call for emergencies at all times

TABLE 4.11-7: ESTIMATED EMPLOYMENT AND ECONOMIC ACTIVITY FROM OPERATION OF THE PROJECT		
	Total New York City and State	**New York City Share**
Permanent Employment (Full-Time Equivalent Jobs)		
Direct (On-Site)	30	30
Indirect (Secondary and Induced)	72	51
Total	102	81
Wages and Salaries (Millions of constant 2000 dollars)		
Direct (On-Site)	$3.50	$3.50
Indirect (Secondary and Induced)	$3.82	$2.81
Total	$7.32	$6.31
Total Economic Activity* (Millions of constant 2000 dollars)		
Direct (On-Site)	$30.00	$30.00
Indirect (Secondary and Induced)	$14.42	$9.35
Total	$44.42	$39.35

Note:

* As measured by the RIMS II model; the figures are measures of the estimated output, or demand, for City and State industries; as such, they express the dollar amounts of direct, indirect, and total effect on the City and State economies.

Source:

The operating characteristics of the energy facility; and the Regional Input-Output Modeling System (RIMS II), U.S. Department of Commerce, Bureau of Economic Analysis.

The direct wages and salaries during Project operations are estimated at approximately \$3.5 million annually. Total direct and generated wages and salaries resulting in New York City from operation of the Project are estimated at approximately \$6.31 million. In the broader New York State economy, total direct and generated wages and salaries from operation of the Project are estimated at approximately \$7.32 million.

Based on the RIMS II model, the total economic activity including indirect expenditures (those generated by the direct expenditures) and non-real estate tax revenues that would result from operation of the Project is estimated at \$44.4 million in New York State, of which \$39.35 million would occur in New York City (see Table 4.11-7).

4.11.4.2.2 Real Estate Taxes

In addition to total economic activity as defined above, real estate taxes from the Project Site are expected to increase due to an increased tax basis from the Project compared with the Site's current tax assessment.

4.11.4.2.3 Demand for Municipal Services

Project operations also are not anticipated to require a significant allocation of local police, fire, emergency and other services. The Project will include an on site fire detection and suppression system. (See Project Description, Section 3.8.)[4] Thus, significant impacts on local fire control resources are not anticipated from permanent operation of the Project. In addition, Astoria Energy will continue to maintain the security fence along the street during Project operations. Thus, significant impacts on local police services also are not anticipated.

All Project employees will undergo health and safety training prior to employment. This training will include identification and proper use of on site safety equipment and first aid. Thus, Project operations are not expected to have a significant impact on local emergency services.

[4] October 26, 1999 meeting with the New York City Fire Department. See Appendix 2.0.

4.11.5 Environmental Justice

In 1994, President Clinton signed Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." The order required the U.S. Environmental Protection Agency (EPA), all other federal agencies, and all state agencies receiving federal funds, to develop Environmental Justice strategies to identify and address disproportionately high human health and environmental effects of their programs, policies, and activities on minority and low-income populations. In 1998, the EPA enacted "Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses" (Guidance) to assist federal agencies in their Environmental Justice evaluations. This document now serves as a framework used by many other federal and state agencies for initial Environmental Justice screening evaluations.

The Guidance establishes a two-step process for evaluating the potential for Environmental Justice impacts. The two-step process considers:

- Whether the community potentially affected by a project includes enough of a minority and/or low-income population to trigger an Environmental Justice concern.
- Whether environmental impacts are likely to fall disproportionately on identified minority and/or low-income communities.

The Guidance provides a numeric measure to determine the presence of an affected minority population. An affected minority population exists if it represents 50 or more of the affected area's general population. The Guidance does not define the term "affected area", but the Guidance recommends that the term should be interpreted as that area on which the proposed project will or may have an effect.

In the case of this Project, as described at the beginning of this Section, the Socioeconomic Study Area encompasses the area within one mile of the Project Site. This area encompasses 14 census tracts in their entirety and is approximately contiguous with the New York State Department of

Labor's Statistical Employment Data for zip code 11105. An evaluation of the Guidance criteria for Environmental Justice in the Socioeconomic Study Area follows.

4.11.5.1 Demographics of the Study Area

Table A-6 of Appendix 4.11 provides demographic characteristics of the Study Area, including ethnic makeup. As shown, the total white, non-Hispanic population constitutes nearly 85 % of the study area. The next largest group is Hispanics at 6 %. Asians are next at 5 %, with the remaining groups, Native Americans and others, collectively constituting just under 5 % of the Study Area. Based on this data, we can conclude that, because white, non-Hispanics constitute nearly 85 % of the Socioeconomic Study Area, no minority group, either by itself or collectively, comprises 50 % or more of the Project's "affected area". Consequently, the Socioeconomic Study Area does not contain enough of a minority population to trigger the EPA's Environmental Justice criterion for the presence of a potentially affected minority population.

The Guidance does not give a percentage of the population as a threshold to determine the existence of a low-income population for Environmental Justice evaluation. Consequently, to assess low-income populations, the U.S. Census determination of poverty level was used, assuming the same 50 % criterion that is used to determine the presence of a potentially affected minority population. According to the 1990 U.S. Census Data: Poverty Level by Age, the poverty threshold for a U.S. family of four persons is $12,674 (U.S. Census, 1998). As shown on Table A-4 of Appendix 4.11, the median household income in the study in 1989 was $43,014 with most falling between $32,000 and $46,000. Further, the census data indicates that about 11 % of the Socioeconomic Study Area is at or below the poverty level. Based on this data, we can conclude that the Socioeconomic Study Area does not contain enough of a poverty level population to trigger the EPA's Environmental Justice criterion for the presence of a potentially affected low-income population.

4.11.5.2 Potential Environmental Impacts

The above evaluation determined that the Socioeconomic Study Area does not contain enough of a: (i) minority population to trigger EPA's Environmental Justice criterion for the presence of a potentially affected minority population, and (ii) low-income population to trigger the EPA's criterion for the presence of a potentially affected low-income population.

Further, the analysis contained in this Application has indicated that potential environmental impacts from the Project on the Socioeconomic Study Area will not be significant. As a result, we can conclude that the Socioeconomic Study Area's demographics do not support an Environmental Justice sensitivity claim and even those members of the Socioeconomic Study Area that are minorities or are below the poverty level will not be subject to significant environmental impacts from the Project.

Further considerations of air-quality related Environmental Justice, if and as required in support of the Project PSD Application, are included in the support documentation for the PSD Application

4.12 Electric Transmission Interconnection

4.12 Electric Transmission Interconnection

4.12.1 Introduction

In accordance with PSL Sections 164 (1) (a) and (c), Section 1001.1(c) of the Article X Regulations this section discusses the physical and transmission system impacts of the Project.

Astoria Energy is proposing certain improvements to electric transmission facilities owned by Con Edison that will serve to connect the Project with the New York State bulk transmission system. These improvements to the transmission facilities are the electric interconnection between the Project and the existing Con Edison 138 kV Astoria East Substation and modification of equipment at Con Edison substations in the vicinity of the Project.

With respect to potential impacts on the transmission system from the Project, Section 1001.1(c) of the Article X Regulations requires the Applicant to discuss "the benefits and detriments of the proposed facility on ancillary services and the electric transmission system, including impacts associated with reinforcements and new construction." In compliance with that provision, the Application includes thermal, voltage, short circuit and stability analyses to evaluate the impact of the interconnection of the Project on the Con Edison system, the New York Independent System Operator ("NYISO") system, the New England Independent System Operator ("NEISO") system and the Pennsylvania-Jersey-Maryland Independent System Operator ("PJMISO") system.

Astoria Energy engaged Power Technologies Inc., ("PTI") to perform the studies identified above. Draft reports prepared by PTI, entitled "System Impact Study for the Electrical Connection of the 1000 MW Astoria Energy Plant with the Con Edison Transmission System (Phase 1)" ("Phase 1 System Impact Study") and "System Impact Study for the Electrical Connection of the 1000 MW Astoria Energy Plant with the Con Edison Transmission System (Phase 2)" ("Phase 2 System Impact Study") are attached as Appendix 4.12. The Phase 1 and Phase 2 System Impact Studies show the physical and transmission system impacts of the Project.

4.12.1.1 *Summary of Results*

The Phase 1 and Phase 2 System Impact Studies include assessments of any impacts of the Project on the thermal, voltage, short circuit, and stability performance of the Con Edison system as well as any impacts on New York intra-pool and inter-pool transfer limits under summer and winter peak load conditions for year 2003. The studies were performed consistent with what may be required to meet a minimum interconnect standard and to determine impacts to the system with currently available information from projects that have filed an application under Article X of the New York Public Service Law. The Phase 1 study was completed analyzing the Project alone and without re-dispatching any other units in the Con Edison system. Initial analysis in the Phase 2 study indicates that with the additional projects considered, not re-dispatching in-city units on an economic basis would lead to study results that are inconsistent with how the system typically would be expected to operate. Therefore, a one for one re-dispatching of megawatts on an economic basis was used in the Phase 2 analytical studies.

The evaluation of thermal, voltage, and stability performance of the interconnected transmission system shows that the addition of the Project has de minimis adverse effect on the voltage stability, thermal limitations and stability performance of the Con Edison transmission system. In addition, the studies show that the Project has no significant impact on the thermal transfer capability of New York intra-pool and inter-pool interfaces. Furthermore, the Project would benefit ancillary services as it provides effective reactive and voltage support in the Queens load pocket.

The Project will increase fault current duties on several substations. Con Edison currently is working on studies and various alternative solutions for solving the fault current duty limitations that exist system wide as any new generator interconnections are considered. The Phase 1 System Impact Study report includes a breaker-by breaker analysis for the specific impacts of the Project alone. The substations referenced in the Phase 2 System Impact Study report will require a further breaker-by-breaker analysis before any upgrades or improvements can be proposed. Data from system wide changes being studied by Con Edison will be incorporated into future studies required before actual interconnection.

A relay-coordination study is not addressed in the System Impact Study report because such a study was not defined in the Con Edison scope of work. In addition, a relay-coordination study must include data from the transmission system at the time of interconnection. Astoria Energy is committed to completing a relay-coordination study in accordance with Con Edison requirements no later than one year prior to the projected commercial operation date of the Project.

The System Impact Study report also does not cover aspects of auto-reclosing, as this work was not requested by the Con Edison scope of work nor is auto-reclosing applicable to the Con Edison underground cable system. Auto-reclosing is used for overhead transmission lines, principally in the northern reaches of the Con Edison system.

4.12.2 Electric Interconnection

To interconnect the 1000 MW Project to the existing 138 kV Con Edison transmission system, Astoria Energy will construct a 138 kV switchyard on the Project Site and a 138 kV double circuit transmission line that will connect to the existing Con Edison 138 kV Astoria East substation.

To provide reliability, flexibility, and continuity of service, Astoria Energy has incorporated into the switchyard design a separate 138 kV bus configuration for each of the two 500 MW power blocks for the new, on site switchyard, with a normally open tie between the two buses. Each bus provides a connection for one steam turbine generator unit and two combustion turbine generator units through 18/138 kV step-up transformers and one outgoing transmission line circuit position.

In the switchyard at the Project Site, one circuit breaker is provided for each circuit (lines or transformers) connected. There are the same number of circuits as there are breakers. In addition, a normally open tie breaker provides a maintenance power transfer connection between the two transmission line circuits in case of an outage of one line circuit.

A twin-five breaker scheme will be used for the Project Site switchyard in a ring bus configuration. See Appendix 4.12 at A-3. Either a ring bus or a radial bus arrangement will be provided for each power block.

Two transmission line circuits, each capable of carrying 500 MW continuous load (one half the total power generated by the Project) are proposed to interconnect the Project to the existing Con Edison 138 kV Astoria East substation.

The 500 MW conductor thermal summer rating is based on a maximum operating temperature of 95 degrees C (203 degrees F) with an ambient air temperature of 35 degrees C (81 degrees F) and air blowing at the speed of 2 feet per second (1.4 miles per hour).

Each three phase circuit made of twin 1272 kcmil all aluminum conductors ("AAC") will be supported on galvanized steel pole double circuit structures. Two (2) 3/8 inch EHS (Extra High Steel) galvanized wires will be provided for shielding of the line circuits supported on the same structures.

The line will run approximately 3200 feet from the Project switchyard to the Astoria East substation and for most of its length will be located on Con Edison property. A total of 11 steel pole structures up to 75 feet high with a maximum of 350-foot span length will be used, located in the centerline of an 85 feet minimum right-of-way width. The transmission line structures and wire clearances will be designed in accordance with Con Edison standards and will meet the National Electric Safety Code.

A 350 feet span crossing Steinway creek with similar steel pole structures will be made from the first structure out of the Project Site switchyard on the eastern side of the creek to the next structure on the west side of the creek.

A typical single pole tangent structure with two circuit and three circuit wire configurations and outline dimensions is shown in Appendix 4.12.

The two 500 MW transmission circuits will be routed into the Astoria East substation and connected to two available circuit positions. One circuit will be connected on the west bus between existing circuit breakers 3E and 4E and the other circuit will be connected between existing circuit breakers 3W and 4W. Both circuit positions are presently spares. The physical details of these connections will be designed in accordance with Con Edison standards.

4.12.3 Transmission System Analysis – Phase 1 Report

The Phase 1 System Impact Study, Appendix 4.12, includes thermal, voltage, short circuit, and stability analyses. The analyses are based on the 2003 summer and winter peak conditions and were performed in close cooperation with Con Edison, which assisted in defining the scope of the System Impact Study and provided the base cases and operating criteria as well as other important inputs for the study.

4.12.3.1 Thermal Analysis

The thermal analysis conducted by PTI calculates transfer limits for the base 2003 system for certain interfaces. Specifically, transfer limit analyses were performed for two 2003 base cases – summer peak of 2003 and winter peak of 2003 without the Project – and the base cases were compared with three different dispatch scenarios in which the Project displaces generation located within the NYISO and within the NEISO and PJMISO. The dispatch scenarios were constructed by dispatching the Project at its full output (1000 MW) and reducing the output of other generating units by that amount. Transfer limits under the scenarios studied were calculated for intra-pool interfaces in the eastern portion of New York State including Total East, Central East, from the North-Western part of the State to the Con Edison system (UPNY-SENY & UPNY-Con Edison) and the New York City cable system. Transfer limits under the scenarios studied also were calculated for inter-pool interfaces including transactions between the NYISO and NEISO and between NYISO and PJMISO. The analyses tested contingencies under normal and emergency transfer criteria.

As set forth in more detail in Appendix 4.12, transfer limits within the NYISO interfaces analyzed either increase or decrease by an insignificant amount as a result of the operation of the Project. On the UPNY-SENY interface, for both summer and winter cases, the base case transfer limit, for normal and emergency transfer criteria, increases with the dispatch of the Project against non-Con Edison generating units. There is a slight decrease, of approximately 390 MW, in transfer limits at this interface when the Project displaces generation imports from NEPOOL and a decrease of approximately 800 MW when the Project displaces imports from PJM. On the Total East interface, for both summer and winter cases, the base case transfer limits, for normal and emergency transfer criteria, increase with the dispatch of the Project against other units except: (i) when the Project displaces imports from PJM in summer or winter, in which case the decrease in transfer limits is approximately 900 MW and 570 MW, respectively; and (ii) when the Project displaces imports from NEPOOL in the winter case, in which case the decrease in the transfer limit is approximately 40 MW.

At the New York City Cable interface, for the summer case, the base case transfer limits, for normal and emergency transfer criteria, decrease slightly when the Project displaces generation from non-Con Edison generating units as well as when the Project displaces imports from NEPOOL and PJMISO. At the UPNY-Con Edison interface, for the summer case, there also is a minor decrease in transfer limits when the Project displaces generation from non-Con Edison generating units or when it displaces imports from NEPOOL. When the Project displaces imports from PJMISO in the summer case, under normal transfer criteria, there is an increase in the transfer limit of approximately 450 MW. When the Project displaces imports from PJM in the summer case, under emergency transfer criteria, there is a decrease in the transfer limit of approximately 900 MW.

The impacts of the Project on transfer limits between the NYISO and PJMISO and between the NYISO and the NEISO also were analyzed. With respect to transfer limits from the NYISO to the PJMISO and from the PJMISO to the NYISO, for the summer case, transfer limits are not substantially affected by the Project except when the Project displaces generation in PJM. In that case, the reduction in the transfer limit is 930 MW. This is due to a significant change in the pre-contingency power flow on the interface. Similarly, with respect to transfer limits from the

NYISO to the PJMISO and from the PJMISO to the NYISO, for the winter case, transfer limits are not affected substantially by the Project except when the Project displaces generation in PJM. In that case, the reduction in the transfer limit is 450 MW.

With respect to transfer limits from the NYISO to the NEISO and from the NEISO to the NYISO, for both summer and winter cases, transfer limits are not substantially affected by the Project.

4.12.3.2 Voltage Analysis

The voltage analysis conducted by PTI evaluates voltage performance of the Con Edison system, predisturbance and immediately following the sequential (non-simultaneous) loss of each of the two most critical reactive power sources on the Con Edison system. The two most critical reactive power sources are the Sprain Brook to Tremont circuit and Astoria Unit 3 or Unit 5.

With the occurrence of the double contingency, for the summer base case, with the Project out of service, a number of low voltage violations exist. These are identified in Table 4-11 of Appendix 4.12. However, when the Project is in service, all of the voltage violations that occur in the summer base case are removed. Thus, the Project provides effective reactive support in the Queens load pocket.

Similarly, with the occurrence of the double contingency, for the winter base case, with the Project out of service, there are a number of low voltage violations. These are identified in Table 4-12 of Appendix 4.12. However, as with the summer base case, when the Project is in service, all of the voltage violations that occur in the winter base case are removed. Thus, the Project provides effective reactive support in the Queens load pocket for the winter base case as well as the summer base case.

4.12.3.3 Thermal and Voltage Analysis – Extreme Contingency Tests

In addition to the thermal and voltage analyses summarized in sections 4.12.3.1 and 4.12.3.2 above, PTI also performed extreme contingency tests for the summer base case and the summer case with the Project in service. The extreme contingencies tested were: (1) loss of the entire Project; (2) loss of all lines emanating from the Astoria East substation; and (3) loss of the Buchanan-Millwood right-of-way (two 345 kV circuits and two 138 kV circuits.) These are the extreme contingencies set forth in NPCC's Basic Criteria entitled "Extreme Contingency Assessment". The results of these analyses show that these extreme contingencies result in neither widespread thermal overloads nor voltage collapse.

4.12.3.4 Short Circuit Analysis

Short circuit currents were calculated for the summer base case, for the summer base case with the Project in service and for the summer base case with the Project in service and the Astoria Gas Turbines in service. The purpose of these analyses was to determine if the additional generation from the Project would increase the fault current levels on the Con Edison system. The fault duty levels were computed on all 69 kV, 138 kV, and 345 kV Con Edison substations for three phase-to-ground, double phase-to-ground and single phase-to-ground faults.

Table 5-1 of Appendix 4.12 shows the results of the short circuit calculations. The fault currents exceed the existing current levels or the nominal ratings of breakers at the following substations: Astoria East, Astoria West, Corona, Hell Gate 5 and 6, Jamaica, Queenbridge and Sherman Creek. A further breaker-by-breaker analysis for fault current interrupting duties was performed for these substations.

Table 5-2 of Appendix 4.12 shows the results of the individual breaker analysis. The analysis assumed that there are no over-dutied breakers at these substations prior to the Project being in service. As shown on Table 5-2, a total of 21 breakers were identified with fault levels exceeding the nominal or rated interrupting capacity of the breaker. Recommended modifications as a result of these analyses will be provided pending the results and plans recommended by Con Edison after the completion of its studies.

4.12.3.5 Stability Analysis

PTI performed a Stability Analysis to evaluate the stability impacts of the Project to the Con Edison system under summer and winter load conditions during the initial operating year (2003). The system was tested for design contingencies and extreme contingencies.

The design contingencies tested were: (1) loss of a single Project generating unit for a three phase fault;(2) loss of a large adjacent (to the Project) generating complex for a three phase fault -- the loss of the Ravenswood generating complex and the loss of the Poletti generating complex each were modeled for this contingency; (3) loss of Poletti generating complex for a three phase-to-ground fault; (4) loss of a single circuit for a three phase fault; and (5) loss of a double circuit for a three phase fault -- the loss of double circuits at Hell Gate was modeled for this contingency.

The extreme contingencies tested were: (1) loss of the entire Project for a three phase-to-ground fault; (2) loss of a transmission right-of-way for a three phase-to-ground fault -- the Buchanan-Millwood right-of-way was modeled for this contingency; (3) loss of all tie lines emanating from a bulk power station for a three phase-to-ground fault -- the loss of all lines from the Astoria East substation was modeled for this contingency; (4) a stuck breaker following a three phase-to-ground fault to determine the back-up breaker critical clearing time; and (5) loss of a large load or a major load center – loss of the load center at Farragut substation was modeled for this contingency.

For both the summer base case 2003 with the Project out of service and the summer base case 2003 with the Project in service, the system remained stable under all the specified contingency tests. In fact, even under a severe three-phase fault on the Astoria East 138 kV substation followed by a tripping of all Project generating units, system integrity was maintained.

Similarly, for the winter base case 2003 with the Project out of service and with the Project in service, system integrity was maintained under all contingencies tested.

With respect to critical clearing time, the analysis shows that systems remain stable with the Project on line, for both summer and winter cases, under the stuck breaker contingency. As a result, no adjustments are necessary to the back-up relay setting at the Astoria East substation.

4.12.4 Transmission System Analysis – Phase 2 Report

The Phase 2 System Impact Study, included as part of Appendix 4.12, includes load flow studies, contingency analysis (thermal and voltage), transfer limit analysis, short circuit and stability simulations. The analyses are based on the 2003 summer and winter peak conditions and were performed in close cooperation with Con Edison, which assisted in defining the scope of the System Impact Study and provided the base cases and operating criteria as well as other important inputs for the study.

4.12.4.1 Steady-State Analysis

A steady-state analysis models the power system with power flows. The steady-state analysis in the Phase 2 System Impact Study (Appendix 4.12) assesses the following four power flow conditions: Summer peak of 2003 with new proposed projects, except the Astoria Energy Project; Summer Peak of 2003 with new proposed projects including the Astoria Energy Project; Winter peak of 2003 with new proposed projects, except the Astoria Energy Project; and Winter peak of 2003 with new proposed projects including the Astoria Energy Project.

Contingency analyses (thermal and voltage) were performed for each of the four power flow cases to evaluate the steady-state response to outages of any single element in the Con Edison system. The outages studied include 138 kV and 345 kV circuits, 345/128 kV transformers and generating units. A transfer limit analysis also was performed for the four power flow cases to determine the impact of the Project on intra-pool and inter-pool transfers.

With respect to the thermal and voltage contingency studies for the summer 2003 cases, the addition of the Project does not result in additional overloads or voltage violations. There were a number of thermal and voltage violations during contingencies that occurred in the summer 2003 case without the Project and these violations reappeared in the summer 2003 case with the Project. However, no additional violations occurred during contingencies with the inclusion of the Project. Accordingly, the Project has little negative impact on the system following network contingencies. Similarly, for the winter 2003 cases, the incremental impact of the Project on thermal and voltage performance, during contingencies, is negligible.

With respect to the impact of the Project on transfer limits, an analysis was performed with regard to Long-Term Emergency Rating (LTE) and Short-Term Emergency Rating (STE). The analysis compares the thermal transfer limits of the summer case without the Project and with the Project displacing generation in the New York City area. The interfaces analyzed, monitored elements and contingencies tested were the same as those in the Phase 1 System Impact Study. (See Section 4.12.3.1).

The intra-pool transfer limit analysis included five intra-pool interfaces: New York City cable, UPNY-Con Edison, UPNY-SENY, Central East and Total East. With respect to the New York City Cable interface, the summer base case transfer limit is unchanged by the Project and the winter base case transfer limit is decreased very slightly by the Project. For the UPNY-Con Edison interface, there is no change in the summer or winter transfer limit as a result of the Project being in service. At the UPNY-SENY interface, the operation of the Project does not have any negative impact on the summer or winter transfer limits. And, the transfer limits at the Total East and Central East interfaces are unaffected or slightly increased by the operation of the Project for both the summer and winter cases.

An analysis also was performed for two inter-pool interfaces in both directions: NYISO-PJMISO and NYISO-NEISO. For the summer case, the transfer limits on the NYISO-PJMISO interface, in both directions, are not affected by the Project. Transfers from NYISO to NEISO are unchanged for summer and winter conditions when the Project is in service. The operation of the

Project has a minor effect on transfers from NEISO to NYISO during summer and winter conditions.

In addition to the analysis described above, a double contingency analysis was performed to evaluate thermal and voltage performance of the Project on the Con Edison system under pre-contingency conditions and immediately following the sequential (non-simultaneous) loss of each of the two most critical reactive power sources on the system. For the summer 2003 case, without the Project, the double contingency results in no major thermal violations but causes a large number of low voltage violations. With the interconnection of the Project, these voltage violations are removed or significantly mitigated. Thus, the Project provides effective reactive support in the Astoria load pocket. For the winter 2003 case without the Project, the double contingency results in no major thermal violations but causes a few low voltage violations. The operation of the Project has little impact on these voltage violations during winter peak conditions.

PTI also performed extreme contingency tests for the summer 2003 case with and without the Project. The contingencies analyzed are those set forth in Section 7.0 of NPCC's Basic criteria entitled "Extreme Contingency Assessment." The results of this analysis show that the extreme contingencies do not result in widespread voltage collapse or thermal overloads, except for the loss of the entire Project which causes a number of low voltages. This is due to the displacement of the Astoria Units 3 & 5 by the Project; there is a deficiency in reactive power in the area when all of the Project units are out of service. However, even in the summer 2003 case without the Project, the loss of Astoria Units 3 & 5 results in low voltages. Moreover, voltage performance is better with the Project than without the Project.

4.12.4.2 Short-Circuit Analysis

A short-circuit analysis was performed using a short circuit model representing the Con Edison transmission system and including six new proposed generating projects. This analysis used the same methodology as the analysis performed for the Phase 1 System Impact Study (see Section 4.12.3.4). Short circuit currents were calculated for the summer 2003 case with and without the

Project to determine how the addition of the Project's 1,000 MW of generation increases fault currents on the system. The fault duties were computed for all 69 kV, 138 kV and 345 kV substations for three-phase-to-ground, double-phase-to-ground and single-phase-to-ground faults.

The results of this analysis show that for some substations the fault current exceeds either the level for the summer 2003 case without the Project (the base system plus the six proposed projects) or the lowest nominal rating of the breakers, or both quantities. Substations in which the fault current exceeds the lowest nominal rating of the breakers, with the Project on line, are identified in section 5.1 of the Phase 2 System Impact Study. A further breaker-by-breaker analysis is recommended for these substations and possible improvements or upgrades will be discussed based on the results of this additional analysis.

4.12.4.3 Stability Analysis

A stability analysis was performed, in addition to the analysis described in the Phase 1 System Impact Study (see Section 4.12.3.5), in which the six additional proposed projects were included. The same methodology and the same contingencies were used in this stability analysis as were used in the initial stability analysis for the Phase 1 System Impact Study.

The results of this analysis show that the Con Edison system, with the Project in operation, remains stable even following severe disturbances in the vicinity of the Project. The analysis also shows that with respect to critical clearing time, no problems will result from the existing settings for both primary and back-up protection systems at the Astoria East substation. Therefore, the project will not result in a need for adjustment of the back-up relay setting in the Astoria East substation.

4.13 Transmission Line Electric and Magnetic Fields

4.13 Transmission Line Electric and Magnetic Fields (EMF)

4.13.1 Introduction and Overview

In accordance with Sections 164(1)(a) and 164(1)(c) of the New York Public Service Law, Section 1001.1(a) and 1001.3 of the Article X Regulations, and Stipulation No. 3, this Section provides a discussion that complies with: (a) the Commission's applicable electric field strength standards set forth in Commission Opinion No. 78-13, and (b) the applicable provisions of the Commission's Interim Policy Statement on Magnetic Fields, dated September 11, 1990. This section provides an assessment of electric and magnetic fields (EMFs) associated with the transmission of power generated by the Project.

The assessment included herein provides measurements of existing EMFs and models future EMFs along the route of a proposed new electric transmission line. Existing EMFs are characterized at three locations: beneath an existing distribution line, beneath an inactive 138 kV transmission line, and along the fence line of the Astoria East substation.

Astoria Energy is considering two alternatives for an interconnection to the Astoria East substation located approximately one-half mile southwest of the Site. The first alternative involves a three-circuit tower design. A double circuit would connect the Project to the Astoria East substation, and the third circuit would be Con Edison's existing circuit. In this alternative, the steel pole structures would be an estimated 95 to 97 feet high. The second alternative involves only a double-circuit tower design. In this alternative, the existing Con Edison circuit would not be relocated, and the steel pole structures would be an estimated 75 feet in height. For both alternatives, the line will be slightly over 3,000 feet in length and mostly on Con Edison property. The towers will be placed on the centerline of a Right-of-Way (ROW) that has a minimum width of 85 feet.

Maximum measured magnetic fields were approximately 24 milligauss (mG) along the fence line of the Astoria East substation beneath existing active transmission lines that connect at the substation. Measured magnetic fields were significantly lower beneath the existing distribution lines and the inactive 138 kV transmission line: maximum measured fields were approximately 1 mG beneath the existing distribution lines and 4 mG beneath the inactive 138 kV transmission line. Under the magnetic field strength guidelines established by the Public Service Commission, a magnetic field at the edge of a ROW (measured one meter above ground level) may not exceed 200 mG. At all locations that were examined in the analysis, existing magnetic field strengths are substantially less than the guideline.

Projected electric and magnetic field strengths for the new electric transmission line were modeled for each of the two alternatives for the interconnect. For the three-circuit tower design, the modeling assumed a load of 500 MW on each of the two Astoria circuits (in-phase) and a load of 250 MW on the existing Con Edison circuit. For the two-circuit tower design, the modeling assumed only a load of 500 MW on each 138 kV circuit. For the three circuit alternative, the highest modeled magnetic and electric field strengths at the edge of the ROW one meter above ground level are 148 mG and 0.6 kV/m, respectively. Because a proposed commercial building may be located on the edge of the ROW for the three-circuit design, magnetic fields were also modeled on the second floor of a hypothetical building at the edge of the ROW. The highest modeled magnetic fields at a point where the exterior wall of the building meets the ROW were 194 mG. Fields inside the building at a greater distance from the ROW would be less. For the two circuit alternative, at the point of minimum ground clearance for the conductors (28 feet), the modeled magnetic field strength at the edge of the 85- foot ROW measured one meter above ground level is 187 mG. The modeled electric field strength at the edge of the ROW measured one meter above ground level is 0.3 kV/m. The modeled field strengths for both alternatives are within the EMF guidelines established by the Commission of 200 mG for magnetic fields and 1.6 kV/m for electric fields at the edge of the ROW one meter above ground level. At points other than the point of minimum ground clearance, field strengths would be lower.

4.13.2 EMF Description

Electric power transmission lines create EMF because they carry electric currents at high voltages. The voltages and currents are produced by electric charges. Electric charges (electrons and protons) are present in all matter, and can give rise to electrical effects. Most objects are electrically neutral because positive and negative charges are present in equal numbers. When the balance of electric charges is altered, we experience electrical effects such as the attraction between a comb and our hair, the drawing of sparks after walking on a synthetic rug in the wintertime, or the presence of EMFs from power lines. The work put into separating electric charges is measured by *voltage*. The units of work-per-unit-charge are *volts* (V) or *kilovolts* (kV; 1 kV = 1000 V). Voltage is the "pressure" of electricity, and is analogous to the pressure of water in a plumbing system.

Electric charges push and pull on other charges and, therefore, each electric charge generates an *electric field* that exerts a force on nearby charges. Opposite charges (*i.e.*, + and –) attract, and like charges (*i.e.*, + and +) repel. Electric fields are equal to the "force per unit charge" and are measured in units of *volts / meter* (V/m) or *kilovolts / meter* (kV/m).

The movement of electric charges is called *electric current* and is measured in *amperes* (A). Current measures the "flow" of electricity, which is analogous to the flow of water in a plumbing system. The moving charges in an electric current produce a *magnetic field* which exerts force on other moving charges. Wires carrying currents running in parallel attract, while wires carrying currents in opposite directions repel. This is the principle by which electric motors generate force. Magnetic fields are measured in *gauss* (G) or *tesla* (T) (1 T = 10,000 G). Smaller fields are measured in *milligauss* (1 mG = 0.001 G) or *microtesla* (1 μT = one-millionth of a tesla). Milligauss is the unit most often used to measure the strength of magnetic fields in electric transmission lines.

Permanent magnets contain electrical currents at the atomic level that can generate strong magnetic fields, approximately 100–500 G (*i.e.,* 100,000–500,000 mG). Thus, magnetic fields from permanent magnets can exert forces on electric currents, or on other magnetic objects, as for example, when a compass needle orients toward a magnet.

EMFs decrease in size as the distance from the source (the electric charges or currents) increases. For an electric transmission line, EMF levels are highest near the center of the ROW and decrease as the distance from the transmission corridor increases.

Everyone is exposed to a wide variety of natural and man-made electric and magnetic fields. The earth's atmosphere produces slowly-varying electric fields (about 0.1 to 10 kV/m) that occasionally manifest themselves as lightning. The earth's core produces a steady magnetic field, as can easily be demonstrated with a compass needle. The earth's magnetic field ranges in strength from about 470 mG to 590 mG over the United States and is about 560 mG in the Northeast. Knowing the strength of the earth's fields provides a perspective on the size of the electric and magnetic field measurements from an electric transmission line.

Man-made magnetic fields are common in everyday life. Many childhood toys contain magnets, and many of us use magnets to hold items on the metallic surface of refrigerators. These permanent magnets typically have fields in excess of 100,000 mG. An increasingly common diagnostic procedure, magnetic resonance imaging (MRI), uses fields of 20,000,000 mG on humans and is preferred over X-rays because of its safety.

Magnets and steady electric currents, *i.e.*, direct currents (DC), produce steady magnetic fields. Electric transmission line currents are alternating currents (AC), because they change size and direction 60 times per second (60 cycles/second = 60 Hertz or 60 Hz). AC currents produce AC magnetic fields; however, aside from the variation in time (60 Hz) that characterizes electric transmission line fields, they are identical in nature to steady fields, such as those due to the earth's atmosphere or geomagnetism. Moreover, as we move our bodies, the direction of the earth's magnetic field relative to us changes and our body experiences a time-varying magnetic field, as in the case of AC magnetic fields.

Electric power transmission lines, distribution lines, and the electric power lines that come into our homes and workplaces are sources of electric and magnetic fields that vary in time at a frequency of 60 Hz (in North America) or 50 Hz (abroad). Magnetic fields are proportional to the current, and electric fields are proportional to the voltage on the wires; both decrease as distance from the electrical wires increases. EMFs from different sources (*e.g.*, adjacent wires) may partially cancel or may add to the EMF level at any location. For residences, typical baseline 60-Hz magnetic fields in the middle of rooms range from 0.5 to 2.0 mG. These fields are, to a large extent, produced by outdoor distribution wiring, indoor wiring, and ground return pathways.

In the home, 60-Hz EMFs can also be found in the vicinity of electric appliances, including electric ranges, microwave ovens, refrigerators, clothes washers and dryers, fluorescent lights, televisions, toasters, vacuum cleaners, etc. Appliances produce magnetic fields of 40-80 mG at distances of 1 foot, but the fields diminish quickly with distance. Personal electric appliances such as shavers, electric toothbrushes, hair dryers, massagers, electric toys, and electric blankets can produce fields measuring 100 mG or more in the vicinity of those using them. Computer video-display monitors create magnetic fields ranging from approximately 3 mG to 20 mG at a distance of 1 to 4 feet from the device (NIEHS, 1995).

In the school and work environment, copy machines, vending machines, video-display terminals, electric lights, tools, and motors are all sources of EMFs. In the U.S., *per capita* electric power consumption has increased more than 20-fold over the last 50 years, and population exposure to EMFs at power-line frequencies has increased due to factors such as rural electrification, increased electric current service to residences, increased use of electrical office equipment, and increased use of appliances, electric toys, audio-video equipment, and power tools. The EMFs produced by transmission lines, as detailed elsewhere in this report, are well within the range of EMF exposures from other sources. Table 4.13-1 summarizes the strengths of magnetic fields associated with various devices and phenomena and those specified by various standards.

TABLE 4.13-1: MAGNETIC FIELD STRENGTHS	
Device, phenomenon, location, or standard	**Magnetic field strength (mG)**
MRI scan	20,000,000[a]
Permanent magnet	100,000[a]
ACGIH standard	10,000
INIRC-IRPA occupational guideline (1998)	4,167
ACGIH guideline for individuals with pacemakers	1,000
INIRC-IRPA general public guideline (1998)	833
Earth's magnetic field	470-590[a]
Hair dryers and electric blankets	100-500
Typical household appliance	40-80
Maximum measured field strength under current conditions	24.2

[a] These magnetic fields are steady fields (not time-varying) as opposed to the other fields which are low-frequency (60 Hz), time-varying fields.

4.13.3 Applicable Regulatory Guidelines on EMF

The applicable electric field strength standards established by the Commission are set forth in Opinion No. 78-13 (issued June 19, 1978). The magnetic field standards established by the Commission are set forth in the Commission's Interim Policy Statement on Magnetic Fields, issued September 11, 1990 ("Interim Policy"). Opinion No. 78-13 established an electric field strength interim standard of 1.6 kV/m for Article VII electric transmission lines, at the edge of the right-of-way, one meter above ground level, with the line at the rated voltage. The Interim Policy establishes a magnetic field strength interim standard of 200 mG, measured at one-meter above grade, at the edge of the right-of-way, at the point of lowest conductor sag.

4.13.3.1 Other Published Guideline on EMF

The International Radiation Protection Association (INIRC-IRPA, 1990; 1998) has published interim guidelines on limits of exposure to 50/60-Hz electric and magnetic fields. The guidelines are based on current literature and earlier review articles published by the World Health Organization (WHO, 1993). The WHO concluded that no biological effects could be expected from magnetic fields smaller than 50,000 mG. The IRPA (1998) guidelines state that occupational exposure continuing throughout the working day should be limited to 60-Hz magnetic fields below 4,167 mG. The guidelines also state that exposure for members of the general public should be limited to 833 mG, and general-public magnetic field exposure between 1,000 and 10,000 mG should be limited to a few hours per day.

A number of national and international organizations have formulated guidelines for limiting occupational exposures to EMF (Bailey, *et al.*, 1997). The American Conference of Governmental Industrial Hygienists (ACGIH) publishes Threshold Limit Values (TLVs), to which nearly all workers may be exposed repeatedly without adverse health effects. ACGIH has published an acceptable continuous magnetic field guideline of 10,000 mG at 60 Hz. However, for workers wearing a cardiac pacemaker, the ACGIH recommends limiting 60-Hz magnetic fields to 1,000 mG (incorporating a safety factor of 10).

4.13.4 Baseline Electric and Magnetic Field Conditions along Transmission Route

On January 31, 2000, (~10:30 AM to 12:15 PM) present-day environmental electric (E-fields) and magnetic (B-fields) field strengths were measured both in the vicinity of the proposed electric transmission line running between the Project Site and the Astoria East substation, and in the vicinity of the Astoria East substation. The weather was partly sunny, windy, and cold (36° F).

It should be noted that the new electric transmission line between the Project and the Astoria East substation lies entirely on private property within fenced and guarded perimeters, and no portion of the ROW is accessible to the general public.

An existing, inactive 138-kV transmission line currently runs from the Astoria East substation to a location near Steinway Creek, but this line is located on the side of the creek opposite the Project Site. The proposed route for the new electric transmission line is a new ROW with a minimum width of 85-feet. Most of the route will be on Con Edison property.

Three locations were chosen for representative measurements of existing EMFs: (1) E- and B-field levels were measured under the existing distribution lines, at a location where they pass over T Avenue, near the intersection of T Avenue with 31st Street; (2) E- and B-field levels were measured under the existing, inactive 138 kV transmission line, at a location where they parallel the north shore of Steinway Creek; and (3) E- and B-field levels were measured on the north side of the Astoria East substation, where several overhead, active transmission lines enter the property. Figure 4.13-0 shows the measurement locations.

Procedures for the Measurement of Magnetic Field Strength

The magnetic field strength was recorded at each of the three locations. In all three cases, magnetic field strength was measured every 1.5 seconds[1] at an elevation of approximately 3 feet above grade.[2] Distance was correlated with the magnetic field measurements and the field values were plotted as a function of distance.

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1 Specifically, a 1.5-second running average field strength was computed continuously and reported by the measuring device every 1.5 seconds.

2 1 meter (approximately 3 feet) elevation is specified by Opinion No. 78-13 and the Interim Policy as well as the Institute of Electrical and Electronics Engineers (IEEE) as part of its standard procedures for the survey of EMF generated by power lines (IEEE, 1995a, p. 21).

Measurements at each location were made over a few hundred feet. Magnetic field strength was measured using an EMDEX II recording meter (manufactured by Enertech Consultants, Campbell, CA). Specifications for this instrument appear in Table 4.13-2.

TABLE 4.13-2:

SPECIFICATIONS FOR THE EMDEX II METER

Sensors	Three orthogonally oriented magnetic field sensor coils
Sensitivity	Electric fields, 0.0 kV/m - 109 kV/m Magnetic fields, 0.1 mG - 3,000 mG. Reports magnetic field resultant (root mean square) in the broad band mode, the frequency bandwidth being 40 Hz to 800 Hz.
Features	Automatic multi-range measurement capability Easily modified Survey and Normal measurement modes
Amplitude Response	True RMS measurement with a "Crest Factor" of a periodic signal
Power	One 9-volt alkaline battery
Output	Survey mode: display data values on LCD Normal mode: sampled data stored in memory

The EMDEX II reports the resultant field strength[3] in mG. This meter satisfies the Institute of Electrical and Electronics Engineers (IEEE) instrumentation standards for measuring magnetic field strength at power line frequencies (IEEE, 1995a; 1995b). The device records these measurements every 1.5 seconds and allows the user to designate "events" corresponding to measurements at specific locations.

[3] The resultant field strength (B_r) is equal to the square root of the sum of the squared field intensity values measured along three orthogonal axes. That is, $B_r = \sqrt{B_x^2 + B_y^2 + B_z^2}$, where B_x, B_y, and B_z are the field intensity measurements along the x, y, and z axes.

Procedures for the Measurement of Electric Field Strength

At each of the three locations, the electric field was monitored at an elevation of 3 feet above grade (IEEE, 1995a). Along each traverse, the maximum electric field strength was noted.

Electric field strength was measured using a Holaday HI-3600-2 meter (manufactured by Holaday Industries, Inc., Eden Prairie, MN). This meter reports field strength in kV/m (or V/m). The meter satisfies IEEE instrumentation standards for measuring electric field strength at power line frequencies. Specifications for this instrument appear in Table 4.13-3.

TABLE 4.13-3:

SPECIFICATIONS FOR THE HOLADAY HI-3600-02 METER

Sensors	Concentric plate displacement current electric field sensors • 8-inch diameter electrically shielded magnetic field sensing loop • Switch selectable between electric and magnetic fields
Sensitivity	Electric fields, 1 V/m - 199 kV/m Magnetic fields, 10 mA/m - 1999 A/m
Features	Auto-select or manually selected field strength scales Max-hold feature stores and displays highest reading
Amplitude Response	True RMS field strength measurements for accurate measurement of non-sinusoidal waveforms
Polarization Response	Displacement sensor and magnetic field sensor are designed for response to one field polarization component at a time
Power	Two 9-volt alkaline batteries
Output	Liquid crystal display; preamplifier output *via* phone jack; digital fiber optic signal

Baseline Monitoring Results

The following sections present the electric and magnetic field strength measurements beneath the distribution lines, beneath the inactive 138 kV transmission line, and in the vicinity of the Astoria East substation. For each traverse, point values for electric field strength are reported. The magnetic field strength profile versus distance along the road also is reported.

Electric Field Strengths

For the existing distribution lines, E-field levels peaked at about 78 – 93 V/m directly under the lines, and dropped to 18 – 23 V/m at 20 feet from the centerline to either side. At 50 feet from the distribution lines, E-field levels decreased to 6 – 15 V/m.

For the existing, inactive 138-kV transmission line, E-fields directly under the line were very low, indicating that the conductors were not energized. E-field levels were 2 – 5 V/m, i.e., approximately 1,000-fold lower than might be expected if this line were energized at 138,000 Volts.

Along the north side of the Astoria East substation, E-fields more typical of transmission line environments were measured. When not in the immediate vicinity of any electrical structures (switchyard elements, incoming lines), E-field levels were in the range of 200 – 500 V/m. When within 25 – 30 feet of incoming lines or switchyard elements, field levels were in the range of 800 – 4,000 V/m. The peak E-field measured was under incoming transmission lines, and was 4,550 V/m.

Magnetic Field Strengths

For the existing distribution lines, measured B-fields were very low. The maximum magnetic field strength, directly beneath the lines, was measured at 1.3 mG. Moving away from the distribution lines, magnetic field strengths dropped off even further, to levels that were generally less than 0.5 mG at distances greater than 50 feet from the distribution lines. Figure 4.13-1 is a graph of magnetic field strength beneath the distribution lines.

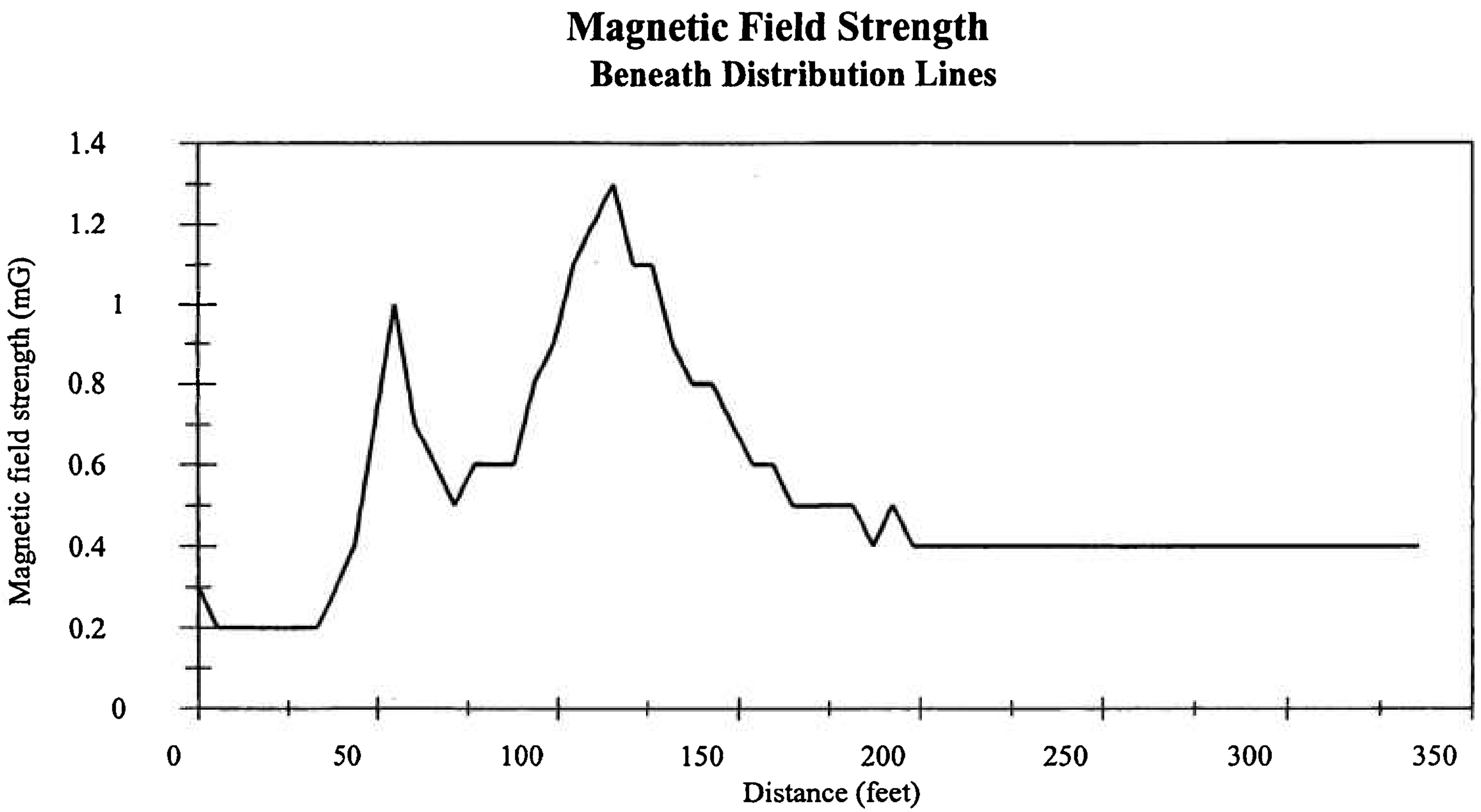

Figure 4.13-1 Magnetic Field Strengths Beneath Existing Distribution Lines Near the Intersection of T Avenue With 31st Street From East to West

Beneath the existing, inactive, 138 kV transmission lines, the maximum measured magnetic field was 4.4 mG, which occurred approximately beneath the transmission lines. At distances greater than 50 feet from the transmission lines, magnetic field strengths dropped to less than 1 mG. Figure 4.13-2 is a graph of magnetic field strength beneath the inactive transmission lines.

Along the south fence line of the Astoria East substation, the maximum measured B-field strength was 3.1 mG. Along the north fence line of the substation, magnetic field strengths were greater due to the presence of active transmission lines passing over the fence line. The maximum measured B-field strength along the north fence line was 24.2 mG, beneath the active transmission lines. Figures 4.13-3 and 4.13-4 are graphs of the magnetic field strengths along the south fence line and north fence line respectively.

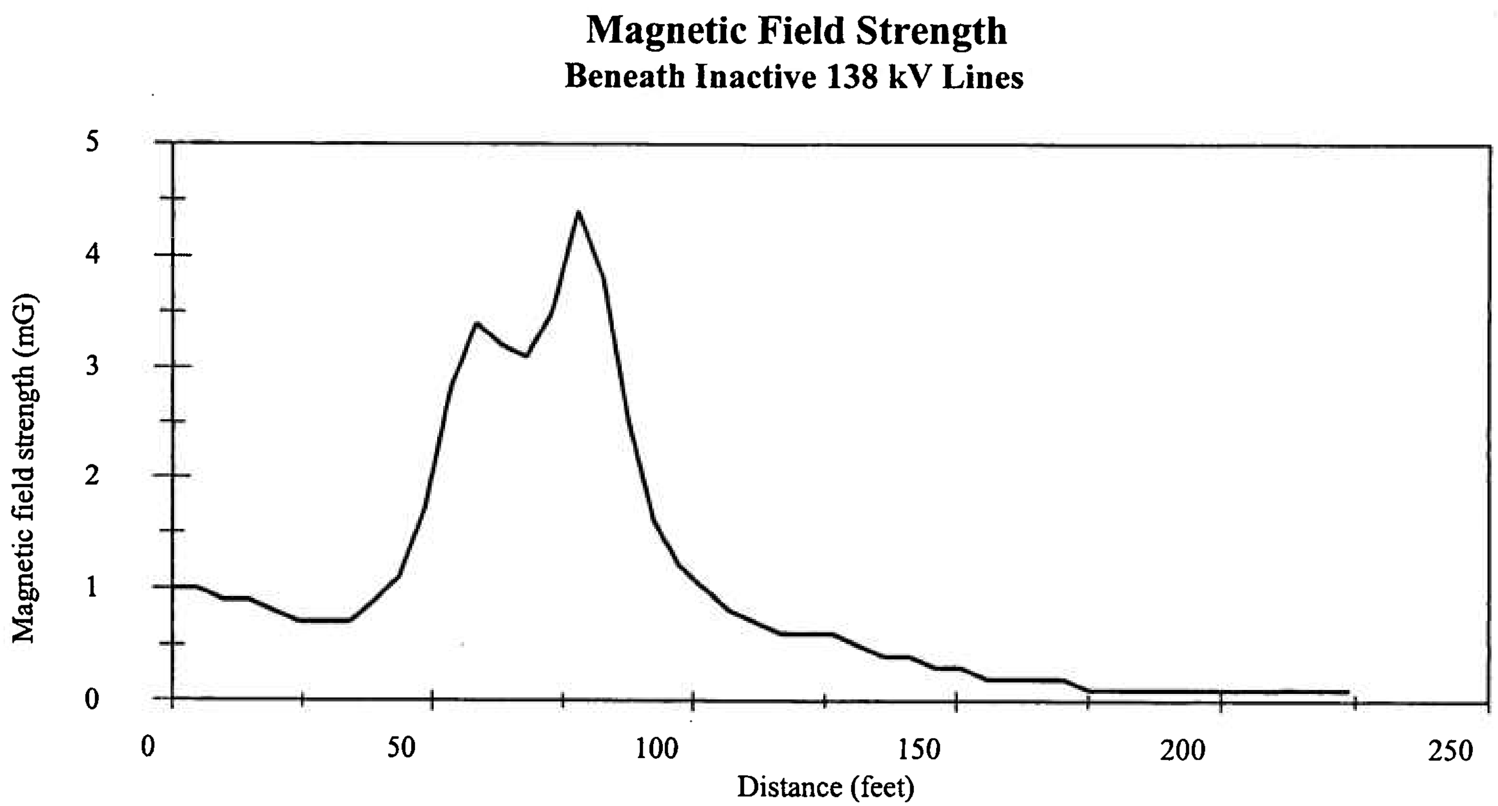

Figure 4.13-2 Magnetic Field Strengths Beneath the Inactive 138 kV Transmission Beginning at Steinway Creek

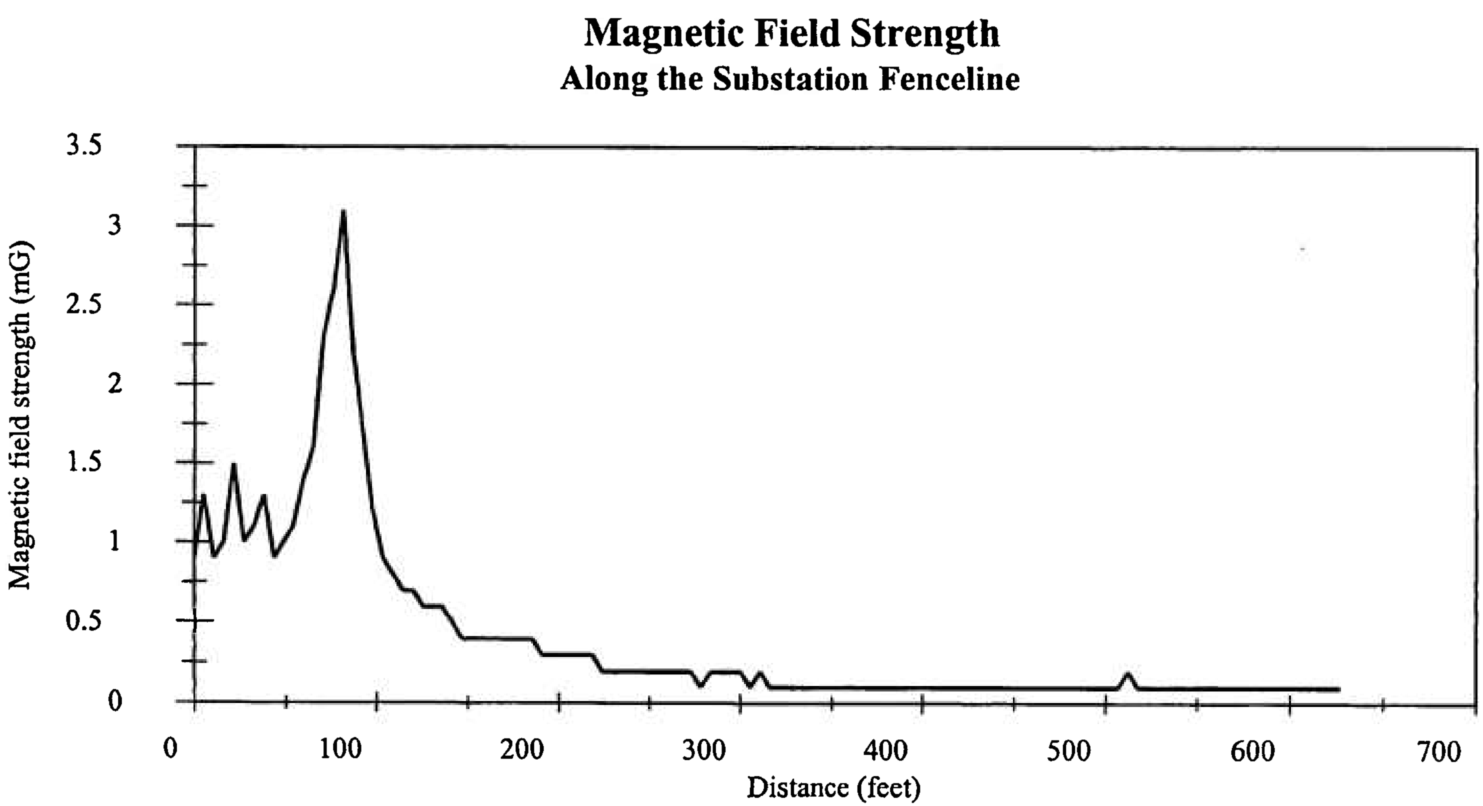

Figure 4.13-3 Magnetic Field Strengths Along the Substation Fenceline Along 31st Street From Avenue K Towards the Gate

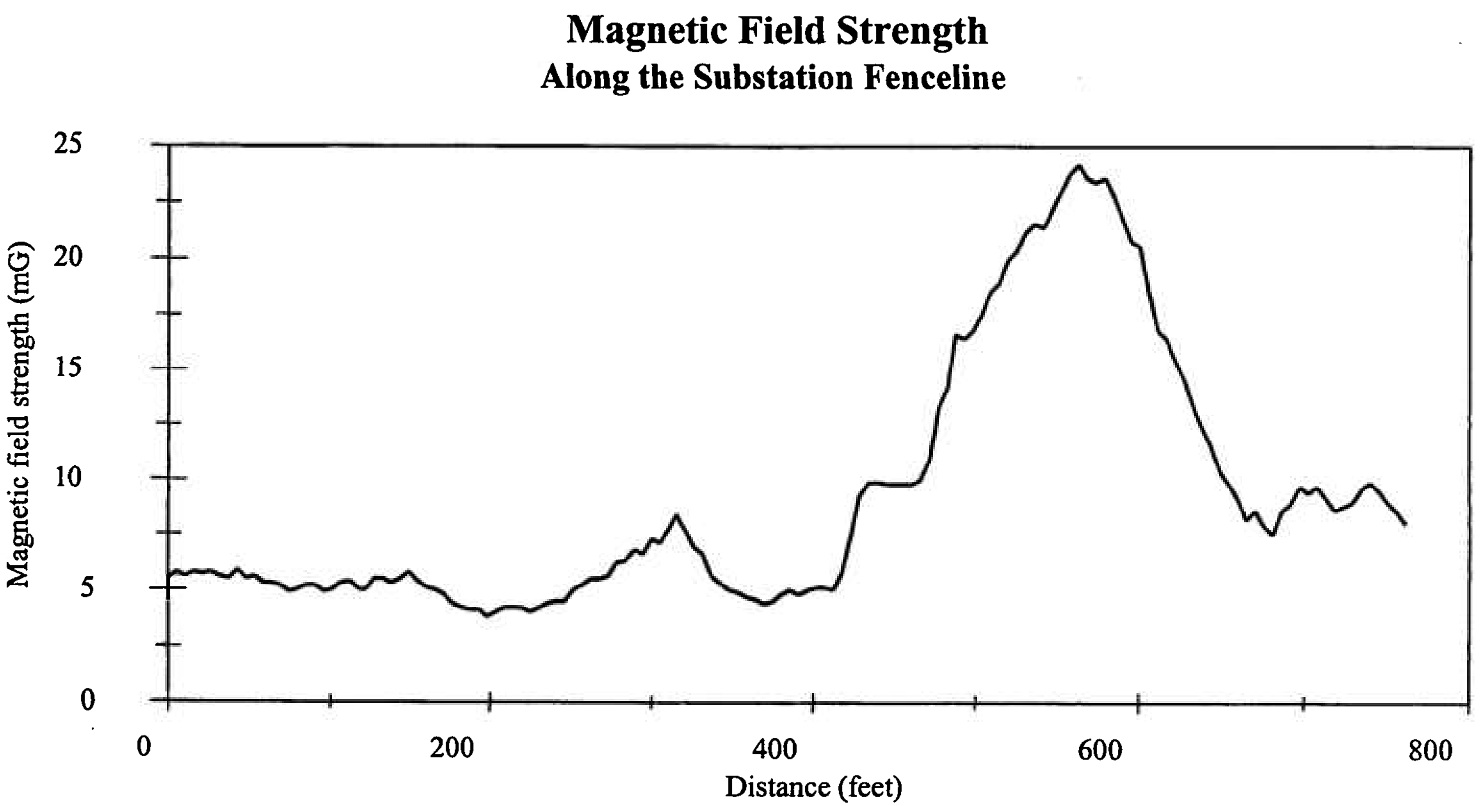

Figure 4.13-4 Magnetic Field Strengths Along the North Side of the Con Ed Switchyard From West to East

4.13.5 Methodology for Projecting EMF Levels From the New Electric Transmission Line

The "FIELDS" computer program was used to project field strength associated with the new 138 kV electric transmission line from the Project Site to the Astoria East substation.

Electric and magnetic fields beneath the new electric transmission lines after the construction of the Project will depend on the electric output of the Project and the loads carried by each circuit. The electric and magnetic field modeling performed assumes that each of the two circuits connected to the Project carries a load of 500 MW. For the three-circuit alternative, the modeling assumes the Con Edison line carries a load of 250 MW.

The current per phase on the electric transmission line satisfies the relationship:

$$P = \sqrt{3} f_p V I_{phase}$$

where P is the power in kilowatts (500,000 kW), f_P is the power factor (0.85), V is the line voltage in kilovolts (138 kV), and I_{phase} is the current per phase in amps. Hence, the current per phase is:

$$I_{phase} = \frac{500{,}000\ \text{kW}}{\sqrt{3} \times 138\ \text{kV} \times 0.85} = 2{,}461\ \text{amps}$$

At the Project's full capacity of 1000 MW, split equally over the two 138 kV circuits, 2,461 amperes are required per phase for a three-phase circuit. For the three-circuit alternative, the same relationship shows that 1,230 amperes are required per phase for a loading of 250 MW on a three phase circuit.

The transmission line characteristics used in the FIELDS model for each of the modeled alternatives are shown in Table 4.13-4. The transmission line characteristics presented in the table were provided by Raytheon Engineers and Constructors. The height of the lowest conductor in all runs is assumed to be 28 feet, the estimated minimum ground clearance along the electric transmission line ROW. The results of the FIELDS analysis thus overestimate electric and magnetic fields at points other than the point of minimum clearance. The results of the EMF modeling at ground level are not sensitive to the position of ground wires and the distance between bundled conductors.

Figures 4.13-5, 4.13-6, and 4.13-7 are diagrams of the proposed 138 kV double or triple circuit steel pole structure. Two possible designs are shown for the three circuit alternative.

TABLE 4.13-4:

PARAMETER VALUES USED IN THE FIELDS PROGRAM TO PROJECT EMF LEVELS ALONG THE 138 kV TRANSMISSION LINES

Transmission Line Characteristics	Parameter Values
Line voltage	138 kV
Number of circuits	2 or 3
Number of phases per circuit	3 (0 degrees, 120 degrees, and 240 degrees)
Number of conductors per phase	2 for the two circuits connected to the Project; 1 for the Con Edison circuit
Conductor diameter	1.3 inches for all conductors
Transmission line configuration	See Figures 4.13-5, 4.13-6, and 4.13-7. The conductors are oriented vertically with one circuit on either side of the pole. The top and bottom conductors are 8 feet from the pole, and the middle conductors are 11 feet from the pole. In the three circuit design, the Con Edison circuit is below the other two.
Conductor separation	10.5 feet between the top and middle conductors and 9.5 feet between the middle and bottom conductors. Vertical separation for the Con Edison circuit is approximately 5 feet (see figures).

TABLE 4.13-4: (Cont.)

PARAMETER VALUES USED IN THE FIELDS PROGRAM TO PROJECT EMF LEVELS ALONG THE 138 kV TRANSMISSION LINES

Transmission Line Characteristics	Parameter Values
Distance between bundled conductors	12 inches
Current capacity[a]	2,461 amps each conductor phase; 1,230 amps each phase for the Con Edison circuit
Number of earth wires	2
Earth wire configuration	The earth wires are located at the peak of the tower, 12 feet above the top conductor, and 6 feet to either side of the pole.
Height of the transmission wires	The minimum ground clearance of 28 feet was used. This is greater than the minimum ground clearance allowed by code (25 feet).
Vertical height of field sensor	3 feet (or approximately 1 meter); 15 feet when modeling a two-story building

[a] The specific values for electric current per phase represent the full 1,000 MW output of the Astoria Energy plant split evenly between the two circuits.

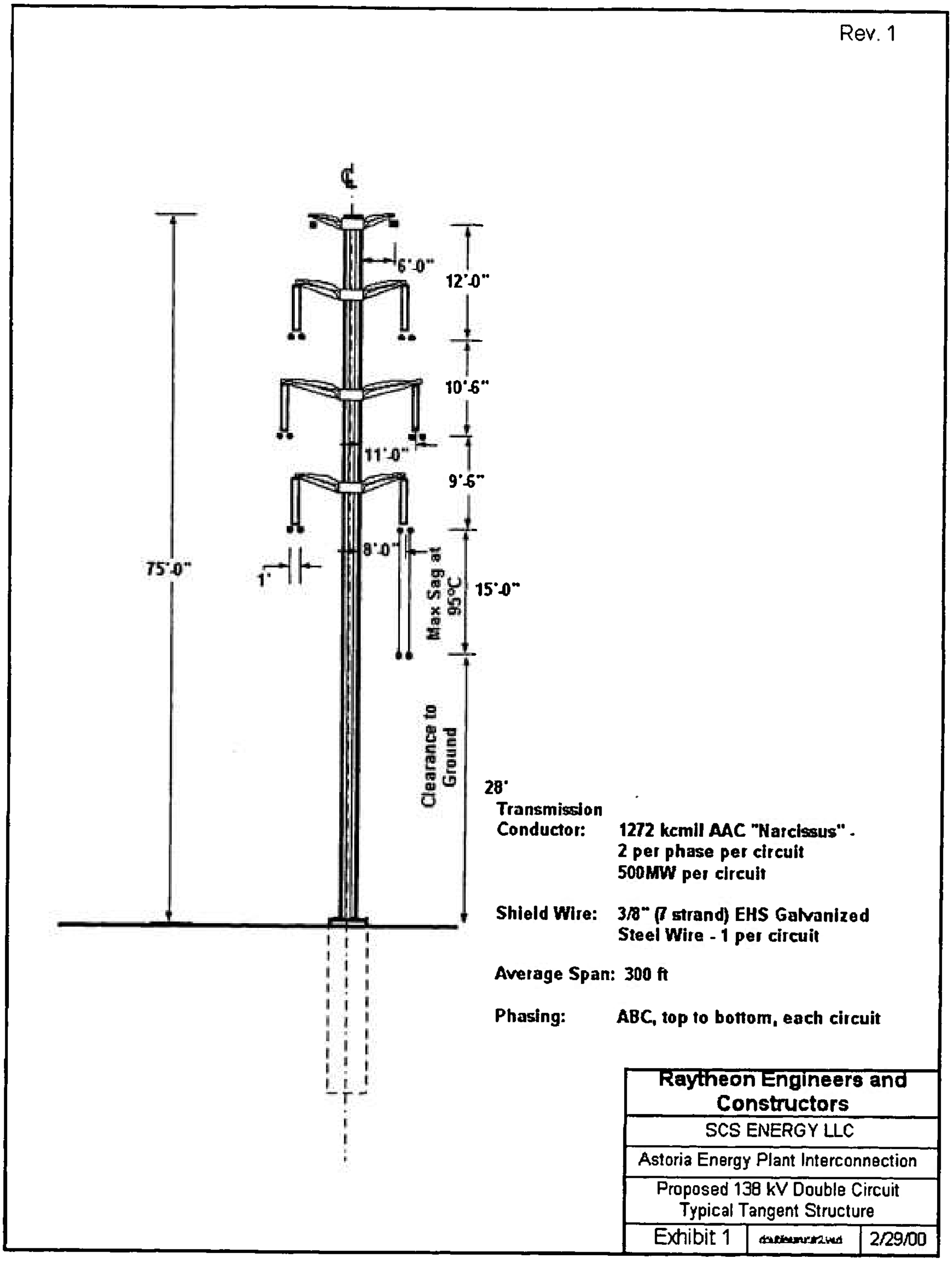

Figure 4.13-5 Diagram of the Proposed Pole Structure for the Astoria Interconnect

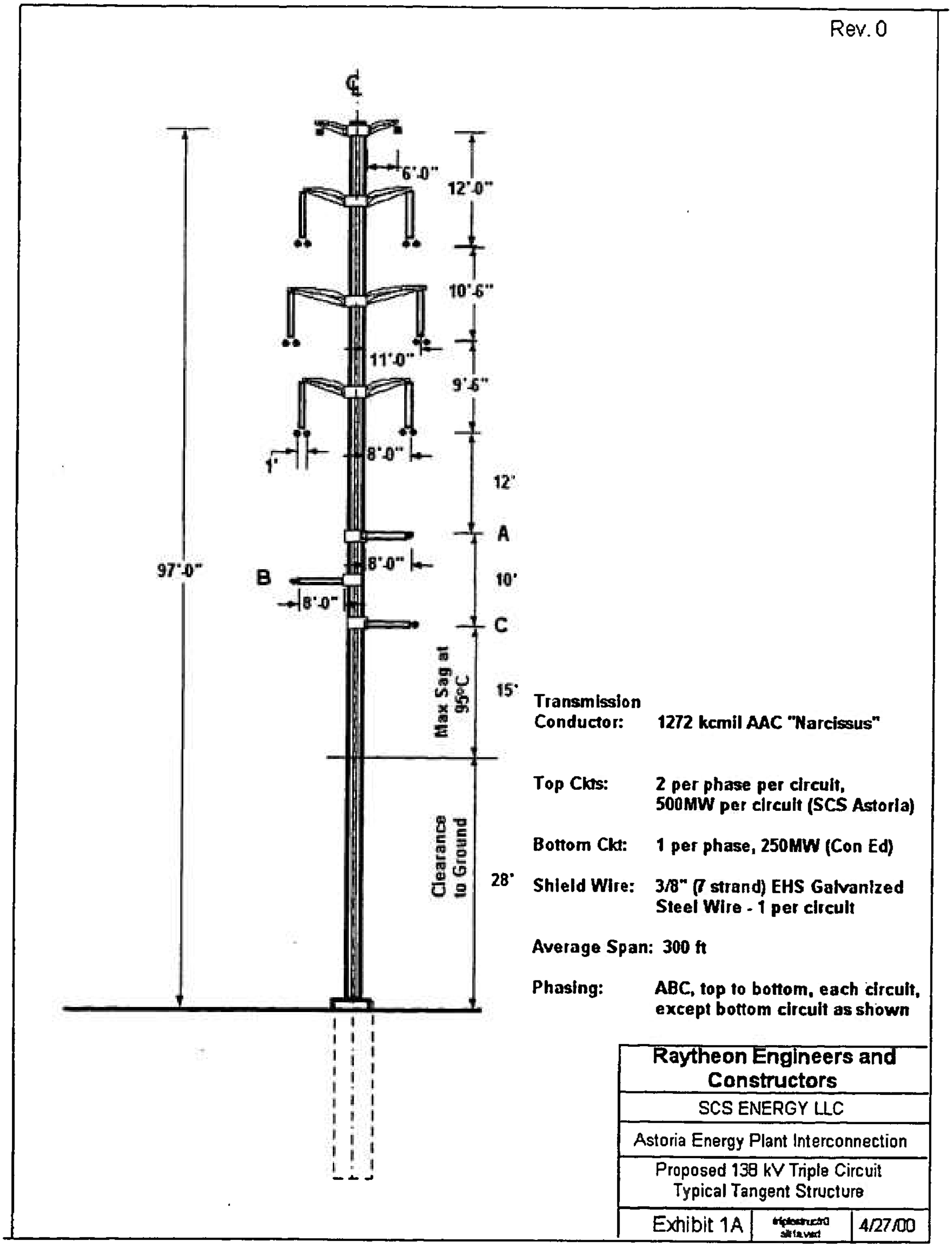

Figure 4.13-6 Diagram of the Proposed Three-Circuit Design for the Astoria Interconnect (Alternative 1A)

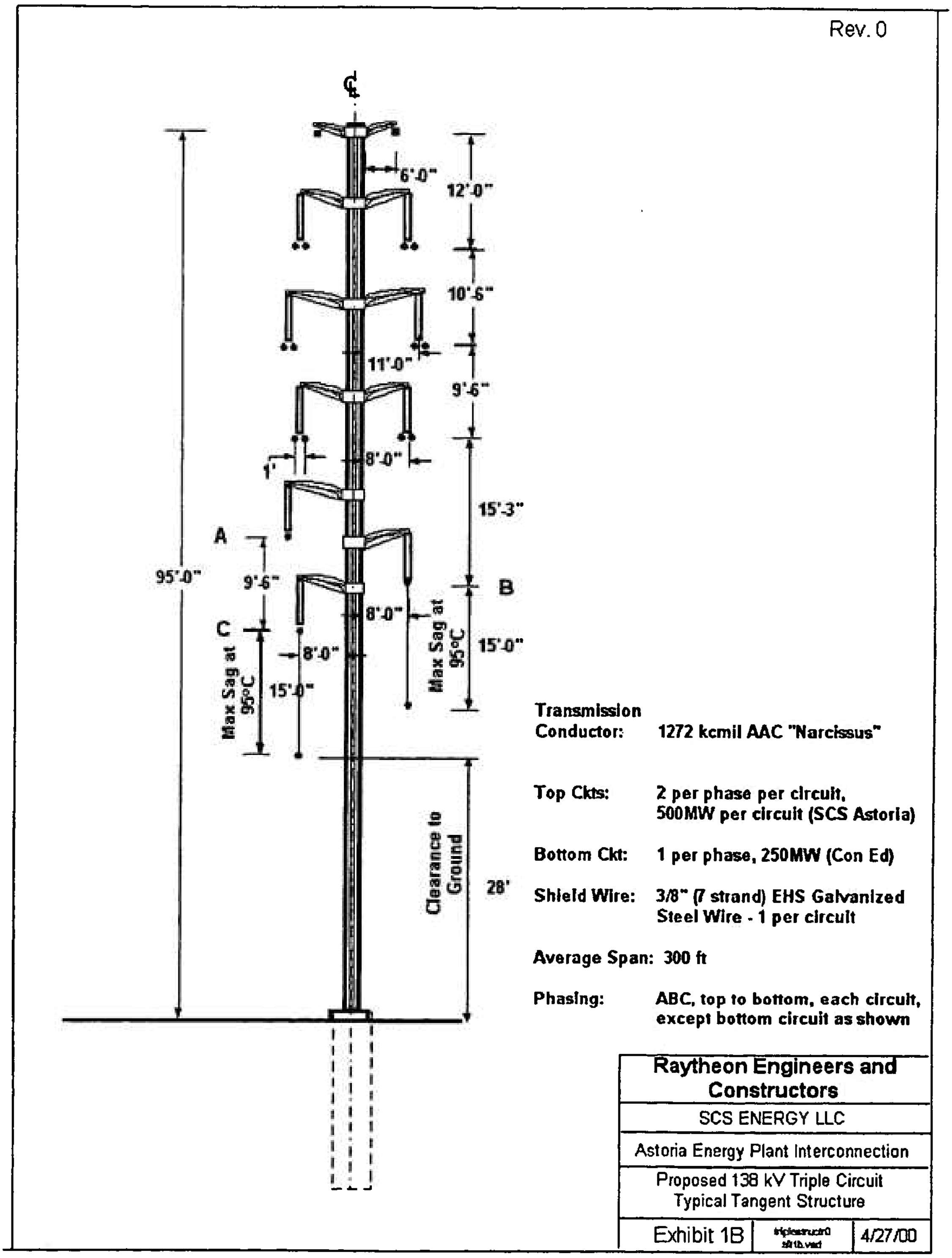

Figure 4-13-7 Diagram of a Second Alternative for the Three Circuit Design for the Astoria Interconnect (Alternative 1B)

4.13.6 Summary of Existing and Projected EMF Levels

Existing Conditions

The maximum measured strength of electric fields in the vicinity of the new electric transmission line was 4,550 V/m beneath active transmission lines on the north side of the Astoria East substation. Typical electric field strengths near the Astoria East substation ranged from 200 to 500 V/m. Electric field strengths beneath distribution lines peaked at about 78 to 93 V/m. Electric field strengths beneath the inactive 138 kV transmission lines were between approximately 2 and 5 V/m.

Measurements of conditions in the vicinity of the new electric transmission line showed that at 3 feet above grade, existing peak magnetic fields were approximately 24 mG at points directly below the active transmission lines on the northern side of the Astoria East substation. Measured magnetic field strengths at each measurement location are summarized in Table 4.13-5.

TABLE 4.13-5:

MEASURED MAGNETIC FIELD STRENGTHS IN THE VICINITY OF THE PROPOSED INTERCONNECT

Location	Maximum Measured Magnetic Field (mG)
Beneath distribution lines	1.3
Beneath inactive 138 kV lines	4.4
South side of substation	3.1
North side of substation	24.2

Modeled EMFs for the New Electric Transmission Line

Electric and magnetic fields were modeled assuming that the full production from the Project (1,000 MW) is split evenly between the two 138 kV circuits on the electric transmission lines and that the conductors on the two circuits are in-phase. Field strengths were projected at locations 3 feet above grade, assuming that the lowest conductors for each circuit are 28 feet above ground level. Field strengths were first projected for the two-circuit configuration, then for two different three-circuit configurations (Alternative 1A and 1B). Because the corner of a proposed commercial building is at the edge of the ROW for the three-circuit configuration, magnetic field strengths for these alternatives were projected both at 3 feet above ground level, and at 15 feet above ground level, the approximate height of a two story building. The modeling results are graphically depicted in Figures 4.13-8 through 4.13-15.

For all modeled scenarios, projected ground level (3 feet) field strengths at the edge of an 85-foot ROW are less than the Commission guidelines of 200 mG for magnetic fields and 1.6 kV/m for electric fields. For the three circuit configuration, modeled magnetic fields on the second story of a building at the edge of the ROW are also less than the Commission guidelines.

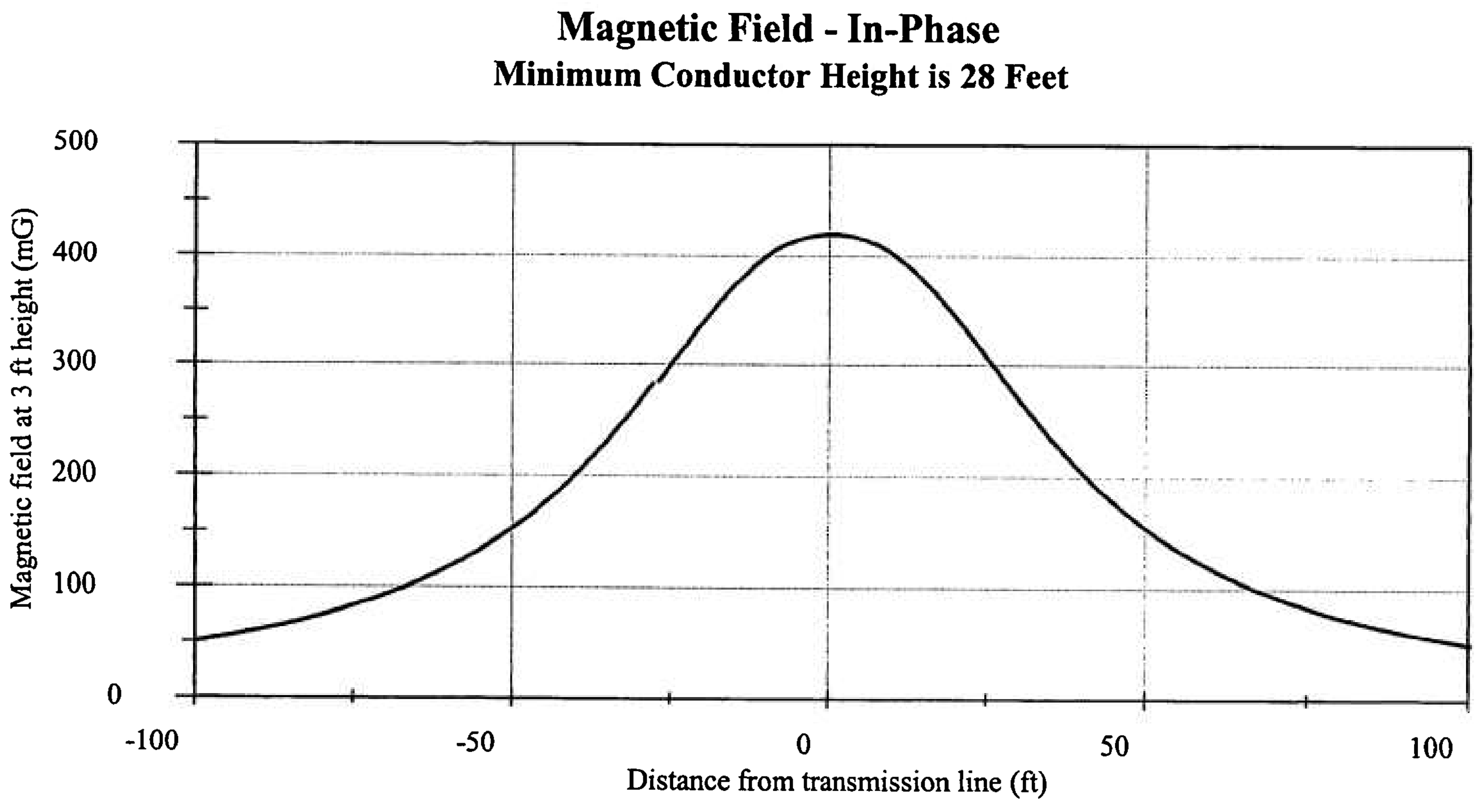

Figure 4.13-8 Ground Level Magnetic Fields Modeled for In-Phase Conductors with a Minimum Ground Clearance of 28 Feet.

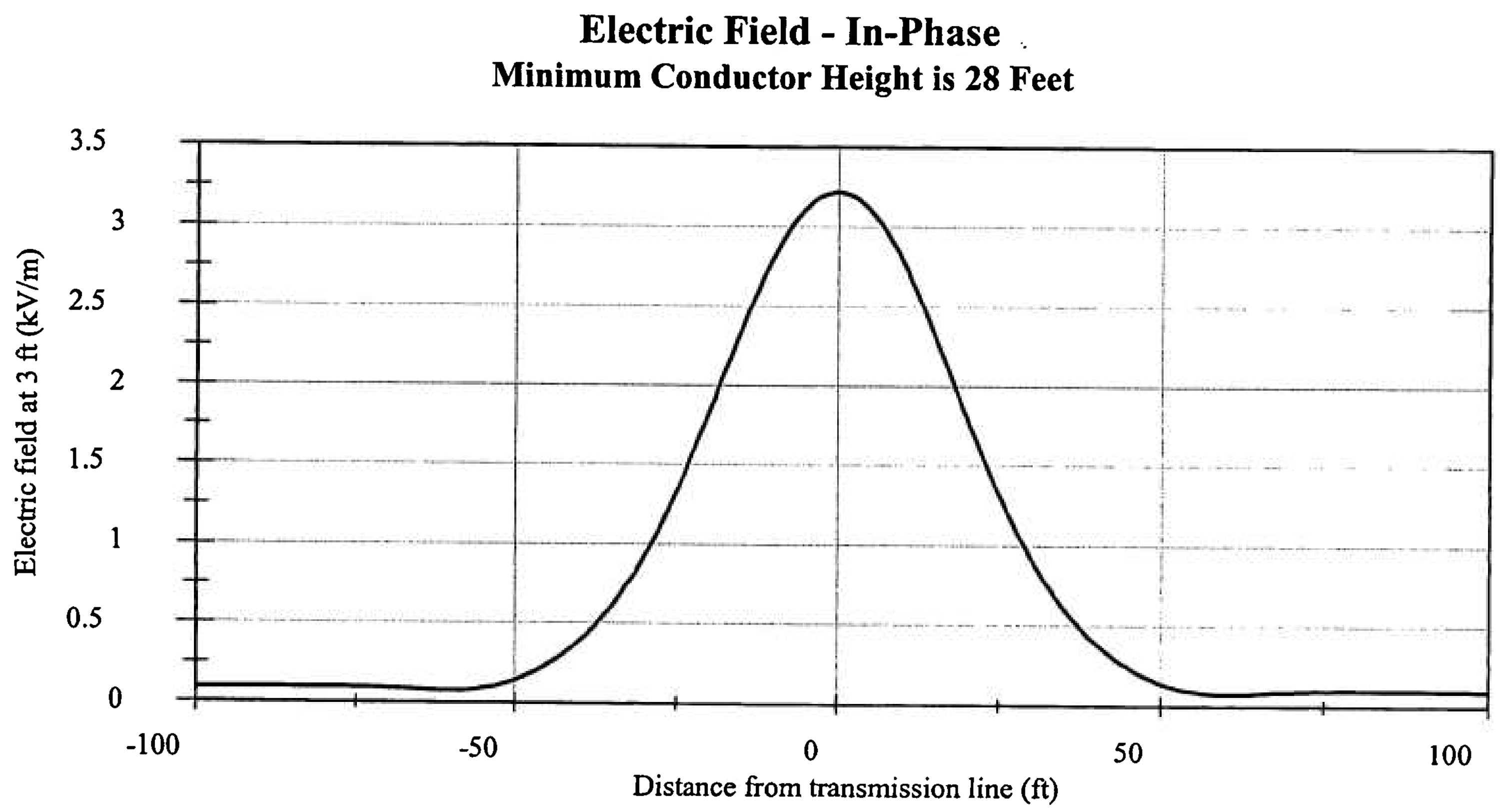

Figure 4.13-9 Ground Level Electric Fields Modeled for In-Phase Conductors with a Minimum Ground Clearance of 28 Feet

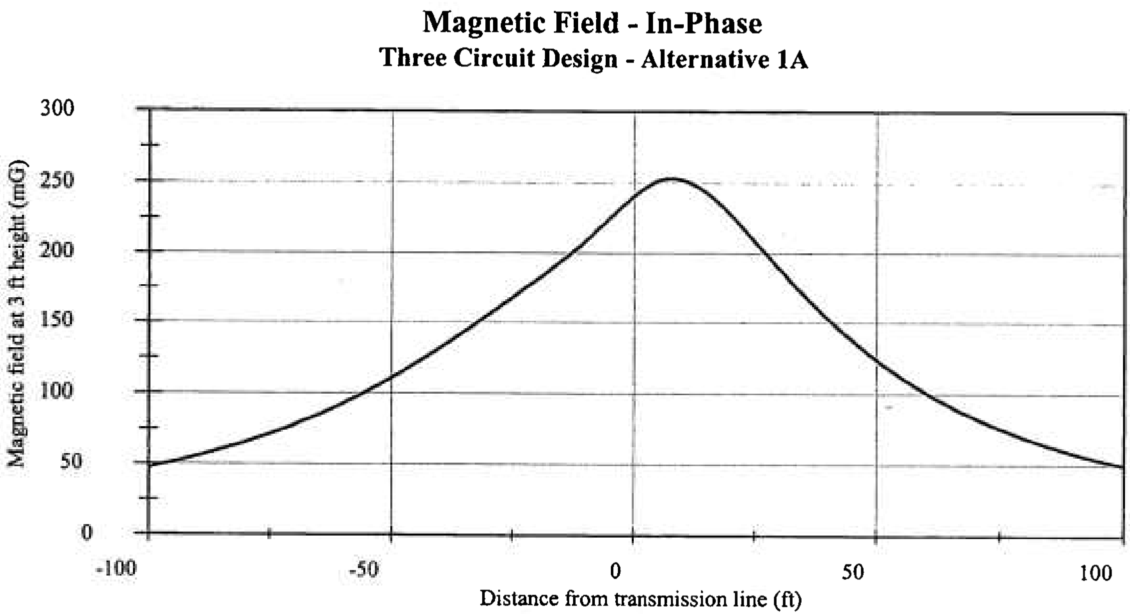

Figure 4.13-10 Ground Level Magnetic Fields for the Three-Circuit Design (Alternative 1A)

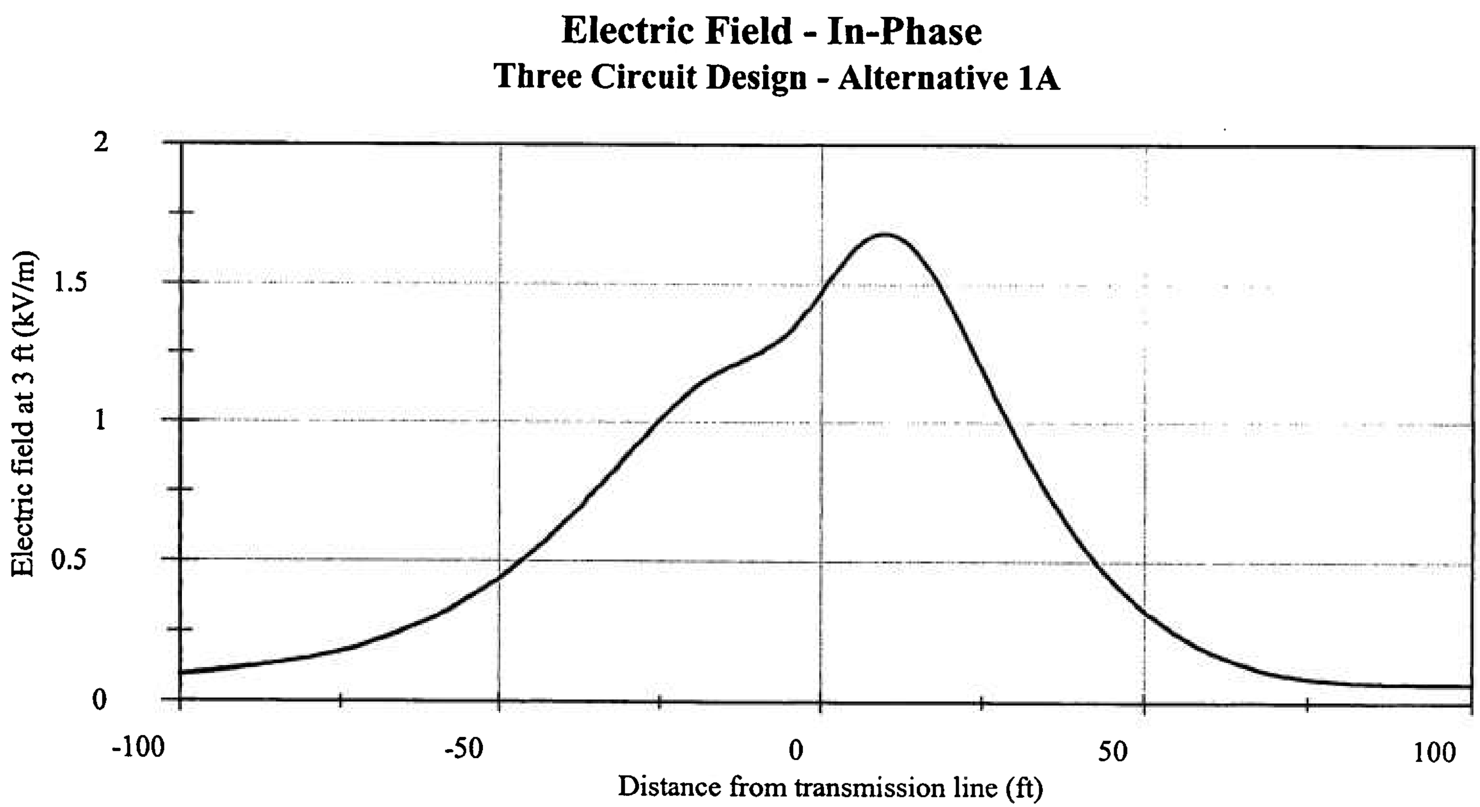

Figure 4.13-11 Ground Level Electric Fields for the Three-Circuit Design (Alternative 1A)

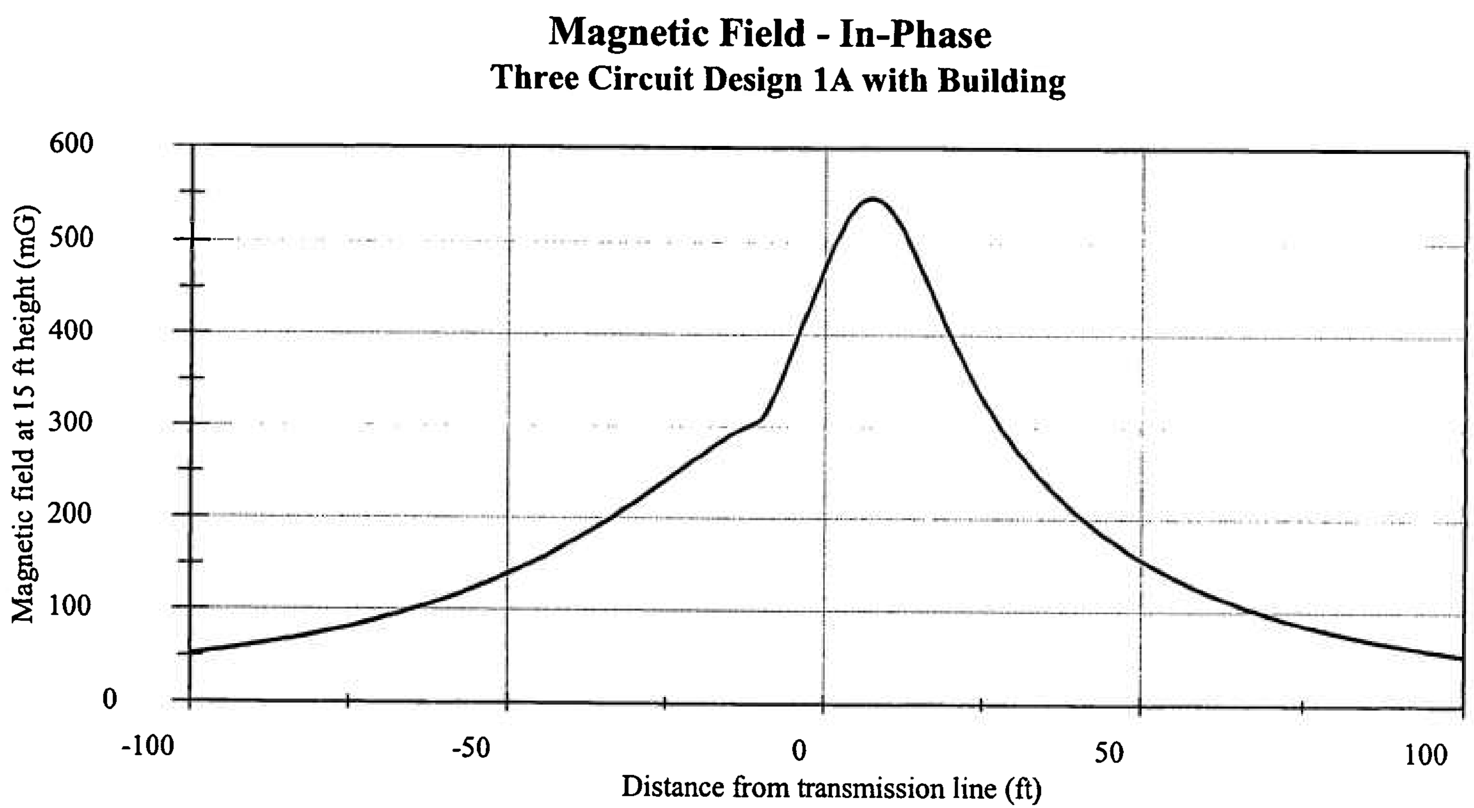

Figure 4.13-12 **Magnetic Fields Modeled for the Three Circuit Design (Alternative 1A) on the Ssecond Floor of a Building at the Edge of the ROW**

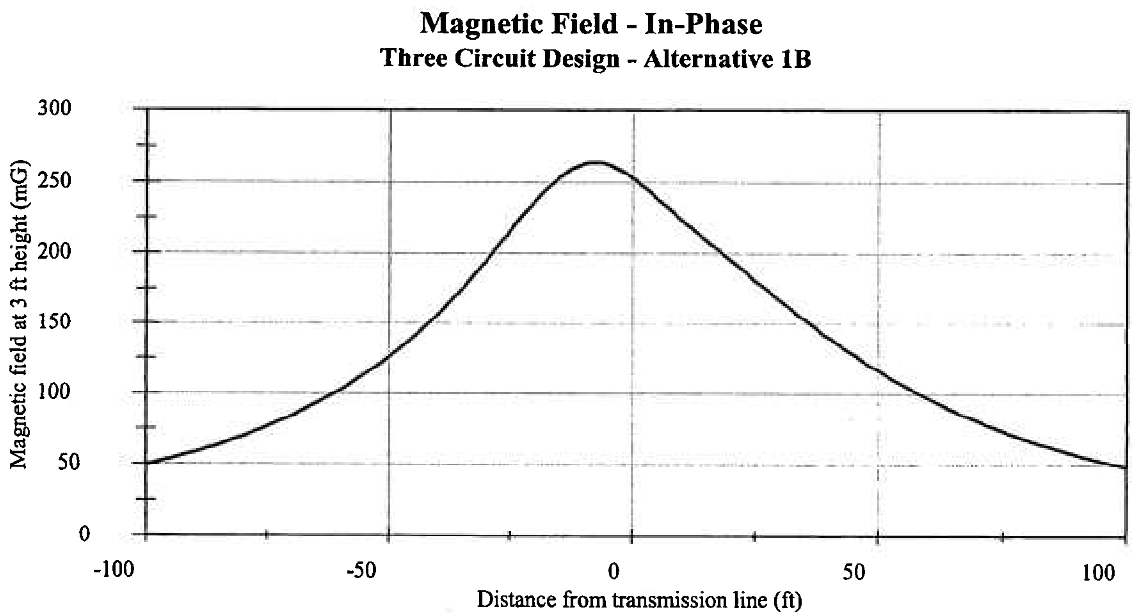

Figure 4.13-13 Ground Level Magnetic Fields for the Three Circuit Design (Alternative 1B)

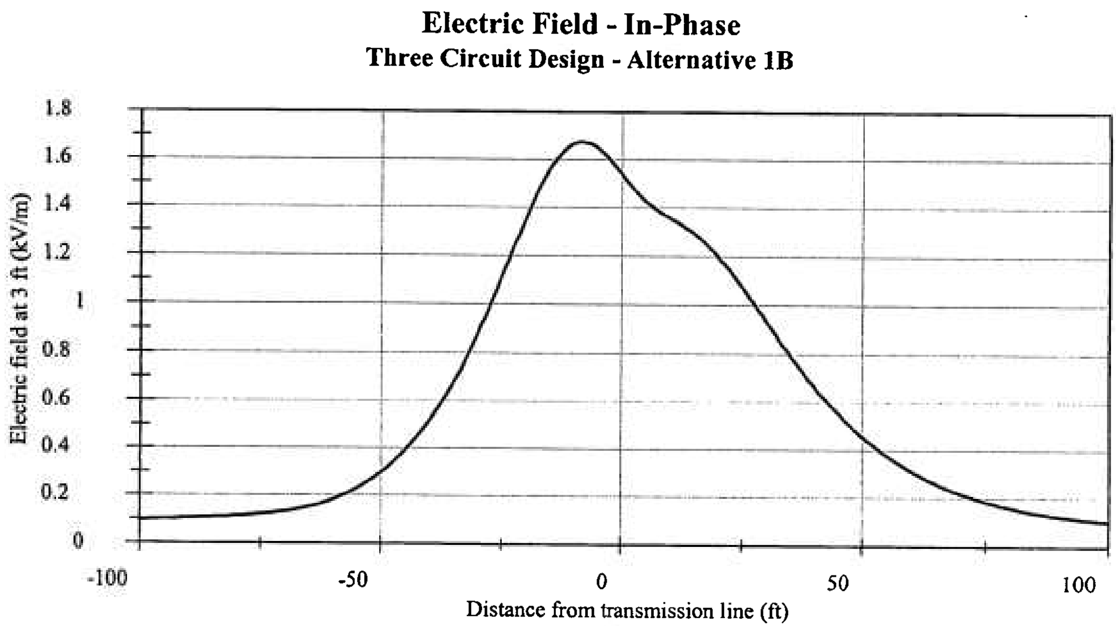

Figure 4.13-14 Ground Level Electric Fields for the Three-Circuit Design (Alternative 1B)

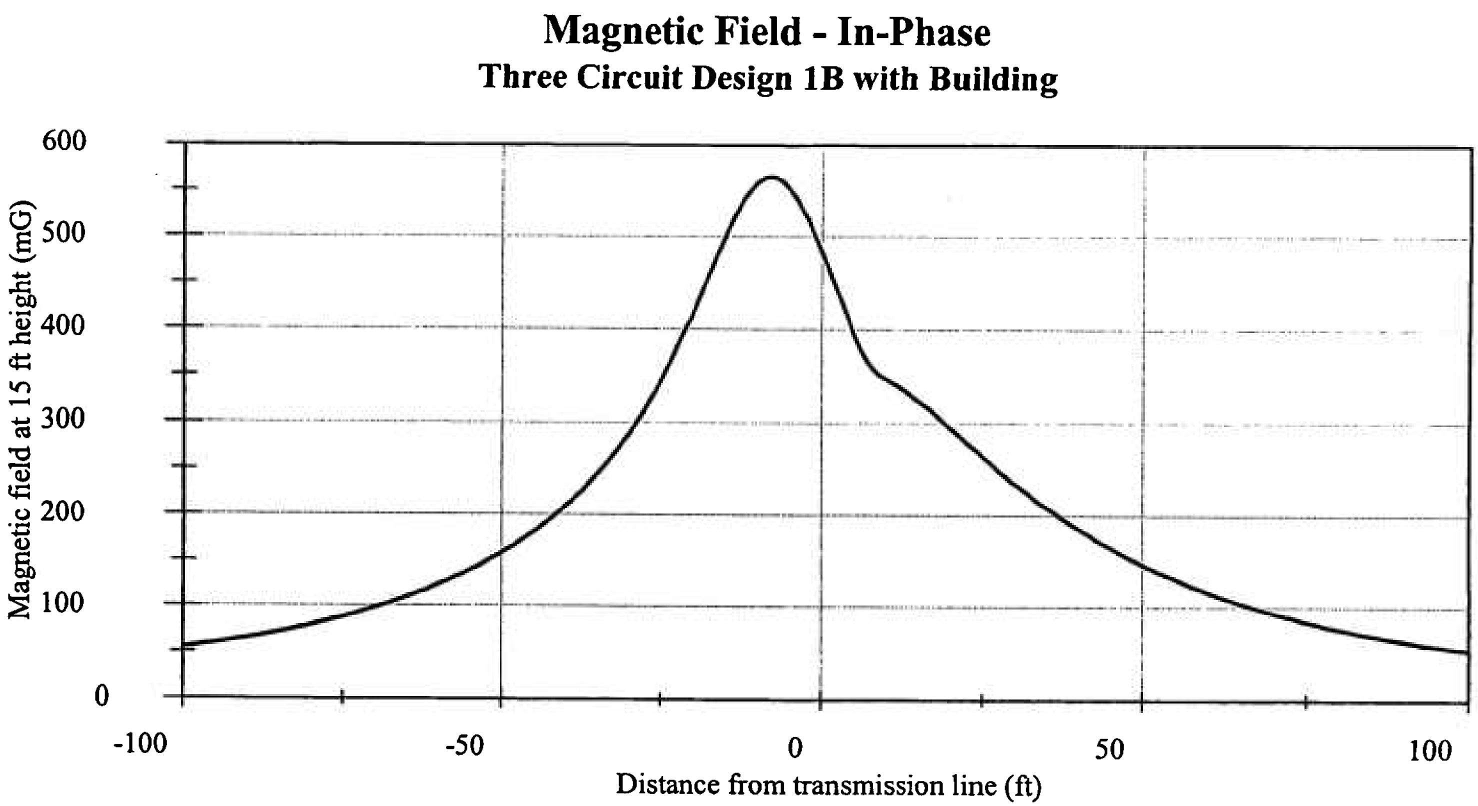

Figure 4.13-15 **Magnetic Fields Modeled for the Three Circuit Design (Alternative 1B) on the Second Floor of a Building at the Edge of the ROW**

4.13.7 References

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4.14 Natural Gas Transmission Facilities

4.14 Gas Transmission Facilities

In accordance with Sections 164(1)(a) and 164(1)(c) of the New York Public Service Law, Sections 1001.1(a) and 1001.3 of the Article X Regulations and Stipulation No. 4, this section provides a study of gas supply, capacity, and system impact for the Project. As demonstrated more fully below, the study establishes that there is more than sufficient capacity to supply the estimated gas requirements of the Project.

4.14.1 Gas Interconnection and Requirements

If the Con Edison natural gas interconnection is consummated, the Project will connect with Con Edison's 24-inch diameter high-pressure gas transmission line that forms part of the New York Facilities System. The Facilities System is the backbone of the gas transmission system controlled jointly by Consolidated Edison Company of New York (Con Edison) and the two KeySpan gas distribution companies (Brooklyn Union Gas Company and Brooklyn Union of Long Island) to deliver gas to the customers of all three companies in the New York City market.

All gas interconnection facilities, including: piping, meters, valves, and regulation, both onsite and offsite, will be designed, constructed, owned, and operated by Con Edison in compliance with all rules and regulations to insure safe and reliable service. All onsite gas piping beyond the Con Edison meters will be installed, owned, and maintained by the Project and will be constructed by certified contractors in accordance with applicable safety requirements. To provide gas to Astoria Energy, Con Edison will need to install a connection facility consisting of a 20 inch transmission-pressure (i.e., above 125 psig) gas service main from 20th Avenue running underground down Steinway Place to the Project Site. The 20 inch service main will tie into an existing 24 inch gas transmission main located on 20th Avenue. The main extension will continue north on 38th Street, approximately 1,850 feet to the intersection of Berrian Boulevard. At the intersection, a 20 inch Remote Operated Valve (ROV) will be installed. The main extension will then turn east and continue on Berrian Boulevard for approximately 300 feet, where it will enter the Project Site. An onsite filter/scrubber will be installed to remove liquids entrained in the gas stream. After the filter, an 8 inch line will tee off of the 20 inch run. The 8 inch line will go to an 8 inch turbine meter and gas regulators, and supply gas to the auxiliary boiler and duct firing units. The 20 inch line will continue to a 20 inch ultrasonic meter, and on to the Project's compressor, where the gas will be compressed to 450 psig.

The onsite compression facilities will be comprised of three (3) 100 percent capacity units. Each unit at 3,000 kW will be required for the operation of one of the two power blocks. Thus, one unit will act as an installed spare. Therefore, the total fuel gas compressor load for the entire Project is estimated to be 6,000 kW. To serve the heating load in the offices and warehouse etc., a 4 inch low pressure gas main will be extended down Steinway Street approximately 800 feet from an existing 4 inch low pressure gas main. Then, a 4 inch gas service will be extended to the Project Site, and metered for the firm space heating requirements. In addition to the regulator and metering equipment, installation of low gas pressure trip switches will be required.

A description and diagram of the proposed Con Edison interconnection facilities is attached hereto as Appendix 4.14. Preliminary cost estimates included in Appendix 4.14 have been redacted. In addition, the proposed route is shown in Figures 4.14-1 and 4.14-2.

In the alternative, Astoria Energy will seek to connect directly to the facilities of the Iroquois Gas Transmission System ("IGTS"). IGTS is seeking FERC approval of an approximately 29 mile expansion of its existing system from an interconnection at Northport, New York to the Bronx ("Eastchester Expansion"). At Astoria Energy's request, IGTS will evaluate and prepare necessary documentation to seek approval from FERC to build a 13.7 mile lateral to its interstate system that would connect directly to the Project ("Astoria Lateral"). The Astoria Lateral would be a 24-inch pipeline extending southwesterly from the Eastchester Expansion Project near Huckleberry Island, landing near the Throgs Neck Bridge, heading westerly for approximately 8.7 miles through Old Ferry Point, Hunts Point, and Wards Island, and terminating at Astoria, Queens. The Astoria Lateral would be subject to FERC jurisdiction.

The Project's estimated peak requirement for natural gas is approximately 8,000 Mcf per hour and approximately 192,000 Mcf per day.[1] The estimated annual gas requirement is approximately 65 Bcf. This estimate is based on the prediction that natural gas will be used to operate the Project the equivalent of 341 days. This includes 10 days of shut down per year for scheduled maintenance, and additional shut downs for interruptions by Con Edison or IGTS. The estimated winter season requirement (November through March) is 27.0 Bcf. The estimated summer season requirement (April through October) is 38.0 Bcf.

4.14.2 Gas Supply and Pipeline Capacity

This section describes the current and projected availability of natural gas supplies in the Northeast region,[2] and pipeline delivery capacity into the New York City market area.

<u>Northeast Region Gas Supplies</u>

Astoria Energy has examined available information on the status of gas supply availability for the Northeast. Reports show that adequate supplies of gas will be available to meet forecast demands that assume high, middle, and low growth scenarios. For example, the 1998 New York State Energy Plan (1998 SEP) included a high demand growth case that assumed all new electric generation capacity needs within the planning horizon to the year 2016 would be met through new natural gas-fired generation units located in New York. The 1998 SEP states that natural gas supplies are expected to be adequate to meet this range of demand in the planning period (<u>see</u> Appendix 4.14). *(New York State Energy Plan and Final Environmental Impact Statement* (November 1998) at 3-30 and *Appendix* (1998) at 6.1.) Other studies also show that adequate gas supplies will be available to meet the Northeast region's needs over the planning horizon. According to the U.S. Department of Energy Information Administration, *Annual Energy Outlook 2000, Issues in Focus, Natural Gas: Industry Expansion; Report No. DOE/EIA-0383*

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[1] Based on an assumed natural gas heat content of 1,000 Btu per cubic foot.

[2] The Northeast is defined as the Middle Atlantic census region (New York, New Jersey, and Pennsylvania) and New England.

(2000), ample gas supplies for this region will be available from the U.S. Gulf Coast producing area and Western Canada (see Appendix 4.14). Other sources of gas supply include Appalachian and Mid-continent production, liquefied natural gas (LNG) imports, and supplemental supplies, such as propane-air and refinery gas.

New Gas Supplies

Several major gas pipeline projects currently are being developed that will add capacity into the Northeast region. To a large extent, these projects are the result of competition to deliver new gas supplies to high-value Northeast markets. The projects include growing Western Canadian gas production channeled through Midwest pipelines, new gas production from offshore Nova Scotia, and LNG imports from Trinidad. Furthermore, the Cove Point LNG terminal in Maryland, recently sold to The Williams Company, has existing 5 Bcf of storage capability and 1Bcf of gas per day of send-out capacity with plans to expand to 7.5 Bcf of storage capability. Currently used for "peak shaving" services to customers in the Mid-Atlantic region, this facility is expected to be back in full operation by mid 2002.

Eastern Canadian gas production will become an important new supply source in the Northeast market with the completion of the Maritimes & Northeast Pipeline. Recent forecasts by the Canadian National Energy Board show Scotian Shelf production more than doubling from under 500 MMcf per day in 2000 to over one Bcf per day in 2010[3] over the next ten years. Gas use in the Maritimes is expected to grow to approximately 200 MMcf per day over this same period. Consequently, most of this gas will be available for export to U.S. markets.[4]

In addition, because Eastern Canadian supplies will back-feed the regional pipeline grid, existing forward-haul pipeline capacity will become available in upstream markets such as New York and New Jersey, even if these markets are not direct consumers of the Eastern Canadian gas.

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[3] National Energy Board, Canadian Energy Supply and Demand to 2025, 1999.

[4] National Energy Board, Reasons for Decision, Case GH-1-99 (June, 1999), p.10.

Available Capacity in Existing Pipelines

As set forth in Section 4.14.3, there is ample existing pipeline capacity into New York City to support the Project. In addition, because the aggregate capacity utilization rate for pipelines delivering into the Northeast market is relatively low, there are opportunities to increase gas deliveries with existing gas transmission facilities. Raising the capacity utilization rate by five percent would increase gas deliveries into the region by more than 200 Bcf per year. Better utilization of existing pipeline capacity will be facilitated by contract restructuring as existing long term agreements for pipeline capacity rights expire.

Expansion of Existing Pipeline Capacity

Iroquois Gas Transmission, Portland Natural Gas Transmission, and Maritimes & Northeast Pipeline are all relatively young pipelines, constructed within the last 10 years. All of these pipelines can increase mainline delivery capacity at relatively low cost by adding compression capacity to existing pipe. Pipeline construction projects completed in 1998 and 1999 increased the estimated potential supply for the Northeast region to over 4.5 Tcf per year as of January 2000.

Established pipelines such as Transcontinental Gas Pipeline and Texas Eastern Transmission have also demonstrated the ability to increase capacity into Northeast markets at reasonable cost through a combination of compression and pipeline looping. The Transco MarketLink and Duke Energy Spectrum projects are recent examples.

Major pipeline projects currently under development are summarized in Table 4.14-1. Together these projects would create more than 2.5 Bcf per day, and 900 Bcf per year, of additional gas delivery capacity.

TABLE 4.14-1:

PROPOSED PIPELINE PROJECTS INTO NORTHEAST MARKETS

Project	Description	Daily Capacity (MMcf/d)	Annual Capacity (Bcf/year)	Planned start Date
IGTS Eastchester	Extend pipeline from Northport, NY to Bronx, NY	200 - 350	75.0 - 125.0	4/02
Millennium Pipeline	New pipeline from Dawn, ONT to Mt. Vernon, NY	700	255.5	11/01
Independence Pipeline	New pipeline from Defiance, OH to Leidy, PA	1,000	365.0	11/01
Atlantic Advantage	Expand existing CNG and TGP pipeline systems.	Up to 750	Up to 275	11/01

Source: FERC filings and company press releases.

The Project's fuel supply will be provided from marketers providing bundled services, including: released pipeline capacity, storage, exchange with other marketers, and backhaul from New England to the New York City gate. The Algonquin Pipeline interconnects with Iroquois at Brookfield, Connecticut. Maximum annual consumption of the four Project turbines at 100 percent output would be approximately 65 Bcf, well within the 1998 SEP and other supply forecasts. The range of output, however, will be flexible and consistent with gas supply availability over the course of each year or seasonal period.

4.14.3 Gas Delivery Capacity into New York City

Five interstate natural gas pipelines deliver gas into the New York City market today. As shown on Table 4.14-2, total capacity into the New York market is approximately 2.5 Bcf per day and more than 900 Bcf per year. With the exception of Algonquin, which supplies Con Edison markets in Westchester County, these pipelines deliver gas into an integrated gas distribution network. This integration is the result of close coordination of system planning and operations by the three gas utilities serving this market through their joint ownership of the New York Facilities System.

TABLE 4.14-2:

PIPELINE CAPACITY INTO THE NEW YORK CITY* MARKET, 1999

Pipeline	Daily Capacity (MMcf/day)	Annual Capacity (Bcf/year)
Transcontinental Gas Pipeline	1,432	520
Texas Eastern Transmission	605	220
Iroquois Gas Transmission	253	85
Tennessee Gas Pipeline	202	73
Algonquin Gas Transmission	27	10
Total	2,518	908

Source: Index of Customers filed with the FERC.
* Excludes 50 MMcf/day of delivery capacity at South Commack, NY controlled by NJ utilities, and more than 300 MMcf/day of direct delivery capacity into the Northport electric generating facility

Except for periods of peak winter-season demand, only a portion of the available pipeline capacity is needed to meet the requirements of gas sales and transportation customers. In 1999, for example, the combined annual firm gas sales and firm transportation deliveries of Con Edison and the two KeySpan companies totaled 282 Bcf (Table 4.14-3), or less than one-third of the available pipeline delivery capacity as shown on Table 4.14-2. Deliveries for electric generation and other interruptible customers added another 218 Bcf to annual send out. This leaves more than 400 Bcf of potential delivery capacity available on an annual basis.

TABLE 4.14-3:

NEW YORK MARKET GAS SEND OUT, 1999

(BCF)

	Con Edison	KeySpan	Total
Firm Sales & Transportation	89	193	282
Interruptible Sales & Transport.	48	40	88
Total Sales & Transportation	137	233	370
Power Generation Gas Use	51	79	130
Total On-System Deliveries	188	312	500

Sources: Con Edison and KeySpan statistical reports. FERC Form 423 data.

As would be expected in a market with high residential and commercial space-heating demand, gas pipeline capacity available to supply electric generators in the New York City area varies considerably by season. In recent years, approximately 800 MMcf per day of pipeline delivery capacity has been available for electric generation during the five-month winter season. The available gas supply then increases to more than 1,400 MMcf per day during the March-to-October period, when the demand for electricity is the greatest. Existing power generators use only a portion of the available capacity. As Table 4.14-4 illustrates, the gas delivery capacity that is potentially available for power generation with the existing pipeline capacity is large in comparison with the estimated gas requirements of the Project.

TABLE 4.14-4:

CAPACITY AVAILABLE FOR ELECTRIC GENERATION IN NEW YORK CITY, 1995-98

MMcF/DAY

	Winter 1995-96	Summer 1996	Winter 1996-97	Summer 1997	Winter 1997-98
Capacity into NYC*	2,400	2,300	2,400	2,300	2,400
Firm Sales	1,404	454	1,222	481	1,139
Transportation	82	103	236	233	278
Interruptible Sales	103	64	121	108	157
Total Sales & Transp.	1,589	621	1,579	822	1,574
Available for Electric	811	1,679	821	1,478	826
Electric Utility Use	223	567	429	707	449
Unused Capacity	588	1,111	392	770	377

*Estimated pipeline capacity at points of delivery into New York City gas utilities.

Source: On-system gas deliveries from New York Gas Group, New York Gas Report.

Moreover, there is strong evidence that additional pipeline delivery capacity will be constructed into the New York market within the time period required to supply gas to the Project. Table 4.14-5 describes four projects already in development that would increase delivery capacity into New York markets by up to 1.3 Bcf per day and up to 480 Bcf per year by 2003. With relatively low growth in non-electric demand, much of the new capacity will be available for power generation use.

TABLE 4.14-5:

PROPOSED PROJECTS TO INCREASE GAS SUPPLY INTO NEW YORK CITY

Project	Description	Daily Capacity* (MMcf/day)	Annual Capacity (Bcf/year)	Planned Start Date
IGTS Eastchester	Extend pipeline from Northport, NY to Bronx, NY.	200 - 350	75 - 125	4/02
Millennium Pipeline	New pipeline from Dawn, ON to Mt. Vernon, NY.	350	127.8	11/01
MarketLink	Expansion from Leidy, PA to Manhattan and Narrows gates.	500	182.5	11/01
CrossBay (Phase 1)	Add compression to existing Transco Long Beach line.	125	45.6	11/02

*Proposed deliveries to gate stations supplying New York City markets.

Source: FERC filings and company press releases.

Finally, by displacing existing oil and gas-fired generating plants on the power grid, new power plants with combined-cycle technology will free up gas delivery capacity that is currently being used by much older steam generating plants. Because these new plants use up to 40 percent less natural gas than conventional steam plants to produce a given amount of electricity, the available gas supply will be used more efficiently, reducing incremental requirements for delivery capacity on the gas pipeline and distribution systems.

4.14.4 Natural Gas Capacity Contracts

Astoria Energy has applied for gas transportation service on the Con Edison distribution system. The service will be governed by the applicable terms of Con Edison's SC-9 tariff schedule approved by the New York Public Service Commission. It is anticipated that an agreement with Con Edison will provide for service from Con Edison's interconnections with interstate pipelines to the Project, subject to curtailment or interruption by Con Edison under certain conditions.

Because of the Project's ability to bypass the Con Edison system by connecting directly to the IGTS system, Astoria Energy has requested a bypass deferral contract under Con Edison's S.C. 9 tariff and negotiations are underway. In the event those negotiations are unsuccessful, the Project will connect directly to the IGTS interstate system. As noted earlier, at Astoria Energy's request, IGTS would evaluate and prepare necessary documentation to seek approval from FERC for the Astoria Lateral.

The Project will be a merchant plant and will enter into arrangements with gas suppliers for the delivery of gas into the Con Edison or IGTS systems. It is anticipated that gas suppliers to the Project will use both firm and interruptible pipeline capacity. Pipeline capacity will come from contractual rights already held by suppliers, capacity turned back by existing shippers at the expiration of their service agreements, capacity offered by existing shippers under pipeline capacity release programs, or capacity in new pipeline projects. The Project may hold firm pipeline capacity on upstream pipelines for some portion of its gas requirement.

4.14.5 Impact on the Con Edison Gas Distribution System

If the Project connects to the Con Edison system, there will be de minimis impact on the operations of that system. Because the gas transportation service with Con Edison will be subject to interruption on days of peak gas load at the utility's discretion, the Project's gas usage will not increase peak day requirements on the Con Edison system. In fact, most of the Project's gas usage will occur during periods when there is currently unutilized capacity on the Con Edison system. By increasing the system load factor, the Project will improve the operating efficiency of the Con Edison gas distribution system. There will be no operational impact on the Con Edison system if the Project connects directly to the IGTS system.

4.14.6 Description of Con Edison Upgrade Projects

Con Edison has provided a preliminary analysis which states that 7,700 feet of 36 inch gas main must be installed in the Astoria area of Queens and the Hell Gate area of the Bronx to accommodate the Project. The Project currently is in discussions with Con Edison regarding the scope and estimated cost of this system reinforcement.

4.14.7 Fuel Oil Use

The Project is expected to operate on low sulfur distillate fuel oil for a limited number of hours annually. During those periods when oil is being used, the peak rate of oil use is estimated to be 56,000 gallons per hour, or 1.3 million gallons per day. Based on an expected permit limit of 720 hours of oil use annually, the maximum annual oil consumption of the Project will be approximately 39 million gallons. Onsite tank storage capacity will allow at least 4.5 days of operation at maximum oil use.

5.0 Alternatives

5.0 ALTERNATIVES

5.1 Cooling System Alternatives

In accordance with Stipulation No. 13, the following alternative cooling systems to Air Cooled Condensers (ACCs) were evaluated for the Project: (i) Conventional Condenser with Once-Through Cooling System; and (ii) Conventional Condensers with Wet-Dry (Hybird) Cooling Tower. Based on consideration of the following parameters: environmental impact (water resources, noise, air emissions), visual impact, chemical use and storage, make-up water requirements, plant performance, cost, and the characteristics present at the Project Site, Astoria Energy has chosen ACCs to minimize potential significant adverse environmental impacts.

To evaluate performance, condenser pressure for each alternative was optimized for lowest evaluated cost at Project design conditions of 85°F, 60% relative humidity. Heat balances were developed for each alternative at an annual average temperature of 57°F to determine plant net output differentials. Fuel use was not an evaluation factor because it is the same for all three alternatives. The optimum pressures for the alternatives were determined as 4"Hga for the air cooled condenser, 3.5"Hga for the wet-dry tower, and 2.4"Hga for the once-through system.

Cost quotations from vendors were received for the ACC and the wet-dry cooling tower. Conventional condensers, pumps, and interconnecting piping for the wet-dry cooling tower and the once-through cooling systems were evaluated using a Raytheon database. Total installed cost includes direct costs (civil, mechanical, electrical), indirect costs, professional services, overhead, and contingency.

Per Stipulation No. 13, the ACC alternative was selected as the base case for evaluating the once-through cooling system and wet-dry cooling tower alternatives.

5.1.1 Air Cooled Condensers

5.1.1.1 Technical Description

As set forth in Section 3.0, ACCs use ambient air as the cooling medium. Steam from the steam turbine is exhausted into a duct, which distributes the steam to finned tube elements. The steam condenses inside the tubes as it is cooled by ambient air flowing on the outside of the tubes. Cooling air is provided by axial fans which are driven by electric motors through speed reducing gear boxes. Condensate from the finned tube elements is drained by gravity into a condensate tank. The condensate is partially reheated by steam from the main steam duct in order to release non-condensables. Non-condensables and any air that may leak into the condenser are evacuated by vacuum pumps and discharged to the atmosphere. From the condensate tank, the condensate is pumped to the steam generator.

5.1.1.2 Environmental Considerations

Noise

The ACC electric motors, gearing, and fans produce noise. For the purpose of this evaluation, both the ACC and the wet-dry tower were designed to the same noise criteria. The noise levels can be mitigated by installing low-noise components, such as variable frequency drives, motors, gearboxes, and fans, and designing for low speed fans.

Air Quality

Hot air discharged at the top of the condensers will rise and is not expected to have any adverse effect on ambient temperatures in the vicinity of the Project particularly because there are no high-rise buildings near the Project Site.

Visual Impact

Two (2) air cooled condensers will be required for the Project, one (1) for each power block. Each condenser will be approximately 160 feet by 430 feet with a height of approximately 105 feet. Because the ACCs are the largest structures of the three alternatives, many urban generating facilities lack sufficient area to site them. However, sufficient space is available at the Project Site to support the ACCs required for Project operations.

5.1.1.3 Project Performance and Cost

The ACC alternative was used as the base case in evaluating Project performance and cost for the remaining alternatives per Stipulation No. 13. Capital costs include the following major equipment for this alternative: two ACCs, steam supply ducts, condensate drain tanks, condensate pumps, piping, supports and foundations. Comparative costs are summarized in Table 5-1.

TABLE 5-1:

COMPARISON OF COSTS

Differential Cost, 1000$	Air Cooled Condenser	Wet-Dry Cooling Tower	Once-Through System
Installed Cost Differential	Base	-$32,000	-$29,000
Wet-Dry Tower Water Make-up	Base	+$18,700	0
Generation Revenue Differential	Base	+$11,400	-$18,600
Fuel Cost Differential	Base	0	0
Total Evaluated Cost Differential	Base	-$1,900	-$47,600

5.1.2 Once-Through Cooling

5.1.2.1 Technical Description

This cooling system provides cooling water for conventional condensers. A conventional condenser is a tube-shell heat exchanger. Steam from the steam turbine is exhausted into the shell of the condenser and condensed by cooling water flowing through the tubes. The condensate is partially reheated by steam from the steam turbine exhaust that bypasses the tube bundle in order to release non-condensables. Non-condensables and any air that may leak into the condenser are evacuated by vacuum pumps and discharged to the atmosphere.

The cooling water to the condenser tubes is supplied from an external body of water such as a river or lake, which for the Project would be the East River or Steinway Creek. The water first passes through an intake structure, which consists of a series of screens, a common plenum, and circulating water pump bays. The screens are assumed to be of the passive wedge-wire type with low water velocity to minimize impingement of fish and shellfish and entrainment of fish and shellfish eggs and larvae. The screens filter the water as it enters the common plenum. From the common plenum, the water enters the circulating water pump bays. The circulating water pumps, usually single stage, vertical pumps, with a mixed flow impeller, deliver cold water to the condenser tubes via an underground pipe.

Warm water from the condenser is discharged via an underground pipe to a discharge structure. The discharge structure consists of a seal well followed by a diffuser. The seal well is necessary because the system operates under a siphon (water in condenser tubes is above the cooling water body level) and any air leakage into the discharge pipe would break the siphon. The seal well is a small basin receiving water from the discharge pipe. Water level in the seal well, is maintained above the top of the discharge pipe top so that no air can leak in. From the seal well the water flows by gravity into a diffuser which is a pipe with several discharge nozzles designed to disperse the warm water into the body of cold water. Because the water side of the condenser in the once-through cooling system is under vacuum (created by the siphon), dissolved air that is released from the water at the top of the condenser water boxes is evacuated by vacuum pumps.

5.1.2.2 Environmental Considerations

Aquatic Habitat

A once-through cooling system impacts the aquatic environment by: (i) increasing the water temperature in the body of water which receives the cooling water discharge; and (ii) impinging fish and shellfish and entraining fish and shellfish eggs and larvae at the point of the water intake. The increase in water temperature from the Project discharge potentially would impact aquatic biota. Depending on design specifics, existing organisms could be displaced by the higher water temperature. Moreover, those species that become acclimated to the higher temperatures may be adversely affected during periods of Project shutdown.

The withdrawal of water also would impact aquatic life by impinging fish and shellfish and entraining eggs and larvae. Impingement of fish and shellfish and entrainment of eggs and larvae of aquatic organisms can be lessened, but not prevented, by the use of passive wedge-wire type water intake screens and/or an aquatic filter barrier, which typically is a full water depth curtain. Cost of this type of barrier was not included in this study.

Chemical Use/Storage

The once-through cooling system would most likely require a biocide. The biocide could either be gaseous chlorine, which would require multiple one-ton cylinders; or more likely, sodium hypochlorite would be employed due to safety considerations. The sodium hypochlorite would be received as a 12% by weight solution and necessitate bulk storage of greater than 10,000 gallons.

Visual Impact

Except for the intake structure that would be located on Steinway Creek or the East River, there would be no visual impact of the once-through cooling system. The intake structure is estimated to be about 25 feet wide, 50 feet long, and 20 feet high.

5.1.2.3 Project Performance and Cost

Capital costs include the following major equipment: intake structure with screens, circulating water pumps, two water cooled condensers, circulating water supply and discharge piping, seal well and diffuser piping. Total estimated costs associated with the once-through cooling system are significantly lower than the total estimated costs for the ACC alternative. As set forth in

Table 5-1, the estimated installed cost differential between the once-through cooling system alternative and ACC alternative is approximately $29,000,000.

Project performance at annual average temperature (57°F) was estimated for this alternative and compared to the base case (air cooled condensers). Net Project output for an electric generating facility using a once-through cooling system is approximately 9.4 MW greater compared to the ACC alternative. This increase in Project output would result in a generation revenue differential of approximately $18,600,000 when compared to the ACC alternative.[1]

5.1.3 Wet-Dry Cooling Towers

5.1.3.1 Technical Description

Wet-dry cooling towers differ from conventional wet cooling towers in that they reduce or eliminate the visible plume associated with wet cooling towers. The wet-dry cooling towers provide cooling water for conventional condensers. The conventional condenser was described above in Section 5.1.1.1. The wet-dry towers consist of two sections: (i) a wet section, in which water is cooled by direct contact with ambient air; and (ii) a dry section, in which water flows inside finned tubes and is cooled by ambient air flowing on the outside of the tubes. The two sections are arranged in parallel in the air stream with the wet section located at the bottom of the tower and the dry section located at the top of the tower. Cooling air to both sections is provided by axial induced draft fans which are driven by electric motors through speed reducing gear boxes. Saturated air discharged from the wet section is mixed with superheated air discharged from the dry section. The resulting mixture is superheated air that will reduce or eliminate visible plumes. The air mixture remains superheated even when cooled to ambient temperature, so that there is no cloud formation at a distance from the tower. Blowdown from the cooling tower is necessary to maintain circulating water chemistry at acceptable levels.

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[1] The formula used to derive the generation revenue differential is set forth below in Section 5.1.4.

5.1.3.2 *Environmental Considerations*

Wet-dry towers impact the environment in terms of noise, drift, visible plume (at very low temperatures), and blowdown discharge to the municipal sewer system.

Air Quality

Drift consists of small water droplets entrained in the air in the wet section of the tower where air and water are in direct contact. In cold weather, the droplets may cause ice deposition on adjacent structures. When droplets evaporate, particulates are generated from the dissolved and suspended solids contained in the cooling water. The wet-dry cooling tower design considered for this Project would eliminate visible plumes down to an ambient temperature of 12°F. A plume would be visible below this temperature. According to ASHRAE, temperatures during the winter of 11°F or lower occur for only 1 percent of the 2160 total winter hours, or 21.6 hours per year (based on data from LaGuardia Airport). Therefore, a plume may be visible for only one or two days a year. Although cooling tower designs that eliminate plume visibility at lower temperatures are available, the costs associated with this design are considered prohibitive.

Chemical Use/Storage

The wet-dry cooling system would most likely require a dispersant, a corrosion inhibitor and a biocide. The dispersant and corrosion inhibitors would typically be proprietary blended products including polyphosphates, and organic polymers. These materials would be received and stored in totes (350-400 gallon containers) or bulk (greater than 1000 gallon tanks). The biocide could either be gaseous chlorine, which would require multiple 1-ton cylinders; or more likely, sodium hypochlorite due to safety considerations. The sodium hypochlorite would be received as a 12% by weight solution and would necessitate bulk storage of greater than 10,000 gallons.

Noise

For the purpose of this evaluation, both the ACC and the wet-dry tower alternatives were designed to the same noise criteria. The projected sound levels are 60 dBA at various points on the street along the Site boundary, 37 dBA at 1800 feet, and 35 dBA at 2400 feet from the Project Site. The noise levels can be mitigated by installing low-noise components such as variable frequency drives, motors, gearboxes, and fans, and designing for low speed fans.

Visual Impact

Two wet-dry cooling towers would be required for the Project, one for each power block. Each cooling tower would be approximately 50 feet by 300 feet and would be approximately 60 feet in height. It is anticipated that a visible plume would be present during periods when temperatures are below 12°F (one or two days a year).

Make-Up Water Requirements

The wet-dry cooling tower alternative would require make-up water to replace water lost due to evaporation, drift, and blow-down. The blowdown would be discharged to the municipal sewer system. Steinway Creek or East River water was not considered for the cooling tower make-up because the components contained in this water would be dispersed to the atmosphere through the cooling tower drift. Therefore, the make-up water was assumed to be supplied from the municipal water system. For most of the year, the cooling tower would operate in the wet mode. Only at ambient temperatures that would produce visible plume would the dry section be utilized to eliminate the plume. During the wet mode of operation, the tower would require more make-up water than during the wet-dry mode of operation. The average volume of make-up water that would be required for the two cooling towers is estimated at approximately 4,175 gallons per minute (gpm).

5.1.3.3 *Project Performance and Cost*

Capital costs associated with the wet-dry cooling tower alternative include the installation of the following major equipment: two wet-dry cooling towers, two water cooled condensers, circulating water pumps, circulating water piping between condensers and towers, and foundations. Total costs associated with the wet-dry cooling towers are significantly lower than