REPORT

EAST HAMPTON POWER & LIGHT COMPANY
P.O. Box 805 Middle Island, New York 11953

PUBLIC SERVICE COMMISSION
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September 17, 2003

Hon. Janet Hand Deixler
Secretary
New York State Public Service Commission
Three Empire State Plaza
Albany, NY 12223-1350

By Federal Express

ORIG-FILES
C03-E-0518
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MR. J. GALLAGHER
MR. S. BLOW (4)

Re: Petition – In the Matter of East Hampton Power and Light Company, Inc.
Petition for an Order Regarding Regulatory Regime, Application for Certificate of Public Convenience And Necessity and Petition for Financing Approval
Case 03-E-0518

Dear Secretary Deixler:

Enclosed for filing are an original and five copies of a supplemental environmental impact assessment to our Petition for an Order Regarding Regulatory Regime, Application for Certificate of Public Convenience and Necessity and Petition for Financing Approval on behalf of East Hampton Power & Light Company, Inc., as requested by your office.

Also attached are exhibits concerning the affidavit of publication for Notice of Intent, Correspondence with the Long Island Power Authority for a Purchase Power Agreement, and our Certificate of Incorporation.

Again, I would like to thank your staff counsel and especially Mr. Steven Blow, for advise with various procedural aspects and sound legal advise.

If you have any questions concerning this Petition, please feel free to contact me at your convenience.

Respectfully submitted,

James A. Heller
President and CEO
East Hampton Power & Light

JAH/enclosures

N. Y. S. DEPARTMENT OF STATE
DIVISION OF CORPORATIONS AND STATE RECORDS ALBANY, NY 12231-0001

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County of Suffolk)

Michelle Donnelly of said county says she is the Legal Ad Clerk of Suffolk County Life, a newspaper published in the town of Riverhead County of Suffolk, State of New York, and annexed is a printed copy that has been regularly published in said newspaper once a week for 1 week(s) successively, commencing the 2 day of April, 2003.

Michelle Donnelly
Legal Clerk

Sworn to before me this 02 day of April, 2003.

Jennie L Taylor
Notary Public

JENNIE L. TAYLOR
Notary Public, State of New York
No. 01TA6079722
Qualified in Suffolk County
Commission Expires September 3, 2006

NOTICE OF APPLICATION OF EAST HAMPTON POWER & LIGHT COMPANY

East Hampton Power & Light Company ("EHPLC") a New York corporation, has filed a petition with the Public Service Commission for a certificate of public convenience and necessity to construct and operate a 79MW dual fired combustion turbine power generation facility in the Township of Riverhead, New York.

EHPLC has requested that the hearing required by the Public Service Law be Held before the Public Service Commission on the basis of the petition and accompanying Material and such exhibits, and other information as may have been filed by any party or The Staff of the Public Service Commission.

Any person opposed to the granting of the certificate, within 10 days of the publication of this notice, should notify in writing the Secretary of the Public Service Commission at Agency Building 3, Empire State Plaza, Albany, New York 12223, of [illegible] the reasons for the opposition.

LEGAL NOTICE #5203 SCL-RH 4/2

5203

EAST HAMPTON POWER & LIGHT

Supplement to Petition

Case Number 03-E-0518

(Draft)
Environmental Impact Assessment

Executive Summary

Submitted by: East Hampton Power & Light
P.O. Box 805
Middle Island, New York 11953

Executive Summary

1.0 Project Description

1.1 Introduction

As the energy industry on Long Island is undergoing many changes and improvements, retail customers are demanding lower prices for electric power. New power plants are being constructed in order to meet the growing demands as well as assure the residents uninterruptible service without rolling blackouts and power outages. These requirements have a profound impact on the long range planning process, especially the need for adding new on island generating sources.

The New York Energy Planning Board has recently issued a plan in which they emphasize provisions for safe, reliable and affordable electric energy in an environmentally responsible manner, and among whose objectives include the promotion of technological innovations, wholesale competition, and the encouragement of merchant generation and transmission development. East Hampton Power and Light's principles follow precisely along these advisory lines. We are also in favor of implementing and developing plans to avoid major power disruptions, that have been in the past unnecessary and unwarranted. We further, are in agreement with resource adequacy improvements and clean energy programs, such as the one we will construct and have in operation by the summer of 2004, approval pending.

To meet the need for additional generating capacity and to improve system reliability on the portion of the Long Island Power Authority (LIPA) grid serving the Eastern End of Long Island, LIPA may consider entering into a long-term power purchase agreement with East Hampton Power & Light (EHPLC), to purchase the output from a new electrical generating facility to be constructed in the Township of Riverhead, at the former Grumman Naval Reserve Facility, Calverton, Suffolk County, New York. The proposed facility, to be called the Calverton Generating Station (or CGS), would consist of one simple cycle gas/oil fired, air/water cooled 79 MW General Electric 7001 EA combustion turbine and generator with a pre-installed scrubber system (Selective Catalytic Reduction-SCR) for absolute compliance with all New York Department of Environmental Conservation air quality requirements.
The entire generating system may be optionally air-cooled allowing for minimal water usage. The combustion system is dual fired (oil & gas) and will use very low sulfur light oil until natural gas is available at the end of 2005.

The proposed state-of-the art Calverton Facility would be located on approximately 3 acres, in a pre-paved area of the Riverhead Industrial Park, that is zoned under the Riverhead Town Code as a pre-existing industrial zone. When the Grumman Plant was active an oil fired steam heat producing system was used for heating the airport hangars, assembly plant and administrative offices. When the Grumman Corporation relocated, the United States Government bequeathed the entire 2,900 acres on which the naval defense site was situated to the Township of Riverhead. The infra structure remains in place and intact enabling present day usage, including an ample water supply as well as sanitary waste water and sewage disposal. There will be little construction involved where noise, traffic, and dust pollution will be significant.

Because the maximum out put of the proposed facility will be less than 80 MW, the facility will not be considered as a major facility subject to the jurisdiction of the Board on Electric Generation Siting and the Environment, pursuant to Article X of the Public Service Law.

The object of the Environmental Assessment is to analyze the potential impacts of the proposed Calverton Facility in accordance with the State Environmental Quality Review Act (SEQRA), and to provide the basis for the DEC to act as the SEQRA lead agency, to make an informed decision as to whether the proposed action may result in any significant adverse environmental effects and thus require the preparation of an Environmental Impact Statement. We are currently assessing potential environmental impacts in all of the relevant environmental aspects, including land use and zoning, neighborhood character, community facilities, cultural resources, visual resources, traffic and transportation, air quality, noise, infrastructure, contaminated materials, coastal zone management, and construction. Because it is expected that the proposed facility will be constructed and operating by the summer of 2004, and no material changes are predicted during this interval, future conditions without the proposed project would be the same as existing conditions. Consequently, impacts are assessed by comparing future conditions with the proposed facility to existing conditions without the facility. Although construction of the proposed facility constitutes a discrete action under SEQRA, and is not dependent on approval of any other facility, the assessment nevertheless includes, where relevant to ensure a conservative analysis, potential impacts from other proposed facilities under consideration by LIPA, as well as the other facilities referred to in the discussion of cumulative impacts.

1.1.1. Public Need and Purpose

As set forth in LIPA's Draft Energy Plan 2002-2011, LIPA has determined that there is a need for an additional 200 MW to meet the energy needs of the LIPA service area for this summer (2003) and to prevent Long Island's generating capacity from slipping below prudent levels in future years. After this year, LIPA's projections of future energy needs on Long Island indicate that the peak demand will grow each year by approximately 100 MW between now and 2011. The peak load is projected to increase approximately 1.7 percent per year during this period. The current "Requests for Proposals" issued last month, June 24, 2003, to provide Capacity, Energy, & Ancillary Services to the Long Island Power Authority, quoted in part as follows: The Authority recognizes the need for additional generation either on Long Island, or transmitted to Long Island from off-island generating sources, in order to serve its increasing load requirements." The current request for proposals is seeking to purchase 250-600 MW to be in service by the summer of 2006. (See: Appendix A: Request for Proposal Meeting of LIPA, June 24, 2003.)

Prior to the current Request for Proposals the need for additional generating capacity on Long Island became very evident during July 2002. On July 3, 2002, during a heat wave, power demand reached a new record of 5,030 MW. On July 29, 2002 that record was broken when the demand for electricity reached 5,059 MW. The total usage for July 2002 exceeded that of July 2001 by 21 percent.

Given this level of growth, the loss of a large generating unit or major transmission interconnection could have a devastating effect impact on the electrical system. To guard against these potentially severe consequences, LIPA has developed a stringent set of criteria that takes into consideration the specific operational conditions or contingencies that impact resource planning in the LIPA service area. These criteria require LIPA to have sufficient resources available to ensure uninterrupted service to the residents of Long Island and those portions of Queens served by LIPA.

The New York Independent System Operator (NYISO) requires LIPA either to own, or have contracts for, generating capacity and other resources to meet peak summer demand, plus a reserve of 18 percent. Resources available to satisfy this demand include power generation facilities and other demand side resources. The reserve requirement is necessary in the event of possible outages of power plants, as well as weather conditions that may be warmer than anticipated, as was the case during the past three summers.

In addition to requiring an 18 percent reserve, NYISO also requires LIPA to maintain a location based installed capacity within LIPA's service area due to the limited transmission capacity in the area. Transmission capacity is limited because of the areas geographical separation from the major transmission infrastructure in New York State's electric grid. The LIPA service area is one of only two areas in the state on which this requirement is imposed – the other is New York City. The location requirement is set at 93 percent of the expected summer peak demand. Although LIPA is currently meeting NYISO's resource adequacy criteria, due to projected increased electricity demand LIPA must secure the construction of additional generating capacity to maintain system reliability. Even with the availability of existing resources, Long Island continues to be very close to its capacity limits and immediate action is necessary to avoid the risk of system wide voltage reductions, business shutdowns and rolling blackouts.

This years, August 16, 2003, blackout was the worst in the history of the United States. Over 50,000,000 people were left without electric power. This error was indeed not due to negligence, but rather the fact that the electric system is relatively old. It has served the population for nearly a century, but now it must be put to rest and a new system constructed in its place (See: Appendix B – The Causes and Effects of the August 2003 Blackout).

Long Island being a load pocket survived the blackout very quickly. However had the cause of the blackout been in reverse, that is if the short circuit occurred in Long Island, then the restoration of power might have taken weeks. The integrity and reliability of LIPA is excellent. But one can only do so much with what one has. Therefore if the reliability is subject to degradation due to ancillary forces, the solution is to add state-of-the-art, contemporary generation systems to protect the efficiency of the system. This 2003 blackout clearly re-demonstrates the public need for additional, modern, safe and reliable electric generation especially on Long Island.

Further, Long Island's transmission and capacity restraints are aggravated by the fact that the generating infrastructure in the LIPA system is relatively old. The majority of the generating capacity is derived from facilities that are more than 30 years old, and a significant portion of the generating capacity is derived from facilities that are more than 40 years old. During the summer of 2002 peak demand period, virtually all of the LIPA generating facilities were operating, and well over 95 percent of the generating capacity was available. Due to regional demands for electricity, the availability of additional capacity from NYISO to LIPA's service area was extremely strained. Has any significant equipment failures occurred on LIPA's system, emergency measures and possibly rolling blackouts would have been necessary to maintain the integrity of the system.

East Hampton Power and Light's proposed Calverton Facility will provide urgently needed additional generating capacity to the LIPA system and, in particular will assist LIPA in alleviating system capacity constraints and meeting seasonal peak demands on the East End. With this facility in operation, the necessitation to import electricity from facilities farther west on Long Island, or imported from other states will be reduced.

1.1.2 Organization of the Environmental Impact Assessment

The Environmental Assessment (EA) is organized as follows:

Chapter 1.0, "Project Description," contain an overview of the proposed project's purpose, need and benefits; a description of the proposed project; a brief description of the proposed project environmental conditions; a summary of the public outreach efforts conducted in support of the proposed project; and required approvals, permits and notifications.

Chapter 2.0 describes the environmental setting sand provides a discussion of potential environmental impacts by specific environmental analysis disciplines (including land use and zoning, neighborhood character, community facilities, cultural resources, visual resources, traffic and transportation, air quality, noise, infrastructure, hazardous materials, water resources, natural resources, coastal zone management, and construction). Because it is expected that the proposed facility would be constructed and operating within approximately 6 months and no material changes are expected during this period, future conditions without the proposed project would be the same as existing conditions. Consequently impacts are assessed by comparing future conditions with the proposed facility to existing conditions without the facility. Appendices containing additional supportive materials are referenced in various sections of the EA assessment.

1.1.3. Type and Size

The proposed electric generating facility would be a simple cycle configuration. The plant's prime equipment would be General Electric MS7001EA dual fired (gas and oil) Combustion Turbine (CT) Generators with a capacity of 79 MW net to LIPA grid. The unit would utilize-low sulfur (0.05 percent) distillate fuel oil as a fuel, until natural gas is available. There is not a sufficient natural gas supply currently available in the project area to support the proposed facility's operation with natural gas. An illustrative site plan is given as Figure 1-3.

The combustion turbine's efficient combustion system is a major element to emissions control. In addition, a selective catalytic reduction (SCR) system and oxidation catalyst would be employed to reduce nitrogen oxide (NO_x), carbon monoxide (CO), and valatile organic compounds (VOC) emissions. Treated exhaust gas would be emitted through a stack approximately 65 feet above grade (one stack). Stack emissions would be monitored with a continuous emissions monitoring system (CEMS).

Additional equipment includes a spray-mist cooling system, ammonia injection system for the SCR system, electric metering, step-up transformer, auxiliary transformer, station transformer and electric switchgear. A local unit-control system would integrate all operating functions of the proposed facility. Information on the General electric MS7001EA proposed for use at the proposed facility is contained in Appendix D.

The proposed facility would connect to LIPA's electric transmission system through a 69-kV transmission line from the proposed facility's transformer step-up to the 69kV Brookhaven-Calverton-Riverhead Nos.69-867 and 69-885 to the Riverhead Substation. The proposed transmission line route is shown in Figure 1-4.

1.4 Permits, Approvals, and Notifications

Development of the proposed project may require or involve the following regulatory agency notifications, actions, permits and/or approvals:

Long Island Power Authority

- Transmission line interconnection agreement.
- Facility purchase power agreement.

Village of Riverhead

- Water and Sewer Connection.
- Building Permit.
- Local Waterfront Revitalization Program Consistency.

Town of Riverhead

- Freshwater Wetland Permit or Waiver.

Suffolk County Department of Health Services

- Petroleum Bulk Storage Permit (Delegated by NYDEC).
- Erosion and Sediment Control Plan.
- Stormwater Management Plan.

New York State Department of Environmental Conservation

- New York State Facility Air Permit (for construction) pursuant to 6 NYCRR Part 201-5.
- Title IV Acid Rain Permit.
- Title V Operating Permit pursuant to 6 NYCRR Part 201-6 would be required within one year from commencement of operation.
- Wetlands Permit Notification.

New York State Public Service Commission

- Certificate of Public Convenience and Necessity pursuant to Section 68 of the Public Service Law (together with an Order for Lightened Regulation, and/or financing approval pursuant to Section 69 of the Public Service Law).

U.S. Army Corp of Engineers

- Nationwide General Permit for transmission line construction along Grumman Boulevard (formerly Swan Lake Road) and River Road.

2.0 Potential Environmental Impacts of the Proposed Actions

2.1 Land Use, Zoning and Neighborhood Character

The proposed site is located on the former Grumman Naval Defense Reserve, previously known as Peconic Airport in the Township of Riverhead, Suffolk County, New York. The facility lies on the north side of Grumman Boulevard (formerly Swan Road) and River Road. The parcel is 2,900 acres. The core where the airport, hangars, and steam heating plant is part of 454 acres set aside for the Riverhead Industrial Park. The proposed facility will be 3 acres, within the 454 acres, inclusive of the administration building, storage, warehouse and emission stack. There are no residences within one mile of the facility.

2.1.1. Land Use

The area of the proposed site is a pre-existing industrial zone that is part of a 454-acre industrial park situated within the Township of Riverhead. Existing utilities, water supply, sewage and storm water discharge facilities are in place and have been permitted for use for this project by the Township of Riverhead and Suffolk County. There are no residences within one mile of the facility. The most prominent nearby community land use is the Swan Lake Golf Course that operates seasonally – spring and summer, and is closed during the fall and winter months. Within a five-mile radius are small agricultural farms, a section of the Long Island Pine Barrens, and the Calverton National Cemetery.

2.1.2. Zoning

The proposed facility project site is located within a 2,900-acre section in the Township of Riverhead known as the Calverton Enterprise Park that was bequeathed to the township by the U.S. Government after the Naval Defense Facility relocated. The Township of Riverhead set aside 454 acres as an industrial park. The 454 acres was the core of the Defense facility and contained the hangars, assembly plant, warehouses, oil fired steam heating plant and administrative offices. It is today zoned exclusively for industrial use. All of the facilities utilities are operating and have been permitted for use by the Township of Riverhead and Suffolk County.

2.1.3. Neighborhood Character

The surrounding neighborhood outside of the 2,900-acre Enterprise Park is a mix of small agricultural farms, a seasonally operated golf course, a section of the Long Island Pine Barrens, a few hiking trails, and the Calverton National Cemetery. The existing neighborhood character would not be affected by the proposed facility. The facility would conform to the established land use patterns and existing zoning in the area.

2.2 Community Facilities

An inventory of community facilities (schools, hospitals, government offices, religious institutions etc.) has been taken of both the immediate project site and a 1-mile radius of the area surrounding the proposed facility to assess the potential effects that may possibly occur. The community facilities within a one-mile radius are a seasonally operated public golf course and a proposed recreational park. The facility would be equipped with a state-of-the-art noise suppression system and exhaust silencers where any sound emitted from the proposed site would be inaudible and not adversely affect the operation of the golf course or proposed recreational facilities.

2.3 Cultural Resources

There are no known archaeological sites within the proposed Calverton facility site or within the proposed transmission line routes. Therefore, no known archaeological resources would be disturbed by the proposed project. It is not expected that potential archaeological resources would be disturbed by the project since documentary research and subsurface archaeological investigations indicate that the Calverton facility site and transmission line route are not sensitive for archaeological resources. The proposed 3 acre site within the 454 acre industrial park have been developed by construction associated with the operation of the former U.S. Navy Aircraft Research and Development Facility, and field investigations encountered no significant archaeological remains in subsurface testing of the undisturbed sections. The 2,900 acres of the Calverton Enterprise Park do not contain any significant archaeological resources. Since the utility transmission line would replace the existing transmission line right of ways, reconstruction and installation of the proposed transmission line connecting the proposed site with the Riverhead Substation would not affect any potential archaeological resources. Therefore, no further archaeological study is warranted for the Calverton Facility site and the proposed transmission line routes.

There are no State and National Registries eligible, locally designated, or potential architectural resources within one mile of the Calverton Facility site. Therefore the proposed facility would be located to far from any architectural resource to cause physical impacts, and the proposed facility would not be visible or audible from any of the architectural resources located within the study area.

2.4 Visual Resources

The project facility does not visually impede any current sight lines within the five-mile visual and aesthetic study area. The tallest element of the proposed facility would be the 10-foot diameter, 5-foot tall stack that is well below the heights of the majority of pine trees and upland woods that surround the site area. Within the 2,900 acre Calverton Enterprise Park is an airport control tower that is higher than the proposed stack height would be. Given this tree screening, even during leaf off conditions, the proposed facility would not be visible from any of the public or historic resources in the five-mile radius.

With regard to the transmission line reconstruction since it is presently operating as a 69 kV line an increase in voltage to 138 kV would not have a significant adverse visual impact.

2.5 Environmental Justice

The focus of an environmental justice analysis is the determination of whether the construction and operation of a proposed facility would have both adverse and disproportional impacts on an environmental justice community.

The first step in the analysis is to determine whether the proposed project is in or near a low-income and/or minority community. Based on a review of the census data for the study area, no minority group was identified within the one-mile study area and no census tract was identified as meeting the definition of a low-income community within the same area.

If the presence of a low-income or minority community has been documented, NYDEC guidance on environmental justice defines two steps to determine if potential environmental impacts are likely to adversely affect communities of concern. The steps are to identify potential environmental impacts and to determine whether impacts are likely to adversely affect a minority or low-income community.

2.7.5. Accidental Ammonia Release

Aqueous ammonia as proposed for use in the SCR at the site is stored as a 17.5 to 19.5 percent ammonia-water solution. Storage would be in a state-of-the-art tank system with leak detection and fully dike impermeable containment. Ammonia is highly water-soluble and as such is easier to handle for use in the SCR, because ammonia is highly soluble, it is less available to rapid evaporation and release to the air than more volatile chemicals.

The proposed ammonia tank is not subject to Sepia's Risk Management Program for hazardous materials; however, a worst-case accidental release analysis was conducted to alleviate any potential concerns from the community in the very unlikely event of a spill or leak.

The Area Locations of Hazardous Atmospheres (ALOHA) emergency release model was selected as the tool to perform the modeling. The entire tank capacity if 12,000 gallons was assumed to be released even though such storage tanks are only filled to 95 percent of capacity. The ALOHA model uses highly conservative meteorological assumptions including wind speed, wind direction, and other important factors. This methodology is consistent with USEPA's Risk Management Model Program and Plan for Ammonia Refrigeration prepared in 1996.

To predict the worst-case consequence of the ammonia release, the ALOHA model was used to estimate the distance to the ammonia toxic endpoint of 150 ppm. The toxic value endpoint of 150 ppm is the American Industrial Hygiene Association Emergency Response Guideline Level 2 (EPRG-2). The value represents the maximum airborne concentration below which nearly all individuals could be exposed for up to one hour without experiencing or developing irreversible or other serious side effects.

The results of modeling with ALOHA demonstrate that the potential ammonia risk level for a one-hour period of 150 ppm is not approached by this assumed catastrophic event at the site. The ALOHA model determined that at the nearest residence, the maximum predicted concentration would be well below the target risk level of 150 ppm. Therefore, the defined worst-case accidental release scenario would not result in any adverse health effects due to ammonia, and even with this conservative approach, no significant impacts would occur.

2.7.6. $PM_{2.5}$ Impact

An assessment was made of the potential effects of fine particulates ($PM_{2.5}$) on public health and welfare. The term $PM_{2.5}$ refers to the particle size range equivalent to 2.5 micrometers and smaller. Particles within the range are considered "inhalable particulates." The assessment examined the basis of the proposed USEPA $PM_{2.5}$ standards (i.e., 24-hour $PM_{2.5}$ concentration of 65 $\mu g/m^3$ and annual $PM_{2.5}$ concentration of 15 $\mu g/m^3$), how it relates to protecting public health, and potential health effects of emissions of $PM_{2.5}$ from the Calverton Facility on the nearby community.

For purposes of this assessment it was assumed that the $PM_{2.5}$ emissions from the proposed facility would be equivalent to the PM_{10} emissions (i.e., all particulate emissions are $PM_{2.5}$). This is a conservative assumption since $PM_{2.5}$ represents only a portion of the total particulates emitted. While there is not sufficient monitored data for the project area and no approved USEPA model for definitively assessing compliance with standards, based upon the assumption that 100 percent of PM_{10} emissions are $PM_{2.5}$ and using the PM10 air quality modeling results, the maximum 24-hour concentration for $PM_{2.5}$ due to project facility emissions would be 4.92 , while the maximum annual $PM_{2.5}$ concentration due to project facility emissions would be 0.049 If these values are added to the corresponding NYDEC measured value, the maximum total 24-hour concentration would be 36.82 ug/m^3 which would be well below the 24-hour $PM_{2.5}$ ambient standard, and the maximum total annual concentration would be 12.84 which would be below the 15 $\mu g/m^3$ annual $PM_{2.5}$ standard.

In addition to the primary $PM_{2.5}$ that may be emitted by the proposed Calverton Facility, NO_x, SO_2 and ammonia are most likely to affect the formation of secondary particles. The reactions of these compounds are quite slow and may take several hours to many days, the rates depending on many factors such as background concentrations of trace level and catalytic species, sunlight, temperature, relative humidity, and others. As such, the secondary particulates will not affect or contribute to the maximum air quality concentrations of $PM_{2.5}$ particulate resulting from the primary emissions.

The slow reaction times cause the plume to be very widely dispersed. Where dispersion has not diluted the emissions greatly, very little of the NO_x, SO_2 and ammonia would be converted to particles because of the time required for the transformation. Far from the facility where more of these gases would have been transformed, physical dispersion of the emissions would have diluted the impact to such an extent that it would be insignificant relative to background levels. As such, the Calverton Facility is expected to have no significant impact as a result of secondary fine particulates.

In conclusion, the proposed Calverton Facility would contribute only a small amount to both the annual and the short-term concentrations of $PM_{2.5}$, and these contributions are not expected to significantly effect $PM_{2.5}$ concentrations. Emissions of $PM_{2.5}$ from the proposed facility would not significantly affect compliance with $PM_{2.5}$ standards. These standards are set to protect the public health with an adequate margin of safety. Therefore the proposed facility would not be expected to result in any significant adverse $PM_{2.5}$ health effects.

2.7.7. Climate Change

The project's impact on climate change due to emissions of greenhouse or climate change gases (GHGs) was assessed. GHGs contribute to climate change by increasing the ability of the atmosphere to trap heat. The principal GHGs are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). To express emissions of the different gases in a comparable way, a weighing factor called the Global Warming Potential (GWP) is often used, which relates the ability of each greenhouse gas to trap heat in the atmosphere to a single gas (CO_2).

The proposed project would fire very low sulfur light distillate oil, until natural gas is available. The greatest proportion of the potential GHG emissions from the project would be as CO_2 from the combustion process. Trace amounts of CH_4 and N_2O would also be emitted; however, emissions of these compounds are considered negligible when compared to the total CO_2 emissions, even taking into consideration their GWP, and therefore are not considered significant to the climate change issues.

As a conservative estimate, maximum CO_2 emissions were estimated to be 353 x 106 pounds per year, or 0.159 teragrams (Tg) CO_2 Eq. per year. GWP is taken as the equivalent heat trapping ability of one teragram (Tg, or 1 billions kilograms) of CO_2, expressed as Tg CO_2 Eq. To assess the proposed project impact on climate change, the projects maximum GWP was compared to state, national and global estimates of man made CO_2 emissions. The worst case annual emissions from the proposed project would be approximately 0.082 percent of the total New York CO_2 inventory. On a national scale, the proposed project would contribute only approximately 0.0027 per cent to the total national emissions inventory of CO_2. Finally, the proposed emissions if CO_2 from the project would be less than 0.00071 percent of the total annual global emission rate.

In conclusion, the operation of the proposed facility would result in a negligible contribution to the state, national and global inventories of CO_2 emissions, and therefore the impacts to general public health from project related operations would be insignificant.

The proposed Calverton Facility is not expected to have any significant adverse impacts on the surrounding community. Air quality analysis results show that the emissions from the proposed Calverton Facility would result in pollutant concentrations that would be well below applicable air quality standards. Therefore, an evaluation of the maximum air emission impacts from the proposed project has not identified any significant impacts on a short- term of cumulative basis to low income or minority populations. In accordance with the environmental justice objectives defined by NYDEC, there would be no disproportionate impacts on minority populations near the proposed facility.

2.6 Traffic and Transportation

The proposed facility would not adversely impact existing traffic conditions in the vicinity of the proposed project. The proposed Calverton Facility would generate a small number of vehicle trips for operations and maintenance staff, and oil trucks. During normal operation, the proposed facility would generate a maximum of 10 vehicle trips during the busiest hour for staff and maintenance. The oil hauling would generate a maximum of 4 truck trips during the busiest hour, or an average of 1.2 trucks per hour for a 10-hour working day. The very small number of trips generated by the proposed facility, even when staffed, would not significantly increase traffic on local roadways. Therefore, the proposed Calverton Facility would not have the potential to impact vehicle traffic.

2.7 Air Quality

2.7.1. Introduction

The East Hampton Power and Light's proposed Calverton Generating Facility involves the placement of a 79.9 MW gas and oil fired turbine unit in the Riverhead Industrial Park in the Township of Riverhead, Suffolk County, New York. The facility would use very low sulfur light distillate oil until natural gas becomes available next year, so the air emission parameters analyzed here are for both gas and oil. Operating limits would be implemented so that annual emissions of all air pollutants would not exceed "major stationary source" thresholds as defined in 40 CFR 52.21 and 6 NYCRR Part 231. As such, the Federal Prevention of Significant Deterioration (PSD) and Non-Attainment New Source Review (NNSR) rules would not apply to the proposed facility.

2.7.2. Facility Design

The facility would consist of a simple cycle, air cooled in the natural gas configuration, General Electric 7 EA turbine generator set. In the oil combustion configuration, the GE 7EA would burn very low sulfur light (0.05 percent) distillate fuel oil. The GE 7EA would include both an air-cooled and water injections system where required.

2.7.3. Facility Emissions

Emission information is based on General Electric (GE) recommended measurement methods. NO_x emissions are corrected to 15% O2 without heat rate correction and are not corrected to ISO reference condition per 40CFR 60.335(a)(1)(i). Algorithms with SPEEDTRONIC control system will control NOx levels shown. Projected annual emissions for the project are summarized in Tables ES-2 and ES-3 and compared with the major source thresholds – PSD and NNSR (Table 1). The state facility air permit regulation could limit facility emissions to the values shown in this table and consequently keep the facility's air emissions below major source thresholds. Since this facility may be capped by the limiting parameter (NO_x emissions), the actual potential to emit for all parameters would be defined by the predicted hours of operation of the unit as capped by the annual NO_x limit.

2.7.4. Pollutant Concentrations

The air quality impacts due to emissions of criteria pollutants (i.e., those pollutants of concern which include, PM_{10}, SO_2, NO_2, and CO) were assessed using state-of-the-art air dispersion simulation models. The dispersion modeling for the Calverton Facility was performed consistent with the procedures found in USEPA documents and NYDEC requirements.

It utilized the USEPA Industrial Source Complex Short Term (ISCST3) Version 02035 model with rural dispersion parameters, 5 years of meteorological data (from Long Island MacArthur Airport, in Islip, N.Y. with upper air sounding data from Atlantic City, New Jersey and Brookhaven National Labs, Upton, N.Y.), and a polar grid of receptors going out to 2 kilometers with additional sensitive receptors. To obtain total concentrations for comparison to Ambient Air Quality Standards, the highest representative measured background values obtained using 3 years of recent data from nearby NYDEC monitoring stations was combined with the highest model predicted value.

Table ES 2.7-1: Major Source Thresholds and Project Potential Emission Rates

Pollutant [a]	Major Source PSD (TPY*)	Thresholds NNSR (TPY)	Annual Facility Emissions (TPY) [a]
Carbon Monoxide	250[b]	N/A	24.0
Sulfur Dioxide	250	N/A	88.9
PM	250	N/A	136.3
PM_{10}	250	N/A	136.3
Nitrogen Oxides	250	25	22.5
VOC	250	25	20.5

Notes:
* TPY = tons per year
[a] NO_x emissions based on an annual operation to maintain minor source status. Emissions of remaining pollutants Conservatively assume that NO_x emissions are controlled below the SCR vendor guarantee of 6.0 ppm, which could result in increased operating hours (values in table assume facility operates 6,413 hours per year).
Source: 6 NYCRR 231-2 and 40 CFR 52.21

The maximum predicted concentrations from the proposed facility are shown in Tables ES-2 and ES-3. Maximum predicted concentrations from the proposed facility were combined with highest representative measured background levels for comparison to the National Ambient Air Quality Standards (NAAQS). The results shown and this comprehensive modeling analysis determined that the facility's emissions would not result in air quality concentrations that exceed the recognized SILs. Emissions from the proposed facility would not result in significant air quality concentrations. Additionally, the maximum total concentrations resulting from emissions from the proposed facility added to the highest representative background concentrations would be below applicable NAAQS.
Consequently, the proposed facility would not have a significant air quality impact or exceed the applicable NAAQS.

2.7.5 Accidental Ammonia Release

Aqueous ammonia as proposed for use in the SCR at the site is stored as a 17.5 to 19.5 percent ammonia-water solution. Storage would be in a state-of-the-art tank system with leak detection and fully dike impermeable containment. Ammonia is highly water-soluble and as such is easier to handle for use in the SCR, because ammonia is highly soluble, it is less available to rapid evaporation and release to the air than more volatile chemicals.

The proposed ammonia tank is not subject to Sepia's Risk Management Program for hazardous materials; however, a worst-case accidental release analysis was conducted to alleviate any potential concerns from the community in the very unlikely event of a spill or leak.

The Area Locations of Hazardous Atmospheres (ALOHA) emergency release model was selected as the tool to perform the modeling. The entire tank capacity if 12,000 gallons was assumed to be released even though such storage tanks are only filled to 95 percent of capacity. The ALOHA model uses highly conservative meteorological assumptions including wind speed, wind direction, and other important factors. This methodology is consistent with USEPA's Risk Management Model Program and Plan for Ammonia Refrigeration prepared in 1996.

To predict the worst-case consequence of the ammonia release, the ALOHA model was used to estimate the distance to the ammonia toxic endpoint of 150 ppm. The toxic value endpoint of 150 ppm is the American Industrial Hygiene Association Emergency Response Guideline Level 2 (EPRG-2). The value represents the maximum airborne concentration below which nearly all individuals could be exposed for up to one hour without experiencing or developing irreversible or other serious side effects.

The results of modeling with ALOHA demonstrate that the potential ammonia risk level for a one-hour period of 150 ppm is not approached by this assumed catastrophic event at the site. The ALOHA model determined that at the nearest residence, the maximum predicted concentration would be well below the target risk level of 150 ppm. Therefore, the defined worst-case accidental release scenario would not result in any adverse health effects due to ammonia, and even with this conservative approach, no significant impacts would occur.

2.7.6 $PM_{2.5}$ Impact

An assessment was made of the potential effects of fine particulates ($PM_{2.5}$) on public health and welfare. The term $PM_{2.5}$ refers to the particle size range equivalent to 2.5 micrometers and smaller. Particles within the range are considered "inhalable particulates." The assessment examined the basis of the proposed USEPA $PM_{2.5}$ standards (i.e., 24-hour $PM_{2.5}$ concentration of 65 $\mu g/m^3$ and annual $PM_{2.5}$ concentration of 15 $\mu g/m^{3)}$, how it relates to protecting public health, and potential health effects of emissions of $PM_{2.5}$ from the Calverton Facility on the nearby community.

For purposes of this assessment it was assumed that the $PM_{2.5}$ emissions from the proposed facility would be equivalent to the PM_{10} emissions (i.e., all particulate emissions are $PM_{2.5}$). This is a conservative assumption since $PM_{2.5}$ represents only a portion of the total particulates emitted. While there is not sufficient monitored data for the project area and no approved USEPA model for definitively assessing compliance with standards, based upon the assumption that 100 percent of PM_{10} emissions are $PM_{2.5}$ and using the PM10 air quality modeling results, the maximum 24-hour concentration for $PM_{2.5}$ due to project facility emissions would be ,while the maximum annual $PM_{2.5}$ concentration due to project facility emissions would be . If these values are added to the corresponding NYDEC measured value, the maximum total 24-hour concentration would be , which would be well below the 24-hour $PM_{2.5}$ ambient standard, and the maximum total annual concentration would be , which would be below the 15 $\mu g/m^3$ annual $PM_{2.5}$ standard.

In addition to the primary $PM_{2.5}$ that may be emitted by the proposed Calverton Facility, NO_x, SO_2 and ammonia are most likely to affect the formation of secondary particles. The reactions of these compounds are quite slow and may take several hours to many days, the rates depending on many factors such as background concentrations of trace level and catalytic species, sunlight, temperature, relative humidity, and others. As such, the secondary particulates will not affect or contribute to the maximum air quality concentrations of $PM_{2.5}$ particulate resulting from the primary emissions.

The slow reaction times cause the plume to be very widely dispersed. Where dispersion has not diluted the emissions greatly, very little of the NO_x, SO_2 and ammonia would be converted to particles because of the time required for the transformation. Far from the facility where more of these gases would have been transformed, physical dispersion of the emissions would have diluted the impact to such an extent that it would be insignificant relative to background levels. As such, the Calverton Facility is expected to have no significant impact as a result of secondary fine particulates.

In conclusion, the proposed Calverton Facility would contribute only a small amount to both the annual and the short-term concentrations of $PM_{2.5}$, and these contributions are not expected to significantly effect $PM_{2.5}$ concentrations. Emissions of $PM_{2.5}$ from the proposed facility would not significantly affect compliance with $PM_{2.5}$ standards. These standards are set to protect the public health with an adequate margin of safety. Therefore the proposed facility would not be expected to result in any significant adverse $PM_{2.5}$ health effects.

2.7.7 Climate Change

The project's impact on climate change due to emissions of greenhouse or climate change gases (GHGs) was assessed. GHGs contribute to climate change by increasing the ability of the atmosphere to trap heat. The principal GHGs are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). To express emissions of the different gases in a comparable way, a weighing factor called the Global Warming Potential (GWP) is often used, which relates the ability of each greenhouse gas to trap heat in the atmosphere to a single gas (CO_2).

The proposed project would fire very low sulfur light distillate oil, until natural gas is available. The greatest proportion of the potential GHG emissions from the project would be as CO_2 from the combustion process. Trace amounts of CH_4 and N_2O would also be emitted; however, emissions of these compounds are considered negligible when compared to the total CO_2 emissions, even taking into consideration their GWP, and therefore are not considered significant to the climate change issues.

As a conservative estimate, maximum CO_2 emissions were estimated to be 353 x 106 pounds per year, or 0.159 teragrams (Tg) CO_2 Eq. per year. GWP is taken as the equivalent heat trapping ability of one teragram (Tg, or 1 billions kilograms) of CO_2, expressed as Tg CO_2 Eq. To assess the proposed project impact on climate change, the projects maximum GWP was compared to state, national and global estimates of man made CO_2 emissions. The worst case annual emissions from the proposed project would be approximately 0.082 percent of the total New York CO_2 inventory. On a national scale, the proposed project would contribute only approximately 0.0027 per cent to the total national emissions inventory of CO_2. Finally, the proposed emissions if CO_2 from the project would be less than 0.00071 percent of the total annual global emission rate.

In conclusion, the operation of the proposed facility would result in a negligible contribution to the state, national and global inventories of CO_2 emissions, and therefore the impacts to general public health from project related operations would be insignificant.

Table ES 2.7-2: Background Concentrations of Criteria Pollutants

Pollutant	Averaging Period	1998 Background Concentration ($\mu g/m^3$)[a]	1999 Background Concnetration ($\mu g/m^3$)[a]	2000 Background Concentration ($\mu g/m^3$)[a]	Monitor Location
CO	1-Hour 8-Hour	6,440 4,600	7,130 5,175	4,140 2,875	Eisenhower Park
SO_2	3-Hour 24-Hour Annual	**147** **89** 18	141 168 18	118 60 **26**[b]	East Farmingdale Water District
PM_{10}	24-Hour Annual	40 **19**	**41** 16	38 17	East Farmingdale Water District (1998) Eisenhower Park (1999-2000)
$PM_{2.5}$	24-Hour Annual	- -	**31.9**[c] **12.9**[b,c]	31.8 12.6	East Farmingdale Water District
NO_2	Annual	41	**47**	45	Eisenhower Park

Notes:

(a) Highest, second highest, short term (1-,3-,8 & 24-Hour), and maximum annual average Concentrations presented except $PM_{2.5}$, which is the 98th percentile 24-Hour concentration.

(b) Based on less than 75% available data.

(c) Based on 3rd and 4th quarter data from 1999.

Bold Value: identifies the greatest value over the 3-year period and is presented as being a representative background concentration for the study area.

Source: NYDEC 1998, 1999, and 2000.

Table ES 2.7-3: Calverton Project Modeling Parameters

Basic Dispersion Parameters

Parameter	Exit Velocity	Stack Diameter (meters)	Exhaust Temperature (K)	Stack Height (meters)
100% Load	44.73	3.048	657.04	19.81
50 % Load	44.73	3.048	532.00	19.81

Emission Rates

Parameter	Sulfur Dioxide (lb/hr)	Nitrogen Dioxide (lb/hr)	Carbon Monoxide (lb/hr)	Particulate*
100% Load	28.0	14.0	7.5	47
50% Load	14.0	7.0	3.8	23

* Modeled input includes assumption of 15% conversion of sulfur dioxide to ammonium sulfate as secondary PM. Actual data for PM is 45.4 pph.

2.7.8. Cumulative Air Impact Assessment

a. Introduction

Potential cumulative impacts due to the six new combustion turbine projects that were constructed for LIPA for the Summer of 2002 (i.e., facilities at Shoreham, Edgewood, Glenwood, Port Jefferson, Bethpage, and Bayswater) and four separate combustion turbine projects that LIPA is considering for the summer of 2003 (i.e., facilities to be located in North Bellport, Freeport, Jamaica Bay and Greenport were analyzed). The potential effect of this project on impacts from the other LIPA projects is examined qualitatively.

b. Cumulative Impact Assessment of LIPA 2002/2003 Facilities

Cumulative effects of the LIPA 2002/2003 facilities on localized air quality were addressed by 1) examination of the relative locations of the projects, and the extent of the individual project concentrations downwind; and, 2) the distribution of overlapping project air quality impacts relative to the prevailing winds.

With regard to the first item, the LIPA 2002/2003 facilities are widely spaced throughout Nassau, Suffolk, and Queens Counties. This distribution of projects spreads the relatively low air emissions from each facility through a wide geographical area. Each of the facilities has individually demonstrated through air quality dispersion modeling of potential facility emissions, to have insignificant air quality impacts (i.e., maximum concentrations are below the SILs). The maximum concentrations for each facility would occur very closely to the combustion turbines for each facility. The concentrations continue to decrease with distance from the sources, such that at the distance to the next adjacent source, the concentrations would be a scant fraction of the SIL and nearly immeasurable.

With regard to the second item, it can be concluded that no significant cumulative interaction of the facilities would occur based upon an examination of the prevailing wind directions.

The modeling results and comparison to the standards are presented in Table ES-4. As shown in the table, the combined air quality results indicate that the total concentrations (i.e., the cumulative effect of the modeled LIPA 2002/2003 facilities and worst-case background levels) would not exceed the ambient air quality standards. Therefore, the cumulative effect would not produce significant air quality impacts.

Table ES 2.7-4: Cumulative Air Quality Impacts of LIPA 2002/2003 Facilities

Pollutant	Averaging Period	Maximum Modeled Concentration (ug/m^3)	Background Concentration (ug/m^3)	Total Concentration (ug/m^3)	NAAQS (ug/m^3)
CO	1-hour	86.8	7,216	7,302.8	40,000
CO	8-hour	21.2	5,196	5217.2	10,000
SO_2	3-hour	3.4	150.4	153.8	1,300
SO_2	24-hour	1.1	90.1	91.2	365
SO_2	Annual	0.12	26.1	38.1	80
PM_{10}	24-hour	1.0	42.0	43.0	150
PM_{10}	Annual	0.12	19.1	19.2	50
NO_2	Annual	0.10	47.1	47.2	100

While the Calverton Facility has not been quantitatively assessed, the potential interaction of its emissions with other LIPA sources is expected to be negligible and insignificant. This is due in large part to its being spatially separated from the other sources, and that the Calverton emissions will be predominately downwind from the other sources. Furthermore, maximum concentrations from Calverton are expected to be well below the SILs. Therefore, because the individual impacts of each facility are so small and the facilities are distributed geographically, there will be no cumulative impact from simultaneous operation of the proposed Calverton Facility or the other LIPA 2002/2003 facilities.

The air quality analysis presented in Section 2.7 of this Environmental Assessment shows that emissions from the Calverton Facility would be below major source thresholds, concentrations would be below applicable air quality standards. Table 2.4-3 presents the results iof air quality monitoring of the Calverton Facility with and without the addition of measured background and compares the National Ambient Air Quality Standards measured background and compares the National Ambient Air Quality Standards (NAAQS). The values in the table clearly show that even when maximum plant impacts are added to maximum measured ambient concentrations, the resulting air quality levels will be well below NAAQS.

With worst-case parameters the air quality modeling demonstrated results that are below U.S. EPA designated significant impact levels (SILs) for under all modeled circumstances. SILs have been established by U.S. EPA as the level below which no significant impact to air quality is deemed to occur. The contribution of the proposed facility emissions relative to the total concentrations that may be experienced by commercial enterprises within the identified community was also determined. These results indicate that the Calverton Facility would have a negligible contribution to the total concentrations presented on Table 2.5-3, and would not result in a disproportionate or adverse impact to the surrounding community.

Table 2.5-4: Calverton Facility Maximum Modeled Concentrations

Pollutant	Average Period	NAAQS ($\mu g/m^3$)	Significant Impact Level ($\mu g/m^3$)	Background Concentrations ($\mu g/m^3$)[1]	Maximum Modeled Concentrations ($\mu g/m^3$)[2]	Total Concentrations ($\mu g/m^3$)
CO	1-Hour	40,000	2,000	7,130	5.4	7,135.4
	8-Hour	10,000	500	5,175	1.2	5,176.2
SO_2	3-Hour	1,300	25	147	10.2	157.2
	24-Hour	365	5	89	2.9	91.2
	Annual	80	1	26	0.029	26.03
PM_{10}	24-Hour	150	5	46	4.92	45.92
	Annual	50	1	19	0.049	19.05
NO_2	Annual	100	1	47	0.015	47.02

Notes:

1 Background concentrations are the highest second highest short-term (1-,3-,8- and 24-Hour), and maximum annual average concentrations which is the 98th percentile 24-Hour concentrations monitored from 1999-2000.

2 Highest first highest concentration.

Table ES-4: Cumulative Air Quality Impacts of LIPA 2002/2003 Facilities

Pollutant	Averaging Period	Maximum Modeled Concentration (ug/m^3)	Background Concentration (ug/m^3)	Total Concentration (ug/m^3)	NAAQS (ug/m^3)
CO	1-hour		7,216		40,000
CO	8-hour		5,196		10,000
SO_2	3-hour		150.4		1,300
SO_2	24-hour		90.1		365
SO_2	Annual		26.1		80
PM_{10}	24-hour		42.0		150
PM_{10}	annual		19.1		50
NO_2	annual		47.1		100

While the Calverton Facility has not been quantitatively assessed, the potential interaction of its emissions with other LIPA sources is expected to be negligible and insignificant. This is due in large part to its being spatially separated from the other sources, and that the Calverton emissions will be predominately downwind from the other sources. Furthermore, maximum concentrations from Calverton are expected to be well below the SILs. Therefore, because the individual impacts of each facility are so small and the facilities are distributed geographically, there will be no cumulative impact from simultaneous operation of the proposed Calverton Facility or the other LIPA 2002/2003 facilities.

2.8 Noise

The noise assessment of the proposed Calverton Generating Facility consisted of two parts: 1) an ambient noise monitoring program in the vicinity of the project site in order to characterize the existing noise environment; and 2) a noise/modeling impact evaluation of the project. The noise impact evaluation consisted of performing computer noise modeling of the major noise producing equipment and determining impacts based upon the change in one-hour equivalent noise levels ($L_{eq(1)}$). An increase in noise levels of more than 6 dBA was considered a significant noise impact. In addition, an assessment was performed to evaluate consistency of the proposed project with the Township of Riverhead Noise Code.

Seven receptor sites were selected for analysis. These receptor sites included the closest residence and commercial sites where the proposed facility might have a significant impact. At six of the seven-receptor sites, short term monitoring (20 minutes in duration) was conducted during the day and late at night. At the seventh site, a continuous 24-hour noise measurement was performed. These measured noise levels were used to determine the quietest hours of the day and night, and thus the time period when the proposed facility would have the greatest potential for significant impacts.

A computer noise model was utilized which calculated the project noise by summing the contributions from each of the major noise sources at the proposed facility. Noise level data for most of the major facility noise sources were obtained from equipment vendors. In cases where these data were not available, octave band spectra from comparable facilities was used in the analysis.

The proposed facility has been designed to incorporate noise attenuation measures to reduce potential project impacts. These measures include exhaust silencers; an inlet noise suppressor and auxiliary engine baffles from the General Electric sound suppression equipment option additions. The facility operating equipment is enclosed in a specially equipped a state-of-the-art sound proofing with noise vents that practically eliminate turbine engine noise. A firewall outside of the enclosure further prevents annoying sounds from polluting the atmosphere.

Model results are presented in Table ES-5. Table ES-5 shows the calculated noise from the proposed facility alone, the measured ambient late night noise, the projected future total late night noise with the proposed facility (i.e., the sum of the facility and existing ambient noise levels), and the calculated maximum increase in noise due to the proposed facility (i.e., the difference between the future total noise with the proposed facility and existing late night noise levels). At all of the receptor sites, the noise from the proposed facility alone would be less than 30 dBA, and would be in conformance with the requirements of the Township of Riverhead Noise Code. For purposes of this impact assessment, at all of the receptor sites, even during the quietest hour of the night, the maximum increases in noise levels would be less than 1 dBA. These increases in noise levels would be imperceptible, and well below the 6 dBA impact threshold. Therefore, noise from the proposed facility would not result in any significant adverse impacts.

2.9 Infrastructure

2.9.1. Water Supply

The Suffolk County Water Authority (SCWA) through water mains that were connected when the area belonged to the United States Government and was operating a U.S. Navy Aircraft and Defense Facility would supply water. Each of the mains is permitted by the Township of Riverhead and Suffolk County. No further construction, other than the standard water connections would be required.

The proposed facility would require about 100 gallons per day (gpd) for miscellaneous service water uses such as plant housekeeping activities, emergency showers and eyewash stations. The facility would use approximately 92 gallons per minute or about 132,500 gpd of water for evaporative cooling, controlled combustion and air pollution reduction equipment.

Alternatively, if the Suffolk County Water Authority could not deliver water, it could be obtained from the existing Township of Riverhead water supply system, which is comprised mainly of individual water wells.

2.9.2. Wastewater

The proposed facility's total wastewater generation discharge would be minimal based on its operation as a simple-cycle facility. All sanitary wastewater would be discharged directly or by pump out to the Riverhead Wastewater Treatment Plant. Process wastewater would be about 600 gallons per week when the facility is operating at capacity. The wastewater may also be hauled off site and disposed of at a licensed facility. Disposal of these volumes would not have an adverse impact on the wastewater handling systems.

2.9.3. Energy

The proposed Calverton Facility would consume approximately 14 million gallons per year of very low sulfur light distillate oil (less than 0.05% sulfur) if it operates at capacity. The proposed use of oil is minimal compared to the sixe of the system and overall use of oil in the area. Moreover, the proposed facility would serve a vital public need by providing electric power to Long Island and improving system reliability, especially during periods of peak demand.

2.9.4 Solid Waste

The proposed facility would generate limited quantities of solid waste. Solid waste produced by the facility would average less than .05 tons per month. A local licensed waste hauler would transport non-recyclable materials for disposal at an approved disposal facility. Generation of solid waste by the proposed Calverton Facility would be minimal, and its disposal would not have an adverse impact on the solid waste handling system or on the capacity of regional landfills.

2.10 Contaminated Materials

The proposed site was cleared during the time when the U.S.Government operated a Naval Defense and Aviation Research Facility. The entire area of 2,900 acres was left in a clean and orderly manner when it was bequeathed to the Township of Riverhead. There are no debris piles within or adjacent to the proposed facility site.

2.11 Soils, Geology, and Seismology

The proposed site soils and geology are suitable for construction of the planned generating facility. No blasting would be required. All facilities would meet applicable seismic standards. A Soil Erosion Prevention and Control Plan would be developed for the project. The plan would prevent sedimentation in the nearby wetlands, watercourses, and properties. Therefore, no significant adverse impacts associated with soils or seismic activities are expected.

2.12 Natural Resources

The proposed project site encompasses 3 acres within a 460 acre industrial park, that lies within a 2,900 acre divided parcel bequeathed to the Township if Riverhead by the U.S. Government. This parcel was subdivided and sold in sections by the Town of Riverhead to be used as an industrial park and recreational area, respectively. The entire area is within New York's coastal lowlands ecozone and is characterized by mid to late succession upland deciduous forest. Surrounding the area within a five-mile radius are the Long Island Pine Barrens, which is a very sensitive area with regard to conservation. No ecologically significant habitats or wildlife species occur at the proposed site, within the 460-acre industrial park, nor within the 2,900-acre parcel reserved by the Township of Riverhead. The 2,900-acre area was previously used as an airport and naval aircraft research facility where wildlife species were not encouraged to live for fear of safety to the cadets and test pilots who were testing U.S. Naval Defense Aircraft.

No state or federally listed threatened or endangered species inhabit the site and no significant impacts on wildlife species or habitats would result as a result of the proposed action.

2.12 Water Resources

Process water makeup requirements for the proposed facility would be a maximum of 92 gallons per minute (gpm) or about 132,000 gallons per day (gpd). The Suffolk County Water Authority would supply water for the proposed facility's generating system through existing water mains that were used during the time when the U.S. Naval

Defense Facility used the area for aircraft research, assembly, aeronautical engineering and for administrative purposes. The area contained an oil fired steam heating facility for general all around heating purposes.
The second method for facility water requirements would be to reactivate various local wells, and pump the water directly to the site at the permitted rate of 500 gallons per minute, more than the proposed project would need. The calculated permissive sustained yield (PSY) from these wells are from .50 to 1.25 million gallons per day (mgd), depending on rainfall, with an annual average PSY of about .90 mgd. The demand of 132,000 gpd is well below the minimum PSY of .60 mgd.

The construction of the facility would have little impact on the site's infiltration rate, since most of the storm water would be routed to an on site infiltration basin and existing in use sewer system The proposed facility is located in the Hydrogeologic Zone VI. No significant adverse impacts are to be expected on the regional or local aquifers due to the minor water consumption of the facility and the site's management of storm water.

2.13 Storm water Management

As the facility would be located on a site with an existing water sewage drain system that has been in service since the U.S.Naval Defense and Aviation Research Facility was located here, and the sewage system has been approved by the Township of Riverhead and the Suffolk County Department of Public Works. Impervious surfaces would be added to the site as a result of the proposed project. Because of this, a further stormwater management system has been designed to properly manage rainfall under post development conditions. As in most areas in Central Suffolk County, the stormwater management system would collect and convey site stormwater runoff to an onsite infiltration or recharge basin.

The stormwater management system would allow the clean stormwater from roofs, roads, parking areas and general site areas to infiltrate and not flow off site. Stormwater from containment areas would be sent to an oil/water separator and then either directed to the Riverhead Wastewater Treatment or hauled to a licensed facility for disposal. A Stormwater Pollution Prevention and a Spill Prevention Control and Countermeasure would be developed to implement these designs and procedures. An Integrated Contingency Plan would be developed in the event of a spill or other incident. With these measures in place, the proposed project would not have a significant adverse environmental impact associated with stormwater and materials used on site.

2.15 Coastal Zone Management

The entire Village of Riverhead lies within the New York State Coastal Management Zone. The Village of Riverhead adopted a Local Waterfront Revitalization Program (LWRP), which was approved by the New York State Department of State.

While this project is within the coastal zone, the proposed facility is between 3 ½ and 4 miles from the Long Island Sound and over 15 miles to the Atlantic Ocean, and does not provide any waterfront access or water recreation uses to the public, it may still be subject to LWRP consistency review. However, many of the specific policies are not applicable. Where applicable, the proposed project would be assessed for consistency with the following policies: developmental; fish and wildlife; flooding and erosion control; public access; historic and scenic resources; energy; water and air. The proposed Calverton Facility would be consistent with these policies.

2.16 Construction Impacts

Potential construction impacts would be limited to land use, infrastructure, noise, traffic, air quality, and storm water. Construction activities associated with the proposed Calverton Facility would include site preparation and foundations, unit assembly, final site work, and start-up testing.

2.16.1 Description of Construction Phases

a. Site Preparation and Foundations
As the site was previously excavated and leveled when the U.S. Government was using the site for the Grumman Naval Air Defense and Research Facility and Air Field, there would be relatively little earth moving requirements, therefore with the use of dust suppression systems the impacts from the laying of a new foundation will be minimal.

b. Unit Assembly and Final Site Work
Major components of the facility (turbines, generators, compressors, transformers, auxiliary engines, input and exhaust fans) are delivered pre-tested on extra heavy-duty sixteen wheel transports, requiring little on site fabrication.
Other facility components such as tanks, piping, air quality control systems, and exhaust stack erection would require on site fabrication.
During this phase secondary containment structures, storm water management systems, pavements and utilities would be installed.

c. Startup and Testing

The General Electric Corporation's, Power Systems Division prior to delivery, tests the entire generating system. It is retested after the components are delivered, placed on the foundation, and auxiliary equipment is assembled. No adverse impacts are expected during this phase.

2.16.2 Resource Impact Assessment and Controls

a. Land Use

The 454-acre Riverhead Industrial Park is zoned for commercial industry. The Calverton Facility will use 3 acres. The site plan shows ample room for construction access, use and egress this would not be a significant adverse impact.

b. Air Quality

Possible impacts on local air quality during construction of the proposed project include fugitive dust (particulate) emissions from earth movement; mobile source emissions, including hydrocarbons, nitrogen oxide, and carbon monoxide emissions from construction workers and delivery vehicles and construction equipment operation. Appropriate fugitive dust control measures include watering of exposed areas and dust covers for trucks, would be employed to minimize any impacts. As a result, no significant air quality impacts from fugitive dust emissions are anticipated.

Mobile source emissions during construction may result from trucks delivering construction materials or removing debris, worker's private vehicles, and construction equipment operation. Because the location of the site is adjacent to roadways, truck deliveries and worker's private vehicles will not need to travel excessive distances, and are subsequently not expected to have a significant impact on mobile source emissions. Therefore mobile source emissions are not expected to be significant

c. Noise and Vibration

Impacts on noise and vibration levels during construction of the proposed project include noise and vibration from construction equipment operation and noise from construction and delivery vehicles traveling to and from the site. The level of impact of these noise sources depends on the noise characteristics of the equipment and activities involved, the construction schedule, and the location of the potentially sensitive noise receptors. Noise and vibration levels at a given location are dependent on the kind and number of pieces of construction equipment being operated, as well as the distance from the construction site. In general, like most projects, construction of the proposed project would result in increased noise and vibration levels for a limited period of time. Typical noise levels of construction equipment that may be employed during construction processes are given in Table ES-6:

Table ES-6: Typical Noise Emission Levels for Construction Equipment

Equipment Item	Noise Level at 50 Feet (dBA)	Equipment Item	Noise Level at 50 Feet (dBA)
Air Compressor	81	Dump Truck	88
Asphalt Spreader	89	Front-End Loader	84
Asphalt Truck	88	Gas Driven Vibro Compactor	76
Backhoe	85	Hoist	76
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Sources:

Wood, E.W. and A.R. Thompson, Sound Level Survey, Concrete Batch Plant: Limerick Generating Station, Bolt, Beranek and Newman Inc., Report 2825 Cambridge, MA. May 1974.

New York State Department of Environmental Conservation, Construction Noise Survey, Report No. NC-P2, Albany, N.Y., April 1974.

Bungener, J.H., Sound Level Survey: Wise's Landing, Kentucky, Bolt Beranek and Newman Inc., Report No. 2880, Downers Grove, IL, June 1975.

F.B. Foster Company, Foster VibroDriver/Extractors, Electric Series Brochure, W-925-10-75-5M

In general, noise levels caused by construction activities would vary widely, depending on the phase of construction and specific tasks being performed. In general, construction activities for the proposed project would take place on weekdays between the hours of 7:00 AM and 6:00 PM. However, based on scheduling, some activities may take place outside of this timeframe (weekends and after 6:00 PM).

Increases in noise levels caused by delivery trucks, employees traveling to and from the site and other construction vehicles would not be significant, and would be limited to access roadways to the project site.

Increased noise levels caused by construction activities can be expected to be most significant during stages of construction that require the use of impact equipment. However these impacts would be short term in duration and, as there are no residences within a one-mile area, would not result in any significant adverse impacts.

d. Infrastructure and Hazardous Materials Management

A Health and Safety Plan would be implemented during construction to minimize exposure of construction workers, workers on nearby sites, and others in the vicinity of areas of concern on site. The Health and Safety Plan defines worker safety training, monitoring procedures, and personal protective equipment. In addition, all material removed from the site would be disposed of in compliance with all applicable laws and regulations. With these measures, no significant impacts would occur during construction.

e. Stormwater, Erosion and Sediment Control

Under the new Phase II stormwater permitting program, site disturbance of more than one acre requires the development of a Stormwater Pollution Prevention Plan (SPPP) and submission of a Notice of Intent (NOI) to NYDEC. A SPPP would be reviewed by NYDEC for compliance with applicable regulations. The SPPP would be strictly enforced during the construction period in order to prevent any impacts on nearby wetlands, drainage courses and properties.

f. Traffic

During construction, there would be new vehicle trips to a from the project site, including those from workers commuting to and from the site, as well as those from the movement of goods and equipment. The maximum number of workers on site is estimated to be approximately 15 to 75 during construction. A peak construction work force of approximately 75 persons would extend approximately three to four weeks. Given typical construction hours, worker trips would be concentrated in off-peak hours and would not represent a substantial increase during peak travel periods. Therefore, vehicle trips associated with construction would not be likely to have any significant adverse impacts on surrounding streets. Heavy equipment and construction material delivery would average less than 10 hours per day over the construction period, but may have several peak days of less than 40 trucks. Based upon the relatively modest number of vehicular trips, and the short duration of construction, construction activities should not result in any significant adverse traffic impacts.

2.16 Cumulative Impacts

A cumulative impact analysis was performed to examine whether the proposed Calverton project, cumulatively with other relevant facilities (i.e., facilities built for LIPA for the summer of 2002, and facilities proposed for the summer of 2003), would have the potential for causing significant adverse environmental impacts. The cumulative impact analysis considered each of the environmental categories (i.e., land use and zoning, community facilities, cultural resources, contaminated materials, traffic, air quality, noise, etc.) as analyzed above. Because of the very localized extent of each such facility's impacts, in all areas other than air quality, cumulatively the new LIPA electric generating facilities have no potential for significant impacts.

With respect to air quality, the LIPA facilities would also have only very localized effects, though other larger facilities (not part of the LIPA system) could have broader impacts. Consequently, quantified analyses were performed to assess the potential cumulative air quality impacts of the proposed project together with such facilities. The detailed cumulative analyses contained in Section 2.7, "Air Quality," show that all of the maximum concentrations from stack emissions would be below the applicable air quality standards. Therefore, in terms of air quality, the proposed project would not, either individually or cumulatively, have any significant adverse environmental impacts.

EAST HAMPTON POWER & LIGHT

Supplement to Petition

Case Number 03-E-0518

(Draft)

Environmental Impact Assessment

Submitted by: **East Hampton Power & Light**
P.O. Box 805
Middle Island, New York 11953

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Glossary

This glossary has definitions for technical words used in the Clean Air Act summary. For the most part, the glossary provides fuller definitions than those given in the summary itself. When a word or group of words is printed in italics within a definition, that tells you that you'll find a definition of the word or group of words elsewhere in the glossary.

Acid rain -- Air *pollution* produced when acid chemicals are incorporated into rain, snow, fog or mist. The "acid" in acid rain comes from sulfur oxides and *nitrogen* oxides, products of burning coal and other fuels and from certain industrial processes. The sulfur oxides and nitrogen oxides are related to two strong acids: sulfuric acid and nitric acid. When sulfur dioxide and nitrogen oxides are released from power plants and other *sources*, winds blow them far from their source. If the acid chemicals in the air are blown into areas where the weather is wet, the acids can fall to Earth in the rain, snow, fog or mist. In areas where the weather is dry, the acid chemicals may become incorporated into dusts or smokes. Acid rain can damage the environment. human health and property.

Alternative fuels -- Fuels that can replace ordinary gasoline. Alternative fuels may have particularly desirable energy efficiency and *pollution* reduction features. Alternative fuels include compressed natural gas, alcohols, liquefied petroleum gas (LPG), and electricity. The 1990 *Clean Air Act* encourages development and sale of alternative fuels.

Attainment area -- A geographic area in which levels of a criteria air pollutant meet the health-based primary standard (national ambient air quality standard, or NAAQS) for the pollutant. An area may have on acceptable level for one criteria air pollutant, but may have unacceptable levels for others. Thus, an area could be both attainment and nonattainment at the same time. Attainment areas are defined using federal pollutant limits set by EPA.

Carbon monoxide (CO) -- A colorless, odorless, poisonous gas, produced by incomplete burning of carbon-based fuels. including gasoline, oil and wood. Carbon monoxide is also produced from incomplete *combustion* of many natural and synthetic products. For instance, cigarette smoke contains carbon monoxide. When carbon monoxide gets into the body, the carbon monoxide combines with chemicals in the blood and prevents the blood from bringing oxygen to cells, tissues and organs. The body's parts need oxygen for energy, so high-level exposures to carbon monoxide can cause serious health effects, with death possible from massive exposures. Symptoms of exposure to carbon monoxide can include vision problems, reduced alertness, and general reduction in mental and physical functions. Carbon monoxide exposures are especially harmful to people with heart, lung and circulatory system diseases.

CFCs (chlorofluorocarbons) -- These chemicals and some related chemicals have been used in great quantities in industry, for refrigeration and air conditioning, and in consumer products. CFCs and their relatives, when released into the air, rise into the *stratosphere*, a layer of the atmosphere high above the Earth. In the stratosphere, CFCs and their relatives take part in chemical reactions which result in reduction of the stratospheric *ozone* layer, which protects the Earth's surface from harmful effects of radiation from the sun. The 1990 *Clean Air Act* includes provisions for reducing releases (emissions) and eliminating production and use of these ozone-destroying chemicals.

Clean Air Act -- The original Clean Air Act was passed in 1963, but our national air pollution control program is actually based on the 1970 version of the law. The 1990 Clean Air Act Amendments are the most far-reaching revisions of the 1970 law. In this summary, we refer to the 1990 amendments as the 1990 Clean Air Act.

Clean fuels -- Low-pollution fuels that can replace ordinary gasoline. These are *alternative* fuels, including gasohol (gasoline-alcohol mixtures), natural gas and LPG (liquefied petroleum gas).

Combustion -- burning. Many important pollutants, such as *sulfur dioxide*, *nitrogen oxides*, and *particulates* (PM-10) are combustion products, often products of the burning of fuels such as coal, oil, gas and wood.

Continuous emission monitoring systems **(CEMS)** -- machines which measure, on a continuous basis, *pollutants* released by a *source*. The 1990 *Clean Air Act* requires continuous emission monitoring systems for certain large sources.

Control technology; control measures -- equipment, processes or actions used to reduce air pollution. The extent of pollution reduction varies among technologies and measures. In general, control technologies and measures that do the best job of reducing pollution will be required in the areas with the worst pollution. For example, the *best available control technology/best available control measures* (BACT,BACM) will be required in serious *nonattainment areas* for *particulates*, a *criteria air pollutant*. A similar high level of pollution reduction will be achieved with *maximum achievable control technology* (MACT) which will be required for sources releasing hazardous air pollutants.

Criteria air pollutants -- a group of very common air *pollutants* regulated by EPA on the basis of criteria (information on health and/or environmental effects of pollution). Criteria air pollutants are widely distributed all over the country.

Curtailment programs -- restrictions on operation of fireplaces and woodstoves in areas where these home heat sources make major contributions to *pollution*.

Emission -- release of *pollutants* into the air from a *source*. We say sources *emit* pollutants. *Continuous emission monitoring systems* (CEMS) are machines which some large sources are required to install, to make continuous measurements of pollutant release.

Enforcement -- the legal methods used to make polluters obey the *Clean Air Act*. Enforcement methods include citations of polluters for violations of the law (citations are much like traffic tickets), fines and even jail terms. EPA and the state and local governments are responsible for enforcement of the *Clean Air*

Act, but if they don't enforce the law, members of the public can sue EPA or the states to get action. Citizens can also sue violating *sources*, apart from any action EPA or state or local governments have taken. Before the 1990 *Clean Air Act*, all enforcement actions had to be handled through the courts. The 1990 *Clean Air Act* gave EPA authority so that, in some cases, EPA can fine violators without going to court first. The purpose of this new authority is to speed up violating sources' compliance with the law and reduce court time and cost.

***Hazardous air pollutants* (HAPs)** -- chemicals that cause serious health and environmental effects. Health effects include cancer, birth defects, nervous system problems and death due to massive accidental releases such as occurred at the pesticide plant in Bhopal, India. Hazardous air pollutants are released by *sources* such as chemical plants, dry cleaners, printing plants, and motor vehicles (cars, trucks, buses, etc.)

***Inspection and maintenance program* (I/M program)** -- Auto inspection programs are required for some polluted areas. These periodic inspections, usually done once a year or once every two years, check whether a car is being maintained to keep *pollution* down and whether emission control systems are working properly. Vehicles which do not pass inspection must be repaired. As of 1992, 111 urban areas in 35 states already had I/M programs. Under the 1990 *Clean Air Act*, some especially polluted areas will have to have *enhanced inspection and maintenance programs*, using special machines that can check for such things as how much pollution a car produces during actual driving conditions.

International air pollution -- Canada and Mexico, the United States' neighbors, share the air at our borders. *Pollution* moves across the national borders; this international pollution can be serious. The 1990 *Clean Air Act* includes provisions for cooperative efforts to reduce pollution that originates in one country and affects another.

Interstate air pollution -- In many areas, two or more states share the same air. We say these states are in the same air basin defined by geography and wind patterns. Often, air *pollution* moves out of the state in which it is produced into another state. Some pollutants, such as the power plant *combustion* products that cause *acid rain*, may travel over several states before affecting health, the environment and property. The 1990 *Clean Air Act* includes many provisions, such as interstate compacts, to help states work together to protect the air they share. Reducing interstate air pollution is very important since many Americans live and work in areas where more than one state is part of a single metropolitan area.

***Material safety data sheets* (MSDS)** -- product safety information sheets prepared by manufacturers and marketers of products containing toxic chemicals. These sheets can be obtained by requesting them from the manufacturer or marketer. Some stores, such as hardware stores, may have material safety data sheets on hand for products they sell.

Mobile sources -- moving objects that release *pollution*; mobile sources include cars, trucks, buses, planes, trains, motorcycles and gasoline-powered lawn mowers. Mobile sources are divided into two groups: road vehicles, which includes cars, trucks and buses, and non-road vehicles, which includes trains, planes and lawn mowers.

***Monitoring* (monitor)** Measurement of air *pollution* is referred to as monitoring. EPA, state and local agencies measure the types and amounts of pollutants in community air. The 1990 *Clean Air Act* requires certain large polluters to perform enhanced monitoring to provide an accurate picture of their pollutant releases. Enhanced monitoring programs may include keeping records on materials used by the *source*, periodic inspections, and installation of *continuous emission monitoring systems* (CEMS). Continuous emission monitoring systems will measure, on a continuous basis, how much pollution is being released into the air. The 1990 *Clean Air Act* requires states to monitor community air in polluted areas to check on whether the areas are being cleaned up according to schedules set out in the law.

Nitrogen oxides **(NOx)** -- a *criteria air pollutant*. Nitrogen oxides are produced from burning fuels, including gasoline and coal. Nitrogen oxides are smogformers, which react with volatile organic compounds to form smog. Nitrogen oxides are also major components of acid rain.

Nonattainment area -- a geographic area in which the level of a *criteria air pollutant* is higher than the level allowed by the federal standards. A single geographic area may have acceptable levels of one criteria air pollutant but unacceptable levels of one or more other criteria air pollutants; thus, an area can be both attainment and nonattainment at the same time. It has been estimated that 60% of Americans live in nonattainment areas.

Offset -- a method used in the 1990 *Clean Air Act* to give companies which own or operate large (major) *sources* in *nonattainment areas* flexibility in meeting overall pollution reduction requirements when changing production processes. If the owner or operator of the source wishes to increase release of a *criteria air pollutant*, an *offset* (reduction of a somewhat greater amount of the same pollutant) must be obtained either at the same plant or by purchasing offsets from another company.

Oxygenated fuel **(oxyfuel)** -- special type of gasoline, which burns more completely than regular gasoline in cold start conditions; more complete burning results in reduced production of *carbon monoxide*, a *criteria air pollutant*. In some parts of the country, carbon monoxide release from cars starting up in cold weather makes a major contribution to pollution. In these areas, gasoline refiners must market oxygenated fuels, which contain a higher oxygen content than regular gasoline. Some gasoline companies started selling oxyfuels in cities with carbon monoxide problems before the 1990 *Clean Air Act* was passed.

Ozone -- a gas which is a variety of oxygen. The oxygen gas found in the air consists of two oxygen atoms stuck together; this is molecular oxygen. Ozone consists of three oxygen atoms stuck together into an ozone molecule. Ozone occurs in nature; it produces the sharp smell you notice near a lightning strike. High concentrations of ozone gas are found in a layer of the atmosphere -- the *stratosphere* -- high above the Earth. Stratospheric ozone shields the Earth against harmful rays from the sun, particularly *ultraviolet B*. *Smog*'s main component is ozone; this ground-level ozone is a product of reactions among chemicals produced by burning coal, gasoline and other fuels, and chemicals found in products including solvents, paints, hairsprays, etc.

Ozone hole -- thin place in the ozone layer located in the *stratosphere* high above the Earth. Stratospheric ozone thinning has been linked to destruction of stratospheric ozone by CFCs and related chemicals. The 1990 *Clean Air Act* has provisions to reduce and eliminate ozonedestroying chemicals' production and use. Ozone holes have been found above Antarctica and above Canada and northern parts of the United States, as well as above northern Europe.

Particulates particulate matter **(PM-10)** -- a *criteria air pollutant*. Particulate matter includes dust, soot and other tiny bits of solid materials that are released into and move around in the air. Particulates are produced by many sources, including burning of diesel fuels by trucks and buses, incineration of garbage, mixing and application of fertilizers and pesticides, road construction, industrial processes such as steel making, mining operations, agricultural burning (field and slash burning), and operation of fireplaces and woodstoves. Particulate pollution can cause eye, nose and throat irritation and other health problems.

Permit -- a document that resembles a license, required by the *Clean Air Act* for big (major) sources of air pollution, such as power plants, chemical factories and, in some cases, smaller polluters. Usually permits will be given out by states, but if EPA has disapproved part or all of a state permit program, EPA will give out the permits in that state. The 1990 Clean Air Act includes requirements for permit applications, including provisions for members of the public to participate in state and EPA reviews of permit applications. Permits will have, in one place, information on all the regulated pollutants at a source. Permits include information on which pollutants are being released, how much the source is allowed to release, and the program that will be used to meet pollutant release requirements. Permits are required both for the operation of plants (operating permits) and for the construction of new plants. The 1990 Clean Air Act introduced a nationwide permit system for air pollution control.

Permit fees -- fees paid by businesses required to have a *permit*. Permit fees are like the fees drivers pay to register their cars. The money from permit fees will help pay for state air pollution control activities.

***Pollutants* (pollution)** -- unwanted chemicals or other materials found in the air. Pollutants can harm health, the environment and property. Many air pollutants occur as gases or vapors, but some are very tiny solid particles: dust, smoke or soot.

Primary standard -- a *pollution* limit based on health effects. Primary standards are set for *criteria air pollutants*.

Reformulated gasoline -- specially refined gasoline with low levels of smog-forming *volatile organic compounds* (VOCs) and low levels of *hazardous air pollutants*. The 1990 *Clean Air Act* requires sale of reformulated gasoline in the nine smoggiest areas. Reformulated gasolines were sold in several smoggy areas even before the 1990 Clean Air Act was passed.

Secondary standard -- a *pollution* limit based on environmental effects such as damage to property, plants, visibility, etc. Secondary standards are set for *criteria air pollutants*.

Smog -- a mixture of *pollutants*, principally ground-level *ozone*, produced by chemical reactions in the air involving smog-forming chemicals. A major portion of smog-formers come from burning of petroleum-based fuels such as gasoline. Other smog-formers, *volatile organic compounds*, are found in products such as paints and solvents. Smog can harm health, damage the environment and cause poor visibility. Major smog occurrences are often linked to heavy motor vehicle traffic, sunshine, high temperatures and calm winds or *temperature inversion* (weather condition in which warm air is trapped close to the ground instead of rising). Smog is often worse away from the source of the smog-forming chemicals, since the chemical reactions that result in smog occur in the sky while the reacting chemicals are being blown away from their sources by winds.

Source -- any place or object from which *pollutants* are released. A source can be a power plant, factory, dry cleaning business, gas station or farm. Cars, trucks and other motor vehicles are sources, and consumer products and machines used ir industry can be sources too. Sources that stay in one place are referred to as *stationary sources*; sources that move around, such as cars or planes, are called mobile sources.

State implementation plan **(SIP)** -- a detailed description of the programs a state will use to carry out its responsibilities under the *Clean Air Act*. State implementation plans are collections of the regulations used by a state to reduce air *pollution*. The Clean Air Act requires that EPA approve each state implementation plan. Members of the public are given opportunities to participate in review and approval of state implementation plans.

Stationary source -- a place or object from which *pollutants* are released and which does not move around. Stationary sources include power plants, gas stations, incinerators, houses etc.

Stratosphere -- part of the atmosphere, the gases that encircle the Earth. The stratosphere is a layer of the atmosphere 9-31 miles above the Earth. *Ozone* in the stratosphere filters out harmful sun rays, including a type of sunlight called *ultraviolet B*, which has been linked to health and environmental damage.

Sulfur dioxide -- a *criteria air pollutant*. Sulfur dioxide is a gas produced by burning coal, most notably in power plants. Some industrial processes, such as production of paper and smelting of metals, produce sulfur dioxide. Sulfur dioxide is closely related to sulfuric acid, a strong acid. Sulfur dioxide plays an important role in the production of *acid rain*.

Temperature inversion -- one of the weather conditions that are often associated with serious *smog* episodes in some portions of the country . In a temperature inversion, air doesn't rise because it is trapped near the ground by a layer of warmer air above it. *Pollutants*, especially smog and smog-forming chemicals, including *volatile organic compounds*, are trapped close to the ground. As people continue driving, and sources other than motor vehicles continue to release smog-forming pollutants into the air, the smog level keeps getting worse.

Ultraviolet B **(UVB)** -- a type of sunlight. The *ozone* in the *stratosphere*, high above the Earth, filters out ultraviolet B rays and keeps them from reaching the Earth. Ultraviolet B exposure has been associated with skin cancer, eye cataracts and damage to the environment. Thinning of the ozone layer in the stratosphere results in increased amounts of ultraviolet B reaching the Earth.

Vapor recovery nozzles -- special gas pump nozzles that will reduce release of gasoline vapor into the air when people put gas in their cars. There are several types of vapor recovery nozzles, so nozzles may look different at different gas stations. The 1990 *Clean Air Act* requires installation of vapor recovery nozzles at gas stations in smoggy areas.

Volatile organic compounds **(VOCs)** -- Organic chemicals all contain the element carbon (C); organic chemicals are the basic chemicals found in living things and in products derived from living things, such as coal, petroleum and refined petroleum products. Many of the organic chemicals we use do not occur in Nature, but were synthesized by chemists in laboratories. *Volatile* chemicals produce *vapors* readily; at room temperature and normal atmospheric pressure, vapors escape easily from volatile liquid chemicals. Volatile organic chemicals include gasoline, industrial chemicals such as benzene, solvents such as toluene and xylene, and tetrachloroethylene (perchloroethylene, the principal

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1.0 Project Description

1.1 Introduction

As the energy industry on Long Island is undergoing many changes and improvements, retail customers are demanding lower prices for electric power. New power plants are being constructed in order to meet the growing demands as well as assure the residents uninterruptible service without rolling blackouts and power outages. These requirements have a profound impact on the long range planning process, especially the need for adding new on island generating sources.

The New York Energy Planning Board has recently issued a plan in which they emphasize provisions for safe, reliable and affordable electric energy in an environmentally responsible manner, and among whose objectives include the promotion of technological innovations, wholesale competition, and the encouragement of merchant generation and transmission development. East Hampton Power and Light's principles follow precisely along these advisory lines. We are also in favor of implementing and developing plans to avoid major power disruptions, that have been in the past unnecessary and unwarranted. We further, are in agreement with resource adequacy improvements and clean energy programs, such as the one we would construct and have in operation by the summer of 2004, approval pending.

To meet the need for additional generating capacity and to improve system reliability on the portion of the Long Island Power Authority (LIPA) grid serving the Eastern End of Long Island, LIPA may consider entering into a long-term power purchase agreement with East Hampton Power & Light (EHPLC), to purchase the output from a new electrical generating facility to be constructed in the Township of Riverhead, at the former Grumman Naval Reserve Facility, Calverton, Suffolk County, New York. The proposed facility, to be called the Calverton Generating Station (or CGS), would consist of one simple cycle gas/oil fired, air/water cooled 79 MW General Electric 7001 EA combustion turbine and generator with a pre-installed scrubber system (Selective Catalytic Reduction-SCR) for absolute compliance with all New York Department of Environmental Conservation air quality requirements.
The entire generating system may be optionally air-cooled allowing for minimal water usage. The combustion system is dual fired (oil & gas) and will use very low sulfur light oil until natural gas is available at the end of 2005.

The proposed state-of-the art Calverton Facility would be located on approximately 3 acres, in a pre-paved area of the Riverhead Industrial Park, which is zoned under the Riverhead Town Code as a pre-existing industrial zone (See Figures 1.1- Site Location - Regional Map, and Figures 1.2–Aerial Site Photographs). When the Grumman Plant was active an oil fired steam heat producing system was used for heating the airport hangars, assembly plant and administrative offices. When the Grumman Corporation relocated, the United States Government bequeathed the entire 2,900 acres on which the naval defense site was situated to the Township of Riverhead. The infra structure remains in place and intact enabling present day usage, including an ample water supply as well as sanitary waste water and sewage disposal. There will be little construction involved where noise, traffic, and dust pollution will be significant.

Because the maximum out put of the proposed facility will be less than 80 MW, the facility will not be considered as a major facility subject to the jurisdiction of the Board on Electric Generation Siting and the Environment, pursuant to Article X of the Public Service Law.

The object of the Environmental Assessment is to analyze the potential impacts of the proposed Calverton Facility in accordance with the State Environmental Quality Review Act (SEQRA), and to provide the basis for the DEC to act as the SEQRA lead agency, to make an informed decision as to whether the proposed action may result in any significant adverse environmental effects and thus require the preparation of an Environmental Impact Statement. We are currently assessing potential environmental impacts in all of the relevant environmental aspects, including land use and zoning, neighborhood character, community facilities, cultural resources, visual resources, traffic and transportation, air quality, noise, infrastructure, contaminated materials, coastal zone management, and construction. Because it is expected that the proposed facility will be constructed and operating by the summer of 2004, and no material changes are predicted during this interval, future conditions without the proposed project would be the same as existing conditions. Consequently, impacts are assessed by comparing future conditions with the proposed facility to existing conditions without the facility. Although construction of the proposed facility constitutes a discrete action under SEQRA, and is not dependent on approval of any other facility, the assessment nevertheless includes, where relevant to ensure a conservative analysis, potential impacts from other proposed facilities under consideration by LIPA, as well as the other facilities referred to in the discussion of cumulative impacts.

1.1.1. Public Need and Purpose

As set forth in LIPA's Draft Energy Plan 2002-2011, LIPA has determined that there is a need for an additional 200 MW to meet the energy needs of the LIPA service area for this summer (2003) and to prevent Long Island's generating capacity from slipping below prudent levels in future years. After this year, LIPA's projections of future energy needs on Long Island indicate that the peak demand will grow each year by approximately 100 MW between now and 2011. The peak load is projected to increase approximately 1.7 percent per year during this period. The current "Requests for Proposals" issued last month, June 24, 2003, to provide Capacity, Energy, & Ancillary Services to the Long Island Power Authority, quoted in part as follows: The Authority recognizes the need for additional generation either on Long Island, or transmitted to Long Island from off-island generating sources, in order to serve its increasing load requirements." The current request for proposals is seeking to purchase 250-600 MW to be in service by the summer of 2006. (See: Appendix A: Request for Proposal Meeting of LIPA, June 24, 2003.)

Prior to the current Request for Proposals the need for additional generating capacity on Long Island became very evident during July 2002. On July 3, 2002, during a heat wave, power demand reached a new record of 5,030 MW. On July 29, 2002 that record was broken when the demand for electricity reached 5,059 MW. The total usage for July 2002 exceeded that of July 2001 by 21 percent.

Given this level of growth, the loss of a large generating unit or major transmission interconnection could have a devastating effect impact on the electrical system. To guard against these potentially severe consequences, LIPA has developed a stringent set of criteria that takes into consideration the specific operational conditions or contingencies that impact resource planning in the LIPA service area. These criteria require LIPA to have sufficient resources available to ensure uninterrupted service to the residents of Long Island and those portions of Queens served by LIPA.

The New York Independent System Operator (NYISO) requires LIPA either to own, or have contracts for, generating capacity and other resources to meet peak summer demand, plus a reserve of 18 percent. Resources available to satisfy this demand include power generation facilities and other demand side resources. The reserve requirement is necessary in the event of possible outages of power plants, as well as weather conditions that may be warmer than anticipated, as was the case during the past three summers.

In addition to requiring an 18 percent reserve, NYISO also requires LIPA to maintain a location based installed capacity within LIPA's service area due to the limited transmission capacity in the area. Transmission capacity is limited because of the areas geographical separation from the major transmission infrastructure in New York State's electric grid. The LIPA service area is one of only two areas in the state on which this requirement is imposed – the other is New York City. The location requirement is set at 93 percent of the expected summer peak demand. Although LIPA is currently meeting NYISO's resource adequacy criteria, due to projected increased electricity demand LIPA must secure the construction of additional generating capacity to maintain system reliability. Even with the availability of existing resources, Long Island continues to be very close to its capacity limits and immediate action is necessary to avoid the risk of system wide voltage reductions, business shutdowns and rolling blackouts.

This year on, August 16, 2003, blackout was the worst in the history of the United States. Over 50,000,000 people were left without electric power. This error was indeed not due to negligence, but rather the fact that the electric system is relatively old. It has served the population for nearly a century, but now it must be put to rest and a new system constructed in its place (See: Appendix B – The Causes and Effects of the August 2003 Blackout).

Long Island being a load pocket survived the blackout very quickly. However had the cause of the blackout been in reverse, that is if the short circuit occurred in Long Island, then the restoration of power might have taken weeks. The integrity and reliability of LIPA is excellent. But one can only do so much with what one has. Therefore if the reliability is subject to degradation due to ancillary forces, the solution is to add state-of-the-art, contemporary generation systems to protect the efficiency of the system. This 2003 blackout clearly re-demonstrates the public need for additional, modern, safe and reliable electric generation especially on Long Island.

Further, Long Island's transmission and capacity restraints are aggravated by the fact that the generating infrastructure in the LIPA system is relatively old. The majority of the generating capacity is derived from facilities that are more than 30 years old, and a significant portion of the generating capacity is derived from facilities that are more than 40 years old. During the summer of 2002 peak demand period, virtually all of the LIPA generating facilities were operating, and well over 95 percent of the generating capacity was available. Due to regional demands for electricity, the availability of additional capacity from NYISO to LIPA's service area was extremely strained. Has any significant equipment failures occurred on LIPA's system, emergency measures and possibly rolling blackouts would have been necessary to maintain the integrity of the system.

East Hampton Power and Light's proposed Calverton Facility will provide urgently needed additional generating capacity to the LIPA system and, in particular will assist LIPA in alleviating system capacity constraints and meeting seasonal peak demands on the East End. With this facility in operation, the necessitation to import electricity from facilities farther west on Long Island, or imported from other states will be reduced.

1.1.2 Organization of the Environmental Impact Assessment

The Environmental Assessment (EA) is organized as follows:

Chapter 1.0, "Project Description," contain an overview of the proposed project's purpose, need and benefits; a description of the proposed project; a brief description of the proposed project environmental conditions; a summary of the public outreach efforts conducted in support of the proposed project; and required approvals, permits and notifications.

Chapter 2.0 describes the environmental setting sand provides a discussion of potential environmental impacts by specific environmental analysis disciplines (including land use and zoning, neighborhood character, community facilities, cultural resources, visual resources, traffic and transportation, air quality, noise, infrastructure, hazardous materials, water resources, natural resources, coastal zone management, and construction). Because it is expected that the proposed facility would be constructed and operating within approximately 6 months and no material changes are expected during this period, future conditions without the proposed project would be the same as existing conditions. Consequently impacts are assessed by comparing future conditions with the proposed facility to existing conditions without the facility. Appendices containing additional supportive materials are referenced in various sections of the EA assessment.

1.1.3 Type and Size

The proposed electric generating facility would be a simple cycle configuration. The plant's prime equipment would be General Electric MS7001EA dual fired (gas and oil) Combustion Turbine (CT) Generators with a capacity of 79 MW net to LIPA grid. The unit would utilize-low sulfur (0.05 percent) distillate fuel oil as a fuel, until natural gas is available. There is not a sufficient natural gas supply currently available in the project area to support the proposed facility's operation with natural gas. An illustrative site plan is given as Figure 1-3.

The combustion turbine's efficient combustion system is a major element to emissions control. In addition, a selective catalytic reduction (SCR) system and oxidation catalyst would be employed to reduce nitrogen oxide (NO_x), carbon monoxide (CO), and valatile organic compounds (VOC) emissions. Treated exhaust gas would be emitted through a stack approximately 65 feet above grade (one stack). Stack emissions would be monitored with a continuous emissions monitoring system (CEMS).

Additional equipment includes a spray-mist cooling system, ammonia injection system for the SCR system, electric metering, step-up transformer, auxiliary transformer, station transformer and electric switchgear. A local unit-control system would integrate all operating functions of the proposed facility. Information on the General electric MS7001EA proposed for use at the proposed facility is contained in Appendix D.

The proposed facility would connect to LIPA's electric transmission system through a 69-kV transmission line from the proposed facility's transformer step-up to the 69kV Brookhaven-Calverton-Riverhead Nos.69-867 and 69-885 to the Riverhead Substation. The proposed transmission line route is shown in Figure 1-4.

1.1.4. Description of Physical Characteristics of Plant

a. Project Equipment Description - Plant

Combustion Turbine Generators

The General Electric MS7001EA (7EA) consists of a dual fueled (gas and oil), air and water cooled combustion turbine directly connected by a rigid, non-lubricated load coupling to an open ventilated air-cooled generator capable of producing 79 MW of electricity. The generator is open ventilated air-cooled. It has a Class F armature and rotor insulation; class B temperature rise, armature and rotor winding; 60Hz frequency; bearings; monitoring devices (two (2) velocity vibration probes at turbine end, 1 at collector end, with provisions for proximity probes; generator field is direct cooled, two pole with finger type amortissuers; assembly brushless exciter, wiring and installation devices (lifting and jack trunions). See Appendix D – Generator and General Scope of Combustion Turbine System Supply.

The General Electric MS7001 EA (7EA) Turbine and Generator System is a base mounted, single-shaft PG7121 turbine and compartment including: modulating inlet guide vanes; multi-stage, axial flow, corrosion protected compressor; a ten (10) chamber combustion system; a three (3)- stage turbine; dual fuel (gas or oil) system, stainless steel piping and water injection for NO_x control when operating on liquid fuel; vibration sensors; thermocouples for measuring critical turbine temperatures; fully lagged enclosure for outdoor installation; exhaust frame/No.3 bearing area cooling fan modules (2) mounted at left side of unit; rigid, non-lubricated load coupling; fire detection and protection system; water wash system; on-base piping per ANSI b31.3; area classification features (National Electric Code (NEC) Class 1, Group D, Division 2); and base mounted terminal boxes and interconnecting wiring in rigid metal conduits per NEC. See Appendix G: complete model and specifications per manufacturer – G.E. The Calverton Facility would have the capability of being remotely operated, with sufficient staffing to dispatch to the site in the event of an on-site emergency or for maintenance. However, it would be staffed with an operator when the facility is operating. The plant would operate during peak demand periods, and at other times depending upon market conditions and the availability of equipment to meet the demands on the LIPA grid. The annual number of hours would be limited to keep annual NO_x emissions below 25 tons per year, thereby allowing the facility to operate as a minor source for air-permitting purposes.

Compressor and Combustion Sections

Ambient air enters the compressor inlet through a spray-mist cooling and filtrations system. Air is compressed in a multi-stage, axial flow, corrosion protected compressor. There is protective paint on the compressor wheels on the first eight stages – C450 compressor blades for the first (3) stages- compressor inlet thermocouple, borescope inspection port in compressor casing and compressor inlet humidity sensor. The G.E. water injection system enhances performance efficiency and lowers NO_x formation by injecting water into the liquid fuel prior to entering the liquid fuel nozzles. The compressed air is then passed into the burner section where fuel is fired into a number of burners.

Low-sulfur (0.05%) distillate fuel oil would be used, until natural gas is available. The low-sulfur (0.05%) distillate fuel oil supply for the proposed project would be stored in two 150,000-gallon tanks. The tanks would be located adjacent to the power block within a secondary containment structure capable of containing 110 percent of the full capacity of one of the two identical bulk oil storage tank, in accordance with Suffolk County regulations.

Turbine Section

The hot combustion gas from the burners combines with the compressed air producing a high-pressure gas stream, which enters the turbine section. There, the gas stream passes through a second series of stationary and rotating turbine blades. Enough energy is produced in the turbine section to power the air compressor and the generator. The air compressor and gear share a common shaft that enables the unit to compress drive air and produce a nominal 79 MW.

Air Pollution Control System

The proposed General Electric MS7001EA (7EA) combustion turbine, together with the proposed SCR emission control technology, would be among the most efficient, cleanest simple-cycle duel fuel fired power plant in the United States with regard to NO_x and CO emissions.

The proposed facility would achieve an emission rate of 6 parts per million-volume dry (ppmvd) of NO_x when firing low-sulfur distillate oil using water injection and SCR processes. (Actual emissions may be less than the 6 ppmvd value.) Water injection reduces NO_x formation by reducing combustion peak temperatures. The SCR system reduces NO_x formation by reducing combustion peak temperatures. The SCR system injects an aqueous ammonia solution into the combustion turbine exhaust, which then passes over a bed of catalyst where the NO_x is catalytically reacted (reduced) to nitrogen and water, further reducing NO_x emissions. The aqueous ammonia would be stored outdoors in a 12,000-gallon tank with automatic leak detection and alarms. The tank would be surrounded by a concrete or steel containment structure sized to fully contain 110 percent of the tank capacity as secondary containment.

The unit would use an oxidation catalyst for control of CO emissions. The catalyst is effective in controlling approximately 67 percent of the CO, allowing the vendor to guarantee a 5ppmvd emissions limit. (Actual emissions may be less than the vendor guarantee of 5ppmvd value.) The CO catalyst is an all-on, all-off design.

With low-sulfur (0.05%) distillate fuel oil, some of the sulfur present in the fuel would react with the ammonia from the SCR and form particulate matter. These emissions have been included in the proposed facility's air quality permit calculations.

Further detailed discussion on the proposed project's air pollution control system is presented in Section 2.7, "Air Quality."

With more than 750 units in service today, the 7EA has accumulated tens of millions of hours of service and is well recognized for high efficiency, reliability and availability. The General Electric factories fabricate, assemble and test each system utilizing procedures certified to ISO 9000 standards prior to shipping. Provisions for a single source responsibility for manufacturing quality, operations, training and support will alleviate the burden of qualifying hundreds of vendors and specifications for all of the components in a generator set. The complete generation plant uses an earthquake-qualified structural design, durable electric systems and all stainless steel fluid systems and reservoirs. Redundant, oversize fans keep turbine compartments cool while generators sized larger than turbine output accommodate future rating increases in an emergency.

Advanced digital control systems utilize a modular digital architecture, incorporating a rugged GE Mark VI microprocessor control for engine monitoring with integrated fuel management; a programmable logic controller for automatic sequencing of auxiliary equipment during start/stop; a high speed digital processing with data logging/trending capability, automatic or manually controlled synchronization and operator-friendly interface with PC, color CRT and on-line diagnostics.

All operational personnel receive complete classroom and hands-on operator training at the factory and the job site in order to improve operator confidence and trouble shooting capability, enabling them to exercise positive dynamic control during cyclic operations on a daily basis.

Incremental systems such as water treatment, substations, compressed air, heat recovery, foundations, piping, waste, chilled water, buildings, and fuel handling are inclusive. Other technical positions as design, procurement, construction management, logistics, transportation, assembly, startup, commissioning, quality control, environmental health and safety, testing and permitting assistance are part of the plants administrative duties.

For complete operating description of the basic scope of supply including Gas Turbine, Generator, Direct Drive Generator, Acoustic Enclosure, Base plate, Inlet Air System, Turbine Exhaust System, Piping System, Fuel System, Lube Oil System, Electro-Hydraulic Starting System, Fire Detection System, Digital Control System, Water Wash, Water Injection Metering System, Steam Injection Metering Module, Dry Low NO_x Emission Control, Inlet Air Chiller Coil, Winterization, Exhaust Assembly and Exhaust Silencers, Step-Up Transformer, DC Enclosure Lighting see Appendix F.)

b. Project Layout and Appearance

The proposed project site-design would include:

- Combustion turbine generators;
- Control House;
- SCR and stack;
- Oil storage tanks;
- Raw water treatment pad for mobile demineralizer trailer;
- Demineralized water tank;
- Main and auxiliary transformers; and
- Ammonia storage tank.

The proposed Calverton Facility General Electric MS7001EA and associated facilities are outdoor designs and would occupy approximately 1-acre. (See: Appendix R - Layout Design Plan) Equipment would also include the fuel oil storage tanks, demineralized water tank, aqueous ammonia storage tank, and minor appurtenant structures and fixtures, the combustion turbine generator and related controls, a combined NO_x control water injection and lube oil skid, and aqueous ammonia injection skids. The turbine inlet air system is an up and over orientation; self cleaning type filter, inlet system pressure differential indicator and an 8 foot perforated stainless steel inlet silencing system.

Stack

The General Electric MS7001 EA would exhaust through a flange located in the end of the turbine enclosure through an exhaust expansion joint to a transition duct, into a 90 dBA exhaust silencer and out through the 65-foot stack assembly, which includes a continuous emission monitoring system (CEMS). The stack height has been established through modeling of air emissions to ensure impacts would remain below U.S. Environmental Protection Agency (U.S. EPA) established significant impact levels (SILs), while minimizing visual impacts. Modeling determined that the proposed 65-foot stack height is sufficiently high to provide for adequate dispersion without affecting local air quality. Access platforms for air testing and monitoring equipment would be provided. The unit's 65-foot stack would be below the Federal Aviation Administration (FAA) height that initiates a lighting requirement. Correspondence with the FAA concerning area placement of the stack is located in Appendix D: Correspondence – F.A.A.

Water Treatment Area

Water treatment equipment would be located in an area designated as the raw water treatment area adjacent to the combustion turbines. Pumps, piping, and hook-ups would be provided for a mobile demineralization unit that would treat raw water from the Suffolk County Water Authority's (SCWA) water pipeline distribution system. The unit would produce demineralized water using a cation/anion exchange process with possible reverse-osmosis enhancement for spray-mist cooling. NO_x control, and combustion turbine washwater. Processed water would be routed to the 150,000-gallon demineralized water storage tank, which would be located adjacent to the water treatment area.

The demineralized system is a leased, skid mounted system that allows for treatment of raw water for process systems requiring ultra-clean water free of minerals that may cause scaling, corrosion or pitting on systems. Use of a leased, mobile system allows for rapid replacement of system components, and a vendor-serviced resin management system avoids on-site management of spent cation or anion exchange resins that could be expensive and present a higher degree of on-site environmental risk. U se o f a l eased system allows for these regeneration processes – and the chemical inventory to support tem – to occur and be stored off site, further minimizing on site risks.

Storage Tanks

Above ground storage tank systems would be located on site for storage of demineralized water, aqueous ammonia, low-sulfur fuel oil, and wastewater. Each of these systems is described below:

- Fuel Storage – The low-sulfur distillate oil system would consist of two aboveground 150,000-gallon (gal) storage tanks and delivery truck unloading area. The fuel oil storage system (storage tanks and off-loading area) would be designed in conformance with requirements of the Township of Riverhead, local building code, Suffolk County Sanitary Code 9Article 12), New York State Building Code, and the Riverhead Fire Marshal regulations. The fuel storage would be located along the northwestern side of the site.

- The two above-ground fuel storage tanks would be 30 feet in diameter by 30 feet high and store 150,000 gal each of fuel and would be provided with an impervious, earthquake resistant, secondary containment basin. The containment basin, capable of holding 110 percent of the storage volume of either tank, would constructed using concrete with a polymer composite micro overlay system approved by the U.S. Army Corp of Engineers, Department of Defense, numerous State's Department of Transportation and the Federal Aviation Administration (Engineering Brief No. 62). The tanks would be tightness-tested before use and inspected on regular schedule. Automated level monitoring and leak detection equipment would also be installed. This system would include an audible alarm in the proposed facility control room as well as overfill detection and prevention devices. Tanks are pre-manufactured in accordance with IEEE standards. The qualities of the storage tanks are similar to the storage tanks used at MacArthur, JFK, and LaGuardia Airports Aviation Jet Fuel Storage, which were designed according to the National Aeronautics and Space Administrations (NASA) requirements for safety and reliability.

A fuel unloading for delivery trucks would be located adjacent to the tank containment area. The off-loading area would also be paved and curbed using concrete with an approved polymer composite overlay and drained into the containment area.

All underground oil piping would be of stainless steel, double-wall construction and equipped with interstitial leak detection sensors. All underground piping would be provided with cathodic protection.

- Water Storage – A 150,000-gallon demineralized water storage tank would be located on site. The demineralized water tank would be approximately 30 feet in diameter and 30 feet high.

- Ammonia Storage – The SCR requires aqueous ammonia injection as a catalyst for NO_x emissions control. An approximately 19-percent aqueous ammonia solution would be stored in a 12,000-gallon tank located adjacent to the power block area. This tank would be approximately 12 feet in diameter and approximately 16 feet long, and would be of welded stainless steel construction. The tank would be located within a concrete secondary containment area capable of storing 110 percent of the tank contents. The tank would be tightness tested before use and inspected on a regular schedule. A leak detection system would be installed. The system would have an audible alarm in the control room and alarm at the remote monitoring and control site. The storage tank and containment design would include provisions for overfill detection and prevention. Containment provisions for the tank would also include containment and spill control for transfer areas and systems including, but not limited to, pipe connection to the SCR, water/ ammonia mixing connections, and truck unloading areas. These provisions are facility specific and designs will be reviewed by the New York State Department of Environmental Conservation (NYDEC) during the construction document development.

- Wastewater Holdup Tank – a 10,000gallon wastewater holdup tank would be constructed to manage wastewater generated from the trench drains and off-line compressor/turbine washwater. Prior to discharge to the tank, trench drains from potentially oily areas would be routed through an oil/water separator. This waste system would be directed off-site for appropriate treatment and disposal at the waste water treatment plant or hauled to another licensed disposal facility.

- Oil/Water Separator – An oil/water separator would be utilized to separate oils from wastewater sources subject to oil containment en route to the wastewater holdup tank. The oil/water separator would be appropriately sized for the largest oil container and appropriate wastewater flow rate.

In addition to the above tanks, the facility would also contain storage for lubricants, oily wastes, and other fluids including a 400-gallon turbine oil container, and a 60-gallon container for hydraulic oils.

Main and Auxiliary Transformers

There would be one main step-up transformer containing approximately 15,000 gallons of insulating oil, and one auxiliary transformer containing approximately 1,000 gallons of insulating oil. These oils will not contain PCBs. The oil in each transformer would be contained within the steel transformer casing and installed in a containment basin. A dry type auxiliary transformer design may be substituted during final design, alleviating the need for a containment basin.

Electric Interconnection

The proposed facility would connect via a 69-kV electric transmission line to LIPA's electric system at the Riverhead Substation located approximately 3 miles to the eastside of the site. An overhead line would exit the site along Grumman Boulevard to the Calverton #885 and on to the Riverhead Substation (See Appendix C: Interconnection and Transmission Line Study).

Substation Expansion

In conjunction with the project, the existing Riverhead substation could be expanded. LIPA is planning to improve the substation and transmission system in the area in the near future and may coincide with the proposed facility interconnection (See Appendix D Correspondence). If the LIPA substation were expanded to handle higher electric demand on the eastern end of Long Island, it would be subject to its own environmental review.

c. Project Water Supply

Water would be required for several functions associated with operation of the proposed facility. Water would be used for air emissions control (water injection for NO_x control), cooling of inlet air, general maintenance, and for washdown water. In the unlikely event of a fire, the existing firewater system would be used to meet fire suppression control requirements. Fire protection water backup would be available to the site through the on-site 150,000 gal demineralized water storage tank.

Process water makeup requirements for the proposed facility would be a maximum of approximately 20 gallons per minute (gpm) or about 132,000 gallons per day (gpd), which would be supplied by the Suffolk County Water Authority from existing water supply pipelines that were in service when the site area was used by the U.S. Government as a Naval Defense Research Facility.

The proposed project design minimizes potential water resource impacts, utilizing a simple-cycle combustion turbine for power generation rather than the traditional steam cycle. As such, the proposed facility would not require large amounts of boiler water or water for cooling-water purposes. This minimizes effects on the general wastewater supply system.

Water supply and wastewater discharge requirements also would be minimized through a leased demineralization system, which would eliminate the need for performing on-site regeneration of cation and anion exchange resins. In addition, off-site regeneration minimizes the storage, handling, and, management of acids or caustics required for 0n-site regeneration.

Wastewater

Wastewater would be handled in the following manner, by type:

- Sanitary Wastewater – All sanitary wastewater would be discharged directly into the existing drainage and sewer system previously used when the area was used for a U.S. Government Defense Facility.

- Industrial Wastewater – Project process wastewater flows would be generated from trench drains in the enclosures, and from off-line compressor cleaning operations. Each waste stream would be collected and stored in a collection tank, subjected to an oil/water separator, and directed to or pumped and delivered to the licensed disposal facility.

Stormwater

A Stormwater Management Plan would be integrated with the final design and would comply with all state and local requirements for both construction and operation phases of the proposed project.

The purpose of the Stormwater Management Plan is to manage stormwater runoff from the site and provide both flow and quality controls. The system would be designed to remove pollutants prior to discharge and to ensure that the natural hydrology of the site is maintained as closely as possible. Stormwater would be managed on site through groundwater infiltration, as appropriate.

Oil and chemicals would be managed in accordance with the Spill Prevention Control and Countermeasures Plan (SPCC) for the proposed project during construction to prevent a release to the environment and to prevent impacts to human health.

Good housekeeping practices would be used throughout the proposed project site to maintain a safe, clean, and efficient work environment. In addition, all contractors at the proposed facility would be contractually obligated to maintain a clean work environment. By design, no process or sanitary wastewater would discharge to stormwater collection, conveyance, and management systems.

The following areas would have special stormwater drainage components and/or characteristics. A more detailed description of the stormwater drainage is presented in Section 2.14, "Stormwater Management."

- *Aqueous ammonia unloading and storage area.* This area would include secondary containment encompassing the unloading area and the storage tank and transfer pump area. All stormwater captured in the containment area would be treated as industrial wastewater and directed to the wastewater treatment plant or stored and hauled to another licensed facility.

- *Transformer containment area.* These areas would include secondary containment that would be coarse stone filled. All stormwater captured in the containment area would be treated as industrial wastewater and directed to the wastewater treatment plant or stored and hauled to another licensed facility.

- *Bulk Oil Storage/Unloading Area.* This area would include a secondary containment basin encompassing the unloading area, the storage tanks, and the transfer pumps. All stormwater captured in the containment area would be treated as industrial wastewater and directed to the wastewater treatment plant or stored and hauled to another licensed facility.

Waste Generation and Disposal

A private contractor would dispose of non-recyclable materials. Normal maintenance would generate small quantities of solid waste on a periodic basis. Depleted SCR catalysts would be sent to the manufacturer or licensed recycler for recovery or disposal.

1.1.5. Timetables and Project Construction

a. Schedule

The project's schedule calls for installation of the proposed combustion turbines and completion of construction within approximately 6 months of received required permits.

Activities/Phasing

During the construction period, the number of workers on site would vary from about 25 to 80 personnel at any one time. A peak construction work force of approximately 80 persons would extend approximately three to four weeks. In general, site preparation and construction sequencing is as follows:

- Construction of site infiltration basins and diversion trenches;
- Installation of erosion and sedimentation control measures (silt fencing, inlet protection controls, etc., as necessary);
- Set-up and assembly of temporary office;
- General site grading;
- Preparation of construction parking and equipment staging areas;
- Installation of temporary utilities (electricity and phone);
- Minor excavation, grading, and construction of foundations;
- Erection of permanent equipment and buildings;
- Installation of off-site manufactured components;
- Stabilization of areas disturbed by construction (ongoing, as construction permits);
- Ongoing inspections and maintenance of erosion and sediment controls.
- Removal of temporary erosion and sediment controls.

Proper sequencing of construction activities would minimize the effect of construction on the site and adjoining properties. Best Management Practices (BMPs) for sedimentation and erosion control would be constructed early in the construction process and prior to the start of major earthwork activities. These include installation of stabilized construction entrances, perimeter fencing, perimeter interception trenches/swales, and installation of any useful portions of the stormwater management system.

Construction Support Area

The construction support area would be completely contained within the Calverton facility property.

1.2 Summary of Existing Environmental Site Conditions

The Town of Riverhead has subdivided the proposed site located within a 2,900-acre parcel bequeathed to the Town of Riverhead by the U.S. Government, who used it for a Naval Defense Area. The section of land where the facility will be located has been zoned exclusively for industrial usage and located within the Calverton Industrial Park. It is a paved area and all the required utilities, water supply, sewage and drainage are already in place and have been permitted for use by the Township of Riverhead. County, State and Federal Permits are inclusive. Existing conditions at the proposed project site are provided in an aerial, three site photographs (see figures 1.2.1 and 1.2.2.respectively) and location blueprints of the site at the Riverhead Industrial Park, (See: AppendixR).

1.3 Notifications, Actions, Permits and Approvals

This section addresses the requirements of 16NYCRR 1001.7(a) which requires East Hampton Power and Light to "identify any permit, consent, approval or license which will be required for the construction or operation of the Calverton Facility at Riverhead Township, Suffolk County, New York. The application shall specify the date on which an application for any such approval was made or the estimated date on which it will be made."

Federal Permits

a. Delegated Permits

A delegated permit means a permit issued by the DEC for which a comparable permit may be required by Federal law. Such delegated permits issued by the Department are:

1. Resource Conservation and Recovery Act (RCRA) Of 1976, 42USC 6901 *et seq.,* 1984 (ECL article 27, title 9) for any hazardous waste disposal.
2. Clean Water Act (CWA) amendments, 33 USC 1251 *et. Seq.,* 1987 (ECL article 17, titles 7 and 8) for state pollutant discharge elimination systems (SPDES) permit involving an industrial or municipal discharge.
3. Clean Air Act (CAA) amendments 42 United States Code 7401 *et. Seq.,* as amended in 1990 by Public Law 107-549 for any air pollution control source under ECL article 19 subject to any of the following federal requirements:
    a. Prevention of Significant Deterioration (PSD),
    b. New Source Review in Nonattainment Areas, or
    c. Title V Facility Permits.

b. Specific Permits

1. Permits under title 5 of ECL article 15 and Part 608 of 6 NYCRR – Use and Protection of Water.

2. Permits under title 27 of ECL article 15 and 6 NYCRR Part 666 – Administration and management of the Wild, scenic and recreational rivers systems.
2. Certifications made in accordance with section 401 of the Clean Water Act, and 6 NYCRR Part 608 – Water quality certifications for projects requiring a Federal permit.
3. Permits under title 7 and 8 of ECL article 17 and 6 NYCRR Parts 750-758 – State Pollution Elimination System (SPDES).
4. Permits under ECL article 19 and 6 NYCRR Parts 201, 203 and 215 – Air Pollution Control.
5. Permits under title 17 of ECL article 23 – Liquefied natural gas and petroleum gas facilities (LNG/LPG).
6. Permits under ECL article 24 and 6 NYCRR Parts 662-663 – Freshwater Wetlands.
7. Permits under title 7 of ECL article 27 and 6 NYCRR Part 360 – Solid Waste Management Facilities (SWMF).
8. Permits under title 9 of ECL article 27 and 6 NYCRR Part 373 – Hazardous waste management facilities.
9. Certificate of environmental safety and public necessity under title 11 of ECL article 27 and 6 NYCRR Part 361 – Siting of industrial hazardous waste facilities.
10. Permits under ECL article 34 and 6 NYCRR Part 505 – Coastal erosion management.
11. Ambient Air Quality Screening Analyses – New York Department of Environmental Conservation, Division of Air Resources, Bureau of Stationary Sources.
12. Toxicity Classification of Air Contaminants – Division of Air Resources (DAR)
13. DAR – 1 Annual and Short Term Guideline Concentrations (AGC/SGC Tables).
    A. New York State Department of Environmental Conservation – NYDEC. – Develops short-term one hour and annual guideline concentrations to protect the general population from adverse inhalation exposure at off-site industrial property.
    B. United States Environmental Protection Agency – USEPA – Publishes criteria values on the Integrated Risk Information System (IRIS) (http://www.epa.gov/iris/) for use in protecting public health through risk assessment and risk management.
    C. New York State Department of Health – NYSDOH
    D. American Conference of Industrial Hygienists – ACGIH – Publishes occupational exposure values for workers, ceiling values (never to be exceeded during a workday), and short-term exposure limits.
    E. Analogy by the NYDEC – When limited or no toxicological data exists to develop and AGC or SGC value, NYDEC sometimes assigns the same AGC/SGC value as that from a similar chemical compound based on a structural activity relationship ("analogy").
    F. Moderate and Low Toxicity *de minimis* Limits assigned by NYDEC.

G. High Toxicity *de minimis* Limit by NYDEC
H. Air Quality Standards – No source of an air contaminant may cause a predicted exceedance of a Federal or State Air Quality Standard unless monitoring data invalidates that prediction.
I. Equivalent Standards – These are for several States and Federal Standards not based on hourly or annual averaging times.
   a. NYS Fluoride Standards (Part 257-8). – New York State has several air quality standards for gaseous fluorides. Fluorides are defined as any compound that tests as fluoride by the appropriate method. Therefore, the regulation applies to all **inorganic** gaseous compounds, which contain the element fluoride.
   b. Federal 3-Month Lead Standard.
   c. Federal 24 Hour PM-10 Standard.
   d. Federal 3 hour Sulfur Dioxide Standard.

Prevention of Significant Deterioration Permit.

The primary purpose of the PSD program is to ensure that major new sources of air emissions apply the appropriate, legally required pollution control technologies; and to ensure that such sources are in compliance with ambient air quality standards. This permit program is administered by NYDEC, but the USEPA retains oversight authority. The USEPA has authority to issue a waiver from pre-construction air quality monitoring. As the Calverton Facility is 79.9 MW it is not considered to be a major facility a PSD permit is not required.

Federal Aviation Administration.

The Federal Aviation Administration (FAA) issues determinations relative to hazards and obstruction to air navigation, pursuant to Title 14 of the Code of Federal Regulations (CFR) Part 77. FAA correspondence is included in Appendix E – Correspondence. On June 25, 2003, East Hampton Power and Light submitted a Notice of Proposed Construction (Form 7460-1) to FAA for the Calverton Project. The next step in the process is to submit Form 7460-2 for Project construction, which would only occur after a certificate for the project, has been issued.

Endangered Species Compliance Act.

East Hampton Power and Light coordinated with the US Fish and Wildlife Service regarding any potential for impacts to habitat of species protected by the Federal Endangered Species Act on June 30, 2003…. (See Appendix E - Correspondence.)

FERC Exempt Wholesale Generator.

An Exempt Wholesale Generator (EWG) filing will be made to the Federal Energy Regulatory Commission pursuant to 18 CFR 365. EWG status will permit the Calverton Project to participate in the competitive wholesale electric generation marketplace.

Fuel Use Act

Thermal electric generating facilites are required to self certify their fuel capability pursuant to Section 201 of the Powerplant and Industrial Fuel Use Act (42 USC §8311). East Hampton Power & Light expects to file this self-certification statement prior to construction.

New York State Permits or Approvals

Pursuant to PSL § 172, a Certificate of Environmental Compatibility and Public Need for the Calverton Project will include approval for the following consents, permits, certificate or other conditions (except as noted for permits issued by NYDEC, which will be coordinated with but not made part of the Certificate).

NYDEC Permit for Approved Stationary Source

This permit application would be filed pursuant to 6 NYCRR 201. Because the permit would be issued pursuant to federal law (as described for the PSD program in the preceding paragraph and in the description of the Ambient Air Quality and Particulate Emissions in section 2.4), NYDEC is the permit-issuing agency.

NYDEC Operating Permit Title IV (Acid Rain)
This permit will be issued pursuant to federal law, whereby NYDEC is the permit issuing agency.

NYDEC Operating Permit Title V
This permit will be issued pursuant to federal law, whereby NYDEC is the permit issuing agency.

New York State Office of Parks, Recreation and Historic Preservation (OPHRP) Section 106 Review. (which also acts as the parallel review process pursuant to Section 14.09 of the New York State Parks, Recreation and Historic Preservation Law)

New York State Environmental Conservation Law §9 and §11 Compliance
This is the state corollary to the Federal Endangered Species Act compliance process. East Hampton Power and Light's correspondence with the NYDEC's Natural Heritage Inventory Program, research studies, and field trips indicate that significant and endangered species and habitats are not likely to be found on the site.

Department of Transportation (NYSDOT) Highway Work Permit
The proposed facility sewer interconnection will not require a Highway Work Permit pursuant to 17 NYCRR 131.16(a).

New York Department of Environmental Conservation Notice of Intent for coverage under the SPDES General Permit for Construction of Storm Water Discharge
A prerequisite of the NOI for General Permit coverage is that a storm water pollution prevention plan (SWPPP) be in place. The NOI and the proposed SWPPP for Project construction are being processed.

NYDEC SPDES Permit application for storm water discharge
This application is being processed.

NYDEC Petroleum Bulk Storage Registration
The project's low sulfur oil reservoir being above the threshold of 1,100 gallons requires registration pursuant to NY Environmental Conservation Law, ECL §17, Title 10. Such tanks must meet standards outlined in 6 NYCRR 598 and 599.

Suffolk County Approvals

Planning Department / Commission Review of Special Permit- pursuant to § A14-22 of the Suffolk County Administrative Code. This review is undertaken for certain zoning actions (within 500 feet of major highways). The Suffolk County Planning Department stated that under existing conditions this type of review would not apply.

County Highway Work Permit pursuant to Section 239-f of the General Municipal Code requirement for a compliance filing of the Calverton Project in its final design approval.

Sewer Connection Approval and Industrial User Special Permit pursuant to Chapter 424 of the Regulatory Local Laws.

Suffolk County Sanitary Code Article 6 - approval for water and sewage use.

Suffolk County Sanitary Code Article 7- approval for discharge authorization.

Suffolk County Sanitary Code Article 10- approval for air emissions.

2.0 Potential Environmental Impacts of the Proposed Actions

2.1 Land Use, Zoning and Neighborhood Character
The proposed site is located on the former Grumman Naval Defense Reserve, also known as Peconic Airport in the Township of Riverhead, Suffolk County, New York. The facility lies on the North side of Grumman Boulevard (Swan Road – River Road.) The parcel is 2,900 acres, the core where the airport, hangars, and steam heating plant is part of 454 acres set aside for the Riverhead Industrial Park. The proposed facility will be 3 acres inclusive of the administration building, storage, warehouse and emission stack. There are no residences within 1 mile of the facility.

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2.1.1. Existing Land Use and Zoning

a. Existing Land Use

Proposed Project Site and Interconnection

The proposed site is located on the former Grumman Naval Defense Reserve, also known as Peconic Airport In the Township of Riverhead, Suffolk County, New York (See Figure 2.1-1). The facility lies on the north side of Grumman Boulevard (Swan Road – River Road.) The parcel is 2,900 acres. The core where the airport, hangars, and steam heating plant are located is part of 454-acres set aside for the Riverhead Industrial Park (See Figure 2.1-2). The proposed facility will be 3 acres inclusive of the combustion turbine equipment enclosures, tanks, storage and emission stack. There are no private residences within 1 mile of the facility. The area of the proposed site is a pre-existing industrial zone that is part of a 454-acre industrial park. Existing utilities, water supply, sewage, and storm water discharge systems are in place and been in service since the time when the U.S. Government operated a Naval Defense Aviation and Research Facility on this site. They are presently permitted for use for this project by the Township of Riverhead and Suffolk County (see: Figure 2.1-3).

The proposed electric transmission line would be reconductored and/or reconstructed within existing roadways and utility rights-of-way. The proposed facility's 69-kV electric transmission interconnection would connect to LIPA's electric system at the Riverhead Substation located approximately 3 miles to the east of the site (See: Appendix C – Electric Interconnection and Transmission). An overhead line would exit the site along the Calverton facility's rights-of-way (ROW), then eastward towards the LIPA Calverton #885 & 867, then further eastward to the Riverhead Substation (See: Figure 2.1-4).

Surrounding Land Uses

The Township of Riverhead owns about 2,500-acres east of and adjacent to the proposed facility that was bequeathed to them by the U.S. Government who previously used it for a Naval Defense Facility. The Township is planning to revitalize the area and created the Calverton Enterprise Park. One of the airports that was used for naval defense, research and for experimental aircraft will remain open as a general aviation airport (See: Figure 2.1-5). The park is family recreation oriented and will contain various activities and commercial enterprises (See: Appendix L – Riverhead's Comprehensive Plan). To the south of and adjacent to the proposed facility is the Swan Lake Golf Course that operates seasonally – spring and summer and is closed in the fall and winter (See; Figure 2.1-6). To the west of and adjacent to the proposed facility are deciduous forests and parts of the Pine Barrens (Described in detail in Appendix M – Natural Resources). To the north of and adjacent to the proposed facility is property donated by the Township of Riverhead to the Department of Environmental Conservation for preservation.

Certain of the following aspects are being discussed today and may or may not call for the preparation of a SEQRA EIS:

1. NYS Environmental Conservation Law Article 57 Long Island Pine Barrens Reserve Act of 1990 as amended by the Long Island Pine Barrens act of 1993 as further a mended. A ct c ould apply although the project is within the Calverton Enterprise Industrial Park, but does not seem likely.

2. DEC has designated the Central Pine Barrens as a Critical Environmental Area. It is also the largest pine barren ecosystem in New York supporting one of the highest diversities of rare plant and animal species in the state, hosting many state listed birds including five breeding bird populations. It is also a James Audubon Important Bird Area.

3. The Peconic River traverses land on west and south sides of the Airport. While designated a Wild, Scenic, & Recreational River it is also within a Coastal Zone Management Corridor. In addition there are several new hiking trails in the general area that have not been recognized.

3. The Town of Riverhead is completing a new comprehensive land use master plan. The Town is presently advocating the Calverton Enterprise Park and has offered very generous tax advantages for new businesses within the Park. The enterprise may include a multi-use industrial park; a theme attraction area; a sports park/commercial recreation area and retained open space. It sees the Riverhead area as a tourist destination and is marketing itself as an agritourism destination

b. Land Use Changes and Probable Impacts of the Project

Development of the proposed project would result in redevelopment of a formerly used industrial facility. The proposed facility is to be built on previously excavated, cleared, leveled and paved land that was used by the U.S. Government as a Naval Aviation Defense and Research Facility. The proposed facility is an allowed use within the Riverhead Industrial Park. Further the project is compatible with existing land uses within the 1-mile radius study area, as well as the broader region. The project avoids impacts to land use, including impacts to the air, water, noise, traffic and transportation, visual resources, community facilities and natural resources. In addition, the project would not adversely impact existing land uses. The following summarizes and evaluates overall compatibility with existing land uses.

Air Quality

As detailed in the air quality impact analysis included in Section 2.7, "Air Quality," of this environmental assessment study, the proposed facility would not have a significant air quality impact or exceed the applicable National Ambient Air Quality Standards (NAAQS) (see Table 2.7-7). Further, maximum modeled concentrations at all sensitive receptors, including community facilities, would be below the U.S. EPA defined significant impact levels for all applicable standards and would not cause any violations of NAAQS. Operations of the proposed interconnections would not result in any significant air quality impacts.

Water Use and Quality

The Suffolk County Water Authority (SCWA) will supply water for the proposed project through a previously used water piping and supply system. The water supply system is active today as it was when the U.S. Government used when operating a Naval Defense Aviation and Research Facility. Based on a projected peak daily water use of 132,500 gallons per day, impacts to the local water distribution system are not anticipated. The proposed facility does not affect any Groundwater Protection System, or is it in a Water Supply Sensitive Area. To assure that adequate protection to the underlying aquifer is provided, the proposed facility would be designed to meet all applicable requirements of the Suffolk County Code Article 7: Water Pollution Control; and Article 12: Toxic and Hazardous Materials Storage and Handling Controls. The interconnection facilities would generate no water use or wastewater, and thus would not affect water use or wastewater disposal patterns.

Noise

Operation of the proposed facility would not result in any significant adverse noise impacts. As shown in Table 2.8-10, the maximum increase in noise levels at any sensitive receptor location, even during the quietest hours of the night, would be well below the project's 6 dBA impact criteria for significance. In addition, operation of the proposed facility would comply with the Township of Riverhead's noise standards. Accordingly, no significant noise impacts would occur as a result of the operation of the Calverton Facility.

Traffic

Operation of the proposed facility would not adversely impact traffic conditions in the vicinity of the project site. The proposed facility would contribute a small number of vehicle trips per hour (this includes worker, maintenance and fuel delivery vehicles). Therefore based on the observations of existing traffic volumes along Wading River Road and Grumman Boulevard, and the very small number of trips that would be generated by the proposed facility, traffic flow on nearby roadways would not be significantly affected by the project (see: Figure 2.7-7: Average Annual Daily Traffic (AADT).

Visual Resources

Because of the generally low relief and tree heights, the proposed facility would not be visible from most locations. At the limited number of locations where it may be possible to see the upper portion of the stack, the probable effects are expected to be minimal. Existing facilities in the area include a radio transmitter tower (FM 98.7), the control tower and antennas for the single runway in use at the Calverton Enterprise Park. Conversations with the Federal Aviation Administration indicate the emissions stack height is permissive. will not require special night lighting (it is under 185 feet high)) but will have a notice to airman (NOTAM) published in the airfield data directory and all aviation sectional, IFR, and navigation maps. The surrounding tree heights are slightly higher so there will be no adverse impact to visual resources. The transmission towers that will be reconductored or reconditioned are already in place. The new interconnection system would not use towers that are higher than the ones currently in service therefore they will not be a significant adverse visual impact.

Construction

Potential construction-related impacts of the proposed project (including construction of the generating facility and electric interconnections) are detailed in Section 2.16, "Construction" of the Environmental Impact Assessment. In general, construction activities are likely to result in some noticeable effects with regard to noise, traffic, and air quality. However, these conditions would be relatively short in duration and would not be expected to result in significant adverse impacts.

2.1.2. Zoning

a. Setting

Proposed Project Site

The proposed Calverton Generating Facility project site is located within a zoned 454-acre industrial park, known as the Riverhead Industrial Park within the Township of Riverhead. The Town Code of the Riverhead Township has zoned and approved the site for its proposed use as an electric generating facility.

Surrounding Zoning Districts

The proposed facility site is approximately 3-acres, which is located within the 454-acre industrial zone of the Riverhead Industrial Park. Surrounding the 454-Acre Industrial Zone are 2,446 acres that was previously used for a U.S. Naval Defense Aircraft Manufacturing Plant including an airfield, hangars, assembly plant, oil fired steam plant, and administrative offices and is now the Calverton Enterprise Park zoned for commercial and recreational purposes.

b. Projected Compliance with Zoning

The 3-acre project site is located within the 454-acre Riverhead Industrial Park, which is zoned exclusively for industrial purposes. Therefore, the proposed action is in conformance with the local zoning regulations, and the proposed project would not result in significant adverse impacts.

With regard to the transmission line to the Riverhead Substation, since there is already a LIPA transmission line in place (see: Appendix C) that has been zoned for transmission, and been previously granted the right-of-way, any reconductoring or reconditioning would conform to the use regulations presented in the zoning codes and therefore no significant adverse impacts in the study area are anticipated.

2.1.3. Neighborhood Character

The surrounding neighborhood outside of the proposed 3-acre site is a 454-acre industrial park, which is part of the 2,900-acre Calverton Enterprise Park. Surrounding the Calverton Enterprise Park is a mix of farms, a hiking trail, a small pond, a seasonally operated golf course which is closed in winter, a cemetery and preserved land. The existing neighborhood character would not be affected by the proposed facility, which conforms to the established land use patterns and existing zoning in the area.

2.1.4. Probable Impacts of the Project

The proposed Calverton Facility, which is an allowed use within the Riverhead Industrial Park, would serve an urgent and vital public need by providing much needed additional electric power to the Long Island power grid. It would also help alleviate the burden of peak loading and increase the system reliability. The facility is in compliance with the Township of Riverhead's zoning code. The proposed stack height of 65 feet will not obscure any known visual resources. The ambient air quality will not be adversely affected. It is in compliance with the village noise standards. The project will not adversely affect the health, safety and welfare of the areas residents or result in an undesirable change in the character or the environmental conditions of the surrounding neighborhood or nearby properties.

The proposed facility would not impact land use, zoning districts, or neighborhood character within a 1-mile and 5-mile radius of the project site. The project and proposed interconnections would not prevent the orderly and reasonable use of permitted or legally established uses in surrounding zoning districts. Moreover, the Township of Riverhead has determined that the proposed electric generating facility is an allowed use within the Industrial Park, and the proposed facility is an appropriate use.

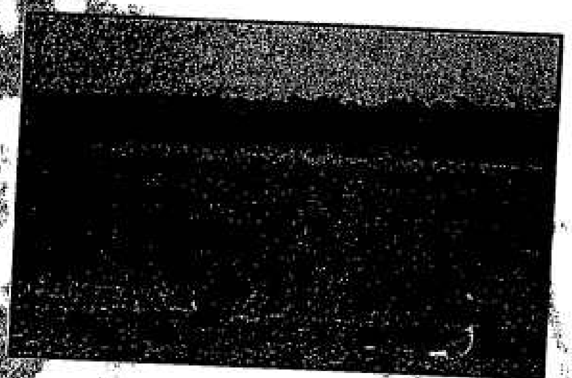
2.2 Community Facilities

2.2.1. Existing Conditions

An inventory of community facilities (schools, hospitals, government offices, religious institutions etc.) has been taken of both the immediate project site and a 1-mile radius of the study area surrounding the proposed project site to assess the potential effects, if any, of the proposed project on these facilities. The community facilities identified in the inventory are listed in Table 2.2-1, illustrated in Figure 2.2-1 and described in detail in Appendix N.

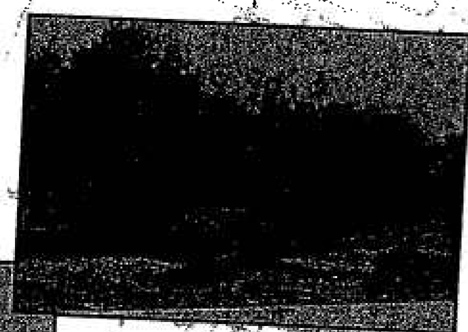
Figure 2.1-1: Calverton Enterprise Park

STATE-OF-THE-ART FACILITIES...



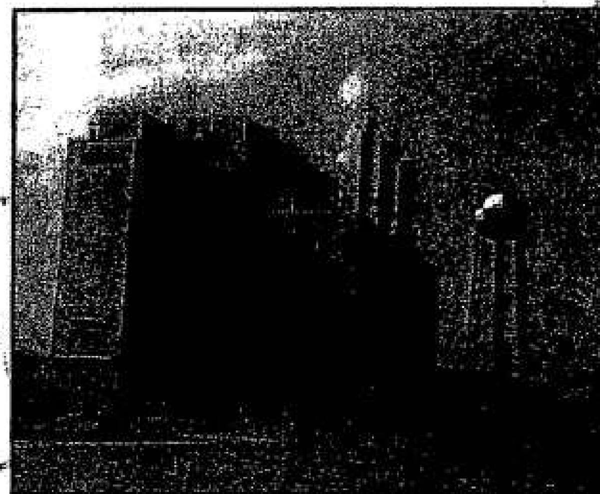
he high-tech facilities at EPCAL remain in total balance ith the area's existing natural beauty.

The Enterprise Park at Calverton is envisioned as a series of parks within a park. Anchored by the existing industrial park, distinct areas are ideal for entertainment and sports-oriented use. A "nature park" runs throughout, serving as a nature preserve for the region and a buffer between the Park's developed areas.

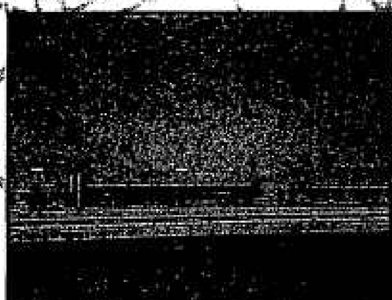


EPCAL is a easily accessible to all major roadways. The site also features an existing Long Island Railroad spur and a well maintained 10,000 foot runway. All major New York airports are within a 60 mile radius, and auto and freight ferries to Southern New England are located nearby.

Figure 2.1-2: Riverhead Industrial Park

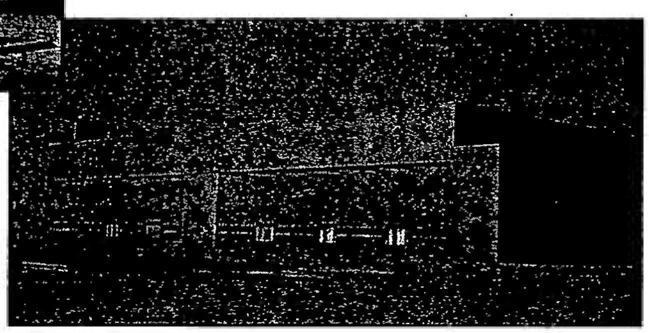


One million square feet of mixed-use space is located on 282 acres at the center of the site. An additional two million square feet may be developed to complete the industrial core.

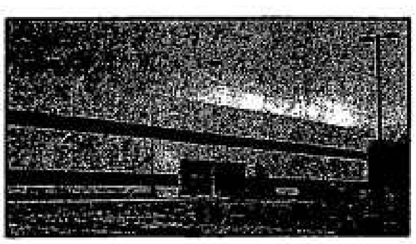


The entire complex is served by an on-site water supply and distribution system and features an operational oil-fired steam plant (seen above) which has conversion capability to natural gas. Sewage treatment and a fire prevention system are also on site.

Once utilized for final assembly of aircraft and flight development, this 200,000 square foot complex and features a main building, four hangers and the Airport Central Tower seen on the left side of the exterior photo.

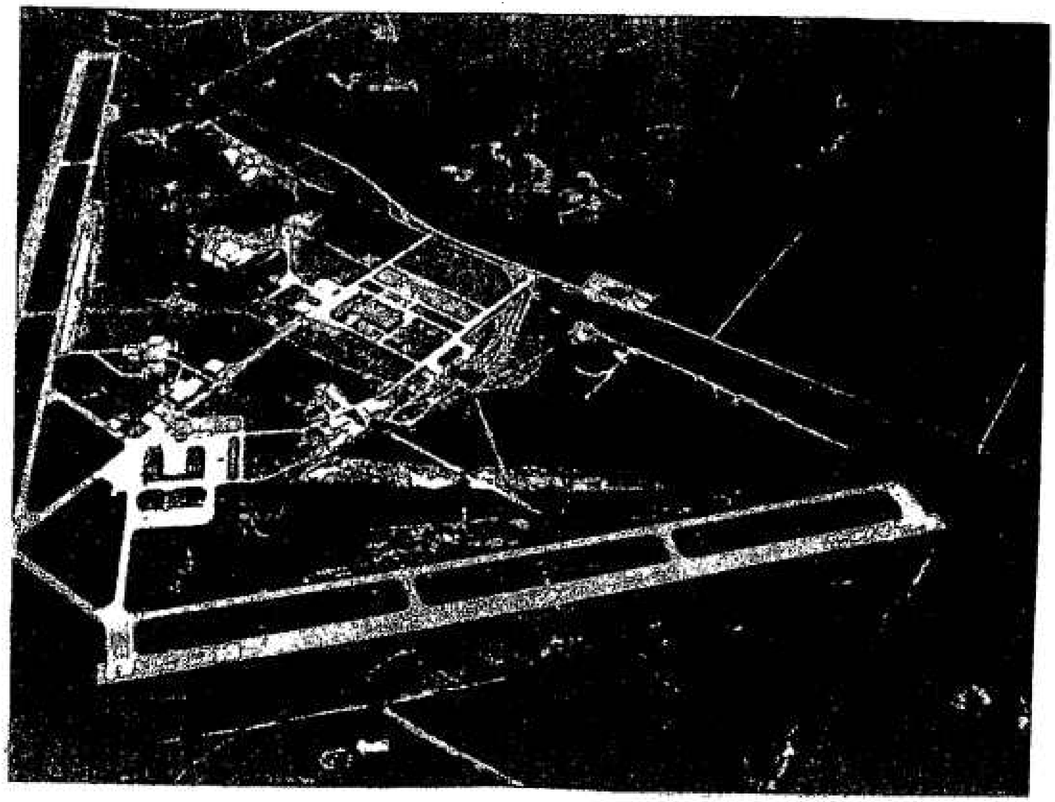


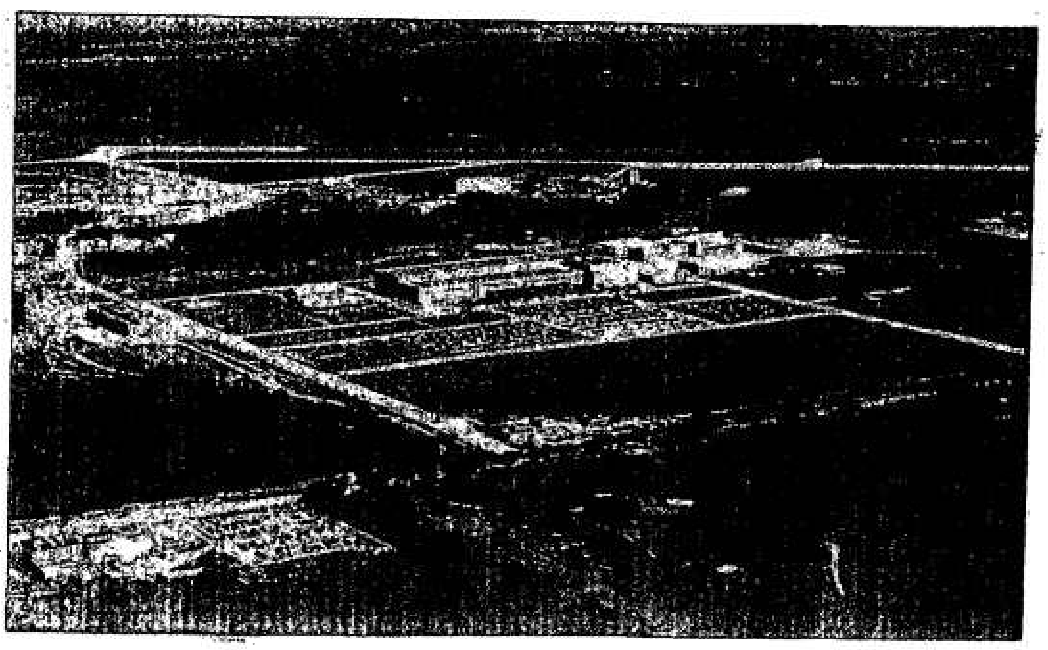
The former Main Operations Building contains 300,000 square feet of floor space. One third of the area is high bay featuring five fifteen-ton overhead cranes.



This office building is ideally suited for corporate headquarters, financial, technological, educational or research facility applications.

Figure 2.1-1 Calverton Site Aerial Photographs





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2.2 Community Facilities

2.2.1 Existing Conditions

An inventory of community facilities (schools, hospitals, government offices, religious institutions, recreational areas, parks, lakes, ponds, etc.) has been taken of both the immediate project site and a 1-mile radius of the study area surrounding the proposed project site to assess the potential effects, if any, of the proposed project on these facilities. The community facilities identified in the inventory are illustrated in Figures 2.2-1 and 2.2-2, and described in detail in Appendix N.

a. Project Site

There are no community facilities on the project site.

b. 1-Mile Study Area

Two community facilities have been identified within the 1-mile radius of the proposed project site:

- Swan Lake Golf Course
- Riverhead Industrial Park

The Calverton Enterprise Park is located adjacent to the Riverhead Industrial Park, however it is outside of the 1-mile study area.

2.2.3. Probable Impacts of the Project

The community facility located within closest proximity to the proposed site is the Swan Lake Golf Course. It is on the south side of the site approximately ¾ of a mile from the generating plant. One small part of the golf course is adjacent to Grumman Boulevard, formerly Swan Lake and River Road, respectively, which is within the one-mile radius. Only one of the "holes" is along the roadway boundary-line; the other 17-holes recede into a southerly direction for ½ mile. The golf course is open seasonally (spring and summer, while closed in the fall and winter). The second facility in the 1-mile area is the Riverhead Industrial Park that is part of the 2,900-acre tract bequeathed to the Township of Riverhead by the U.S. Government. The Township is planning to use 454 acres exclusively for industrial and commercial purposes (See Figure 2.2-3), however the businesses have not yet commenced operations. Further to the east, but outside of the one-mile study area is the Calverton Enterprise Park, which the Township is planning to develop as a family oriented recreational area. However, these plans have not currently been put into the development stage. They will include an airport. We have discussed, with the Federal Aviation Administration, the parameters of locating a 65 foot stack within 3-miles of an airport. They indicated that it would not cause any type of aviation hazard and will grant us a permit for constructing the stack if required. As described in section 2.7, "Air Quality," the proposed facility would not adversely affect the operation and enjoyment of the golf course and industrial park. Further, as the facility would be equipped with a noise suppression air inlet system and exhaust silencers any sound emitted from its operation would be inaudible and well within the regulated Riverhead Township Noise Code. Consequently, the proposed facility would not have an adverse impact on community facilities.

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2.3 Cultural Resources

This section considers the potential of the proposed project to affect cultural resources on or near the project site. Cultural resources include both archaeological and architectural resources. The study area for archaeological resources would be the area disturbed for project construction, which includes the site of the proposed Calverton Facility and the route designated for an interconnection with the LIPA substation located in the Town of Riverhead.

Riverhead possesses a variety of important scenic and historical resources, ranging from expansive views of working agricultural landscapes; to scenic roadways like Sound Avenue; the historic structures and landscape of the Hallock Homestead; the scenic bluffs along Long Island Sound; historic hamlet like Jamesport, as well as the historic buildings and compact layout of downtown Riverhead. These resources and features reflect the richness and diversity of the East End's historic, cultural and natural landscape. They also contribute strongly to Riverhead's long-term economic vitality and business development due to their ability to attract visitors and tourists (see Appendix O- Scenic and Historic Resources), however the study area for architectural resources is defined as being within an approximately one-mile radius of the Calverton Facility site, and within 90 feet of the interconnection line to the Riverhead substation. The one mile study area for the Calverton Facility accounts for potential physical effects on architectural resources located close enough to the Calverton Facility to experience construction related effects and accounts for potential visual, audible, and contextual effects from the proposed electrical generating facility. As there already exists a power line to the Riverhead Substation from the proposed site a voltage increase would require only require reinforcing of existing lines, therefore there would be no potential for visual or contextual effects on architectural resources. The study area for the transmission line route has been defined as within 90 feet of the affected sites, the distance to which ground borne construction period vibrations could extend. The search for architectural resources listed on the State and National Registers of Historic Places or the Riverhead Landmark Preservation Commission have shown none in this study area.

2.3.1. Existing Cultural Resources

a. Archaeological Resources

Documentary research was conducted to identify known archaeological sites within one mile of the Calverton Facility. No previously recorded archaeological sites exist within the project area.

There are no known archaeological sites within the proposed Calverton Generating Facility or within the proposed transmission line routes. Therefore, no known archaeological resources would be disturbed by the proposed project. The entire area surrounding the project site is 2,900 acres. It was previously used as an airport, for aircraft construction with numerous large hangars, administrative offices and maintenance plants. Accordingly, no further archaeological study is warranted for the Calverton Facility site and proposed transmission line routes.

b. Architectural Resources

Within the study area, architectural resources listed on the State and National Registers of Historic Places and the Riverhead Landmarks Preservation Commission were not found.

2.3.2. Probable Impacts

a. Archaeological Resources

There are no known archaeological sites within the proposed Calverton Facility or within the proposed transmission line routes. Therefore, no archaeological resources would be disturbed by the proposed project. It is not expected that potential archaeological resources would be disturbed by the proposed project site since documentary research and subsurface archaeological investigations indicate that the Calverton Facility site and the transmission line routes are not sensitive for archaeological resources. The 460-acre Riverhead Industrial Park, where within lies the proposed facility site, have been previously disturbed by construction, and field investigations encountered no significant archaeological remains. Since the utility transmission line would extend within previously disturbed road and transmission line ROW's, construction and installation of the proposed transmission line connecting the proposed facility with the Riverhead substation would not affect any potential archaeological resources. Therefore, no further archaeological study is warranted for the Calverton Facility site and the proposed transmission line routes.

b. Architectural Resources

There are no State and National Registries, locally designated, or potential architectural resources located within a one-mile radius of the Calverton Site. Therefore the proposed facility would be located too far from any architectural resources located within the study area and no adverse impacts to any architectural resources would occur.

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2.4 Visual Resources

The following section characterizes the visual resources within the assessment area of the project site. A view line of five miles is generally considered a Visual resource Assessment Standard, beyond which facilities are not noticeable unless they are particularly prominent. Figure 2.4-1 shoes a one-mile radius from the proposed site, and figure 2.4-2 shows a five-mile radius. Evaluating the natural and cultural features found within the fove-mile study area can determine the potential visual effects of the proposed facility on these resources. The visual effects assessment included field visits to the proposed project site and study area in June 2003 and a review of aerial photograo=phs, topographic maps and other documentation of the area.

2.4.1. Existing Environmental Setting

Section 1, "Project Description," describes the basic project setting. For the Visual Resources assessment, the tree canopy adjacent to the site on the west and north is a primary limiting factor. The maturing climax community is a relatively typical American Beech, Oak, and Pine, and the expected natural forest type for the area. These trees have an average height of about 65 feet and a maximum height of 75 feet.

The proposed project site is approximately 30 feet above mean sea level (MSL). Much of the five-mile study area includes the Long Island Sound and the Inner Channels major bodies of water. To the north and west lies the Pine Barrens. To the east and south lie agricultural farms, the Swan Lake Golf Course and the Robert Cushman County Park. The highest point within the five-mile radius is Zeke's Knoll at an altitude of 196 feet. The tallest structure in the 5-mile visual resource area is a radio transmitter tower at a height above ground of 130 feet. Site designs for the project site would keep a buffer of the forest between the proposed plant and adjacent properties. Under consideration and discussion with the NYDEC is the feasibility of an aesthetic camouflage for the stack as has been done previously with several major utilities.

Fig. 2.4-2 lists the sensitive viewpoints within the five-mile radius of the proposed facility.

2.4.2. Probable Impacts of the Project

The project facility has been studied for potential visual impacts to the surrounding parks, cultural resources and urban areas. The project facility does not visually impede any current sight lines within the five-mile visual and aesthetic study area. The tallest element of the proposed project facility would be the 10-foot diameter, 65-foot tall stack. This is well below the nearby radio transmission tower of 130 feet. The wooded area surrounding the project area includes numerous 65 to 75 foot maturing hardwood and pine trees. Given this tree screening, even during leaf-off conditions, the proposed facility would not be visible from any of the public or historic resources in the five-mile radius.

Even nearby residential and commercial establishments would have little view of the project facilities. None of the properties listed on or eligible for listing on the NRHP would be affected by the proposed facility. The proposed facility would not be visible from any of these properties. The proposed project would not have a significant adverse visual impact.

With regard to the existing transmission line interconnection to the Riverhead substation, it has been in operation for over 40-years and may soon be replaced into an underground conduit. The existing line does not have any significant adverse visual impacts.

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2.5 Environmental Justice

2.5.1. Introduction

The proposed Calverton Facility has been reviewed to assess its potential impacts on minority and low-income communities. The purpose of this evaluation is to assess if disproportionate averse environmental, economic, and health impacts may result from federal and state actions and policies. This assessment is consistent with the objectives outlined in the U.S. Environmental Protection Agency (USEPA) policy and guidance papers on environmental justice and with the New York State Department of Environmental Conservation's (NYDEC) policy and guidance papers.

U.S. EPA Region 2 developed and issued a December 2000 Interim Environmental Justice Policy. The Environmental Justice Policy was issued in accordance with the President's Executive Order 12898. Region 2 notes in the December 2000 Interim Environmental Justice Policy (Interim Policy) that it is now incorporating Environmental Justice into its technical and management decisions and actions. Region 2 uses this policy to ensure that it is identifying, targeting, and responding to decisions and actions that would disproportionately impact the health and environment of communities. This policy promotes Environmental Justice that assures the fair treatment and meaningful involvement of all people in a community regardless of race, color, national origin, or income.

2.5.2. Evaluating Disproportionate Adverse Burden

On January 2, 2002, NYDEC published "Recommendations for the New York State Department of Environmental Conservation Environmental Justice Program." This report set forth recommendations for how environmental justice can be incorporated into permit review, SEQR procedures, and some components of NYDEC's enforcement, public participation, and grants programs. The report and public comment generated from the report will serve as the basis for a future NYDEC policy related to environmental justice. The Janaury 2002 report recommends that the NYDEC environmental justice screening process utilize the methodology employed by U.S. EPAA Region 2 in its Interim Environmental Justice Policy (Interim Policy).

On August 7, 2002, NYDEC published a draft policy on environmental justice analysis to be used in their permitting process. The NYDEC Draft approach is used in this Environmental Justice analysis. A three step methodology is prescribed for conducting the preliminary screening analysis, as has been done above. The steps are described below:

> Step 1: Determine whether the proposed action is in or near a minority or low-income community. NYDEC methodology requires the use of Geographic Information Systems (GIS) to map United States Census Tracts and Blocks where environmental impacts from the project may occur. Based on conditions in New York State, NYDEC has identified low-income communities as those where the

poverty levels exceed 24.8 per cent of the total population; and minority communities as those where in rural area, the minority population exceeds 33.5 percent of the total population.

Step 2: Identify potential environmental impacts.

Step 3: Determine whether impacts are likely to adversely affect a minority community or a low-income community. For this step, "if no census block group(s) meeting the GIS application thresholds for minority community or low income community is identified, the proposed action is not likely to adversely affect a minority community or a low income community."

The environmental justice policy, when finalized, will apply to permits administered under Article 70 of the Environmental Conservation Law (ECL) and Title 6 of the New York Code of Rules and Regulations (NYCRR) Part 621. Any application for a new permit that is classified as a major project (as defined by 6 NYCRR Part 621.4) from applicable programs or an application for a major modification of an existing permit from the same applicable programs should be subject to the environmental justice screening process.

2.5.3. Selection for Potential Environmental Justice Communities

U.S. Census bureau data for the 2000 and 1990 census were obtained for this area along with information from the Township of Riverhead and Brookhaven, the Chamber of Commerce, and local realtors. The study area for this project covers the Township of Riverhead. Census tracts that cover this geographic area are tracts 1697.02 and 1594.10. The block for this census tract is the focus of this study as they represent the immediate area out to more than 1-mile. The boundaries of the relevant census tracts and block is shown on Figure 2.5-1.

The above-cited NYDEC Draft Policy defines the term "minority population" as a group of individuals that are identified or recognized as African-American, Asian-American and Pacific Islander, American Indian or Hispanic. (Hispanic refers to ethnicity and language, not race, and may include people whose heritage is Puerto Rican, Cuban, Mexican, and Central or South American). For purposes of this assessment, the white non-Hispanic population was identified from the census data and all other individuals were identified as minority groups (refer to Table 2.5-1).

The NYDEC Draft Policy also establishes the New York State threshold for low income population at 24.8 percent. Income data are part of the U.S. Census "long form" questionnaire and are based on a partial sample count. For the year 2000 census, low-income population is defined as the percentage of individuals whose 1999 income was less than the 100 percent of the poverty level. Block groups in which more than 24.8 percent of individuals fit this description are potential environmental justice communities.

Table 2.5-1: Minority Data by Census Tract

	Total Population[1]	Minority Population[2]	Minority Population Percentage
Suffolk County	1,419,369	219,250	15.4%
1697.02 Block Group 1	3,951	152	5%
1594.10 Block Group 2	1,248	61	4%

Notes:

[1] U.S. Census Bureau, American Fact Finder, P1 Total Population [1] – Universe: Total Population, Census 2000 Summary File 1 (SF 1) 100 – Percent Data.

[2] U.S. Census Bureau, American Fact Finder, P4 Hispanic or Latino and not Hispanic or Latino by Race [73]-Universe: Total Population, Census 2000 Summary File 1 (SF 1) 100-Percent Data.

As identified in Table 2.5-1, Census Tract 1697.02 and Census Tract 1594.10 do not meet the NYDEC definition of a minority community. No census tract was identified as meeting the definition of a low-income community (See Table 2.5-2).

Table 2.5-2: Percentage of Persons at or Below the Poverty Level, 2000 Census

	Total Population[1]	Poverty Population[2]	Poverty Level Percentage
Suffolk County	1,393,546	83,111	6.0%
1697.02 Block Group 1	3,951	0	0%
1594.10 Block Group 2	1,248	0	0%

Notes:

[1] U.S. Census Bureau, American Fact Finder, P 87 Poverty Status in 1999 by Age [17] – Universe: Population for whom poverty status is determined, Census 2000 Summary File 3 (SF 3) – Sample Data.

[2] U.S. Census Bureau, American Fact Finder, P53 Median Household Income in 1999 (Dollars) [1] – Universe: Households, Census 2000 Summary File 3 (SF 3) – Sample Data.

2.5.4. Area Toxic Inventory

Federal and State information sources have been utilized to evaluate the existing air emissions, water discharges, waste generation and management, and toxic and hazardous releases within the 1-mile study area. EPA's Envirofacts Warehouse and Environmapper were utilized along with NYDEC's Navigator mapping function. Appendix lists the results for the 11933 and 11949 zip codes identified through EPA's Environmapper. This list identified 6 facilities including a few facilities that are well outside the 1-mile study area for this analysis. The facilities listed are generally identifiable as the neighborhood golf course, the Calverton Enterprise Park and the Riverhead Industrial Park. Several of the facilities are listed because of permitted waste handling activities, water discharges and non-major air discharges. No significant non-compliance status was identified for any facility on this study area.

A review of the toxic release inventory (TRI) from the EPA shows no facilities reporting under TRI in the 11933 and 11949 zip codes. Therefore, it is concluded that no disproportionate environmental burden exists in the identified communities.

2.5.5. Probable Impacts of the Proposed Project

The air quality analysis presented in Section 2.7 of this Environmental Assessment shows that emissions from the Calverton Facility would be below major source thresholds, concentrations would be below applicable air quality standards. Table 2.4-3 presents the results iof air quality monitoring of the Calverton Facility with and without the addition of measured background and compares the National Ambient Air Quality Standards measured background and compares the National Ambient Air Quality Standards (NAAQS). The values in the table clearly show that even when maximum plant impacts are added to maximum measured ambient concentrations, the resulting air quality levels will be well below NAAQS.

With worst-case parameters the air quality modeling demonstrated results that are below U.S. EPA designated significant impact levels (SILs) for under all modeled circumstances. SILs have been established by U.S. EPA as the level below which no significant impact to air quality is deemed to occur. The contribution of the proposed facility emissions relative to the total concentrations that may be experienced by commercial enterprises within the identified community was also determined. These results indicate that the Calverton Facility would have a negligible contribution to the total concentrations presented on Table 2.5-3, and would not result in a disproportionate or adverse impact to the surrounding community.

Table 2.5-3: Calverton Facility Maximum Modeled Concentrations

Pollutant	Average Period	NAAQS (μg/m^3)	Significant Impact Level (μg/m^3)	Background Concentrations (μg/m^3)[1]	Maximum Modeled Concentrations (μg/m^3)[2]	Total Concentrations (μg/m^3)
CO	1-Hour	40,000	2,000	7,130	5.4	7,135.4
	8-Hour	10,000	500	5,175	1.2	5,176.2
SO_2	3-Hour	1,300	25	147	10.2	157.2
	24-Hour	365	5	89	2.9	91.2
	Annual	80	1	26	0.029	26.03
PM_{10}	24-Hour	150	5	46	4.92	45.92
	Annual	50	1	19	0.049	19.05
NO_2	Annual	100	1	47	0.015	47.02

Notes:

[1] Background concentrations are the highest second highest short-term (1-,3-,8- and 24-Hour), and maximum annual average concentrations which is the 98th percentile 24-Hour concentrations monitored from 1999-2000.

[2] Highest first highest concentration.

2.5.6. Conclusion

This Environmental Assessment and associated permit documents show that the various types of environmental burden potentially posed by the project are well below recognized regulatory and health and welfare based standards. The air quality analysis shows that the project would be capped below the major source threshold for nitrogen oxide (NO_x) and would have state-of-the-art technologies incorporated for combustion efficiency and emissions control (i.e., Selective Catalytic Reduction and water injection) would be controlled by add-on catalytic oxidation technology (considered the technical state-of-the-art for gas turbines. SO_2 would be controlled by using low-sulfur (0.05 percent) distillate oil. Dispersion modeling for the proposed project shows that modeled emissions for criteria emissions are below the SIL deemed by U.S. EPA and NYDEC to be the level below which emissions pose no adverse impacts. Additionally, the very brief time of travel for air emissions over the land on eastern Long Island further mitigates any significant exposures to criteria pollutant and $PM_{2.5}$. Most if not all secondary $PM_{2.5}$ (particulates formed beyond the stack by condensation of ammonium sulfate) will occur over the Atlantic Ocean and not over the land due to the long time for condensation to occur and the very short time of travel over the land at this end of eastern Long Island.

Although no minority community was identified within the vicinity of the proposed project, an evaluation of the maximum air emission impacts from the proposed project has not identified any significant adverse impacts on a short-term of cumulative basis to low-income or minority populations. Therefore, the proposed project is in accordance with the environmental justice objectives defined by NYDEC.

Figure 2.5-1 Environmental Justice Geographic Assessment

U.S. Environmental Protection Agency

Environmental Justice

Environmental Justice Geographic Assessment Tool

The Environmental Justice Geographic Assessment Tool is now available.

This new tool replaces the EnviroJustice Mapper with new features and new technology. It is the result of an Agency-wide work group and provides information relevant to any area in the Continental U.S. Factors relevant to environmental justice assessments generally fall into four sets of indicators, i.e., environmental, health, social, and economic. The conditions these indicators seek to illuminate include, but are not limited to: adverse health or environmental impacts, aggregate or cumulative impacts, unique exposure pathways, vulnerable or susceptible populations, or lack of capacity to participate in decision making process. As these data become available, they may be incorporated into the Environmental Justice Geographic Assessment Tool, which when fully developed will provide the information necessary to conduct a comprehensive preliminary analysis of any area of concern. Use of buffers is incorporated into the Environmental Justice Geographic Assessment Tool; population estimation is accomplished through the area-weighted methodology. The smallest unit of geographic resolution is the census block.

This Environmental Justice Geographic Assessment Tool is meant to serve as a module to be incorporated on the front end (e.g., screening) of all appropriate Agency assessments. This web-based technology is currently accessible on the public access (http://www.epa.gov/enviro/ej). For more information contact Sheila Lewis (lewis.sheila@epa.gov)

Last updated on Friday, August 15th, 2003
URL: http://www.epa.gov/compliance/environmentaljustice/assessment.html

Figure 2.5-1 Environmental Justice Geographic Assessment

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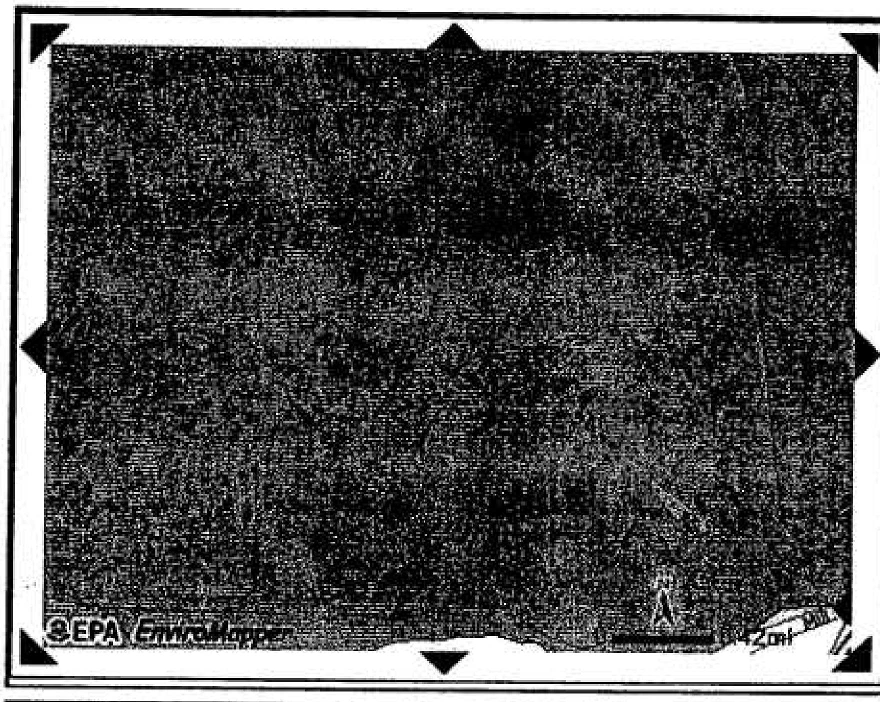

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Figure 2.5-1a Environmental Justice Geographic Assessment

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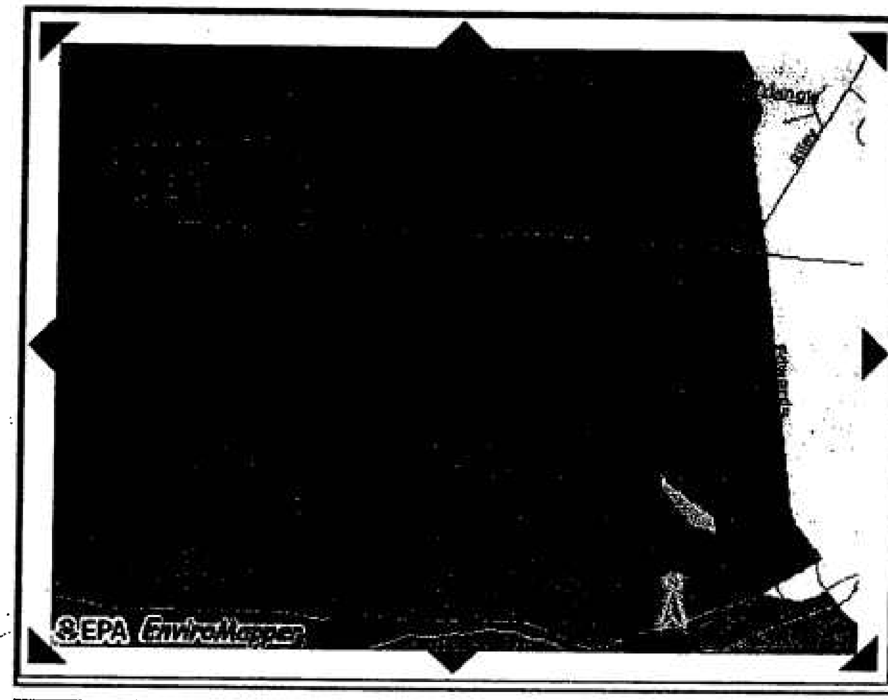

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Figure 2.5-1b Environmental Justice Geographic Assessment

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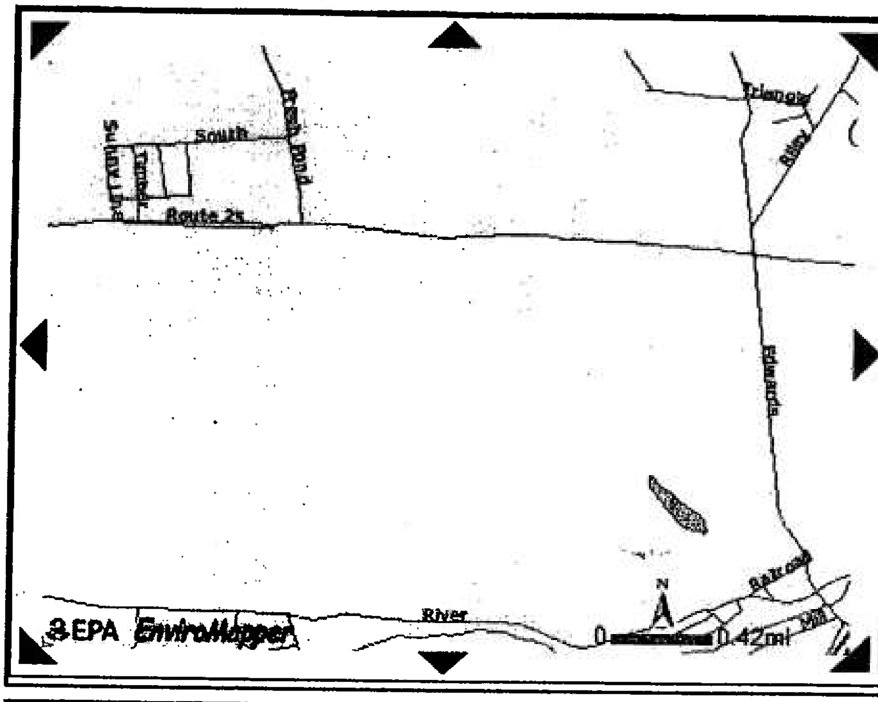

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Figure 2.5-1c Environmental Justice Geographic Assessment

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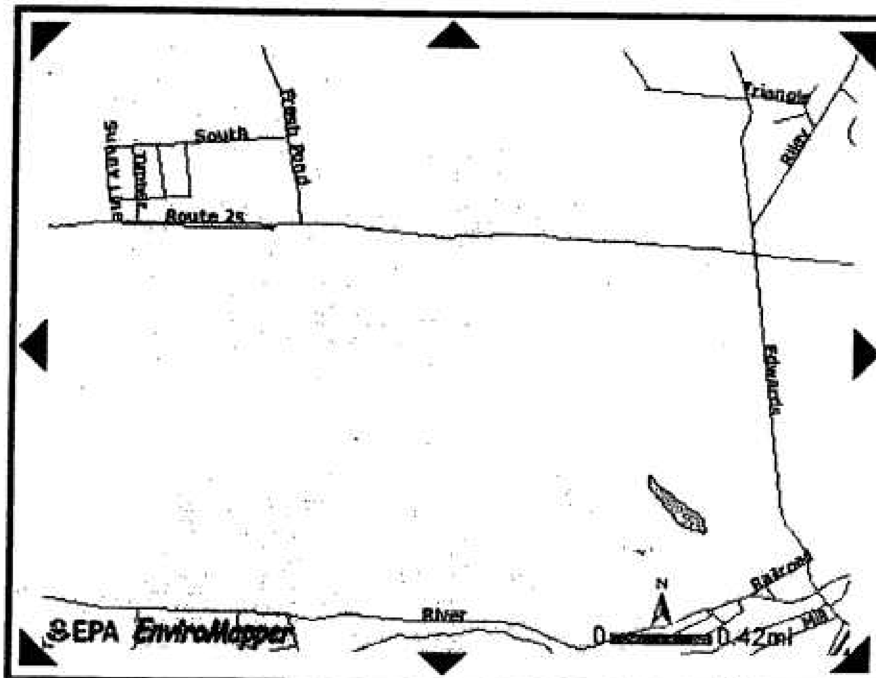

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2.6 Traffic and Transportation

This section describes existing and future traffic and transportation conditions at and associated with the project site and proposed facility. Section 2.15, "Construction Effects," describes construction-related effects on traffic and transportation.

2.6.1. Existing Roadway Network and Traffic Volumes

Figure 2.6-1 shows the project site and vicinity road network. The major roads include the east-west NY State Route 25 and Grumman Boulevard – River Road, and the north-south Wading River Road and Edwards Avenue which completely surround the 2,900-acre parcel bequeathed to the Township of Riverhead by the U.S. Government, wherein lies the 460-acre Riverhead Industrial Park, and the proposed Calverton Facility.

County traffic records show an annual average daily traffic (AADT) volume of non-significant traffic on each of the above roads, except for the N.Y. State Route 25 that has a volume of 7,500 (See: figure 2.6-2). Based on the configuration and use pattern, it is expected that over 95 percent of traffic to the site would originate from the Long Island Expressway (LIE) to Wading River Road and onto Grumman Boulevard where the proposed facility entrance gate is located. The Long Island Expressway is approximately 3 miles from Grumman Boulevard and does not effect local traffic.

Peak traffic hours generally occur between 8 AM and 10 AM in the morning, and between 4 PM and 6 PM in the evening in low-density areas, such as the proposed site facility. Using a peak-hour factor of 0.14 AADT (Standard Handbook for Civil Engineers, Merritt, F., 1983), the peak-hour volumes for State Route 25 and estimated to be 600. NY State Route 25, however is not expected to be used for construction, general maintenance and deliveries.

2.6.2. Probable Impacts of the Project

The proposed facility would generate two types of traffic: operations and maintenance staff, and oil trucks. Assuming normal operations, the facility would generate a maximum of 8 vehicle trips during the busiest hour for staff and maintenance, or an AADT of 25, or an hourly average of 2.5 vehicles over a 10-hour working day. The oil hauling would generate a maximum of 4 truck trips during the busiest hour, an AADT of 12 (6 roundtrips per day), or an average of 1.2 trucks per hour for a 10-hour working day.

Assuming that all trucks and vehicles enter from the Wading River Road (off the LIE) the project would result in an increase in peak-hour traffic on Wading River Road of approximately the number of trips required.

2.6.3. Conclusion

The small number of trips generated by the proposed facility would not significantly affect traffic flow conditions and would not result in a significant adverse traffic impact.

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2.7 Air Quality

2.7.1. Introduction

This analysis examines the air quality effects of operation of the proposed General Electric MS7001EA dual fired turbine combustion system to be sited at the Calverton Generating Facility.

* Since this supplemental EIS was first composed, several significant aspects of air quality review have come under consideration, and would mitigate this proposed facility permit evaluation requirements. They are listed below:

- Court of Appeals decision: *Spitzer vs. Farrell (June 5, 2003), the analysis of $PM_{2.5}$ that the petitioner performs may well be somewhat different and perhaps less extensive than those performed by similar applicants in the last 18 months.*

- On August 27, 2003 the Bush Administration exempted thousands of older power plants, refineries and factories from having to install costly clean air controls.

- In a major new revision to its air pollution rules, the Environmental Protection Agency (U.S. EPA), will allow up to 20 percent of the costs of replacing each plants production system.

The Calverton Generating project involves the placement of a 79.9 MW dual fired (gas and oil) turbine unit in the Township of Riverhead, Suffolk County, New York. See figure 1-1 and 1-2 in the "Project Description" setting. The unit is the General electric MS7001EA dual fired turbine generating system. It is a pre-tested system, which is delivered in sections on an extra heavy-duty transport trailer. The system was developed to be an ultra modern, air pollution free turbine system. It is equipped with a dry low NO_x combustion system which includes thermal barrier coated liners, nimonic transition pieces, Reuter Stokes SiC flame detectors and compressor inlet heating, continuous emission monitoring (CEMS), and programmable logic controllers and sequencing. Very low sulfur light distillate oil (less than 0.05% sulfur content) would be used until natural gas is available. The low sulfur oil is far below the New York State standard for fuel sulfur content in Suffolk County.

2.7.2. Applicable Air Permitting Requirements

The proposed project would be capped below the 25 ton per year major source threshold for the controlling non-attainment pollutant, nitrogen oxide (NO_x). Non-Attainment New Source Review (NSR) and review for Prevention of Significant Deterioration (PSD) would not apply to the proposed facility.

The NYDEC and the U.S. EPA have promulgated air quality regulations that establish ambient air quality standards and emission limits potentially applicable to the project. These regulations include National Ambient Air Quality Standards (NAAQS), New York Air Quality Standards (NYACS), New Source Review (NSR) requirements for major sources and modifications including PSD review and Non-attainment New Source Review (NNSR), New Source Performance Standards (NSPS), and Acid Rain Prevention (See: Glossary in Appendix). The NYDEC administers these programs under the auspices of the EPA and in the regulations

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of Title 6 of the New York Code of Rules and Regulations (6 NYCRR). There are additional New York State Programs including the Environmental Conservation Laws (ECL), which address air toxics analysis, acid deposition and plume visibility analysis. These standards and requirements impose design constraints on new facilities and provide the basis for an evaluation of the potential impacts of proposed projects on ambient air quality. This section describes the relevance of each of the regulations as they apply to potential project impacts on ambient air quality.

The air quality analysis examines effects of operation of the proposed General Electric 7EA Gas Turbine Electric Generating System to be erected at the Calverton Industrial Center, Township of Riverhead in Suffolk County, New York.
The East Hampton Power & Light's Calverton facility involves the placement and operation of a 79.9 MW gas and oil fired turbine unit in the Industrial Reserve of the Calverton Industrial Center, Riverhead, New York. See Appendix D – Scope of Supply, Major Equipment, Gas Turbine and Accessories, Generator and Accessories, Design Criteria / Assumptions, Performance Curves and Blueprints of Configuration and Construction.

2.7.3. Facility Design and Proposed Technology
The proposed Calverton Generating facility would utilize the General Electric 7EA dual fired turbine combustion system. See figure 2.7.1 and Appendix K for the site plan layout, scope of supply, and configuration. With more than 750 units in service, the 7EA fleet has accumulated tens of millions hour of service and is well recognized for excellent efficiency performance and high reliability. The 7EA incorporates an ultra modern emission control system including components as selective catalytic reduction (SCR), dry low NO_x combustion burners, continuous emission monitoring system (CEMS), and programmable logic sequencers

The generator is a base-mounted, open ventilated synchronous unit. The generator compartment has the same general appearance as the turbine compartment, and provides for exhaust emission controls, maintenance and inspection via doors on the sides of the outdoor enclosure, See figure 2.7.2. generator unit.

a. Emission Quantities and Stack Parameters
The proposed Calverton Facility would be designed to meet the following emission limits:

- 6 parts per million (ppm) NO_x.
- The facility NO_x emissions would be capped at 22.5 tons per year with monitoring by Continuous Emission Monitoring (CEMS). A data acquisition and handling system would automatically collect and compile data.
- The facility would limit sulfur in fuel oil to a maximum of 0.05% by weight. Fuel quality is guaranteed and documented for each delivery.

- CO emissions would be limited to 5 ppm as a measure of combustion efficiency as measured by Continuous Emission Monitoring (CEMS)

- A self cleaning air filtration system for particulate emissions

Potential to emit (PTE) is determined by the highest hourly emission rate for each pollutant applied against annual potential hours of 8760 unless a federally enforceable permit limitation is in place. Since this facility would be capped by the limiting parameter (NO_x emissions) the actual potential to emit for all parameters would be defined by the predicted hours of operation of the unit as capped by the annual NO_x limit. However, if NO_x, as the controlling pollutant for the cap, would be controlled in practice at levels lower than the allowable rate of 6 ppm, than the other pollutants may be emitted at higher annual levels corresponding directly to the hours of operation controlled by NO_x. To be conservative, unrestricted PTEs for these pollutants are as follows for 8760 hours of operation at progressively lower control levels for NO_x. (See Table 2.7-1).

2.7.4. Attainment Status and Compliance with Standards

a. Air Quality Standards

Federal and New York ambient air quality standards have been developed for this airshed area and are applicable for the project area. National primary and secondary ambient air standards (NAAQS) set the foundation for the air quality objectives that the State of New York must demonstrate it will achieve in its State Implementation Plan (SIP). The United States Environmental Protection Agency (U.S. EPA) has promulgated standards for six criteria air pollutants. The criteria air pollutants are nitrogen dioxide ($N0_2$), sulfur dioxide ($S0_2$), carbon monoxide (CO), particulate matter (PM_{10} and $PM_{2.5}$), ozone 0_3), and lead (Pb). New York has developed and promulgated state air quality standards for these pollutants along with an air quality classification system that categorizes the air quality limitations along with an air quality classification system that categorizes the air quality limitations expected in each county. The New York Air Quality Standards are published at 6 NYCRR Part 257 and the classification system is published at 6 NYCRR Part 256. The classification levels for Suffolk County are published at 6 NYCRR Part 307. The project site is located at a Level 1 air quality classification area of Suffolk County as detailed in 6 NYCRR Part 307. Suffolk County falls within the area defined by the 1990 Clean Air Act as the northeast ozone transport region (NOTR). The area is part of the New York State severe non-attainment area for ozone.

As a result of the severe ozone non-attainment area designation the major source threshold for facilities is limited to no greater than 25 tons per year for NO_x or VOCs. Facilities with potentials to emit greater than 25 tons per year of NO_x or Vocs in Suffolk County would be subject to new source review under 6 NYCRR Part 231.

Table 2.7-1: Maximum Project Emissions Based on NO_x Emission Rate

	NO_x ppmvd	Emission Cap (tpy)	lbs/hr	Maximum Hours per Year	NOx	CO	SO_2	PM_{10}	VOC	Ammonia
NO_x@	6	22.5	14.03	3206	22.5	12.0	44.5	68.1	10.3	13.9
NO_x@	5	22.5	11.70	3848	22.5	14.4	53.4	81.8	12.3	16.6
NO_x@	4	22.5	9.36	4810	22.5	18.0	66.7	102.2	15.4	20.8
NO_x@	3	22.5.	7.02	6413	22.5	24.0	88.9	136.3	20.5	27.7

Notes:

* PM_{10} levels need to be increased to account for secondary PM formation as sulfur dioxide converts to ammonium sulfate. A correction of 15 percent for conversion of SO_2 to ammonium sulfate gives a total (including secondary) of 45.4 pph. Modeling was performed at 47 pph. The values in the above table reflect PM_{10} based on vendor emission rate reported data.

NO_x = varies
CO = 7.5 lbs/hr
SO_2 = 27.74 lbs/hr
PM_{10}= 37 lbs/hr
VOC = 6.4 lbs/hr
Ammonia = 8.64 lbs/hr

b. State Requirements

- The proposed project is subject to: New York Part 201-5 requirements for state air facility permits. This section requires the project to receive pre-construction permits under either the title V major source permitting requirements or as a capped state facility permit. This section defines the type of information to be submitted to the New York State DEC in the permit application.

- The proposed project would be subject to 6 NYCRR Part 202 emissions verification requirements including testing and payment of annual emission fees.

- The proposed project would not be subject to the LAER and offset requirements of 6 NYCRR Part 231 as the facility would be capped below the severe area major source threshold of 25 tons per year. Operating restrictions would be taken in the permit to ensure that the facility remains below the major source threshold.

- The facility would be subject to the future provisions of Part 204 NO_x Budget Trading Program as it has a nameplate capacity greater than the 15 MW threshold in Part 204. As a result it would be necessary for the facility to submit a Part 204 application.

- The proposed project would be subject to the general prohibitions and visible emission restrictions contained within 6 NYCRR Part 211.

- The proposed project would be subject to the provisions of 6 NYCRR Part 225-1.2, Table 2. The Sulfur in fuel limit applicable to Suffolk County, Long Island is 1 percent by weight. The sulfur content for this project would be a maximum if 0.05 percent by weight.

- The proposed project would not be subject to the reasonably available control technology (RACT) requirements in Part 227-2 since it is not a major source of NO_x.

- The proposed project would be subject to the provisions of 6 NYCRR Part 207 for air pollution episodes and would prepare a response plan as required.

c. Federal Requirements

- The proposed project would not be a major source or in a named source category above the 250 tons per year threshold for applicability of federal prevention if significant deterioration (PSD) requirements. Operating restrictions would be taken in the permit to ensure that the facility remains below the major source threshold.
- U.S. EPA has promulgated new source performance standards (NSPD) for numerous source categories. These standards are intended to provide technology-forcing requirements for the affected source category. U.S. EPA has promulgated NSPS for gas turbines at 40 CFR Part 60 Subpart GG.
- The facility is subject to the acid rain program requirements in 40 CFR Part 72.6. This section requires that each turbine that serve a generator with an ISO power rating greater than 25MW is subject to the acid rain program. An acid rain permit is required along with a 40 CFR Part 75 compliant monitoring and record-keeping program. A Part 75 compliant Continuous Emission Monitoring System (CEMS) is proposed for the purpose of monitoring emissions from the project.

2.7.5 Air Quality Impact Analysis

Air quality impacts are being assessed and would meet all evaluation criteria. Criteria pollutant emissions were modeled using accepted dispersion modeling techniques and evaluated against air quality standards. A dispersion modeling protocol of Environmental Conservation (NYDEC) would be submitted for review and approval.

Model performance uses the U.S. EPA reference air model ISCST3 (the Industrial Source Complex Short Term version 02035, See Figure 2.7-1). Meteorological data is obtained in a model ready format already previewed and approved by the NYDEC for another turbine project. A Wind Rose was generated from 1991-1995 MacArthur Airport Meteorological Data. (See Figure 2.7-1A).

Receptor grids are placed to a distance of up to 2 kilometers (1.2 miles) from the site. All twelve compass points are selected and used as potentially sensitive receptors. (See: Table 2.7-2 for identification of the selected sensitive receptors and locations). The Cartesian grid contained more than 3,000 nodes.

Table 2.7-2: Calverton Modeling – Name and Location of Sensitive Receptors

Sensitive Receptor	Name	UTM-E (meters)	UTM-N (meters)	Elevation (feet)	Distance From Source (ft)
1	New York State Route 25	684,098	4,532,210	62	5,200
2	400-acres preserved area	682,607	5,533,101	80	3,000
3	Wading River Road	683,111	4,529,990	58	6,000
4	Grumman Boulevard	684,990	4,530,582	64	1500
5	Swan Pond Golf Course	685,995	4,530,275	37	3900
6	River Road	687,533	4,530,498	39	8500
7	McKay Lake	686,000	4,530,618	45	2900
8	Calverton Enterprise Park	686,712	4,534,009	60	8,500
9	Peconic Airfield	685,903	4,532,698	70	5500
10	Riverhead Industrial Park	685,399	4,531,266	50	3,000
11	Manor-Wading River Rds	683,050	4,529,100	50	5,900
12	Vacant Fields	683,611	4,533,310	100	6,500

Regional background for the Riverhead, Calverton Facility area is estimated by using data from NYDEC's ambient air quality monitoring network The most complete data for the Long Island area comes from East Farmingdale and Eisenhower Park monitoring sites that are located approximately 30 miles from the project area. Representative background concentrations of the air from the years 1998-1999-2000 are reviewed. The representative background concentrations are presented in Table 2.7.3. Further emissions data were obtained from the equipment manufacturer, General Electric Corporation, and from similar model turbines previously tested and in use today, and from U.S. EPA AP-

42. The facility was modeled with a stack height of 65 feet and an effective diameter of 10 feet. Stack exit velocities of 145 –161 ft/s are expected with this configuration. Stack gas temperatures range from 719 degrees Farenheit (°F) to 874°F over the range of ambient temperature conditions. For modeling purposes. The proposed Calverton GE 7EA unit was assumed to operate under two separate scenarios; at 100 percent load and at 50 percent load. At the 50 percent load level, the turbine would be operating at ½ capacity. As a result, part load results occur with half of the emissions input and the same baseline inputs for stack gas parameters. Stack gas temperature used for the 50 percent load case is 530F°. Inputs for the modeling are provided in Table 2.7-4.

Table 2.7-3: Background Concentrations of Criteria Pollutants

Pollutant	Averaging Period	1998 Background Concentration ($\mu g/m^3$)[a]	1999 Background Concentration ($\mu g/m^3$)[a]	2000 Background Concentration ($\mu g/m^3$)[a]	Monitor Location
CO	1-Hour	6,440	7,130	4,140	Eisenhower Park
	8-Hour	4,600	5,175	2,875	
SO_2	3-Hour	**147**	141	118	East Farmingdale Water District
	24-Hour	89	**168**	60	
	Annual	18	18	**26**[b]	
PM_{10}	24-Hour	40	**41**	38	East Farmingdale Water District (1998)
	Annual	**19**	16	17	Eisenhower Park (1999,2000)
$PM_{2.5}$	24-Hour	-	**31.9**[c]	31.8	East Farmingdale Water District
	Annual	-	**12.9**[b,c]	12.6	
NO_2	Annual	41	**47**	45	Eisenhower Park

Notes:

(a) Highest, second highest, short term (1-, 3-, 8 & 24-hour), and maximum annual average concentrations presented, except $PM_{2.5}$, which is the 98th percentile 24-hour concentration.

(b) Based on less than 75 % available data.

(c Based on 3rd and 4th quarter data from 1999.

Bold value identifies the greatest value over the 3-year period and is presented as being a representative background concentration for the study area.

Source: NYDEC 1998, 1999, and 2000.

Table 2.7-4: Calverton Project Modeling Parameters

Basic Dispersion Parameters

Parameter	Exit Velocity	Stack Diameter (meters)	Exhaust Temperature (K)	Stack Height (meters)
100% Load	44.73	3.048	657.04	19.81
50% Load	44.73	3.048	532.00	19.81

Emission Rates

Parameter	Sulfur Dioxide (lb/hr)	Nitrogen Dioxide (lb/hr)	Carbon Monoxide (lb/hr)	Particulate*
100% Load	28.0	14.0	7.5	47
50% Load	14.0	7.0	3.8	23.5

* Modeled input includes assumption of 15% conversion of sulfur dioxide to ammonium sulfate as secondary PM. Actual data for PM is 45.4 pph.

With worse-case input parameters, the modeling demonstrated results that are below U.S. EPA designated significant impact levels (SILS) under all modeled circumstances. Modeling performed for operating loads at 100 percent and 50 percent capacity show results less than the SILs. NO_x and CO modeled values were far less than the SILs for both the highest as well as the second high value. Sulfur dioxide and particulates modeled at significant fractions of the 3-hour and 24-hour values and were far below the annual values.

The modeled results at 100 percent load show that no individual highest reading exceeded its respective SIL. The 50 percent load case also demonstrates achievement of the SILs. Sils have been established by the U.S. EPA as the level below which no significant impact to air quality is deemed to occur. Modeling results for the modeling domain are presented in Table 2.7-5 and results for the 14 sensitive receptor points are presented in Table 2.7-6. Maximum predicted impacts occur for the 100 percent load case.

Table 2.7-5: Maximum Modeled Concentrations

Pollutant	Averaging Period	Maximum* Ground-Level Impact ($\mu g/m^3$)	Significant Impact Level ($\mu g/m^3$)	PSD Class II Increment ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
Sulfur Dioxide (SO_2)	3-hour	10.2	25	512	1,300
	24-hour	2.9	5	91	365
	Annual	0.029	1	90	80
Nitrogen Dioxide (NO_2)	Annual	0.015	1	25	100
Particulate (PM_{10})**	24-hour	4.92	5	30	150
	Annual	0.049	1	17	50
Carbon Monoxide (CO)	1-hour	5.4	2,000	NA	40,000
	8-hour	1.2	500	NA	10,000

Notes:
* Highest first highest concentration.
** Includes consideration of partial conversion of SO_2 to ammonium sulfate in the stack.

Modeled results from the project can be added to the regional background to estimate the predicted impact to overall air quality. Table 2.7-7 shows the addition of the Calverton modeled emissions results to the background air quality.

Results of testing will show the emission levels of sulfur dioxide, nitrogen dioxide, and carbon
monoxide and particulate matter are below U.S. Environmental Agency designated significant impact levels (SILS) for each parameter tested. Performance was measured at 100 per cent and 50 per cent capacity. It is concluded that the overall emissions from the Calverton Facility will have no adverse impacts on the existing air quality in either the Riverhead Township, or in Suffolk County.

2.7.6. Accidental Ammonia Release Analysis

Because the facility would also store and use significant quantities of aqueous ammonia the potential for release of a large quantity of ammonia was considered. This analysis is an extremely conservative analysis postulating the catastrophic release of the entire storage tank contents. Aqueous ammonia as proposed for use in the SCR at the site is stored as a 17.5 to 19.5 percent ammonia-water solution. Storage is in a state-of-the-art tank system with leak detection and fully diked impermeable containment. Ammonia is highly water-soluble and as such is easier to handle for use in the SCR. Because ammonia is highly soluble it is less available to rapid evaporation and release to the air than more volatile chemicals.

The ammonia tank is not subject to U.S. EPA's Risk Management Program for hazardous materials; however, a worst-case accidental release analysis was conducted to alleviate any potential concerns from the community in the very unlikely event of a spill or a leak.

The Area Locations of Hazardous Atmospheres (ALOHA) emergency release model was selected as the tool to perform the modeling. The entire tank capacity of 12,000 gals was assumed to be released even though such storage tanks are only filled to 95 percent of capacity. The ALOHA model uses highly conservative meteorological assumptions including wind speed, wind direction, and other impact factors. This methodology is consistent with the U.S. EPA's Risk Management Model Program and Plan for Ammonia Refrigeration prepared in 1996 by SAIC

To predict the worst-case consequence of the ammonia release, the ALOHA model was used to estimate the distance to the ammonia toxic endpoint of 150 ppm. The toxic endpoint value of 150 ppm is the American Industrial Hygiene Association Emergency Response Guideline Level 2 (EPRG-2). The value represents the maximum airborne concentration below which nearly all individuals could be exposed for up to one hour without experiencing or developing irreversible or other serious health effects.

The results of modeling with Aloha demonstrate that the potential ammonia risk level for a one-hour period of 150 ppm is not approached by this assumed catastrophic event at the site. The ALOHA model determined that at the nearest residence, the maximum predicted concentration would be well below the target risk level. Therefore, the defined worst-case accidental release scenario would not result in any adverse health effects due to ammonia, and even with this conservative approach, no significant impacts would occur.

Table 2.7-7: Project Impact on Ambient Air Quality vs. NAAQS

Pollutant	Averaging Period	Max. Modeled Receptor Locations: UTM Easting (m)	Max. Modeled Receptor Locations: UTM Northing (m)	Maximum Modeled Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentrate ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
CO	1-hour	684,990	4,530,382	5.8	7,110	7,115.8	40,000
	8-hour	684,880	4,530,332	1.3	5,155	5,156.3	10,000
SO_2	3-hour	685,995	4,530,275	10.7	149	159.7	1,300
	24-hour	685,910	4,532,698	2.8	88	90.8	365
	Annual	686,000	4,530,618	0.031	27	27.03	80
PM_{10}	24-hour	685,399	4,531,266	4.85	42	46.85	150
	Annual	686,712	4,534,009	0.044	19	19.04	50
NO_2	Annual	685,903	4,532698	0.014	46	46.01	100

Results of testing will show the emission levels of sulfur dioxide, nitrogen dioxide, and carbon monoxide and particulate matter are below U.S. Environmental Protection Agency designated significant impact levels (SILs) for each parameter tested. Performance was measured at 100 percent and 50 percent capacity. It is concluded that the overall emissions from the Calverton Facility will have no adverse impacts on the existing air quality in either Riverhead Township, or in Suffolk County.

2.7.7. Analysis of Potential Air Quality and Health Effects of Project Related $PM_{2.5}$

a. Introduction and Overview

As discussed above, potential effects on air quality in the areas surrounding the facility were assessed through air quality modeling for sulfur dioxide, carbon monoxide, nitrogen oxides, and PM_{10}. This section analyzes potential effects on air quality and public health from $PM_{2.5}$ emissions[1] as a result of operation of the GE 7EA turbine unit. $PM_{2.5}$ refers to not a single pollutant, but instead to an array of fine inhalable materials. There are for example, thousands of forms of natural ambient $PM_{2.5}$ and perhaps as many forms of man-made $PM_{2.5}$. While all the disparate forms of $PM_{2.5}$ can be inhaled, their toxicological properties can differ dramatically. Some particulate matter (PM) is emitted directly to the atmosphere through various chemical reactions and physical transformations (i.e., secondary PM). The secondary formation of $PM_{2.5}$ is one determinant of ambient air quality and is, thus far, extremely difficult to model.

The major constituents of PM2.5 are typically sulfates, nitrates, organic carbon, elemental carbon (soot), ammonium, and metallic elements (not including sulfur). Secondary sulfates and nitrates are formed from their precursor gaseous pollutants, sulfur dioxide (SO_2) and nitrogen oxides (NO_x), at some distance from the source due to the time needed for the chemical conversion within the atmosphere. Elemental carbon and metallic elements are primary components, while organic carbon can be either emitted directly from a source or formed as a secondary pollutant in the atmosphere. Due to the influence of these "secondary" pollutants from distant or regional sources, regional ambient levels of $PM_{2.5}$ are typically more evenly distributed than their related class of pollutants PM_{10}, which is more highly influenced by local sources. The expected composition of regional and urban $PM_{2.5}$ is shown in Table 2.7-8 below. Data from the Botanical Gardens in the Bronx, NY, and Queens College in Queens, NY (both in dense urban areas) indicates that the greatest contributors to ambient $PM_{2.5}$ concentrations are sulfates, and organic carbon (approximately two thirds of the total $PM_{2.5}$ mass).

Table 2.7-8 Urban $PM_{2.5}$ Component Composition

Pollutant Component	Botanical Gardens Bronx, NY (Percent)	Queens College Queens, NY (Percent)
Sulfate	31	33
Organic Carbon	31	30
Ammonium	14	14
Nitrate	11	12
Elemental Carbon	8	6
Metallic Elements (minus Sulfur)	5	5

Source: NYDEC Report to the Examiners on Consolidated Edison's East River Article X Project, Case No. 99-F-1314, and February 2002.

[1] $PM_{2.5}$ refers to particles with an aerodynamic diameter equal to or less than 2.5 microns and is a subset of PM_{10}.

Additional studies confirming the contribution of long-range transport to ambient $PM_{2.5}$ levels compare the data from New York City monitors to monitor from a remote site within the state, downwind from other states. This data shows that high levels of sulfate and other pollutants come into New York State from areas to the west and south of New York. The data also indicate that urban sites are more likely to experience increased nitrate and carbon levels than rural sites.[2]

Although the issue of health effects due to $PM_{2.5}$ is complex, $PM_{2.5}$ impacts from this Project would be insignificant. The specific types and amount of $PM_{2.5}$ associated with combustion of low sulfur fuel oil are not known to adversely impact health, and are expected to be benign at the concentrations that would be in ambient air as a result of the operation of the turbines.

This section discusses the yet-to-be implemented standard for acceptable levels of $PM_{2.5}$ in ambient air adopted by the U.S. EPA. The analytical framework for the analysis of $PM_{2.5}$ impacts from this Project, the results of the $PM_{2.5}$ air quality modeling, a discussion of secondary $PM_{2.5}$, information on the composition of various forms of $PM_{2.5}$, and the potential public health effects associated with the types and levels of ambient $PM_{2.5}$ from this Project are also discussed. Finally, the estimated increments to PM2.5 levels resulting from the project are compared with current levels of $PM_{2.5}$ in ambient air in Long Island.

b. The National Ambient Air Quality Standard for $PM_{2.5}$

Section 108 of the Clean Air Act (CAA) directs the U.S. Environmental Agency (EPA) to identify criteria pollutants that may reasonably be anticipated to endanger public health and welfare. Section 109 of the Clean Air Act requires the U.S. Environmental Agency to establish National Ambient Air Quality Standards (NAAQS) and periodically revise the NAAQS for such criteria pollutants. Primary NAAQS are mandated to protect the public health with an adequate margin of safety. In setting the NAAQS, the EPA must account for uncertainties associated with inconclusive scientific technical information and potential hazards not yet identified, and the standard must be adequate to protect the health of any sensitive group of the population. Secondary NAAQS are defined as standards that are necessary to prevent adverse impacts on public welfare such as impacts to crops, soils, water, vegetation, wildlife, weather, visibility, and climate.
Beginning in 1994, the EPA conducted its five-year review of the NAAQS for particulate matter, which included an in-depth examination of epidemiological and toxicological studies. The EPA also held public meetings across the nation and received over 50,000 oral and written comments regarding these studies, particularly as to whether $PM_{2.5}$ is correlated with adverse health effects, and at what ambient air concentrations of $PM_{2.5}$ these correlations hold. These studies are summarized in the EPA's Criteria Document for Particulates, Chapters 10-13 (1996); EPA's Staff Papers on Particulates, particularly

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[2] NYDEC, *Report to the Examiners on Consolidated Edison's East River Article X Project, Case No 99- F-1314,* February 2002.

Chapter V;[3] and U.S. EPA's proposed NAAQS for particulates, found in the December 13,1996 Federal Register, at page 65638. Based on this extensive analysis EPA revised its NAAQS for particulate matter and adopted a new standard for $PM_{2.5}$ consisting of both a long-term (annual) limit of 15 micrograms per cubic meter ($\mu g/m^3$) and a short term (24-hour) limit of 65 $\mu g/m^3$.[4]

The new standard was immediately challenged in court by a number of industry groups, and in May 1999, the U.S. Court of Appeals for the District of Columbia in *American Trucking Assoc., Inc. v. EPA,* 175 F.3d 1027 (D.C. Cir. 1999), vacated the new standard and instructed EPA to revisit the matter. In February 2000, the U.S. Supreme Court overturned the Court of Appeals decision and remanded the case to EPA and the lower court.[5] A separate decision on March 26, 2002 rejected the remaining claims that EPA's decision was arbitrary and capricious and not supported by the evidence.

U.S. EPA has not yet implemented the new $PM_{2.5}$ standard and, as discussed below, implementation is not expected to occur until 2005 (at the earliest) because of the absence of background data and modeling techniques. Although the new $PM^{2.5}$ standards were subject to litigation, $PM^{2.5}$ monitoring stations were installed across the nation in the late 1990's. Ambient $PM^{2.5}$ concentrations are measured on a 24-hour basis by determining the amount of particulate matter deposited on a filter that has had a known value of airflow through it in that 24-hour period. EPA recommends sampling occur every third day, with approximately 120 samples per year.

For a given geographical area, the annual standard would be met if the three-year average of the annual arithmetic mean if the 24-hour concentrations does not exceed 15.0 $\mu g/m^3$. The monitored concentrations could be from a single monitor or from a spatial average of several populations oriented monitors. Annual averages are based on the averaging of quarterly averages, each of which must have valid observations for 75 percent of the potential samples; annual averages are rounded to the nearest 0.1 $\mu g/m^3$. To comply with the 24 hour standard, the three-year average of the annual 98th percentile measurement cannot exceed 65$\mu g/m^3$ at each monitor in an area. The 98th percentile measurement for each year is the measured 24-hour concentration that is equal to or greater than 98 percent of the year's measurements. The determination of the 98th percentile concentration is a function of the number of samples obtained in that year. For example, if measurements are recorded every third day for a year and the measurements were placed in order (lowest to highest), the 118th value (120 x 0.98 = 117.6, is rounded up to 118) is taken as the 98th percentile.[6] For evaluation if the 24-hour standard, measured values are rounded to the nearest $\mu g/m^3$.

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[3] Many of the studies are found on EPA's web page at http://www.epa.gov/ttn/oarpg/tlsp.html. EPA's second and third external review draft of the PM criteria document are available on EPA's website as well.

[4] 62 Federal Register 38652 (July 18, 1997).

[5] Whitman v. American Trucking Assoc., Inc., 531 U.S. 457 (2001).

[6] Methods for calculating annual average and 98th percentile concentrations are given in the Code of Federal Regulations at 40 CFR Part 50, Appendix N.

c. Current Status of $PM_{2.5}$ Regulations

Even when the new $PM_{2.5}$ standard was first enacted in 1997, EPA did not intend to implement the standards until 2005. Several stages of sampling, analysis, and planning must be completed as part of the full implementation program. First, EPA requires the states to measure and compile three years of ambient air monitoring data in order to determine which area are in compliance with the new standard. Second, the chemical composition of $PM_{2.5}$ for areas not meeting the standard must be determined in order to evaluate possible control strategies for non-attainment areas. Third, the states then have three years to develop regulations to control $PM_{2.5}$ emissions and their precursors in the non-attainment areas, after which EPA must then approve these regulations for incorporation into the State Implementation Plan (SIP). Finally, the EPA must develop modeling methods and emission factors to enable individual facilities to estimate $PM_{2.5}$ emission impacts from new projects, to compare predicted increases relative to the new standards, and to determine the effects of such increases relative to the NAAQS.

Given the lack of background data on $PM_{2.5}$ and the difficulties associated with modeling it, EPA has recommended that facilities continue to examine PM_{10} emissions from proposed projects because any analysis of PM_{10} will necessarily include an examination of $PM_{2.5}$.[7] Since $PM_{2.5}$ is a subset of PM_{10}, controlling emissions of PM_{10} will generally afford control of $PM_{2.5}$ emissions as well.

d. Analytical Framework for Incremental $PM_{2.5}$ Estimation

__Emission Estimates__

The first step in determining the impacts of the facility on $PM_{2.5}$ ambient concentrations is to determine the $PM_{2.5}$ emissions rates from the turbines. The ratio of $PM_{2.5}$ to PM_{10} for a gas combustion turbine electric generating facility varies depending on the type of fuels used. Particulate emission rates for low sulfur fuel are low, and the size distribution of such particles is not entirely in the $PM_{2.5}$ range.[8] However for analysis purposes, the environmental assessment assumes that all PM_{10} emissions are $PM_{2.5}$ emissions. While most of the formation of secondary $PM_{2.5}$ occurs in the ambient air often far beyond the emitting source a conservative assumption would suggest that as much as 15 percent or more of the stack-emitted sulfur dioxide converts to ammonium sulfate. The calculated

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[7] Memorandum by John Seitz, Director of EPA's Office of Air Quality Planning and Standards, October 21,1997. See also, September 19, 2000 letter by Jeanne M. Fox, EPA Region 2 Regional Administrator, (suggesting that a qualitative discussion of increased bus and truck traffic is an appropriate analysis of examining $PM_{2.5}$ emissions from mobile sources or point sources); January 7, 2002 letter by George Pavlou, Director, EPA Region 2, Division of Environmental Planning and Protection, to Carl Johnson, Deputy Commissioner, NYDEC.

[8] *Compilation of Air Pollutant Emission Factors* AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources (AP-42) U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, (2001), Research Triangle Park, NC: Available on-line at http://www.epa.gov/ttn/chief/ap42/index.html.

$PM_{2.5}$ emission rate including secondary formation is 45.4 lb/hr. A worst-case scenario for $PM_{2.5}$ was modeled at 47 lb/hr. See Table 2.7-4 for inputs that were used in the air modeling analysis.

e. Modeling Methodology

The second step in determining the potential impact of $PM_{2.5}$ emissions from the facility on ambient air is to conduct air quality modeling analyses in accordance with the modeling protocol approved by the NYDEC. Air quality impacts from $PM_{2.5}$ emissions from the turbine units were evaluated using the same procedures described earlier in this section for the other pollutants of concern.

The concentrations of $PM_{2.5}$ at the maximum impacted receptor point were based on the maximum anticipated emission rates. The highest NO_x and SO_2 concentrations were examined, since they are precursors to the formation of secondary $PM_{2.5}$. SO_2 is the most significant precursor to the formation of ambient secondary $PM_{2.5}$ in the Eastern portion of the United States. By burning low sulfur fuel (0.05 percent), the facility impacts are very small.

f. Potential Project-Related $PM_{2.5}$ Impacts

Potential Maximum Increases in PM 2.5 Concentrations

Table 2.7-5 presents the results of the modeled ambient pollutant concentrations for the maximum 24-hour and annual averages for $PM_{2.5}$; the maximum 3-hour, 24-hour and annual averages for SO_2; and the maximum annual average for NO_x due to emissions from the facility. These maximum estimated 24 hour and annual $PM_{2.5}$ levels are small relative to the respective measured background concentrations. A comparison between the combined $PM_{2.5}$ increments due to the project and background $PM_{2.5}$ concentrations is well below the pending standard. The highest annual $PM_{2.5}$ is 0.049 μg/m^3, which represents about 0.3 percent of U.S. EPA's annual $PM_{2.5}$ standard of 15 μg/m^3 and would have a negligible effect on ambient $PM_{2.5}$ concentrations in the area.

Table 2.7-9: Maximum Modeled Pollutant Concentrations (μg/m^3)

Pollutant-Averaging Time	Concentration Due to Stack Emission μg/m^3
NO_2 – Annual	0.015
SO_2 – 3-Hour	10.2
SO_2 – 24-Hour	2.9
SO_2 - Annual	0.029
$PM_{2.5}$ - 24-Hour	4.92
$PM_{2.5}$ - Annual	0.049

These predicted local $PM_{2.5}$ increments based on modeling are not good indicators of actual ambient levels that the public may be exposed to on a continuous basis for the purposes of assessing potential public health risk. The modeling of maximum predicted concentrations is typically used only to determine predicted air quality impacts with the

NAAQS and significant impact levels in the permitting process. However, U.S. EPA has not yet determined significant impact levels for $PM_{2.5}$ to be used in any future modeling analysis.

In the case of the Calverton project $PM_{2.5}$ impacts, would occur far over the Atlantic Ocean. The project site is on the northeastern end of Long Island, slightly west of the fork. It is 3 miles to the Long Island Sound and about 15 miles to the ocean. At a wind speed of 1 m/s, time of travel over land is less than 90 minutes in the north direction, SEVEN HOURS in the south direction and a little under 8 hours in the prevailing easterly direction. The typical wind speeds for Long Island in the 1-4 m/s range would result in air departing land in well under one hour in the prevailing wind directions. U nder these circumstances virtually all $PM_{2.5}$ from condensation would be expected to form far out over the ocean rather than over land.

g. Current Levels of $PM_{2.5}$ In Ambient Air

NYDEC began monitoring ambient levels of $PM_{2.5}$ at locations in Long Island in July 1999. Typically, the results of that monitoring became available for use approximately six months after the monitoring period. Currently, $PM_{2.5}$ data are available through the first quarter of 2002.

The air quality modeling analysis has determined that the m aximum 2 4-hour m odeled project impact for PM_{10} would be **4.92** $\mu g/m^3$, while the annual PM_{10} concentration would be **0.049** $\mu g/m^3$ In order to relate the modeled concentrations to the standard, the 24-hour concentration of **4.92** $\mu g/m^3$ may be added to the 1999 recorded monitoring value of 31.9 $\mu g/m^3$ (from the East Farmingdale Water District monitoring site), with the total compared to the standard. The resultant 24-hour value of **36.82** $\mu g/m^3$ is well below the 24-hour $PM_{2.5}$ ambient standard of 65 $\mu g/m^3$. Similarly, the annual concentration of **0.049** $\mu g/m^3$ may be added to the 1999-monitored annual concentration of 12.8 $\mu g/m^3$. This total concentration of **12.849** $\mu g/m^3$ is below the annual $PM_{2.5}$ standard of 15$\mu g/m^3$, and the addition of the proposed facility emissions would not cause the standard to be exceeded.

The modeled incremental increases are less than the typical variations measured among the NYDEC $PM_{2.5}$ monitors. Even the $PM_{2.5}$ measurements taken by duplicate, co-located monitors[9] frequently vary by concentrations greater than the increase in concentrations estimated to be caused by the Project. Thus, predicted 24-hour and annual $PM_{2.5}$ increments would result, assuming maximum permitted operation of the proposed project, in negligible increases of the $PM_{2.5}$ ambient concentrations.

h. Formation of Secondary $PM_{2.5}$

[9] Daily $PM_{2.5}$ measurements for NYDEC monitors, including those for duplicate, co-located monitors, are available at http://www.dec.state.ny.us/website/dar/baqs/pm25mon.html.

As mentioned earlier, some secondary particulate matter is formed when gaseous chemicals react and condense to form non-gaseous compounds within liquid aerosols or as solid particles. Within eastern U.S. environments, a large portion of $Pm_{2.5}$ is comprised of secondary particles, and the largest portion of these is of ammonium sulfate ($(NH_4)_2SO_4$). Of the chemicals to be released from the turbine, NO_x, SO_2 and ammonia are most likely to affect the formation of secondary particles.

The modeling of secondary particle formation and dispersion is extremely complex. Due to the small size of the inputs from the Calverton Project, and the minor contribution expected from the formation of secondary particulate to the background $PM_{2.5}$ levels found on Long Island, it is not currently reasonable to predict that small an increment with any precision. Therefore, a qualitative description of secondary $PM_{2.5}$ impacts from the Project is presented below.

Three factors must be kept in mind when addressing the incremental impact of secondary particle formation caused by emissions from individual sources. First, the processes by which gases are transformed into particles depend on many factors. The chemical oxidation rates of the gases SO_2 and NO_x depend on the presence and behavior of low-level, short-lived, and highly reactive species such as hydroxyl radicals (OH), ozone (O_3), and hydrogen peroxide (H_2O_2). Among the important chemical reactions, there are homogenous gas-phase reactions, aqueous-phase reactions, and catalyzed heterogeneous reactions. The governing atmospheric chemistry varies over both time and space. The overall conversion rates for SO_2 and NO_x emitted from a specific source depends on the background concentrations of trace-level and catalytic species, sunlight, temperature, relative humidity, and many other factors.

Secondly, because the overall conversion rates are generally on the order of a few percent per hour or lower, the secondary PM are formed at significant distances from the source of the gases, and well after the emissions have been physically dispersed. This effect is responsible for the regional, non-localized nature of secondary $PM_{2.5}$ levels.

Thirdly, only a portion of the precursor species emitted to the atmosphere is ever converted to particles. Before they form particles, the relevant gases (e.g., SO_2, NO_x and ammonia), and the intermediate compounds (e.g., H_2SO_4, and HNO_3) may be removed from the atmosphere either directly (by dry deposition) or in precipitation (by wet deposition).

According to the National Acid Precipitation Assessment Program State of Science and Technology Report (NAPAP, 1990), the principal nitrogen oxygen in anthropogenic emission is nitric oxide (NO), which is oxidized by ozone to nitrogen dioxide (NO_2). Nitrogen dioxide may then follow two different oxidation paths to become nitric acid (NHO_3). During the daytime, the conversion is primarily due to oxidation by the hydroxyl radical (OH), the concentration of which is a function of many parameters including solar ultra-violet radiation, relative humidity, and the background concentrations of nitrogen oxides, volatile organic compounds, and carbon monoxide.

Estimates for the daytime conversion rate of NO_x to HNO_3 are about 8 percent per hour in the summer and about 0.8 percent per hour in the winter. At night, the conversion pathway includes the oxidation of NO_2 by O_3 which produces the nitrate radical NO_3 and the combined form nitrogen pentoxide (N_2O_5). The reaction with ozone is the rate-limiting step, with estimated nighttime conversion rates of the same order as the daytime summer rates.

Reactions involving secondary sulfate formation include gas phase conversion of SO_2 to H_2SO_4 initiated by reaction with OH radicals and aqueous-phase reactions of SO_2 with H_2O_2, O_3 or O_2. In the eastern U.S., the peak conversion rate is about 5 percent per hour during daytime summer conditions. Based on wind speeds and wind direction typical in the Riverhead Township during the summer period, virtually all-secondary sulfate formation would occur at sea rather than overland.

In the turbines, ammonia is intentionally added to the flue gas to reduce emissions of NO_x. With the stack environment, at a temperature on the order of 700°F, NH_3 reacts with NO_x to form nitrogen (N_2) and water (H_2O). However, under typical atmospheric conditions, the rates of these oxidation/reduction reactions are insignificant. Thus, once released from the stack into the atmosphere, residual levels of unreacted ammonia will behave in a different manner.

According to Seinfeld (1986), because NH_3 is readily absorbed by surfaces such as water and soil, its residence time in the lower atmosphere is quite short. As the most abundant basic (i.e., not acidic) gas in the atmosphere, ammonia provides the principal means by which acidic substances, such as sulfuric acid (H_2SO_4) and nitric acid (HNO_3) are neutralized. The combination of ammonia with these acids leads to the formation of the salts ammonium sulfate (NH_4)2SO_4 and ammonium nitrate NH_4NO_3, The complexity of the chemistry and the lack of data for the abundance and distribution of all the relevant chemical species make it impossible to predict the precise locations and rates at which reactions will occur (In addition to those compounds mentioned above, there are many others that play a role in the complete system). However, is possible to describe the ammonium-sulfate-nitrate system given what is known about the properties and general concentrations of the numerous species.

Two conditions dictate the relevant chemistry for describing the expected behavior of ammonia in the Long Island area: 1) The atmospheric lifetime of atmospheric ammonia is relatively short; and 2) Sulfate (SO_4^{2-}) is the principal anion in East Coast aerosols. Given these conditions, there is likely to be insufficient ammonia to neutralize the SO_4^2, resulting in acidic liquid-phase aerosols. Any additional ammonia emitted into the atmosphere will thus tend to be consumed in reducing the acidity of the liquid phase by producing the less acidic salts, such as (NH_4) 2SO_4 would also lead to decreases in regional atmospheric acidity (albeit on a small scale).

Based on how secondary PM forms, the contribution of the Project to $PM_{2.5}$ levels in Long Island due to secondary particle formation would be significantly less than the small effect the Project would have on primary $PM_{2.5}$ levels. From the capped potential to emit estimates it can be seen that maximum combined NO_x and SO_2 emission rates from the turbine is somewhat less (in tons per year) than primary $PM_{2.5}$ emission rates. Under typical atmospheric conditions, only a few percent of the emitted NO_x and SO_2 would be converted to HNO_3 and H_2SO_4 and only a portion of this would be converted to particulate matter. Where dispersion has not diluted the emissions greatly, very little of the NO_x and SO_2 (SO_2 at about a three times slower rate than NO_x) would be converted to particles because of the time required for the transformation. Far from the facilities where more of the NO_x and SO_2 would have been transformed, physical dispersion of the emissions would have diluted the impact to such an extent it would be insignificant relative to background levels. Similarly, emission of NH_3 could have an impact on secondary PM formation through the formation of sulfates, but on an even smaller scale than is expected from NO_x and SO_2 emissions. As with the secondary PM related to NO_x and SO_2 emissions, the PM formed due to NH_3 emissions is expected to be formed in the atmosphere far from the turbine, where dispersion would have reduced the concentrations to negligible levels.

i. Potential Public Health Effects

The potential for $PM_{2.5}$ to affect public health is dependent on the amount of particulate material in the atmosphere (i.e., the higher the ambient $PM_{2.5}$ concentration, the more likely that it will have an impact), and the composition of the material. The evidence cited by U.S. EPA in establishing the NAAQS for $PM_{2.5}$ is derived from observational epidemiological studies that found, at typical ambient levels, PM concentrations are statistically correlated with increased levels of morbidity and mortality.[10] It is also unclear what forms of PM and what physiological mechanisms are responsible for the observed health effects. However, the extent of any adverse public health effect related to an increase in PM concentrations is expected to be proportional in some way to the concentration increase – a small increase in PM concentrations can, at most, lead to a small increase in PM related public health effects. As discussed above, based on modeled results, the Project would not have a significant effect on ambient levels of $PM_{2.5}$.

In establishing the NAAQS for $PM_{2.5}$ in 1997, U.S. EPA conservatively assumed that moderate levels of airborne PM of any chemical, physical, or biological form might harm health, and so additional regulation was required. In setting the NAAQS, U.S. EPA was required to account for uncertainties associated with inconclusive scientific and technical information and for potential hazards not yet identified. In setting the value of the annual

[10] Some analysts doubt that PM concentrations and these health effects are causal. Compare *Air Quality Criteria for Particulate Matter, Second External Review Draft,* EPA 600/P-99/002aB (2001). Pope, III, C.A. (2000), "Epidemiology of fine particulate air pollution and human health: Biologic mechanisms and who's at risk?" *Environ Health Perspect, 108*(4), 713-23; and Samet, J. M., Dominici, F., Curriero, F., C., Coursac, I., & Zeger, S.L. (2000), "Fine Particulate Air Pollution and mortality in 20 Cities, 1987-1994," *N Engl J Med, 343(24),* 1742-1749; with Lipfert, F.W., Perry, Jr., H.M. Miller, J.P. Baty, J.D. Wyzga, R.E., & Carmody, S.E. (2000), The Washington University-EPRI Veteran's "Cohort Mortality Study: Preliminary Results," Inhalation *Toxicology, 12(4),* 41-73; and Gamble, J.F. (1998). "$PM_{2.5}$ and mortality in long-term prospective cohort studies: Cause-effect or statistical associations?" *Environ Health Perspect.,* 106, 535-549.

average NAAQS for $PM_{2.5}$, U.S. EPA found that an annual average $PM_{2.5}$ concentration of 15μg/m^3 is below the range of data most strongly associated with both short-and long-term exposure effects. The U.S. EPA Administrator concluded that an annual NAAQS of 15μg/m^3 'Will provide an adequate margin of safety against the effects observed in the (se) epidemiological studies."[11] The annual standard is supplemented by a 24-hour standard of 65 μg/m^3 to protect against short-term exposures in areas with strong local or seasonal sources.[12]

Although the NAAQS for $PM_{2.5}$ is based on the measurement of simple particle mass concentrations (i.e., total μg/m^3), the U.S. EPA recognized the need for further research into the relationships between PM composition and PM related health effects. Indeed, a major requirement of 40 CFR Part 58, (*Ambient Air Quality Surveillance for Particulate Matter, Final Rule)*, is the chemical speciation of $PM_{2.5}$ at fifty monitoring sites across the country. A great deal of Current PM research, including studies conducted under the U.S. EPA's Office of Research and Development,[13] is focused on attempting to better understand the biological, chemical, and physical characteristics of PM underlying its potentially toxic effects. A basic finding among these studies is that different forms of $PM_{2.5}$ differ substantially in their toxicologicai significance.

As noted above, unlike the other ambient air pollutants regulated at the national level–carbon monoxide, nitrogen dioxide, ozone, lead, and sulfur dioxide – PM (PM_{10} or $PM_{2.5}$) is hardly a single molecule or small set of molecules, but is instead a sundry collection of complex aerosols and microscopic solids with widely varying physical, chemical, and biological properties. The vast differences among various chemical and biological forms of $PM_{2.5}$ mean that these forms also differ significantly in their toxicological effects.

Considerable research will be required in order to identify, quantify, and rank the myriad components of $PM_{2.5}$ in terms of their potential importance for public health. The National $PM_{2.5}$ Speciation Program,[14] established under 40 CFR Part 58 as mentioned above, will serve as only as modest, first-cut analysis, as it will provide no information on the biologic content of ambient air PM, and only limited information on some metallic, ionic, and organic constituents of ambient PM. Although chemical and toxicological knowledge of ambient $PM_{2.5}$ is limited, current evidence, as outlined below, suggests that $PM_{2.5}$ that is rich in either biologically-active material or in various metals is significantly more harmful than $PM_{2.5}$ that has little to no biologic or metallic content.

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[11] 62 Federal Register 28652, 38676 (July 18, 1997).

[12] Although some advocates for a new $PM_{2.5}$ standard identified $PM_{2.5}$ as a "non-threshold" pollutant, and the Appellate Division in its UPROSE decision agreed with this position, the EPA Administrator rejected the view when promulgating the $PM_{2.5}$ NAAQS, finding that up to 15μg/m^3 of $PM_{2.5}$ could be present in ambient air without causing adverse health effects.

[13] U.S. EPA Office of Research and Development, Research and Development, Fiscal Years 1997-1998 Research Accomplishments, EPA 60-R-99-106.
[14] Id.

j. Biologically Active $PM_{2.5}$ May Be Harmful

Particulate matter rich in pollen and other aeroallergens is well known to exacerbate respiratory problems, especially among people with allergic asthma and suffers of hay fever (also called seasonal allergic rhinitis).[15] Other common forms of PM, present year-round, may aggravate respiratory problems because of their biologic content. Fine particulate matter from "ordinary" re-suspended dust, for example, is a complex mixture of biologically and immunologically active materials, such as macromolecules, derived from molds, grasses, trees, cat and dog dander-epithelium, and latex rubber (Miguel et al., 1999).

k. $PM_{2.5}$ Rich in Metals May Be Harmful

Inhalation of metals of various types may harm the upper respiratory tract, lungs, and other organs.[16] Although such problems have long plagued various occupational settings, environmental scientists at U.S. EPA and elsewhere are now focusing on whether the heavy metal content of some forms of respirable PM may be responsible for correlations between ambient air PM and morbidity and mortality in studied populations. For example, U.S. EPA scientists have demonstrated that extracts of metal-rich PM cause lung inflammation in human volunteers.[17] In particular, they evaluated ambient PM collected in the late 1980's from the Utah Valley, where PM was rich in copper, zinc, lead, and nickel because of the dominance of a major steel mill in that valley. Compared with extracts of "ordinary" ambient PM (obtained when the mill was closed), the metal rich extracts induced several signs of inflammatory injury.

The investigators conclude that "metal content, and consequent oxidative stress that paralleled metal concentrations" caused the injury they observed, so that "mass may not be the most appropriate metric to use in assessing health effects after PM exposure, but rather specific components must be identified and assessed." Similar studies have been carried out in laboratory rats, with similar results reported.[18]

l. $PM_{2.5}$ from Fuel Oil-Fired Turbine Generators

Airborne emissions from combustion of low sulfur fuel oil consist primarily of water vapor and carbon dioxide. Also emitted are low levels of PM, nitric oxide (NO) and

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[15] American Lung Association, 2001, http://www.lungusa.org/air/envhayfever.html.

[16] Kelleher, P.T., Pacheco, K., and Newman, L.S. (2000), *Inorganic Dust Pneumonia: The Metal-related Parenchymal Disorders,* Environ. Health Perspect. 108, Supplement 4, 685-696.

[17] Ghio, A. J. and Devlin, R.B. (2001), Inflammatory Lung Injury after Bronchial Instillation of Air Pollution Particles, Am J Respir Crit Care Med 164: 704-708.

[18] Dye, J.A., Lehmann, J.R., McGee, J.K., Winsett, D. E., Ledbetter, A. D., Everitt, J.I., Ghio, A.J. & Costa, D.L. (2001), Acute pulmonary toxicity of particulate matter filter extracts in rats: Coherence with epidemiologic studies in Utah Valley Residents. EHP Supplement, 109(3), 395-404.

carbon monoxide (CO), small amounts of NO_2, N_2O, and SO_2, and trace amounts of volatile organic compounds (VOCs), methane and metals (*AP42*, Stationary Gas Turbines, Section 3.1, April, 2000). Emissions of sulfur-based compounds (e.g., SO_3, Sulfur trioxide) are a direct function of the quantity of sulfur in the fuel oil.

Particulate matter emitted from fuel oil-fired turbine generators consists primarily of organic products of incomplete combustion, and is very low in metal content *(AP42,* Section 3.1, April, 2000). Further, this PM contains no biological material. Small amounts of nitrates and sulfates may be present in this PM (given the gas-phase presence of nitrogen oxides and sulfur dioxide), and NO_x and SO_2 emissions may lead to further (but much more diffuse) formation of secondary PM, but these constituents, when present at less than $1 \mu g/m^3$ levels in air – even at the maximally affected locations, do not appear to harm health.[19] Many toxicological studies have shown that concentrations of hundreds of micrograms of sulfate or nitrate per cubic meter of air are required before even minimal changes can be observed, even in asthmatic subjects or in sensitive laboratory rodents.[20]

m. Conclusion

As shown above, the operation of the turbine would result in emissions much less than the NAAQS levels established by the U.S. EPA to protect public health and would have no more than a negligible effect on ambient air concentrations of $PM_{2.5}$. Impacts to public health from project-related $PM_{2.5}$ would be correspondingly negligible. Based on the composition of the facility related PM $_{2.5}$ emissions, there is no significant public health effect associated with operation of this facility.

2.7.7. Global Climate Change

a. Summary of the Kyoto Protocol

For more than a century scientists have known about the possibility that man-made carbon dioxide emissions may cause an increase in the average temperature of the atmosphere. However, widespread public concern about climate change did not exist until the late 1980s when high temperatures, predictions from general atmospheric circulation computer models, and concern about the greenhouse effect jointly attracted public attention. Recognizing the needs of policy makers for up-to-date scientific information, the United Nations Environment Programme and the World Meteorological Organization jointly established the Intergovernmental Panel on Climate Change (IPCC) in 1988. The IPCC issued its first climate report in 1990, which called for a global treaty

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[19] Concentrations of at least 100 micrograms of sulfate or nitrate per cubic meter of air are required before even minimal changes in respiratory function can be observed, even in asthmatic subjects or in sensitive laboratory rodents. See U.S. EPA 2001 *(PM Criteria Document Draft)* for extended discussion and references.

[20] See U.S. EPA 2001 (*PM Criteria Document Draft)* for extended discussion and references.

to assess the issue. In 1989 the UN approved a resolution call for an environmental summit, which was held in Rio de Janeiro in June 1992. At that meeting, the attending nations agreed to participate in the Framework Convention on Climate Change, an ongoing series of meetings the purposes of which was to develop agreements that reduce greenhouse gas emissions.

After years of intense negotiations, the treaty known as the Kyoto Protocol was adopted in Kyoto, Japan in December 1997. The Kyoto Protocol outlined basic mechanisms to address the climate change concern, but did not provide a clear picture of the treaty's detailed requirements, or "rulebook." Further negotiations were conducted in Buenos Aries in November 1998, the Hague in November 2000, Bonn, Germany in July 2001 and finally in Marrakesh, Morocco in November 2001. The Marrakesh Accords, which contained a detailed rulebook for the Kyoto Protocol, consist of the five main elements discussed below.

Commitments

The protocol establishes a set of legally binding emissions targets for Annex I Parties (relatively wealthy industrialized nations, as well as the Russian Federation, the Baltic States and several Central and Eastern European States), for the six main greenhouse gases: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and Sulfur Hexafluoride (SF_6). These targets represent a total cut among all Annex I Parties of at least 5 percent from 1990 (some countries have a baseline other than 1990) levels by 2008-2012.

Implementation

To meet emissions targets, Annex I Parties that have ratified the Protocol must establish domestic policies to cut their greenhouse gas emissions. Emissions may be offset by increasing the removal of greenhouse gases into carbon sinks. In addition to domestic actions, Parties may also use three mechanisms – *joint implementation* (implementing projects in the territories of annex I Parties), the *clean development mechanism* (implementing projects in the territories of non-Annex I Parties) and *emissions trading* (trading emission reduction amounts from other Annex I Parties) – to gain credit for emissions reduced (or greenhouse gases removed) at lower cost abroad than home.

Minimizing Impacts on Developing Countries

Provisions are included in the Protocol to address the specific needs and concerns of developing countries, especially those most vulnerable to the adverse conditions of climate change and to the economic impact of response measures.

Accounting, Reporting and Review

The protocol has established several safeguards including an accounting system, requirements for regular reporting by Parties, and in-depth review of reports by expert review teams.

Compliance

The protocol has established a Compliance Committee, to assess and deal with any cases of non-compliance by participating nations.

b. United States Global Climate Change Policy

Although the U.S. has decided against participating in the Kyoto Protocol, it has established a climate change policy whereby the aims of the Protocol – the overall reduction of greenhouse gas emissions – are maintained. In February 2002, the U.S. Department of Energy began steps to recommend reforms to its existing voluntary greenhouse gas registry, to: (1) ensure that businesses that register voluntary reductions are not penalized under a future climate policy, and (2) give credit to companies that can show real emissions reductions.

c. New York State Climate Change Policy

The *2002 State Energy Plan and Final Environmental Impact Statement* (Energy Plan) encompasses policies that address fairly priced, clean, and efficient energy resources. The Energy Plan directs the State to take advantage of technological developments among the most advanced uses of energy, and to participate in emerging markets for valuing and trading environmental attributes associated with energy use. Section 1.3 of the Energy Plan presents the policy recommendations for climate change related issues. Part 4.D, Promoting and Achieving a Cleaner and Healthier Environment states that "the State should lead the nation in taking actions to reduce greenhouse gas emissions, stressing the aggressive implementation of existing, and development of new technologies and strategies that would significantly reduce emissions."

In the summer of 2001, the State announced the formation of the Greenhouse Gas Task Force, comprised of representatives from the business community, environmental organizations, State agencies, and universities, to develop policy recommendations that would be considered for incorporation into the Energy Plan. The following recommendations were adopted in the Plan[21].

- Commit to a statewide goal of reducing greenhouse gas (GHG) emissions 5 percent below 1990 levels by 2010, and 10 percent below 1990 levels by 2020.

- Develop at GHG emission registry program for registering baseline GHG emissions and emissions reductions from actions implemented at facilities.

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[21] New York State Energy Research and Development Authority, *2002 State Energy Plan and Final Environmental Impact Statement,* June 2002.

- Emphasize the greenhouse gas emission reduction potential, most notably of carbon dioxide (CO_2), as a criterion in developing new program initiatives in the State's public benefits programs.

- Expand the State's efforts to improve the efficiency of electricity generation and encourage use of indigenous and renewable energy resources, including solar, wind, waste methane, geothermal, sustainable biomass, combined heat and power, clean and efficient distributed generation.

- Adopt a specific plan to develop an indigenous bio-fuels industry in New York to produce, refine, and market transportation and other fuels from indigenous biomass resources.

- Develop a program that allows businesses to enter into voluntary agreements to meet certain energy efficiency targets and reduce greenhouse gas emissions. To assist businesses in meeting such voluntary agreements, the State should offer technical assistance, public recognition, expedited regulatory permit review, and financial incentives, as appropriate or necessary.

- Redirect transportation funding toward energy-efficient transportation alternatives, including public transportation, walking and bicycling, and provide incentives to encourage greater use of related alternatives that improve transportation efficiency.

- Include in the State transportation planning and State Quality Environmental Review Act (SEQR) related processes, consideration of CO_2 production and mitigation strategies, as appropriate.

- Target open space funding to prevent suburban sprawl, promote Quality Communities, reduce vehicle miles traveled, and support, adopt, and enhance transportation measures that reduce energy use and pollutant emissions.

- Support, adopt, and enhance transportation measures that reduce energy use and pollutant emissions, such as Commuter Choice, Ozone Action Days, diesel vehicle retrofits, improved traffic signal coordination with light emitting diode (LED) replacement technology, transportation systems management, and other similar actions.

- Encourage low-cost, passive building efficiency measures, such as white roofs, passive solar design, and improved foundation membranes, and incorporate such measures in the State's building construction codes. In addition, the State should support local building and development projects that include funding for open space conservation and urban forestry that reduce the need for air-conditioning in urban "heat islands."

- Expand research, development, and demonstration (RD&D) of energy and GHG-efficient vehicle technologies, add GHG goals to vehicle tax credits and incentives, and coordinate with other states to encourage improvements in vehicle fuel economy.

- Working with regional and local planning organizations, analyze and quantify the energy use and air pollution emissions expected to result from transportation plans and programs.

- Support the design and construction of energy-efficient and environmentally friendly "green buildings" through financial incentives, technical assistance, and related program initiatives.

The state will continue to evaluate the economic and environmental benefits of all the policy recommendations of the Greenhouse Gas Task Force.

d. Potential Project Emissions of Global Warming Gases (GWG)

Greenhouse or Global Warming gases contribute to climate change by increasing the ability of the atmosphere to trap heat. The principal GWGs are carbon dioxide (CO2), methane (CH_4), and nitrous oxide (N_2O). Because these gases differ in their ability to trap heat, one ton of CO_2 in the atmosphere has a different effect on warming than one ton of CH_4. To express emissions of the different gases in a comparable way, atmospheric chemists have developed a weighing factor called the Global Warming Potential (GWP). The GWP was developed to compare the ability of each greenhouse gas to trap heat in the atmosphere relative to other gases. Carbon dioxide (CO_2) was c hosen as the reference gas, and therefore the GWP is defined as the equivalent heat-trapping ability of one terragram (Tg, or 1 billion kilograms) of CO_2, expressed as Tg CO_2 Eq.

The proposed Calverton Facility would fire very low sulfur (0.05 percent) distillate oil, until natural gas is available. The greatest proportion of the potential climate change gas emissions from the Calverton Facility would be in the form of CO_2 from the combustion process. Trace amounts of CH_4 and N_2O would also be emitted, however, emissions of these compounds are considered negligible when compared to the total CO_2 emissions, even taking into consideration their GWP, and are therefore not considered significant to the climate change issues.

CO_2 emissions during distillate oil firing are estimated to be approximately 157 pounds CO_2/mmBTU (*AP-42*, Stationary Gas Turbines, Section3.1, April, 2000). The proposed Calverton Project would fire low sulfur distillate oil at a maximum rate of approximately **16,045,823** gallons per year (equivalent to **2,246,415.22 MMBTU/year**). Therefore potential CO_2 emissions from the proposed Project were calculated at a rate of approximately **353 x 10^6 pounds per year, or O.159Tg CO_2 Eq per year.**

e. Comparison to State, National and Global Emissions

As shown above, the proposed Calverton Project would conservatively emit approximately 0.159 Tg CO_2 Eq per year. The annual emission of CO_2 for the state of New York for the years 1990 through 1999 are shown in Table 2.7-10. As shown, the average annual emissions of CO_2 over the most recent five years of available data had been around 195 Tg CO_2 Eq. Therefore on the state level, the annual emissions from the proposed Calverton Project would be approximately **0.082** percent of the total New York CO_2 inventory.

Table 2.7-10: New York State-CO_2 Emissions Inventory by Sector (Tg CO_2 Eq.)

Sector	1995	1996	1997	1998	1999
New York Total	189.42	195.95	198.95	198.33	191.80
Commercial	26.55	27.65	29.59	27.68	30.62
Industrial	26.84	30.10	28.60	26.77	29.04
Residential	33.84	36.81	35.09	31.75	34.32
Transportation	62.88	65.96	66.96	66.51	67.69
Utility	39.31	35.42	39.71	45.58	30.18

Source: http://yosemite.epa.gov/oar/globalwarming.nsf/content/EmissionsStateEnergyCO_2Inventories.html

The annual emissions of CO_2 for the United States are presented in Table 2.7-11. As shown in this table, the annual emissions have gradually increased each year to an annual value of 5,840 Tg CO_2 Eq. On a national scale, the proposed project would contribute only approximately **0.0027 per cent (full load basis)** to the total national emissions inventory of CO_2.

Table 2.7-11: United States – CO_2 Emissions Inventory for Electricity Generation (Tg CO_2 Eq.)

Sector	1995	1996	1997	1998	1999	2000
U.S. Total	5,305.9	5,483.7	5,568.0	5,575.1	5,665.5	5,840.0
Electricity Generation	1,989.3	2,061.2	2,137.9	2,226.4	2,246.2	2,352.5

Notes: Electricity Generation includes fuel consumption by both regulated utilities and non-utilities (e.g., independent power producers, qualifying co-generators, and other small power producers).
Source: U.S. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2000, April, 2002

Global emissions of CO_2 in 1999 were estimated to be on the order of 22,367 Tg CO_2 Eq (USDOE, EIA, *International Energy Annual 1999*,February 2001). At this scale, the proposed emissions of CO_2 from the Project would be less than **0.00071 per cent** (full load basis) of the total annual global emission rate.

f. Importance of Emissions

It is difficult to quantify the importance of the emissions of the proposed Calverton Project as it relates to increasing the emissions of GWG for the benefit of the common good (i.e., providing electricity). However, the emissions of this Project can be related to existing electrical power generating sources of GWG. In general, because of the market based economy for providing electrical power in New York State, energy generated by the Project would in all likelihood displace some electricity that would have been otherwise generated by less efficient facilities. The operation of these older, less efficient sources would result in more emissions of GWG on a per megawatt basis than the proposed facility.

The nature of the market-driven sale of electrical energy favors higher efficiency electrical generating sources such as simple cycle combustion turbines. This approach is in direct agreement with the Kyoto Protocol. Displacement and reduction of emissions of CO_2 (and other GWGs) is a key aspect of the Protocol. In this way, the development of merchant generation of electrical power is not only important in achieving a national reduction in greenhouse gas emission, but vital.

g. Conclusion

As shown above, the operation of the proposed facility would result in a negligible contribution to the state, national and global inventories of CO_2 emissions, and therefore the impacts to general public health from project related operations would correspondingly be negligible. Furthermore, it is possible that the generation of energy by the Project would result in the displacement of electricity that would have been otherwise generated by less efficient facilities, which would result in the Project having an even smaller impact on climate change.

2.7.8. Cumulative Impact Assessment

a. Introduction

This section addresses potential cumulative impacts due to the six new combustion turbine projects that were constructed for LIPA for the Summer of 2002 (i.e., facilities at Shoreham, Edgewood, Glenwood, Port Jefferson, Bethpage, and Bayswater) and four separate combustion turbine projects that LIPA is considering for the Summer if 2003 (i.e., facilities to be located in Jamaica Bay, Freeport, North Bellport and Greenport.

The proposed Calverton project was not analyzed at the time the cumulative impact analysis was prepared. However, the potential effect of this project on impacts from the other LIPA projects is examined qualitatively.

b. Cumulative Impact Assessment of LIPA 2002/2003 Facilities

Tables 2.7-12 and 2.7-13 present stack parameters and emissions, respectively for the aforementioned projects.

Table 2.7-12: Stack Parameters

Source	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Stack Height (ft)	Exhaust Temperature (k)	Stack Velocity (m/s)	Stack Diameter (ft)
Shoreham	679,506	4,535,983	20	110	585	18.8	12
Edgewood	644,031	4,516,504	30	105	641/679[b]	25.9/17.6[b]	12
Glenwood	614,044/ 614,048[i]	4,520,752/ 4,520,727[i]	4	125	645.37/649.26[c]	38.0/37.9[c]	10
Port Jefferson	661,717	4,534,791	5	265	645.37/649.26[c]	38.0/37.9[c]	14.4[a]
Bethpage	626,708	4,511,463	37	100	654.67	18.06/15.26 21.66/13.0[g]	13.5
Bayswater	604,720	4,496,120	2	110	678/733[d]	23.76/21.36 21.65[e]	15
Jamaica Bay	604,690	4,495,964	2	110	679/721/756[f]	23.8/24.24/ 20.65[f]	15
Freeport	621,039	4,500,010	4	180	641/647/719[f]	33.8/34.0/33.4[f]	10.5
North Bellport	673,566	4,520,307	32	100	866.5/845.9 807.6[h]	17.7/19.5/ 23.3[h]	19
Greenport	720,299	4,553,571	3	65	657.04	44.73	10
Calverton[j]	684,808	4,531,357	20	65	658.13	44.50	10

Notes:

a Effective stack diameter.

b First value is used for CO, SO_2, and NO_2 modeling. Second value is used for PM_{10} modeling.

c First value is used for CO modeling. Second value is used for SO_2, PM_{10}, and NO_2 modeling.

d First value is used for CO and SO_2 modeling. Second value is used for PM_{10} and NO_2 modeling.

e First value is used for CO and SO_2 modeling. Second value is used for PM_{10} modeling. Third value is used for NO_2 modeling.

f. First value is used for CO modeling. Second value is used for SO_2 and NO_2 modeling. Third value is used for PM_{10} modeling.

g. First value is used for 1-hour CO and 3-hour SO_2 modeling. Second value is used for 8-hour CO and 24-hour SO_2 modeling. Third value is used for annual SO_2 and annual NO_2 modeling. Fourth value is used for PM_{10} modeling.

h. First value is used for CO and PM_{10} modeling. Second value is used for 3-hour SO_2 modeling. Third value is used for 24-hour and annual SO_2 and annual NO_2 modeling.

i. First value is for Unit 1; second value is for Unit 2.

j. The Calverton facility was not included in the cumulative modeling analysis but is included here for informational purposes.

Table 2.7-13: Emissions for LIPA Projects

Source ID	NO_x (g/s)	SO_2 (g/s)	PM_{10} (g/s)	CO (g/s)
Shoreham[a]	1.18	1.73	1.58	1.58
Edgewood[a]	0.517	0.124	0.479	2.709
Glenwood[a]	1.91	2.38	2.17	26.77
Port Jefferson[a]	1.91	1.79	2.05	26.77
Bethpage[a]	0.49	0.09/0.06/0.12[d]	0.38/0.36[e]	0.46/0.33[f]
Bayswater[a]	0.61	0.23	0.83	2.16
Jamaica Bay[a]	0.68	3.694/1.40[b]	5.509/2.09[c]	2.186
Freeport[a]	1.92	2.82	5.10	2.709
North Bellport[a]	3.78	0.66/0.82g	1.26	32.76
Greenport[a]	1.77	3.53	2.96	0.47
Calverton[a,h]	1.66	3.49	2.86	0.51

Notes:

a. Per Turbine

b. First value is used for 3-hour and 24-hour SO_2 modeling. Second value is used for annual SO_2 modeling

c. First value is used for 24-hour PM_{10} modeling. Second value is used for annual PM_{10} modeling.

d. First value is used for 3-hour SO_2 modeling. Second value is used for 24-hour SO_2 modeling. Third value is used for annual SO_2 modeling, and is scaled by 8,400 hours/8,760 hours.

e. First value is used for 24-hour PM_{10} modeling. Second value is used for annual PM_{10} modeling, and is scaled by 8,400 hours/8,760 hours.

f. First value is used for 1-hour CO modeling. Second value is used for 24-hour and annual SO_2 modeling.

g. First value is used for 3-hour SO_2 modeling. Second value is used for 24-hour and annual SO_2 modeling.

h. The Calverton facility was not included in the cumulative modeling analysis but short-term emissions rates are included here for informational purposes.

The LIPA 2002/2003 facilities are widely dispersed throughout Nassau, Suffolk, and Queens Counties. This distribution of projects spreads the relatively low air emissions from each facility through a wide geographical area. The distribution of the facilities is illustrated in Figure 2.7-2. The study area selected for air quality modeling of the modeled LIPA 2002/2003 projects includes 100-meter space polar receptors within 3 kilometers of each project, as well as a Cartesian grid with 2-kilometer spaced receptors, which covers most of Long Island. All of the facilities have individually demonstrated through air quality dispersion modeling of potential facility emissions, to have insignificant air quality impacts (i.e. maximum concentrations are below the SILs). The maximum concentrations for each facility would occur very close to the combustion turbine(s) for each project. These concentrations continue to decrease with distance from the sources, so that at the distance to the next adjacent source, the concentrations would be a scant fraction of the SIL and nearly immeasurable.

A cumulative impact assessment of these sources was performed using the same modeling procedures that were used for assessing compliance with air quality standards of the proposed facility alone. Maximum total concentrations were determined by adding together the modeling results and representative "worst case" background values. These values were compared to the NAAQS and NYAQS. The modeling results and comparison to the standards are presented in Table 2.7-14. As shown in the table, the combined air quality results indicate that the total concentrations (i.e., the cumulative effect of the modeled LIPA 2002/2003 facilities and worst-case background levels) would not exceed the ambient air quality standards. Therefore, the cumulative effect would not produce significant air quality impacts.

Table 2.7-14: Cumulative Air Quality Impacts of LIPA 2002/2003 Facilities

Pollutant	Averaging Period	Maximum Modeled Concentration (µg/m³)[a]	Maximum Concentration Location UTM Easting (m)	UTM Northing (m)	Background Concentration (µg/m³)	Total Concentration (µg/m³)	NAAQS (µg/m³)
CO	1-Hour	86.0	614,328	4,521,576	7,130	7,216.0	40,000
	8-Hour	21.2	620,100	4,517,500	5,175	5,196.2	10,000
SO_2	3-Hour	3.4	614,470	4,521,266	147	150.4	1,300

	24-Hour	1.1	614,944	4,518,193	89	90.1	365
	Annual	0.12	618,100	4,517,500	26	26.12	80
PM_{10}	24-Hour	1.0	614,944	4,518,193	41	42.0	150
	Annual	0.12	618,100	4,517,500	19	19.12	50
NO_2	Annual	0.10	618,100	4,517,500	47	47.10	100

Note:[a] Maximum impacts from individual facilities may exceed the values shown in the table, since this cumulative analysis was performed primarily to predict cumulative interaction of the facilities. The maximum impacts from individual facilities are presented in the facilities' environmental assessments and would not result in any violation of air quality standards, and are consistent with the conclusions of this analysis.

A second demonstration supporting no cumulative interaction of the facilities may be made by an examination of the prevailing wind directions. In order to have cumulative concentrations, the emitted plumes would need to align in the same direction. Figure 2.7-1 presents a wind rose (wind direction and speed distribution) based on meteorological data obtained from Long Island MacArthur Airport in Islip. This data was used for assessing the air quality impact of several of the projects, and is recognized by NYDEC to be representative of the meteorology of central Long Island. By comparing the distribution of winds one can discern that the prevailing directions are from the southwest and northwest directions. Southwesterly winds are more typical of summertime conditions, when the facilities would likely be operating simultaneously.

By comparing the distribution of the facilities with the prevailing southwesterly winds, it is easily seen that the modeled LIPA facilities would not significantly interact with each other. The Bethpage facility's plume may overlap slightly with Freeport. As stated previously, any potential combination of the plumes at a distance would result in maximum concentrations well below the SILs. Therefore, there would be no significant cumulative environmental impact from simultaneous operation of all ten projects which were modeled.

Finally, it should be noted that while the proposed Calverton facility was not quantitatively assessed with the other proposed and existing facilities, the potential interaction of its emissions with these other LIPA sources is expected to be negligible and insignificant. This is primarily because of the large separation spatially from the other sources (ranging from about 30 to 60 miles). Due to the eastward location of the project on Long Island and because Calverton emissions would be predominantly downwind from most of the other sources, especially during the summer months, the proposed Calverton facility would not contribute to air quality impacts around any of the other LIPA 2002/2003 facilities. While the plumes from the other 2002/2003 LIPA facilities may overlap with the Calverton Facility's plume, the distances are so great that additional concentrations would be negligible, and would likely occur over the Long Island Sound. Furthermore, the maximum concentrations from Calverton's modeled assessment have been determined to be well below the SILs.

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2.8 Noise

2.8.1. Introduction

The noise analysis for the proposed Calverton facility focuses on noise impacts from the operation of mechanical equipment at the project site. As discussed in the traffic section, the proposed facility would generate a small number of worker and fuel oil delivery vehicle trips (i.e., a maximum of approximately 10 vehicle trips in an hour). This small number of vehicle trips would not have the potential for significantly affecting noise levels. Consequently, this analysis concentrates on examining potential impacts due to the operation of equipment at the proposed facility.

2.8.2. Noise Fundamentals

a. "A"- Weighted Sound Level (dBA)

Noise is typically measured in units called decibels (dB). Because loudness is important in the assessment of the effects of noise on people, the dependence of loudness on frequency must be taken into account in the noise scale used in environmental assessments. One of the simplified scales that accounts for the dependence of perceived loudness on frequency is the use of a weighting network, known as A-weighting in the measurement system, to stimulate the response of the human ear. For most noise assessments, the A weighted sound pressure level in units of dBA is used in view of its widespread recognition and its close correlation with perception. In the following study, all measured noise levels are reported in dBA or A-Weighted decibels

Some common or typical noise levels are shown in Table 2.8-1. As shown in the table, the threshold of human hearing is defined as 0 dBA; very quiet conditions (as a library, for example) are approximately 40 dBA; levels between 50 dBA and 70 dBA define the range of acceptable daily activity; levels above 70 dBA would be considered noisy, loud, intrusive, and deafening as one moves up the scale to 130 dBA. In considering these values, it is important to note that the dBA scale is logarithmic, meaning that 2 equal sources produce an increase in sound level of 3 dBA.

b. Community Response to Changes in Noise Levels

The average ability of an individual to perceive changes in noise levels is well documented (see Table 2.8-2). Generally changes in noise levels less than 3 dBA are barely perceptible to most listeners, whereas 10 dBA changes are normally perceived as doublings (or halving) of noise levels. These guidelines permit direct estimation of an

Table 2.8-1: Common Noise Levels

Sound Source	(dBA)
Military Jet, air raid siren	130
Amplified rock music	110

Jet takeoff at 500 meters	100
Freight train at 30 meters	95
Train horn at 30 meters	90
Heavy truck at 15 meters	80
Busy city street, loud shout	80
Busy traffic intersection	80
Highway traffic at 15 meters	70
Predominantly industrial area	60
Light car traffic at 15 meters, city or commercial Areas or residential areas close to industry	
Background noise in an office	50
Suburban areas with medium density Transportation	
Public Library	40
Soft whispers at 5 meters	30
Threshold of hearing	0

Note: A dBA increase in level appears to double the loudness, and a 10 dBA decrese halves the apparent loudness.

Table 2.8-2: Average Ability to Perceive Changes in Noise Levels

Change (dBA)	Human Perception of Sound
2-3	Barely perceptible
5	Readily noticeable
10	A doubling or halving of the loudness of sound
20	A "dramatic change"
40	Difference between a faintly audible sound and a very loud sound

Source: Bolt Beranek and Neuman, Inc., Fundamentals and Abatement of High-Way Traffic Noise, Report No. PB-222-703. Prepared for Federal Highway Administration, June 1973.

individual's probable perception of changes in noise levels. It is also possible to characterize the effects of noise by studying the aggregate response of people in communities. The rating method used for this purpose is based on statistical analysis of the fluctuations in noise levels in a community, and integrating the fluctuating sound energy during a known period of time, most typically 1 hour or 24 hours. Various government and research institutions have proposed criteria that attempt to relate changes in noise levels to a community response. One commonly applied criterion for estimating response is incorporated into the community response scale proposed by the International Standards Organization (ISO) of the United Nations (see Table 2.8-3). This scale relates changes in noise level to the degree of community response and permits direct estimation of the probable response of a community to a predicted change in noise level.

Table 2.8-3: Community Response to Increases in Noise Levels

Change (dBA)	Category	Description
0	None	No Observed Reaction
5	Little	Sporadic Complaints
10	Medium	Widespread Complaints
15	Strong	Threats of Community Action
20	Very Strong	Vigorous Community Action

Source: International Standards Organization, Noise Assessment with Respect to Community Responses, ISO/TC 43. (New York: United Nations, November 1969).

c. Noise Descriptors Used in Impact Assessment

Because the sound pressure level unit of dBA describes a noise level at just one moment and because very few noises are constant, other ways of describing noise over more extended periods have been developed. One way of describing fluctuating sound is to describe the fluctuating noise heard over a specific period, as if were a steady, unchanging sound. For this condition, a descriptor called the "equivalent sound level," or $L_{eq\,(1)}$, can be computed. This is the constant sound level that, in a given situation and period (e.g., 1 hour, denoted by $L_{eq\,(1)}$, or 24 hours, denoted as $L_{eq\,(24)}$), conveys the same sound energy as the actual time-varying sound. Statistical sound level descriptors – such as L_1, L_{10}, L_{50}, and L_{90} – are sometimes used to indicate noise levels that are exceeded 1, 10, 50, and 90 percent of the time, respectively. Discrete even peak levels are given as levels.

The relationship between L_{eq} and levels of exceedance is worth noting. Because L_{eq} is defined in energy rather than straight numerical terms, it is not simply related to the levels of exceedance. If the noise fluctuates very little, L_{eq}, may approximate L_{50} or the median level. If the noise fluctuates broadly, the L_{eq} may be approximately equal to the L_{10} value. If there are extreme fluctuations, the L_{eq} may exceed the background level by 10 or more decibels. Thus, the relationship between L_{eq} and the levels of exceedance will depend on the character of the noise.

In community noise measurements, it has been observed that the L_{eq} is generally between L_{10} and L_{50}. The relationship between L_{eq} and exceedance levels has been used in the current studies to characterize noise sources and to determine the nature and extent of their impact at all receptor locations.

For purposes of the proposed project, the maximum 1 hour equivalent sound level ($L_{eq(1)}$) has been selected as the noise descriptor to be used in the noise impact evaluation. $L_{eq(1)}$ is a noise descriptor that is widely used for project impact evaluation, including stationary source equipment noise impact evaluation, and is used to provide an indication of highest expected sound levels.

2.8.3. Noise Standards and Criteria

There are a variety of noise standards and guidelines that have been promulgated by various city, state, and federal agencies. A number of these agencies' criteria are discussed below. However, none of these criteria are directly applicable to the proposed facility.

a. Township of Riverhead

The Township of Riverhead has a noise standard which specifies the maximum continuous sound emitted by a commercial, business or industrial operation that enters (a) residential property zoned for residential use or property within a noise-sensitive zone, or; (b) commercial zoned property. The maximum allowed values are a function of the time of the day. These noise standards are shown in Table 2.8-4. The Town Board of Riverhead has the authority to grant variances to the provisions of it's noise code.

Receiving Land Use	Hours		
	7:00 AM to 8:00 PM	8:00 PM to 1:00 AM	1:00 AM to 7:00AM
Residential or Noise Sensitive	75 dBA	58 dBA	30 dBA
Commercial	75 dBA	55 dBA	30 dBA

b. New York State Department of Transportation

The New York State Department of Transportation (NYSDOT) has noise criteria that it uses for projects subject to its jurisdiction. NYSDOT has adopted the noise criteria of the Federal Highway Administration (FHWA) (23 CFR 772). These criteria have two components: "fixed" noise criteria and "relative" noise criteria.

The fixed noise criteria consist of the FHWA Noise Abatement Criteria (NAC), which are shown in Table 2.8-5. These NAC depend on task interference due to noise interruption of various activities involving speech, which vary by land use. By NYSDOT policy, substantial fixed noise impacts occur when predicted traffic-noise levels equal or exceed the applicable NAC from this table.

The second type of FHWA criterion is relative to existing noise levels. Substantial relative noise impacts occur when predicted traffic-noise levels increase by more than 5 decibels (i.e., 6 decibels or more) above existing noise levels.

Table 2.8-5: FHW Fixed Noise Criteria

Activity Category	$L_{eq\,(1)}$	Description of Activity
A	57 Outdoors	Lands on which serenity and quiet are of extraordinary significance and Serve an important public need and where the preservation of those quali- Ties is essential if the area is to continue to serve its intended purpose.

B	67 Outdoors	Picnic areas, recreation areas, playgrounds, active sports areas, parks, Residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 Outdoors	Developed lands, properties, or activities not included in Categories A or B Above.
D	None	Undeveloped Lands.
E	52 Indoors	Residences, motels, hotels, public meeting rooms, schools, churches, Libraries, hospitals, and auditoriums

c. New York State Department of Environmental Conservation

New York State Department of Environmental Conservation (NYDEC) recently published a guidance document entitled *Assessing and Mitigating Noise Impacts* October 6, 2000). This document states that increases from 0-3 dBA should have no appreciable Effects on receptors, increases of 3-6 dBA may have the potential doe adverse impact only in cases where the most sensitive of receptors are present, and increases of more than 6 dBA may require a closer analysis of impact potential depending on existing noise levels and the character of surrounding land use and receptors. It goes on to say that in terms of threshold values, the addition of any noise source, in a non-industrial setting, should not raise the ambient noise level above a maximum of 65 dBA, and ambient noise levels in industrial or commercial areas may exceed 65 dBA with a high end of approximately 79 dBA. Projects that exceed these guidance levels should explore the feasibility of implementing mitigation.

d. Noise Control Act of 1972

As a result of the Noise Control Act of 1972, a document entitled *Information on Levels of Environmental Noise requisite to Protect Public health and Welfare with an Adequate Margin of Safety* was published in 1974 by the Federal Environmental Protection Agency (EPA). Table 2.8-6 shows these values. These levels do not constitute enforceable federal regulations or standards. Nevertheless, the noise levels identified by EPA represent valid criteria for evaluating the effect of project noise on public health and welfare.

2.8.4. Impact Criteria

For purposes of this project, the project would have a significant impact if the project results in an increase in $L_{eq(1)}$ noise levels over future conditions without the project of greater than 6.0 dBA and noise levels exceeded the noise requirements of the Township of Riverhead. Both conditions would have to occur in order to have a significant impact. The 6.0 dBA relative change criterion, is consistent with the NYDEC guidance document and increases in noise levels of this magnitude are generally considered noticeable and likely to result in complaints.

Table 2.8-5A:Noise Levels Identified as Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety

Effect	Level	Area
Hearing loss	$L_{eq(24)} \geq 70$ dB	All areas
Outdoor activity Interference	$L_{dn} \geq 55$ Db	Outdoors in residential areas and annoyance and Farms, other outdoor areas where people spend widely varying amounts of time, and other places

		in which quiet is a basis for use.
	$L_{eq(24)} \geq 55$ dB	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoyance	$L_{dn} \geq 45$ dB	Indoor residential areas
	$L_{eq(24)} \geq 45$ dB	Other indoor areas with human activities, such as schools, etc.

Sources: Report No. EPA-550/9-74-004, March 1974

2.8.5. Noise Prediction Methodology

Sound power level data for the primary noise sources at the proposed Calverton Facility are shown in Table 2.8-6. Sound power levels are independent of distance. These data were provided by the General Electric Corporation and also taken from comparable facilities.

Table 2.8-6: Sound Power Levels of Major Sources of Facility Noise

	Octave Band L_w in dB									
Source	**31**	**63**	**125**	**250**	**500**	**1K**	**2K**	**4K**	**8K**	**A-wt.**
General Electric 7EA	104	106	105	93	90	86	87	84	79	94.7
Exhaust Stack	119	114	91	80	59	55	62	74	92	93.0
SCR breakout	110	105	99	97	87	76	72	62	44	91.1
GSU Transformer	95	101	103	98	98	92	87	82	75	98.4
Dilution air cooling fans	93	93	93	92	93	93	91	88	90	98.1
Ammonia dilution fans	77	77	77	76	77	77	75	72	74	72.1
Intercooler recycle fans	89	95	94	91	86	84	78	72	66	89.0

At each receptor location noise levels due to each of the noise sources at proposed facility were calculated based upon using the following formula:

$$L_p = L_w - 20\log(D) - 0.6 - A_e$$

Where: L_p = predicted sound pressure level,

L_w = equipment sound power level,

D = distance for L_p (feet), and

A_e = excess attenuation.

In the equation above, the term [20log(D)] represents the decrease of sound levels due to distance from the source by hemispherical spreading. Excess attenuation owing to environmental and other conditions is the attenuation beyond that caused by hemispherical spreading. For this analysis it included the following: attenuation by absorption in the air, attenuation for soft ground absorption, attenuation due to barriers or obstructions, and attenuation due to trees.

Attenuation due to noise control features of the proposed facility were taken into account. As part of this installation, exhaust silencers, inlet air silencers, and a gas turbine enclosure would be provided for the GE MS7001EA to reduce noise levels. A 65-foot high exhaust stack and an SCR/CO catalyst were factored into the sound level data. In addition, where appropriate it was assumed that the GSU transformer would be shielded, that the dilution air cooling fans would use a suction silencer, and that the ammonia dilution fans would duct the inlet and outlet to reduce sound levels.

The cumulative sound level at each receptor was calculated by summing the sound pressure level (SPL) generated by each piece of equipment associated with the project

2.8.6. Existing Conditions

a. Selection of Noise Receptor Locations

Seven receptor sites adjacent to and near the project site were selected for analysis. The location of the noise receptor sites are shown in Figure 2.8-1, and are described below.

- **Site 1:** Receptors would be placed at the south side of Grumman Boulevard at the Swan Lake Golf Course. This site is approximately 2,400 feet south of the generator site. There are no residences within a 1-mile area on the south side of the proposed facility.

- **Site 2:** Receptors would be placed on the north side of the proposed facility site adjacent and parallel to N.Y. Route 25 approximately 1,500 feet from the generator. There are no residences on the north side within a 1-mile radius.

- **Site 3:** Receptors would be located 2,700 feet to the west, on Wading River Road. There are no residences within a 1-mile radius towards the west.

- **Site 4:** This site is located within the Riverhead Industrial Park on the east side of the proposed facility approximately 3,700 feet of the generator site. There are no private residences located within a 1-mile radius in this direction, but there are several commercial facilities in the planning stages.

- **Site 5:** This site is located to the northeast of the generator site at a distance of 1,500 feet near where the proposed Calverton Enterprise Park is being planned. There are no private residences within this area. Several commercial recreational facilities are anticipated to be located in this area.

- **Site 6:** This site is located north-northeast of the proposed generating site at a distance of 2,000 feet. There is presently located there an aircraft runway which will be used for private and small commercial aircraft operations.

- **Site 7:** This location, at a distance of 850 feet are the preserved vacant lands which were allocated by the Township of Riverhead to be preserved.

b. Noise Monitoring

At sites 1 through 6, 20-minute noise measurements would be made during the midday time period (i.e., between 10A.M. and 3P.M.) and during the late night /early morning time period (i.e., between 10P.M. and 6A.M.) using representative testing. (Based upon past experience, 20 minute measured values are typically representative of one-hour values.) The midday and late night/early morning period were selected, since these are the time periods when existing noise levels would be expected to be low and consequently, project impacts would be expected to be largest. The late night/early morning time period is also the time period when generally any nearby residences would be ht e most sensitive to increases in noise levels. During other hours project noise impacts would be expected to be lower than during these time periods.

In addition, at site 7, a continuous 24-hour noise measurement is included. The purpose of this measurement is to determine the quietest hour during the 24-hour time period, at the nearest sensitive receptor site, to ensure that the impact analysis showed the maximized potential project impacts.

Equipment

The 20 minute noise monitoring would use a Larson Davis Labs (LDL) Model MK224 microphone connected to an LDL preamplifier attached to an LDL Model 700 Type 1 (according to ANSI Standard S1.4-1983) sound level meter. The equipment is mounted at a height of 4 feet above the ground on a tripod. The meter is calibrated before and after readings with a Brüel and Kjaer Type 4230 sound level calibrator using the appropriate adaptor. Measurements at each location are made on the A-scale (dBA) for a sampling period of one hour. The data is digitally recorded by the noise analyzer and displayed at the end of the measurement period in units of dBA.

The 2 4-hour c ontinuous n oise m onitoring i s c onducted u sing a B rüel a nd K jaer Noise Level Analyzer Type 4427, a Brüel and Kjaer Sound Level Calibrator Type 4230, a Brüel and Kjaer half-inch microphone Type 4189, and a Brüel and Kjaer microphone preamplifier Type 2619. Measurements are made on the A-scale (dBA) for sampling periods of 1 hour, throughout the 24 hour measurement period. The data is digitally recorded by the noise analyzer and displayed at the end of the sampling period in units of dBA (see Figure 2.8-1).

For both the 20 minute and 24 hour monitoring, measured quantities includes L_{eq}, L_1, L_{10}, L_{50}, and L_{90} values; a windscreen is used during all sound measurements except for calibration, and; all measurement procedures conform to the requirements of ANSI Standard S1.13-1071 (R1976).

Results of Measurement

The 20 minute monitored noise levels ($L_{eq(1)}$ and the statistical noise levels) at the six receptor sites are shown in Table 2.8-7, and the 24-hour monitored noise levels ($L_{eq(1)}$ and statistical noise levels) at Site 7 are shown in Table 2.8-8. The measured levels at all of the receptor sites reflect the noise level of traffic activity on adjacent and/or nearby roadways. In general, the measured noise levels late at night are lower than the daytime levels.

Table 2.8-8: Existing Noise Levels

Site	Location	Time	$L_{eq(1)}$	$L_{1(1)}$	$L_{10(1)}$	$L_{50(1)}$	$L_{90(1)}$
1	Grumman Boulevard	Midday	65.8	74.3	69.8	62.5	54.2
		Night	59.7	71.8	62.4	47.3	40.3
2	Wading River Road	Midday	54.0	62.9	56.4	61.9	48.9
		Night	41.7	54.4	41.6	32.3	30.8
3	Swan Lake Golf Course	Midday	55.1	67.2	56.3	47.2	31.7
		Night	40.2	53.2	41.2	33.2	53.7
4	N.Y. State Route 25	Midday	61.3	68.3	64.3	59.3	54.3
		Night	53.6	64.8	53.8	46.8	45.9
5	Proposed Recreation Area	Midday	54.2	58.8	56.7	53.2	49.2
		Night	42.3	52.2	46.2	36.2	34.7
6	Airport	Midday	59.6	70.2	63.2	56.2	49.2
		Night	42.0	54.2	43.2	31.7	31.2

Notes: All values in dBA

2.8.7. No Build Conditions

Since it is anticipated that the proposed facility would be in operation within 6-8 months, conditions without the proposed project would be the same as existing conditions.

2.8.8. Probable Impacts of the Project

Table 2.8-10 shows the results of the noise analysis with operation of the proposed Calverton Generating Facility during the quietest period of the night.

Noise levels for the proposed generating facility were calculated using the methodology previously described which includes taking credit for the sound attenuation features to be incorporated into the project's design, including air inlet suppression state-of-the-art equipment as well as exhaust silencers. In addition, to be conservative and to ensure that maximum project impacts are identified, at Site 1 the 20-minute nighttime monitored noise level was reduced by 7.6 dBA to reflect the fact that, based upon the measured 24-hour values, noise levels during the 3-4 AM time period along this roadway would be less than the measured values during the 1-2 AM time period when the nighttime measurements were made at this location.

Because of the fairly low noise levels of the generating facility, the substantial distance between the site of the proposed generating facility and the receptor sites, and the availability of excess attenuation credits, the facility alone would produce $L_{eq(1)}$ noise levels of less than 30 dBA at all of the receptors sites. Consequently, noise levels would satisfy the Township of Riverhead Noise Code requirements at all the receptor sites.

In terms of project impacts, because of the very low noise levels due to the facility alone, the total noise levels with the proposed facility would be less than 0.5 dBA higher than existing noise levels or noise levels without the proposed facility. At all seven receptor sites (including Site 7), the proposed project would result in an imperceptible and insignificant increase in noise levels that would be well within the 6 dBA significance criteria used for assessing project impacts.

Consequently, the proposed facility would result in no significant adverse noise impacts.

Table 2.8-9: Existing Noise Levels at Site 7

Time	$L_{eq(1)}$	$L_{1(1)}$	$L_{10(1)}$	$L_{50(1)}$	$L_{90(1)}$
12 – 1 AM	56.2	64.3	48.8	38.9	34.9
1-2	56.2	63.9	47.3	37.7	34.9
2-3	59.9	63.5	46.7	36.9	33.7
3-4	48.8	59.9	45.3	36.5	33.7
4-5	52.1	62.3	44.7	37.3	33.9
5-6	62.6	63.2	45.7	39.9	33.9
6-7	68.9	65.7	49.7	38.5	34.1
7-8	63.0	73.3	67.3	56.7	49.0
8-9	67.8	80.5	67.7	56.2	48.9
9-10	59.3	79.1	66.3	52.7	41.9
10-11	58.9	77.3	65.7	53.2	43.7
11-12 PM	59.1	75.5	65.2	52.7	41.9
12-1	59.3	71.0	63.6	51.5	46.7
1-2	59.6	70.7	63.6	51.7	47.3
2-3	61.3	71.1	64.3	53.0	47.5
3-4	60.3	71.1	64.2	53.1	47.7
4-5	61.0	70.7	64.5	53.2	47.9
5-6	58.5	70.5	64.2	52.9	47.4
6-7	61.3	71.0	68.0	49.7	44.0
7-8	60.4	70.7	66.7	47.9	42.1
8-9	56.6	70.2	64.3	47.3	49.7
9-10	53.2	70.1	62.8	46.0	40.2
10-11	61.1	64.6	50.6	40.3	35.5
11-12 AM	62.0	65.4	49.9	39.8	35.8

Note: All values in dBA.

Table 2.8-10: Noise Levels With Operation of the Proposed Calverton Generating Facility

Site	Location	Lowest Existing Noise Level	Generating Facility Only	Total Noise Level With Generating Facility	Project Increase
1	Grumman Boulevard	59.5	20.2	59.5	0.0
2	Wading River Road	41.7	24.4	41.8	0.1
3	Swan Lake Golf Course	40.2	19.0	40.2	0.0
4	Riverhead Industrial Park	53.6	15.1	53.7	0.1
5	Calverton Enterprise Park	42.3	24.8	42.3	0.0
6	Aircraft Runway	42.0	22.0	42.0	0.0
7	Land Preservation Area	48.8	29.1	48.9	0.1

Notes:

All values in dBA and $L_{eq(1)}$.

Figure 2.8-1 Noise Monitoring Equipment

Home → Products → Airport Noise Monitoring Systems → ANM Hardware

ANM Hardware

- Noise Monitoring Terminal Type 3597
- Noise Level Analyzer Type 4441
- Outdoor Microphone Type 4184

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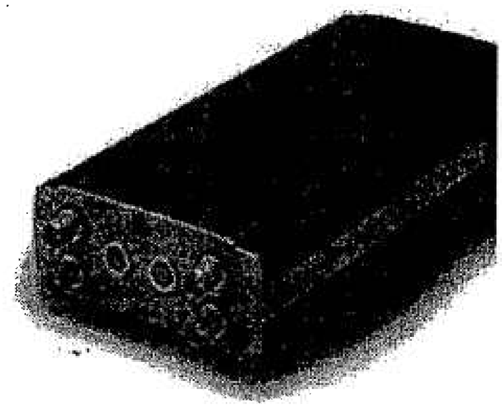
Select a related topic Go!

Noise Level Analyzer Type 4441

The Noise Level Analyzer (NLA) analyses data from the weatherproof microphone, and the analysed data is logged by the System Controller. The NLA is a Type 1 analyzer and has a dynamic range of 110 dB.



The NLA together with the System Controller can store a huge amount of valuable information in a database. The standard capacity of the database is 10 Gigabyte. This corresponds to an average of 3 months storage time. The retention time can be set up for all data sets. All results can be downloaded to a central server, either in real-time or at a user-defined time intervals, e.g., once per day. The following parameters are stored:

· Hourly reports: statistical information for every complete hour, including Distribution, LI values, Total Leq, Background Leq, Noise Event Leq.

· Noise events: detects noise events from any user-defined trigger levels and durations, stores the information in the database. For each event the following information is store 1 second intervals:

1. Leq and SPL values
2. 1/3-octave spectrum and PNL and PNLT values
3. Sound file

Furthermore, PNdB (Perceived Noise Level) and EPNdB (Effective Perceived Noise Le the events according to the ICAO Annex 16 are also calculated and stored in the databa

Figure 2.8-1a Noise Monitoring Equipment

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ANM Hardware

- Noise Monitoring Terminal Type 3597
- Noise Level Analyzer Type 4441
- Outdoor Microphone Type 4184

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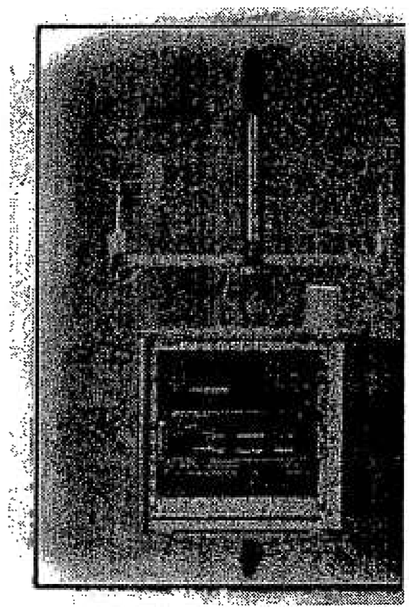
Noise Monitoring Terminal Type 3597



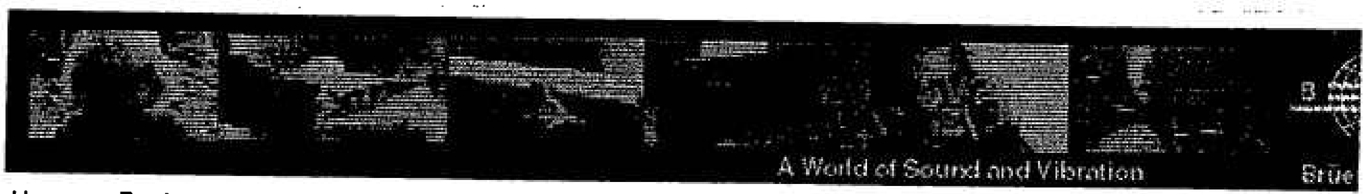
The Noise Monitoring Terminal (NMT) is for outdoor use, in all climatic environments, and is a component of an unattended environmental noise monitoring terminal system.

The NMT is an intelligent unit built around Brüel & Kjær's Noise Level Analyzer Type 4441 and Weatherproof Microphone Unit Type 4184 With a modem, the NMT can communicate with a remote PC using public telephone lines, wireless LAN, cellular phones, ISDN or LAN. The Noise Level Analyzer and the modem are housed in a protective weatherproof cabinet fitted with a thermostatically controlled fan and heater.

The NMT does the following:
- Makes remote unmanned environmental noise measurements
- Correctly gauges the signal from the weatherproof microphone unit
- Provides the necessary frequency and time weightings
- Processes noise data
- Checks the calibration of the weatherproof microphone unit
- Stores the results of several months of monitoring
- Transmits data via RS - 232 or LAN interface

Product Data: Noise Monitoring Terminal Type 3597
Bp1883.pdf (size 303 kb)

Figure 2.8-1b Noise Monitoring Equipment



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ANM Hardware

- Noise Monitoring Terminal Type 3597
- Noise Level Analyzer Type 4441
- Outdoor Microphone Type 4184

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Outdoor Microphone Type 4184

The Weatherproof Microphone is an outdoor unit suitable for unattended measurements. Its omnidirectionality ensures that sounds from all directions are detected without any undesirable reflections from its casing affecting the noise measurements being undertaken.

The microphone is based on a unique patented probe tube system, where the microphone cartridge is installed inside the casing of the unit. The system automatically checks the calibration 4 times a day using an acoustical signal and the patented Charge Injection Calibration (CIC) check. CIC ensures that the entire measurement chain is tested.

It functions correctly under conditions of up to 96% relative humidity and in ambient temperatures ranging from - 40 to +50°C. Its precision condenser microphone is buried and fully protected within the unit's body. It has spikes at the top of its windscreen to deter birds.

Product Data: Weatherproof Microphone Unit Type 4184
Bp0741.pdf (size 129 kb)

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2.9 Infrastructure

This section addresses the water supply, wastewater discharge, solid waste, and energy requirements of the proposed project. The infrastructure-specific needs of the proposed facility are quantified, and the planned connections and access to the service providers are discussed.

2.9.1 Water Supply

Water would be supplied to the proposed project by the Suffolk County Water Authority (SCWA) from already installed system water piping that was previously constructed and used by the former Grumman Naval Defense Facility that was located on this site.

2.9.2. Potable Water

The proposed facility would require about 100 gallons per day (gpd) for miscellaneous use, such as normal sanitary, emergency situations (shower, eyewash, infirmary) and ordinary office and plant keeping and maintenance.

The proposed site is located within the Suffolk County Water Authority service area. SCWA has approximately 350,000 customers, including 1.2 million people, making SCWA the largest groundwater supplier in the nation. SCWA has 461 active wells, which are scattered across 220 sites covering a majority of Suffolk County's 1,000 square miles. The water is treated and released into 5,246 miles of water main. Water production for this system currently exceeds 60 billion gallons per year, with peak production in excess of 450 million gallons per day (mgd) and peak monthly production in excess of 11 billion gallons. On average, SCWA's overall withdrawal is currently 164 mgd. SCWA has 64 storage facilities, which can store up to 66.7 million gallons of water. This water is held in storage to maintain the proper amount of pressure in the water mains (usually 40-60 pounds per square inch). The water also serves as a back-up supply during periods of heavy water demand and for fire fighting.

2.9.3. Process Water Requirements

The facility would consume approximately 92 gallons per minute or about 132,500 gpd of water for evaporative cooling, peak power augmentation and improved plant efficiency. It is anticipated that evaporative cooling would be used only during periods when the ambient temperature exceeds 80 degrees Fahrenheit. No process water would be discharged as wastewater. The anticipated water demand is just of 2.6 million gallons per year, if water for the spray mist cooler is required at all times. This is unlikely, and the total water demand may be less.

2.9.4. Firewater Requirements

The Manorville Fires District is based in the Manorville section of Brookhaven, near the southwestern corner of Riverhead. The district headquarters is located on Silas Carter Road, and another substation is located on Cranford Boulevard in Mastic. The part of the district that lies within Riverhead is primarily served from the headquarters.

This district in recent years has experienced little development overall, since much of its land area lies in the Pine Barrens Core Preservation Area. Current equipment levels are generally adequate to serve existing land uses. The district has 5 pumpers, 1 tanker, 2 police vans, 3 brush trucks, and 1 combined pumper/hook-and-ladder. However, future development at Enterprise Park (and at the Riverhead Industrial Section where the proposed generating site is located) may require additional facilities and equipment.

Enterprise Park and Riverhead Industrial lies within the district and is served by the Manorville headquarters. Prior to the closing of the U.S. Naval Defense Facility, the site was entirely served by its own government-run fire-fighting squad, as required by the Federal Aviation Administration (FAA). Currently, the Manorville district would have a 15-minute response time to the south entrance of the site and potentially 20 to 25 minutes to an individual building within the site. The Wading River Fire District covers the portion of Enterprise Park and Riverhead Industrial that fronts on N.Y. Route 25.

Firewater would be provided by an already existing hydrants system of the Suffolk County Water Authority that was in use when the U.S. Government's Naval Defense Facility was in operation and 150,000 gallons stored demineralized water available as backup.

2.9.5. Wastewater

Washwater from equipment washdown would be collected and pumped to storage. Washwater would be disposed of by tank truck collection and hauled to the Riverhead Wastewater Treatment Plant for off-site treatment, or it may be treated on site with an oil/water separation system included in the facility and then drained into the already existing sewage system that was installed when the site was used for the U.S. Government's Naval Defense Facility. Washwater from off-line washes is about 600 gallons per wash. When a new demineralization trailer is brought on site, about 1,000 gallons of water are used in the startup, and this water is not suitable for use in the evaporative cooling process. The water would be hauled off site for disposal. Site storm drainage would be handled through infiltration through the stormwater system. Stormwater collected from on-site oil or hazardous materials storage collection pads would route to a sump pit, then through an oil-water separator, and then held, pumped and hauled to the WWTP or to a licensed off-site facility for treatment and disposal. On-site equipment drains would be routed to a collection sump for pumping to an on-site collection tank and treated similarly.

2.9.6. Energy

The proposed Calverton Facility would consume just under 14 million gallons per year of low-sulfur distillate, assuming that it operated at maximum capacity within air quality permits limits.

2.9.7. Solid Waste

The proposed facility would generate limited quantities of solid waste. Solid waste produced by the facility would average less than 100 pounds per month. A local licenses waste hauler would transport the solid waste for disposal at an approved disposal facility. Solid waste generated by the facility would consist of paper products, containers used to deliver non-hazardous materials, and employee generated waste.

2.9.8. Probable Impacts of the Project

a. Water Supply Effects

The anticipated maximum daily water use would be 132,500 gallons if the facility generates electricity 24-hours per day. The volume is minor compared to SCWA system's existing demand and would not cause an adverse impact if all water were supplied by SCWA.

b. Wastewater Discharge

The proposed facility's total wastewater generation discharge would be minimal based on its operation as a simple-cycle facility. All sanitary wastewater would be discharged directly or by pump out to the Riverhead WWTP. Process wastewater would be about 2,600 gallons per week when the proposed facility is operating at capacity. This wastewater would be discharged to the WWTP or hauled off site and disposed of at a licensed facility. Disposal of these volumes would not have an adverse impact on the wastewater handling systems.

c. Energy

The use of about 14 million gallons of low-sulfur distillate oil is minimal compared to the size of the system and the overall petroleum use in the area. In addition, the fuel would be used to generate need electricity, another energy source.

d. Solid Waste

Generation of about 100 pounds per month of solid waste is minimal, and its disposal would not have an adverse impact on the solid waste handling system or on the capacity of landfills.

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2.10 Contaminated Materials

A Phase I Environmental Site Assessment of the property was conducted in accordance with the requirements of ASTM Standard 1527-00, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process.* The text is included in Appendix G. The purpose of a Phase I environmental Site Assessment is to identify environmental conditions that could be associated with contamination.

The Phase I tasks included:

- Site reconnaissance;
- Description of historical site conditions;
- Interviews with the property site managers and realtors;
- Review of environmental database and regulatory agency records;
- Preparation of a report summarizing findings, opinions, and conclusions.

2.10-1 Existing Conditions

The proposed site had been previously developed by the United States Government for use as a Naval Aircraft Defense, Aeronautical Research and Assembly Facility. According to an environmental site assessment by the Township of Riverhead it is further indicated that there are absolutely no contaminated materials on this site. The site, comprised of a 2,900-acre parcel was kept in strict military order and no contaminated materials were accumulated or dumped. When the property was bequeathed to the Township of Riverhead it was left in a clean and orderly manner.

Site reconnaissance by a qualified professional found no evidence of contaminated materials on site. A review of historical documents, including aerial photographs, topographic maps indicated that the site was used for an airport. From a thorough examination of the site today it is found to be in the same clean and orderly fashion as it was when it was given to the Township of Riverhead, and therefore there would be no adverse impacts due to the presence of contaminated materials.

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2.11 Soils, Geology, and Seismology

2.11.1. Geological Setting

Topographically, Long Island is dominated by two terminal, subparallel moraine ridges, the Harbor Hill Terminal Moraine and the Ronkonkoma Terminal Moraine. The moraines merge in the west but separate in central Nassau County and trend eastward the length of the island. They form the North and South Forks of the eastern end of Long Island. The land surface generally slopes both to the north and to the south from the two moraines; gently to the south and more abruptly to the north. Barrier beaches form the southern edge of the island and enclose Great South Bay.

In the Township of Riverhead, the Riverhead Industrial Park lies on the northern part of the middle island, just west of where the two forks divide into the north fork and south forks. The unconsolidated deposits that comprise this area are glacial clay, silt, sand, and gravel that overlie crystalline bedrock of Pre-Cambrian age. The overlying deposits range in age from Cretaceous to Pleistocene. The bedrock lies about 670 feet below ground surface and are overlain by a mix of clay, silt, sand and gravel known as the Upper Glacial Aquifer, the major source of fresh water on the northeastern end of Long Island. (United States Geological Survey [USGS], 1996).

The proposed project site is in a region with a surficial geology of outwash sand and gavel shaped and deposited by the Hudson-Champlain lobe of the Woodfordian Glacier, which receded from Long Island. The surficial deposits are till moraine, which is more permeable, variably sorted, and variably drained than normal till.

The proposed project is located at an elevation of approximately 30 feet above mean sea level (msl), and is relatively flat with the exception of low wetland areas, several ponds, and an occasional knoll.

The Soil Survey of Suffolk County, NY identifies Sudbury sandy loam as the soil type at the site and Canadice silt loam as the soil type in surrounding areas to the west and south of the site (SCS 1975). Sudbury sandy loam typically occurs in the transition zone between poorly drained and well drained soils. Sudbury soils are moderately well drained, coarse textured, and are considered non-hydric (NRCS 1996). Canadice silt loam is a moderately drained, fine textured soil that contains poorly-drained pockets of clay deposits. Field observations confirmed the presence of soils indicative of the Sudbury and Canadice series on and off site, respectively.

2.11.2. Project Area Seismicity

New York State is characterized as a location of moderate-level seismicity and seismic hazard. The highest levels if seismicity in the state are located in the Metropolitan New York City area, the northern Adirondacks, and Western New York (Jacob, 1993).

2.11.2. Probable Impacts of the Project

A soil Erosion Prevention and Control Plan would be developed for the project. The plan would prevent sedimentation in the nearby wetlands, water courses, and properties.

The proposed site soils and geology are suitable for construction of the planned generating facility. No blasting would be required. All facilities would meet applicable seismic standards. Therefore, no significant adverse impacts associated with soils or seismic activities are expected.

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2.12 Natural Resources

Protection of terrestrial resources, including wetland resources, is circumscribed by federal, state and local law as described below.

A. Public Service Law

The Public Service Law requires an issuance of a Certificate only if it finds that the Facility would "minimize adverse impacts, considering...the interest of the state" with respect to wildlife. PSL § 168.2(c)(i). Furthermore regulations require an analysis of "significant ecosystem resources," including "wetlands...unique old-growth forests, trees listed in the Registry of Big Trees in New York State, populations of critical...terrestrial organisms, habitats with documented extant occurrences of rare, threatened or endangered species, forest stands or tree farms managed for timber production and active or developing sugarbushes." 16 NYCRR 1001.3(b) 1(ii).

B. Clean Water Act, Section 404

Section 404 of the Clean Water Act requires authorization from the U.S. Army Corps of Engineers (ACOE) for work in waters of the United States, which includes wetlands. Since there is no water directly on the proposed site it is likely to be jurisdictionally determined by the ACOE that section 404 authorization is not required.

C. Federal Endangered Species Act

The endangered Species Act imposes prohibitions and requirements with regard to endangered or threatened species of plants and animal ("listed species") and the habitats of such species that have been designated as "critical habitat." The United States Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) share the responsibilities of administering the Federal Endangered Species Act of 1973. All activities which are likely to jeopardize the continued existence of any "listed species" or which may result in the destruction and/or adverse modifications of "critical habitat" are prohibited under the Federal Endangered Species Act without a license or permit from the USFWS or the NMFS.

D. Environmental Conservation Law

The New York Natural Heritage Program is responsible for analyzing existing sources of information, monitoring and taking censuses of plant and animal populations, and cooperating with other public agencies and scientific and educational institutions to identify the location and status of rare, threatened or endangered plant and animal species and various ecological communities within the State of New York. Under the New York Fish and Wildlife Law (ECL § 11-0535), "the taking, importation, transportation, possession or sale" of any endangered or threatened plant or animal species is regulated by the state. All these activities are prohibited without a license or permit. Furthermore, ECL §9-1503 regulates protected plants "by reason of their endangered, rare, threatened or exploitably vulnerable status." "Exploitably vulnerable" plants are species which are not currently threatened or endangered, but which are commonly collected for flower arrangements or other uses. Under ECL §9-1503.3, no person may "Knowingly pick, pluck, sever, damage by the application of herbicides or defoliants or carry, without the consent of the owner thereof, protected plants." Thus since Calverton would own the site and utilize it for its intended purpose, the presence of protected plants under ECL §9-1503 would not restrict use of the site.

Article 24 of the Environmental Conservation Law (also referred to as the Freshwater Wetlands Act) regulates activities in and around state-regulated wetlands. Pursuant to ECL §24-0301, all wetlands above 12.4 acres in area and other wetlands of unusual local importance have been mapped in New York State. As shown in Figure 2.12-1 the nearest state-regulated wetlands are the SWAN POND and surrounding wetland areas. Since none of these state-regulated wetlands are on or near the proposed facility site, no adverse impacts would occur.

E. Riverhead Tree Preservation Ordinance

The Riverhead Tree Preservation Ordinance generally requires a permit to destroy or remove any tree (defined as a perennial living woody plant at least 6 feet high and greater than 3 inches in diameter measured 3 feet from ground level) from an industrial site. This permit is only issued after a site plan has been approved or a building permit issued.

F. Riverhead Wetlands and Waterways Ordinance

The Riverhead Township Division of Environmental Preservation as part of their Coastal Assessment Evaluation determines regulated wetlands. As there are no wetlands on the proposed facility site, the project would not be subject to the Riverhead Wetlands and Waterways Ordinance. (See APPENDIX H–State Freshwater Wetlands and NWI Wetlands near Facility Site.

2.12 Natural Resources

The following section presents the results of field surveys and associated background literature reviews to determine the potential for adverse environmental impacts from the proposed project.

Field surveys were conducted at the site in June 2003, with the following objectives:

1. To characterize the general ecological character of the proposed site.

2. To inventory dominant plant and animal species and habitats present at the proposed site.

3. To document the presence of potential threatened and endangered species or their habitats at the proposed site.

4. To identify, characterize, and delineate the extent of wetlands at the site and document the presence of wetlands, if any, adjacent to the proposed site.

2.12.1 Existing Conditions

a. General Site Description

The proposed site encompasses 3-acres within a 460-acre industrial park that lies within a 2,900 acre divided parcel bequeathed to the Township of Riverhead by the U.S. Government. This parcel was previously used for a Naval Defense, Research, and Aircraft Assembly Plant. The core of the parcel, where the industrial park and proposed facility site is presently situated, was at the time it was used by the Government cleared of all forests and vegetation and paved in order to operate two aircraft runways, a control tower, aircraft hangars, assembly plant, oil fired steam heating facility and administrative offices. The 2,900-acre parcel has been subdivided with the intention of being used as an industrial park, a recreational area and for conservative land preservation. The entire area is within New York's coastal lowlands ecozone and is characterized by mid to late succession upland deciduous forest. Surrounding the area within a five-mile radius are the Long Island Pine Barrens, which is a very sensitive area with regard to conservation.

b. Transmission Line Description

The existing transmission line from the site to the Riverhead Substation was constructed during the time and before the U.S. Navy was operating a National defense and Government Aviation Research Facility. The transmission lines were originally designed to receive power from the Riverhead Substation. The same transmission site would be used today to supply additional and needed electric power to the Riverhead Substation. (See Appendix C Maps, and Electric Interconnection and Transmission Study).

c. General Description of Vegetation Communities Present

Three plant communities occur within and adjacent to the proposed site:

1. Upland deciduous forest.
2. Long Island Pine Barrens
3. Comprehensive plant species, as seen in Table 2.12-1.

1. Upland Deciduous Forest

Parts of the area around the site are characterized by upland mid-late successional deciduous forest with an average tree canopy height of 60-70 feet and maximum canopy height of roughly 75 feet. The forest is a climax community resembling typical coastal oak beech and coastal oak-laurel forest communities of the region. American beech (Fagus grandifolia), black oak (Quercus nigra), and white oak (Quercas alba) comprise the canopy and red maple (Acer rubrum), black gum (Nyssus sylvatica), black cherry (Prunus serotina), inkberry (Ilex glabra), and witch hazel (Hamamellis virginiana), and flowering dogwood (Cornus florida) comprise the subcanopy. Canopy and subcanopy closure is high, ranging between 75 and 95 percent. The shrub understory is sparse, with covering range between 20 and 40 percent, and dominated by mountain laurel (Kalmia latifolia), arrowwood (Vibernum recognitum), and mapleleaf vibernum (Vibernum acerfolium) with lowbush blueberry (Vaccinium angustifolium), multiflora rose (Rosa multiflora), blackberry (Rubus argutus), and shadbush (Amelanchier arborea) occurring sporadically throughout.

Ground layer herbs are very sparse with less than 10 percent cover and include lady fern (Athyrium filix-femina), New York fern (Thelypteris noveboracencis), starflower (Astra nostramous), and false solomons seal (Smilacina racemosa). Trailing vines include Virginia creeper (Parthenocissus cinqufolia), poison ivy (Toxicdendron radicans), and common greenbrier (Smilax rotundfolia).

Soils in the upland forest community are non-hydric, a strong brown to brown silty and sandy loams with faint, infrequent mottles. Soil contains occasional pockets of sand, decomposing organic matter, and unidentifiable material that was assumed to be refuse or fill material. No hydric characteristics, except for the faint infrequent mottles, occur in the upper 36 inches of soil, the maximum soil depth observed and depth of investigation required for wetland determination.

2. Plant Species and Emergent Wetland

Approximately 0.2 acres of lightly wooded and emergent wetland lay 4,000 feet south and north west of the proposed project.. This wetland is depicted on NYDEC Freshwater Wetlands Maps, and the Cowardin system of wetland classification classifies this system as a palustrine, seasonally flooded, broad leaved deciduous, forested wetland with a pocket of palustrine, seasonally flooded, emergent, persistent wetland. Dominant plant species in the forested portion of the wetland include red maple, white oak, black gum, and black walnut (Juglans cinerea) in the canopy and subcanopy and common greenbrier, spice bush (Lindera benzoin), sheep laurel (Kalmia angustfoilia), highbush blueberry (Vaccinium corymbosum), swamp azalea (Rhododendrum viscosum), and American elderberry (Sambuscus Canadensis) in the understory. Canopy covers in the forested wetland is roughly 85 percent and understory covers range from 40 to 70 percent. Ground cover and herbaceous vegetation is sparse and dominated by creeping buttercup (Ranunculus sp.) sensitive fern (Onoclea sensibilis).

The wetland open to a community that is characterized by lurid sedge (Carex lurida), tussock sedge (Carex stircta), bladder sedge (Carex intumescens), soft rush (Juncus effuses), mannagrass (Glycera striata), arrow-leaved aster (Aster sp.), lance-leaved goldenrod (Solidago graminifolia), button bush (Cephalanthus occidentalis), bonset (Eupatorium perfoliatum), phragmites (Phragmites communus), and water horehound (Lycopus virginicus). The emergent portion of the wetland contained roughly 5 inches of standing water at the time of the site visit in June 2003.

d. Wildlife Resources

This section is a characterization of the proposed project site and interconnections as to the wildlife and wildlife habitats. The study can be based on reconnaissance or systematic surveys, supplemented by available data from the New York state Amphibian and Reptile Atlas Project, the NYS Breeding Bird Atlas and range maps. Included is a list of the species of mammals, birds, amphibians, and reptiles reasonably likely to occur at and around the proposed project site and interconnections based on observations and supplemented by publicly available sources.

The woodland habitat found on site and in the general area provides habitat for a number of wildlife species. The site is not near surface waters or wetland areas that support a diverse set of species, and is not situated in any identified wildlife travel corridor of concern. Indeed, the habitat is fragmented on all sides – New York State Route 25 to the north, Wading River Road to the west, Grumman Boulevard to the south and River Road to the east.

<u>Reptiles and Amphibians</u>

Due to the limited quality of the disturbed area wetlands, fully aquatic reptiles and amphibians are not expected, although the site and laydown areas may support a limited number of terrestrial species. Table 2.12-2 is a list of amphibian and reptile species that are reasonably likely to occur on site given the existing habitat. This list is not intended to be all-inclusive but provides a detailed representation of what is likely to be found on site. It should be noted that no reptiles or amphibians were noted within the construction laydown area or interconnections.

Table 2.12-2: Reptiles and Amphibians Observed

Common Name	Scientific Name
fowler's toad	*Bufo woodhousei fowleri*
eastern spadefoot toad	*Scaphiopus holbrooki* [s]
*red-backed salamander	*Plethodon cinereus cinereus*
*wood frog	*Rana Sylvatica*
common garter snake	*Thamnophis sirtalis*
eastern hognose snake	*Heterodon platyrhinos* [s]
eastern milk snake	*Lampropeltis triangulum*
eastern box turtle	*Terrepene carolina* [s]

Birds

Several characteristic bird species including the rufous-side towhee, common yellowthroat, field sparrow, prairie warbler, pine warbler, blue jay, and whip-poor-will. In general, the composition of the avian community in the area is typical of this part of New York State. None of the species recorded are uncommon, and all are reported as inhabitants of Suffolk County. Table 2.12-3 describes over 90 bird species known to be in the area. None of these are on the endangered species list.

Mammals

The habitats found around the site within a 3-mile area are expected to support a number of mammal species. Small rodents and insectivores such as mice, shrews, moles, and voles are expected to be the most abundant mammals, but the surrounding area should also support larger mammals. Table 2.12-4 contains a list of the mammals, which are likely to occur within the 3-mile area because of existing conditions therein.

Table 2.12-3: Area Bird Species

Common Name	Scientific Name	Status	Breeding Bird Survey Status
great-horned owl	*Bubo virginianus*		Probable
long-eared owl	*Asio otus*		
American robin	*Turdus migratorius*		Confirmed
pine siskin	*Carduelis pinus*		
chipping sparrow	*Spizella passerina*		Confirmed
field sparrow	*Spizella pusilla*		Confirmed
Savanah sparrow	*Passerculus sandwichensis*		
white-crowned sparrow	*Zonotrichia leucophrys*		
grasshopper sparrow	*Ammodramus savannarum*	[s]	Confirmed
vesper sparrow	*Pooecetes gramineus*	[s]	Probable
fox sparrow	*Passerella iliaca*		
house sparrow	*Passer domesticus*		Confirmed
song sparrow	*Melospiza melodia*		Confirmed
*white-throated sparrow	*Zonotrichia albicollis*		
*European starling	*Sturnus vulgaris*		Confirmed
eastern phoebe	*Sayornis phoebe*		Confirmed
barn swallow	*Hirundo rustica*		Confirmed
tree swallow	*Tachycineat bicolor*		Probable
purple martin	*Progne subis*		Possible
chimney swift	*Chaetura pelagica*		Probable
brown thrasher	*Toxostoma rufum*		Confirmed
rufous-sided towhee	*Pipilo erythrophathalmus*		Confirmed
hermit thrush	*Catharus guttatus*		Confirmed
*wood thrush	*Hylocichla mustelina*		Confirmed
*tufted titmouse	*Parus bicolor*		Confirmed
*wild turkey	*Meleagris gallopavo*		
Veery	*Catharus fuscescens*		Confirmed
red-eyed vireo	*Vireo olivaceus*		Confirmed
yellow-throated vireo	*Vireo flavifrons*		
white-eyed vireo	*Vireo griseus*		Confirmed
chestnut-sided warbler	*Dendroica pensylvanica*		Confirmed
blue-winged warbler	*Vermivora pinus*		Confirmed
black-and-white warbler	*Mniotilta varia*		Confirmed
black-throated blue warbler	*Dendroica caerulescens*		
pine warbler	*Dendroica pinus*		Confirmed
prairie warbler	*Dendroica discolor*		
yellow-rumped warbler	*Dendroica coronata*		
yellow warbler	*Dendrocica petchia*		
horned lark	*Eremophila alpestris*	[s]	
Killdeer	*Charadrius vociferus*		Confirmed
cedar waxwing	*Bombycilla cedrorum*		Probable
whip-poor-will	*Caprimulgus vociferous*	[s]	Probable

[s] special concern species

Table 2.12-3: Area Bird Species

Common Name	Scientific Name	Status	Breeding Bird Survey Status
*gray catbird	*Dumetella carolinensis*		Confirmed
red-winged blackbird	*Agelaius phoeniceus*		Confirmed
Eastern bluebird	*Sialia sialis*		
*black-capped chickadee	*Parus atricapillus*		Confirmed
northern bobwhite	*Colinus irginainuse*		Confirmed
indigo bunting	*Passerina cyanea*		Probable
*Northern cardinal	*Cardinalis cardinalis*		Confirmed
brown-headed cowbird	*Molothrus ater*		Confirmed
brown creeper	*Certhia familiaris*		
*American crow	*Corvus brachyrhynchos*		Confirmed
yellow-billed cuckoo	*Coccyzus americanus*		Confirmed
black –billed cuckoo	*Coccyzus americanus*		Probable
*mourning dove	*Zenaida macroura*		Confirmed
*rock dove	*Columba livia*		Confirmed
American goldfinch	*Carduelis tristis*		Probable
house finch	*Carpodacus mexicanus*		Confirmed
purple finch	*Carpodacus purpureus*		
*Northern flicker	*Colaptus auratus*		Confirmed
least flycatcher	*Empidonax minimus*		
great-crested flycatcher	*Myiarchus crinitus*		Confirmed
blue-gray gnatcatcher	*Polioptila caerulea*		Confirmed
*common grackle	*Quiscalus quiscula*		Confirmed
ruffed grouse	*Bonasa umbellus*		
ring-necked pheasant	*Phasianus colchicus*		Confirmed
American redstart	*Setophaga ruticilla*		Confirmed
rose-breasted grosbeak	*Pheucticus ludovicianus*		Probable
red-tailed hawk	*Buteo jamaicensis*		Probable
broad-winged hawk	*Buteo platypterus*		Confirmed
ruby throated hummingbird	*Archilochus colubris*		Probable
American kestrel	*Falco sparverius*		Confirmed
*blue jay	*Cyanocitta cristatta*		Confirmed
*Northern (dark-eyed) junco	*Junco hyemalis*		
Eastern kingbird	*Tyrannus tyrannus*		Confirmed
golden-crowned kinglet	*Regulus satrapa*		
Eastern meadowlark	*Sturnella magna*		Confirmed
ruby-crowned kinglet	*Regulus calendula*		
*Northern mockingbird	*Mimus polyglottos*		Confirmed
white-breasted nuthatch	*Sitta carolinensis*		Confirmed
Northern oriole	*Icterus galbula*		
Ovenbird	*Seiurus aurocapillus*		Confirmed
Common nighthawk	*Chordeiles minor*	[s]	
Eastern screech owl	*Otus asio*		Probable

Table 2.12-3: Area Bird Species

Common Name	Scientific Name	Status	Breeding Bird Survey Status
American woodcock	*Philhela minor*		Probable
Eastern wood-peewee	*Contopus virens*		Confirmed
downy woodpecker	*Picoides pubescens*		Confirmed
hairy woodpecker	*Picoides villosus*		Confirmed
red-bellied woodpecker	*Melanerpes carolinus*		Confirmed
yellow bellied sapsucker	*Sphyrapicus varius*		
Carolina wren	*Thryothorus ludovicianus*		Confirmed
house wren	*Troglodytes aedon*		Confirmed
common yellowthroat	*Geothlypis trichas*		Confirmed

[s] special concern species

Table 2.12-4 Mammals Reasonably Likely to Occur Around the Proposed Site and Transmission Lines

Common Name	Scientific Name
Eastern cottontail	*Sylvilagus floridanus*
Big-brown bat	*Eptesicus fuscus*
hoary bat	*Lasiurus borealis*
keen's bat	*Myotis keenii*
little brown bat	*Myotis lucifugus*
red bat	*Lasiurus borealis*
eastern pipistrelle	*Pipistrellus subflavus*
silver-haired bat	*Lasionycteris noctivagans*
eastern chipmunk	*Tamis striatrus*
eastern mole	*Scalopus aquaticus*
house mouse	*Mus musculus*
white-footed mouse	*Peromyscus leucopus*
short tailed shrew	*Blarina breuicauda*
masked shrew	*Sorex cinereus*
least shrew	*Cryptotis parva*
pine vole	*Microtus pinetorum*
woodchuck	*Marmota monax*
raccoon	*Procyon lotor*
virginia opossum	*Didelphis virginiana*
eastern gray squirrel	*Sciurus carolinensis*
red fox	*Vulpes vulpe*
white-tailed deer	*Odocoileus virginiana*
domestic cat	*Felis domestica*

2.1.2. Probable Impacts

According to published reports of the U.S. Fish and Wildlife Service and NYDEC's New York Natural Heritage program regarding endangered, threatened, or rare animal species it has been indicated that there are no federally listed animal species on or in the vicinity of the proposed facility site.

The impacts to ecological resources at the proposed site will not have an adverse effect since the area has been previously cleared, and an industrial park is presently situated within the described area.

The primary mitigation effort that the proposed facility will undertake is land preservation, preservation of agricultural land and forested areas and protection of the Pine Barrens region of Long Island. No ecologically significant habitats or wildlife species occur at the proposed project site and no significant impacts on wildlife species or habitats would occur as a result of the proposed action. No state or federally listed threatened species are known to inhabit the site or adjacent areas. The existing electric transmission line from the proposed site to the Riverhead Substation does not significantly affect vegetation or wildlife communities. No sensitive wildlife communities occur in the immediate vicinity so such resources would not be affected by construction or operation of the proposed Calverton electric generation plant or operation of the LIPA transmission lines.

2.13 Water Resources

2.13.1 Local Hydrology

Water is supplied by the Suffolk County Water Department through water mains that were connected to the site when the former Grumman Naval Defense Facility was operating a U.S. Government research and aircraft manufacturing facility. The water system is operating today with the approval of the Township of Riverhead. Process water requirements would be 1200 gallons per hour at peak and 132,000 gallons per day.

2.13-2 Groundwater

The United States Environmental Protection Agency (USEPA) identified the aquifer system underlying all of Long Island as the Nassau-Suffolk Aquifer System and characterized it as a Sole Source Aquifer. A Sole Source Aquifer is defined by the USEPA as an aquifer that is the sole or principal drinking water source for the area, which, if contaminated, would create a significant hazard to public health.

Three principal aquifers underlie Long Island: the Upper Glacial aquifer at the top, the Magothy aquifer in the middle, and the deep less accessible Lloyd aquifer lying just above the Paleozoic metamorphic basement rocks. The three aquifers are bounded above by the water table and below by the crystalline bedrock surface. There are two major confining units. The Pleistocene Gardiners Clay is found mainly on the southern part of the island and provides some restriction of flow between the Upper Glacial and the Magothy aquifers. The other unit is the Raritan confining unit, which is quite thick and restricts the flow between the Lloyd and the Magothy aquifers.

The proposed site lies south of a groundwater divide that runs the length of the North Fork of Long Island (United States Government Survey, 1974), with the southern side of the divide having groundwater flowing generally southward and the northern side generally northward. It is important to note that groundwater flow direction can be influenced locally and regionally by the presence of local wetland features, surface topography, recharge and discharge areas, horizontal and vertical inconsistencies in the types and location of subsurface soils, and proximity to water pumping wells. The groundwater divides for Long Island are shown in Figure 2.13-1.

The Long Island Ground Water Management Plan (developed pursuant to section 208 of the Clean Water Act) divides the groundwater of Long Island into various hydrogeologic zones. The proposed project site is located in Zone IV, which is located on the north shore of both Nassau and Suffolk Counties. The site's hydrogeologic zones is shown in Figure 2.13-2.

The Long Island Regional Planning Board (LIRPB) also has designated nine Special Groundwater Protection Areas (SGPAs). The SGPAs are significant, largely undeveloped or sparsely developed geographic areas of Long Island that provide recharge to portions of the deep flow aquifer system, and protection of these groundwaters is a first order priority of the LIRPB. The proposed site is within a SGPA. The SGPAs for Long Island are shown in Figure 2.13-3.

The groundwater recharge in the Suffolk County area is 990 million gallons per day (mgd). The total capacity of the aquifers is about 70 trillion gallons. There are more than 600 public supply wells in the county, withdrawing approximately 210 mgd total from the Upper Glacial and Magothy aquifers. Most of this water is returned to the aquifer with consumptive loss estimated to be 95 mgd. The loss is through sewage systems, marine discharges, and evapotranspiration associated with irrigation and lawn watering.

A groundwater management study (C.R. Velzy Associates, May 1992) was prepared to assess impacts of increased consumptive use of groundwater from the Upper Glacial aquifer. That study examined the sole source aquifer in order to develop more refined water budget areas and the resulting permissive sustained yield (PSY) than had been identified in previous studies.

The fresh water aquifer within the Township of Riverhead lies within the "eastern aquifer." The PSY analysis considered the percentage of rainfall available as recharge to the aquifer and compared to current and future projected consumptive use of groundwater. Resulting PSY values were based on the maximum rate at which groundwater could be withdrawn from the eastern aquifer segment without inducing saltwater intrusion. Independent PSY values were developed for the western aquifer segment. The calculated PSY values are an indication of what the annual limits of consumptive use of groundwater from each aquifer should be. Additional analyses were performed at each of the heavily used water plants to determine site specific maximum daily pumpage to avoid saltwater upcoming; and maximum recommended drawdowns and pumpage durations to prevent lateral saltwater intrusion.

The calculated allowable pumpage rates were compared to historical incidents of increased chlorides in water supply wells, with the conclusion that the theoretical projections underestimate the pumpage that can be safely sustained without causing upcoming. The cone of depression analysis indicated that drawdowns to the water table caused by the Township of Riverhead wells were negligible under most conditions. The annual consumptive use in the eastern aquifer segment was estimated as 0.43 mgd, and is not believed to have increased significantly since then. The calculated PSY for these wells ranged from 0.58 to 1.25 mgd, depending on rainfall, with an average PSY of 0.89 mgd.

Generally, the chemical quality of the water in the aquifers of Long Island is suitable for most uses, including human consumption. Concentrations of dissolved solids in water from each of the aquifers are exceptionally low – less than 40 milligrams per liter. Stream and lake water, which are largely derived from ground water discharge, reflect these small concentrations, having similar dissolved solids concentrations of less than 50 milligrams per liter. In places, larger concentrations of dissolved solids indicate mixing of freshwater with saltwater or contamination from sources at the land surface. Iron concentrations are locally excessive, and the pH of the water commonly is less than 6.0, which causes the water to be very corrosive to transmission pipes, pumps, and plumbing.

2.13.2 Probable Impacts of the Project

The Calverton facility would consume approximately 95 gallons per minute (gpm) or 133,500 gallons per day of water for spray mist cooling, and controlled turbine combustion, as needed for peak power augmentation and improved plant efficiency. The amount of water used in the cooling system varies with the load when the ambient temperature reaches 80 degrees Fahrenheit. The overall demand for water is small compared to the ground water recharge rate for the region served by SCWA. The water that would be regulated and supplied to the facility would be from the Suffolk County Water Authority's water system.

There will be no impact to the site's infiltration rate, as all the waste and storm water will be collected in an existing water sewage system that was also constructed at the time when the Naval Defense Facility was operating. No adverse impacts are expected on the regional or local aquifers due to the minor water consumption of the facility and the site's management of stormwater.

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2.14 Stormwater Management

The following section describes plans for stormwater management and spill prevention, as well as material handling procedures, to be incorporated into the proposed Calverton Facility design and operation. The proposed facility would manage stormwater runoff to avoid impacts on adjacent properties and eliminate the potential for erosion or sediment transport. The Stormwater Pollution Prevention Plan (SPPP) is described first, followed by discussion of the Spill Prevention Control and Countermeasure Plan (SPCC) and Integrated Contingency Plan (ICP). Finally, potential impacts are assessed.

2.14.1 Stormwater Pollution Prevention Plan (SPPP)

As the facility would be located on a site with an existing water sewage drain system,that has been in service since U.S. Naval Defense and Aviation Research was located here, and the sewage system has been approved by the Township of River and the Suffolk County a stormwater management plan is already in place. However, a secondary stormwater management system would consist primarily of infiltration facilities. Based on a screening analysis, site development would generate an increase in peak flow of 1 to 2 cubic feet per second and a net 10-year runoff of 9,000 cubic feet. It is assumed that the sandy soils around the proposed site infiltrate at a rate of 0.2 gallons per minute (0.02 cfs), which is very conservative considering the sandy soils. The infiltration facility would consist of stones with 40-percent voids and catchment structures. In addition, the detention basin would have a minimum of 50 square feet of leaching area and a volume of 22,500 cubic feet. Assuming a detention basin with an effective depth of 4 feet, there would require a footprint of approximately 5,600 square feet (0.13) acres). There is sufficient available area fro the relatively small facility within the proposed site.

The proposed facility would have catch basins, and a pipe network leading to the stormwater detention basin collecting water from the entrance road on the eastern side of the property and the area surrounding the facility. The balance of the site's stormwater would be flows downland in a southerly direction.

During operations, the stormwater from roofs, roads, parking lots and general site areas would be directed to stormwater outfalls for discharge to the stormwater system. Containment areas, loading and storage pads, and other areas that may capture contaminated runoff would be directed to an oil-water separator, wastewater holding tank, and then delivered to either the Riverhead Wastewater Treatment Plant (WWTP) or haulded off site to a licensed facility for disposal.

The SPPP would contain the following sections for use during operations:

- General description of facility operations;
- Significant materials used at the facility;
- History of chemical releases from the site;

- Location, storage and handling of significant materials, oils and chemicals;
- Current stormwater flow patterns and pollution prevention measures;
- Stormwater drainage system;
- Spill prevention and response;
- Sediment control and erosion prevention;
- Employee training program and facility recordkeeping;
- Elimination of non-stromwater discharge; and
- Stormwater management controls.

2.14.2 Spill Prevention Control and Countermeasure Plan

A Spill Prevention Control and Countermeasure Plan (SPCC) for the project site would be developed prior to operation of the proposed facility. A listing of the secondary containment features to be incorporated in proposed facility design is provided below. The following areas would have special stormwater drainage components and/or characteristics.

- Aqueous ammonia unloading and storage area. This area would include secondary containment encompassing the unloading area and the storage tank and transfer pump area. All stormwater captured in the containment area would be treated as industrial wastewater and directed to the WWTP or haulded off site for disposal at a licensed facility.

- Transformer Containment Area. This area would include secondary containment that would be coarse stone filled. All stormwater captured in the containment area would be treated as industrial wastewater and directed to the WWTP or hauled off site for disposal at a licensed facility.

- Bulk oil storage/containment area. This area would include a secondary containment basin encompassing the unloading area, the storage tank, and the transfer pumps. All stormwater captured in the containment area would be treated as industrial wastewater and directed to the WWTP or hauled off for disposal at a licensed facility.

2.14.3 Materials Handling

The proposed facility's safety and material handling procedures for operation or generating facilities have been developed to protect on-site employees and the adjacent environment. This section identifies the material handling requirements of the facility operation and the associated safety procedures.

a. Material Handling and Safety

The proposed facility would be designed, constructed, and operated in full accordance with applicable regulations. The proposed facility would use very low sulfur light distillate fuel oil (0.05%) until gas is available, lubricants, and aqueous ammonia. These materials have been safely used by commercial and industrial operations throughout Long Island and the United States in a wide range of applications, including electrical energy generation.

The proposed facility would utilize state-of-the-art management systems, control systems and secondary containment systems to reduce the potential for incidents from the use of these materials. Using these systems, in the unlikely event of an accidental release at the proposed facility would be contained within the boundaries of the proposed project site, preventing any impact to the local neighborhood.

With respect to a release of ammonia, ammonia levels would not exceed 150 parts per million (ppm), the level of concern, at the nearest community facility, as there are no private residences within a 1-mile radius.

An Integrated Contingency Plan (ICP) would be developed to assist in the management of oil and/or hazardous materials in the event of an incident. The ICP would be designed specifically to protect human health and the environment, and would detail employee training requirements, materials management release prevention procedures, and emergency response procedures. The ICP would be coordinated with the local Fire Department and other emergency response personnel to maximize the protection to the community. The ICP would be tested at routine intervals and critiqued to determine its effectiveness.

Trained personnel would monitor the proposed facility to provide response in the event of an incident. The facility would also contract with local emergency response contractors to provide a second level of response and cleanup in the event of an incident.

b. Oil and Chemicals Used During Operation

The generation of electricity requires use of some common chemicals and petroleum products. Table 2.14-1 lists the types and quantities of materials needed for operation of the proposed project. The proposed facility would be designed and operated so that minimal, consumptive quantities of these materials are stored on site. By designing the proposed facility to operate with low quantities of these materials in storage, the risk associated with material management is reduced and the level of protection for on-site workers and the environment is increased.

2.14.3 Probable Impacts of the Project

The stormwater management system would assure that the clean stormwater from roofs, roads, parking areas, general site, and areas will be directed towards the existing sewer system. Stormwater from the containment areas will be directed to an oil/water separator and disposed of in a prescribed manner. An SPPP and an SPCC would be developed to implement these designs and procedures. An ICP would be developed in the event of a spill or other incident. With these measures in place, the proposed project would not have an adverse environmental impact associated with stormwater or the materials used on site.

Table 2.14-1: Bulk Oil and Chemicals Used in Operation

Oil and Chemicals	Quantity Stored	Rate of Use	Container	Storage Description
Aqueous ammonia	12,000 gallons		One 12,000-gallon above-ground tank	Tank with secondary containment
Low-sulfur fuel oil	300,000 gallons		Two 150,000-gallon above ground storage tanks	Tanks with secondary containment
Turbine lubrication oil	400 gallons	Not consumed – replaced every 2 To 4 years	75 gallons in turbine	In equipment in diked, contained area
Hydraulic fluid	60 gallons	Not consumed – replaced every 2 to 4 years	In General Electric generation unit	In equipment in diked, contained area
Mineral oil	320 gallons	Not consumed – replaced every 2 to 4 years	In transformers	In equipment in diked, contained area
Lube/valve seal oil	55 gallons	Varies		In equipment in diked, contained area
Heat transfer oil	15,000 gallons	Not consumed – Replaced every 20 years	150,000 gallons in single 69 kV transformer	In equipment in diked, contained area
Heat transfer oil	4,000 gallons	Not consumed – replaced every 2 to 4 years	2,000 gallons in each transformer	In equipment in diked, contained area

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2.15 Coastal Zone Management

The entire Township of Riverhead including the project site lies within the New York State Coastal Management Zone (CMZ) established by the state as authorized under the 1972 Coastal Zone Management Act (CZMA). New York's Waterfront Revitalization Program and Coastal Resources Act (Executive Law, Article 42) as codified at 9 NYCRR 600, implements the federal CZMA and establishes state-specific programs, procedures, and regulations. The Township of Riverhead adopted a Local Waterfront Revitalization Program (LWRP) on September 1988, and the LWRP was approved by New York State Department of State on November , 1988 and by the Office of Ocean and Coastal Resource Management on June 1989.

The proposed project site is between 3 ½ and 4 miles from the Long Island Sound and over 15 miles to the Atlantic Ocean. Due to the distance away from the coast discussions are taking place to determine whether there is a necessity for a State Agency to complete the Coastal Assessment Form if the proposed actions are subject to Part 600 of Title 19 of the NYCRR. This assessment would be intended to supplement other information used by a state agency in making a determination of significance pursuant to the State Environmental Quality Review Act (see 6 NYCRR, Part 617). If it is determined that a proposed action will not have a significant effect on the environment, this assessment is intended to assist a state agency in complying with the certification requirements of 19 NYCRR Section 600.4.

However, if the New York Department of State, Division of Coastal Resources determines that a complete coastal assessment would be in the best interest of the public, a preliminary scopeing has been done to determine which aspects need a special compliance permit. An overview of the analysis is presented below. While the project is within the coastal zone and is subject to LWRP consistency review, it is not on the shoreline. It does not provide any waterfront access or water recreation uses to the public. Therefore many of the specified policies are not applicable.

- Developmental: The project is consistent with permitted and adjacent land uses and zoning regulations as discussed in Section 2.1, "Land Use, Zoning, and Neighborhood Character," and Section 2., "Community Facilities."

- Fish and Wildlife: The project would have no significant effect on fish and/or wildlife or critical habitats, as discussed in Section 2.12, "Biological Resources and Wetlands."

- Flooding and Erosion Control: The project lies outside the 100-year floodpalin, as shown on FEMA FIRMS 36103C0176G. Appropriate erosion and sediment control measures would be designated consistent with local permitting requirements and implemented as required. The proposed site is not within a coastal erosion area.

- Public Access: The project would not effect public access related to coastal or waterfront resources or uses. The project site, while within the coastal zone, is not

Within the waterfront districts or central business district, which are the primary management focus of coastal zone regulations and policies for Riverhead.

- Historic and Scenic Resources: As discussed in Section 2.3, "Cultural Resources," and Section 2.4, "Visual Resources," the project would not affect historical or visual resources.

- Energy: The project, while addressing energy needs for the area, is consistent with the policy against large energy facilities. Development of small facilities, such as proposed in this document, address energy goals, without conflicting with policies against adverse effects associated with large energy facilities.

- Water and Air: The project would obtain water and air permits consistent with applicable limits and regulations for discharges, design, and management, as described in Section 2.7, "Air Quality," and Section 2.13, "Water Resources" See Appendix K: Coastal Assessment Form).

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2.16 Construction Impacts

Potential construction impacts would be limited to land use, infrastructure, noise, traffic, air quality, and storm water. The construction period would be weather permitting, a maximum of 24 weeks. In general, it is anticipated that construction activities, would occur primarily during the daytime hours of 7A.M. to 4 P.M. All construction workers are tested for drug use prior to being employed. Extensions of this basic workday, and evening or weekend work are likely to occur. It is expected, however, that evening activities would require a lesser number of workers than would occur during peak daytime hours. Based on the typical construction workday, it is anticipated that the majority of the construction workers would generally arrive at and depart from the proposed project prior to peak roadway hours.

2.16.1 Description of Construction Phases

a. Site Preparation and Foundations

As the site was previously excavated and leveled when the U.S. Government was using the site for the Grumman Naval Air Defense and Research Facility, there would be relatively little earth moving requirements. The foundation of the generating facility is in the area of 100 feet by 100 feet. Footing and foundation excavations are expected to be 6 feet deep. The certified foundation engineer will be using steel reinforced and earthquake resistant special cement mixes for extra strength and to be impervious of any kind of accidental leakages from operating mechanical equipment. The concrete would be poured and the formwork removed and exterior areas backfilled after the concrete has cured for the period specified by the manufacturer.
Equipment on site during this period would include trucks, backhoes, loaders, bulldozers, track excavators, cement mixers, and employee transit vehicles.
Site preparation and foundation installation would take 4-6 weeks and require 20-30 workers, many transient, such as cement mix truck drivers and formwork crews.

b. Unit Assembly and Final Site Work

Major components of the facility (turbines, generators, compressors, transformers, auxiliary engines, input and exhaust fans) are delivered pre-tested on extra heavy-duty large sixteen wheel transports, requiring little on site fabrication. Cranes would be required to assist in unloading and placement of the equipment on the foundation.
Other facility components such as tanks, air quality control components and exhaust stack erection would require on-site fabrication and additional equipment and specialized labor, such as welding and cutting equipment, steelworkers, pipe-fitters, and electricians.
During this phase, secondary containment structures, storm-water management systems, pavements, loading area and utilities (water, sanitary and electric) would be installed. Most of this work would require equipment and staff similar to the site preparation phase. Generation equipment enclosures, tank fabrication, facility assembly and other site work described will be performed concurrently. The expected time required for this phase is 4

To 8 weeks and may involve 30-50 workers, approximately a third of which will be transient.

The transmission line would be constructed concurrently by Keyspan and LIPA and involve minor limited excavation, assembly equipment, pole setting equipment, lifts and other miscellaneous equipment. Site workers would include linemen, excavation crews, and electricians.

c. Start-Up and Testing

The generation units are tested by the manufacturer, General Electric Corporation, Power Systems Division at the factory prior to delivery. They are tested again after installation with the balance of plant (BOP) testing in preparation for start-up and routine operation. Piping will be tested according to American Society of Mechanical Engineers (ASME) Standard B31.1, which includes hydrostatic testing, air testing, and alignment verifications. Electrical systems will be tested at this time in accordance with the National Electric Code standards governing meggering, hipot, and continuity. Other features tested during this phase of construction include fuel systems, remote monitoring, shut-down devices, auxiliary systems, leak detection, and vibration.

Upon completion of the preliminary testing phase, the unit is started and performance and output evaluated at 25, 50, 75, and 100 percent capacity. Successful performance testing will indicate that the turbine generator is ready for full-time operation.

2.16.2 Resource Impact Assessment and Controls

Construction activities will have a small, short-term effect on various resource areas described in preceding sections of this document. The following sections describe the construction effects on these individual resource areas, as appropriate.

a. Land Use

The proposed facility would be situated on 3-acres. The site plan (See: Appendix R) shows 3-acres to be ample space for use during construction as a staging and laydown area. After construction, construction equipment and materials would be removed and the area restored to its current condition. This would not be a significant adverse impact.

b. Air Quality

Possible impacts on local air quality during construction of the proposed project include fugitive dust (particulate) emissions from earth movement; mobile source emissions, including hydrocarbons, nitrogen oxide, and carbon monoxide emissions from construction workers and delivery vehicles and construction equipment operation.

Fugitive Emissions

Fugitive dust emissions are possible from earth movement, wind erosion and traffic over unpaved areas. Actual quantities of emissions depend on the extent and nature of clearing operations, the type of equipment employed, the physical characteristics of the underlying soil, the speed at which the construction vehicles are operated and the type of fugitive dust control methods employed. The United states Environmental Protection Agency (EPA) has suggested, in general, an overall emission rate of about 1.2 tons of particulate/acre/month of active construction from all phases of land clearing operations, before accounting for fugitive dust control measures. However, this is a national estimate and actual emissions would vary widely depending on many factors, including the intensity and type of land clearing operations. Much of the fugitive dust generated by construction activities consists of relatively large size particles, which are expected to settle within a short distance from the construction site and not significantly affect people nearby.

Appropriate fugitive dust control measures include watering of exposed areas and dust covers for truck, would be employed to minimize any impacts. As a result, no significant air quality impacts from fugitive dust emissions are anticipated.

Mobile Source Emissions

Mobile source emissions are emissions of air pollutants from motor vehicles, referred to as mobile sources. During construction, such emissions may result from trucks delivering construction materials or removing debris, worker's private vehicles, and construction equipment operation. Because the location of the site is near to roadways, truck deliveries and workers' private vehicles will not need to travel excessive distances, and are subsequently not expected to have a significant impact on mobile source emissions.

c. Noise and Vibration

Impacts on noise and vibration levels during construction of the proposed project include noise and vibration from construction equipment operation and noise from construction and delivery vehicles traveling to an from the site. The level of impact of these noise sources depends on the noise characteristics of the equipment and activities involved, the construction schedule, and the location of the potentially sensitive noise receptors. Noise and vibration levels at a given location are dependent on the kind and number of pieces of construction equipment being operated, as well as the distance from the construction site. In general, like most major projects, construction of the proposed project would result in increased noise and vibration levels, but only for a limited period of time.

Noise

Typical noise levels of construction equipment that may be employed during the construction process are given in Table 2.16-1.

Table 2.16-1: Typical Noise Emission Levels for Construction Equipment

Equipment Item	Noise Level at 50 Feet (dBA)	Equipment Item	Noise Level at 50 Feet (dBA)
Air Compressor	81	Dump Truck	88
Asphalt Spreader	89	Front-End Loader	84
Asphalt Truck	88	Gas Driven Vibro-Compactor	76
Backhoe	85	Hoist	76
Compactor	80	Jackhammer (Paving Breaker)	88
Concrete Plant	83[1]	Line Drill	98
Concrete Spreader	89	Motor Crane	83
Concrete Mixer	85	Pile Driver/Extractor	101
Concrete Vibrator	76	Pump	76
Crane (Derrick)	76	Roller	80
Delivery Truck	88	Shovel	82
Diamond Saw	90[2]	Truck	88
Dredge	88	Tug	85
Bulldozer	87	Vibratory Pile/Extractor	89

Sources:

Wood, E.W. and A.R. Thompson, Sound Level Survey, Concrete Batch Plant: Limerick Generating Station, Bolt, Beranek and Newman Inc., Report 2825 Cambridge, MA, May 1974.

New York State Department of Environmental Conservation, Construction Noise Survey, Report No. NC-P2, Albany, NY, April, 1974.

Bungener, J.H., Sound Level Survey: Wise's Landing, Kentucky, Bolt Beranek and Newman Inc., Report No. 2880, Downers Grove, IL, June 1975.

F.B. Foster Company, Foster VibroDriver/Extractors, Electric series Brochure, W-925-10-75-5M.

The Township of Riverhead has regulations that limit noise from construction activities, and the United States EPA has regulations that limit noise from construction equipment.

The Township of Riverhead in it's Noise Code has restrictions applying to noise from construction as follows: (1) construction activities may not produce unreasonable noise across a residential property between the hours of 8 PM and & AM the following day on weekdays or at anytime on Sundays or legal holidays; (b) construction activities may not produce continuous sound levels at or across a real property boundary that exceeds an L_{10} vlue of 80 dBA, and; construction activities may not produce a peak impulsive sound pressure level at or across a real property boundary that exceeds 130 dBA.

Noise from construction equipment is regulated by United States EPA noise emission standards. These federal requirements mandate that certain classifications of construction equipment and motor vehicles meet specified noise emission standards and construction material be handled and transported in such manner as not to create unnecessary noise.

These regulations would be carefully followed. In addition, appropriate low-noise emission level equipment would be used and operational procedures implemented. Compliance with noise control measures would be ensured by including them in the contract documents as material specifications, and by directives to the construction contractor. The contractor would be encouraged to use quiet construction equipment.

In general, noise levels caused by construction activities would vary widely, depending on the phase of construction and specific tasks being performed. In general, construction activities for the proposed project would take place on weekdays, between the hours of 7:00 AM and 6:00 PM. However, based on scheduling, some activities may take place outside of this timeframe (weekends and after 6:00) PM).

Increases in noise levels caused by delivery trucks, employees traveling to and from the site and other construction vehicles would not be significant, and would be limited to access roadways to the project site.

Increased noise levels caused by construction activities can be expected to be most significant during the stages of construction that require the use of impact equipment.

In general, noise from construction activities associated with the proposed project, particularly operation of impact-type equipment, could be intrusive at close by residences. However, these impacts would be short-term in duration and would not be considered a significant adverse impact. Expected worst-case $L_{eq(1)}$ sound levels from the noisiest places of construction activity are expected to be approximately

69dBA at the Calverton Enterprise Park, which is also under development and construction. However, at all sensitive receptor locations, construction activities will not result in continuous L_{10} values that exceed 80 dBA, or produce peak impulsive sound pressure levels that exceed 130 dBA. Therefore, construction activities would be in conformance with the requirements of the Township of Riverhead Noise Code.

Noise due to construction activities, while noticeable, and possibly intrusive at times, would not result in any significant adverse noise impacts.

Vibration

To avoid the potential for project-related construction damage a construction protection plan would be developed. This plan would include a protocol for the preconstruction inspection of a potentially affected structure, establish controls on construction vibration, and outline measures to provide for vibration monitoring, stopping work, and building inspections, as appropriate. Table 2.16-2 shows risk criteria from vibration damage.

Table 2.16-2: Vibration-Induced Risk Criteria for Buildings

Activity	Perceptible Distance (feet)	Historic	Residential	Structural
Blasting	1,000	400	300	60
Pile Driving	200	90	50	12
Pavement breaking	150	60	40	8
Heavy Truck Traffic	50	20	15	3
Bulldozing	60	30	20	3
Jackhammers	30	15	10	2

Sources:

Wiss, John F. Construction Vibrations: States-of-the-art. Journal of the Geortechnical Engineering Division, Procedings of the American Society of Civil engineers, Volume 107, No. GT0, February, 1981. Standard Recommended Practice for Evaluation of Transportation Related Earthborne Vibrations, ASHTO Designation: R8-81 (1986).

d. Infrastructure and Hazardous Materials Management

Construction and pre-operational cleaning of the proposed facility would generate limited amounts of some waste solvents and flushing materials. A licensed contractor would remove these materials for appropriate off-site disposal.

Solid waste and debris that cannot be recycled, reused, or salvaged would be stored in on-site dumpsters or similar containers for disposal. Potentially hazardous wastes would be separated from normal waste including segregation of storage and proper labeling of containers. License contractors would remove all waste from the project site in accordance with applicable regulatory requirements.

During construction, all chemical materials would be evaluated during the material receiving process. Materials that are determined to be hazardous would be stored in identified storage areas that would include containment measures. Personnel would be trained on the proper use, handling, protective equipment, storage, and disposal of hazardous materials.

A Health and Safety Plan would be developed and implemented to ensure that the potential for exposure of construction workers, workers on nearby sites, and others in the area is minimized. The Health and safety Plan would define worker safety training, monitoring procedures, and personal protective measures.

The construction phase would require use of various petroleum and chemical products, including medium-weight oil, waste oil, aerosol lubricant, thinners, solvents, paint, gasoline, and diesel. None of these products would exceed 1,500 gallons with aerosol lubricant and thinners and solvents at less than 250 gallons.

e. Stormwater and Erosion and Sediment Control

Under the new Phase II stormwater permitting program, site disturbance of more than one acre requires the development of a Stormwater Pollution Prevention Plan (SPPP) and submission of a Notice of Intent (NOI) to NYDEC. A SPPP would be reviewed by NYDEC for compliance with applicable regulations. The SPPP would be strictly enforced during the construction period in order to prevent any impacts on nearby wetlands, drainage courses and properties.

f. Traffic

Construction would occur over a 16 to 24 week period and would include both truck and construction work traffic. Heavy truck delivery of construction materials would likely be along the Wading River Road to Grumman Boulevard and onto the site, both roads currently provide heavy truck traffic access. There would not be extensive nor prolonged material delivery of equipment to the site, and except for when turbine units and other large, pre-constructed pieces of equipment and construction cranes would arrive, equipment movement would not be expected to significantly affect traffic on local roadways. The turbine units and other large, pre-constructed pieces of equipment, and construction cranes will be moved, where feasible, during off-peak and nighttime hours, to minimize any adverse effects on traffic flows on roadways. Heavy equipment and construction material delivery would average less than 10 trucks per day over the construction period, but may have several peak days of less than 40 trucks.

During the construction period, the number of workers on site would vary from about 25 to 80 personnel at any one time. A peak construction force of approximately 80 persons would extend approximately three to four weeks. The addition to the vehicular traffic during construction would add from 10 to 32 additional vehicles daily. This increased volume represents less than 2 percent of the anticipated traffic volume under worst-case conditions and would not be a significant impact.

The short-term effects of equipment movement, material deliveries, and construction worker trips would not be expected to have any significant adverse traffic impacts.

2.17 Cumulative Impacts 119

2.17 Cumulative Impacts

A cumulative impact analysis was performed to examine whether the proposed Calverton project, cumulatively with other relevant facilities (i.e., facilities built for LIPA for the summer of 2002, and facilities proposed for the summer of 2003), would have the potential for causing significant adverse environmental impacts. The cumulative impact analysis considered each of the environmental categories (i.e., land use and zoning, community facilities, cultural resources, contaminated materials, traffic, air quality, noise, etc.) as analyzed above. Because of the very localized extent of each such facility's impacts, in all areas other than air quality, cumulatively the new LIPA electric generating facilities have no potential for significant impacts.

With respect to air quality, the LIPA facilities would also have only very localized effects, though other larger facilities (not part of the LIPA system) could have broader impacts. Consequently, quantified analyses were performed to assess the potential cumulative air quality impacts of the proposed project together with such facilities. The detailed cumulative analyses contained in Section 2.7, "Air Quality," show that all of the maximum concentrations from stack emissions would be below the applicable air quality standards. Therefore, in terms of air quality, the proposed project would not, either individually or cumulatively, have any significant adverse environmental impacts.

East Hampton Power & Light Company

Calverton Generating Facility

Appendix A

LIPA
Long Island Power Authority

LIPA
Long Island Power Authority

Generation/Transmission RFP Solicitation
Proposers' Conference

Tuesday June 24, 2003

www.lipower.org
www.lipa-rfp.org

Agenda

LIPA
Long Island Power Authority

- Welcome & Opening Remarks
- Overview of LIPA's Goals & Objectives in RFP
- Product 1: On-Island Generation
- Product 2: Off-Island Generation
- Product 3: Transmission Cable
- Product 4: Combined Off-Island Generation & Transmission Cable
- Fuel Issues
- Transmission Issues
- Credit/Security Issues
- Respondent Data Sheets
- General Q&A
- Closing

Long Island Power Authority

WELCOME &

OPENING REMARKS

June 24, 2003

Overview of LIPA/Need for New Resources

LIPA
Long Island Power Authority

- The Authority is a corporate municipal instrumentality and political subdivision of the state of New York governed by a Board of Trustees. LIPA is the Authority's subsidiary which provides electrical service to its customer base.
- LIPA has nearly 1.1 million customers in Nassau County, Suffolk County and the portion of Queens County known as the Rockaways.
- LIPA owns its transmission and distribution system used to provide electrical service to its customers.
- In July 2002, Long Island experienced a peak demand of over 5,000 MW.
- Peak demand is growing at approximately 100 MW per year & energy consumption by about 350 GWh per year.
- As a result of such growth, coupled with LIPA's current resource situation, LIPA needs between 250-600 MW of on-island capacity by early summer 2007.

Goals of RFP

LIPA
Long Island Power Authority

- Procure 250-600 MW of cost effective, reliable capacity to serve LIPA's customers for delivery no later than early summer 2007.

- Increase competition in the wholesale generation market on Long Island.

- Diversify LIPA's base of suppliers.

LIPA
Long Island Power Authority

On-Island Generation

June 24, 2003

On-Island Generation

LIPA
Long Island Power Authority

Minimum Requirements

- 250 – 600 MW with physical location on Long Island
- Power sale term of 10, 15, or 20 years
- Combined cycle generating facility (completed in one or two phases)
  - Single-Phase - must have combined cycle operations in-service in early summer 2007
  - Two-Phase – must have simple cycle phase in-service in early summer 2006 followed by combined cycle phase being fully operational by early summer 2007
- Repowerings & life extension projects not eligible.
- Merchant amount (to be defined) required for terms of 15 or 20 years.
- LIPA to schedule resource with NYISO.
- Project cannot increase LIPA's largest single generation contingency which is 360 MW.
- Proposed pricing firm through December 31, 2003.
- Proposal submittals must include fully completed Respondent Data Sheets.
- $10,000 Proposal Submittal Fee

On-Island Generation

LIPA
Long Island Power Authority

Fuel Issues

- To be discussed in conjunction with fuel issues for other products later in conference.

Transmission Issues

- To be discussed in conjunction with transmission issues for other products later in conference.

Credit Issues

- To be discussed in conjunction with credit issues for other products later in conference.

LIPA
Long Island Power Authority

Merchant Amount

- Merchant amount defined as that portion of the project retained by the developer for sale into the wholesale or retail market.
- No merchant amount required for contracts with 10 year terms.
- Minimum merchant amount for contracts of 15 and 20 years is as follows:

Minimum Merchant Amount		
Project Size	**15 Years**	**20 Years**
250 – 399 MW	40 MW	40 MW
400 – 499 MW	60 MW	60 MW
500 – 599 MW	75 MW	75 MW
600 MW	90 MW	90 MW

On-Island Generation

LIPA
Long Island Power Authority

Contract Issues

- LIPA PPA for On-Island Generation proposals is available to interested Respondents upon submittal of LIPA PPA Request Form via the LIPA RFP website. (LIPA PPA expected to be available by early July).
- Proposals need to state whether pricing is based on acceptance of or exceptions to the LIPA PPA.
- Any exceptions to the LIPA PPA must be set forth clearly in writing.
- Questions about provisions in LIPA's PPA can be asked on the RFP website.

On-Island Generation

LIPA
Long Island Power Authority

LIPA's Preferences

- Combined Cycle commercial operation prior to early summer 2007.

- Proposals from Respondents that do not currently own any substantial amount of generation on Long Island.

- Projects with firm fuel supplies.

- Projects with dual fuel supplies.

- Projects which require minimal transmission reinforcements (connections at LIPA's Newbridge Road, Ruland Road, or Pilgrim Substations are best).

- Proposals in which the Respondent demonstrates a willingness to accept the terms and conditions set forth in the LIPA PPA.

LIPA
Long Island Power Authority

Off-Island Generation

Off-Island Generation

LIPA
Long Island Power Authority

Minimum Requirements

- 250 – 600 MW
- Power sale term of 10, 15, or 20 years
- Proposals from new or existing projects are welcome
- Generation must be "electrically located" on Long Island such that it would be deemed to be Zone K capacity pursuant to NYISO Rules.
- In service date no later than early summer 2007.
- Generator responsible for all costs to make firm delivery to Off-Island terminus of a new or existing transmission line that directly connects to LIPA's electric system.
- LIPA to schedule resource with NYISO and other affected ISOs.
- Proposed pricing firm through December 31, 2003.
- Proposal submittals must include fully completed Respondent Data Sheets.
- $10,000 Proposal Submittal Fee

Off-Island Generation

LIPA
Long Island Power Authority

Fuel Issues

- To be discussed in conjunction with fuel issues for other products later in conference.

Transmission Issues

- To be discussed in conjunction with transmission issues for other products later in conference.

Credit Issues

- To be discussed in conjunction with credit issues for other products later in conference.

Merchant Amount

- No Merchant amount required for Off-Island Generation.

Off-Island Generation

LIPA
Long Island Power Authority

Contract Issues

- LIPA PPA for Off-Island Generation proposals is available to interested Respondents upon submittal of LIPA PPA Request Form via the LIPA RFP website. (LIPA PPA expected to be available by early July).

- Proposals need to state whether pricing is based on acceptance of or exceptions to the LIPA PPA.

- Any exceptions to the LIPA PPA must be set forth clearly in writing.

- Questions about provisions in LIPA's PPA can be asked on the RFP website.

Off-Island Generation

LIPA
Long Island Power Authority

LIPA's Preferences

- Commercial operations prior to early summer 2007.
- Projects with firm fuel supplies.
- Projects with dual fuel supplies.
- Proposals in which the Respondent demonstrates a willingness to accept the terms and conditions set forth in the LIPA PPA.

Transmission Cable

Transmission Cable

LIPA
Long Island Power Authority

Minimum Requirements

- 250 – 600 MW of new firm transfer capacity to Long Island.
- Term of 10, 15, or 20 years
- Must accommodate the delivery of generation capacity to Long Island such that it would be deemed to be Zone K capacity pursuant to NYISO rules.
- Must be available for commercial operation by early Summer 2007.
- Respondents shall be responsible for all required reinforcements for Off-Island transmission.
- Proposed pricing firm through December 31, 2003.
- Proposal submittals must include fully completed Respondent Data Sheets.
- $10,000 Proposal Submittal Fee

Transmission Cable

LIPA
Long Island Power Authority

Transmission Interconnection/Upgrades Issues

- To be discussed in conjunction with transmission issues for other products later in conference.

Credit Issues

- To be discussed in conjunction with credit issues for other products later in conference.

Merchant Amount

- None required by RFP. Subject to FERC Open Season process.

Transmission Cable

Contract Issues

- LIPA Firm Transmission Capacity Purchase Agreement (LIPA Cable Contract) for Transmission Cable proposals is available to interested Respondents upon completion of LIPA PPA Request Form via the LIPA RFP website. (LIPA Cable Contract expected to be available by early July).

- Proposals need to state whether pricing is based on acceptance of or exceptions to the LIPA Cable Contract.

- Any exceptions to the LIPA Cable Contract must be set forth clearly in writing.

- Questions about provisions in LIPA's Cable Contract can be asked on the RFP website.

Transmission Cable

LIPA
Long Island Power Authority

LIPA's Preferences

- Commercial operations prior to early summer 2007.

- Projects which require minimal transmission reinforcements for LIPA's electric system (connections at LIPA's Newbridge Road, Ruland Road, or Pilgrim Substations are best).

- Proposals in which the Respondent demonstrates a willingness to accept the terms and conditions set forth in the LIPA Cable Contract.

Combination Off-Island Generation and Transmission

June 24, 2003

Combination Transmission and Generation

LIPA
Long Island Power Authority

Minimum Requirements

- 250 – 600 MW
- Term of 10, 15, or 20 years
- Generation must be "electrically located" on Long Island such that it would be deemed to be Zone K capacity pursuant to New York ISO Rules.
- Respondents shall be responsible for all required reinforcements for off-Island transmission.
- LIPA to schedule with NYISO.
- Must be available for commercial operation by early Summer 2007.
- Proposed pricing firm through December 31, 2003.
- Proposal submittals must include filled in Respondent Data Sheets.
- $10,000 Proposal Submittal Fee

Combination Transmission and Generation

LIPA
Long Island Power Authority

Fuel Issues

- To be discussed in conjunction with fuel issues for other products later in conference.

Transmission Issues

- To be discussed in conjunction with transmission issues for other products later in conference.

Credit Issues

- To be discussed in conjunction with credit issues for other products later in conference.

Merchant Amount

- None required by RFP. Cable subject to FERC Open Season process.

Combination Transmission and Generation

LIPA
Long Island Power Authority

Contract Issues

- Two Contracts required:
  - LIPA PPA for Off-Island generation
  - LIPA Cable Contract for transmission cable
- Both contracts are available to interested consortium Respondents upon completion of LIPA PPA Request Form via the LIPA RFP website (Both contracts expected to be available by early July).
- Proposals need to clearly state whether pricing is based on acceptance of or exceptions to the LIPA PPA and LIPA Cable Contract.
- Any exceptions to the LIPA PPA or the LIPA Cable Contract must be clearly set forth in writing.
- Questions about provisions in LIPA PPA or LIPA Cable Contract can be asked on the RFP website.

Combination Transmission and Generation

LIPA
Long Island Power Authority

LIPA's Preferences

- Commercial operations prior to early summer 2007.

- Projects which require minimal transmission reinforcements for LIPA's electric system (connections at LIPA's Newbridge Road, Ruland Road, or Pilgrim Substations are best).

- Proposals in which the Respondent demonstrates a willingness to accept the terms and conditions set forth in the LIPA PPA and LIPA Cable Contract.

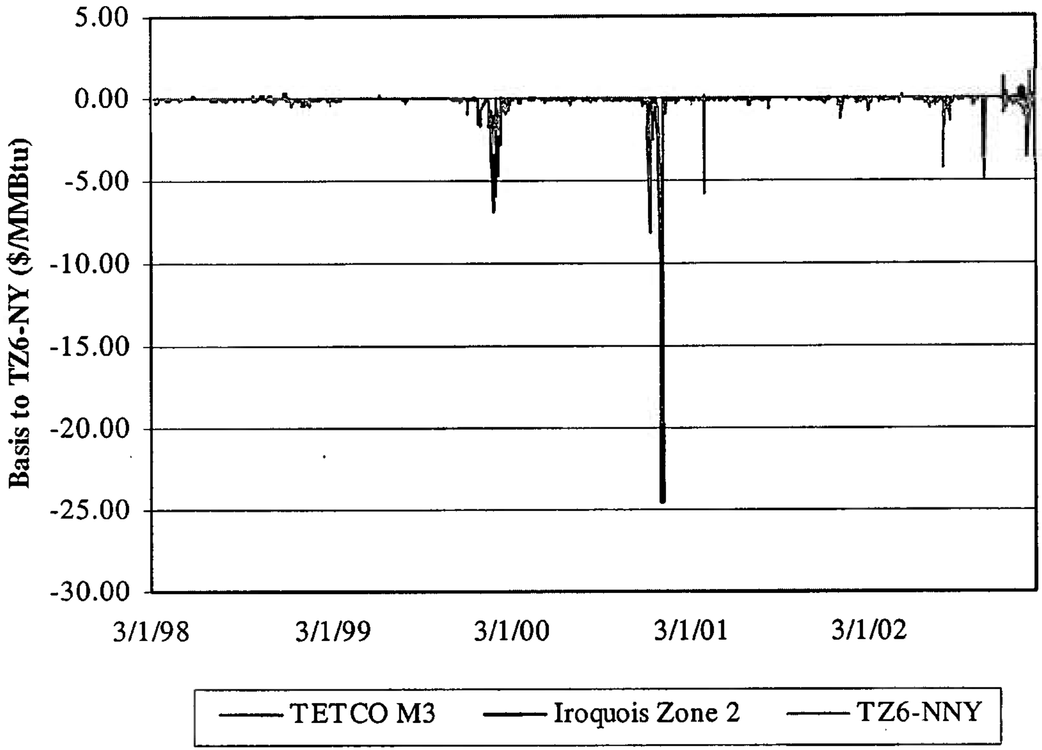
Fuel Issues

LIPA Assessment of Proposed Fuel Management Plan

LIPA
Long Island Power Authority

- Indexation to liquid pricing point(s), plus or minus
- Fixed or floating adder(s) are acceptable
- Seasonal / monthly basis differentiation
- Unbundle interstate and local delivery charges, if applicable
- Specify expected number of days of gas transport delivery (interstate v. local)
- Fuel and Transport term should match PPA term
- Firm fuel supply – Proposers encouraged to find creative solutions, including on-site storage where possible.

Regional Transport Basis to Transco Zone 6 New York.



June 24, 2003

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Natural Gas Pricing Points

Good

(no order of preference)

- Henry Hub
- TZ6-NY
- Dawn, Ontario
- TETCO M3
- AECo-C

Possible

- Iroquois Zone 2
- Algonquin CityGates
- Niagara
- TZ6-NNY

Existing Interstate Pathways to Long Island

- Transco

- Iroquois

Upstream pipeline interconnects used as required

KEDLI Local Delivery Service (SC 14)

LIPA
Long Island Power Authority

- SC 14 is 335 day equivalent service
- SC 14 applies Annual Minimum Bill Obligation
- Rate

	Contribution to Fixed Costs:	$0.10/Dth
+	Unitized Long Run Marginal Costs:	$0.14/Dth
		$0.24/Dth

- Other Components (i.e., Balancing, Value-Added Charge, Ratable Take provision) will affect hourly takes
- Delivery Pressure

Liquid Fuel Backup

LIPA
Long Island Power Authority

- On-site Storage of distillate oil or kerosene provides backup fuel
- Indexed to NY Harbor
- BE CREATIVE!!

Off-Island Generation/Transm Projects onto L.I.

- Indexed Pricing for energy into Controllable AC Cable or DC Cable must be explained
- Fuel Diversity a plus
- Same Gas Indexation Pricing Issues for injections from PJM, ROS-NY, or New York City

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Scheduling / Fuel Management Issues

- LIPA's scheduling rights cannot be subordinated
- Imbalance resolution and/or penalties attributable to scheduling in DAM or RTM are LIPA's responsibility
- Operating Agreement will delineate logistical protocols
- Good Potential for LIPA / third party fuel management (tolling)
- Fuel Management charge(s) must be separately stated

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Network Transmission Issues

Transmission Issues

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Long Island Power Authority

Interconnection with LIPA System

- LIPA's interconnection standards are posted on LIPA's website.
- All interconnection costs will be borne by Respondent.

System upgrades on LIPA's System

- LIPA will assume cost responsibility for all required system upgrades on the LIPA system (both NYISO "Attachment S" upgrades and upgrades required for capacity deliverability); however, estimated costs for such upgrades will be included in evaluation process.

Interconnection with Off-Island System

- Respondents are responsible for:
  - Meeting all requirements of transmission owner and transmission provider of Off-Island System.
  - All costs for necessary system upgrades on Off-Island System to allow for proposed product.

Transmission Service to Off-Island Cable Terminus

- This will be relevant for both Off-Island generation proposals and combination generation & transmission proposals.
- Respondents are responsible for securing Firm Transmission Service (FTS) from Generation unit to Off-Island terminus.

System Upgrades on Off-Island System

- Respondents are responsible for all required system upgrades to ensure delivery of capacity to Off-Island terminus.

Process for Providing Information to Respondents on Transmission Interconnection & Upgrade Costs on LIPA's System

- A form entitled "Request for System Upgrade Cost Estimate" will be available to all Respondents via the LIPA RFP website.
- LIPA will provide three complimentary cost estimates, additional cost estimates will require fee from Respondent.

Credit

Creditworthiness

- Primary purposes of security are for Liquidated Damages(LDs) and to mitigate LIPA's costs for replacement power in the event of seller default both pre and post commercial operations.

- Respondents must be able to demonstrate on-going financial strength and creditworthiness throughout term of contract.

- Respondents who are investment grade may provide guaranty or Letter of Credit (LOC) or other similar forms of security.

- Respondents who are either below investment grade or unrated will be required to provide a LOC or other similar form of "hard" security.

- In case of a consortium bid, LIPA will weight percentage ownership vs. proposer's ratings.

Security Amount

LIPA
Long Island Power Authority

- Guarantor or LOC issuer must be BBB rated or higher throughout the term of the contract. After a ratings downgrade to BBB- or below, guaranty must be enhanced.
- Acceptable form of LOC or guaranty will be provided.
- Security Amount: ***All New Generation Projects***
  - Within five (5) days of Contract Effective Date: Seller provides 1/3 of total amount of security required, ($900,000 for each 25 MW of Contract Capacity)
  - By Earlier of COD Target Date or COD: Seller provides remaining 2/3 of security amount required, for a total of $2.7M for each 25 MW of Contract Capacity
- Security Amount: ***Off- Island Existing Generation Projects***
  - Within five (5) days of Contract Effective Date: $2.7 M for each 25 MW of Contract Capacity
- Security Amount: ***Transmission Cable***
  - Within five (5) days of Contract Effective Date: Seller provides $300,000 for each 25 MW of contract capacity
  - By Earlier of COD Target Date or COD: Seller increases security to total of $1M for each 25 MW of firm transmission capacity
- Security amount declines by 5% on each 5^{th} Anniversary of the COD.
- Above amounts may be increased or decreased depending upon contract terms proposed by Respondents.

Credit Examples: Generation Projects

EXAMPLE 1:

Creditworthiness Criteria: New Generation Project

- "BBB" rated company selling 500 MW to LIPA

Security Requirements: Guarantee and/or Letter of Credit

- Within five (5) days of Contract Effective Date: Seller provides $18M
- By Earlier of COD Target Date or COD: Seller provides additional $36M for total of $54M
- Guaranty /LOC amount declines by 5% on each 5th anniversary of the COD

EXAMPLE 2:

Creditworthiness Criteria: Off-Island Existing Generation Project

- "A-" rated company selling 250 MW to LIPA

Security Requirements: Guarantee and/or Letter of Credit

- Within five (5) days of Contract Effective Date: Seller provides $27M
- Guaranty /LOC amount declines by 5% on each 5th anniversary of the COD

Credit Example: Transmission Project

LIPA
Long Island Power Authority

EXAMPLE 3:

Creditworthiness Criteria: New Transmission Cable

- "A" rated company selling 300 MW of firm transmission service to LIPA via a new cable

Security Requirements: Guarantee and/or Letter of Credit

- Within five (5) days of Contract Effective Date: Seller provides $3.6M
- By Earlier of COD Target Date or COD: Seller provides additional $8.4M or total amount of $12
- Guaranty/LOC amount declines by 5% on each 5th anniversary of the COD

EXAMPLE 4:

Creditworthiness Criteria: New Transmission Cable

- "BBB-" rated company selling 300 MW of firm transmission service to LIPA via a new cable

Security Requirements: Letter of Credit

- Same as Example 3 above except security must be Letter of Credit or other comparable "hard" security.

Respondent's Data Sheet

Summary of Respondent's Data Sheet

LIPA
Long Island Power Authority

- All Respondents are required to complete a set of data sheets to facilitate LIPA's quantitative analysis of each proposal and submit on Proposal Submission Date.

- Separate sets of data sheets for following:

1. **On-Island Generation:**	Single phase
2. **On-Island Generation**	Two Phase
3. **Off-Island Generation**	Single Phase
4. **Off-Island Generation**	Two Phase
5. **Transmission Line**	Controllable AC Cable
6. **Transmission Line**	DC Cable

- For a Combination Generation and Transmission proposal, Respondent(s) should submit a data sheet for Off-Island Generation and a data sheet for the transmission line from the list above.

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Additional Information Sources

LIPA RFP Web Site

LIPA
Long Island Power Authority

- Documents to be posted include:
  - Proposers Conference presentation
  - Proposers Conference transcript
  - Respondent Data Sheets
  - Forms including:
    - Request for System Upgrade Cost Estimate
    - LIPA PPA Request Form
- Proposers are encouraged to ask questions on website.
- Answers will be posted for all to see.

Submission of Proposals

LIPA
Long Island Power Authority

Copies of the respondent's proposal and $10,000 proposal submittal fee (if not already tendered) must be mailed, sent by courier, or hand-delivered so that they are received by 3:00PM Eastern daylight time on August 11, 2003 to the following individuals at their respective addresses:

Jim Peterson (6 Bound Copies and Proposal Fee)
Director of Power Markets Contracts
333 Earle Ovington Blvd, Suite 403
Uniondale, NY 11553

Robert Kendall (One unbound original, 6 Copies and a CD containing PDF files of all proposal content)
Long Island Power Authority
c/o of Navigant Consulting
Attn: Robert Kendall-Capacity and Energy RFP
1400 Old Country Road, Suite 402
Westbury, New York 11590-5156

Procurement Schedule

Overview of Procurement Target Schedule

LIPA
Long Island Power Authority

RFP Issuance	May 30, 2003
Proposers Conference	June 24, 2003
Intent to Respond Due	July 9, 2003
Sealed Proposals Due	**3:00PM, August 11, 2003**
Potential Project(s) Awarded	November 1, 2003
Preferred In-Service Date	Early Summer 2006
Required In-Service Date	Early Summer 2007

LIPA
Long Island Power Authority

Q&A

CLOSING

East Hampton Power & Light Company

Calverton Generating Facility

Appendix B

East Hampton Power & Light Company

Calverton Generating Facility

Appendix C

Appendix C: Electric Interconnection and Transmission

1. Applicable Regulatory Requirements
   a. Consultation Regarding Scope
2. Electric Interconnection
3. Interconnection Study Results
   a. Introduction
      1. Compliance with Planning Standards
   b. Thermal Analysis
      1. Line Overloads
      2. Changes in Interface Transfer Limits
   c. Voltage Analysis
   d. Stability Analysis
   e. Short Circuit Analysis
      1. Impact on Fault Current Levels
      2. Sensitivity to External Generation
   f. Evaluation of Protective Relays
4. Transmission System Impact Analysis
   a. Reliability
   b. Voltage Stability, Thermal, Short Circuit and Transmission Interface Analysis
   c. Benefits and Detriment of the Project on Ancillary Services and Electric Transmission System
5. Transmission Upgrade Environmental Assessment
   a. Existing Land Use and Environmental Features
   b. Probable Impacts
      1. Air
      2. Cultural/Historical
      3. Land Use
      4. Noise
      5. Safety
      6. Solid Waste
      7. Traffic and Transportation
      8. Visual
      9. Groundwater, Water Supply and Wastewater
      10. Terrestrial Ecology, Surface Water and Wetlands
      11. Conclusion
6. Electric and Magnetic Field Studies
   a. General Description of Magnetic Fields
   b. Standards and Criteria
   c. Existing Conditions
   d. Probable Impacts of the Proposed Substation Expansion
      1. EMF and Health
   e. Chemicals Used at Substations
   f. Construction
   g. Cumulative Impacts
   h. Conclusion

Electric Interconnection & Transmission

1. Applicable Regulatory Requirements

East Hampton Power and Light is proposing an interconnection with LIPA's 69 kV transmission line from the site of the planned Calverton Generating Facility to the Riverhead Substation. The transmission line from Riverhead Substation to the proposed plant site at the former U.S. Government Naval Defense and Aircraft Research Facility, previously known as the Grumman Naval Defense Facility. This area comprised 2,900 acres. The U.S. Government bequeathed it to the Township of Riverhead when the naval aviation plant closed and the Grumman Corporation relocated. The 69 kV transmission line from the Riverhead Substation supplied electrical energy for the plant as well as some of the local farms. The proposed Calverton Generating Facility would interconnect with LIPA from the switchyard where the transformer units are located. It would follow the same Right of Way that is in use to today for incoming electric service from the Riverhead Substation. The section of line under consideration here (See: Appendix 6 – site maps, interconnection locus, transmission line, and substation) is presently being evaluated by LIPA for a reconditioning or reconstruction due to its ancillary characteristics and performance value. This section describes the proposed interconnection to the transmission grid and provides the results of an interconnection study.

With respect to the proposed projects impacts on the transmission system an outline of "the benefits and detriments of the proposed facility on ancillary services and the electric transmission system, including impacts associated with reinforcements and new construction" is included.

A letter was sent to system protection and system planning engineers at the Long Island Power Authority (LIPA) concerning the scope and magnitude of the proposed project for comments and review (See: Appendix D, Correspondence).

2. Electric Interconnection

The projects generator will be connected to the generation step-up transformer. The transformer will connect to a new ring bus in the switchyard. The LIPA 69 kV transmission line will connect to the ring bus. The switchyard will be proximate to the existing transmission line ROW, as shown in Figure 1.1.2.1. The interconnection will consist of a loop of the ???kV line into the site (i.e., total of two lines to the site from the existing right-of-way). To provide reliability, flexibility and continuity of service, a 3-breaker split ring radial configuration has been proposed. For a one-line diagram of the proposed interconnection, see Figure 1.1.2.2.

3. Interconnection Study Results

3.a. Introduction

This section addresses the parameters of the details required for a study of this scope and dimension. It is of our understanding that LIPA will conduct the interconnection study. However, we have been advised that should such a study commence independently, it will have to be under the auspices of NYISO.
The study would examine in detail the effect of the Calverton Generating Facility on the LIPA system in order to confirm that the project has no significant adverse impacts and that those effects identified within the LIPA system are easily mitigated. Details of the required upgrades are shown below in the specific sections devoted to the analysis. In summary the study identifies one line section that exceeds it rating after installation of the proposed project. This is the 69kV line from Calverton to Riverhead. No additional upgrades were identified as resulting from implementation of this proposal. However, three other overload conditions have been identified in the adjacent area. They are the Brookhaven-Moriches 69 kV line, the Brookhaven-William Floyd 69 kV line, and the Holbrook 138/69 kV Transformer #2. The two 69 kV lines have already been scheduled for reconductoring that will eliminate these overload conditions.

Short circuit analysis shows that any effect of the project would be localized. Breaker duties would be exceeded for the Calverton to Riverhead line and have taken into consideration the greater demand requirements for future years.

Furtherance of the interconnection study uses four different load levels summer and winter peak, light load and minimum load. It has been concluded that the proposed project will not cause a degradation in the performance of the LIPA or of LIPA's neighboring systems (Consolidated Energy Company of New York, Inc. (ConEdison), Central Hudson Gas & Electric Corporation (CHG&E), New York Power Authority (NYPA), New York State Electric & Gas Corporation (NYSEG), Niagara Mohawk Power Corporation (NMPC), Orange and Rockland Utilities, Inc. (O&R), Rochester Gas & Electric Corporation (RG&E), New England Independent System Operator (NE-ISO) and Pennsylvania-Jersey-Maryland Independent System Operator (PJM-ISO).

Long Island has limited electrical connections to the mainland and is an electric load pocket, which under peak conditions is generally an electricity importer. As shown in figure 1.2.1.2. Long Island's annual average import of electric energy was equivalent to a rate of 646MW. The peak transfer capacity into Long Island is presently 1295 MW under summer conditions.

The unfortunate blackout of August 15, 2003 (See: Appendix B - Causes and Effects of the August 2003 Blackout) exemplifies the extraordinary need to modernize the electrical interconnection system in the United States and especially on Long Island. The present electrical system was one of the very first in this country and perhaps today, one of the oldest. It performed wonderfully for the last 70 years but it is antiquated and in dire need of reconstruction. The very high growth rate on Long Island has created a very high demand for additional electric power. The Calverton facility will greatly help to alleviate future strains on the capacity and demand levels for the eastern end of Long Island in the coming years.

3.a.1. Compliance with Planning Standards

The study would be compliant with the New York State Reliability Council (NYSRC) Reliability Standards including the Local Reliability rules that pertain to LIPA. Table 3.a.1. lists the contingencies that would be evaluated in demonstrating compliance with NYSRC and LIPA requirements, while Table 3.a.2. summarizes the results of the analysis.

Table 3.a.2. shows the impact the Calverton Project has on the Bulk Power System (BPS) with respect to the New York Reliability Council and LIPA reliability rules and criteria. There are existing criteria violations, based on the LIPA reliability criteria, that are noted in this report. Existing violations that are not exacerbated by the proposed facility; thus, the project will not cause a violation of LIPA or NYSRC criteria.

Since the study would show that other NY Transmission Owners, as well as PJM and ISO-NE are not affected by the addition of the facility, detailed analysis of their reliability criteria is not needed.

The NPCC criteria are virtually identical to the NYSRC requirements with one exception. The NPCC criteria are more liberal in that they allow two lines to be on the same tower for 5 or fewer towers exiting the station without requiring evaluation of the loss of both lines. NYSRC criteria require that under such an arrangement the loss of both lines be tested. Compliance with NYSRC criteria therefore assures compliance with NPCC criteria.

The North American Reliability Council (NERC) has approved *Planning Standards*, which are mandatory. The NERC requires that its regions, sub-regions, power pools, and their members:

- Develop planning criteria and guides that are applicable to their respective areas and which are in compliance with the *NERC Planning Standards,*

- Coordinate their planning criteria and guides with neighboring regions and areas, and

- Agree on planning criteria and guides to be used by intra- and interregional groups in their planning and assessment activities.

The NERC Planning Standards also note that the regions, sub-regions, power pools, and their members have the primary responsibility for the reliability of bulk electric supply in their respective areas. These entities also have the responsibility to develop their own appropriate or more detailed planning and operating reliability criteria and guidelines that are based on the *Planning Standards* and that reflect the diversity of individual electric system characteristics, geography and demographics for their areas. Therefore, all electric industry participants must also adhere to applicable regional, sub-regional, power pool, and individual member planning criteria and guides are more restrictive than the *NERC Planning Standards*, the more restrictive reliability criteria and guidelines must be observed.

Since the NYSRC criteria are more stringent than the NERC criteria, by complying with the NYSRC criteria the proposed facility is by definition in compliance with the NERC criteria.

3.b. Thermal Analysis

This section addresses the proposed facility's effect on transfer limits for the following interfaces: LIPA, Con Edison cable system, Upstate New York/Con Edison, Central East, Total East, PJM-NY, and NE-NY. The study would also evaluate the thermal performance of all pertinent system components affected by the proposed facility, such as transmission cables, transmission lines, and transformers during normal and emergency conditions, in order to ensure that these components operate within their rated load capabilities and to determine any needed upgrades.

3.b.1. Line Overloads with and without Facility

Thermal testing would be done at the following load levels:

- Summer peak 2003 — 4803 MW Long Island load
- Winter peak 2003 — 3247 MW Long Island load
- Light load 2003 — 2200 MW Long Island load
- Minimum load of 2003 — 1500 MW Long Island load

In addition to the existing generation units the following resources are added:

1. A TransEnergies Cross Sound 330 MW HVdc tie from New England into the Shoreham 138 kV substation. The maximum import capability of the tie was modeled as 330 MW into Shoreham.

2. A Keyspan Energy Spagnoli Road combined cycle generation plant (235.5 MW net generation) was modeled, connected through a bus tie to the Ruland Road 138

kV station. This plant consists of one 177.3 MVA gas turbine generator and one 99.7 MVA steam turbine generator.

3. A Keyspan Energy Spagnoli Road simple cycle gas turbine generator (99.7 MVA, 84.8 MW net generation) was modeled, connected through a bus tie to the Ruland Road 138 kV station.

4. A Keyspan Energy Shoreham combined cycle generation plant 235.5 MW net generation) was modeled, connected through a bus tie to the Shoreham 138 kV station. This plant consists of one 177.3 MVA gas turbine generator and one 99.7 MVA stem turbine generator.

No new transmission reinforcements were added to support these new resources.

A contingency list of 402 single and multiple element outages was supplied by LIPA and used in the analysis. Each contingency was solved with phase angle regulating transformers, LYC transformers, and switched shunts in their ore-outage state. Area interchange was not adjusted for contingencies. For outages that result in loss of generation, the lost generation was distributed to units throughout the entire modeled system in proportion to their initial (pre-disturbance) power output.

There are numerous thermal violations for the benchmark system (and thus automatically for the system with the proposed Calverton Facility). However, many of these overloads are being addressed by LIPA's previously planned system reinforcements out to 2002.

Three lines are overloaded in the base case without the facility. The overloads increase with the facility's addition. They are in LIPA's 2002 re-conductor plan and with their new ratings they will not be overloaded after the proposed facility is built. They are the Brookhaven-Moriches 69 kV line (69-855), the Brookhaven-Moriches 69 kV line and the Brookhaven-William Floyd 69 kV line (69-850).

The Holbrook 138/69 kV transformer #2 can overload, both with and without the facility, for loss of Holbrook transformer #1.Transformer #1 has a summer rating of 240/298/336 MVA, and transformer #2 has a rating of 104/128/150 MVA. This is an existing problem that requires operating one or more of the Holbrook gas turbines (GTs) during peak summer loads. Test cases show that operating the facility at maximum output for select dispatches during summer peak can increase the post-contingency flow through this transformer by up to 12 MVA.

Another line, the Brookhaven-Calverton section of the Brookhaven-Calverton-Riverhead 69 kV line (69-867 and 69-885) has existing post-contingency overloads (as high as 105% of LTE). With the facility, these post-contingency overloads are increased (as high as 112%).

One line section, the Calverton to Riverhead portion of the Brookhaven-Calverton-Riverhead 69 kV line (69-867 and 69-885) had no overloads in the base case, but can experience overloads of up to 106% with the facility in service. LIPA is planning to install additional circuit breakers at Riverhead and Brookhaven that may eliminate the need for an upgrade. Figure 1-3a. Proposed Calverton Facility to Riverhead Substation Interconnection shows the route and configuration of the new or reconductored transmission line.

The other violations found in the thermal analysis are present both with and without the facility, and are not significantly impacted by the proposed facility. Some existing thermal violations are reduced by the facility's addition. There are several existing violations that are reduced by dispatching the facility. It was not determined whether these improvements were the result if adding the proposed facility's generation or an indirect effect of the concomitant reduction in generation at other stations.

3.b.2. Changes in Interface Transfer Limits

Transfer limits are calculated for the East of Holbrook interface and the Con Edison-LIPA interface. For the transfer limit analysis, the power flow base cases were manually adjusted to obtain a transfer level within 5% of the maximum available capacity. The cases are examined for over 400 contingencies. S full alternating current (a.c.) power flow solution was used for each contingency. Line and cable limits were based on current flows, and transformer limits were based on MVA flow. Thus, reactive power flow and off-nominal voltages are taken into account. Due to the complex nature of the LIPA system (i.e., the number of phase angle regulating transformers controlling flow), linear transfer analysis was not used to determine interface limits. The results for the East of Holbrook Interface are shown in Table 1.3.b.2.

Table 1.3.b.2: East of Holbrook Interface Analysis Results

The facility's impacts on the Interface limits would be minimal. The reductions in transfers shown from the addition of the facility are within the margin of error of the study.

The results for modeling the transfer capabilities of the LIPA/Con Edison Interface with and without the addition of the Calverton facility are shown in Table 1.3.b.3 below. As with the East of Holbrook Interface, the facility has no impact on the LIPA/Con Edison Interface.

Table 1.3.b.2: LIPA/Con Edison Interface Analysis Results

Interface Connection	Benchmark System	System w/Facility
Con Edison-LIPA Interface flow (into LIPA)	1096 MW	1093MW
Dunwoodie-Shore Rd (Y50) normal flow	654 MW/1.0 pu	653 MW/1.0 pu
Sprain Brook-East Garden City (Y49) normal flow	651 MW/0.99 pu	648 MW/0.99 pu
Y49 flow for outage of Y50	947 MW/1.05 pu	945 MW/1.05 pu

The LIPA/ISO-NE Interface consists of the Northport 138 kV phase shifter controlled tie and the proposed Cross Sound HVdc project. Combined, there is a total import capability of 530 MW (200 MW from the a.c. cable and 330 MW from the HVdc tie). One light load and two summer peak load cases would be developed with maximum imports from ISO-NE to LIPA. None of the outages tested, with the exception of two extreme contingencies, resulted in overloads on the a.c. tie. The two extreme contingencies that caused overloads on the a.c. cable are loss of Shoreham substation and loss of East Garden City substation. For summer peak conditions with high imports into Long Island, these contingencies resulted in overloads of up to 108% with the facility. Note that these contingencies do not result in loading beyond the cable's STE rating.

Cases tested with reduced flow on the Northport tie did not show any post-contingency overloads associated with LIPA/ISO-NE imports. Loss of the entire Project for all study conditions did not result in overloads on the ISO-NE ties.

The project would not impact the LIPA/ISO-NE interface, or the ability of LIPA to import power over this interface.

Because the Con Edison and ISO-NE interface limits are not significantly impacted, there is no need to perform specific studies of the more distant interfaces beyond those studied in order to conclude that they are unaffected by the facility.

3.c Voltage Analysis

This section evaluates the voltage performance of the system during normal and emergency conditions. The same system configuration, load levels and contingencies are assessed in the voltage analysis as for the thermal study.

The voltage analysis would show that there would be one new voltage violation caused by the addition of the facility. It is the loss of four 138 kV lines and one 138/kV transformer at Ruland Road under peak load/minimum Long Island generation condition.

The outage would result from a bus section fault with a stuck breaker at Ruland Road. LIPA already plans to rebuild this substation with a ring bus configuration prior to the proposed facility's start-up and operation so the contingency will no longer exist.

Details of the voltage analysis are provide in **Table c6 (Appendix C of the Interconnection Study, Appendix w-1).**

3d. Stability Analysis

This section evaluates the transient stability performance of the facility during and after the most severe system disturbances.

Stability analysis depicts the following study conditions:

- Summer peak of 2003
- Summer light load of 2003

Transient stability data sets (power flow cases and machine stability data) representing 2006 peak and light load conditions were developed by Keyspan Energy. These data sets were developed by the NYISO. The power flow data was modified to represent 2003 conditions on Long Island. The system outside of Long Island was not modified. Stability data was collected to model prior generation projects on Long Island, including the HVdc cable project.

When adding the facility and increasing existing generation, all redispatching was assumed to be off Long Island. Generation at Nine Mile Point, the Oswego Complex, and Kintigh would be reduced to accommodate the new Long Island generation. Further, for the peak load cases evaluated, all existing generation East of Holbrook was placed in service at maximum output.

For analysis of the summer peak condition with the facility in service, the East of Holbrook interface would be loaded to 1094 MW (flow from east to west). This represents a loading of 127% of the maximum East of Holbrook interface flow (863 Mw for winter peak conditions, limited by thermal constraints). Without the facility the East of Holbrook interface was loaded to 574 MW.

Stability simulations would be performed representing normally cleared single element faults, generation trip scenarios, stuck breaker faults, bus faults, extreme contingencies, and double circuit tower outages. In total, over 100 stability simulations would run for each of the study cases. For each simulation, line re-closing is modeled where appropriate. All re-closings were simulated as failed events. That is, the line is closed back into the original fault.

The only normally cleared simulations to show instabilities involve loss of either of the Holbrook-Port Jefferson 138 kV lines, initiated with a three-phase fault for summer peak conditions. For these cases one of the Port Jefferson units is radial to the 69 kV system, and loses synchronism. This would occur both in the benchmark summer peak system without the proposed facility, as well as with the facility, when the Port Jefferson generators are at maximum power output (202 MW for Unit 3, and 204 MW for Unit 4). Tests would be run simulating a single-phase fault both with and without the proposed facility. In both cases, the Port Jefferson generators (as well as all units on the system) were stable. Additional tests with reduced output at Port Jefferson (190 MW on each unit) showed a stable response.

The facility does not have any adverse impact on the stability of the Long Island system. At comparable power transfer levels (with and without the facility), the facility will tend to reduce the magnitude of the voltage dips and stabilize the Eastern Long Island system. This would be caused by the relatively high inertia of the Calverton generator, with respect to the existing local generators.

3.e Short Circuit Analysis

This section evaluates the effect of interconnecting the facility on the fault duty levels of individual breakers.

3.e.1. Impact on Fault Current Levels

A short-circuit database would be provided by LIPA to evaluate the impact of the facility on fault current levels in the NYISO system. This database did not model the prior generation requestors in the NYISO queue.

Four data sets were developed from the original short-circuit data. They are:

- G0-A0: Benchmark short circuit case without any additional generation
- G0-A1: Benchmark case with the facility added
- G1-A0: Benchmark case with proposed Keyspan Energy generation projects modeled
- G1-A1: Benchmark case with the facility and Keyspan Energy generation projects

The TransEnergie Cross Sound HVdc project was modeled in all cases as a 1.5 kA current injection at the Shoreham 138 kV bus. This represents the maximum current the converter can deliver.

Three phase (3ϕ), single line to ground (SLG, 1ϕ), and line-line-ground (LLG) faults were simulated at all substations (69 kV and higher) in LIPA. Fault currents were calculated for all lines-in and for all lineout cases. The fault analysis is in three phases. These are described below:

1. Fault calculations for all stations in the study area. Stations where the facility would cause an increase in fault current of 1% or greater were identified.

2. For stations where the facility would cause a 1% or greater increase in fault current, the maximum fault current (the highest of 3ϕ, SLG, and LLG, with all lines in service) would be compared to the lowest circuit breaker rating. If the maximum fault current would exceed the lowest breaker rating further study would be stipulated.

4. All breakers with ratings below the maximum fault current would be examined to determine the highest level of interrupting duty they could be exposed to. Table1.3.d.1 shows the final results of the breaker duty analysis.

A full set of contingencies would also be run on the Con Edison system. The additional generation would have less than 1% on fault currents.

Table 1.3.e.3: Circuit Breakers with Maximum Interrupting Current Exceeded

Station	kV	Circuit Breaker Number	Rating (kA)	G0-A0 Max I	G0-A0 %OL	G0-A1 Max I	G0-A1 %OL	G1-A0 Max I	G1-A0 %OL	G1-A1 Max I	G1-A1 %OL
Pilgrim	138	1310	52.38	---	---	---	---	51.54	---	52.66	0.55
		1320	52.38	---	---	---	---	51.54	---	52.66	0.55
Ruland Road	138	1350	37.8	---	---	---	---	37.7	---	38.2	1.04
Brookhaven	69	6040 (3)	19.60	21.06	7.41	22.60	15.28	21.74	10.89	23.17	18.21
		6040 (1)	19.60	24.29	23.89	24.40	24.46	23.72	21.01	24.83	26.64
Holbrook	69	6020	37.15	36.02	---	37.29	0.37	36.61	---	37.73	1.57
		6030	37.15	36.14	---	37.39	0.66	36.73	---	37.84	1.85
		6040	37.15	36.14	---	37.39	0.66	36.73	---	37.84	1.85
		6060	37.15	35.99	---	37.22	0.19	36.57	---	37.66	1.38
		6070	37.15	35.87	---	37.02	---	36.39	---	37.42	0.72
		6080	37.15	36.62	---	37.88	1.97	37.20	0.14	38.33	3.17
		6090	37.15	37.10	---	38.39	3.33	37.70	1.48	38.85	4.57
		6120	37.32	37.0	---	38.17	2.28	37.56	0.64	38.59	3.42
Riverhead	69	6030	19.66	---	---	---	---	19.04	---	19.73	0.35
		6040	19.66	---	---	---	---	19.04	--	19.73	0.35
Shoreham	69	640	12.38	12.90	4.15	13.19	6.51	13.22	6.75	13.46	8.68

Notes: All fault currents and circuit breaker ratings are listed for 3-Phase faults except Brookhaven 69 kV breaker 6040. (3) show 3ϕ and (1) shows SLG faults currents and ratings. SLG fault current in highest for this breaker. A column with"---" indicates that the fault current does not exceed the breaker rating.

3.e.2 Sensitivity to External Generation

A sensitivity analyses is performed to determine the impact of the proposed new generation in the Con Edison system and in Connecticut that precede the facility in the NYISO and ISO-NE interconnection queues.

Assuming that all additional generation on the LIPA system interconnection queues is constructed, the facility requires that the breakers listed above be upgraded. With those upgrades the facility does not degrade the reliability of the system.

3.f Evaluation of Protective Relays

This section evaluates any protective relay changes that may be necessary. The transmission owners in New York State must have a complete listing of any relay changes that are necessary to the system reliability. Protective relay requirements are limited to installing new equipment at the facility switchyard interconnecting the facility to the adjacent 69 kV LIPA circuits and changes to accommodate the new interconnection at the substations that interconnect directly with those circuits.

3.g Auto-Reclosing

Where auto re-closing is applicable to the facility and interconnection, Calverton must demonstrate that the machines to be used will in all cases withstand high speed auto re-closing.

A shaft torque analysis would calculate the effect of the facility's shafts of a fault and high-speed re-closing. **SEE APPENDIX W-2**

The analysis concludes that the machines to be used will withstand high-speed auto re-closing. Specifically, the report would conclude that the re-closing events produce torques that are only marginally larger than the torques produced for the facility's design criteria.

4. Transmission System Impact Analysis

4.a. Reliability

This section addresses the facility's potential significant impacts on the New York State transmission system reliability. As discussed in Section 3 and detailed in the interconnection study, the facility will not overload the thermal capacity of the lines in the region, nor will it affect stability or short circuits. In addition the torque analysis shows that the proposed generators will withstand high-speed auto re-closing. Furthermore, data shown in the project description show that the proposed turbine system is extremely reliable and thus operation of the facility will improve the general reliability of the electricity supply on Long Island.

4.b. Voltage Stability, Thermal, Short Circuit and Transmission Interface Analyses

This section addresses the requirement of an analysis of the facility's impacts on voltage stability, thermal limitations, short circuit and transmission interface capabilities (total transfer capacity).

Each of these area of study was discussed in summary form in **SECTION 8.3 and in Detail in the Interconnection Study (Appendix W-1`**

4.c. Benefits and Detriments of the Project on Ancillary Services and Electric Transmission System

This section addresses the benefits and detriments of the facility on ancillary services and the electric transmission system, including impacts associated with reinforcements and new construction necessary as a result of the facility.

In order to ensure that the quick start generation east of Holbrook remains available to the interconnected system a set of analyses was performed with all the quick start, East of Holbrook units on line and the facility both on and off. This would not result in overloads in the East-of-Holbrook Interface. The presence of the facility will not interfere with the availability of the quick start generation located east of Holbrook. This demonstrates that these important ancillary service units are unaffected by the addition of the proposed Calverton facility.

The facility will benefit the electric system in several material respects, **AS DETAILED in section 1.2.5.** To summarize, the addition of low cost production in the competitive market will lower production cost for the state without causing transmission-related reliability problems. The addition of modern efficient generation will add to capacity reserves, making the state's electric grid more reliable, reducing the likelihood of power shortages and providing the NYISO greater flexibility to deal with operating contingencies.

Regarding detriments, the only transmission construction required of the facility will be the switchyard and interconnecting lines. A short scheduled transmission outage on each line will be required to interconnect the plant. It is anticipated that the outage will be timed during the spring or fall. Planning and coordination with LIPA will remove concerns about system reliability during the brief outage. In addition, the upgrade to the Calverton-Riverhead 69 kV line avoids detrimental effects to the electric transmission system, and has a very minor impact of its own. These impacts are discussed in Section 5.

5. Transmission Upgrade Environmental Assessment

As shown in Section 3, the Interconnection Study determined that under certain contingencies, the facility would cause the 69kV Calverton-Riverhead line to exceed its capacity, and that this line may need to be upgraded (It has been determined that the

Calverton-Riverhead line becomes loaded as high as 106% of its LTE rating for outages, including loss of both Riverhead-Brookhaven and Riverhead-Wildwood 138kV lines- Contingencies included "Loss of Riverhead Breaker 1350" and contingency no. "75" for summer peak conditions. Without the facility, the line is loaded to 93% of its post-contingency LTE rating. Accordingly, this section addresses potential environmental and land use impacts that could result from the need to upgrade the 69 kV Calverton to Riverhead line. The 69 kV line is currently built with steel davit-arm 100'-tall (and higher) towers, with cable and other equipment capable of accommodating 345 kV in one portion of the route and 138 kV in the other portion of the route. Thus, it appears quite certain, that even if the conductors on this circuit were its limiting factor, transmission tower replacement would not be necessary. Upgrades are likely to involve no work on the circuit, but rather adjustments to the Calverton and Riverhead substations. Because it cannot be presently be determined for certain what activities will be required, the following brief environmental assessment assumes the worst-case impact – that from reconductoring.

5.a. Existing Land Use and Environmental Features

(SEE MAPS FOR DESCRIPTION <u>TO</u> THE CALVERTON TAP)

5. Electric and Magnetic Field Studies

The following section discusses focuses on potential impacts from magnetic fields.

5.a. General Description of Magnetic Fields

Any object with an electric charge on it has a voltage (potential) at its surface and can create an electric grid. When electric charges move together (an electric current), they create a magnetic field. Magnetic fields are one of the basic forces of nature. The strength of a magnetic field depends on the current (higher currents create stronger magnetic fields), the configuration/size of the source, spacing between conductors, and distance from the source (magnetic fields grow weaker as the distance from the source increases).

Magnetic flux densities are reported using units of gauss (G). However, it is usually more convenient to report magnetic fields using the unit milligauss (mG), which is equal to one thousandth of a gauss (i.e., 1mG = 0.001 G). Some technical reports also report magnetic flux densities in the unit of tesla (T) or microtesla (μT; 1 μT = 0.000001 T). The conversion between these units is 1mG = 0.1 μT and 1μT = 10 mG.

Magnetic fields can be static/unchanging in direction

5.b Standards and Criteria

At least two states have adopted engineering-based exposure guidelines or standards ("status quo" standards for magnetic fields. The purpose of most of these exposure standards is to make the field levels from new power lines similar to the field levels from existing lines. Table 5.b.1.presents a summary for these standards. The magnetic fields typically associated with electric substations and underground distribution lines are far lower than these engineering-based standards.

Although there are no federal standards in the United States specifically to limit exposure to 60 Hertz magnetic fields, two organizations have developed exposure guidelines: the International Commission on Non-Ionizing Radiation Protection (ICNIRP)(6) and the American Conference of Governmental Industrial Hygienists (ACGIH)(7). Tables5.b.2.and 5.b.3.present a summary of the magnetic field levels of these guidelines, respectively. The magnetic field levels typically associated with electric substations and underground distribution lines are far lower than these health-based guidelines.

Table: 5.b.2. State Regulations that Limit Magnetic Field Strengths On New Transmission Line Rights-Of-Way (ROW)

State	Magnetic Field Limit
New York	200 mG at edge of ROW (Max Load)[1]
Florida	200 mG for 500 kV lines at edge of ROW (Maximum Load)
	250 mG for double circuit 500 kV lines at edge of ROW (Maximum Load)
	150 mG for 230 kV and smaller lines at edge of ROW (Maximum Row)

Note:[1] The 200 mG standard applies to the edges of defined ROWs for Article VII transmission facilities (transmission lines 100 kV and greater) and where there is no defined ROW, the 200 mG standard is measured at 75 feet from the centerline of the structures supporting the transmission line operating at 345 kV, 60 feet from the centerline of the structures supporting transmission lines operating at 230 kV,and 50 feet from the centerline of structures supporting Article VII circuits operating at a lower voltage.

Table: 5.b.3 Summary of ICNIRP 60 Hz Magnetic Field Exposure Guidelines (International Commission on Non-Ionizing Radiation Protection Guidelines)

Exposure (60Hz)	Magnetic Field
Occupational	
Reference Levels for Time-Varying Fields	4.167 G (4,167mG)
General Public	
Reference Levels for Time-Varying Fields	0.833 G (822mG)

Table: 5.b.4. Summary of ACGGIH 60 Hz Magnetic Field Exposure Guidelines (ACGIH Occupational Threshold Limit Values for 60-Hz EMF)

Exposure (60 Hz)	Magnetic Field
Occupational exposures should not exceed	10 G (10,000mG)
For workers with cardiac pacemakers, the field should not exceed	1 G (1,000mG)

5.c Existing Conditions

Currently, the project site is developed land with existing electric facilities and the surrounding maximum EMFs are well within the permitted range (and well below the maximum fields) produced by a number of household appliances.

5.d. Probable Impacts

With the relatively low voltage from the transformers to the transmission line, maximum EMFs immediately adjacent the transformer in the switchyard would be expected to be in the range of 1 to 35 mG, and maximum fields would be expected to be less than 4 mG at distances of 75 feet or more from the transformer. These values are well within range (and well below the maximum fields) produced by a number of household appliances. More importantly, these are maximum values, long term values will vary depending upon the electrical load, and would be expected to be close to zero within 100 feet.

5.e. EMF and Health

According to the scientific approach used for assessing health effects, conclusions about health are based on the weight of evidence from laboratory and epidemiologic studies. Taken together, this research does not provide evidence that exposure to EMF will have adverse effects on human health or reproduction, compromise normal function, or cause cancer. The consensus of scientists who have reviewed the literature for scientific and regulatory organizations including the International Agency for Research on Cancer (IARC), the National Institute of Environmental Health Sciences (NIEHS), the Health Council of the Netherlands (HCN), the California Department of Health Services (CHDS), and the National Radiological Protection Board of Great Britain (NRPB) is that no cause and effect relationship between EMF and ill health has been established at the levels generally found in residential environments.

With the proposed facility in operation, long-term exposures at receptor locations in the study area are expected to be much the same as they are now. On a long-term basis the increase in EMFs due to the proposed facility and interconnection would be close to zero. Consequently, the proposed facility and interconnection would not be expected to have any adverse health effects.

5.f. Chemicals Used in the Switchyard

The operation of a transformer where it is interconnected to a transmission line involves the use of products and chemical, many of which are common houseold items. LIPA has a program of chemical approval, communication of hazards, and training of employees in the use and hazards of chemicals. LIPA also has programs in place to reduce the use and storage of hazardous chemicals and to deal with spills and other emergencies that may arise.

In facilities, such as the proposed facility, products may be used from time to time for various cleaning, maintenance and repair functions. Many of these items include cleaners such as clear glass window cleaner, Bon-Ami (a general cleaning agent), hand soaps, detergents for washing floors, desk cleaners, and light oils such as Liquid Wrench and WD-40. These agents may be present in the facility in small quantities, i.e., a few 12-ounce cans to 5-gallon containers.

In summary, the quantity of hazardous materials or chemicals that would be used or stored in the facility as a result of the facility is expected to be minimal, if any at all. All such chemicals and materials would be stored and disposed of in accordance with all applicable rules and regulations. As a result, no significant adverse impacts are expected from the use or storage of such chemicals in the proposed facility.

5.g. Construction

Construction and interconnection is expected to take approximately 2 weeks and would utilize, as appropriate, all of the construction-related measures discussed in Section_____ With respect to the Calverton Generating Facility and associated interconnection line.

5.h. Cumulative Impacts

There would be no cumulative effect of the proposed interconnection to the Calverton Generating Facility.

5.i. Conclusion

Based on the above analyses, the proposed interconnection would not have any significant adverse environmental impacts.

LIPA
Long Island Power Authority
Distributed Resource Management
175 E. Old Country Rd, Hicksville, NY 11801

VIA Airborne Express

May 16, 2003

Mr. James A. Heller
President
East Hampton Power & Light
P.O. Box 805
Middle Island, NY 11953

Re: Transmittal of Electric System Impact Study Agreement

Dear Mr. Heller:

Attached you will find an "Electric System Impact Study Agreement" for your East Hampton Power & Light Project. Please complete the required areas and return two signed copies to my attention.

An executed Electric System Impact Study Agreement is required prior to the commencement of any LIPA system interconnection studies or agreements.

In addition, an invoice for $10,000 is enclosed. An initial $10,000 non-refundable payment is due prior to the commencement of any work. Please note, all checks should be made payable to "Long Island Power Authority" and mailed to:

Stephen J. Cantore
175 E. Old Country Rd, 2nd Flr., East Office Bldg.
Hicksville, NY 11801
Attn: Distributed Resource Management

Please feel free to contact me at (516) 545-4820 if you have any questions.

Sincerely,

Stephen J. Cantore, C.E.M., C.C.P.
Senior Engineer

ELECTRIC SYSTEM IMPACT STUDY AGREEMENT

THIS AGREEMENT ("Agreement") dated and effective as of the_______ ______, 2001 ("Effective Date"), is between LONG ISLAND LIGHTING COMPANY D/B/A LIPA ("LIPA"), a New York corporation with offices at 333 Earle Ovington Boulevard, Suite 403, Uniondale, New York 11553, through LIPA's agent KEYSPAN ELECTRIC SERVICES LLC, and ____, a corporation with offices at ___________________________________.

RECITALS

WHEREAS, Long Island Lighting Company d/b/a LIPA is a wholly-owned subsidiary of the Long Island Power Authority (the "Authority"), a corporate municipal instrumentality organized under the laws of the State of New York, and the owner of, with certain limited exceptions, the electric transmission and distribution ("T&D") system of Nassau and Suffolk Counties and on the Rockaway Peninsula in Queens County; and

WHEREAS, effective May 29, 1998, KeySpan Electric Services LLC (the "T&D Manager"), a subsidiary of KeySpan Corporation d/b/a KeySpan Energy ("KeySpan Energy"), became the manager of LIPA's T&D system; and

WHEREAS, ____which develops and acquires power generation and distribution facilities world-wide; and

WHEREAS, ___________ is a wholly-owned subsidiary of___________, a FORTUNE 500 energy company; and

WHEREAS, _____desires LIPA to conduct a System Impact Study (the "Study") relative to the interconnection of a ______ MW generating plant to LIPA's transmission system: _________Substation; and

WHEREAS, LIPA desires to conduct the Study and has authorized the T&D Manager to conduct the Study on behalf of LIPA.

NOW THEREFORE, in consideration of the mutual covenants, terms and conditions herein contained, the parties hereto do hereby covenant and agree as follows:

1. **Study Methodology**

The Study will be conducted under current New York Independent System Operator ("NYISO") planning standards and procedures, as required. A copy of the NYISO procedures will be provided to _______ upon request.

The T&D Manager, on behalf of LIPA, will conduct the Study to evaluate the impact of the proposed interconnection to the LIPA transmission system using an applicable transmission system electrical model. The evaluation may consider the following:

a. Connection Plan
b. Short Circuit's Analysis for the LIPA transmission system
c. Thermal Analysis
d. Voltage Analysis
e. Stability Analysis
b. Miscellaneous planning support (i.e., review of Article X studies)
c. Miscellaneous engineering studies, analysis and support

Analysis will involve using the appropriate transmission system electrical model in a short circuit program to simulate various system contingency situations that may occur, and determining whether system response meets the established criteria considering the prospective interconnection.

The Study will analyze effects of ______'s proposed interconnection on LIPA's transmission system, including facilities which: (i) exist as of the date of this Agreement, (ii) LIPA has previously proposed to construct, and (iii) would have to be constructed in conjunction with generation interconnections that other parties have requested, prior to the date of this Agreement, LIPA to construct or study. The actual effects of ______'s interconnection and the facilities required for that interconnection may differ from the effects and facilities indicated by the Study if a change occurs in the construction plans of LIPA or the interconnection proposal of other parties.

2. **Representative**

All work pertaining to the Study that is the subject of this Agreement will be approved and coordinated only through the designated and authorized representatives of LIPA and/or the T&D Manager, on behalf of LIPA, and_____:

T&D Manager Representative on behalf of LIPA:	____________ Representative:
Richard Zambratto Director, Electric Planning & Forecasting KeySpan Energy 175 East Old Country Road Hicksville, New York 11801 Telephone No.: (516) 545-3235 Facsimile No.: (516) 545-6134	

Each party shall inform the other in writing of changes in representation.

3. Confidential Information

3.1 Non-Disclosure. The T&D Manager and ____ may be required to disclose to each other certain information and materials during the performance of the Study that are proprietary and confidential to LIPA and/or the T&D Manager, if LIPA and/or the T&D Manager is the party disclosing such information, or to_____, if _____ is the party disclosing such information ("Confidential Information"). The parties may each be referred to as the "Receiving Party" when the recipient of Confidential Information, or as the "Disclosing Party" when the discloser of Confidential Information, as the context of this Agreement may require. With respect to any such disclosure, the Receiving Party recognizes that the Confidential Information constitutes special, unique and valuable property of the Disclosing Party, that the Disclosing Party desires to maintain and insure the confidentiality of the Confidential Information, and that the Disclosing Party shall be irreparably harmed if the Confidential Information is made public. Confidential Information transmitted orally shall be so designated by the Disclosing Party as coming under the terms of this Agreement at the time of disclosure and promptly confirmed in writing by the Disclosing Party. Accordingly, all such Confidential Information provided the Receiving Party, either in writing (and so marked as confidential) or orally, directly or indirectly, shall be kept confidential and shall be subject to the following obligations:

a. The Receiving Party shall not use the Confidential Information for the Receiving Party's own use or commercial purposes without the written authorization of the Disclosing Party.

b. The Receiving Party shall not disclose any Confidential Information to any third party without the prior written consent of the Disclosing Party.

c. Any Confidential Information which is made available to the Receiving Party by the Disclosing Party or to which the Receiving Party may have access shall not be copied or duplicated in any form or manner except as may be necessary in furtherance of the purposes of this Agreement and, with all copies thereof, shall be returned to the Disclosing Party upon the request of the Disclosing Party.

d. Such obligations of confidentiality shall not apply to the following:

(i) Confidential information known to the Receiving Party prior to the date of its disclosure to the Receiving Party by the Disclosing Party.

(ii) Confidential Information which is or becomes public or available to the general public other than through any act or default of the Receiving Party.

(iii) Confidential Information obtained from a third party who is in lawful possession of same and who did not acquire same directly or indirectly from the Disclosing Party under an obligation of confidence.

(iv) Confidential Information which is developed independently by the Receiving Party without reliance on the Disclosing Party's disclosure.

(v) Confidential Information required by any court action or administrative or dispute resolution proceeding; provided, however, that the Receiving Party shall (1) promptly notify the Disclosing Party that such disclosure is required, (2) cooperate with the Disclosing Party in having the court or administrative body enter a protective order limiting further disclosure, and (3) provide the Disclosing Party with an opportunity to revise the form of such Confidential Information to minimize its conspicuousness or value to third parties.

(vi) Information provided by ____ that is required to be disclosed pursuant to the New York State Freedom of Information Law. The Authority is a public entity and the Authority and LIPA, a wholly-owned subsidiary of the Authority, are subject to the New York State Freedom of Information Law. Any information that _____ considers confidential and provides to LIPA and/or the T&D Manager pursuant to this Agreement must be clearly designated as such at the time of disclosure.

e. In the event that the Receiving Party shall have knowledge of any breach of the confidentiality of, or of any misappropriation of, any Confidential Information, the Receiving Party shall promptly give notice thereof to the Disclosing Party.

3.2 Additional Data. The parties agree that any and all data, reports, memoranda, drawings, blueprints, or other information that in any way results from the work performed under this Agreement shall be considered proprietary. Such proprietary information shall be the property of the Disclosing Party. The Receiving Party shall return all copies of such proprietary information to the Disclosing Party, upon termination or expiration of this Agreement.

3.3 Survival. The above obligations concerning Confidential Information shall be in effect for a period of two (2) years from the termination or expiration of this Agreement.

4. **Study Duration and Results**

The T& D Manager estimates that it will require twelve (12) months and person-hours of labor to complete the Study. The T&D Manager will use due diligence to complete the Study within such Study period. The projected schedule and staffing requirements are set forth in Appendix A attached hereto, which is hereby incorporated into and made a part of this Agreement. If NYISO requires further analysis of the proposed interconnection in addition to the Study, the T&D Manager will, at _____'s request, perform such additional analysis on the terms and conditions agreed upon by _____ and the T&D Manager, on behalf of LIPA, as set forth in Section 6 of the Agreement.

Upon completion of the Study, the T&D Manager will provide written results to of the Study based on the information provided and developed as a result of this Study.

5. **Method of Compensation for Work Performed**

_____ shall reimburse the T&D Manager, on behalf of LIPA, for actual cost incurred in connection with the Study. Appendix A summarizes the estimated cost based upon the current billing rate of the T&D Manager, on behalf of LIPA, of one hundred forty-five dollars ($145.00) per hour, which includes: (i) the T&D Manager's accommodation billing rate for engineering labor costs and (ii) a corporate overhead rate.

At onset of the Study, _______ shall pay a $10,000 non-refundable deposit (**All payments shall be made payable to "Long Island Power Authority"**). Upon progression of the Study, the T&D Manager, on behalf of LIPA, will invoice for the difference on a monthly basis. _____ shall pay the T&D Manager, on behalf of LIPA, the invoiced amount in full within thirty (30) days of its receipt of the invoice submitted by the T&D Manager. A late payment charge of one and one-half percent (1½ %) per month will be assessed for payments received subsequent to the thirtieth (30^{th}) day following the date of the receipt of the invoice.

6. **Changes in Study Requirements and Cost Estimates, and Termination Obligations**

The cost estimates set forth in Appendix A relate to the Study as described in Section 1 above. If additional analysis is required, the T&D Manager will notify in writing of the scope and estimated cost of such additional analysis prior to the performance of the additional analysis. The T&D Manager will proceed promptly with the additional analysis upon _____'s authorization of and agreement to pay for such additional analysis. If ____ fails to provide such authorization and agreement within fifteen (15) days of receipt of the T&D Manager's notice, the T&D Manager shall complete the study to the best of its ability without performing such additional analysis or at____'s option, this Agreement may be terminated upon the T&D Manager's receipt of written notice of termination from KPE.

In the event that this Agreement is terminated for any reason, the T&D Manager , on behalf of LIPA, shall invoice ____ for all work performed prior to the date of the T&D Manager's receipt of written notice of termination from___. ____ shall pay the T&D Manager, on behalf of LIPA, the invoiced amount as set forth in Section 5 of this Agreement.

7. **Interconnection or Wheeling Rights**

Nothing in this Agreement shall be interpreted to give _____ rights to wheel over or interconnect with LIPA's transmission or distribution system. Such rights shall be established by separate agreement and in accordance with LIPA's open access transmission tariffs and the NYISO. Neither does LIPA and/or the T&D Manager guarantee that the execution of this Agreement will establish____ 's priority with respect to interconnection with the LIPA transmission system, which priority shall be established in accordance with applicable regulatory requirements.

8. **Use of Study Results**

_____ acknowledges and accepts that the written results of the Study discussed in Section 4 of this Agreement will be listed on LIPA's Open Access Same-time Information System (OASIS), and a copy of the Study results must be made publicly available at cost as required by the Federal Energy Regulatory Commission ("FERC").

The Study results will be used as a reference for future System Impact Studies, as required by FERC.

9. **Creditworthiness**

For the purpose of determining the ability of ____ to meet its obligations related to the service hereunder, LIPA and/or the T&D Manager may require reasonable credit review procedures. This review shall be made in accordance with standard commercial practice.

10. **Breach**

Either party may, upon giving thirty (30) days' written notice identifying specifically the basis for such notice, terminate this Agreement unless the party receiving the notice cures such breach within the thirty (30) day period.

11. **Term**

This Agreement will remain in full force and effect for a period of one (1) year from its Effective Date, unless sooner terminated pursuant to this Agreement. The parties may, however, extend the term of this Agreement by mutual written consent, signed by duly authorized representatives of the parties. ____ may terminate this Agreement by thirty (30) days' written notice except as is otherwise provided herein.

12. **Indemnification**

Each party shall indemnify, defend and hold harmless the other party, its subsidiaries and affiliates and their officers, directors, employees, principals (partners, shareholders or holders of an ownership interest, as the case may be) and agents, from and against any and all claims, demands, loss, damage or expense, including those relating to bodily injury or death of any person or damage to real and/or tangible personal property, directly caused by and to the extent of the negligence or willful misconduct of the indemnifying party, its employees or agents in connection with the performance of the Study.

The obligations set forth in this Section 12 shall survive the expiration or termination of this Agreement.

13. **Limitation of Liability**

The limit of LIPA's and/or the T&D Manager's liability (whether in contract, tort, negligence, strict liability in tort or by statute or otherwise) to ___ or to any third party under this Agreement and in connection with the Study, for any and all claims, shall not in the aggregate exceed the fees and expenses paid or payable by to the LIPA designated manager on behalf of LIPA.

The parties shall not be liable to each other for incidental or consequential damages of any kind based on any theory of action including breach of warranty, breach of contract, strict liability, or negligence arising out of performance under this Agreement.

The obligations set forth in this Section 13 shall survive the expiration or termination of this Agreement.

14. **Assignment**

_____ may not assign, transfer, or otherwise dispose of this Agreement, or of its rights or interests therein, or its power to execute such Agreement to any person, company, partnership, or corporation, without the prior written consent of LIPA or the T&D Manager.

15. **Binding Effect**

This Agreement inures to the benefit of and is binding upon the parties and their respective permitted successors and assigns; provided however, that this Agreement will not bind either party until executed by a duly authorized signatory of each party.

16. **Governing Law**

This Agreement is made in, and shall be interpreted, construed, governed, and enforced in accordance with the laws of the State of New York. Any action arising out of or relating to this Agreement shall be brought in the New York State Supreme Court, Nassau or Suffolk Counties, or United States District Court for the Eastern District of New York.

17. **Severability**

If any word, phrase, clause, article, or other provision of this Agreement is adjudicated or found to be unenforceable, then said word, phrase, clause, article, or other provision shall be deleted or modified, as necessary, to render all the remainder of this Agreement valid and enforceable. All such deletions or modifications shall be the minimum necessary to effect the foregoing.

18. **Force Majeure**

Any failure of performance by either party under this Agreement, except the obligation to make payments hereunder, shall not constitute default hereunder if, and to the extent, caused by force majeure which is defined to be occurrences beyond the party's reasonable control including but not limited to acts of governmental authority, acts of God, strikes, or other concerted acts of workers, fires, floods, explosions, riots, war, rebellion, insurrection, sabotage, and non-cooperation of customers. In the event of any such delay, the time of performance shall be extended for a period reasonably required to recover for the time lost by reason of the force majeure.

19. **Several Obligations**

Except where specifically stated in this Agreement to be otherwise, the duties, obligations, and liabilities of the parties are intended to be several and not joint or collective. Nothing contained in this Agreement shall be construed to create an association, trust, partnership, or joint venture or impose a trust or partnership duty, obligation, or liability on or with regard to either party. Each party shall be individually and severally liable for its own obligations under this Agreement.

20. **Notices**

Any notice, consent, authorization, determination, or other communication required or permitted to be given or made pursuant to this Agreement shall be in writing and shall be sufficiently given or made if:

20.1 Mailed by U.S. certified or registered mail, postage prepaid, return-receipt requested; or

20.2 Telecopied to the facsimile number set forth below and followed by a copy delivered in accordance with Section 20.1 or 20.3; or

20.3 Delivered by nationally recognized express or overnight courier.

Notices shall be sent as follows:

If to_____, addressed to it at:

If to T&D Manager, on behalf of LIPA, addressed to it at:

KeySpan Energy
on behalf of
LIPA
175 East Old Country Road
Hicksville, New York 11801
Attention: Madison N. Milhous
Manager, Electric System Planning
Facsimile: (516) 545-6134

If to LIPA, addressed to it at:
LIPA
333 Earle Ovington Boulevard, Suite 403
Uniondale, New York 11553
Attention: Office of General Counsel
Facsimile: (516) 222-9137

Notices shall be deemed effective when received. The parties may designate a different notice destination by written notice to the other parties given in accordance herewith.

21. **Entire Agreement**

This Agreement, together with all Appendices attached hereto and referenced herein, constitutes the entire agreement between the parties with respect to the subject matter hereof. No promises, agreements, or warranties additional to this Agreement will be deemed to be a part hereof, nor will any alteration, amendment, or modification hereof be effective unless confirmed in writing by the duly authorized representatives of each party.

22. **Prior Agreements**

This Agreement shall completely and fully supersede all other prior understandings or agreements, both written and oral, between the parties relating to the subject matter hereof.

23. **No Waiver**

No delay or omission in the exercise of any right under this Agreement will impair any such right or will be taken, construed or considered as a waiver or relinquishment thereof, but any such right may be exercised from time to time and as often as may be deemed expedient. If any of the terms and conditions are breached and thereafter waived, such waiver will be limited to the particular breach so waived, and will not be deemed to be a waiver of any other breach under this Agreement.

24. **Corporate Authorization**

LIPA and ______ hereby represent and warrant that this Agreement is legally binding and if ______ is incorporated, that the respective officers executing this Agreement have been duly authorized to do so.

25. **Article Titles**

The article headings or titles hereon are for purpose of convenience only, and do not form a part of this Agreement and shall not be taken to qualify, explain or affect any provision hereof.

IN WITNESS WHEREOF, the parties hereto have each caused this Agreement to be executed by its duly authorized representative effective as of the day and the year first above written.

KEYSPAN ELECTRIC SERVICES LLC
ON BEHALF OF
LONG ISLAND LIGHTING COMPANY
D/B/A
LIPA

By: ______________________	By: ______________________
(Signature)	(Signature)
Name: ______________________	Name: ______________________
(Print)	(Print)
Title: ______________________	Title: ______________________
Date: ______________________	Date: ______________________

APPENDIX A
Projected Study Schedule, Staffing Requirements and Costs

Approximately 69 Person-hours @ $145.00/Hr.

LONG ISLAND LIGHTING COMPANY d/b/a LIPA
PARALLEL GENERATION AGREEMENT (PGA)
FOR INTERCONNECTION OF NEW DISTRIBUTED GENERATION UNITS
WITH CAPACITY OF 300 kVA OR LESS TO BE OPERATED IN PARALLEL
WITH RADIAL DISTRIBUTION LINES

Customer Information:

Name:
Address: ____________________

____

____

Telephone: (___)

LIPA Information:

LIPA
175 East Old Country Road
Hicksville, New York 11801
Attn: Distributed Resource Management

DEFINITIONS

Dedicated Facilities- means the equipment and facilities on LIPA's system necessary to permit operation of the Unit in parallel with LIPA's system.

SIR or Interconnection Requirements means the LIPA Interconnection Requirements for New Distributed Generation Units with a Capacity of 300 kVA or Less to be Operated in Parallel with Radial Distribution Lines.

Unit- means the distributed generation unit with a nameplate capacity of 300 kVA or less located on the Customer's premises at the time LIPA approves such unit for operation in parallel with LIPA's system. This Agreement relates only to such Unit, but a new agreement shall not be required if the Customer makes physical alterations to the Unit that do not result in (1) an increase in its nameplate generating capacity or (2) noncompliance with Interconnection Requirements. The nameplate generating capacity of the Unit shall not exceed 300 kVA.

I. TERM AND TERMINATION

1.1 Term: This Agreement shall become effective when executed by both Parties and shall continue in effect until terminated.

1.2 Termination: This Agreement may be terminated as follows:

a. The Customer may terminate this Agreement at any time, by giving LIPA sixty (60) days written notice.

b. Failure by the Customer to seek final acceptance by LIPA within twelve (12) months after the execution of this Agreement unless LIPA consents in writing to an extension. LIPA's consent to such extension shall not be unreasonably withheld or delayed.

c. Either Party may, by giving the other Party at least sixty (60) days prior written notice, terminate this Agreement in the event that the other Party is in default of any of the material terms and conditions of this Agreement. The terminating Party shall specify in the notice the basis for the termination and shall provide a reasonable opportunity to cure the default.

d. LIPA may, by giving the Customer at least sixty (60) days prior written notice, terminate this Agreement for cause. The Customer's noncompliance with an upgrade to the SIR shall constitute good cause.

1.3 Disconnection and Survival of Obligations: Upon termination of this Agreement the Unit will be disconnected from LIPA's system. The termination of this Agreement shall not relieve either Party of its liabilities and obligations, owed or continuing at the time of the termination.

1.4 Suspension: This Agreement will be suspended during any period in which the Customer is not eligible for delivery service from LIPA.

II. SCOPE OF AGREEMENT

2.1 Scope of Agreement: This Agreement relates solely to the conditions under which LIPA and the Customer agree that the Unit may be interconnected to and operated in parallel with LIPA's system. This Agreement is subject in all respects to the applicable provisions of LIPA'sTariff for Electric Service (Tariff) and any amendments thereof, and to the rates, charges, rules, regulations, and conditions therein set forth, as the same may be in effect from time to time, all of which are hereby referenced and made a part hereof. LIPA's Tariff for Electric Service may be examined by the Customer at any business office of LIPA. The furnishing of service to the Customer will be subject in all respects to lawful orders, rules, or regulations of the Long Island Power Authority or of any other governmental body having jurisdiction, and LIPA will not be liable for any inconvenience or damage to the Customer from the discontinuance or change of any of LIPA's facilities or the service therewith if such discontinuance or change be required by law or by lawful order, rule, or regulation of any governmental body, by any amendments to the Tariff for Electric Service or to maintain the safety or reliability of LIPA's system. The provisions of LIPA's Tariff for Electric Service pertaining to its liability for any loss, injury, casualty or damage of any kind are specifically incorporated by reference into this Agreement and are made a part hereof. All disputes arising out of this Agreement will be presented to the Long Island Power Authority for resolution in accordance with the complaint procedures set forth in LIPA's Tariff for Electric Service.

2.2 Electricity Not Covered: LIPA shall have no duty under this Agreement to account for, pay for, deliver, or return in kind any electricity produced by the Unit and delivered into LIPA's System.

III INSTALLATION, OPERATION AND MAINTENANCE OF UNIT

3.1 Compliance with SIR: Subject to the provisions of this Agreement, LIPA shall be required to interconnect the Unit to LIPA's system, for purposes of parallel operation, if LIPA accepts the Unit as in compliance with the SIR. The Customer shall have a continuing obligation to maintain and operate the Unit in compliance with the SIR, as modified or amended.

3.2 Observation of the Unit - Construction Phase: LIPA may, in its discretion and upon reasonable notice, conduct reasonable on-site verifications during the construction of the Unit. Whenever LIPA chooses to exercise its right to conduct observations herein it shall specify to the Customer its reasons for its decision to conduct the observation.

3.3 Observation of the Unit - Fourteen-day Period: LIPA may conduct onsite verifications of the Unit or observe the performance of verification testing within a reasonable period of time, not exceeding fourteen days, after receiving a written request from the Customer to begin producing energy in parallel with LIPA's system. LIPA may accept or reject the request to begin producing energy in parallel with LIPA's system, consistent with the SIR, based upon the verification test results.

3.4 Observation of the Unit - Post-Fourteen-day Period: If LIPA does not perform an on-site verification of the Unit or observe the performance of verification testing within the fourteen-day period, the Customer may begin to produce energy in parallel with LIPA's system after certifying to LIPA that the Unit has been tested in accordance with the verification testing requirements of the SIR and has successfully completed such tests. After receiving the certification, LIPA may conduct an on-site verification of the Unit and make reasonable inquiries of the Customer, but only for purposes of determining whether the verification tests were properly performed. The Customer shall not be required to perform the verification tests a second time, unless irregularities appear in the verification test report or there are other objective indications that the tests were not properly performed in the first instance.

3.5 Observation of the Unit - Operations: LIPA may conduct on-site verification of the operations of the Unit after the Unit commences parallel operations with the LIPA system if LIPA has a reasonable basis for doing so based on its responsibility to provide continuous and reliable service or as authorized by the provisions of LIPA's Tariff relating to the verification of customer installations generally.

3.6 Costs of Dedicated Facilities: During the term of this Agreement, LIPA shall design, construct and install the Dedicated Facilities. The Customer shall be responsible for paying the incremental capital cost of such Dedicated Facilities attributable to operating the Customer's Unit in parallel with the LIPA system. All costs associated with the operation and maintenance of the Dedicated Facilities after the Unit first produces energy in parallel with the LIPA system shall be the responsibility of LIPA.

V. DISCONNECTION OF THE UNIT

4.1 Emergency Disconnection: LIPA may disconnect the Unit, without prior notice to the Customer (a) to eliminate conditions that constitute a potential hazard to LIPA personnel or the general public; (b) if pre-emergency or emergency conditions exist on LIPA system; (c) if a hazardous condition relating to the Unit is observed by a LIPA inspection; or (d) if the Customer has tampered with any protective device required for parallel operation under the SIR. LIPA shall notify the Customer of the emergency if circumstances permit.

4.2 Non-Emergency Disconnection: LIPA may disconnect the Unit, after notice to the Customer has been provided and a reasonable time to correct, consistent with the conditions, has elapsed, if (a) the Customer has failed to make available records of verification tests and maintenance of its protective devices; (b) the Unit interferes with LIPA system or equipment belonging to other customers of LIPA; (c) the Unit adversely affects the quality of service of adjoining LIPA customers.

4.3 Disconnection by Customer: The Customer may disconnect the Unit at any time.

V. ACCESS

5.1 Access to Premises: LIPA shall have access, at all times, to the disconnect switch of the Unit which isolates the Unit from the LIPA system. At reasonable hours and upon reasonable notice consistent with Section III of this Agreement, or at any time without notice in the event of an emergency (as defined in paragraph 4.1), LIPA shall have access to the Unit.

5.2 LIPA and Customer Representatives: LIPA shall designate, and shall provide to the Customer, the name and telephone number of a representative or representatives who can be reached at all times to allow the Customer to report an emergency. For the purpose of allowing access to the Unit, the Customer shall provide LIPA with the name and telephone number of a person or persons responsible for providing access to the Unit.

5.3 LIPA Right to Access LIPA-Owned Facilities and Equipment: If necessary for the purposes of this Agreement, the Customer shall allow LIPA access to LIPA's equipment and facilities located on Customer's property. To the extent that the Customer does not own all or any part of the property on which LIPA is required to locate its equipment or facilities to serve the Customer under this Agreement, the Customer shall secure and provide in favor of LIPA the necessary rights to obtain access to such equipment or facilities, including easements if the circumstances so require.

VI DISPUTE RESOLUTION

6.1 Good Faith Resolution of Disputes: Each Party agrees to attempt to resolve all disputes arising hereunder promptly, equitably and in a good faith manner.

6.2 Mediation: If a Customer complaint arises under this Agreement, the parties agree to comply with the Complaint Procedures of LIPA's Tariff.

6.3 Escrow: If there are amounts in dispute of more than two thousand dollars ($2,000), the Customer shall either place such disputed amounts into an independent escrow account pending final resolution of the dispute in question, or provide to LIPA an appropriate irrevocable standby letter of credit in lieu thereof.

VII. INSURANCE

7.1 Disclosure: The Customer is not required to provide general liability insurance coverage as part of this Agreement, the SIR, or any other LIPA requirement. Due to the risk of incurring damages, LIPA recommends that every distributed generation customer protect itself with insurance, and requires insurance disclosure as a part of this Agreement. The Customer hereby discloses as follows:

(Note: Check off one of the boxes below.)

[ ] the Customer has obtained, or already has in effect under an existing policy, general liability insurance coverage for operation of the Unit and intends to maintain such coverage for the duration of this Agreement (attach Certificate of Insurance or copy of Policy); or

[ ] the Customer has not obtained general liability insurance coverage for operation of the Unit and/or is self-insured.

7.2 Effect: By not requiring the Customer to provide general liability insurance coverage for operation of the Unit in parallel with the LIPA system, LIPA does not waive any rights LIPA may have to pursue remedies at law against the Customer to recover damages.

VIII. MISCELLANEOUS PROVISIONS

8.1 Third Parties: This Agreement is intended solely for the benefit of the parties hereto. Nothing in this Agreement shall be construed to create any duty to, or standard of care with reference to, or any liability to, any person not a party to this Agreement.

8.2 Severability: If any provision or portion of this Agreement shall for any reason be held or adjudged to be invalid or illegal or unenforceable by any court of competent jurisdiction, such portion or provision shall be deemed separate and independent, and the remainder of this Agreement shall remain in full force and effect.

8.3 Entire Agreement: This Agreement constitutes the entire Agreement between the parties and supersedes all prior agreements or understandings, whether verbal or written.

8.4 Waiver: No delay or omission in the exercise of any right under this Agreement shall impair any such right or shall be taken, construed or considered as a waiver or relinquishment thereof, but any such right may be exercised from time to time and as often as may be deemed expedient. In the event that any agreement or covenant herein shall be breached and thereafter waived, such waiver shall be limited to the particular breach so waived and shall not be deemed to waive any other breach hereunder.

8.5 Applicable Law: This Agreement shall be governed by and construed in accordance with the law of the State of New York.

8.6 Amendments: This Agreement shall not be amended unless the amendments is in writing and signed by LIPA and the Customer.

8.7 Force Majeure: For purposes of this Agreement, "Force Majeure Event means any event: (a) that is beyond the reasonable control of the affected Party; and (b) that the affected Party is unable to prevent or provide against by exercising reasonable diligence, including the following events or circumstances, but only to the extent they satisfy the preceding requirements: acts of war, public disorder, insurrection, or rebellion; floods, hurricanes, earthquakes, lightning, storms, and other natural calamities; explosions or fires; strikes, work stoppages, or labor disputes; embargoes; and sabotage. If a Force Majeure Event prevents a Party from fulfilling any obligations under this Agreement, such Party will promptly notify the other Party in writing, and will keep the other Party informed on a continuing basis of the scope and duration of the Force Majeure Event. The affected Party will specify in reasonable detail the circumstances of the Force Majeure Event, its expected duration, and the steps that the affected Party is taking to mitigate the effects of the event on its performance. The affected Party will be entitled to suspend or modify its performance of obligations under this Agreement, other than the obligation to make payments then due or becoming due under this Agreement, but only to the extent that the effect of the Force Majeure Event cannot be mitigated by the use of reasonable efforts. The affected Party will use reasonable efforts to resume its performance as soon as possible.

8.8 Assignment to Corporate Party: At any time during the term, the Customer may assign this Agreement to a corporation or other entity with limited liability, provided that the Customer obtains the prior written consent of LIPA and the assignee agrees in writing to be bound by the terms of this Agreement. Such consent will not be withheld unless LIPA can demonstrate that such proposed assignee is not reasonably capable of performing the obligations of the assigning Customer under this Agreement.

8.9 Assignment to Individuals: At any time during the term, upon prior written notice to LIPA, a Customer may assign this Agreement to another person, other than a corporation or other entity with limited liability, provided that the assignee is the owner, lessee, or is otherwise responsible for the Unit and agrees in writing to be bound by the terms of this Agreement.

8.10 Permits and Approvals: Customer shall obtain all environmental and other permits lawfully required by governmental authorities prior to the construction and for the operation of the Unit in parallel with the LIPA system during the term of this Agreement.

8.11 Limitation of Liability: Neither by inspection, if any, or non-rejection, nor in any other way, does LIPA give any warranty, express or implied, as to the adequacy, safety, or other characteristics of any structures, equipment, wires, appliances or devices owned, installed or maintained by the Customer or leased by the Customer from third parties, including without limitation the Unit and any structures, equipment, wires, appliances or devices appurtenant thereto.

ACCEPTED AND AGREED:

Customer	**KEYSPAN ELECTRIC SERVICES LLC on behalf of Long Island Lighting Company d/b/a LIPA**
By:____________________	By:
Name:____________________	Name:
Title:____________________	Title:
Date:____________________	Date:

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LONG ISLAND POWER AUTHORITY APPLICATION FOR SINGLE PHASE ATTACHMENT OF PARALLEL DISTRIBUTED GENERATION EQUIPMENT 15 kVA OR SMALLER

Customer:

Name: ______________________________ **Phone:** ( ) ______________

Address: ____________________________ **Municipality:** ______________

Consulting Engineer or Contractor:

Name: ______________________________ **Phone:** ( ) ______________

Address: ____________________________

Estimated In-Service Date: ______________________________

Existing Electric Service:

Capacity: ______________ **Amperes** **Voltage:** ______________ **Volts**

Service Charter: ( ) **Single Phase** ( ) **Three Phase**

Location of Protective Interface Equipment on Property:
(include address if different from customer address)

____

Energy Producing Equipment/Inverter Information:

Manufacturer: ____

Model No. ____

( ) **Synchronous** ( ) **Induction** ( ) **Inverter** ( ) **Other** __________

Rating: ______________ **kW** **Rating:** ____________________ **kVA**

Generator Connection: ( ) **Delta** ( ) **Wye** ( ) **Wye Grounded**

Interconnection Voltage: ____________________ **Volts**

System Type Tested (Total System): ( ) **Yes** ( ) **No; attach product literature**

Equipment Type Tested (i.e. Inverter, Protection System):
( ) **Yes** ( ) **No; attach product literature**

Signature:

______________________ ________________ ________________
CUSTOMER SIGNATURE **TITLE** **DATE**

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LONG ISLAND POWER AUTHORITY APPLICATION
FOR ATTACHMENT OF PARALLEL DISTRIBUTED GENERATION EQUIPMENT
GREATER THAN 15 kVA BUT NOT EXCEEDING 300 kVA

Customer:

Name: ______________________________ Phone: (__) ______________

Address: ____________________________ Municipality: ______________

Consulting Engineer or Contractor:

Name: ______________________________ Phone: (__) ______________

Address: ____________________________

Estimated In-Service Date: ______________________________

Existing Electric Service:

Capacity: ______________ Amperes Voltage: ______________ Volts

Service Charter: ( ) Single Phase ( ) Three Phase

Secondary 3 Phase Transformer Connection ( ) Wye ( ) Delta

Location of Protective Interface Equipment on Property:
(include address if different from customer address)

____

Energy Producing Equipment/Inverter Information:

Manufacturer: ____
Model No. ____
( ) Synchronous ( ) Induction ( ) Inverter ( ) Other _________
Rating: ______________ kW Rating: ____________________ kVA
Rated Output: _________ VA Rated Voltage: _______ Volts
Rate Frequency: _____ Hertz Rated Speed: ______ RPM
Efficiency: ______% Power Factor: ______%
Rated Current: _____ Amps Locked Rotor Current: ____ Amps
Synchronous Speed: _____ RPM Winding Connection:
Min. Operating Freq./Time:
Generator Connection: ( ) Delta ( ) Wye ( ) Wye Grounded
System Type Tested (Total System): ( ) Yes ( ) No; attach product literature
Equipment Type Tested (i.e. Inverter, Protection System):
( ) Yes ( ) No; attach product literature
One Line Diagram attached: ( ) Yes
Installation Test Plan attached: ( ) Yes

For Synchronous Machines:

Submit copies of the Saturation Curve and the Vee Curve
( ) Salient ( ) Non-Salient
Torque: ________lb-ft Rated RPM: __________
Field Amperes: ___________ at rated generator voltage and
current and _____% PF over-exciter
Type of Exciter: ______________________________________
Output Power of Exciter: ______________________________
Type of Voltage Regulator: _____________________________
Direct-axis Synchronous Reactance (X_d) ________ ohms
Direct-axis Transient Reactance (X_d) ________ ohms
Direct-axis Sub-transient Reactance(X_d) ________ ohms

For Induction Machines:

Rotor Resistance (R_r) _______ ohms
Rotor Reactance (R_r) _______ ohms
Magnetizing Reactance (X_m) ______ ohms
Stator Resistance (R_s) _______ ohms
Stator Reactance (X_s) _______ ohms
Shore Circuit Reactance ($X@_d$) _______ ohms Phases:
Frame Size: ______________________

Exciting Current _____ Amps
Reactive Power Required:
____ VARs (No Load)
____ VARs (Full Load)

Design Letter: _________ ( ) Single
( ) Three-Phase

Temp. Rise: ____________________ °C.

For Inverters:

Manufacturer: ___________________ Model:
Type: _________________ ( ) Forced Commutated ( ) Line Commutated
Rated Output: _____ Amps _____ Volts
Efficiency: ________%

Signature:

CUSTOMER SIGNATURE	**TITLE**	**DATE**

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New York State Public Service Commission

New York State Standardized/Interconnection Requirements

For Distributed Generators 300 Kilovolt-Amperes or Less Connected In Parallel With Radial Distribution Lines

- Standardized Interconnection Requirements (120 kb)
- Type Tested and Approved Equipment (20 kb)

Type Testing Certification Checklist

- MS Word Format
- Editable - PDF Format (103 kb) **(Please fill in the form fields before printing)**

Staff Contact
Charles Puglisi (518) 486-2899

Alternate Contact
Michael Worden (518) 486-2498

New York State Department of Public Service Commission

This page (http://www.dps.state.ny.us/distgen.htm)
was last modified: ***November 12, 2002***
Questions regarding this service? web_questions.html
Need info on filing a complaint against a utility? Complaint Dept.
Want to comment on utility issues? PSC Comment Form

PSC Home Page

New York State
Standardized Interconnection Requirements and Application Process for New Distributed Generators 300 kVA or Less Connected in Parallel with Radial Distribution Lines

New York State
Public Service Commission
Revised: October 23, 2002

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I. Application Process

Application Process for the Interconnection of New Distributed Generation Units of 300 kVA or Less Connected to Radial Distribution Lines

A. Introduction

This section provides a framework for processing applications to:

- interconnect new distributed generation facilities with a nameplate rating of 300 kVA or less [aggregated on the customer side of the point of common coupling[1] (PCC)] connected in parallel to radial distribution feeders.[2]

- review any modifications affecting the interface at the PCC to existing distributed generation facilities with a nameplate rating of 300 kVA or less (aggregated on the customer side of the PCC) that have been interconnected to the utility radial distribution system and where an existing contract between the applicant and the utility is in place.

Generation neither designed to operate, nor operating, in parallel with the utility's electrical system is not subject to these requirements. This section will ensure that applicants are aware of the technical interconnection requirements and utility interconnection policies and practices. This section will also provide applicants with an understanding of the process and information required to allow utilities to review and accept the applicants' equipment for interconnection in a reasonable and expeditious manner.

The time required to complete the process will reflect the complexity of the proposed project. Projects using previously submitted designs that have been satisfactorily type-tested[3] will move through the process more quickly, and several steps may be satisfied with an initial application depending on the detail and completeness of the application and supporting documentation submitted by the applicant. Applicants submitting type-tested systems, however, are not exempt from providing utilities with complete design packages necessary for the utilities to verify the electrical characteristics of the generator systems, the interconnecting facilities, and the impacts of the applicants' equipment on the utilities' systems.

The application process and the attendant services must be offered on a non-discriminatory basis. The utilities must clearly identify their costs related to the applicants' interconnections, specifically those costs the utilities would not have incurred but for the applicants' interconnections. The utilities will keep a log of all applications, milestones met, and

[1] See Section III: Glossary of Terms for definition.
[2] Ibid.
[3] Ibid.

justifications for application-specific requirements. The applicants are to be responsible for payment of the utilities' costs, as provided for herein.

Staff of the Department of Public Service (Staff) will monitor the application process to ensure that applications are addressed in a timely manner. To perform this monitoring function, Staff will meet periodically with utility and applicant representatives.

B. Application Process Steps

STEP 1: Initial Communication from the Potential Applicant.

Communication could range from a general inquiry to a completed application.

STEP 2: The Inquiry is Reviewed by the Utility to Determine the Nature of the Project.

Technical staff from the utility discusses the scope of the project with the potential applicant (either by phone or in person) to determine what specific information and documents (such as an application, contract, technical requirements, specifications, listing of qualified type-tested equipment/systems, application fee information, applicable rate schedules, and metering requirements) will be provided to the potential applicant. The preliminary technical feasibility of the project at the proposed location may also be discussed at this time. All such information and a copy of the standardized interconnection requirements must be sent to the applicant within three (3) business days following the initial communication from the potential applicant, unless the potential applicant indicates otherwise. A utility representative will serve as the single point of contact for the applicant (unless the utility informs the applicant otherwise) in coordinating the potential applicant's project with the utility.

STEP 3: Potential Applicant Files an Application.

The potential applicant submits an application to the utility. The submittal must include the completed standard application form and, for systems with a contractual total aggregate nameplate rating exceeding 15 kVA, a non-refundable $350 application fee. (If the applicant proceeds with the project to completion, the application fee will be applied as a payment to the utility's total cost for interconnection, including the cost of processing the application.) Within five (5) business days of receiving the application, the utility will notify the applicant of receipt and whether the application has been completed adequately. It is in the best interest of the applicant to provide the utility with all pertinent technical information as early as possible in the process. If the required documentation is presented in this step, it will allow the utility to perform the required reviews and allow the process to proceed as expeditiously as possible.

STEP 4: Utility Conducts a Preliminary Review and Develops a Cost Estimate for the Coordinated Electric System Interconnection Review (CESIR).

The utility conducts a preliminary review[4] of the proposed system interconnection. Upon completion of the preliminary review, the utility will inform the applicant as to whether the proposed interconnection is viable or not, and provide the applicant with an estimate of costs associated with the completion of the CESIR. The preliminary review shall be completed and a written response detailing the outcome of the preliminary review shall be sent to the applicant within five business days.

For systems of 15 kVA or less, no costs may be charged by the utility to the applicant for completion of the Preliminary Review or the CESIR.

STEP 5: Customer-Generator Commits to the Completion of the CESIR

Prior to commencement of the CESIR, the applicant shall provide the following information to the utility:

- a complete detailed interconnection design package,
- the name and phone number of the individual(s) responsible for addressing technical and contractual questions regarding the proposed system, and
- if applicable, advanced payment of the costs associated with the completion of the CESIR

The complete detailed interconnection design package shall include:

(1) Electrical schematic drawing(s) reflecting the complete proposed system design which are easily interpreted and of a quality necessary for a full interconnection. The drawings shall show all electrical components proposed for the installation, and their connections to the existing on-site electrical system from that point to the PCC .

(2) A complete listing of all interconnection devices proposed for use at the PCC. A set of specifications for this equipment shall be provided upon request from the utility.

(3) The written verification test procedure provided by the equipment manufacturer, if such procedure is required by this document.

[4] See Section III: Glossary of Terms for definition.

STEP 6: Utility Completes the CESIR

The CESIR will consist of two parts:

(1) a review of the impacts to the utility system associated with the interconnection of the proposed system, and

(2) a review of the proposed system's compliance with the applicable criteria set forth below.

A CESIR will be performed by the utility to determine if the proposed generation on the circuit results in any relay coordination, fault current, and/or voltage regulation problems. A full CESIR may not be needed if the aggregate generation is less than: 50 kVA on a single-phase branch of a radial distribution circuit; or 150 kVA on a single distribution feeder.

The CESIR shall be completed within 4 weeks (20 business days) of receipt of the information set forth in Step 5 for systems of 15 kVA or less and within 8 weeks (40 business days) for systems larger than 15 kVA. For systems utilizing type-tested equipment, the time required to complete the CESIR may be reduced.

Upon completion of the CESIR, the utility will provide the applicant, in writing, the following:

(1) utility system impacts, if any;

(2) notification of whether the proposed system meets the applicable criteria considered in the CESIR process;

(3) if applicable, a description of where the proposed system is not in compliance with these requirements;

(4) a good faith, detailed estimate of the total cost of completion of the interconnection of the proposed system. Such estimate will include, but not be limited to, the costs associated with any required modifications to the utility system, administration, metering, and on-site verification testing

Photovoltaic, net meter, residential applicants[5] are only responsible for the costs of a dedicated transformer,[6] if applicable, up to a maximum expense of $350.

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[5] See Section III: Glossary of Terms for definition.
[6] Ibid.

STEP 7: Applicant Commits to Utility Construction of Utility's System Modifications.

The applicant will:

- execute a standardized contract for interconnection; and

- provide the utility with an advance payment for the utility's estimated costs as identified in STEP 6. (Estimated costs will be reconciled with actual costs in STEP 11.)

STEP 8: Project Construction.

The applicant will build the facility in accordance with the utility-accepted design. The utility will commence construction/installation of system modifications and metering requirements as identified in STEP 6. Utility system modifications will vary in construction time depending on the extent of work and equipment required. The schedule for this work is to be discussed with the applicant in STEP 6.

STEP 9: The Applicant's Facility is Tested in Accordance With the Standardized Interconnection Requirements.

The verification testing will be performed in accordance with the written test procedure provided in STEP 5 and any site-specific requirements identified by the utility in STEP 6.

The final testing will be conducted at a mutually agreeable time, and the utility shall be given the opportunity to witness the tests. Single-phase inverter-based systems rated 15 kVA or less will be allowed to interconnect to the utility system prior to the verification test for a period not to exceed two hours, for the sole purpose of assuring proper operation of the installed equipment.

STEP 10: Interconnection.

The applicant's facility will be allowed to commence parallel operation upon satisfactory completion of the tests in STEP 9. In addition, the applicant must have complied with and must continue to comply with the contractual and technical requirements.

STEP 11: Final Acceptance and Utility Cost Reconciliation.

Within 60 days after interconnection, the utility will review the results of its on-site verification and issue to the applicant a formal letter of acceptance for interconnection. At this time, the utility will also reconcile its actual costs related to the applicant's project against the application fee and advance payments made by the applicant. The applicant will receive either a bill for any balance due or a reimbursement for overpayment as determined by the utility's reconciliation.

The applicant may contest the reconciliation through the filing of a formal complaint with the Commission.

II. Interconnection Requirements

A. Design Requirements

1. Common

The generator-owner[7] shall provide appropriate protection and control equipment, including an automatic disconnect device[8], that will automatically disconnect[9] the generation in the event that the portion of the utility system that serves the generator is de-energized for any reason or for a fault in the generator-owner's system. The generator-owner's protection and control equipment shall be capable of automatically disconnecting the generation upon detection of an islanding[10] condition and upon detection of a utility system fault.

The generator's protection and control scheme shall be designed to ensure that the generation remains in operation when the frequency and voltage of the utility system is within the limits specified by the required operating ranges.[11] Upon request from the utility, the generator-owner shall provide documentation detailing compliance with the requirements set forth in this document.

The specific design of the protection, control and grounding schemes will depend on the size and characteristics of the generator-owner's generation, as well the generator-owner's load level, in addition to the characteristics of the particular portion of the utility's system where the generator-owner is interconnecting.

The generator-owner shall have, as a minimum, an automatic disconnect device(s) sized to meet all applicable local, state, and federal codes and operated by over and under voltage and over and under frequency protection. For three-phase installations, the over and under voltage function should be included for each phase and the over and under frequency protection on at least one phase. All phases of a generator or inverter interface shall disconnect for voltage or frequency trip conditions sensed by the protective devices. It is recommended that voltage protection be wired phase to ground.

The settings below are listed for single-phase and three-phase applications using wye grounded-wye grounded service transformers or wye grounded-wye grounded isolation transformers. For applications using other transformer connections, a site-specific review will be

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[7] See Section III: Glossary of Terms for definition.
[8] Ibid.
[9] Ibid.
[10] Ibid.
[11] Ibid.

conducted by the utility and the revised settings identified in Step 6 of the Application Process.

Voltage Magnitude

The required operating range for the generators shall be from 106 volts rms to 132 volts rms phase-to-ground (on a 120 volt rms base) at the PCC. That is, 88% to110% of nominal voltage magnitude.

The protective device shall automatically initiate a disconnect sequence from the utility system if the rms voltage at the PCC rises above 132 volts or falls below 106 volts on any phase to which the generator-owner's equipment is connected and remains outside the required operating range for two seconds. The two-second time limit is measured from the time the range is initially exceeded until the generator-owner's equipment ceases to energize[12] the PCC and includes detection and intentional time delay.

The protective device shall automatically initiate a disconnect sequence from the utility system if the rms voltage at the PCC falls below 60 volts (50% of nominal voltage magnitude) on any phase to which the generator-owner's equipment is connected and remains below this level for six cycles. The six-cycle time limit is measured from the time the voltage reaches this level until the generator-owner's equipment ceases to energize the PCC and includes detection and intentional time delay.

The protective device shall automatically initiate a disconnect sequence from the utility system if the rms voltage rises above 165 volts (137% of nominal voltage magnitude) or above on any phase to which the generator-owner's equipment is connected and remains above this level for two cycles. The two-cycle time limit is measured from the time the voltage reaches this level until the generator-owner's equipment ceases to energize the PCC and includes detection and intentional time delay.

Frequency

The required operating range for the generators shall be from 59.3 Hz to 60.5 Hz.

The protective device shall automatically initiate a disconnect sequence from the utility system if the frequency rises above 60.5 Hz (+0.1/-0.0 Hz) or falls below 59.3 Hz (+0.0/-0.1 Hz) and remains outside these limits for six cycles. The six-cycle time limit is measured from the time the frequency reaches these levels until the generator-owner's equipment ceases to energize the PCC and includes detection and intentional time delay.

[12] See Section III: Glossary of Terms for definition

2. Additional Protection Equipment

The need for additional protection equipment shall be determined by the utility on a case-by-case basis. The utility shall specify and provide settings for those relays that the utility designates as being required to satisfy protection practices. Any protective equipment or setting specified by the utility shall not be changed or modified at any time by the generator-owner without written consent from the utility.

The generator-owner shall be responsible for ongoing compliance with all applicable local, state, and federal codes and standardized interconnection requirements as they pertain to the interconnection of the generating equipment.

Protection shall not share electrical equipment associated with utility revenue metering.

A failure of the generator-owner's interconnection protection equipment, including loss of control power, shall open the automatic disconnect device, thus disconnecting the generation from the utility system. A generator-owner's protection equipment shall utilize a non-volatile memory design such that a loss of internal or external control power, including batteries, will not cause a loss of interconnection protection functions or loss of protection set points.

All interface protection and control equipment shall operate as specified independent of the calendar date.

3. Synchronous Generators

Synchronous generation shall require synchronizing facilities. These shall include automatic synchronizing equipment or manual synchronizing with relay supervision, voltage regulator, and power factor control.

4. Induction Generators

Induction generation may be connected and brought up to synchronous speed (as an induction motor) if it can be demonstrated that the initial voltage drop measured at the PCC is acceptable based on current inrush limits. The same requirements also apply to induction generation connected at or near synchronous speed because a voltage dip is present due to an inrush magnetizing current. The generator-owner shall submit the expected number of starts per specific time period and maximum starting kVA draw data to the utility to verify that the voltage dip due to starting is within the visible flicker limits as defined by IEEE 519, Recommended Practices and Requirements for Harmonic Control in Electric Power Systems.

Starting or rapid load fluctuations on induction generators can adversely impact the utility's system voltage. Corrective step-switched capacitors or other techniques may be necessary. These measures can, in turn, cause ferroresonance. If these measures (additional capacitors) are installed on the customer's side of the PCC, the utility will review these measures and may require the customer to install additional equipment.

5. Inverters

Direct current generation can only be installed in parallel with the utility's system using a synchronous inverter. The design shall be such as to disconnect this synchronous inverter upon a utility system interruption.

It is recommended that equipment be selected from the "Type-Tested and Approved Equipment" list maintained by the PSC. Non-type-tested equipment must have dynamic anti- islanding protection as defined by IEEE 929, conform to the maximum harmonic limits delineated in IEEE 519, and be protected by type-tested or utility grade relays (as defined in these requirements) using settings approved by the interconnecting utility and verified in the field. The field verification test must demonstrate that the equipment meets the frequency requirements detailed in this section.

Line-commutated inverters do not require synchronizing equipment if the voltage drop is determined to be acceptable, as defined in Section II.E, Power Quality, of this document. Self-commutated inverters of the utility interactive-type shall synchronize to the utility. Only inverters with utility interactive, line-commutated capabilities shall be used for parallel operation with the utility.

A line inverter can be used to isolate the customer from the utility system provided it can be demonstrated that the inverter isolates the customer from the utility system safely and reliably.

6. Metering

The need for additional revenue metering or modifications to existing metering will be reviewed on a case-by-case basis and shall be consistent with metering requirements adopted by the Public Service Commission.

Photovoltaic, net meter, residential applicants shall be given a standard meter option or a two-meter (or a single meter with bi-directional capability) option. Applicants are advised that the use of a standard meter, running in reverse, does not meet accuracy standards as documented under Public Service Law and accordingly, in any billing dispute dependent upon those meter accuracy standards, the applicant will be unable to rely upon net meter readings as a basis for claim against the utility. Applicants selecting the standard meter option, agree to waive in writing, any billing complaint that is unresolvable because of the inaccuracy inherent in running a meter in reverse. Applicant choosing the alternate option will have their billing disputes resolved on the usual standards for evaluating customer complaints. The applicant is responsible for the cost of installing any necessary meter box and socket.

The two-meter (or bi-directional meter) option is required for Time of Use (TOU) metering, unless a suitable single meter option is proven acceptable to the PSC.

B. Operating Requirements

The generator-owner shall provide a 24-hour telephone contact(s). This contact will be used by the utility to arrange access for repairs, inspection or emergencies. The utility will make such arrangements (except for emergencies) during normal business hours.

Voltage and frequency trip set point adjustments shall be accessible to service personnel only.

The generator-owner shall not supply power to the utility during any outages of the system that serves the PCC. The generator-owner's generation may be operated during such outages only with an open tie to the utility. Islanding will not be permitted. The generator-owner shall not energize a de-energized utility circuit for any reason.

The disconnect switch[13] specified in Section II.D, Disconnect Switch, may be opened by the utility at any time for any of the following reasons:

a. to eliminate conditions that constitute a potential hazard to utility personnel or the general public;

b. pre-emergency or emergency conditions on the utility system;

c. a hazardous condition is revealed by a utility inspection;

d. protective device tampering;

e. parallel operation prior to utility approval to interconnect.[14]

The disconnect switch may be opened by the utility for the following reasons, after notice to the responsible party has been delivered and a reasonable time to correct (consistent with the conditions) has elapsed:

a. A generator-owner has failed to make available records of verification tests and maintenance of its protective devices;

b. A generator-owner's system interferes with utility equipment or equipment belonging to other utility customers;

[13] See Section III: Glossary of Terms for definition.
[14] In the event that no disconnect has been provided as required in Section II.D, the utility shall disconnect the generation utilizing an alternate method. The utility shall make a reasonable attempt to assure that the generation is disconnected in a manner so as not to interrupt any on-site customer load.

c. A generator-owner's system is found to adversely affect the quality of service to adjoining customers.

The utility will provide a name and telephone number so that the customer can obtain information about the utility lock-out. The customer shall be allowed to disconnect from the utility without prior notice in order to self generate.

Following a generation facility disconnect as a result of the operation of a protective function trip sequence, the generation facility shall remain disconnected until the utility's service voltage and frequency has recovered to the utility's acceptable voltage and frequency limits for a minimum of five (5) minutes.

Under certain conditions a utility may require direct transfer trip (DTT).[15] The utility shall provide detailed evidence as to the need for DTT.

If an applicant proposes any modification to the system that has an impact on the interface at the PCC after it has been installed and a contract between the utility and the customer has already been executed, then any such modifications must be reviewed and approved by the utility before the modifications are made.

C. Dedicated Transformer

The connecting utility reserves the right to require a power-producing facility to connect to the utility system through a dedicated transformer. The transformer shall either be provided by the connecting utility at the generator-owner's expense, purchased from the utility, or conform to the connecting utility's specifications. The transformer may be necessary to ensure conformance with utility safe work practices, to enhance service restoration operations or to prevent detrimental effects to other utility customers. The transformer that is part of the normal electrical service connection of a generator-owner's facility may meet this requirement if there are no other customers supplied from it. A dedicated transformer is not required if the installation is designed and coordinated with the utility to protect the utility system and its customers adequately from potential detrimental net effects caused by the operation of the generator.

If the utility determines a need for a dedicated transformer, it shall notify the generator-owner in writing of the requirements. The notice shall include a description of the specific aspects of the utility system that necessitate the addition, the conditions under which the dedicated transformer is expected to enhance safety or prevent detrimental effects, and the expected response of a normal, shared transformer installation to such conditions.

[15] See Section III: Glossary of Terms for definition.

D. Disconnect Switch

Generating equipment shall be capable of being isolated from the utility system by means of an external, manual, visible, gang-operated, load break disconnecting switch. The disconnect switch shall be installed, owned, and maintained by the owner of the power-producing facility, and located between the power-producing equipment and its interconnection point with the utility system.

The disconnect switch must be rated for the voltage and current requirements of the installation.

The basic insulation level (BIL) of the disconnect switch shall be such that it will coordinate with that of the utility's equipment. Disconnect devices shall meet applicable UL, ANSI, and IEEE standards, and shall be installed to meet all applicable local, state, and federal codes. (New York City Building Code may require additional certification.)

The disconnect switch shall be clearly marked, "Generator Disconnect Switch," with permanent 3/8 inch letters or larger.

The disconnect switch shall be located within 10 feet of the utility's external electric service meter. If such location is not possible, the customer-generator will propose, and the utility will approve, an alternate location. The location and nature of the disconnect shall be indicated in the immediate proximity of the electric service entrance. The disconnect switch shall be readily accessible for operation and locking by utility personnel in accordance with Section II.B, Operating Requirements.

The disconnect switch must be lockable in the open position with a standard utility padlock with a 3/8-inch shank.

E. Power Quality

The maximum harmonic limits for electrical equipment shall be in accordance with IEEE 519. The objective of IEEE 519 is to limit the maximum individual frequency voltage harmonic to 3% of the fundamental frequency and the voltage Total Harmonic Distortion (THD) to 5% on the utility side of the PCC. In addition, any voltage fluctuation resulting from the connection of the customer's energy producing equipment to the utility system must not exceed the limits defined by the maximum permissible voltage fluctuations border line of visibility curve, Figure 10.3 identified in IEEE 519. This requirement is necessary to minimize the adverse voltage effect upon other customers on the utility system.

F. Power Factor

If the average power factor, as measured at the PCC, is less than 0.9 (leading or lagging), the method of power factor correction necessitated by the installation of the generator will be negotiated with the utility as a commercial item.

Induction power generators may be provided VAR capacity from the utility system at the generator-owner's expense. The installation of VAR correction equipment by the generator-owner on the generator-owner's side of the PCC must be reviewed and approved by the interconnecting utility prior to installation.

G. Islanding

Generation interconnection systems must be designed and operated so that islanding is not sustained on utility distribution circuits. The requirements listed in this document are designed and intended to prevent islanding.

H. Test Requirements

This section describes two separate and distinct tests, which together constitute the necessary and sufficient SIR testing requirements. The first test is the design test and the second is the verification test. The purpose of the design test is to ensure that devices and systems used in a proposed application meet the necessary technical and functional requirements. The purpose of the verification test is to ensure that the devices and systems, which have displayed conformance with the design testing requirements, have been properly installed and are operating properly following installation at the site.

Two paths are possible to the achievement of an accepted installation. The first path requires that the design test and verification test methodologies be reviewed and accepted by the utility. The second path allows the design test and the verification test procedure to be reviewed and conducted by an independent testing laboratory. The second path is referred to as type testing. Type testing is performed or witnessed once by a nationally recognized independent testing laboratory for a specific protection device or system and the results recorded in the document included as Appendix A. Once the device or system meets the type test criteria described in this section, the design and verification test procedure is accepted by all New York State utilities. If any changes are made to the hardware, software, firmware, or the verification test procedure, the manufacturer must notify the independent testing laboratory to determine what, if any, parts of the type-testing must be repeated (this includes modifications to devices already in service). Failure of the manufacturer to notify the independent test laboratory of changes may result in withdrawal of approval and disconnection of units installed since the change was made. Utility grade relays, as defined in the Glossary of Terms, need not be type tested per the requirements of this section. Manufacturers may elect to have systems comprised of utility grade relays and other devices type tested as complete systems to avoid the utility review required of a non-type tested system.

All interface equipment must include a verification test procedure (unless otherwise noted in this document) as part of the documentation. Except for the case of small single-phase inverters as discussed later, the verification test must establish that the protection settings meet the SIR requirements. The verification testing may be site-specific and is conducted periodically to assure continued acceptable performance.

The checklist (Appendix A) shall be submitted to the contact listed on the Department web site (http://www.dps.state.ny.us/distgen.htm). Staff will perform a preliminary assessment of the information within 10 days to verify whether it is complete per the requirements and contact the manufacturer to request supplemental information if needed. After a complete documentation package has been provided, Staff shall review the checklist to verify that all the appropriate reviews and tests have been performed. Within 30 days from the submission of the complete package, Staff will make a final determination whether the equipment is approved for interconnection per the SIR. A list of this equipment shall be maintained for posting on the Department's web site as referenced above. The list will indicate specific model numbers and firmware versions approved. The equipment in the field must have a nameplate that clearly shows the model number and firmware version.

At the time of production, all interface equipment, including inverters and discrete relays, must meet or exceed the requirements of ANSI/ IEEE C62.41, Recommended Practices on Surge Voltages in Low Voltage AC Power Circuits, or ANSI/IEEE C37.90.1, IEEE Standard Surge Withstand Capability (SWC) Tests for Protective Relays and Relay Systems. If ANSI/IEEE C62.41 is used, devices shall be tested to a minimum category B3 level as defined in ANSI/IEEE C62.41 and the acceptance criteria shall be the same as that required by ANSI/IEEE C37.90.1. If, during the performance of any of the testing protocols prescribed above, the equipment ceases to export power and in the judgement of the independent testing laboratory fails in a safe manner, this will be considered an acceptable result for the purposes of these requirements.

Isolation transformers specified as required or listed as optional must be connected for the testing process. Each optional isolation transformer connection constitutes a separate type test. Generic isolation transformers may be substituted after type testing. Three-phase isolation transformers and voltage-matching transformers connected wye-grounded/delta on the generator side shall not be permitted.

1. Type Testing

The tests prescribed below to meet the requirements of the SIR apply only to devices and packages associated with protection of the interface between the generating system and the utility. Interface protection is usually limited to voltage function, frequency function, synchronizing function, reverse current or power function, and anti- islanding schemes. Testing of relays or devices associated specifically with protection or control of generating or other customer equipment is recommended, but not required unless they impact the interface protection.

The independent testing laboratory shall conduct the verification test prescribed by the manufacturer to determine if the verification test procedure adequately demonstrates compliance with these SIR requirements. All single-phase and three phase test voltages shall be applied phase to ground.[16]

For the following tests for single-phase and three-phase inverters, the type-testing does not have to be repeated if settings other than those specified in Section II.A.1, Design Requirements – Common are required by the interconnecting utility (i.e., when a transformer connection other than wye grounded-wye grounded is used).

a. Single-Phase Inverters and Relay Packages

All single-phase inverters shall be non-islanding inverters as defined by IEEE 929. Inverters 10 kW and below shall at the time of production meet or exceed the requirements of the most current versions of IEEE 929 and UL 1741. Specifically, the inverter shall automatically disconnect for an islanding condition with load quality factor of 2.5 within two (2) seconds. In addition, all single-phase inverters and single-phase voltage and frequency relay packages shall initiate a trip from a waveform generator for the waveforms listed below to verify they meet the requirements set forth in Section II.A.1, Design Requirements – Common.

> **Non-Volatile Memory Test:** Prior to waveform testing, all batteries shall be disconnected or removed for a minimum of ten (10) minutes. If the system requires no battery, then the device shall be disconnected from its source of power for a minimum of ten (10) minutes. This test is to verify the system has a non-volatile memory and that the protection settings are not lost. A test shall also be performed to determine that failure of any battery used in the power conversion and control process and not used to supply trip power will result in an automatic shutdown.
>
> **Waveform Testing:** Each waveform test described below shall be repeated ten (10) times. Unless otherwise noted, the device should cease exporting power to the utility within the relevant time limits specified in Section A.1.

[16] Test voltages are specified phase to ground for a 120 volt nominal system. Other system voltages require adjusting the test voltages by the appropriate percentages. Over- and undervoltage protection should be wired phase to ground. Phase-to-phase voltage sensing results in less sensitive undervoltage detection and more sensitive overvoltage detection.

Reset Timer: These tests shall also verify the inverter or power-producing facility shall not automatically reconnect to the waveform generator until after five (5) minutes of continuous normal voltage and frequency. The manufacturer may supply a special production sample with the reset timer disabled or otherwise temporarily reduce or eliminate the delay in software to minimize the waiting time during type testing. At least three of the 60 total tests (6 waveforms, 10 times each) must be performed on a sample with the reset timer set to the required delay time to verify the function and accuracy of the timer. The test will be considered a failure if, in any one of the tests, the inverter automatically reconnects to the utility system prior to the required time interval. Once the delay timer has been tested three times, the phrase "...and resumes to XX for five minutes..." at the end of the test procedures may be ignored.

The voltage magnitudes listed below are given in percent of rms voltage rating of the inverter, followed in parentheses by the rms voltage magnitude on a 120 V basis:

Waveform 1: A 100% of rated voltage (120 V rms) 60 Hz sinusoidal that drops in voltage to 49% of rated (59 V rms) for six (6) cycles beginning and ending at a zero crossing and resuming to 100% of rated voltage (120 V rms) for five minutes.

Waveform 2: A 100% of rated voltage (120 V rms) 60 Hz sinusoidal that drops in voltage to 88 % of rated (105 V rms) for 120 cycles beginning and ending at a zero crossing and resuming to 100% of rated voltage (120 V rms) for five minutes.

Waveform 3: A 100% of rated voltage (120 V rms) 60 Hz sinusoidal that rises in voltage to 111% of rated (133 V rms) for 120 cycles beginning and ending at a zero crossing and resuming to 100% of rated voltage (120 V rms) for five minutes.

Waveform 4: A 100% of rated voltage (120 V rms) 60 Hz sinusoidal that rises in voltage to 138 % of rated (166 volts) for two (2) cycles beginning and ending at a zero crossing and resuming to 100% of rated voltage (120 V rms) for five minutes.

Waveform 5: A 100% of rated voltage (120 V rms) 60 Hz sinusoidal that drops in frequency at a rate of 0.2 Hz/second to 59.2 Hz for six (6) cycles beginning and ending at a zero crossing and then returning to 60 Hz at a rate of 0.2 Hz/second for five minutes.

Waveform 6: A 100% of rated voltage (120 V rms) 60 Hz sinusoidal that rises in frequency at a rate of 0.2 Hz/second to 60.5 Hz for six (6) cycles beginning and ending at a zero crossing and then returning to 60 Hz at a rate of 0.2 Hz/second for five minutes.

b. Three-Phase Inverters and Relays

Non-Volatile Memory Test: Prior to waveform testing, all batteries shall be disconnected or removed for a minimum of ten (10) minutes. If the system requires no battery, then the device shall be disconnected from its source of power for a minimum of ten (10) minutes. This test is to verify the system has a non-volatile memory and that the protection settings are not lost. A test shall also be performed to determine that failure of any battery used in the power conversion and control process and not used to supply trip power will result in an automatic shutdown.

Waveform Testing: Each three-phase waveform test shall be repeated ten (10) times. Failure to trip for any one run constitutes failure of the test.

Reset Timer Test: These tests shall also verify the inverter or power producing facility shall not automatically reconnect to the waveform generator until after five (5) minutes of continuous normal voltage and frequency. The manufacturer may supply a special production sample with the five-minute reset timer disabled to eliminate waiting time during type testing. At least three tests must be performed on a sample with a five minute reset timer to verify the function and accuracy of the timer. The test will be considered a failure if, in any one of the tests, the inverter automatically reconnects to the utility system prior to the required five-minute time interval.

Three-phase inverters and discrete three-phase voltage relays shall be type-tested with three-phase waveforms. The inverter shall disconnect or the protection equipment shall initiate a trip from the waveform generator for each of the waveforms described below.

The voltage magnitudes listed below are given in percent of rms voltage rating of the inverter, followed in parentheses by the rms voltage magnitude for 120 V rated inverters:

Waveform 1: A three-phase sinusoidal operating at 60 Hz and 100% of rated voltage (120 V rms) interrupted by phase A voltage depressed to 49% of rated voltage (59 V rms) for six (6) cycles beginning and ending at a zero crossing while B and C phases continue at 100% of rated voltage (120 V rms). Repeat the same test with B phase depressed, with C phase depressed, with A and B phases depressed, with B and C phases depressed, and finally with all phases depressed to 49% of rated voltage (59 V rms) for six cycles.

Waveform 2: A three-phase sinusoidal operating at 60 Hz and 100% of rated voltage (120 V rms) interrupted by phase A voltage depressed to 49% of rated voltage (59 V rms) for six (6) cycles beginning and ending at a zero crossing while B and C phases are increased 125% of rated voltage (150 V rms) beginning and ending at the same point of discontinuity. Repeat the same test with B phase depressed and A and C phases increased and with C phase depressed and A and B phases increased.

Waveform 3: A three-phase sinusoidal operating at 60 Hz and 100% of rated voltage (120 V rms) interrupted by phase A voltage depressed to 88% of rated (105 V rms) for two seconds (120 cycles) beginning and ending at a zero crossing while B and C phases continue at 100% of rated voltage (120 V rms). Repeat the same test with B and C phases depressed to the same level and for the same duration holding the other two phases at 100%.

Waveform 4: A three-phase sinusoidal operating at 60 Hz and 100% of rated voltage (120 V rms) interrupted by phase A voltage increased to 111% of rated (133 V rms) for two seconds (120 cycles) beginning and ending at a zero crossing while B and C phases continue at 100% of rated voltage (120 V rms). Repeat the same test with B and C phases increased to the same level and for the same duration.

Waveform 5: A three-phase sinusoidal operating at 60 Hz and 100% of rated voltage (120 V rms) interrupted by phase A voltage increased to 138% of rated (166 V rms) for two cycles beginning and ending at a zero crossing while B and C phases continue 100% of rated voltage (120 V rms). Repeat the same test with B and C phases increased to the same level and for the same duration.

Waveform 6: A three-phase sinusoidal operating at 60 Hz and 100% of rated voltage (120 V rms) interrupted by phase A voltage increased to 138% of rated (166 V rms) for two cycles beginning and ending at a zero crossing while B and C phases are decreased to 83% of rated voltage (100 V rms) beginning and ending at the same point of discontinuity. Repeat the same test with B phases increased and A and

C phases decreased and for C phase increased and A and B phases decreased to the same levels and for the same duration.

Waveform 7: A three phase sinusoidal operating at 60 Hz and 100% of rated voltage (120 V rms) ramped to 59.2 Hz at 0.2 Hz/second, held for six cycles and ramped back to 60 Hz at 0.2 Hz/second beginning and ending at the zero crossing on A phase (or the phase on which the device frequency trip measurements).

Waveform 8: A three-phase sinusoidal operating at 60 Hz and 100% of rated voltage (120 V rms) ramped to 59.3 Hz at 0.2 Hz/second, held for six cycles and ramped back to 60 Hz at 0.2 Hz/second beginning and ending at the zero crossing on B phase. At the same time, A and C phase voltages are to be ramped down to 58% of rated (70 V rms) at a rate of at least 10 volts per cycle and held at that depressed voltage during the six cycles when the frequency on B phase is at 59.3 Hz before ramping back to normal voltage.

Waveform 9: A three-phase sinusoidal operating at 60 Hz and 100% of rated voltage (120 V rms) ramped to 60.6 Hz at 0.2 Hz/second, held for six cycles and ramped back to 60 Hz at 0.2 Hz/second beginning and ending at the zero crossing on A phase (or the phase on which the device performs frequency trip measurements).

Recognizing that the waveform testing method may not be practical for larger inverters, alternate testing methods will be acceptable if it can be demonstrated that the alternate methods verify the test points and time delays of the interconnection functions prescribed in the SIR interconnection requirements. The independent testing laboratory will be responsible to determine if the alternate testing method sufficiently verifies the interconnection functions and can be used as a replacement for the waveform testing method.

The tests shall include:

Non-Volatile Memory Test: Prior to waveform testing, all batteries shall be disconnected or removed for a minimum of ten (10) minutes. If the system requires no battery, then the device shall be disconnected from its source of power for a minimum of ten (10) minutes. This test is to verify the system has a non-volatile memory and that the protection settings are not lost. A test shall also be performed to determine that failure of any battery used in the power conversion and control process will result in an automatic shutdown.

Reset Timer Test: These tests shall also verify the inverter or power producing facility shall not automatically reconnect to the waveform generator until after five (5) minutes of continuous normal voltage and frequency. The manufacturer may supply a special production sample with the five-minute reset timer disabled to eliminate waiting time during type testing. At least three tests must be performed on a sample with a five-minute reset timer to verify the function and accuracy of the timer. The test will be considered a failure if, in any one of the tests, the inverter automatically reconnects to the utility system prior to the required five-minute time interval.

Test 1: With the generator and inverter output stabilized at 60 Hz and 100% of rated voltage (120 V rms) and the inverter output between 0.5 and 1.0 per unit power, ramp the generator voltage up to 111% of rated (133 V rms) at a rate no greater than 5 volts per second. Measure and record the frequency and voltage. The frequency must remain within 0.2 Hz of 60 Hz and the voltage may not exceed 114% of rated (137 V rms). The inverter must cease to export power within two seconds (120 cycles) of the first half-cycle reaching 111% of rated voltage (188 V) peak to neutral. Repeat the test with the inverter output below 0.1 per unit power.

Test 2: Insert a tapped transformer and a breaker between A phase of the generator and A phase of the inverter arranged such that when the breaker is opened or closed, A phase of the inverter receives half the voltage of the generator. With the generator and inverter output stabilized at 60 Hz and 99% of rated voltage (119 V rms) and the inverter output between 0.5 and 1.0 per unit power, operate the breaker so A phase of the inverter only receives 48% of rated voltage (58 V rms). Measure and record the frequency and voltage. The frequency must remain within 0.2 Hz of 60 Hz and the voltage may not drop below 46% of rated (55 V rms) on A phase of the inverter or below 92% of rated (110 V rms) on B or C phases of the inverter. The inverter must cease to export power within six cycles of when the first half cycle of voltage on A phase of the inverter drops below 49% of rated (83 V) peak to neutral. Repeat the test applying half voltage to B and C phases. And repeat the test for all phases with the inverter output below 0.1 per unit power.

Test 3: With the generator and inverter output stabilized at 60 Hz and 100% of rated voltage (120 V rms) and the inverter output between 0.5 and 1.0 per unit power, ramp the generator voltage down to 87% of rated (105 V rms) at a rate no greater than 5 volts per second. Measure

Reset Timer Test: These tests shall also verify the inverter or power producing facility shall not automatically reconnect to the waveform generator until after five (5) minutes of continuous normal voltage and frequency. The manufacturer may supply a special production sample with the five-minute reset timer disabled to eliminate waiting time during type testing. At least three tests must be performed on a sample with a five-minute reset timer to verify the function and accuracy of the timer. The test will be considered a failure if, in any one of the tests, the inverter automatically reconnects to the utility system prior to the required five-minute time interval.

Test 1: With the generator and inverter output stabilized at 60 Hz and 100% of rated voltage (120 V rms) and the inverter output between 0.5 and 1.0 per unit power, ramp the generator voltage up to 111% of rated (133 V rms) at a rate no greater than 5 volts per second. Measure and record the frequency and voltage. The frequency must remain within 0.2 Hz of 60 Hz and the voltage may not exceed 114% of rated (137 V rms). The inverter must cease to export power within two seconds (120 cycles) of the first half-cycle reaching 111% of rated voltage (188 V) peak to neutral. Repeat the test with the inverter output below 0.1 per unit power.

Test 2: Insert a tapped transformer and a breaker between A phase of the generator and A phase of the inverter arranged such that when the breaker is opened or closed, A phase of the inverter receives half the voltage of the generator. With the generator and inverter output stabilized at 60 Hz and 99% of rated voltage (119 V rms) and the inverter output between 0.5 and 1.0 per unit power, operate the breaker so A phase of the inverter only receives 48% of rated voltage (58 V rms). Measure and record the frequency and voltage. The frequency must remain within 0.2 Hz of 60 Hz and the voltage may not drop below 46% of rated (55 V rms) on A phase of the inverter or below 92% of rated (110 V rms) on B or C phases of the inverter. The inverter must cease to export power within six cycles of when the first half cycle of voltage on A phase of the inverter drops below 49% of rated (83 V) peak to neutral. Repeat the test applying half voltage to B and C phases. And repeat the test for all phases with the inverter output below 0.1 per unit power.

Test 3: With the generator and inverter output stabilized at 60 Hz and 100% of rated voltage (120 V rms) and the inverter output between 0.5 and 1.0 per unit power, ramp the generator voltage down to 87% of rated (105 V rms) at a rate no greater than 5 volts per second. Measure and record the frequency and voltage. The frequency must remain within 0.2 Hz of 60 Hz and the voltage must not drop below 82% of rated (99 V rms). The inverter must cease to export power within two seconds (120 cycles) of the first half-cycle reaching 85% of rated voltage (145 V) peak to neutral. Repeat the test with the inverter output below 0.1 per unit power.

Test 4: Insert a tapped transformer and a breaker between A phase of the generator and A phase of the inverter arranged such that when the breaker is opened or closed, A phase of the inverter receives four-fifths the voltage of the generator. With the generator and inverter output stabilized at 60 Hz and 107% of rated voltage (128 V rms) and the inverter output between 0.5 and 1.0 per unit power, operate the breaker so that A phase of the inverter only receives 87% of rated voltage (105 V rms). Measure and record the frequency and voltage. The frequency must remain within 0.2 Hz of 60 Hz and the voltage may not drop below 82% of rated (99 V rms) on A phase of the inverter, or below 92% of rated (110 V rms) on B or C phases of the inverter. The inverter must cease to export power within two seconds (120 cycles) of when the first half cycle of voltage on A phase of the inverter drops below 85% of rated (145 V) peak to neutral. Repeat the test applying low voltage to B and C phases. And repeat the test for all phases with the inverter output below 0.1 per unit power.

Test 5: With the generator and inverter output stabilized at 60 Hz and 100% of rated voltage (120 V rms) and the inverter output between 0.5 and 1.0 per unit power, ramp the generator frequency up to 60.6 Hz at a rate no greater than 0.5 Hz/second. Measure and record the frequency and voltage. The voltage must remain between 96% (115 V rms) and 104% of rated (125 V rms) and the frequency must not exceed 60.8 Hz. The inverter must cease to export power within six cycles of the frequency exceeding 60.5 Hz (8.25 ms between zero crossings). Repeat the test with the inverter output below 0.1 per unit power.

Test 6: With the generator and inverter output stabilized at 60 Hz and 100% of rated voltage (120 V rms) and the inverter output between 0.5 and 1.0 per unit power, ramp the generator frequency down to 59.3 Hz at a rate no greater than 0.5 Hz per second. Measure and record the frequency and voltage. The voltage must remain between 96% (115 V rms) and 104% of rated (125 V rms) and the frequency must not fall below 59.0 Hz. The inverter must cease to export power within six cycles of the frequency falling below 59.3 Hz (8.33 ms between zero and record the frequency and voltage. The frequency must remain within 0.2 Hz of 60 Hz and the voltage must not drop below 82% of rated (99 V rms). The inverter must cease to export power within two seconds (120 cycles) of the first half-cycle reaching 85% of rated voltage (145 V) peak to neutral. Repeat the test with the inverter output below 0.1 per unit power.

Test 4: Insert a tapped transformer and a breaker between A phase of the generator and A phase of the inverter arranged such that when the breaker is opened or closed, A phase of the inverter receives four-fifths the voltage of the generator. With the generator and inverter output stabilized at 60 Hz and 107% of rated voltage (128 V rms) and the inverter output between 0.5 and 1.0 per unit power, operate the breaker so that A phase of the inverter only receives 87% of rated voltage (105 V rms). Measure and record the frequency and voltage. The frequency must remain within 0.2 Hz of 60 Hz and the voltage may not drop below 82% of rated (99 V rms) on A phase of the inverter, or below 92% of rated (110 V rms) on B or C phases of the inverter. The inverter must cease to export power within two seconds (120 cycles) of when the first half cycle of voltage on A phase of the inverter drops below 85% of rated (145 V) peak to neutral. Repeat the test applying low voltage to B and C phases. And repeat the test for all phases with the inverter output below 0.1 per unit power.

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It is not necessary to perform the 137% (165 V rms) test, the 110 % (132 V rms) unbalanced voltage test, or the anti- islanding test (per IEEE 929) on three-phase inverters.

2. Verification Testing

Upon initial parallel operation of a generating system, or any time interface hardware or software is changed, the verification test must be performed. A qualified individual must perform verification testing in accordance with the manufacturer's published test procedure. Qualified individuals include professional engineers, factory-trained and certified technicians, and licensed electricians with experience in testing protective equipment. The utility reserves the right to witness verification testing or require written certification that the testing was successfully performed.

Verification testing shall be performed at least once every four years. All verification tests prescribed by the manufacturer shall be performed. If wires must be removed to perform certain tests, each wire and each terminal must be clearly and permanently marked. The generator-owner shall maintain verification test reports for inspection by the connecting utility.

Single-phase inverters and inverter systems rated 15 kVA and below may be verified upon initial parallel operation and once per year as follows: the owner or his agent shall operate the load break disconnect switch and verify the power producing facility automatically shuts down and does not restart for five minutes after the switch is closed. The owner shall maintain a log of these operations for inspection by the connecting utility. Any system that depends upon a battery for trip power shall be checked and logged once per month for proper voltage. Once every four (4) years the battery must be either replaced or a discharge test performed.

III. Glossary of Terms

Automatic Disconnect Device: An electronic or mechanical switch used to isolate a circuit or piece of equipment from a source of power without the need for human intervention.

Cease to Energize: cessation of energy flow capability

Coordinated Electric System Interconnection Review: Any studies performed by utilities to ensure that the safety and reliability of the electric grid with respect to the interconnection of distributed generation as discussed in this document.

Dedicated Transformer: A transformer with a secondary winding that serves only one customer.

Direct Transfer Trip: Remote operation of a circuit breaker by means of a communication channel.

Disconnect (verb): To isolate a circuit or equipment from a source of power. If isolation is accomplished with a solid-state device, "Disconnect" shall mean to cease the transfer of power.

Disconnect Switch: A mechanical device used for isolating a circuit or equipment from a source of power.

Energy Conversion Device: A machine or solid state circuit for changing direct current to alternating current or a machine that changes shaft horsepower to electrical power.

Generator-Owner: An applicant to operate on-site power generation equipment in parallel with the utility grid per the requirements of this document.

Islanding: A condition in which a portion of the utility system that contains both load and distributed generation is isolated from the remainder of the utility system. (Adopted from IEEE 929.)

Photovoltaic, Net Meter, Residential Applicant: A residential applicant who is proposing to install a photovoltaic generating system, not to exceed 10 kW, in an owner occupied residence per the requirements of New York State Public Service Law §66-j.

Point of Common Coupling (PCC): The point at which the interconnection between the electric utility and the customer interface occurs. Typically, this is the customer side of the utility revenue meter. (Adopted from IEEE 929)

Preliminary Review: A review of the Customer-Generator's proposed system capacity, location on the utility system, system characteristics, and general system regulation to determine if the interconnection is viable.

Radial Feeder: A distribution line that branches out from a substation and is normally not connected to another substation or another circuit sharing the common supply.

Required Operating Range: The range of magnitudes of the utility system voltage or frequency where the generator-owner's equipment, if operating, is required to remain in operation for the purposes of compliance with the type testing procedure contained in this document. Excursions outside these ranges must result in the automatic disconnection of the generation within the prescribed time limits

Type Test: A test performed or witnessed once by a qualified independent testing laboratory for a specific protection package or device to determine whether the requirements of this document are met. The type test will typically be sponsored by equipment manufacturers.

Utility Grade Relay: A relay that is constructed to comply with, as a minimum, the most current version of the following standards for non-nuclear facilities:

Standard	Conditions Covered
ANSI/IEEE C37.90	Usual Service Conditions Ratings - Current and Voltage Maximum design for all relays Ac and dc auxiliary relays Make and carry ratings for tripping contacts Tripping contacts duty cycle Dielectric tests by manufacturer Dielectric tests by user
ANSI/IEEE C37.90.1	Surge Withstand Capability (SWC) Fast Transient Test
IEEE C37.90.2	Radio Frequency Interference
IEEE C37.98	Seismic Testing (fragility) of Protective and Auxiliary Relays
ANSI C37.2	Electric Power System Device Function Numbers
IEC 255-21-1	Vibration
IEC 255-22-2	Electrostatic Discharge
IEC 255-5	Insulation (Impulse Voltage Withstand)

Verification Test: A test performed upon initial installation and repeated periodically to determine that there is continued acceptable performance.

APPENDIX A

New York State Standardized Interconnection Requirements
Checklist for Type Testing of Distributed Generation Protection Equipment

Manufacturer:______________________________

Product Name:______________________________

Model Number:______________________________

Firmware Version:____________________________

For the device or system to be considered as successfully completing the type testing process, a "Yes" response must be provided in all of the pertinent responses on the checklist below. One or multiple "No" responses indicates failure of the device or system to complete the Type Testing process, or that all of the requirements listed in the SIR for the type testing process for the device or system were not completed.

Is an external isolation transformer provided with the device or system?

( ) Yes ( ) No

If so, describe the winding connection:____

Separate voltage waveform tests must be performed for each available isolation transformer winding connection.

1. Surge Testing

Does the device or system meet or exceed the requirements of the most current versions of ANSI/IEEE C62.41– Recommended Practices on Surge Voltages in Low Voltage AC Power Circuits, or C37.90.1– IEEE Standard Surge Withstand Capability (SEC) Tests for Protective Relays and Relay Systems, and the acceptance criteria of ANSI/IEEE C37.90? In the event that the device or system ceases to export power after completion of the tests, does it fail in a safe manner?

( ) Yes ( ) No

2. Verification Test Procedure

Has a verification test procedure been included in the report?

( ) Yes ( ) No

If so is the procedure acceptable to demonstrate the functionality of the protective device or system?

( ) Yes ( ) No

Were all sources of power, including batteries, that are included in the system disconnected?

( ) Yes ( ) No

3. Non-Volatile Memory Test

If the device or system has a DC power supply, was it disconnected from its power supply to verify that the system has a non-volatile memory and that protection settings are not lost?

( ) Yes ( ) No

The device or system does not rely on a DC power supply to retain the protection settings. ( )

4a. Voltage and Frequency Waveform Tests – Single Phase Inverters

Has the device or system been tested with Waveforms 1 through 6 as listed in the SIR?

( ) Yes ( ) No

If so, did the device or system perform as required by these waveform tests?

( ) Yes ( ) No

Were the test voltages applied phase to ground?

( ) Yes ( ) No

Were the waveform tests repeated ten times?

( ) Yes ( ) No

4b. Voltage and Frequency Waveform Tests – Three-Phase Inverters

Has the device or system been tested with Waveforms 1 through 9 as listed in the SIR?

( ) Yes ( ) No

If so, did the device or system perform as required by these waveform tests?

( ) Yes ( ) No

Were the test voltages applied phase to ground?

( ) Yes ( ) No

Were the waveform tests repeated ten times?

( ) Yes ( ) No

4c. Voltage and Frequency Waveform Tests – Three-Phase Inverters – Alternative Test Method.

Has the device or system been tested with Tests 1 through 6 as listed in the SIR?

( ) Yes ( ) No

If so, did the device or system perform as required by these waveform tests?

( ) Yes ( ) No

Were the test voltages applied phase to ground?

( ) Yes ( ) No

Were the waveform tests repeated five times?

( ) Yes ( ) No

5. Five-Minute Reconnect Test

If the device or system is capable of automatically reconnecting to the utility system, following at least three test runs, was a test conducted to verify that the inverter does not automatically reconnect to the utility system until after five (5) minutes of continuous normal voltage and frequency?

( ) Yes ( ) No

If so, did the device or system reconnect to the utility in a time period equal to or exceeding five minutes?

( ) Yes ( ) No

The device or system is not capable of automatically reconnecting to the utility system ( )

Testing Laboratory Information

Name: ______________________________

Address: ____________________________

____

____

Dated: ______________________________

Party Responsible for Completion of the Testing: ______________________

Date Testing Completed: _________________

APPENDIX B

NEW YORK STATE
STANDARDIZED CONTRACT
FOR INTERCONNECTION OF NEW DISTRIBUTED GENERATION UNITS WITH CAPACITY OF 300 kVA OR LESS TO BE OPERATED IN PARALLEL

Customer Information:

Name: ______________________

Address: ____________________

Telephone: __________________

Unit Application No. __________

Company Information:

Name: ______________________

Address: ____________________

Telephone: __________________

DEFINITIONS

Dedicated Facilities means the equipment and facilities on the Company's system necessary to permit operation of the Unit in parallel with the Company's system.

Delivery Service means the services the Company may provide to deliver capacity or energy generated by Customer to a buyer to a delivery point(s), including related ancillary services.

"SIR" means the New York State Standardized Interconnection Requirements for new distributed generation units with a nameplate capacity of 300 kVA or less to be operated in parallel with the Ccompany's radial system on radial distribution feeders.

"Unit" means the distributed generation Unit with a nameplate capacity of less than 300 kVA located on the Customer's premises at the time the company approves such Unit for operation in parallel with the Company's system. This Agreement relates only to such Unit, but a new agreement shall not be required if the customer makes physical alterations to the Unit that do not result in an increase in its nameplate generating capacity. The nameplate generating capacity of the unit shall not exceed 300 kVA.

I. TERM AND TERMINATION

1.1 Term: This Agreement shall become effective when executed by both Parties and shall continue in effect until terminated.

1.2 Termination: This Agreement may be terminated as follows:

a. The Customer may terminate this Agreement at any time, by giving the Company sixty (60) days' written notice.

b. Failure by the Customer to seek final acceptance by the Company within twelve (12) months after completion of the utility construction process described in the SIR shall automatically terminate this Agreement.

c. Either Party may, by giving the other Party at least sixty (60) days' prior written notice, terminate this Agreement in the event that the other Party is in default of any of the material terms and conditions of this Agreement. The terminating Party shall specify in the notice the basis for the termination and shall provide a reasonable opportunity to cure the default.

d. The Company may, by giving the customer at least sixty (60) days' prior written notice, terminate this Agreement for cause. The Customer's non-compliance with an upgrade to the SIR, unless the Customer's installation is "grandfathered," shall constitute good cause.

1.3 Disconnection and Survival of Obligations: Upon termination of this Agreement the Unit will be disconnected from the Company's electric system. The termination of this Agreement shall not relieve either Party of its liabilities and obligations, owed or continuing at the time of the termination.

1.4 Suspension: This Agreement will be suspended during any period in which the Customer is not eligible for delivery service from the Company.

II. SCOPE OF AGREEMENT

2.1 Scope of Agreement: This Agreement relates solely to the conditions under which the Company and the Customer agree that the Unit may be interconnected to and operated in parallel with the Company's system.

2.2 Electricity Not Covered: The Company shall have no duty under this Agreement to account for, pay for, deliver, or return in kind any electricity produced by the Facility and delivered into the Company's System.

III. INSTALLATION, OPERATION AND MAINTENANCE OF UNIT

3.1 Compliance with SIR: Subject to the provisions of this Agreement, the Company shall be required to interconnect the Unit to the Company's system, for purposes of parallel operation, if the

Company accepts the Unit as in compliance with the SIR. The Customer shall have a continuing obligation to maintain and operate the Unit in compliance with the SIR.

3.2 Observation of the Unit - Construction Phase: The Company may, in its discretion and upon reasonable notice, conduct reasonable on-site verifications during the construction of the Unit. Whenever the Company chooses to exercise its right to conduct observations herein it shall specify to the Customer its reasons for its decision to conduct the observation. For purposes of this paragraph and paragraphs 3.3 through 3.5, the term "on-site verification" shall not include testing of the Unit, and verification tests shall not be required except as provided in paragraphs 3.3 and 3.4.

3.3 Observation of the Unit - Fourteen-day Period: The Company may conduct on-site verifications of the Unit and observe the performance of verification testing within a reasonable period of time, not exceeding fourteen days, after receiving a written request from the Customer to begin producing energy in parallel with the Company's system. The Company may accept or reject the request, consistent with the SIR, based upon the verification test results.

3.4 Observation of the Unit - Post-Fourteen-day Period: If the Company does not perform an on-site verification of the Unit and observe the performance of verification testing within the fourteen-day period, the Customer may begin to produce energy after certifying to the Company that the Unit has been tested in accordance with the verification testing requirements of the SIR and has successfully completed such tests. After receiving the certification, the Company may conduct an on-site verification of the Unit and make reasonable inquiries of the Customer, but only for purposes of determining whether the verification tests were properly performed. The Customer shall not be required to perform the verification tests a second time, unless irregularities appear in the verification test report or there are other objective indications that the tests were not properly performed in the first instance.

3.5 Observation of the Unit - Operations: The Company may conduct on-site verification of the operations of the Unit after it commences operations if the Company has a reasonable basis for doing so based on its responsibility to provide continuous and reliable utility service or as authorized by the provisions of the Company's Retail Tariff relating to the verification of customer installations generally.

3.6 Costs of Dedicated Facilities: During the term of this Agreement, the Company shall design, construct and install the Dedicated Facilities. The Customer shall be responsible for paying the incremental capital cost of such Dedicated Facilities attributable to the Customer's Unit. All costs associated with the operation and maintenance of the Dedicated Facilities after the Unit first produces energy shall be the responsibility of the Company.

IV. DISCONNECTION OF THE UNIT

4.1 Emergency Disconnection: The Company may disconnect the Unit, without prior notice to the Customer (a) to eliminate conditions that constitute a potential hazard to Company personnel or the general public; (b) if pre-emergency or emergency conditions exist on the Company system; (c) if a hazardous condition relating to the Unit is observed by a utility inspection; or (d) if the Customer has tampered with any protective device. The Company shall notify the Customer of the emergency if circumstances permit.

4.2 Non-Emergency Disconnection: The Company may disconnect the Unit, after notice to the responsible party has been provided and a reasonable time to correct, consistent with the conditions, has elapsed, if (a) the Customer has failed to make available records of verification tests and maintenance of his protective devices; (b) the Unit system interferes with Company equipment or equipment belonging to other customers of the Company; (c) the Unit adversely affects the quality of service of adjoining customers.

4.3 Disconnection by Customer: The Customer may disconnect the Unit at any time.

4.4 Utility Obligation to Cure Adverse Effect: If, after the Customer meets all interconnection requirements, the operations of the Company are adversely affecting the performance of the Unit or the Customer's premises, the Company shall immediately take appropriate action to eliminate the adverse effect. If the Company determines that it needs to upgrade or reconfigure its system the Customer will not be responsible for the cost of new or additional equipment beyond the point of common coupling between the Customer and the Company.

V. ACCESS

5.1 Access to Premises: The Company shall have access to the disconnect switch of the Unit at all times. At reasonable hours and upon reasonable notice consistent with Section III of this Agreement, or at any time without notice in the event of an emergency (as defined in paragraph 4.1), the Company shall have access to the Premises.

5.2 Company and Customer Representatives: The Company shall designate, and shall provide to the Customer, the name and telephone number of a representative or representatives who can be reached at all times to allow the Customer to report an emergency and obtain the assistance of the Company. For the purpose of allowing access to the premises, the Customer shall provide the Company with the name and telephone number of a person who is responsible for providing access to the Premises.

5.3 Company Right to Access Company-Owned Facilities and Equipment: If necessary for the purposes of this Agreement, the Customer shall allow the Company access to the Company's equipment and facilities located on the Premises. To the extent that the Customer does not own all or any part of the property on which the Company is required to locate its equipment or facilities to serve the Customer under this Agreement, the Customer shall secure and provide in favor of the Company the necessary rights to obtain access to such equipment or facilities, including easements if the circumstances so require.

VI. DISPUTE RESOLUTION

6.1 Good Faith Resolution of Disputes: Each Party agrees to attempt to resolve all disputes arising hereunder promptly, equitably and in a good faith manner.

6.2 Mediation: If a dispute arises under this Agreement, and if it cannot be resolved by the Parties within ten (10) working days after written notice of the dispute, the parties agree to submit the dispute to mediation by a mutually acceptable mediator, in a mutually convenient location in New York State, in accordance with the then current CPR Mediation Procedure, or to mediation by a mediator provided by the New York Public Service Commission. The parties agree to participate in good faith in the mediation for a period of 90 days. If the parties are not successful in resolving their disputes through mediation, then the parties may refer the dispute for resolution to the New York Public Service Commission, which shall maintain continuing jurisdiction over this agreement.

6.3 Escrow: If there are amounts in dispute of more than two thousand dollars ($2,000), the Customer shall either place such disputed amounts into an independent escrow account pending final resolution of the dispute in question, or provide to the Company an appropriate irrevocable standby letter of credit in lieu thereof.

VII. INSURANCE

7.1 Disclosure: The Customer is not required to provide general liability insurance coverage as part of this Agreement, the SIR, or any other Company requirement. Due to the risk of incurring damages, the Public Service Commission recommends that every distributed generation customer protect itself with insurance, and requires insurance disclosure as a part of this Agreement. The Customer hereby discloses as follows:

(Note: Check off one of the boxes below.)

[ ] the Customer has obtained, or already has in effect under an existing policy, general liability insurance coverage for operation of the Unit and intends to maintain such coverage for the duration of this Agreement (attach Certificate of Insurance or copy of Policy); or

[ ] the Customer has not obtained general liability insurance coverage for operation of the Unit and/or is self-insured.

7.2 Effect: The inability of the Company to require the Customer to provide general liability insurance coverage for operation of the Unit is not a waiver of any rights the Company may have to pursue remedies at law against the Customer to recover damages.

VIII. MISCELLANEOUS PROVISIONS

8.1 Third Parties: This Agreement is intended solely for the benefit of the parties hereto. Nothing in this Agreement shall be construed to create any duty to, or standard of care with reference to, or any liability to, any person not a party to this Agreement.

8.2 Severability: If any provision or portion of this Agreement shall for any reason be held or adjudged to be invalid or illegal or unenforceable by any court of competent jurisdiction, such portion or provision shall be deemed separate and independent, and the remainder of this Agreement shall remain in full force and effect.

8.3 Entire Agreement: This Agreement constitutes the entire Agreement between the parties and supersedes all prior agreements or understandings, whether verbal or written.

8.4 Waiver: No delay or omission in the exercise of any right under this Agreement shall impair any such right or shall be taken, construed or considered as a waiver or relinquishment thereof, but any such right may be exercised from time to time and as often as may be deemed expedient. In the event that any agreement or covenant herein shall be breached and thereafter waived, such waiver shall be limited to the particular breach so waived and shall not be deemed to waive any other breach hereunder.

8.5 Applicable Law: This Agreement shall be governed by and construed in accordance with the law of the State of New York.

8.6 Amendments: This Agreement shall not be amended unless the amendment is in writing and signed by the Company and the Customer.

8.7 Force Majeure: For purposes of this Agreement, "Force Majeure Event" means any event: (a) that is beyond the reasonable control of the affected Party; and (b) that the affected Party is unable to prevent or provide against by exercising reasonable diligence, including the following events or circumstances, but only to the extent they satisfy the preceding requirements: acts of war, public disorder, insurrection, or rebellion; floods, hurricanes, earthquakes, lightning, storms, and other natural calamities; explosions or fires; strikes, work stoppages, or labor disputes; embargoes; and sabotage. If a Force Majeure Event prevents a Party from fulfilling any obligations under this Agreement, such Party will promptly notify the other Party in writing, and will keep the other Party informed on a continuing basis of the scope and duration of the Force Majeure Event. The affected Party will specify in reasonable detail the circumstances of the Force Majeure Event, its expected duration, and the steps that the affected Party is taking to mitigate the effects of the event on its performance. The affected Party will be entitled to suspend or modify its performance of obligations under this Agreement, other than the obligation to make payments then due or becoming due under this Agreement, but only to the extent that the effect of the Force Majeure Event cannot be mitigated by the use of reasonable efforts. The affected Party will use reasonable efforts to resume its performance as soon as possible.

8.8 Assignment to Corporate Party: At any time during the term, the Customer may assign this Agreement to a corporation or other entity with limited liability, provided that the Customer obtains the consent of the Company. Such consent will not be withheld unless the Company can demonstrate that the corporate entity is not reasonably capable of performing the obligations of the assigning Customer under this Agreement.

8.9 Assignment to Individuals: At any time during the term, a Customer may assign this Agreement to another person, other than a corporation or other entity with limited liability, provided that the assignee is the owner, lessee, or is otherwise responsible for the Unit.

8.10 Permits and Approvals: Customer shall obtain all environmental and other permits lawfully required by governmental authorities prior to the construction and for the operation of the Unit during the term of this Agreement.

8.11 Limitation of Liability: Neither by inspection, if any, or non-rejection, nor in any other way, does the Company give any warranty, express or implied, as to the adequacy, safety, or other characteristics of any structures, equipment, wires, appliances or devices owned, installed or maintained by the Customer or leased by the Customer from third parties, including without limitation the Unit and any structures, equipment, wires, appliances or devices appurtenant thereto.

ACCEPTED AND AGREED:

Customer: ______________________________

Date: ______________________________

Company: ______________________________

Date: ______________________________

APPENDIX C

NEW YORK STATE STANDARIZED APPLICATION
FOR SINGLE PHASE ATTACHMENT OF PARALLEL
GENERATION EQUIPMENT 15 KVA OR SMALLER
TO THE ELECTRIC SYSTEM OF

Utility:______________________________

Customer:
Name: ______________________________ Phone: (___)__________

Address:______________________________ Municipality: ________________

____

Consulting Engineer or Contractor:
Name: ______________________________ Phone: (___)__________

Address:______________________________

____

Estimated In-Service Date: ______________________________

Existing Electric Service:
Capacity: __________Amperes Voltage: __________Volts
Service Character: ( )Single Phase ( )Three Phase

Location of Protective Interface Equipment on Property:
(include address if different from customer address)

____

Energy Producing Equipment/Inverter Information:
Manufacturer: ______________________________
Model No. ________________ Version No. ________________
( )Synchronous ( )Induction ( )Inverter ( )Other_________
Rating: __________kW Rating: __________kVA
Generator Connection: ( )Delta ( )Wye ( )Wye Grounded
Interconnection Voltage: __________Volts
System Type Tested (Total System): ( )Yes ( )No; attach product literature
Equipment Type Tested (i.e. Inverter, Protection System):
( )Yes ( )No; attach product literature
One Line Diagram attached: ( )Yes
Installation Test Plan attached: ( )Yes

Signature:

______________________________ ______________________________ ________________

CUSTOMER SIGNATURE TITLE DATE

APPENDIX D

NEW YORK STATE STANDARIZED APPLICATION
FOR ATTACHMENT OF PARALLEL GENERATION
EQUIPMENT 300 KVA OR SMALLER
TO THE ELECTRIC SYSTEM OF

Utility:_______________________________

Customer:
Name: ___________________________Phone: (___)_________

Address:___________________________ Municipality: _______________

____

Consulting Engineer or Contractor:
Name: ___________________________Phone: (___)_________

Address:___________________________

____

Estimated In-Service Date:_______________________________

Existing Electric Service:
Capacity: __________Amperes Voltage: __________Volts
Service Character: ( )Single Phase ( )Three Phase
Secondary 3 Phase Transformer Connection ( )Wye ( )Delta

Location of Protective Interface Equipment on Property:
(include address if different from customer address)

____

Energy Producing Equipment/Inverter Information:
Manufacturer: _______________________________
Model No. _______________ Version No. ____________
( )Synchronous ( )Induction ( )Inverter ( )Other________
Rating: __________kW Rating: __________kVA
Rated Output: ____VA Rated Voltage: ____Volts
Rate Frequency: ____Hertz Rated Speed: ____RPM
Efficiency: ____% Power Factor: ____%
Rated Current: ____Amps Locked Rotor Current: ____Amps
Synchronous Speed: ____RPM Winding Connection:
Min. Operating Freq./Time:
Generator Connection: ( )Delta ( )Wye ( )Wye Grounded
System Type Tested (Total System): ( )Yes ( )No; attach product literature
Equipment Type Tested (i.e. Inverter, Protection System):
( )Yes ( )No; attach product literature
One Line Diagram attached: ( )Yes
Installation Test Plan attached: ( )Yes

For Synchronous Machines:

Submit copies of the Saturation Curve and the Vee Curve

( )Salient ( )Non-Salient

Torque: _____lb-ft Rated RPM: _______

Field Amperes: ________ at rated generator voltage and current

and ________% PF over-excited

Type of Exciter: ____

Output Power of Exciter: ____

Type of Voltage Regulator: ____

Direct-axis Synchronous Reactance (X_d) _______ohms

Direct-axis Transient Reactance (X'_d) _______ohms

Direct-axis Sub-transient Reactance (X''_d) _______ohms

For Induction Machines:

Rotor Resistance (R_r)_____ohms

Rotor Reactance (X_r)_____ohms

Magnetizing Reactance (X_m)_____ohms

Stator Resistance (R_s)_____ohms

Stator Reactance (X_s)_____ohms

Short Circuit Reactance (X''_d)_____ohms

Exciting Current ____Amps

Reactive Power Required:

___VARs (No Load)

___VARs (Full Load)

Phases:

( )Single

( )Three-Phase

Frame Size: ____________ Design Letter: ____

Temp. Rise: ____________ ^{O}C.

For Inverters:

Manufacturer: _____________ Model:

Type: ___ ( )Forced Commutated ( )Line Commutated

Rated Output: ____Amps _____Volts

Efficiency: _____%

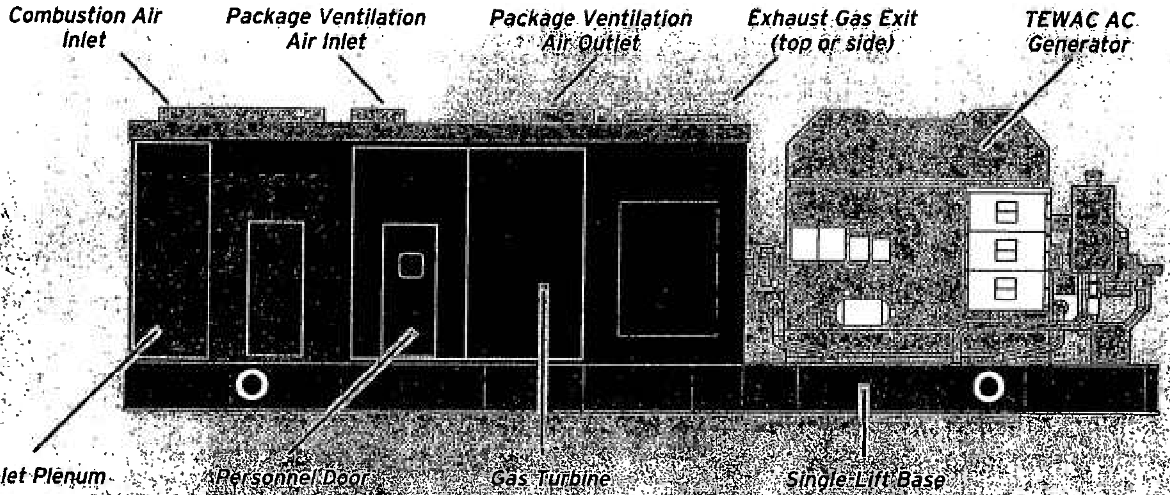
Signature:

______________________	______________________	____________
CUSTOMER SIGNATURE	TITLE	DATE

East Hampton Power & Light Company

Calverton Generating Facility

Appendix D



Base Plate Length	55' 6"	(16.91 m)
Base Plate Width	13' 6.5"	(4.12 m)
Enclosure Height	14' 5"	(4.40 m)
Overall Length	57' 0"	(17.40 m)
Base Plate Foundation Load	315,000 lb.	(143,200 kg)

	Power kW	Heat Rate Btu/kWh LHV	Heat Rate kJ/kWh LHV	No. Shafts	Pressure Ratio	Shaft Speed rpm	Exhaust Flow lb/s	Exhaust Flow kg/s	Exhaust Temp. °F	Exhaust Temp. °C
60 Hz										
LM6000PC SPRINT*	48057	8430	8894	2	30.4	3600	292.5	132.7	815	435
LM6000PC	43736	8103	8549	2	29.1	3600	280.6	127.3	831	444
LM6000PD SPRINT	46824	8235	8688	2	30.7	3600	289.7	131.4	837	447
LM6000PD	42336	8308	8765	2	29.3	3600	277.9	126.1	846	452
LM6000PD (liquid fuel)	40212	8415	8878	2	28.1	3600	268.3	121.7	857	458
LM2500PK	30676	8834	9320	2	22.5	3600	192.2	87.2	959	515
LM2500PH	22000	9328	9842	2	16.4	3600	144.9	65.7	992	533
LM2500PE	22722	9311	9824	2	18.0	3600	152.2	69.0	975	524
50 Hz										
LM6000PC SPRINT*	47937	8467	8933	2	30.6	3600	294.6	133.6	811	433
LM6000PC	43291	8157	8606	2	29.1	3627	281.9	128.1	825	441
LM6000PD SPRINT	46902	8272	8727	2	30.9	3600	292.4	132.6	834	446
LM6000PD	41711	8374	8835	2	29.3	3627	279.4	126.8	838	448
LM6000PD (liquid fuel)	40376	8452	8917	2	28.4	3627	271.7	123.2	853	456
LM2500PV	30244	8607	9081	2	21.5	6100	185.9	84.3	931	499
LM2500PH	21881	9580	10107	2	16.8	3000	148	67.1	1008	542
LM2500PE	21483	9767	10305	2	18.0	3000	152.8	69.3	983	528
Mechanical-Drive Generator Sets										
LM6000PC				2						
LM2500PK	40044	6702	7071	2	22.6	3000	193.5	88	967	519
LM2500PE	30369	7017	7403	2	18.1	3000	153.3	69.7	994	534

* SPRINT 2002 deck is used with water injection to 25ppmvd for power enhancement.

NOTE: Performance based on 59°F amb. temp., 60% RH, sea level, no inlet/exhaust losses on gas fuel with no NOx media, unless otherwise specified.

GE Aero Energy Products

A GE Power Systems Business

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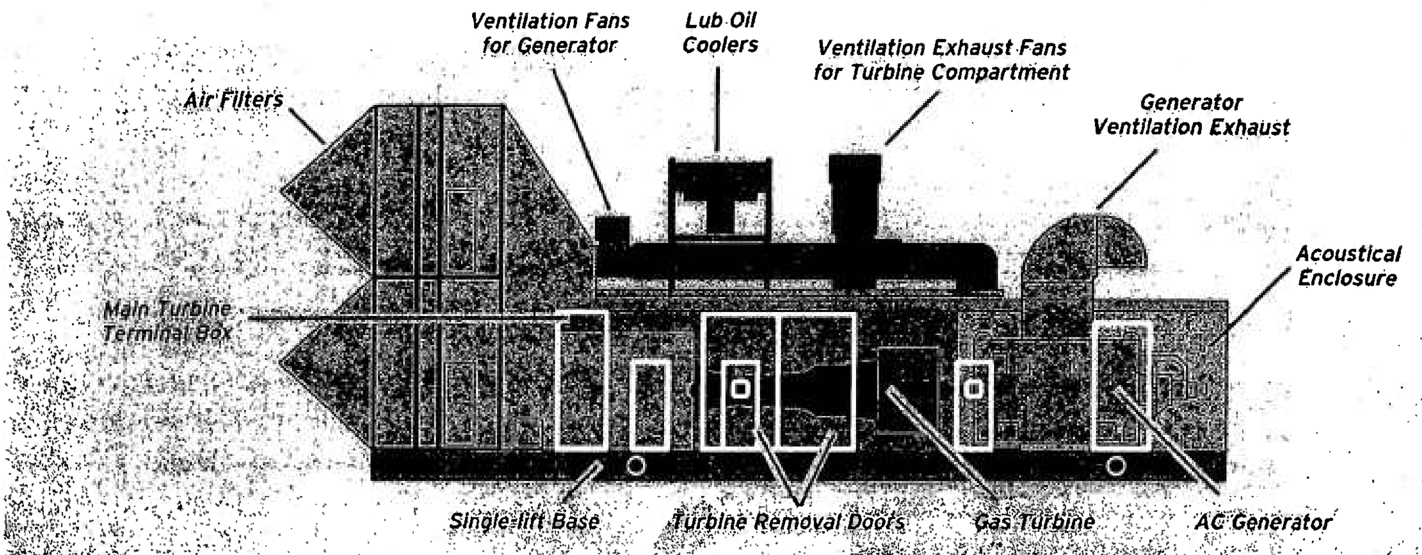

Base Plate Length	71'	0"	(21.6m)	Overall Length	78'	6"	(23.9 m)
Base Plate Width	13'	7"	(4.2 m)	Overall Width*	21'	2"	(6.2 m)
Enclosure Height	13'	6"	(4.1 m)	Overall Height*	34'	0"	(10.4 m)
* Includes air filter				Base Plate Foundation Load*	420,000 lb		(190,900 kg)

	Power kW	Heat Rate Btu/kWh LHV	Heat Rate kJ/kWh LHV	No. Shafts	Pressure Ratio	Shaft Speed rpm	Exhaust Flow lb/s	Exhaust Flow kg/s	Exhaust Temp. °F	Exhaust Temp. °C
60 Hz										
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* SPRINT 2002 deck is used with water injection to 25ppmvd for power enhancement.

NOTE: Performance based on 59°F amb. temp., 60% RH, sea level, no inlet/exhaust losses on gas fuel with no NOx media, unless otherwise specified.

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GE Aero Energy Products' factory packaging concept ensures quick delivery and fast startup. Standardized designs shorten our manufacturing schedule.

Factory Packaging

Our factories fabricate, assemble and test each package utilizing procedures certified to ISO 9000 standards. Extensive research and development, modern manufacturing techniques and on-site experience are behind the success achieved by GE Aero Energy Products.

We provide single source responsibility to the customer for package design, manufacturing, operations, training and support. GE Aero Energy Products provides single source responsibility so customers do not have to qualify hundreds of vendors and prepare specifications for all of the components in a generator set or mechanical drive unit. In addition, we warrant all of the components in the complete package.

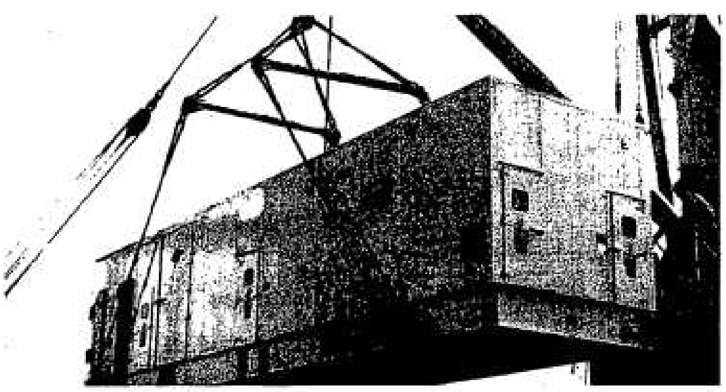
GE Aero Energy Products' factory packaging concept ensures quick delivery and fast startup. Standardized designs shorten our manufacturing schedule. A large number of essentially identical packages are always under construction, giving us the flexibility to meet your delivery requirements — often less than 100 days.

Your unit arrives ready for start-up. All major components are base plate mounted, a design that simplifies transportation and installation. No lengthy

Factory packaging advantages include:

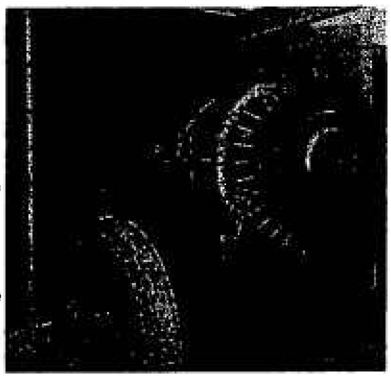
- *Single-lift modules* — easily transportable
- *Stainless steel lube and fuel systems* — reduces maintenance
- *Redundancy on critical systems* — higher reliability and availability
- *Full factory test* — reduces project risk
- *Better training* — operators learn at our factory with follow-up at your site
- *Faster field erection* — reduces startup time and costs
- *Integral support systems* — reduces installation costs

Single-lift modules' design allows easy transportation.



Installation Services

GE Aero Energy Products has been involved in the Engineering, Procurement, and Construction Management of the Balance of Plant equipment on a turnkey basis for more than 10 years. We have installed thousands of megawatts in more than 20 countries. The industry leader in fast-track power generation, GE Aero Energy Products has developed pre-engineered modularized equipment packages to quickly meet customer requirements. Whether a customer's requirements are limited to re-assembly and startup or full turnkey, GE Aero Energy Products can provide a quality project at a competitive price for your power generation or gas turbine mechanical drive project, anywhere in the world.



We have installed thousands of megawatts in more than 20 countries.

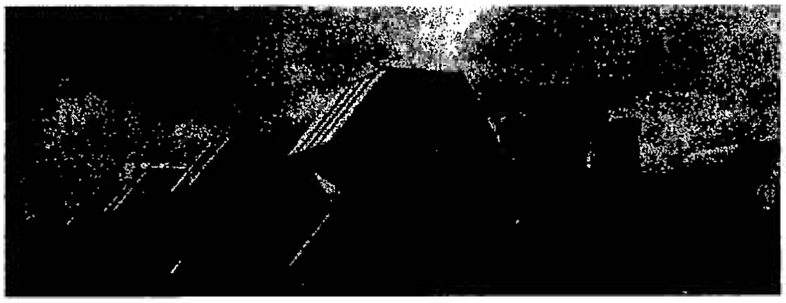
Services

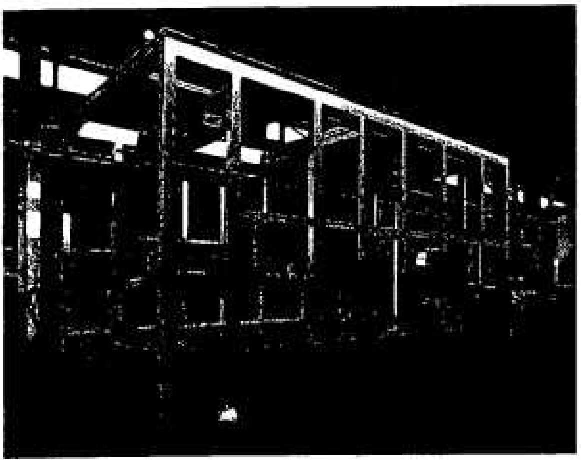
- Detailed Design
- Procurement
- Construction Management
- Logistics / Transportation
- Re-assembly
- Startup / Commissioning
- Quality Control
- Environmental Health and Safety
- Testing
- Permitting Assistance

Systems

- Water Treatment
- Substations
- Compressed Air
- Heat Recovery
- Steam Turbines
- Foundations
- Piping
- Waste Systems
- Chilled Water
- Buildings
- Fuel Systems (Gas, Liquid)

The industry leader in fast-track power generation, GE Aero Energy Products has developed pre-engineered modularized equipment packages to quickly meet customer requirements.





GE Aero Energy Products' gas turbine packages use an earthquake-qualified structural design, durable electrical systems and all stainless steel fluid systems and reservoirs.

Designed for the Long Term

GE Aero Energy Products' gas turbine packages use an earthquake-qualified structural design, durable electrical systems and all stainless steel fluid systems and reservoirs. Redundant, oversized fans keep turbine compartments cool while generators sized larger than the turbine output accommodate future rating increases. This conservative design philosophy reflects the expectations of our customers to operate the package for 20 to 30 years.

Factory Testing

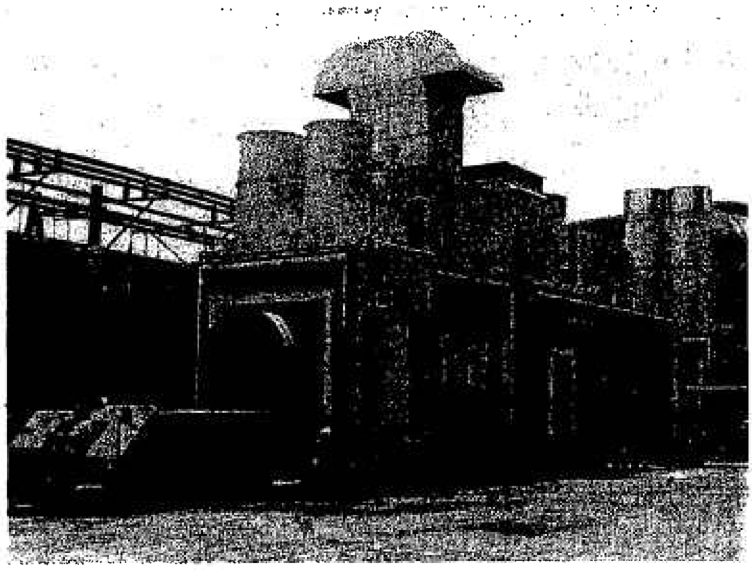
All packages are factory assembled and tested before shipment. Customers are encouraged to witness and participate in the testing. This comprehensive test uses the customer's contract control panel and auxiliary systems to minimize field startup and debugging time.

Advanced Digital Control Systems

GE Aero Energy Products' control systems utilize a modular digital architecture:

- Rugged GE Mark VI microprocessor control for engine monitoring with integrated fuel management
- GE Fanuc programmable logic controller; ladder logic control for automatic sequencing of auxiliary equipment during start/stop
- High-speed digital processing with integrated data logging/trending capability
- Operator-friendly interface with PC, color CRT and on-line diagnostics
- Easy expansion for future needs
- Optional capability to control simple-cycle balance-of plant equipment without

Comprehensive testing before shipment reduces risks and speeds delivery.



Superior Customer Training

GE Aero Energy Products offers complete classroom and hands-on operator training at our facility or your job site — no matter where you are located around the world. Operators will learn valuable information, which will help to eliminate costly mistakes during start-up or operation.

Initial training can even begin at our factory during testing of the turbine package. The training improves operator confidence and trouble-shooting capability during the project start-up.

7. 7EA Major Equipment

Page

7.1 Gas Turbine....................7.2
7.2 Generator....................7.7
7.3 Generator Auxiliaries....................7.10
7.4 Control System and Electrical Auxiliaries....................7.11
7.5 Services....................7.15

7.1 Gas Turbine

Base-mounted, single-shaft PG7121 gas turbine and compartment including:

- Modulating inlet guide vanes
  - — C450 material
- Multi-stage, axial flow, corrosion protected compressor
  - — Protective paint on the compressor wheels on the first eight stages
  - — C450 compressor blades for the first three (3) stages
  - — Compressor inlet thermocouple
  - — Borescope inspection port in compressor casing
  - — Compressor inlet humidity sensor
- Ten (10) chamber combustion system
  - — Nimonic transition pieces
  - — Thermal barrier coated combustion liners
  - — Dry Low NOx (DLN) combustors
- Three (3)-stage turbine
  - — Directionally solidified GTD-111 material (1st stage)
  - — Coated first stage buckets
  - — Borescope inspection port in turbine shell
- Fuel system
  - — Dual fuel: natural gas and #2 distillate, auto transfer
  - — Stainless steel gas piping
  - — Stainless steel fuel oil piping
  - — Stainless steel atomizing air piping
  - — Water injection for NOx control when operating on liquid fuel
- Vibration sensors
  - — Seismic type for protection
  - — Proximity readout

- Thermocouples for measuring critical turbine temperatures
  - — Bearing metal thermocouples
  - — Wheelspace thermocouples (externally removable)
- Fully lagged enclosure for outdoor installation
  - — Load coupling compartment lagging
  - — Turbine compartment lagging
  - — Single accessory/turbine compartment vent fans
- Exhaust frame/No. 3 bearing area cooling fan modules (2) mounted at left side of unit
- Rigid, non-lubricated load coupling
  - — Load coupling guard
- Fire detection and protection system
  - — Compartment warning signs
  - — Fire protection piping
- Water wash system including:
  - — Compressor wash piping and nozzles
- On-base piping per ANSI B31.3 (axially welded pipe may be used as allowed)
- Area classification features:
  - — National Electrical Code (NEC) Class I, Group D, Division 2 (turbine/gas interconnect compartment only)
- Base-mounted terminal boxes and interconnecting wiring in rigid metal conduits per National Electrical Code (NEC)
  - — Underwriters Laboratories/Factory Mutual (UL/FM) certified wire

7.1.1 Turbine Inlet Air System

- Up and over orientation
- Inlet air compartment with:
  - — Self-cleaning type filter
  - — Compressor bleed air supply for self-cleaning filter
  - — Support structure

- Instrumentation
  - Inlet system pressure differential indicator
  - Inlet system pressure differential alarm
- Inlet silencing 2.4 m (8 ft)
  - Perforated stainless steel construction
- Inlet duct section
- Inlet elbow
- Inlet expansion joint
- Inlet transition piece from duct to plenum
- Structural support
- Zinc rich paint on inside and outside of inlet system

7.1.2 Turbine Exhaust System

- Exhaust system arrangement
  - Right side exhaust
- Exhaust ducting
  - Exhaust expansion joint
- Architectural siding
- Exhaust system protection
  - Stainless steel lining with carbon steel shell
  - Zinc rich paint outside only

7.1.3 Accessory Systems Compartment (In Line with Turbine Compartment)

Accessory systems module for the turbine package including:

- Fully lagged enclosure for outdoor installation
- Fire detection and protection system
- Compartment lighting, ac and dc

- Accessory gear heavy duty, multi-shaft with oil-filled accessory coupling to turbine shaft
- Starting System
  - — Electric motor starter (4000 V, 60 Hz, 800 hp)
  - — Torque converter
  - — Non-self-sequencing hydraulic ratchet
  - — Rotor Indexing for borescope inspection
- Lubricating and hydraulic oil system
  - — Shaft-driven main lube oil pump
  - — Auxiliary ac motor-driven lube oil pump
  - — DC motor-driven emergency lube oil pump
  - — Dual lube oil filters
  - — Shaft-driven main hydraulic pump
  - — Auxiliary ac motor-driven hydraulic pump
  - — Dual hydraulic filter
  - — Dual lube oil coolers (plate and frame type)
  - — ASME code stamp
    - – Lube oil coolers
    - – Lube oil filters
  - — 304L stainless steel lube oil feed pipe
  - — Carbon steel drain piping
  - — Lube vent demister
  - — Stainless steel valve trim
  - — Instrumentation
    - – Lube and hydraulic filter delta P switch for alarm
    - – Trip test function for pressure switches
  - — Lube oil heater
- Distillate fuel oil system
  - — Accessory gear driven fuel oil pump
  - — Single, on-base fuel oil filter
  - — Fuel oil flow divider

- Atomizing air system
  - — Accessory gear driven main air compressor
  - — Motor-driven booster compressor for startup
  - — Atomizing air cooler
- Fire detection and protection system
- Electrical component features (except starting motor)
  - — GE Energy Saver™ motors
  - — 480 V/240 V, 3-phase, 4-wire, 60 Hz, auxiliary power
  - — Severe duty
  - — TEFC
  - — Tropicalized with anti-fungus coating

7.1.4 Liquid Fuel Forwarding Skid

- Fully lagged enclosure for outdoor installation
- Located at fuel tank
- Dual inlet liquid fuel strainers
- Liquid fuel heater
- Single unit - one (1) ac motor-driven pump
- Two units - three (3) 100% ac motor-driven pumps

7.1.5 Fuel Gas Module

The module includes:

- Fully lagged enclosure for outdoor installation
- Fuel gas strainer
- Vent fan
- Stainless steel piping
- Combined fuel gas stop/speed ratio and control valves

7.1.6 Auxiliary Skids and Components (One/Unit Unless Noted)

- Water injection skid with enclosure
- Water wash skid with enclosure (one/site)
- Off-base industrial cooling water system
- Air processing skid (for self-cleaning filters and pneumatic valves)
- Low pressure CO_2 fire protection skid located off-base

7.2 Generator

- Open ventilated air-cooled
- Outdoor installation
- Class F armature and rotor insulation
- Class B temperature rise, armature and rotor winding
- 0.85 power factor (lagging)
- Power factor (leading) - refer to capability curve
- 60 Hz generator frequency
- Generator voltage 13.8 kV
- Generator bearings
  - — Pedestal bearing support
  - — Tilting pad bearings
  - — Roll out bearing capability without removing rotor
  - — Insulated exciter end bearing
  - — On-line bearing insulation check
- Monitoring Devices
  - — Two (2) velocity vibration probes at turbine end, 1 at collector end
  - — Provisions for proximity probes

- Generator Field
  - — Direct cooled field
  - — Two-pole field
  - — Finger type amortissuers
- Assembly Brushless Exciter
  - — Exciter armature
  - — Diode wheel
  - — Exciter housing
- Wiring
  - — Voltage separated junction boxes
  - — NEMA 4 junction boxes (collector compartment)
  - — NEMA 4X (stainless steel) junction boxes (exterior locations)
  - — Hardwired cable interconnections
  - — Electrical devices and wiring UL/FM approved
  - — Electrical devices meets US National Electrical Code
- Installation devices
  - — Lifting and jacking trunions

7.2.1 Generator Lube Oil Systems and Equipment

- Lubrication system integral with gas turbine lubrication system
  - — Bearing lube oil
    - – Low lube oil pressure switches
    - – Lube oil block and porting valve assembly
    - – One (1) oil drain sight flow per bearing
  - — Lube oil system piping materials
    - – Stainless steel lube oil feed pipe
    - – Stainless steel lube oil drain pipe
    - – Seamless oil piping
    - – Flexible pipe as permitted by ANSI 31.3

7.2.2 Generator Cooling System

- Open ventilated air cooling system
  - — Equipped with silencers

— Self-cleaning type filters

7.2.3 Generator Temperature Devices

- Stator winding temperature devices
  - — 100 ohm platinum RTDs (Resistance temperature detector)
  - — Grounded RTDs
  - — Six (6) stator slot RTDs
- Gas path temperature devices
  - — 100 ohm platinum gas path RTDs
  - — Single element RTDs
- Bearing temperature devices
  - — Chromel alumel (type K) thermocouples
  - — Dual element temperature sensors
  - — Two (2) bearing metal temperature sensors per bearing
- Lube oil system temperature devices
  - — Chromel alumel (type K) thermocouples
  - — Dual element temperature sensors
  - — One (1) bearing drain temperature sensor per drain

7.2.4 Generator Enclosure

- Enclosure for outdoor installation
  - — Prime painted
- Line-side terminal enclosure
- Neutral terminal enclosure
  - — Integral with generator base assembly
  - — Forced ventilation
  - — Neutral tie
- Compartment lighting and outlets
  - — AC lighting
    - – Turbine end
    - – Exciter compartment
  - — DC lighting

    - Turbine end
    - Exciter compartment
  - Convenience outlets
    - Exciter compartment
- Fire dampers in load coupling compartment
- Fire damper in generator base
- Heaters to prevent condensation
  - Generator stator
  - Generator collector

7.3 Generator Auxiliaries

7.3.1 Compartments

7.3.1.1 Generator Line Accessory Compartment (GLAC)

- Copper bus bars for line termination
- Enclosure for outdoor installation
  - Side mounted
  - Convection cooled

7.3.1.2 Generator Switchgear Compartment (GSC)

- Outdoor metal-clad walk-in switchgear compartment
- Draw-out generator breaker (52G)
- Current transformers
- Fixed type voltage transformer (non-drawout)
- Lightning arresters
- Generator power leads connect at the end wall
- Transformer power leads connect out the top
- Disconnect link for connection to auxiliary transformer

7.3.2 Electrical Equipment

- Motors
  - — TEFC motors
  - — Coated with antifungal material for protection in tropical areas
  - — Extra severe duty motors
  - — Cast iron motor housings
- Current transformers (ratio 8000:5A)
  - — Neutral CTs
    - – CT1, CT2, CT3 (Metering class - 0.3B-1.8 (ANSI C57.13))
    - – CT4, CT5, CT6 (Relaying class C200)
    - – CT7, CT8, CT9 (Relaying class C800)

7.4 Control System and Electrical Auxiliaries

7.4.1 Packaged Electric and Electronic Control Compartment (PEECC)

- Control system and electrical auxiliaries
- Two (2) 100% capacity air conditioners
- Lighting and power outlets

7.4.2 SPEEDTRONIC Mark V Turbine Control Panel

- Triple modular redundant (TMR)
- Local "I" processor (computer)
- Single remote "I" processor
- One (1) Mark V per stage link
- RS232 serial link (Modbus)
- Mark V to <I> connection < 15 m (50 ft)
- Demand display
- Extended I/O

- Customer input contacts
- Customer output contacts
- Normal start/normal load
- Normal start/fast load
- Speed matching, synch and check
- Generator manual synchronization
- Generator synchronizing module
- Isochronous control
- Droop control
- Constant adjustable droop
- Power factor calculation and display
- Load limiter
- Base load only
- Preselected load - manual set point
- Trip signal display
- Bearing metal temperature readout and alarm
- Fire protection discharge - time delay
- Vibration alarm readout and trip (seismic only)
- Redundant sensors for critical measurements
- Combustion monitor
- Wheelspace temperature readout and alarm
- Generator stator overtemperature protection
- Generator coolant and stator temperature indicator

7.4.3 Generator Protection Panel

- Mark V Integration
  - — Auto synchronizing displayed on Mark V
  - — Mark V with speed matching
  - — Manual synchronizing displayed on Mark V (<I>)
  - — Load control in Mark V
  - — Temperature indication - for generator RTDs
- Generator Breaker Trip Switch (52g/cs)
- Generator Digital Meter
  - — VM - Generator volts: 1-2, 2-3, 3-1
  - — AM - Generator amps: Phase 1, 2, 3 and neutral
  - — MWATTS - Generator megawatts
  - — MVAR - Generator megaVARs
  - — FM - Generator frequency
  - — MVA - Generator MVA
  - — PF - Generator power factor
  - — MWH - Generator megawatt-hours
  - — MWVAH - Generator MVA hours
- Digital Generator Protection System (DGP)
  - — Overexcitation (24)
  - — Generator undervoltage (27G)
  - — Reverse power (32)
  - — Loss of excitation (40)
  - — Current unbalance (46)
  - — Ground overcurrent (51GN)
  - — System phase fault relay (51V)
  - — Overvoltage (59)
  - — Stator ground detection (64G)
  - — Over frequency (81O)
  - — Under frequency (81U)
  - — Generator differential lockout relay (86G-1)
  - — Generator differential (87G)

- — Voltage transformer fuse failure (VTFF)

- Protective Relays
  - — Synchronizing undervoltage (27BS-1, 2)
  - — Bus ground fault (59 BN)
  - — Breaker or lockout trip coil monitor (74)

- Step-up Transformer Protection (include in panel)
  - — Overcurrent (51)
  - — Neutral overcurrent (51TN)
  - — Sudden pressure relay (63PX)
  - — Lockout relay (86T)
  - — Differential (87T)

7.4.4 Local Operator Interface <I>

- Table top 14 in. color monitor
- Trackball cursor control
- Table top AT 101 spillproof keyboard
- 24 pin dot matrix printer
- 50 ft of Arcnet cable between Mark V panel and local operator interface <I> for indoor use
- Display in English language

7.4.5 Generator Excitation

- EX2000BR digital static voltage regulator
- Field ammeter with display in Mark V
- Field voltmeter with display in Mark V
- Generator field ground (64F)
- Reactive current compensator (RCC)
- Auto tracking between automatic and manual voltage regulator
- Under reactive amp limit alarm (URAL)

- Volts/hertz limiter
- Dual level volts/hertz protection

7.4.6 Motor Control Center

- Copper buswork
- 480 V, 60 Hz auxiliary power

7.4.7 Batteries and Accessories

- Lead acid battery and charger

7.5 Services

- Technical advisory services
- Customer training by field service
- Gas turbine field tests
  — Station instrument field performance test
- Transportation
  — Domestic freight
- Documentation
  — Up to ten (10) sets of English language service manuals per station, including Operation, Maintenance and Parts volumes
- Installation Equipment
  — Trunions for generator
  — Foundation/installation washer and shim packs

1. Scope of Supply – 7EA GTG

1.1 Gas Turbine Systems....................1.2
1.2 Generator....................1.7
1.3 Gas Turbine-Generator Controls and Electric Auxiliaries......1.11
1.4 Services....................1.17

This chapter presents a listing of the equipment and services which GE typically provides. The list is only a **quick reference** to the scope of supply.

1.1 Gas Turbine Systems

1.1.1 Gas Turbine

Base-mounted gas turbine including:

- Modulating IGV

1.1.2 Combustion System

- Dry Low NOx combustion system
- Combustion system features
  - Thermal barrier coated liners
  - Nimonic transition pieces
  - Reuter Stokes SiC flame detectors
  - Compressor inlet heating

1.1.3 Fuel System

1.1.3.1 Gas Fuel System

- Stainless steel gas piping
- Orifice type gas flow measurement system
- Single gas strainer
- Off base gas fuel module in a standardized location

1.1.4 Lubricating and Hydraulic Systems

1.1.4.1 Pumps

- Shaft driven main lube oil pump
- Shaft driven main hydraulic pump
- AC motor driven, auxiliary lube oil and hydraulic pumps
- DC motor driven, emergency lube oil pump

1.1.4.2 Filters and Coolers

- Dual lube oil system filters
- Dual hydraulic oil filters
- Dual lube oil coolers
  - With 90-10 copper-nickel U-tubes
- ASME code stamp
  - Lube oil coolers
  - Lube oil filters

1.1.4.3 Lube Oil Piping

- 304L stainless steel lube oil feed pipe
- Carbon steel lube oil drain pipe
- Lube system valve stainless steel trim
- Schedule 10 lube oil piping inside lube oil tank

1.1.4.4 Mist Elimination

- Lube vent demister

1.1.4.5 Oil Reservoir

- With heater for -20°F

1.1.4.6 Instrumentation

- Delta pressure switches for lubrication and hydraulic oil filters

1.1.5 Inlet System

- Inlet system arrangement
  - Up and forward inlet system arrangement
  - Inlet compartment supports straddle ductline
- Inlet filtration
  - Self-cleaning inlet filter
  - Compressor bleed air supply for filter cleaning

- Moisture resistant filter media (high humidity environments)
- Air processing unit (APU) with galvanized steel piping
- APU heat tracing kit
- APU NEMA 4X kit
- Weather protection on inlet filter compartment
- Inlet system differential pressure indicator
- Inlet system differential pressure alarm
- Inlet filter compartment support steel (Seismic Zone 2A, <= 100 mph wind speed)
- Caged ladder access to inlet filter compartment
- Left hand access to inlet filter compartment

• Inlet heating
  - Bleed heat manifold located in duct
  - Compressor pressure ratio operating limit bleed heat control
  - Inlet bleed heat control valve(s)

• Inlet ducting
  - Inlet silencing
  - Inlet duct section arrangement per proposed mechanical outline
  - Inlet expansion joint
  - Inlet 90 degree elbow
  - Inlet transition piece
  - Inlet ducting support steel (Seismic Zone 2A, = 100 mph wind speed)

• Inlet system atmospheric protection
  - Zinc rich paint inside and outside of inlet filter compartment
  - Zinc rich paint on inlet filter compartment support steel
  - Zinc rich paint inside and outside of inlet ducting with epoxy top coat inside ducting
  - Stainless steel inlet silencing perforated sheet
  - Zinc rich paint on inlet ducting support steel

1.1.6 Exhaust System

1.1.6.1 Arrangement

• Exhaust plenum with right side exit

- Exhaust expansion joint

1.1.7 Couplings

- Oil filled accessory coupling
- Rigid load coupling
- Load coupling guard

1.1.8 Gas Turbine Packaging

- Lagging and enclosures
  - Load coupling compartment lagging
  - Off-base acoustic enclosure for turbine and accessory compartments
  - Acoustic barrier wall around exhaust plenum and load
- Compartment ventilation, pressurization and heating
  - Single turbine and accessory compartment vent fan
  - Single load compartment vent fan
  - Heated turbine and accessory compartments for humidity control
- Plant arrangement
  - Turbine designed for installation outdoors
  - In-line accessory module
  - Exterior unit walkways by customer, mounting pads by GE
- Turbine and accessory base painting
  - Standard primer only
- UBC Seismic Zone 4 (except for inlet and exhaust)
- UBC Seismic Zone 2A for inlet and exhaust
- Hazardous area classification
  - NEC Class1, Group D, Division 2
    - Turbine compartment
    - Accessory compartment
    - Natural gas fuel compartment
- Special features
  - Dual (metric-English) indicators and gauges

1.1.9 Fire Protection System

- Fire detection system
  - Turbine, accessory and load coupling compartments
- Smoke detection system
  - Control cab/PEECC
- Compartment warning signs
- CO_2 supply system
  - One low pressure CO_2 tank per unit
  - Tank suitable for 0-120°F (-18 to 49°C)
- Fire protection piping
  - Turbine and accessory enclosures
- Hazardous atmosphere detectors in turbine and gas fuel compartments
- Hazardous atmosphere detector readout
  - CHx

1.1.10 Cleaning Systems

- On base piping for on and offline compressor water wash system

1.1.11 Cooling Water System

- Cooling system temperature regulating valve

1.1.12 Starting Systems

- AC motor start
- Rotor turning systems
  - Rotor indexing (borescope inspection)
  - Non self-sequencing, hydraulic ratchet

1.1.13 Miscellaneous Systems

1.1.13.1 Special Systems

- Exhaust frame blowers on left side

1.2 Generator

1.2.1 General Information

- Open ventilated air-cooled generator
- Outdoor installation
- 60 Hz generator frequency
- Generator voltage 13.8 kV
- 0.85 power factor (lagging)
- Capability to 0.95 power factor (leading)
- Class "F" armature and rotor insulation
- Class "B" temperature rise, armature and rotor winding
- Self-cleaning inlet filters
- Generator bearings
  - Pedestal bearing support
  - Tilting pad bearings
  - Roll out bearing capability without removing rotor
  - Insulated collector end bearing
  - Offline bearing insulation check with isolated rotor
- Monitoring Devices
  - Two (2) velocity vibration probes at turbine end, one (1) at collector end
  - Provisions for key phasor-generator
  - Provisions for permanent flux probe
  - Proximity vibration probes
    - Two probes per bearing at 45° angle

- Generator Field
  - Direct cooled field
  - Two-pole field
  - Finger type amortissuers

1.2.2 Generator Lube Oil Systems and Equipment

- Bearing lube oil system
  - Generator lube oil system integral with turbine
  - Sight flow indicator
- Bearing vapor extraction
  - Coalescent mist eliminator
- Lube oil system piping materials
  - Stainless steel lube oil feed pipe
  - Stainless steel lube oil drain pipe
  - Welded oil piping

1.2.3 Generator Grounding Equipment

- Neutral grounding equipment
  - Neutral ground transformer and secondary resistor
  - Mounted in neutral terminal enclosure

1.2.4 Generator Temperature Devices

- Stator winding temperature devices
  - 100 ohm platinum RTDs (resistance temperature detector)
  - Single element RTDs
  - Grounded RTDs
  - Six (6) stator slot RTDs
- Gas path temperature devices
  - 100 ohm platinum gas path RTDs
  - Single element temperature sensors
  - Two (2) hot gas
- Bearing temperature devices
  - Chromel alumel (type K) thermocouples

- Dual element temperature sensors
- Two (2) bearing metal temperature sensors per bearing

- Lube oil system temperature devices
  - Chromel alumel (type K) thermocouples
  - Dual element temperature sensors
  - One (1) bearing drain temperature sensor per drain

1.2.5 Packaging, Enclosures, and Compartments

- Paint and preservation
  - Standard alkyd beige primer
  - Terminal enclosure shipped separate
- Neutral terminal enclosure
  - Neutral CTs
  - Neutral ground equipment mounted in enclosure
- Collector compartment/enclosure
  - Collector compartment/enclosure shipped installed
  - Outdoor
  - Exciter enclosure for brushless exciter
- Foundation hardware
  - Generator shims
  - Generator alignment key(s) - collector end

1.2.6 Electrical Equipment

- Motors
  - TEFC motors
  - Coated with antifungal material for protection in tropical areas
  - High ambient motor insulation
  - Motor heaters connected to ac power
  - Energy saver motors
  - Extra severe duty motors
  - Cast iron motor housings
- Heaters
  - Generator stator heaters

- Generator collector heaters

1.2.7 Generator Excitation Systems, Static Components

- EX2000BR brushless field excitation regulator

1.2.7.1 Excitation Module Features

- Control/monitor/display through TCP
  - Voltage matching in turbine control system
  - Selection of automatic or manual regulator
  - Raise-lower of the active regulator setpoint
  - Enter setpoint command
  - Display field amps
  - Display field volts
  - Display transfer volts
- Built-in diagnostic display panel
  - Automatic voltage regulator (AVR)
  - Manual voltage regulator (FVR)
  - Automatic and manual bi-directional tracking
  - Reactive current compensation (RCC)
  - Volts per hertz limiter (V/Hz LIM)
  - Volts per hertz protection (24EX) (Backup to 24G)
  - Over excitation limiter (OEL)
  - Offline/online over excitation protection (76EX)
  - Under excitation limiter (UEL)
  - Generator overvoltage protection (59EX)
  - Generator field ground detector trip (64FT)
- Dual source internal bulk power supply
- Millivolt shunt for field
- Surge protection
  - Two phase current sensing
  - Three phase voltage sensing
  - Single pole dc field contactor/bridge

1.2.7.2 Performance

- 0.5 response ratio and 140% VFFL (100°C) ceiling @ Vt = 1.0pu

1.2.8 Generator Medium Voltage Enclosure

- Metal clad switchgear compartment
- 1000 MVA/5000 A at 40°C generator breaker
- Breaker rollout
- Dual generator breaker trip coils
- Lightning arresters
- Power leads straight through switchgear compartment
- Non segregated bus duct for outgoing power connection

1.2.9 Generator Current Transformers and Potential Transformers

- Current transformers (CTs)
  - C200 current transformers (CTs)
  - Line side CTs
    - CT 21, 22, 23 (generator differential relay)
  - CT ratio - 8000:5A
  - Neutral CTs
    - CT1, CT2, CT3
    - CT4, CT5, CT6
    - CT7, CT8, CT9
- Potential transformers (PTs)
  - Fixed

1.3 Gas Turbine-Generator Controls and Electric Auxiliaries

1.3.1 Control Cab/Packaged Electric and Electronic Control Compartment (PEECC)

- Control panels mounted on a common skid

- Weatherproof, climate controlled, base mounted enclosure
- Supplemental wall-mounted air conditioner

1.3.2 Gas Turbine Control System Panel Features

- Triple modular redundant (TMR)
- Skid mounted control panels
- Auto/manual synchronizing module with synchronizing check function
- Generator stator overtemperature alarm (49)
- Droop control
- Load limiter
- Automatic transfer from gas to liquid fuel
- Additional customer input contacts (digital), as available
- Additional customer output contacts (digital), as available
- Provision for analog outputs to customer, as available
- Wet low NOx data for EPA compliance
- Vibration alarm readout and trip
- Electrical overspeed protection
- Constant settable droop
- Manual set point preselected load

1.3.3 Local Operator Station

- Commercial grade personal computer
- Color monitor
  - Table top
  - 15 in. screen
- Mouse cursor control
- Table top AT 101 keyboard

- Printer
  - 24 pin dot matrix
- Display in English language
- 50 ft of Arcnet cable between gas turbine control system panel and local operator interface <I>/HMI for indoor use
- RS232C two way serial link (MODBUS) via local <I>

1.3.4 Remote Control and Monitoring Systems

- One remote operator interface <I>
- Commercial grade personal computer
- Color monitor
  - Table top
  - 20 in. screen
- Mouse cursor control
- Table top AT 101 keyboard
- Printer
  - 24 pin dot matrix

1.3.5 Rotor, Bearing and Performance Monitoring Systems

- Vibration sensors
  - Velocity vibration sensors
  - Proximity vibration sensors
- Bently Nevada 3300 monitor
  - Relay outputs wired to gas turbine control panel
- Bearing thermocouples
  - Bearing drain thermocouples
  - Bearing metal thermocouples
- Borescope access holes

1.3.6 Generator Control Panel

1.3.6.1 Generator Control Panel Hardware

- Mounted in PEECC
- Skid mounted with turbine panel
- DGP without test plug capability
- DGP without ModBus communication interface
- DGP with communication interface
- DGP with oscillography capture
- DGP with redundant internal power supply
- Generator breaker trip switch (52G/CS)
- Humidity sensor readout
- Hazardous atmosphere detector readout
- Bentley Nevada vibration monitor(s)

1.3.6.2 Digital Generator Protection System (DGP)

- Generator overexcitation (24)
- Generator undervoltage (27G)
- Reverse power/anti-motoring (32-1)
- Loss of excitation (40-1,2)
- Current unbalance/negative phase sequence (46)
- System phase fault (51V)
- Generator overvoltage (59)
- Stator ground detection (64G1)/(59GN)
- Generator over/under frequency (81O-1, 81U-1)
- Generator differential (87G)
- Voltage transformer fuse failure (VTFF)

1.3.6.3 Generator Protection Discrete Relays

- Synchronizing undervoltage relay (27BS-1,2)
- Breaker failure protection relay (50/62BF, 62BF)
- Breaker or lockout trip coil monitor relay (74)
- DC tripping bus, blown fuse protection relay (74-2)
- Generator differential lockout relay (86G-1)
- Second generator lockout relay (86G-2)

1.3.6.4 Features Integrated Into Gas Turbine Control System

- Gas turbine control system with speed matching, synchronization and check
- Manual synchronization displayed on gas turbine control system <I>
- Auto/manual synchronizing module displayed on gas turbine control system <I>
- Load control in gas turbine control system
- Temperature indication for generator RTDs
- Generator voltage matching (90VM)

1.3.6.5 Generator Control Panel Metering

- Generator digital multimeter
  - VM - Generator volts
  - AM - Generator Amps: Phase 1,2,3 and Neutral
  - MW - Generator MegaWatts
  - MVAR - Generator MegaVARs
  - FM - Generator frequency
  - MVA - Generator MVA
  - PF - Generator power factor

1.3.6.6 Generator Control Panel Transducers

- Generator watt/VAR transducer 4-20 mA output for input to TCP (96GG-1)

- Generator TCP/droop control transducer 4-20 mA output (96GW-1)

1.3.7 Generator Protection

- Generator electrical protection equipment
  - Ground brush rigging

1.3.8 Batteries and Accessories

- Lead acid battery
- Single phase battery charger
- Battery and charger mounted in the PEECC

1.3.9 Motor Control Center

- MCC mounted in control cab/PEECC
- Tin-plated copper bus-work
- 42 kA bracing
- 480V 60 Hz auxiliary power

1.3.10 Motor Features

- TEFC motors less than or equal to 200 hp
- Coated with antifungal material for protection in tropical areas
- High ambient motor insulation
- Energy saver motors
- Extra severe duty motors
- Cast iron motor housings
- All redundant motors to be lead/lag
- Motor heaters
  - Rated 110/120 volts, 50/60 Hz
- WP starting motor

1.4 Services

- Transportation
  - Generator shipped with rotor installed
- Documentation
  - Up to 10 sets of English language service manuals per station, including Operation, Maintenance and Parts volumes
- Turbine maintenance tools
  - Guide pins (for removal or replacement of bearing caps, compressor casing and exhaust frame)
  - Fuel nozzle wrenches
  - Fuel nozzle test fixture
  - Spark plug electrode tool
  - Clearance tools
  - Fuel nozzle staking tool
  - Combustion liner tool
  - Bearing and coupling disassembly fixture
- Generator maintenance tools (1 set per site)
  - Rotor lifting slings
  - Rotor removal equipment including shoes, pans, pulling devices
- Installation equipment
  - Trunions for generator
    - On permanent basis
  - Foundation/installation washer and shim packs
- Electrical System Studies
  - All electrical system integration/setting studies by customer, except as follows
  - Settings for generator: DGP, 27BS, and 59BN relays, as applicable

2. Customer Scope of Supply – 7EA GTG

2.1 Gas Turbine-Generator Systems 2.2
2.2 Civil 2.6
2.3 Installation/Erection 2.6
2.4 Start-Up/Test 2.7
2.5 Interconnecting Piping, Wire, and Cable 2.7

To provide a complete operational installation, additional equipment and services not included in this proposal must be provided by the customer or the installer. These include, but are not limited to, the following:

2.1 Gas Turbine-Generator Systems

2.1.1 Fuel System

- Gas fuel in accordance with GEI-41040, Process Specification Fuel Gases for Combustion in Heavy-Duty Gas Turbines (see Reference Documents chapter)
  - Gas heating to 50°F (28°C) above dew point
  - Gas supply shutoff valve located remotely from the unit

2.1.1.1 Customer Gas Fuel Systems Supply Requirements

2.1.1.1.1 Summary of Typical Natural Gas Fuel Supply Conditions

1. The gas fuel pressures specified in this document are referenced to FG1. This point identifies the purchaser connection as shown on the Purchaser Connection Drawing.
2. The fuel gas delivered to the turbine is to meet the most recent revision of the Process Specification Fuel Gases For Combustion in Heavy-Duty Gas Turbines - GEI-41040.
3. Maximum supply pressure excursions are limited to either 1% per second ramp or 5% step. The 1% per second ramp is applicable over the range of minimum pressure requirement to maximum operating pressure. The 5% step is applicable over the range of minimum pressure requirement to 95% of maximum operating pressure and with a maximum of one 5% step change in 5 seconds.
4. Provide over-pressure protection, (including safety valve accumulation), such that the maximum mechanical design pressure is not exceeded at FG1.
5. ANSI Class VI shut-off in the gas fuel supply line should be provided by the stop/speed ratio valve. If the supply conditions (pressure and temperature) exceed the Class VI shut off limitation on the stop/speed ratio valve, then an automated, hydraulically controlled, Class VI shut-off valve is to be installed upstream of the stop/speed ratio valve.

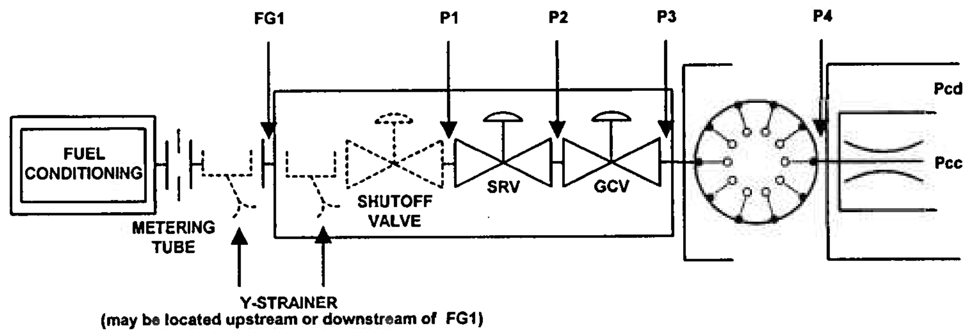
2.1.1.1.2 Fuel Supply Pressure Requirements

Measurement	Value
Model Series	
Combustor	
Maximum Mechanical Design Pressure psig (kPa)	
Maximum Operating Pressure psig (kPa)	
Minimum required pressure psig (kPa)	
Maximum temperature at minimum pressure °F(°C)	
Customer fuel modified Wobbe Index = Btu/((SCF) (°R^½))	

Notes:

1. The minimum pressure is specified at FG1 with respect to the model series, fuel temp, ambient conditions, combustor, and customer design fuel.
2. Maximum mechanical design pressure is specified to provide over-pressure protection, (including safety valve accumulation), such that the maximum mechanical design pressure value is not exceeded at FG1.
3. Maximum operating pressure refers to the maximum turndown capability of the speed ratio valve.
4. Minimum pressure required is referenced to the coldest ambient temperature and the maximum fuel temperature. This value is applicable across the range of operation.
5. Minimum fuel temp required superheat above the hydrocarbon dewpoint at FG1 is quoted in GEI41040.
6. The Modified Wobbe Index allowable variation from that quoted in the table is ± 5%.

Fuel Pressure Reference Points
(typical)



NOTES:
1. FG1 is the customer connection point to the gas fuel module.
   FG1 is the reference point for all pressures quoted in this standard.
2. P1 is the pressure at the inlet to the stop/speed ratio valve.
3. P2 is the inter-valve pressure between the stop/speed ratio valve and the gas control valve.
4. P3 is the discharge pressure from the gas control valve.
5. P4 is the pressure at the combustor end cover.
6. Pcd is the compressor discharge pressure measured in the compressor discharge casing.
7. Pcc is the pressure at the discharge tip of the fuel nozzle.
8. All pressures shown in this diagram are static pressure.
9. If the stop/speed ratio valve is not capable of class 6 shut-off, then a class 6 shut-off valve is installed upstream of the SRV

fuelsys t04

2.1.2 Water Injection System

- Demineralized water for the water injection system in accordance with the following:

Measurement	Value
Total solids	5 ppm max
Total trace metals: sodium + potassium + lithium + vanadium + lead)	0.5 ppm max
pH	6.5 - 7.5

Where contaminants are present in the water, the total limits in the fuel, water and air should be controlled such that the total concentration equivalent in the fuel (from all sources) conforms to the following limits:

Contaminant	Max Equivalent Concentration (ppm-weight)
Sodium plus Potassium plus lithium	1.0
Lead	1.0
Vanadium	0.5
Calcium	2.0

The water quality requirement can generally be satisfied by demineralized water.

2.1.3 Lube Oil System

- Lube oil tank vent piping
- Mineral lube oil in accordance with GE Lube Oil Recommendations (see Reference Documents chapter)

2.1.4 Inlet System

- Inlet heating interconnecting piping

2.1.5 Exhaust System

- Exhaust duct/stack and silencing as required

2.1.6 Gas Turbine Packaging

- Vent and drain piping or ducting, as needed
- Exterior unit walkways by customer, mounting pads by GE

2.1.7 Cleaning Systems

- Water wash skid
- Water for compressor cleaning system in accordance with Gas Turbine Compressor Washing—Liquid Washing Recommendations (see Reference Documents chapter)

2.1.8 Cooling Water System

- Closed cooling water system
- Coolant in accordance with GE cooling system specifications for gas turbine lubrication, turbine supports, atomizing air and generator cooling systems (see Reference Documents chapter)

2.1.9 Starting System

- AC electric power for gas turbine starting system

- Starting motor limit amp

2.1.10 Miscellaneous Systems

- Station instrument air for start-up
- Exhaust frame blower piping

2.1.11 Electrical Auxiliaries

- AC electric power for gas turbine auxiliaries
- Electric power for station auxiliaries
- Interconnecting cables

2.2 Civil

- Foundation design and construction with all embedments including sub-sole plates, anchor bolts, and conduit
- Grounding grid and connections
- Necessary drainage, including sumps and piping

2.3 Installation/Erection

- Qualified labor including foremen and superintendents needed for supervision
- Transportation, unloading, placement on foundation and installation of the equipment offered in this Proposal
- Construction services including electric power, lighting, temporary heaters, test equipment, compressed air, crane(s) and all required standard tools
- Storage and security for equipment received
- Finish paint including any special external finish paints required for corrosion protection with any required tie coats
- Access, necessary authorizations, and office facilities for GE personnel required during installation and start-up

- All interconnecting piping between turbine-generator equipment and auxiliary skids
- All interconnecting cables between turbine-generator equipment and auxiliary skids
- Typical wire, cable and piping supplied by the customer are illustrated in sketches at the end of this section

Note: For a more detailed description of GE and customer responsibilities during installation, see the Technical Advisory Services or Installation chapter of this proposal.

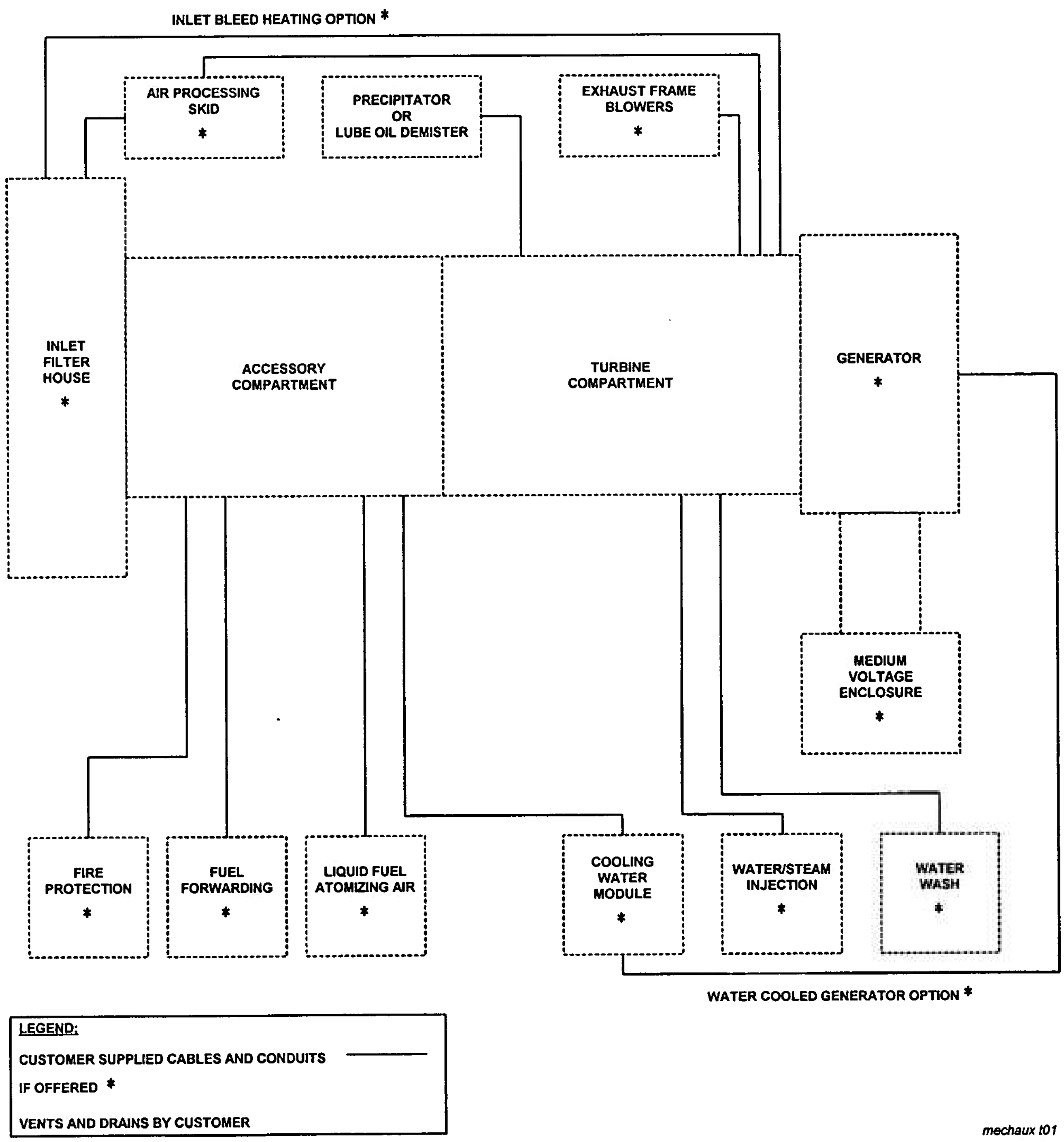
2.4 Start-Up/Test

- Fuel and load for tests
- Operating personnel for starting, preliminary runs and tests
- Lubricating fluid, greases, and supplies for starting, preliminary runs, tests and normal operation thereafter
- All field performance tests conducted in accordance with GE recommended test procedure (see Reference Documents chapter)

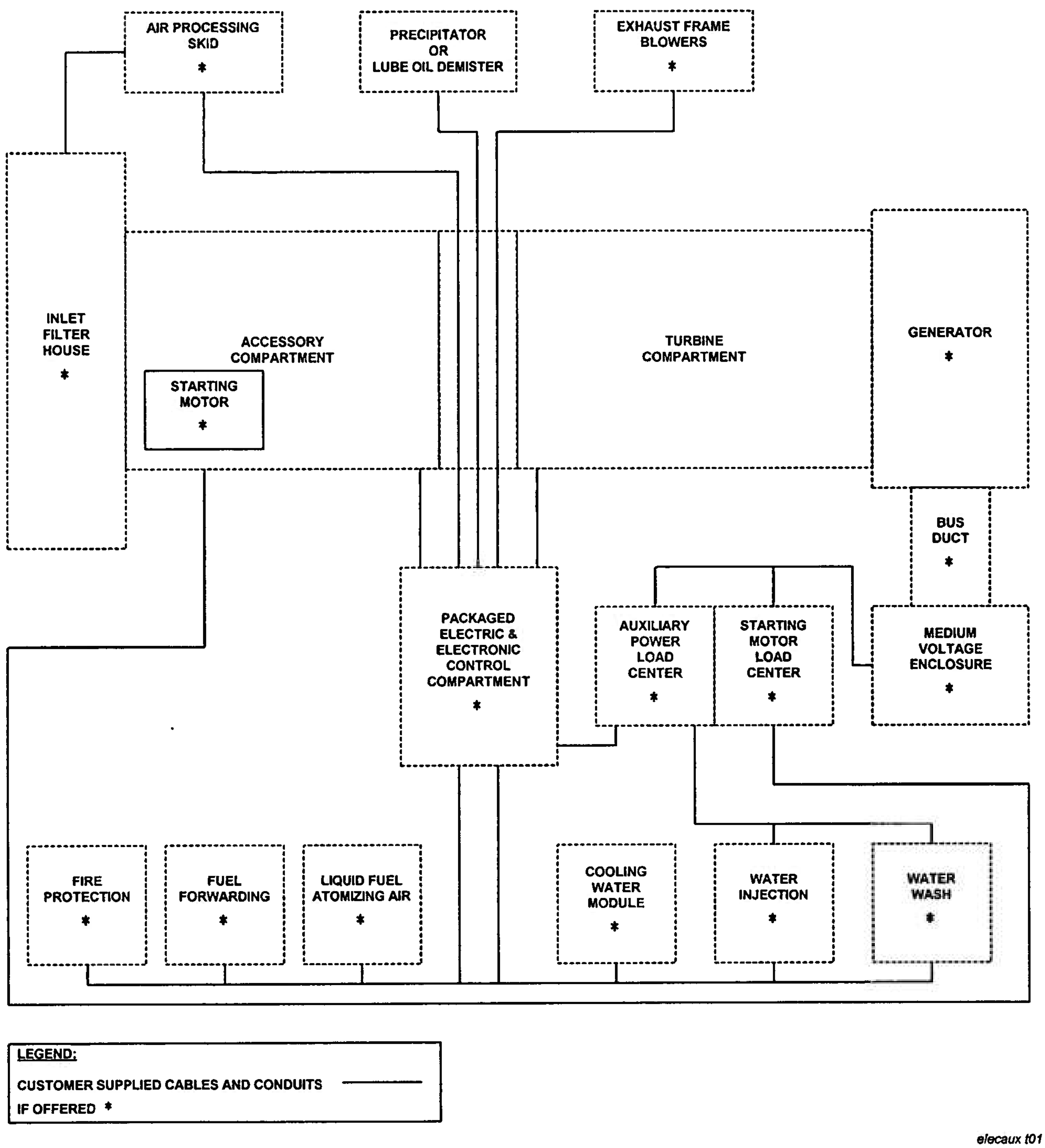
2.5 Interconnecting Piping, Wire, and Cable

Following are interconnecting piping, wire and cable illustrations which are intended to .convey the connections required for customer supply. Relative locations of equipment may differ from those depicted in the illustrations. See Scope of Supply chapter for equipment offered.

Mechanical and Off Base Skid Interconnecting Piping by Customer
(Typical)



Electrical Off Base Skid
Interconnecting Wire and Cable by Customer
(Typical)



2. 7EA General Plant Description

2.1 Simple-Cycle Power Plant Proposal Overview

2.1.1 Design Conditions

Nominal Net Plant Rating	75 MW/Unit (Refer to the Performance Specification Tab for Rating Point Net Plant Output)
Site Conditions	
Design Ambient Dry Bulb Temp./Relative Humidity	32°C (90°F) / 85%
Maximum Ambient Dry Bulb Temp./Relative Humidity	40°C (104°F) / 85%
Minimum Ambient Dry Bulb Temp./Relative Humidity	4°C (39°F) / 85%
Barometric Pressure	760 mm Hg (30 in. Hg)
Elevation	100 m (304 ft)
Location	Coastal
Seismic Criteria	1997 UBC; Zone 2A, Soil Profile Type S_D, Importance Factor = 1.00
Wind Design	1997 UBC; Exposure C, Importance Factor = 1.00, Basic Wind Speed = 160 km/hr (100 mph) at 10 m (33 ft) Above Grade
Annual Rainfall	2,500 mm (100 in.)
Rainfall Intensity Rates:	1-hour / 24 hour Duration
Storm Water Drainage Design	
10-yr Recurrence Interval	50 mm (2 in.) / 100 mm (4 in.)
50-yr Recurrence Interval	75 mm (3 in.) / 150 mm (6 in.)
Containment Design	
100-yr Recurrence Interval	100 mm (4 in.) / 175 mm (7 in.)

Ground Snow Load	0 kg/m^2 (0 psf)

Fuel	
Primary	Natural Gas
Gas Fuel Booster Compressor	Not Included. Assumes Gas Fuel Available @ 24.6 kg/cm^2 (350 psig)
Backup (72 Hour Supply/Units)	Distillate Fuel Oil
Fuel Forwarding Skid	One (1)/Site One (1) Pump/Unit
Startup Heating	Electric startup heater included to raise gas fuel temperature 28°C (50°F) for dew point control
Fuel Preheating	Not Included

2.1.2 Equipment/System Definition

Gas Turbine	MS 7001EA (60 Hz)
Air Filtration	Self-Cleaning
Exhaust System	Refer to Station Arrangement Tab
Starting Means	Electric Motor
Black Start	Not Included
Compressor/Turbine Cleaning	On and Off-line Compressor Water Wash Only
Emissions Control	Dry Low NOx on Natural Gas Water Injection on Distillate Oil
Compressor Water Wash Skid	One (1) Per Site
Water Injection Skid (NOx Reduction/Distillate)	One (1)/Unit
Demineralized Water System	
Water Supply	Produced Off-Site
Storage	Tank - 72 Hour Supply Water Injection/Unit
Fire Protection	Low Pressure CO_2
Cooling System	
Gas Turbine/Generator Lube Oil	Closed - H_2O to Air

Generator	7A6 Packaged
Cooling	Open-Ventilated
Terminal Voltage	13.8 kV
Frequency	60 Hz
Power Factor (pf)	0.85
Excitation	EX2000BR
Insulation Rating	Class F Insulation Class B Temperature Rise Stator/Rotor
Enclosures/Acoustic Barriers	
Gas Turbine	Off-base Enclosure
Auxiliary Module	Off-base Enclosure
Generator	Standard Enclosure
Transformers	
Station Service Transformer	One (1)/Site
Unit Auxiliary	One (1)/Unit
Step-up Transformer	One (1)/Unit
Low Side Breaker	Included
Switchyard	Not Included

2.1.3 Plant Operation

Operating Mode	Continuous Base Load or Daily Cyclic Duty
Plant Control Philosophy	Automatic Startup/Shutdown and Operation

2.1.4 Performance Specifications

Output	Refer to the Performance Specifications Tab
Unit Plant Heat Rate	
Emissions	
Noise	

2.1.5 Installation

Schedule	All-at-once

Note: Refer to the Design Criteria/Assumptions Tab for additional plant design information.

2.2 Introduction

GE proposes to supply a GT-G simple-cycle plant for installation at the Owner's Power Plant Site.

This plant consists of one or more gas turbine-generator unit(s) and mechanical and electrical support systems.

The Power Station is designed for operation as a Simple-Cycle Plant.

The proposed Power Plant includes the following major power generation equipment and support systems:

2.2.1 Gas Turbine-Generator Unit

- One (1) MS7001EA gas turbine packaged power plant equipped with a 7A6 open-ventilated generator.
- The gas turbine-generator unit features and accessories are described in the Power Island Equipment and Auxiliaries Section of this proposal.

2.2.2 Plant Control System

- Gas Turbine Controls
- Generator Excitation/Protection (Redundant)
- Balance of Plant (BOP) Controls (Redundant)
- Auxiliary Systems Controls (Redundant)

Plant control system features and accessories are described in the Control Systems Tab of this proposal. The unit control and operating philosophy is presented in the Plant Operating Philosophy Tab of this proposal.

2.2.3 Mechanical Systems

The equipment and plant support mechanical equipment includes fuel supply and storage systems. These systems are described in the Mechanical/Fluid Tab of this proposal.

2.2.4 Electrical Systems

The electrical systems are defined in the Electrical/Control Tab of this proposal. Electrical systems include gas turbine, generator auxiliary equipment, auxiliary power supply equipment (ac and dc), controls, metering and protective relaying.

2.2.5 Plant Arrangement

The arrangement of power plant equipment is shown in the Station Arrangements Tab of this proposal.

2.2.6 Services

Power Plant Engineering and Management Services are described in the Services Section of this proposal and include:

- Project Management
- Engineering and Design
- Construction and Erection
- Commissioning and Startup
- Technical Advisory Services
- Training

The simple-cycle unit proposed provides a pre-engineered integrated system of equipment that operates as an efficient and highly reliable power plant.

9. Generator and Accessories

Page

9.1 Open-Ventilated Generator 9.2

9.2 Rotating Rectifier Assembly 9.7

9.3 Design Features 9.8

9.4 GNAC (Generator Neutral Accessory Compartment)....................9.9

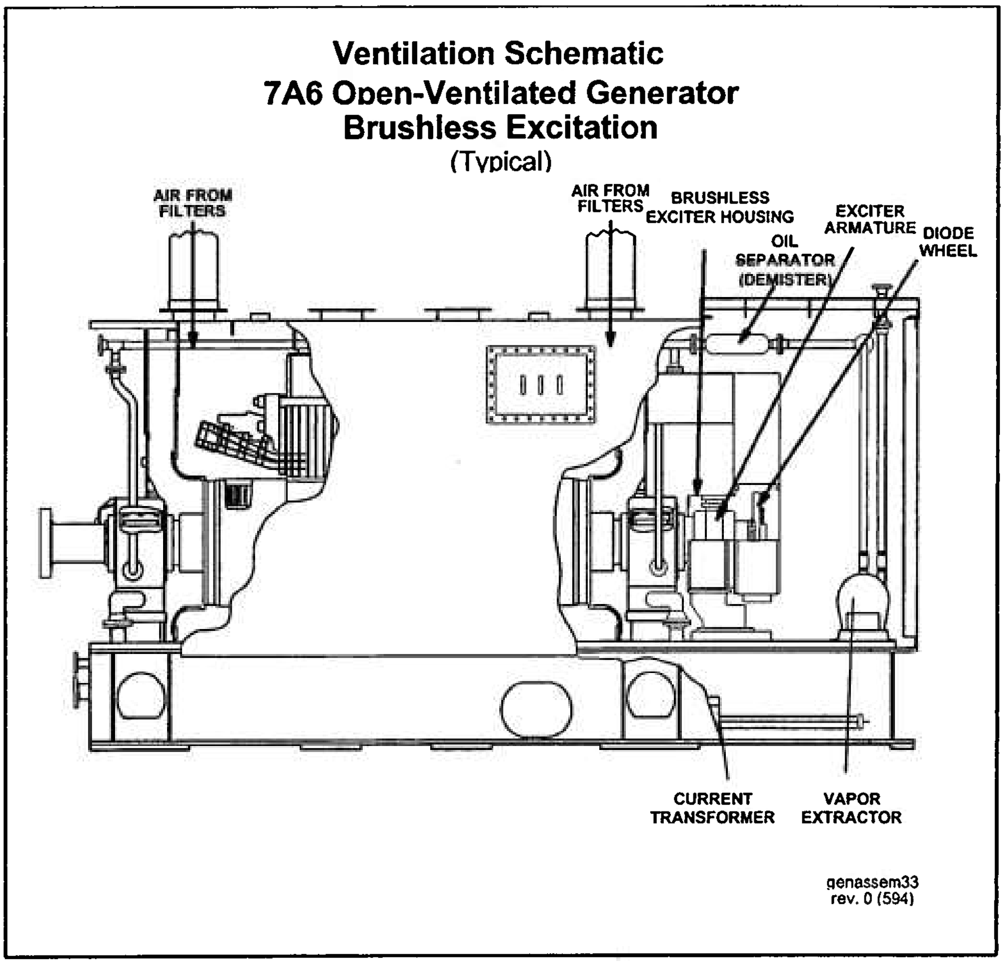
9.5 GLAC (Generator Line Accessory Compartment)....................9.9

9.6 Generator Switchgear Compartment....................9.10

9.1 Open-Ventilated Generator

The generator compartment has the same general appearance as the turbine compartment, and provides for maintenance and inspection via doors on the sides of the outdoor enclosure.

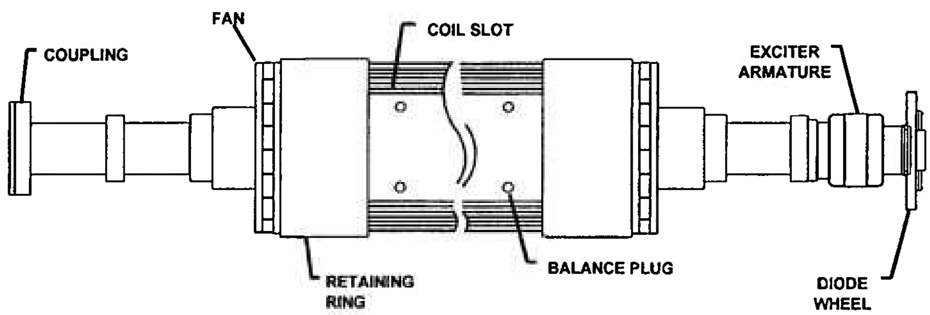
The generator is a base-mounted, open ventilated synchronous unit.



9.1.1 Rotor Design

The rotor (see Schematic) is a simple single-piece forging, pedestal mounted, with tilting pad bearings for smooth operation. The retaining ring is nonmagnetic 18 Cr 18 Mn stainless steel for low losses and high stress-corrosion resistance. The rings are shrunk onto the rotor body and secured with a snap ring. This design minimizes the stresses in the tip of the retaining ring.

Generator Field
(Typical)



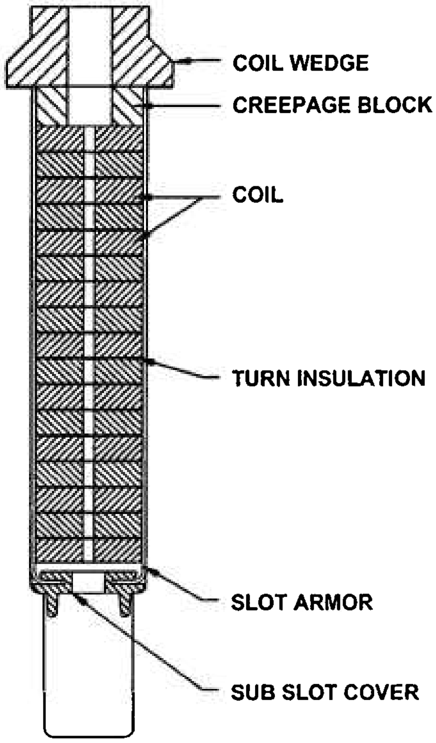
Radial-flow fans are mounted on the centering ring at each end of the rotor. The fan is a high efficiency design, and provides cooling air for the stator winding and core. The rotor winding, which is a directly cooled radial flow design, is self-pumping and does not rely on the fan for air flow.

The rotor winding fits in a rectangular slot and is retained by non-magnetic steel full-length wedges. Where cross slots are required on longer rotors, several wedges are used in each slot. The slot insulation is a simple J-shaped Nomex armor, which fits to the bottom of the slot. A class F epoxy glass laminate subslot cover locates the lowest turn of the winding. The turns are separated by epoxy glass and Nomex. The winding is covered by a high-pressure resin laminate creepage block. (See Schematic).

The rotor slot armor, and all the insulation materials in contact with the winding, are full class F materials and are proven reliable materials through use on other generator designs.

The rotor winding coils are round cornered, with a single braze in each end strap. This significantly reduces the number of parts in each coil and cuts the number of braze joints by a factor of four. This is typical of the type of production simplification which, in turn, leads to improved quality and reliability.

Field Winding Support
(Typical)



9.1.2 Stator Design

The stator frame is divided into an inner and an outer section, both of which mount on a single base fabrication. The inner frame is a very simple structure, designed to support the stator core and winding, while providing some guidance to the air flow in the machine. The stator core, made from grain-oriented silicon steel for low loss and high permeability, is mounted rigidly in the inner frame. Reliability of core insulation is improved by applying a thermosetting varnish to the punchings. Isolation of the core vibration from the remainder of the structure is accomplished through the use of flexible pads between the feet on the inner frame and the base structure. The combined core and inner frame are designed to have a 4-nodal natural frequency well removed from 100 Hz or 120 Hz.

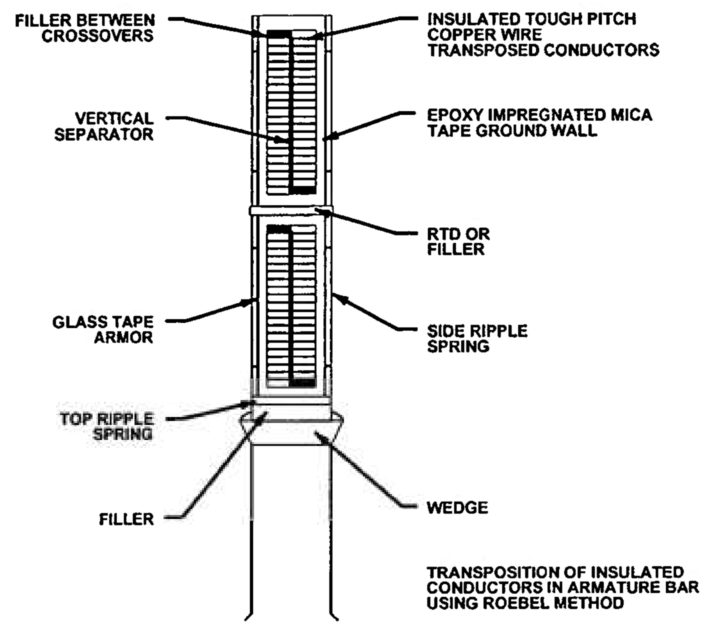
The outer frame is a simple fabricated enclosure, which supports either the air inlets and silencers if the unit is open-ventilated or the roof and cooler enclosure if the unit is totally enclosed, water-to-air cooled. The outer frame further acts as an air guide to complete the ventilation paths, and as a soundproof enclosure to keep noise levels low. Since the rotor is pedestal mounted, the end shields are very simple structures. As with the inner frame, the outer frame was designed to be free of resonances below 80 Hz.

The entire generator is mounted on a single fabricated base, which supports the pedestals, the inner and outer frames, and the brush rigging or the exciter. The base contains piping for oil supplies, conduit for wiring, and a number of components associated with the neutral leads.

The stator winding is a conventional lap-wound design. The insulating materials are those used since the early 1970's, thus maintaining the proven reliability record. The materials are all designed and tested to provide reliable performance at class F temperatures for the life of the machine. The stator bar copper is stranded and insulated with class F materials and is Roebelled for minimum losses. The ground wall insulation is a proven class F system. The exterior of the bar is taped with a conducting armor in the slot section, and a semiconducting grading system is applied to the end arms. In this way the bar is fully protected from the effects of high electrical voltage gradients.

The bars are secured in the slots with fillers and top-ripple springs to restrain the bars radially, and with side-ripple springs to increase friction between the bar and the slot wall. The side-ripple springs are also conducting to ensure proper grounding of the bar surface. Electrical connection to the top and bottom bars are made via a brazed connection with solid copper blocks to provide assurance that the connections will not loosen or overheat.

Stator Slot Section
(Typical)



STATOR SLOT ASSEMBLY

7ea403

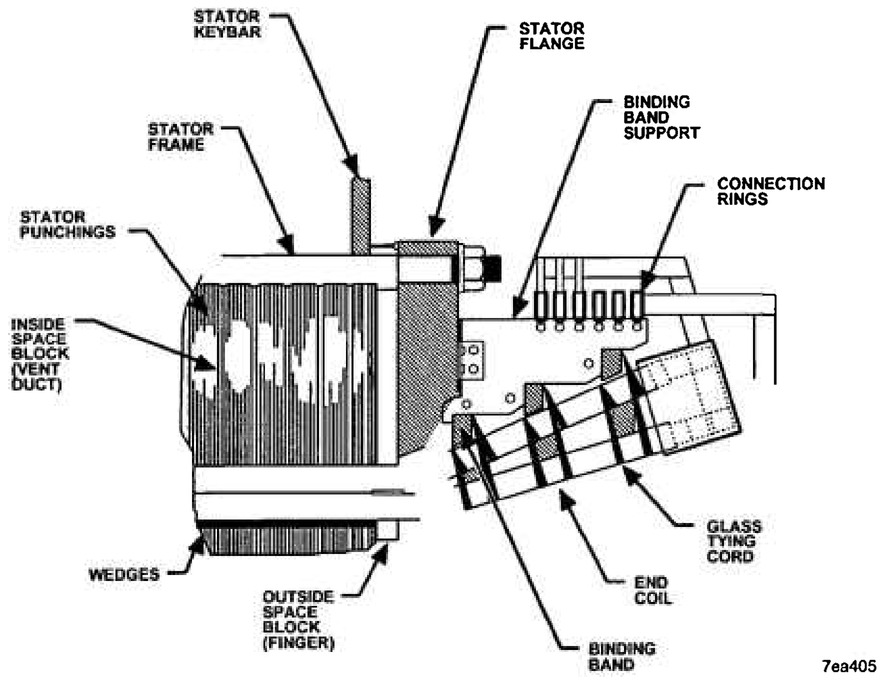
Cooling air for the generator compartment is drawn through the roof of the generator enclosure by radial-flow fans on each end of the generator rotor assembly. The ventilating air is drawn through a filtration and silencing system into the generator. The rotor is cooled externally by the air flowing along the gap over the rotor surface. The rotor windings are cooled by air which passes under the rotor end windings, into the rotor subslots and radially outward to the gap, through holes in the field coils and slot wedges. The rotor is self pumping and does not rely on the fan for air flow. The stator cooling air is forced by the fans into the air gap and also around behind the stator core. The air exits through silencing and air duct work to the outside. The inner side panels of the compartment, including the access doors, are lagged to establish minimum sound levels.

The end winding support system is the proven approach used on conventionally cooled stators on all sizes built by GE. This system utilizes resin impregnated conforming felt pads and blocks, along with resin-impregnated glass woven ties.

One design improvement made in recent years changed the manner in which the series connection between top and bottom bars is made. Until recently this was accomplished by brazing individual strands together and then solidifying the package with an epoxy. The improved system is to braze all the strands together in a solid block and then to braze top and bottom bars together with solid copper plates. This provides a solid electrical connection and a rugged mechanical joint.

Stator End Winding Section

(Typical)



9.2 Rotating Rectifier Assembly

The rotating rectifier exciter consists of a high frequency ac generator with a rotating diode assembly, a static voltage regulator for excitation control and leads that connect the dc diode output directly to the field windings of the main generator.

A self-ventilated exciter is a quill-mounted overhung on an extension of the generator shaft. Cool air is drawn into the exciter assembly and is circulated through the rotor windings, stator poles and air gap. The air then cools the diodes which are mounted on a wheel, outboard of the rotating armature.

A full-wave, 3-phase bridge is used to rectify the rotor output. Redundant diodes are employed, each sized to allow full generator output with its paired diode out of service.

The brushless exciter rotor construction is similar to that used in conventional dc exciters. Laminations are precision punched from high quality electrical steel. Rotor coils are form wound and have resin impregnated Class F insulation. The field or stator assembly consists of a stationary field pole yoke or ring which supports the field poles and carries the magnetic flux between adjacent field poles. Field poles are made of high quality steel laminations and the coils have Class F insulation.

9.3 Design Features

The generator neutral leads are housed in the generator base. The line leads exit on the right side (as viewed from the collector end) of the generator stator frame near the top. A three phase non segregated bus duct connects the generator to the generator auxiliary compartment. The generator neutral tie is completely assembled in the factory and shipped with the generator. The generator base (exciter end) houses neutral grounding equipment, and neutral measurement current transformers.

Lubrication for the generator bearings is supplied from the turbine lubrication system. Lubricant oil feed and drain interconnecting lines are provided and assembled at installation. Flanged connections are provided at the turbine end of the generator package for connection to the turbine package.

Pressure switches in the lube oil feed piping at the aft end of the generator are provided to ensure that lube oil is present at the furthermost takeoff point from the turbine oil pump before starting and during operation.

Twelve (12) resistance type temperature detectors, four per phase, are installed in the generator stator winding, with leads brought out to the junction box.

Six (6) resistance-type temperature detectors, two per phase, are installed in the generator stator winding, with leads brought out to the junction box.

Also two (2) RTDs are installed at the inlet and outlet of the cooling air ducting.

Three (3) velocity-type vibration detectors are provided on the pedestal bearing caps, one at the turbine end and two at the collector end.

9.4 GNAC (Generator Neutral Accessory Compartment)

The GNAC is mounted on the side of the generator opposite the line leads. The estimated weight is 725 kg (1600 lbs). Access for maintenance is provided by a removable panel. Devices included in the compartment are as follows:

- Generator neutral grounding transformer and secondary neutral grounding resistor
- Three (3) generator neutral CTs (metering), ratio 8000:5A
- Generator neutral CTs (protective relaying, ratio 8000:5A
- Generator neutral tie

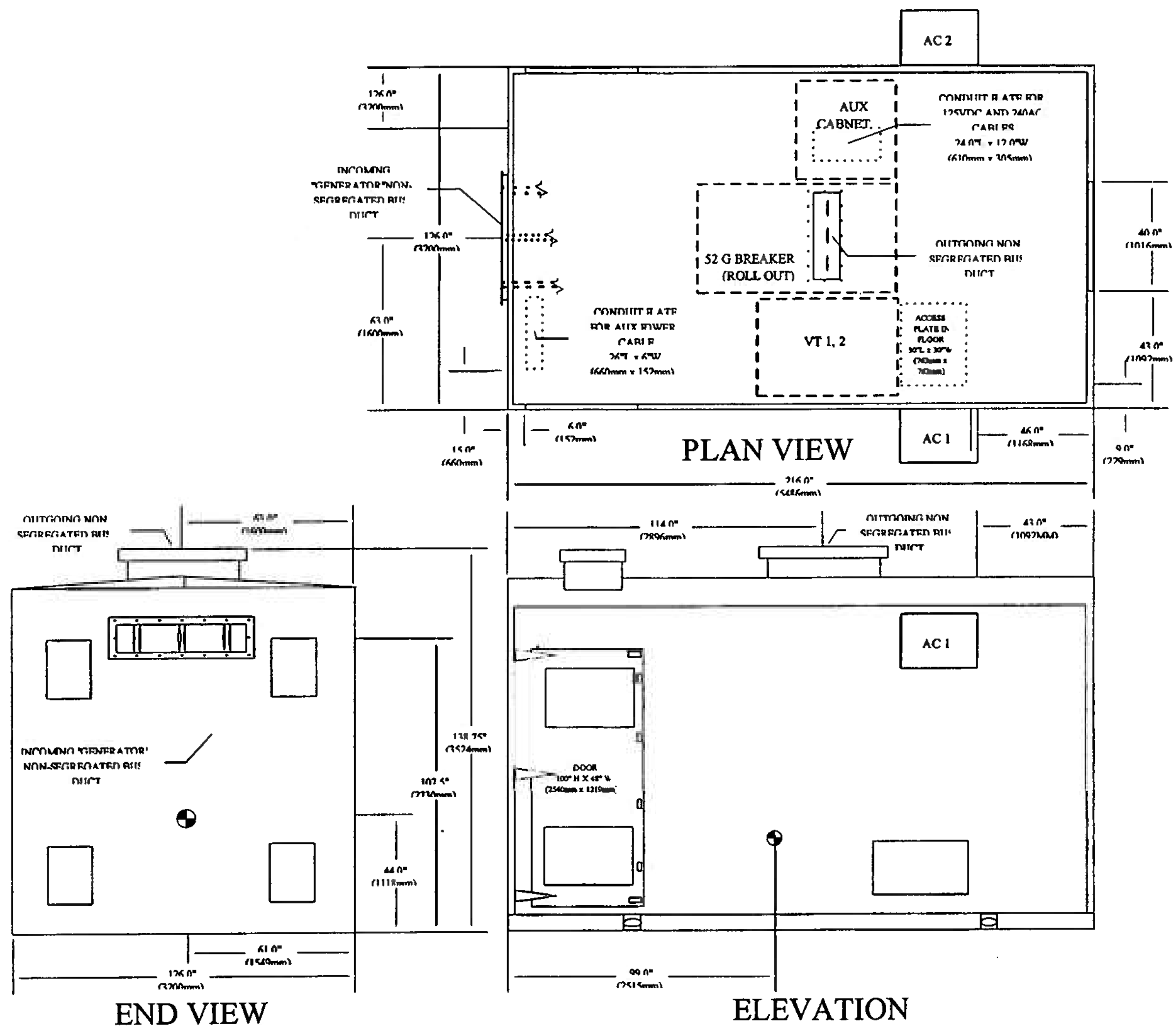
9.5 GLAC (Generator Line Accessory Compartment)

The GLAC is similar in appearance to the GNAC and is mounted on the side of the generator opposite the GNAC. The GLAC contains the line termination bus bars for the generator.

9.6 Generator Switchgear Compartment

The generator switchgear compartment has the same general appearance as the turbine and generator compartments. A typical arrangement is shown below.

SWITCHGEAR FOR 7A6 GENERATOR



9.6.1 General

The following equipment is provided in the walk-in, weather protected enclosure:

- Space heaters in the compartment and individual equipment enclosures
- Ventilating louvers arranged to permit air circulation
- Conveniently located lighting in the compartment and equipment enclosures for equipment inspection and maintenance
- One standby emergency light
- One centrally located 120 VAC service outlet
- Conduit raceways or protective enclosures for all wiring between equipment, panels, terminal boards and junction boxes
- Main bus is rounded edge, high-conductivity aluminum bar
- Ground bus extended to the outside of the compartment for a ground grid connection
- Outgoing power connection made with overhead non-segregated bus duct
- Current transformers
  - — Three (3) current transformers, 8000/5 amperes, for relaying
  - — Three (3) current transformers, 400/5 amperes, for auxiliary watthour meter and relaying
- Potential Transformers
  - — Five (5) potential transformers, 14,400/120 volts, for metering and relaying, two (2) connected on generator side of circuit breaker (52G) and three (3) are connected on transformer side of 52G
  - — Potential transformers are of the fixed type
  - — Auxiliary potential transformers for bus ground detection system
- Generator Circuit Breaker (52G)
  - — One (1) GE-V ac force cooled generator main circuit breaker — nominally rated 5000 amps @ 40°C 13.8 kV, 3-phase, 60 Hz, vacuum type rated 1000 MVA with stored energy closing and trip mechanism
  - — One close and trip coil for 125 V dc operation and stationery auxiliary switch

General Electric Model PG7121(EA) Gas Turbine

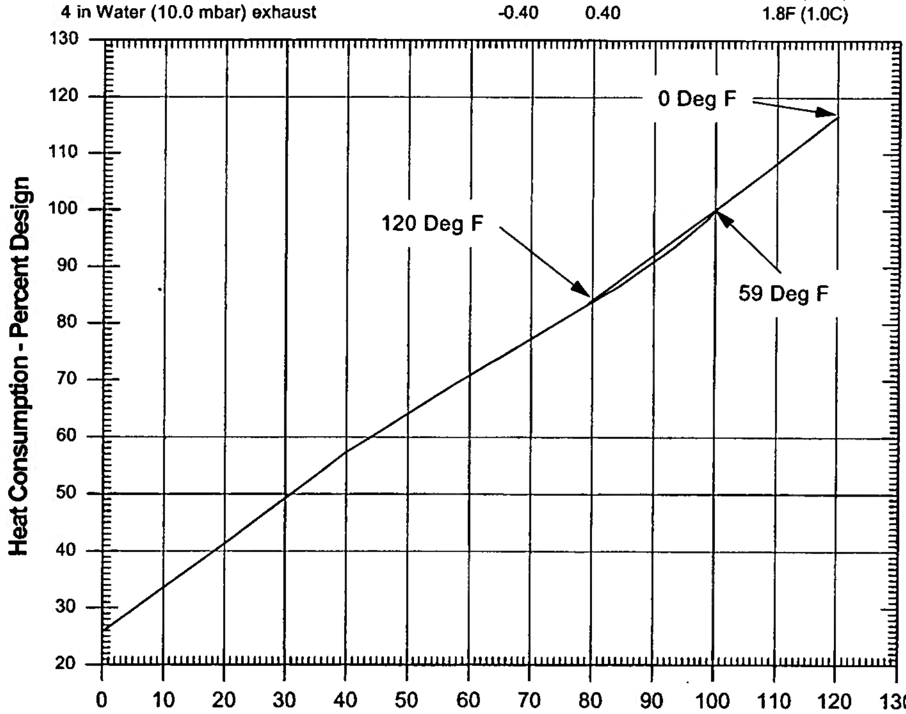
Estimated Performance - Configuration: DLN Combustor

Compressor Inlet Conditions 59F (15 C), 60% Relative Humidity
Atmospheric Pressure 14.7 psia (1.013 bar)

Fuel			Natural Gas	Distillate Oil
Design Output	kW		84960	83500
Design Heat Rate (LHV)	Btu/kWh	(kJ/kWh)	10440 (11010)	10520 (11100)
Design Heat Cons (LHV)	Btu/h	(kJ/h) x10^6	887.0 (935.6)	878.4 (926.0)
Design Exhaust Flow	lb/h	(kg/h) x10^3	2359 (1070)	2365 (1073)
Exhaust Temperature	deg. F	(deg.C)	999 (537)	999 (537)
Load			Base	Base

Notes:
1. Altitude correction on curve 416HA662 Rev A.
2. Ambient temperature correction on curve 522HA283 Rev 1.
3. Effect of modulating IGV's on exhaust temperature and flow on curve 522HA284 Rev 1.
4. Humidity effects on curve 498HA697 Rev B - all performance calculated with a constant specific humidtiy of .0064 or less so as not to exceed 100% relative humidity.
5. Plant Performance is measured at the generator terminals and includes allowances for exitation power, shaft driven auxiliaries, and 4.0 in H2O (10.0 mbar) inlet and 5.5 in H2O (13.7 mbar) exhaust pressure drops, a DLN Combustor, and the effects of inlet bleed heating.
6. Additional inlet and exhaust pressure loss effects:

	% Effect on Output	% Effect on Heat Rate	Effect on Exhaust Temp.
4 in Water (10.0 mbar) inlet	-1.40	0.42	1.9F (1.0C)
4 in Water (10.0 mbar) exhaust	-0.40	0.40	1.8F (1.0C)



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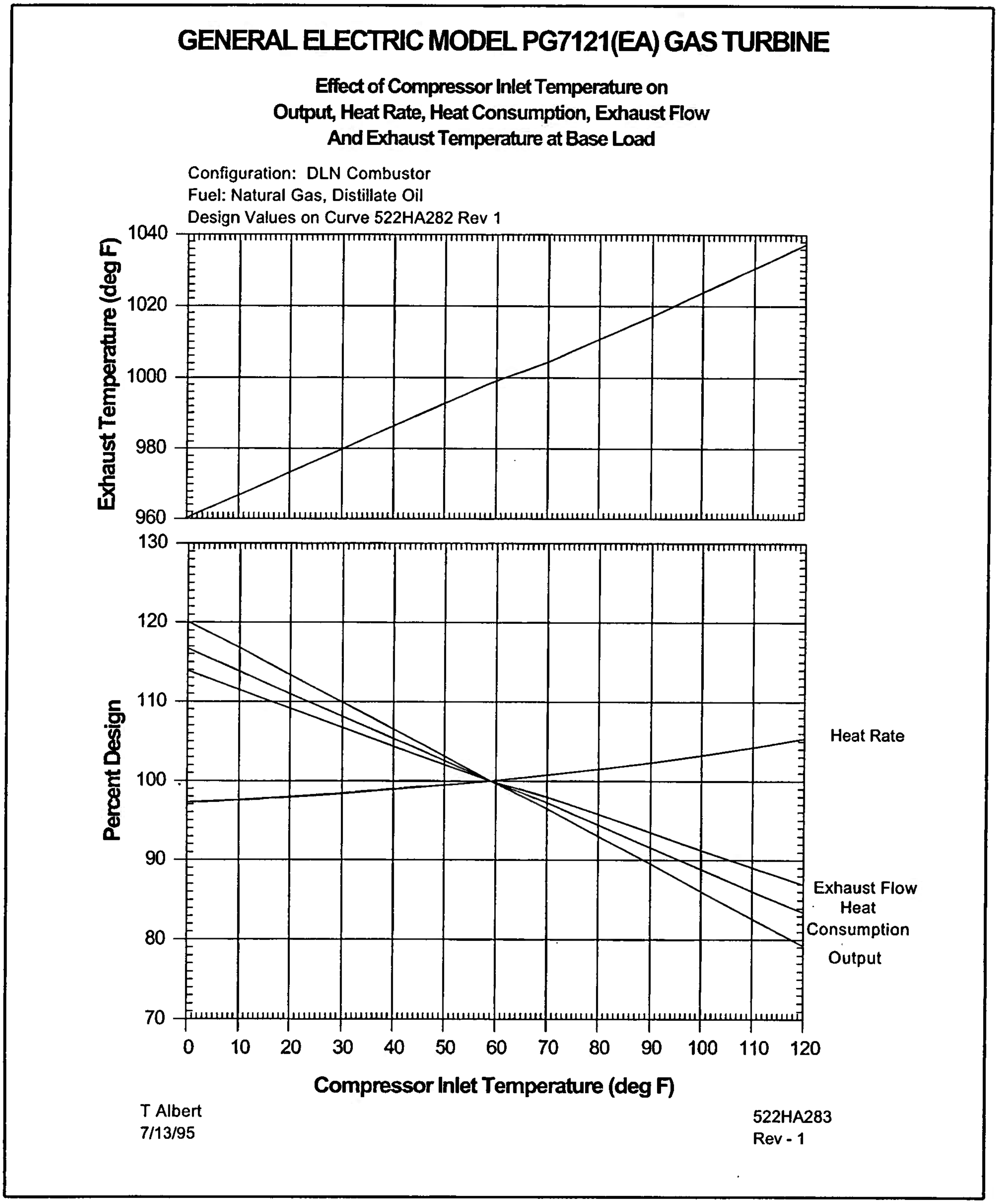
522HA282
Rev - 1


GENERAL ELECTRIC MODEL PG7121(EA) GAS TURBINE
Effect of Compressor Inlet Temperature on
Output, Heat Rate, Heat Consumption, Exhaust Flow
And Exhaust Temperature at Base Load
Configuration: DLN Combustor
Fuel: Natural Gas, Distillate Oil
Design Values on Curve 522HA282 Rev 1
Exhaust Temperature (deg F)
1040
1020
1000
980
960
130
120
110
100
90
80
70
Percent Design
Heat Rate
Exhaust Flow
Heat
Consumption
Output
0
10
20
30
40
50
60
70
80
90
100
110
120
Compressor Inlet Temperature (deg F)
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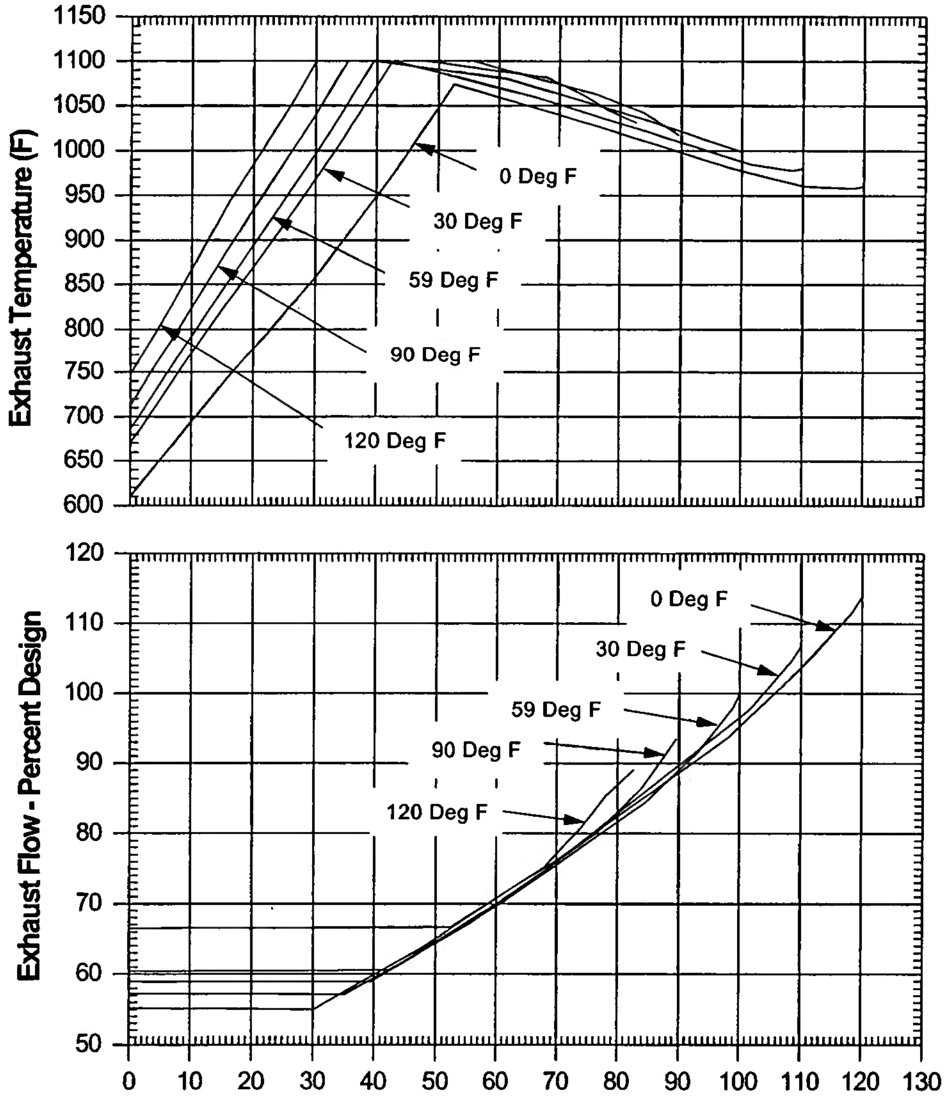
522HA283
Rev - 1

GENERAL ELECTRIC MODEL PG7121(EA) GAS TURBINE

Effect of Inlet Guide Vane on Exhaust Flow and Temperature
As a Function of Output and Compressor Inlet Temperature

Fuel: Natural Gas & Distillate Oil
Design Values on Curve 522HA282 Rev 1
DLN Combustor



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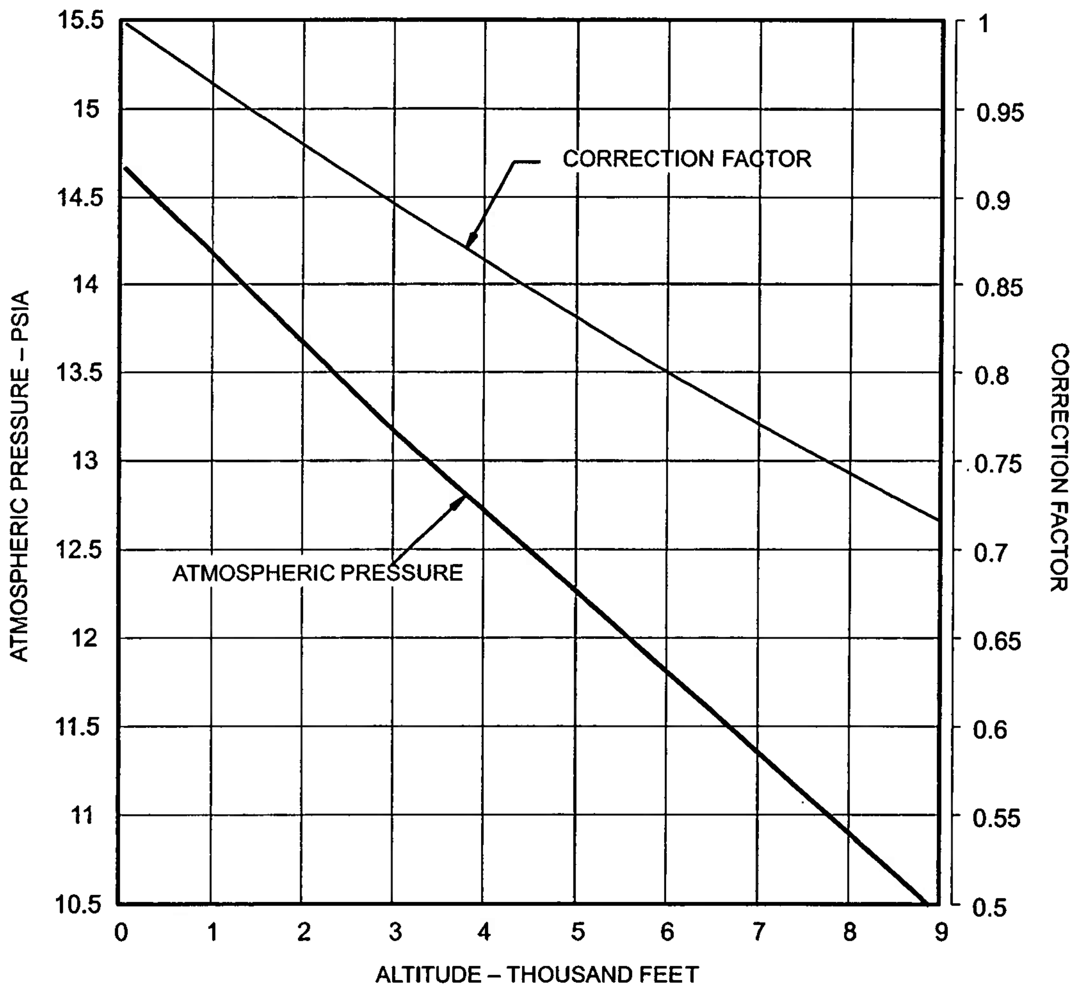
Generator Output - Percent

522HA284
Rev - 1

General Electric Gas Turbine
Altitude Correction Factor

Altitude Vs Atmospheric Pressure
And
Altitude Vs Correction Factor
For Gas Turbine Output And Fuel Consumption

NOTES:
1. Heat Rate and Thermal Efficiency are not affected by altitude.
2. Correction Factor = P(atm)/14.7



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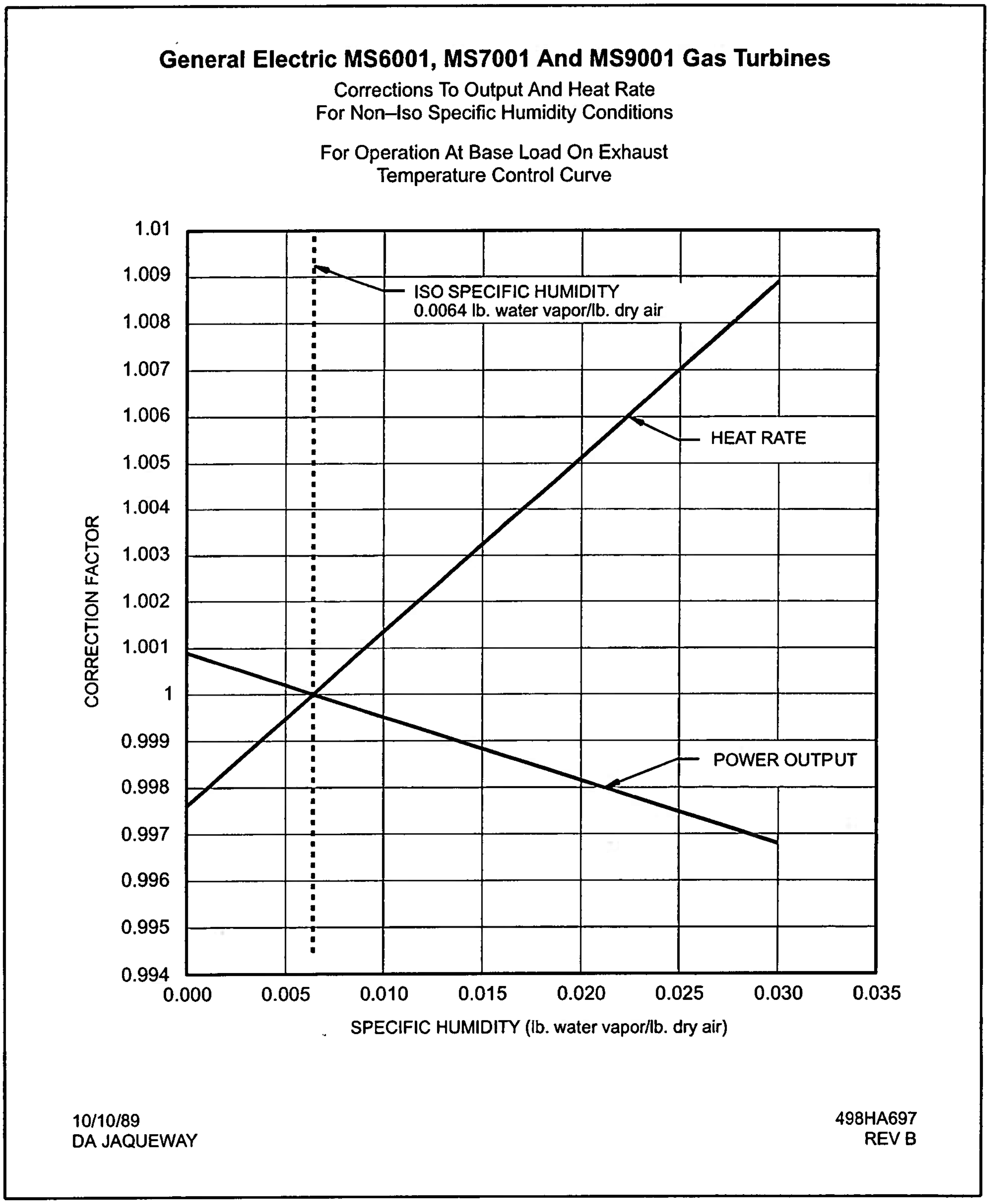
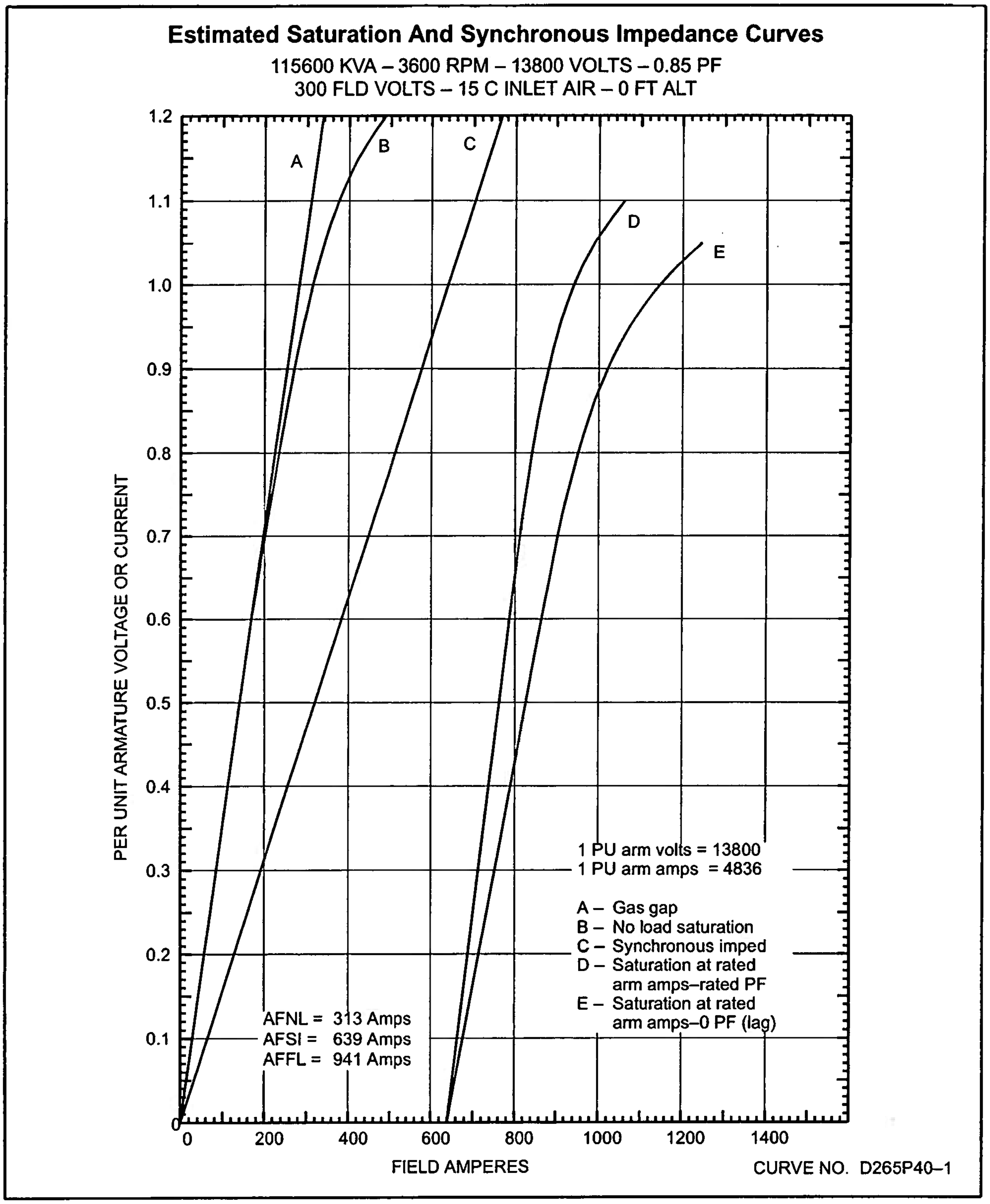
F.J. BROOKS

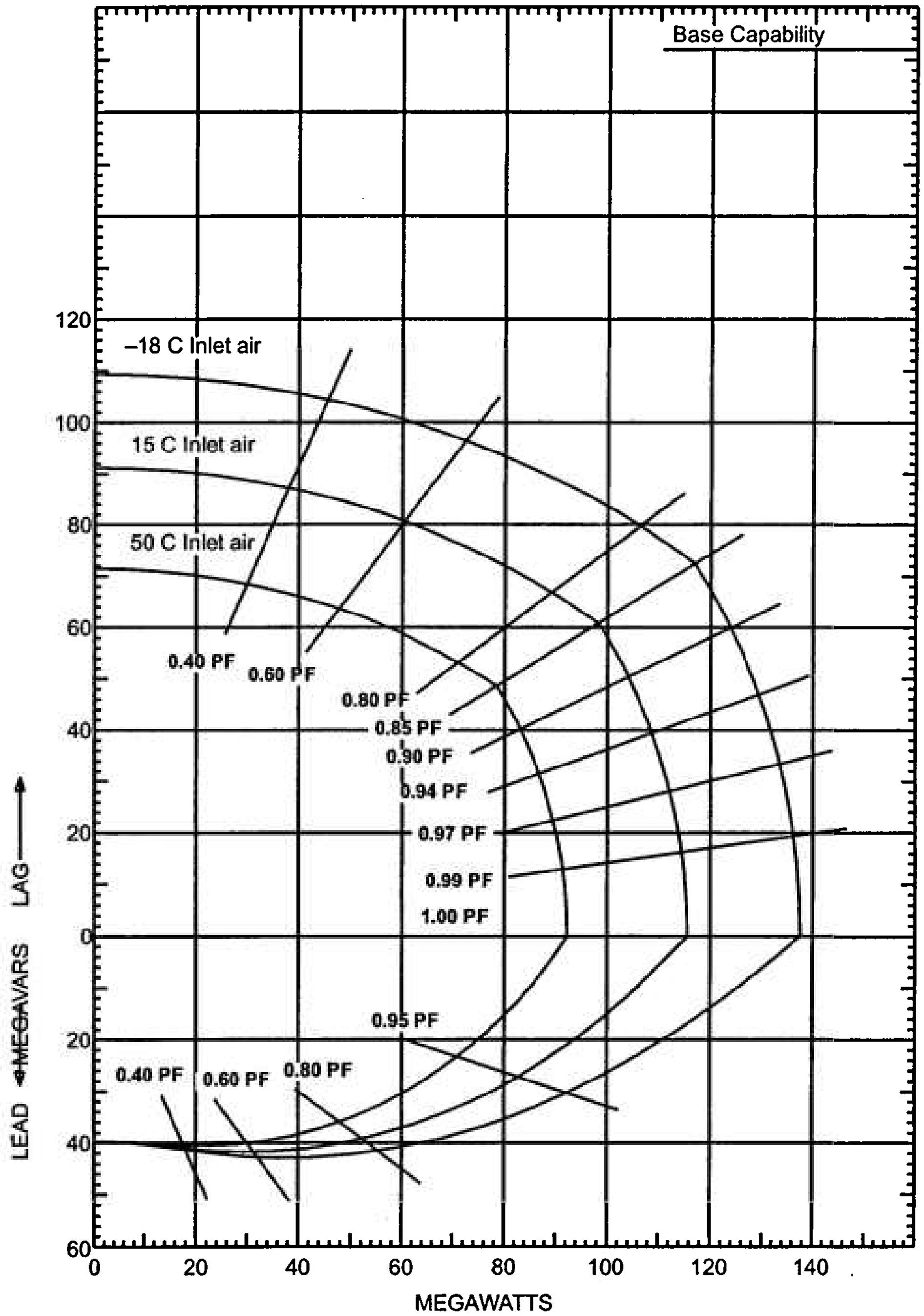
416HA662
REV A


General Electric MS6001, MS7001 And MS9001 Gas Turbines
Corrections To Output And Heat Rate
For Non–Iso Specific Humidity Conditions
For Operation At Base Load On Exhaust
Temperature Control Curve
ISO SPECIFIC HUMIDITY
0.0064 lb. water vapor/lb. dry air
HEAT RATE
POWER OUTPUT
CORRECTION FACTOR
1.01
1.009
1.008
1.007
1.006
1.005
1.004
1.003
1.002
1.001
1
0.999
0.998
0.997
0.996
0.995
0.994
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
SPECIFIC HUMIDITY (lb. water vapor/lb. dry air)
10/10/89
DA JAQUEWAY
498HA697
REV B


Estimated Saturation And Synchronous Impedance Curves
115600 KVA – 3600 RPM – 13800 VOLTS – 0.85 PF
300 FLD VOLTS – 15 C INLET AIR – 0 FT ALT
PER UNIT ARMATURE VOLTAGE OR CURRENT
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
A
B
C
D
E
0
200
400
600
800
1000
1200
1400
FIELD AMPERES
1 PU arm volts = 13800
1 PU arm amps = 4836
A – Gas gap
B – No load saturation
C – Synchronous imped
D – Saturation at rated arm amps–rated PF
E – Saturation at rated arm amps–0 PF (lag)
AFNL = 313 Amps
AFSI = 639 Amps
AFFL = 941 Amps
CURVE NO. D265P40–1

Estimated Reactive Capability Curves

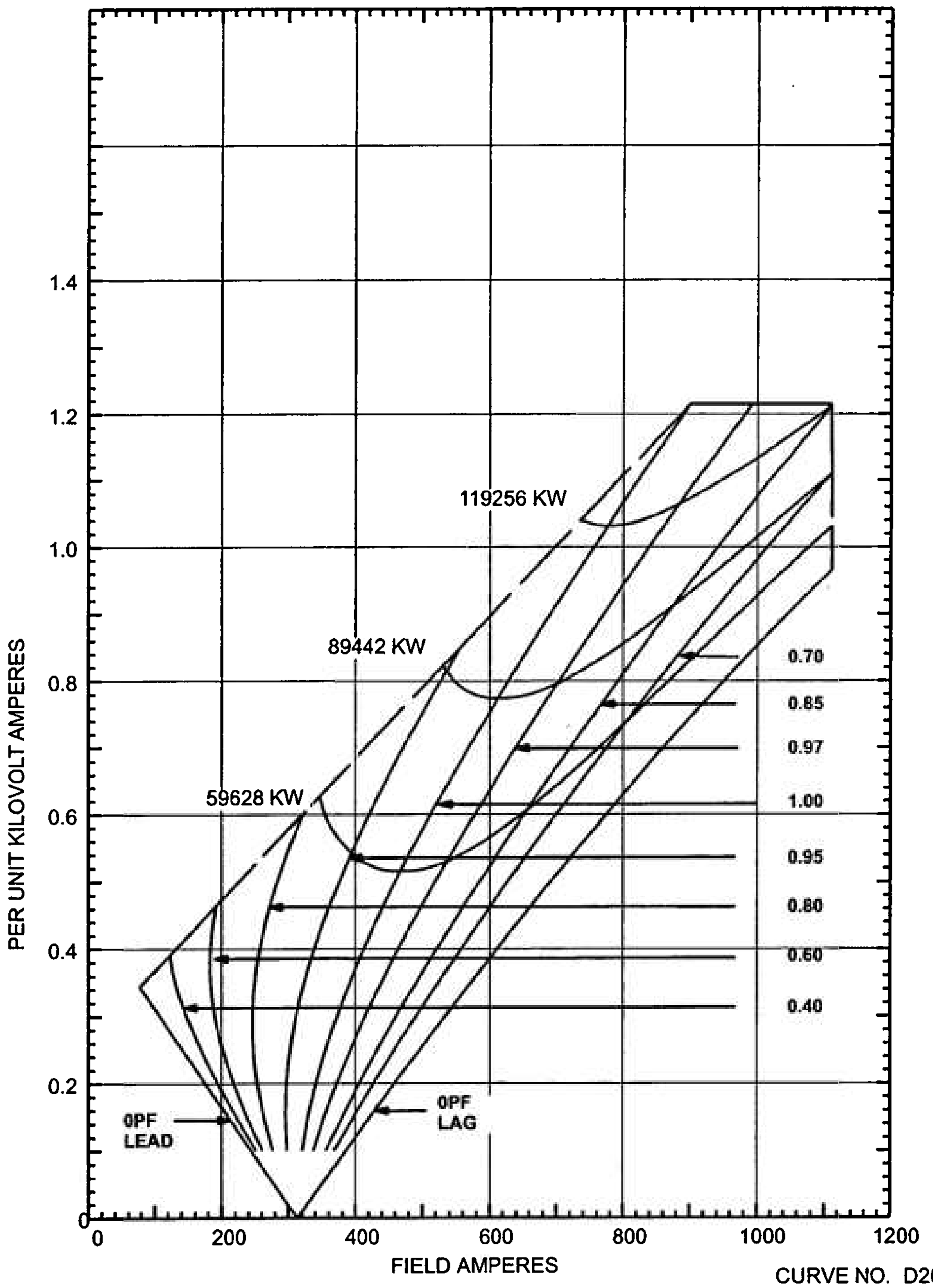
115600 KVA – 3600 RPM – 13800 VOLTS – 0.85 PF
300 FLD VOLTS – 15 C INLET AIR – 0 FT ALT



CURVE NO. D265P40–2A

Estimated Excitation V Curves

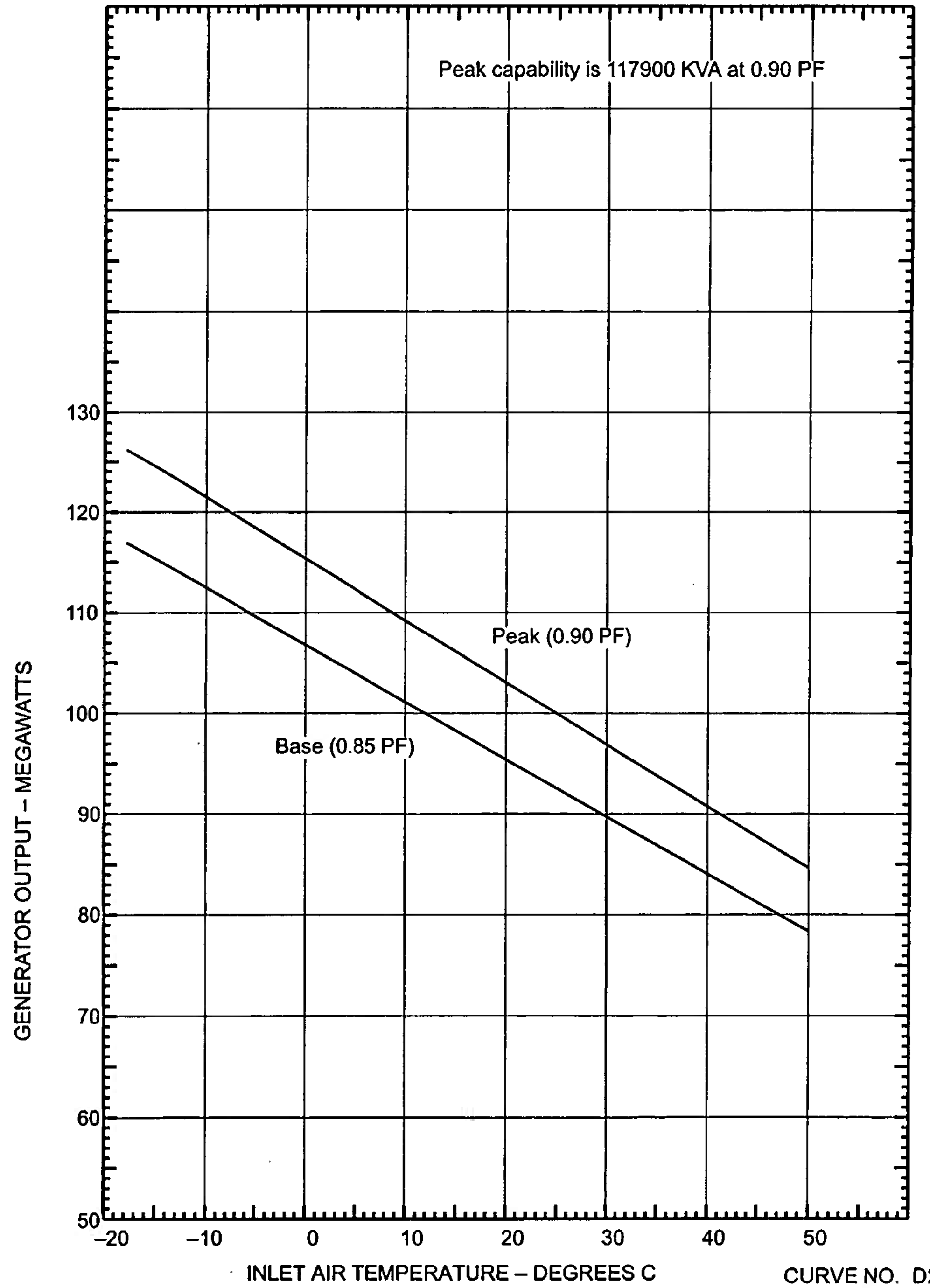
115600 KVA – 3600 RPM – 13800 VOLTS – 0.85 PF
300 FLD VOLTS – 15 C INLET AIR – 0 FT ALT



CURVE NO. D265P40–3

GENERATOR OUTPUT AS A FUNCTION OF INLET AIR TEMPERATURE

115600 KVA – 3600 RPM – 13800 VOLTS – 0.85 PF
300 FLD VOLTS – 15 C INLET AIR – 0 FT ALT



CURVE NO. D265P40–7

8. Gas Turbine and Accessories

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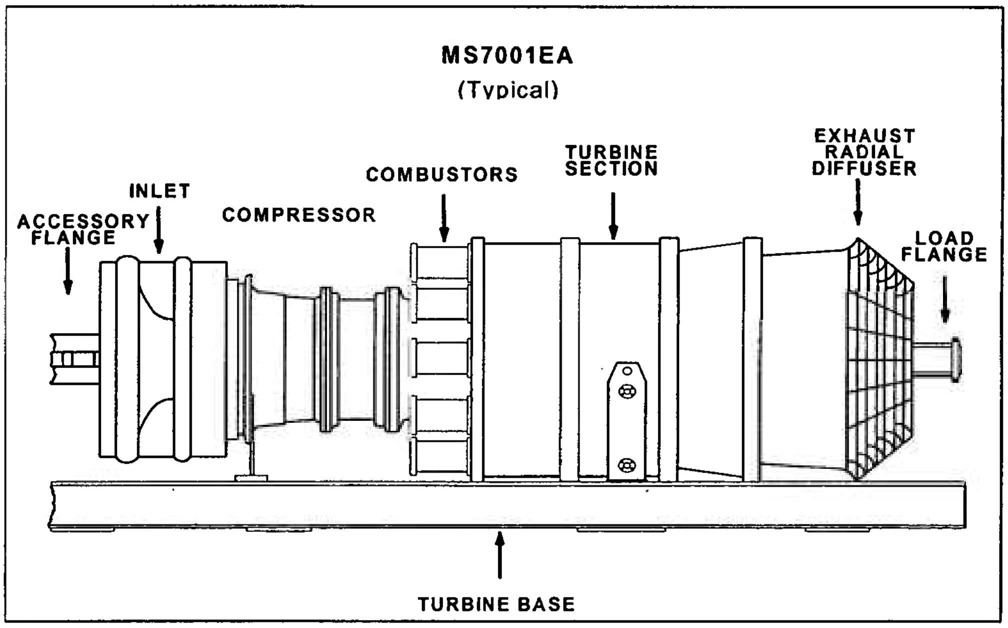
8.1 Gas Turbine

The PG7121EA has a 17 stage axial-flow compressor with modulated inlet guide vanes. The compressor is constructed of individually rabbeted discs held with through bolts.

A reverse-flow multiple chamber combustion system is utilized on the PG7121EA. Dual retractable spark plugs and four flame detectors are a standard part of the combustion system with crossfire tubes connecting each combustion chamber to adjacent chambers on both sides. Transition pieces take the hot gas to the first stage nozzle. The first and second stage nozzles are air-cooled to reduce metal temperatures.

The PG7121EA has three turbine stages with the first and second stages being air-cooled. The buckets are designed with long shanks as shown in the illustration to isolate the turbine wheel rim from the hot gas path. Precision cast buckets are used for each turbine stage with the second and third stages incorporating an integral tip shroud. The first stage buckets are coated. Compressor discharge extraction air is used to cool the turbine wheel.

The turbine and compressor casings are horizontally split for ease of inspection and maintenance. Borescope holes are located in the turbine, combustion and compressor sections to facilitate visual inspection.



8.2 Self-Cleaning Turbine Inlet Air Filter System

The inlet system arrangement includes the filter compartment, silencing, ducting, trash screens, plenum, support structure, walkways and ladder.

The self-cleaning inlet compartment utilizes high efficiency media filters which are automatically cleaned of accumulated dust, thereby maintaining the inlet pressure drop below a preset upper limit. This design provides single-stage high efficiency filtration for prolonged periods without frequent replacements.

Dust-laden ambient air flows upward at a very low velocity into filter modules which are grouped around a clean air plenum. The filter elements, which are pleated to provide an extended surface, are mounted below the modules within metal skirts which protect them from mechanical damage and which also serve as weather protection. The air, after being filtered, passes upward through venturis, and thence to the clean air plenum and inlet ductwork.

As the outside of the filter elements become laden with dust, increasing differential pressure is sensed by a pressure switch in the plenum. When the setpoint is reached, a cleaning cycle is initiated. The elements are cleaned in a specific order, controlled by an automatic sequencer.

The sequencer operates a series of solenoid-operated valves, each of which controls the cleaning of a small number of filters. Each valve releases a brief pulse of high pressure air into a blowpipe which has orifices located just above the venturis. This pulse shocks the filters and causes a momentary reverse flow, disturbing the filter cake. Accumulated dust breaks loose, falls, and disperses. The cleaning cycle continues until enough dust is removed for the compartment pressure drop to reach the lower setpoint. The design of the sequencer is such that only a few of the many filter elements are cleaned at the same time. As a consequence, the airflow to the gas turbine is not significantly disturbed by the cleaning process.

Included with the filter compartment are a pulse air source, necessary support structures, walkways, and ladders. Access to the clean air plenum is by means of a bolt—on hatch. An interior safety light and convenience outlet are provided. A differential pressure gage is supplied to read plenum pressure. An alarm is provided for excessive differential pressure in the plenum or for low pressure in the pulse cleaning air supply.

Ducting is provided to convey air from the clean air plenum to the inlet plenum of the gas turbine. Inlet silencers are included in the ducting to attenuate sounds emitting from the compressor inlet.

The pulse air supply for the self-cleaning filters is supplied from the gas turbine compressor. The air is pressure reduced, cooled and dried. The system only cleans the filters when the Gas Turbine is in operation.

8.2.1 Ducting and Instrumentation

- Instrumentation is provided in the form of an inlet system pressure differential indicator and a differential alarm
- Ducting in an up and forward arrangement over the accessory compartment, including a transition section connected to the filter compartment, directs airflow into the inlet plenum
- Ducting straddling the accessory compartment, including a transition section connected to the filter compartment, directs airflow into the inlet plenum
- Inlet silencers are included in the ducting to attenuate sounds emitting from the compressor inlet

8.3 Exhaust System

The exhaust system arrangement includes plenum, ducting, silencing, and architectural siding. After exiting the last turbine stage the exhaust gases enter an exhaust diffuser section which terminates in a series of turning vanes directing the gases from an axial to a radial direction into the plenum. The gas then flows to the side through silencing into ducting to an up-elbow and then to atmosphere.

Exhaust silencers are included to attenuate sounds emitting from the turbine exhaust ducts.

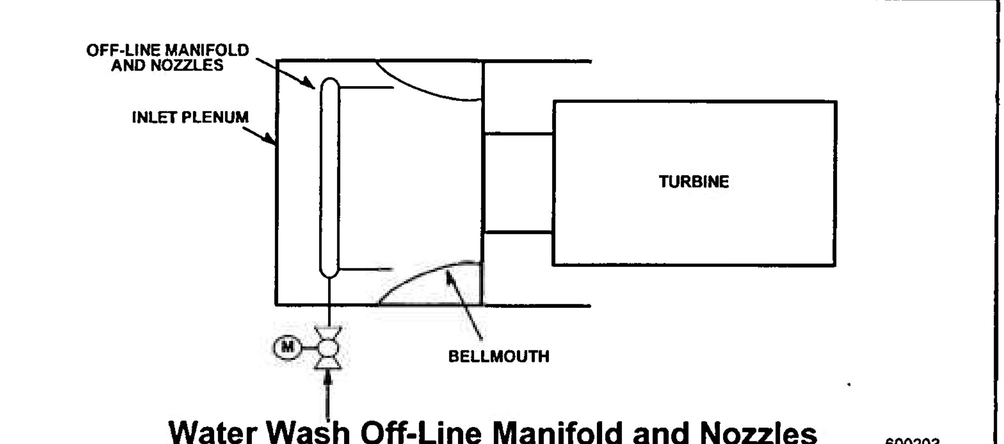
8.4 Off-Line Compressor Water Wash

Compressor water washing is used to remove fouling deposits and to restore performance. Fouled compressors result in reduced air flow, lower compressor efficiency and lower compressor pressure ratio. Compressor cleaning may also slow the progress of corrosion, thereby increasing blade life and reducing the contribution of corrosion products to the formation of fouling deposits. Off-line cleaning is the process of injecting cleaning solution into the compressor while it is being turned at cranking speed.

The on-base compressor washing feature consists of piping, nozzles, solenoid valves and software in the turbine control panel. A compressor water wash can be initiated while the turbine is off-line.

8.4.1 Off-Line Manifold and Nozzles

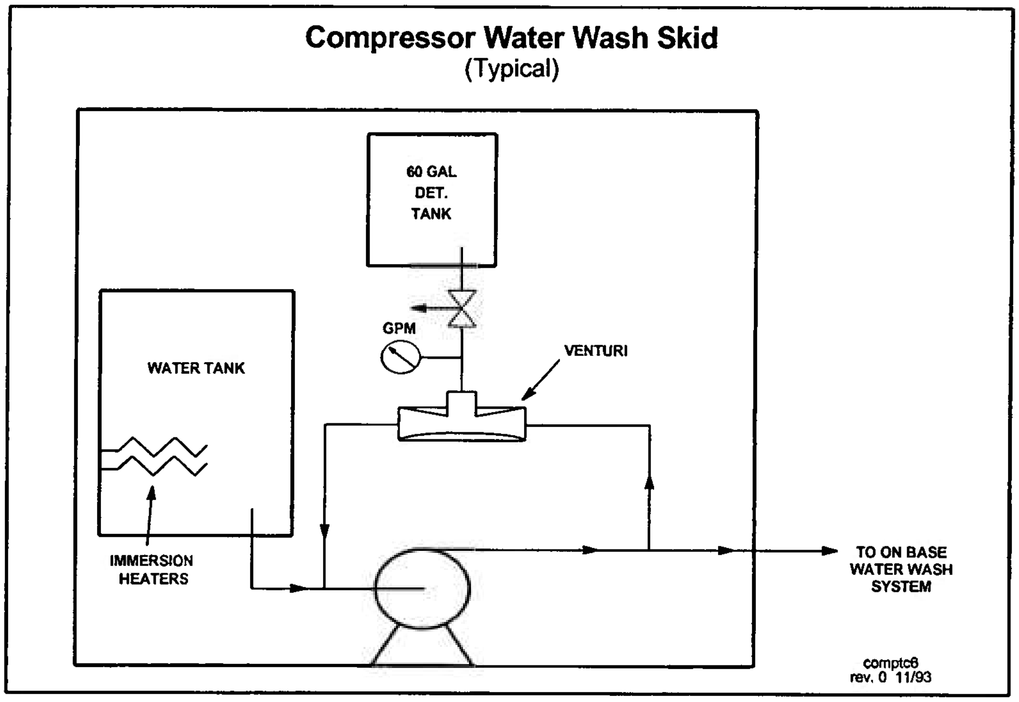
The off-line washing components consist of a piping manifold, and spray nozzles in the forward bellmouth, and a motor-operated valve controlled by the turbine control panel. Off-line washing is a manual operation because of the large number of manual valves on the turbine which need to be manipulated in order to perform an off-line wash.



Water Wash Off-Line Manifold and Nozzles

8.4.2 Off-Base Water Wash Skid

The off-base water wash skid is used for injecting washing solution (water and/or detergent) into the compressor for on-line or off-line cleaning. The skid is equipped with a storage tank and piping, and is completely lagged and heated for outdoor installations. The immersion heaters supplied are able to heat the water to 82°C (180°F) in approximately 9-15 hours. The skid also contains a water pump and a venturi eductor capable of delivering solution at the proper flow, pressure and mix ratio.



8.5 Accessory Compartment

The compartment contains the starting system, accessory gear, lube oil reservoir and liquid fuel system components.

8.5.1 Starting and Cooldown System

The starting system includes 4000 V electric motor to bring the unit to self-sustaining speed during the starting cycle. The cooldown system provides uniform cooling of the rotor after shutdown. This is accomplished by furnishing oil from the ac motor-driven auxiliary lubrication oil pump to the hydraulic ratchet mounted on the torque converter. Sequencing is accomplished by the gas turbine controls with the use of position limit switches with reverse solenoids. The gas turbine is ready to restart on signal at any time, subject to the ability to re-initiate combustion (approximately 10% rated speed or less).

- Hydraulic torque converter
- Connection to unit through accessory gear

- Electro-hydraulic rotor turning device with a dc motor-driven pump, mounted on the torque converter (the turbine shaft is tuned through a 45 degree arc at approximately three minute intervals during the cooldown period)

8.5.2 Accessory Drive System

The accessory gear is connected to the gas turbine rotor by a diaphragm type coupling.

The auxiliary components driven directly by the accessory gear are:

- Lubricating oil pump
- Liquid fuel pump
- Hydraulic oil pump
- Atomizing air compressor

8.5.3 Lubrication System

The lubricating provisions for the turbine, generator, reduction gear and accessory gear are incorporated in a common lubrication system (see schematic). Oil is also taken from this system, pumped to a higher pressure, and used in the hydraulic system. The system is vented to atmosphere through a mist eliminator and includes the following equipment:

- Accessory gear driven main lubrication oil gear pump
- Accessory gear driven main hydraulic variable displacement piston pump
- Oil reservoir mounted within the accessory base with the following devices mounted on it:
  - Full-flow ac motor-driven auxiliary lubrication oil centrifugal pump
  - Partial-flow dc motor-driven emergency lubrication oil centrifugal pump
  - Full-flow ac motor-driven auxiliary hydraulic oil variable displacement piston pump
  - Pressure relief valve in the main pump discharge
  - Dual lubrication oil-to-coolant, finned, 90-10 Cu-Ni, tube heat exchangers with transfer valves. The cooler is a U-Tube and Shell

configuration with the tubes being of the pull-out, removable bundle type.

- — Dual, full-flow 5 micron filters with transfer valve for lubrication oil system (replaceable cartridges are used for each filter)
- — Dual 5 micron filters for hydraulic oil system (replaceable cartridges are used for each filter)
- — ASME code stamp on:
  - – Lube oil coolers
  - – Lube oil filters
- — Bearing header pressure regulator

- Stainless steel lubrication oil feed piping downstream of the lube oil filter transfer valve.
  - — Note: Welding is tungsten inert gas of the root pass.

- Instruments for control, indication and protection of the lubrication oil system as follows:
  - — Bearing metal thermocouples
  - — Temperature indicating gauge for bearing header temperature
  - — Automatic temperature controller which regulates coolant flow to control lube oil and atomizing air temperature during operation.
  - — Permissive-start temperature switch
  - — Bearing header high temperature alarm and trip switches
  - — Bearing header low pressure alarm and trip switches
  - — Auxiliary and emergency pump stop and start switches
  - — Tank mounted level indicator, with low and high level alarm switch
  - — Lubrication oil heater and heater controls
  - — Panel mounted bearing header pressure gauge
  - — Panel mounted main, auxiliary and emergency pump discharge pressure gauges
  - — Panel mounted trip oil pressure gauge
  - — Panel mounted lubrication and hydraulic oil filter differential pressure gauges

8.5.3.1 Mist Elimination

The lube oil mist eliminator is an air-exhaust filtration unit used to remove lube oil-mist particles which are entrained in the lubricating system vent lines by the sealing air returns to the gas turbine lubricating system. The system is mounted on its own foundation adjacent to the accessory base and is piped to the lube oil tank and vent system. The mist eliminator assembly consists of a holding tank with filter elements, motor-driven blower and check-relief valve. Collected oil drains back to the lube oil reservoir.

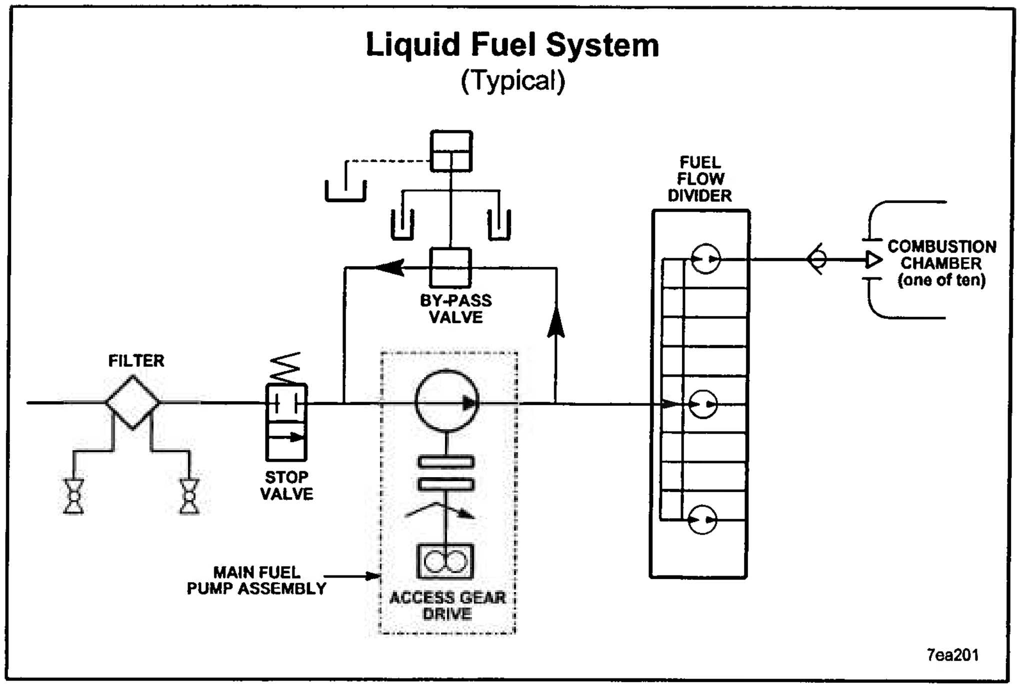
8.5.4 Liquid Fuel System

- Fuel oil stop valve
- Single fuel oil filter, mounted on-base
- Accessory gear driven, screw-type, positive displacement fuel pump
- Electro-hydraulically controlled bypass valve
- Flow divider metering system with magnetic pick-ups providing system feedbacks
- Instruments for the liquid fuel system including:
  - — Selector valve assembly for reading individual fuel nozzle pressure
  - — Fuel oil filter differential pressure gauge
  - — Fuel oil pressure gauge after low pressure filter
- On-base stainless steel piping with carbon steel flanges (downstream from the low pressure filter)

8.5.5 Atomizing Air System

The accessory gear-driven atomizing air compressor provides high-pressure air to atomize the liquid fuel for combustion, to purge the liquid fuel combustor nozzle passages, and to provide the purge control valve operating air. The equipment consists of:

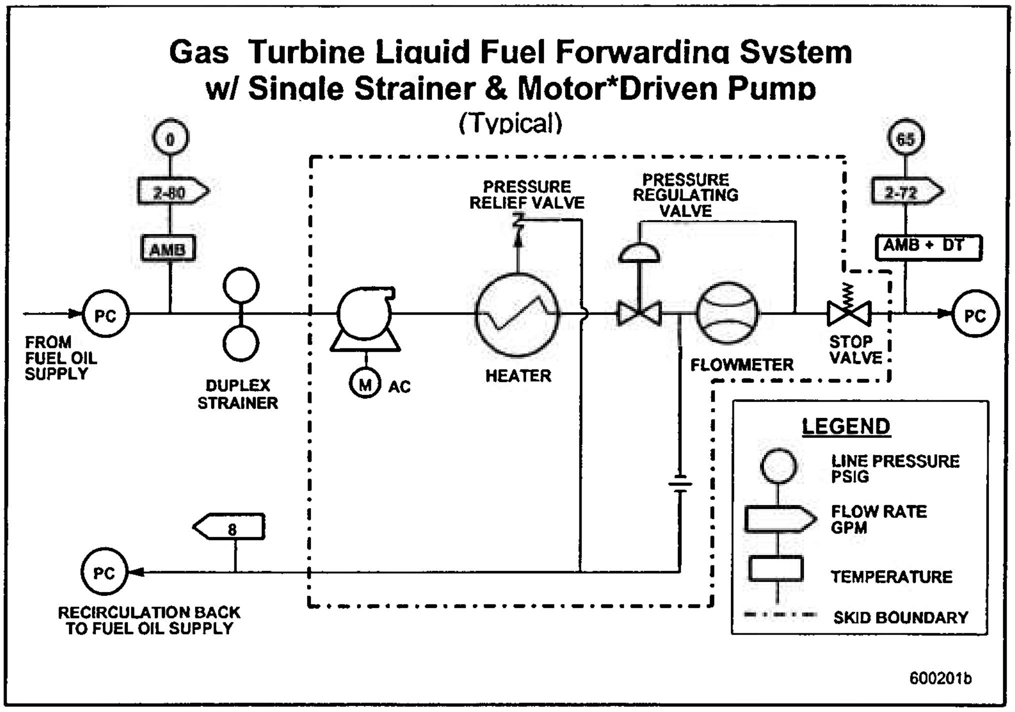
- Single air to water U-tube heat exchanger for cooling cycle air for entry to the atomizing air compressor.
- Full flow one micron filter.
- The booster atomizing air compressor for startup is electric motor-driven.



8.6 Distillate Fuel Forwarding System

The distillate fuel forwarding system is a separately mounted auxiliary skid used to supply liquid fuel at the proper pressure, temperature and flow to the primary fuel pump (on the turbine base). The motor controllers are located in the turbine motor control center. The system includes the following:

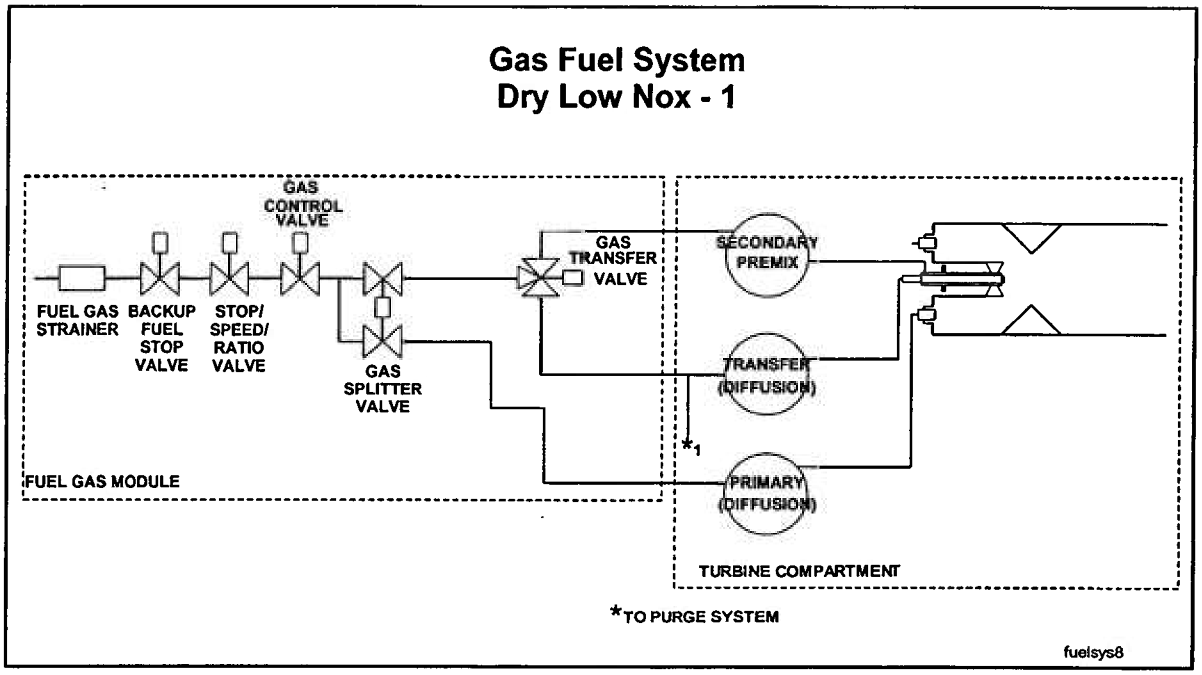
- Duplex strainer
- AC motor-driven pump
- Fuel heater
- Pressure regulating valve
- Flow meter with resettable mechanical totalizer
  - Pulse generator for Mark V
- Stop valve
- On-skid piping
- Electrical junction box
- Outdoor enclosure



8.7 Natural Gas Fuel System

The gas fuel system equipment is installed in a separate, ventilated compartment adjacent to the turbine and consists of the following:

- Stainless steel on base and interconnecting piping to unit manifolds
- Fuel gas stop/speed ratio and control valves
- Fuel gas system instrumentation panel
- Valve vent piping
- Exhaust fan module



8.8 Dual Fuel System

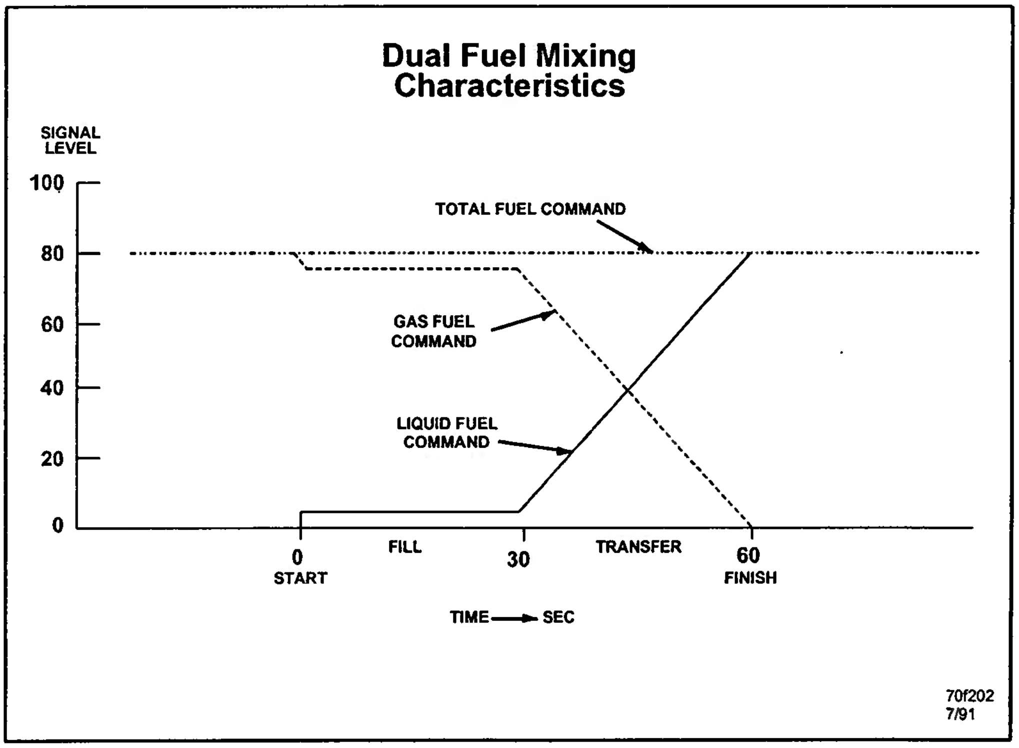
Fuel is to be in accordance with GE fuel specifications as indicated in the Reference Specification section of the proposal.

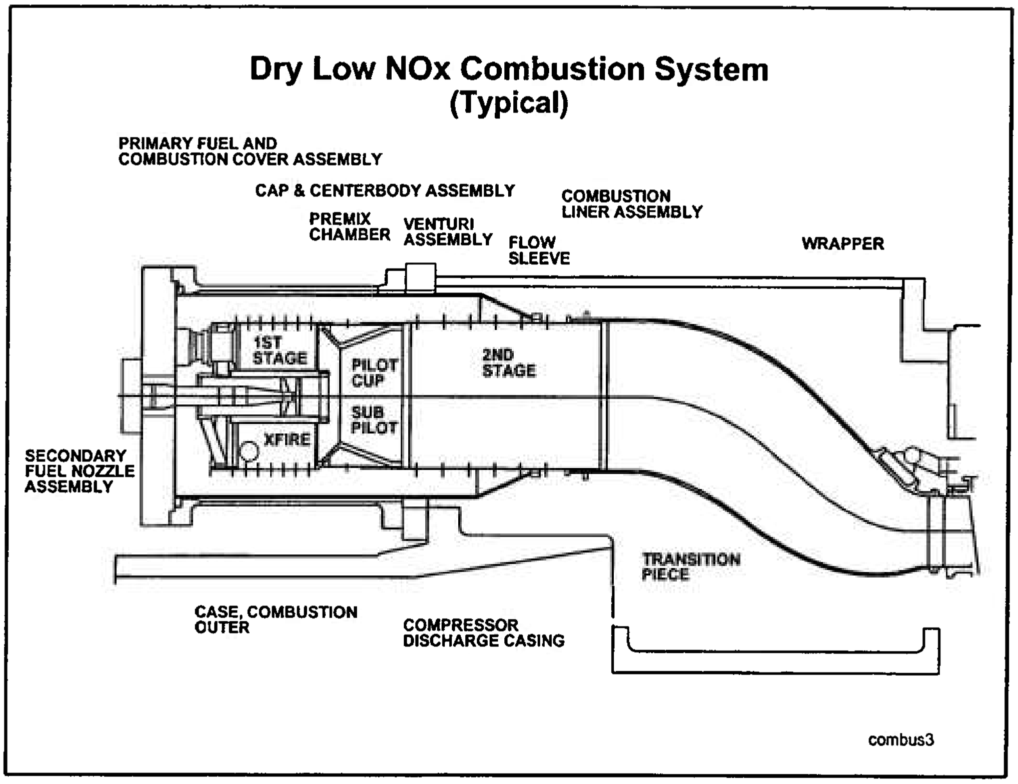
The gas turbine may be started on either fuel, and transfers from one fuel to the other may be initiated by the operator prior to start up or at any time after completion of the starting sequence. Since gas is usually the primary fuel, with distillate as a backup, transfers from gas to distillate can be automatically initiated on low gas supply pressure, provided that liquid fuel is available, and that there is adequate time to start the fuel forwarding pump. Transfer back to the primary fuel is by operator initiation only, in order to ensure the integrity of the supply and prevent oscillatory operation if the gas supply pressure is marginal at the transfer initiation pressure. If liquid fuel is the primary fuel, this automatic sequence can be switched to accommodate this.

A typical gas/distillate transfer is illustrated below. The energy equivalent of the fuel flow as the function of fuel command is matched between the two fuels, so that equal gas and liquid commands will result in equal energy release in the gas turbine combustors. The fuel signal divider then splits the signal to each fuel system in a manner that maintains the sum of the two signals equal to the total required fuel demand.

The transfer sequence is divided into two parts, a line filling period and the actual transfer. During the first period, the incoming fuel command is raised to a level that will allow filling of the system in about thirty seconds, and the outgoing fuel command is lowered by an equivalent amount. After fuel has reached the fuel nozzles, the incoming fuel is ramped up to equal the total fuel demand, and the outgoing fuel is ramped down to zero. Since total energy to the gas turbine is held reasonably constant, load variations for a properly matched and tuned system are minimal, and generally are less than five percent of nameplate rating.

The next step in the process involves initiation of the inactive fuel system purge, if purging is required, and automatic verification of proper operation. Since purging results in additional, although limited, fuel being injected into the turbine to clear the inactive fuel system, there is potential for a load disturbance at this time if the purge is initiated too abruptly. Once the system is cleared, the potential for a load spike disappears. Purge system sequencing is designed to minimize this effect, and in the case of liquid fuel nozzle purging, is initiated during the transfer. This results in random opening of purge check valves, which has been shown to substantially reduce the load spikes. The final step in the transfer process is resetting the NOx control system to meet the needs of the new fuel.





The primary zone is utilized as a diffusion burning zone, similar to a standard GE multi-nozzle combustor, for ignition and low load operation. Emissions are also comparable to a standard combustor in this mode. At a given fuel air ratio in the combustor, fuel is introduced through the secondary fuel nozzle and flame is established in the secondary zone of the combustor. This mode of operation is termed lean-lean. NOx emissions are lowered somewhat in this mode. When the combustor fuel air ratio is sufficient to support a premixed (low NOx) flame a transfer sequence occurs. All of the fuel is first directed through the secondary nozzle in order to extinguish the flame in the primary zone. Fuel is then reintroduced through the primary nozzles and the primary zone becomes a premixing zone, and a premixed flame is established in the secondary zone, anchored by the venturi flame holder. The venturi also accelerates the flow between the primary and secondary zone which prevents the flame from "flashing back" into the primary zone. The fuel is split between the primary and secondary fuel nozzles to optimize the emissions performance of the combustor. Premixed operation is utilized for mid to full load operation on gas fuel.

If required, both primary and secondary fuel nozzles can be dual fuel nozles, thus allowing automatic transfer from gas to oil throughout the load range.

8.9 Dry Low NOx Combustion System

8.9.1 Combustion Chambers

The combustion liners are cylindrical, or have two cylindrical sections of different diameter with a conical transition section between the two. Discharge air from the axial-flow compressor flows forward along the outside of the combustion liner, as guided by the flow sleeve. Liner cooling may be achieved via film cooling with annular slots distributed along the length of the combustion liner, or entirely with enhanced backside cooling. Backside only cooling is utilized on some DLN combustors. Thermal barrier coatings are applied to the inner walls of the combustion liners for longer inspection intervals.

Air enters the combustor through a variety of holes in the liner and cap, and swirlers which are typically a part of the fuel nozzles. The air, depending on its injection location is utilized in the actual combustion process, for cooling, or as dilution to tailor the exhaust gas profile.

8.9.2 System Description (DLN-1)

The Dry Low NOx (DLN) combustor is a dual stage multi-mode combustor capable of operation with either gaseous or liquid fuel. The four major components: fuel nozzles, liner, cap/centerbody, and venturi are arranged to form two stages in the combustor. The multiple primary fuel nozzles are arranged circumferentially around the annular primary zone. A single secondary nozzle is located along the center line of the combustor within the centerbody.

Liquid fuel operation is performed in primary and lean-lean mode with emissions comparable to a standard GE multi-nozzle combustor. Water injection is utilized with liquid fuels for NOx abatement.

8.9.3 Water Injection System for NOx Reduction on Liquid Fuel

The water injection system consists of pumping and metering equipment for supplying water to the combustion system for NOx abatement. All piping and components which come in contact with water are stainless steel. The control system provides NOx emission control with minimum water injection and minimum degradation in heat rate by modulating the water injection rate proportional to fuel consumption.

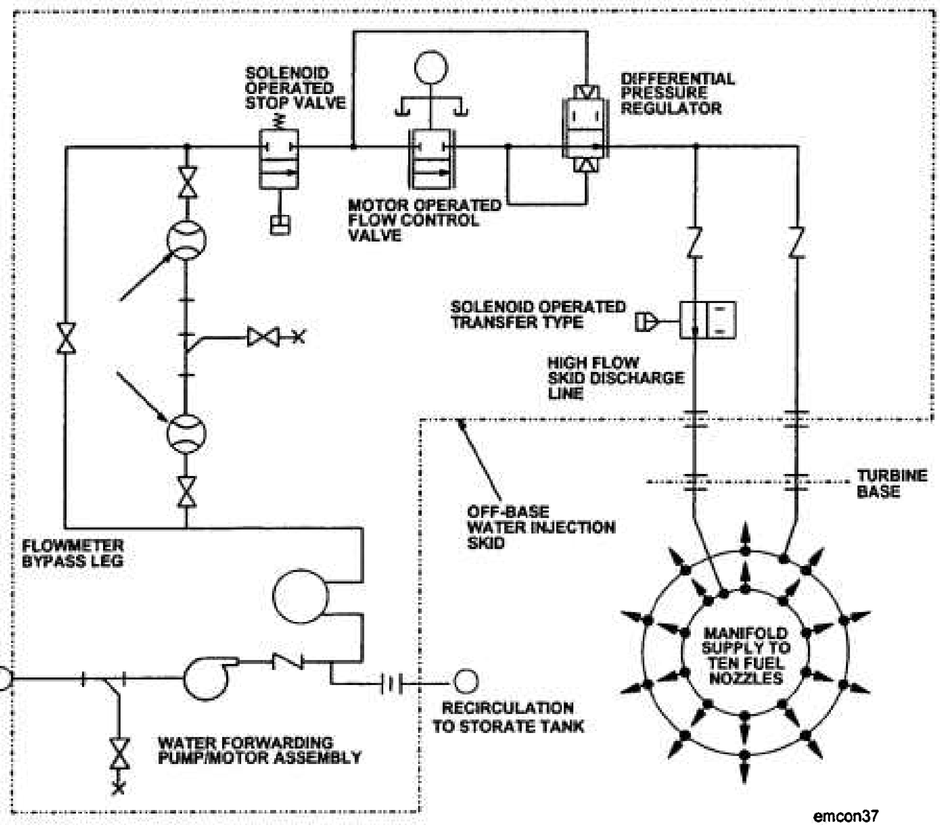
The gas turbine combustion system is equipped with a water supply manifold connected to water injection nozzles in each combustion chamber.

8.9.3.1 Off-Base Water Injection Skid

- Inlet isolation valve and Y-strainer
- AC motor-driven pump
- Single five (5) micron filter
- Flow meters (2) with signal to Mark V
- Control and stop valves
- On-base piping
- Motor control center for skid devices
- Structural steel base
- Outdoor enclosure with lighting

Gas Turbine Water Injection System

(Typical)



8.9.3.2 Water Quality

Total solids	Five (5) ppm max.
Total trace metals (sodium + potassium + lithium + vanadium + lead)	0.5 ppm max.
pH	6.5 - 7.5

In the case where contaminants are present in the water, the total limits in the fuel, water and air should be controlled such that the total concentration equivalent in the fuel (from all sources) conforms to the following limits:

Contaminant	Max. Equivalent Concentration (ppm-weight)
Sodium plus potassium plus lithium	1.0
Lead	1.0
Vanadium	0.5
Calcium	2.0

The water quality requirement can generally be satisfied by demineralized water.

8.10 Off-Base Coolant-to-Air Industrial Type Cooling System

A self-contained, off-base industrial type, closed-loop pressurized coolant system is supplied to dissipate the heat from the lubrication oil and atomizing air system and generator cooling if applicable. The following major components are included:

- Modular 100% capacity coolant-to-air heat exchanger mounted off-base, with motor-driven fans to force air over finned tube heat exchangers. The fan motor power is supplied from the unit motor control center.
- Automatic temperature controller which regulates coolant flow to control lube oil temperature during operation
- Dual full-flow ac motor-driven coolant circulating pumps (one running, one standby)
- Makeup and expansion tank
- Instruments for the system as follows:
  - — Tank low level alarm and indicator
  - — Panel mounted water header pressure gauge, pressure switch and temperature switch
  - — Coolant header temperature gage
  - — Inlet and outlet thermometers

8.11 Starting Sequence

There are two (2) distinctly separate parts to the gas turbine generator starting sequence, starting to synchronization and loading to base load. There are also different versions of each. Starting to synchronization will be addressed first.

The normal gas turbine starting sequence to synchronization includes, in part, the following steps:

- Check protective systems and start auxiliaries
- Provide starting power per the schedule
- Accelerate gas turbine to firing speed (10 to 15%)
- Establish ignition and reduce fuel flow to warmup value
- Warmup for one (1) minute while still accelerating
- Release fuel flow to predetermined schedule
- At 90% speed (rpm), reduce starting power to zero (0)
- Lineup switches for generator operation
- Flash field, provide excitation power and raise voltage
- Govern at 100.3% of speed (rpm) and synchronize

This sequence is used for simple-cycle gas turbines that do not have complex exhaust systems.

Loading the gas turbine to base load is accomplished by increasing the governor set point at a predetermined rate until the gas turbine exhaust temperature reaches its base load control point. The loading rate of the gas turbine is determined by the ramping rate of the governor set point.

These loading rates can be selected independently of the gas turbine-generator starting sequence.

The cool-down system provides uniform cooling of the rotor after shutdown. This is accomplished by a hydraulic ratchet mounted on the starting means torque converter.

8.12 Package Enclosures

Gas turbine enclosures consist of several connected sections forming an all weather protective housing structurally attached to each compartment base. Enclosures provide thermal insulation, acoustical attenuation and fire extinguishing media containment. The enclosures allow access to equipment for routine inspections and maintenance. Enclosures are also heated, cooled and lighted, as described below, for convenience and optimum performance of installed equipment.

8.12.1 Heating and Ventilation System

The following heaters are provided to maintain start-up temperatures and humidity protection during shutdown and standby periods at ambient temperatures down to -17.8°C (0°F):

- Electric (ac) heaters in the control, generator, generator termination, and generator auxiliary compartments
- Electric (ac) heaters are not supplied in the turbine and accessory compartments

Ventilation of compartments during operation is provided for as follows:

- Two (2) air conditioners in PEECC
- Accessory and turbine compartments by one (1) fan
- Turbine shell and exhaust frame cooling fans (2)
- Load compartment exhaust silencers

8.12.2 Fire Protection System

Fixed temperature sensing fire detectors are provided in the unit's turbine, accessory, and load gear compartments. The detectors provide signals to actuate the low pressure carbon dioxide (CO_2) fire protection system. Nozzles in these compartments direct the CO_2 to the compartments at a concentration sufficient for extinguishing flame. This concentration is maintained by gradual addition of CO_2 for an extended period.

The fire protection system is capable of achieving a non-combustible atmosphere in less than one minute, which meets the requirements of the United States National Fire Protection Association (NFPA) #12.

The supply system is composed of low pressure CO_2 tank(s) mounted off-base, a manifold and a release mechanism. Initiation of the system will trip the unit, provide an alarm on the annunciator, turn off ventilation fans and close ventilation openings.

8.12.3 Lighting

The accessory compartment and the Packaged Electric and Electronic Compartment (PEECC) have ac lighting on an automatic circuit. When ac power is not available, a dc battery-operated circuit supplies a lower level of light automatically. The turbine compartment is not lighted.

8.12.4 Painting

The exteriors of the accessory, turbine and generator compartments; auxiliary modules, PEECC and accessory base and other equipment are painted with two (2) coats of alkyd primer prior to shipment.

The exterior surfaces of the inlet duct and the inlet compartment are painted with one (1) coat of primer.

The turbine compartment interior is painted with high-temperature paint. Interiors of all other compartments are painted.

The interior of the inlet system is painted with zinc rich paint.

8.13 Wiring

Control panel wiring is SIS type insulated switchboard wire, AWG #14-41 Strand SI-57275. Ribbon cables are used as appropriate.

On-base wiring utilizes Tefzel insulation for moderate temperature applications (less than 150°C), Teflon/glass/Teflon composite insulation for high temperatures (less than 260°C) and mineral insulated (MI) type conductors for very high temperature environments. Thermocouple wire insulation is Teflon with Kapton overwrap. On-base gas turbine wire termination uses spring tongue crimped type terminals. Generator wire terminations are ring type.

Junction boxes are selected to meet the environmental requirement of the Purchaser but are, in general, of steel or cast aluminum construction. Special environments such as corrosive or hazardous can be accommodated. Terminal boards within junction boxes are of the heavy duty industrial type selected for the particular environment in which the junction box is located.

The overall gas turbine-generator electrical interconnection system includes on-base wiring, terminal boards, junction boxes and compartment interconnecting cables.

General Electric will supply standard cable assemblies for all fixed point compartment interconnections such as control compartment to turbine base, control compartment to generator, etc.

Compartment interconnecting cable is 90°C flame retarded with instrument cable rated 300 V and control cable/480 V power cable rated 600 V. Power cables are sized in accordance with the National Electrical Code. Size for control cable is AWG #12, for instrument signals size is AWG #18 (two or three conductor, twisted shielded wire) and for thermocouples size is AWG #18 Chromel/Alumel twisted-pair, with overall cable shield.

8.14 Miscellaneous Parts and Special Maintenance Tools

As a service to the Buyer to make a more efficient installation of the gas turbine, GE provides shipment of miscellaneous parts associated with the field installation.

Shipment is in a single weather-tight, International-type cargo container. The plywood container, which can be opened from one end, is outfitted with shelves and bins for parts storage. The container comprises what amounts to a "mobile stockroom" and is designed for transport by truck, rail or ship.

Within the container, each part is packed, identified with its own label or tag, and stowed in an assigned bin or shelf. A master inventory list furnished with the container provides the location of each part, for ease in locating the item.

An additional box is furnished for the interconnecting piping.

- Tools typically provided are listed below: (one (1) set is furnished for each group of as many as four (4) units per site)
  - — Guide pins (for removal or replacement of bearing caps, compressor casing and exhaust frame)
  - — Rotor disassembly support
  - — Trolley and rail (for use inside accessory compartment)
  - — Inlet casing jacking support
  - — Rotor turning device
  - — Fuel nozzle wrenches
  - — Fuel nozzle test fixture
  - — Spark plug electrode tool
  - — Clearance tools
  - — Fuel nozzle staking tool
  - — Combustion liner tool
  - — Alignment fixture (for aligning gas turbine to accessory gear)
  - — Bearing and coupling disassembly fixture
  - — Wrench for adjusting overspeed bolt
  - — Generator rotor lifting slings
  - — Generator rotor removal equipment (rotor shoe, skid pan, etc.)

18. Design Criteria/Assumptions

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This section delineates the design criteria and assumptions made to perform the preliminary engineering design and equipment selection for the Balance of Plant (BOP) systems for this power plant. This proposal is based upon these assumptions and they will prevail during the engineering of this project unless modified by contract requirements.

18.1 General

- Refer to the General Plant Description Tab for overall plant configuration, site design conditions and major equipment selection.
- The Owner has conditional approval authority on the general design drawings, namely, the Plot Plan, Station Arrangement, Flow Diagrams and Electrical One-line Diagrams. In areas effecting guarantees, schedule or cost, a change order must be executed. Detailed engineering drawings are presented to the Owner for information only and are used for construction.
- The specifications, listings and drawings included in this proposal are based in part on preliminary information and are, therefore, subject to possible modifications during the final design. This is particularly so with regard to the sizing of auxiliary and accessory equipment and their related systems. GE reserves the right to modify equipment and systems as required based on detailed engineering design.
- In the event that the design criteria and assumptions as stated in this section are changed in a substantive manner, GE reserves the right to modify the design, guarantees and/or pricing in accordance with the General Terms and Conditions and the work scope for the contract.
- The equipment is arranged as shown on the Plot Plan and Station Arrangement drawings contained in the Drawings/Diagrams Section of this proposal. GE reserves the right to modify the Plot Plan and Station Arrangement during the detailed design, subject to the Owner's approval.
- Equipment and materials described herein are factory tested in accordance with manufacturer's standard procedures.

18.2 Mechanical

18.2.1 General

The plant is designed for operating modes ranging from peaking service (daily starting and stopping) to base load (continuous) service. The plant is designed for operation on natural gas and fuel oil. Natural gas is the primary fuel with distillate serving as backup fuel.

18.2.2 Fuel Gas

The fuel gas shall comply with the latest revision of GEI-41040 found in the Reference Specifications/Documents Tab.

Fuel gas is provided at the terminal point at 27°C (80°F) and at a flow rate supporting plant performance requirements. To account for fuel gas conditioning equipment and piping losses from the terminal point to the gas turbine fuel valve, the minimum supply pressure is 3.4 kg/cm^2 (48 psig) [2.7 kg/cm^2 (38 psig) without fuel gas heating to 185°C (365°F)] higher than the GEI requirements for the specific gas turbine model with DLN combustors. The maximum supply pressure shall not exceed maximum fuel gas pressure required at gas turbine fuel gas valve plus pressure drop required for conditioning equipment. A gas compressor is not provided.

The sulfur content of the fuel gas is assumed to be 0 ppm unless otherwise specified by the Owner.

18.2.3 Fuel Oil

The fuel oil is distillate and shall be in compliance with the latest revision of GEI-41047 found in the Reference Specifications/ Documents Tab.

The fuel oil unloading system design is based on the use of 65 m^3/hr (285gpm) capacity pumps, each pump unloading a 9000 gallon capacity tanker truck at a rate of one hour per truck for sixteen hours per day, and filling a fuel oil tank in five days. See the Tanks section of this tab for fuel oil tank criteria.

18.2.4 Raw Water

- The raw water is of potable quality. The following raw water analysis is typical. Water quality requirements for gas turbines can be found in the latest revision of GEK-101944 found in the Reference Specifications/ Documents Tab.

Species	Design	Units
pH range	6.5-7.5	
Silt Density Index (SDI)	<5	
Temperature Range	65-75	°F
Total Organic Carbon (TOC)	<1	ppm as C
Total Suspended Solids (TSS)	<5	ppm
Turbidity	<1	NTU
Chlorine, free	1	ppm ion
Chloramines	0	ppm ion
Ammonia, total	0	ppm ion
Carbon dioxide, free	in equlibrium	
Hydrogen sulfide, free	0	ppm ion
Cations		
Aluminum	<0.01	ppm ion
Barium	<0.05	ppm ion
Calcium	60	ppm CaCO3
Iron (ferrous)	<0.1	ppm ion
Iron (ferric)	<0.1	ppm ion
Magnesium	40	ppm CaCO3
Manganese	<0.01	ppm ion
Potassium	5	ppm CaCO3
Sodium	50	ppm CaCO3
Strontium	<0.05	ppm ion
Anions:		
Alkalinity, Total	20	ppm CaCO3
Chloride	60	ppm CaCO3
Fluoride	1	ppm CaCO3
Nitrate	10	ppm CaCO3
Phosphate	<0.1	ppm CaCO3
Sulphate	60	ppm CaCO3
Silica (reactive)	10	ppm ion
Silica (total)	10	ppm ion
Coliform Bacteria Number		
< 40 samples per month	<1/100 ml	
> 40 samples per month	<5/100 ml	

- The raw water pressure at the terminal points for raw water other than for fire protection is to be a minimum of 4.2 kg/cm^2 (60 psi) at a flow rate supportive of plant requirements.
- Raw water storage is not provided.

18.2.5 Fire Protection

- The fire protection water source is to be raw water without on-site storage or pumps. The fire protection system is assumed to be an extension of an existing hydrant system and is designed in accordance with NFPA 24. The fire water pressure at the terminal point is to be a minimum of 7.0 kg/cm^2 (100 psi) at a flow rate supportive of plant requirements.
- The fuel oil handling and storage area is located away from buildings to preclude the need for fire protection in excess of the hydrant system defined above. Additional insurance carrier requirements are not considered.
- The transformer fire containment firewalls are designed to prevent line-of-sight damage from the top of the transformer tank to nearby structures (e.g. gas turbine inlet compartment support steel, turbine building, etc.). Additional insurance carrier requirements are not considered.

18.2.6 Wastes

- Chemical wastes, including water treatment regeneration wastes, are neutralized to a pH of 6 to 9. Plant effluents are discharged at the terminal point at a maximum temperature of 65°C (150°F). Oil and grease content is to be a maximum of 10 mg/l. Further wastewater treatment is to be performed off-site.
- Waste streams piped to the site boundary and directed off-site include oily drains after passing through an oil/water separator and sanitary waste.
- Storm Water – See Civil/Structural and Environmental Sections
- Oily waste collected after oil/water separation is to be removed by an off-site disposal service.
- Fuel gas drains, gas turbine false start drains and gas turbine water wash are collected in holding tanks for removal by an off-site disposal service.

- For plants equipped with gas turbine inlet evaporative coolers an evaporative cooler blowdown sump shall be provided. The sump shall be sized to hold a minimum of 30 minutes of blowdown between the high level alarm and the sump over flow to allow the operator to respond.

- Waste Tanks – See Environmental Section

- Where wastewater is discharged into surface waters the maximum temperature of the effluents to be discharged as measured at the edge of the 100 m (330 ft) mixing zone shall be as follows:
  - 3°C (5°F) higher than that of the receiving waters.
  - 5°C (9°F) higher when receiving water temperature is equal to or less than 28°C (82°F).

18.2.7 Demineralized Water

The demineralized water tank is to be sized to contain storage of demineralized water for three days NO_X injection water requirements on distillate oil. The water from this tank is also used for gas turbine water wash.

18.2.8 Tanks

- Demineralized water tank — sized for 72 hours NO_X water injection on distillate oil. Maximum tank height is 14.6 m (48 ft) to avoid exceeding 1.5 kg/cm2 (3000 psf) soil bearing pressure.

- Fuel oil tank — a single tank provided for emergency backup fuel and sized for 72 hours of gas turbine operation at full load. Due to concerns of sediment carryover to the gas turbine fuel system this tank cannot be drawn from and filled at the same time. Once the tank has been completely filled a minimum settlement time of 48 hours is recommended. Maximum tank height is 14.6 m (48 ft) to avoid exceeding 1.5 kg/cm^2 (3000 psf) soil bearing pressure.

Environmentally hazardous materials associated with fuel oil storage, transformers, drains tanks, water treatment equipment, etc., are provided with secondary containment as defined in the Environmental Section of this Tab. The containment areas are provided with a sump pit but without a sump pump so that the sump can be pumped by portable means.

18.2.9 Piping

- Piping for fuel oil, acid, caustic, sodium hypochlorite, etc., is single-wall pipe and is located above grade on sleepers.
- Piping is heat traced as required if the minimum site ambient is below 0°C (32°F). Freeze protection is not included.
- Piping insulation and gasket material shall not contain asbestos.
- High density polyethylene (HDPE) piping shall be used for underground water systems operating below 60°C (140°F) and 11.2 kg/cm^2,g (160 psig) with pipe size requirements less that 1 m (36 in.).

18.2.10 Ventilation

Batteries for the dc battery systems are located in a ventilated room or compartment.

18.3 Electrical

18.3.1 General

Choose one of the following (50 Hz or 60 Hz):

50 Hz

- **Balance of Plant (BOP) electrical equipment is to be specified in accordance with International Electrotechnical Commission (IEC) nomenclature and conventions.**
- **The generator step-up transformers are sized based on IEC-354 and a power factor of 0.85 lagging. The nameplate rating will be the capability at 40°C (104°F) ambient.**
- **Medium & Low Voltage Levels are assigned as follows:**

50 Hz Voltage	
SYSTEM/Bus	**USER/Device**
3,300 V, 3-phase, 3-wire or 6,900 V, 3-phase, 3-wire	**3,000 V, 3-phase, 3-wire or 6,600 V, 3-phase, 3-wire**
400 V, 3-phase, 4-wire	**380 V, 3-phase, 4-wire**

220 V, 1-phase, 2-wire	**220 V, 1-phase, 2-wire**

OR

60 Hz

- **Balance of Plant (BOP) electrical equipment is to be specified in accordance with American National Standards Institute (ANSI) nomenclature and conventions.**

- **The generator step-up transformers are sized based on ANSI-C57 and a power factor of 0.85 lagging.**

- **Medium & Low Voltage Levels are assigned as follows:**

60 Hz Voltage	
SYSTEM/Bus	**USER/Device**
4,160 V, 3-phase, 3-wire	**4,000 V, 3-phase, 3-wire**
480 V, 3-phase, 3-wire	**460 V, 3-phase, 3-wire**
120 V, 1-phase, 3-wire	**120 V, 1-phase, 3-wire**

- Power delivery equipment is sized based on turbine power output using primary fuel.

- Balance of Plant (BOP) protective relays, control and indication systems are selected in accordance with standard industry practices as recommended by IEEE.

- Automatic and manual synchronization features will be supplied as part of and included only in the turbine control system. Alternative or stand-alone synchronization features are not included.

- Cable sizes are selected to result in a voltage drop in the circuit acceptable to the operation of the equipment. Generally the voltage drop is less than 5% during normal operation. Circuit voltage drop during motor starting will be limited to 20% maximum.

- Conduit runs through foundations should be avoided. Conduit embedded in turbine foundations is limited to runs that terminate in the interior or immediately outside the foundation, or conduit runs to off base equipment near the unit foundation.

- Underground circuits located in non-vehicle traffic areas shall be run in rigid galvanized steel (RGS), intermediate metallic (IM), or Schedule 40 polyvinylchloride (PVC) conduits that are completely encased in a non reinforced cement/sand mix (flowable fill). The intent of the flowable fill is to eliminate the corrosion effect of the soil on the steel conduits. A mix of steel conduits for instrument and control level circuits and PVC conduits for power circuits is permissible provided electromagnetic level separation between circuits is maintained. Underground PVC conduits runs shall incorporate RGS or IM elbows below grade and RGS or IM stub ups above grade.

- Underground circuits located in areas subject to vehicle traffic, such as under roadways and maintenance crane access, shall be run in RGS, IM, or PVC conduit that is completely encased in reinforced concrete with a minimum strength of 210 kg/cm^2 (3000 psi).

- Above grade circuits routed in conduit shall be run in RGS or IM conduit supported by structures such as pipe racks, walkway supports, foundation surfaces, or other support steel as convenient. Above grade PVC conduit shall not be used.

- Power and control circuits located indoors shall utilize open tray and/or RGS or IM conduit. Instrument circuits located indoors shall be routed in steel solid bottom trays with solid steel covers, RGS conduit, or IM conduit. Control and power circuits may use aluminum ladder tray without covers unless tray covers are required to minimize possible cable damage. Lighting and receptacle circuits located indoors may be routed in electrical metallic tubing (EMT).

- Circuits routed in or near corrosive ambients, such as open cooling towers, shall be routed in fiberglass coated steel conduits or fiberglass trays.

- Direct buried cable is limited to outdoor lighting and grounding.

- All circuits will use spacing between voltage levels to avoid electromagnetic interference in adjacent circuits.

- Wire insulation is selected for the environment and the operating temperatures. PVC insulation is not used for conductor insulation or cable jacket.

- Transformer insulating oil shall not contain polychlorinated biphenyls (PCBs).

18.3.2 Grounding

The station grounding grid is designed in accordance with the recommendations of IEEE Standard 80-1986 to limit step and touch potentials to safe values while not compromising protective relaying sensitivity. For this proposal, materials offered for installation of the ground grid are based on soil resistivity of 100 ohm-meters and the soil content is homogeneous to 3 m (10 ft) below grade. If different, then the design needs to be changed and priced accordingly. Maximum grid current dissipation to remote earth is assumed to be $\leq$ 10 kA.

18.3.3 Lighting

- Lighting design and level of illumination are in accordance with current Illuminating Engineering Society (IES) recommendations.
- Outdoor lighting is designed to illuminate the roadways and equipment walkways where applicable. Security fence lighting and general area outdoor lighting is not included.
- Emergency lighting is the unit compartments by the unit dc system.

18.3.4 DC Power

- The gas turbine is supplied with a dedicated integral dc battery rated at 125 V dc.
- Each unit battery is sized to support its required unit loads for black shutdown power, switchgear control and protection circuits in addition to the UPS system for a period of two (2) hours upon loss of ac power to the unit battery. A completely discharged battery is recharged in approximately sixteen (16) hours.

18.3.5 Low Voltage AC

- The configuration of the low voltage auxiliary system is 3-phase, solidly grounded.
- Main breakers are equipped with self-contained long time and short time trip devices.
- Feeder breakers are equipped with self-contained long time, short time, and instantaneous trip devices.
- Short circuit capability of the low voltage system is 42 kAmps.
- Motor control centers are equipped with combination molded case circuit breaker/motor contactors with series overload heaters.
- The low voltage system to feeds 3-phase motors less than 250 hp.
- A small interruptible power supply unit is provided to supply 120 V ac, single-phase power to the Mark V <I> processor and printer.

18.3.6 Medium Voltage AC

- The configuration of the medium voltage system is 3-phase, 3-wire, resistance grounded.
- Short circuit capability is 250 MVA.
- The medium voltage system feeds three phase motors 250 hp and larger.
- The medium voltage system feeds the gas turbine auxiliary transformers.

18.3.7 High Voltage AC

- Available short circuit current from the high voltage system is to be $\leq$40 kA, both three-phase and single-phase-to-ground.
- Bus duct is used to connect the generator to the main step-up transformer.
- Plant startup power is derived from the switchyard.
- A take-off tower is provided at each generator step-up transformer to connect the transformer to the switchyard. Transformer take–off towers are designed as follows:
  — 4500 kg (10,000 lbs) per phase (line tension)
  — 1000 kg (2,200 lbs) per wire (static wire tension)
  — $\pm$ 15° take-off angle

18.3.8 Motors

- Indoor motors 0.75 kW (1.0 hp) and up are Open Drip-Proof (ODP). Indoor motors less than 0.75 kW (1.0 hp) are Totally Enclosed Fan Cooled (TEFC) or Totally Enclosed Non-ventilated (TENV).
- Outdoor electric motors less than 200 kW (250 hp) are TEFC. Outdoor motors 200 kW (250 hp) and larger are Weather Protected - Type II enclosures (WP-II).
- Motors 18.5 kW (25 hp) and larger are provided with anti-condensation protection.
- Motors under 0.37 kW (0.5 hp) are single-phase. Motors 0.375 kW (0.5 hp) up to 150 kW (200 hp) are 3-phase. Motors 200 kW (250 hp) and above are medium voltage, 3-phase.

- Combination molded case circuit breaker/motor starters with series overload heaters are provided for 3-phase motors less than 90 kW (125 hp). Motors larger than 90 kW (125 hp) and less than 200 kW (250 hp) are started from the low voltage switchgear. Motors 200 kW (250 hp) and larger are started from medium voltage vacuum contactors.
- GE-supplied motors for gas turbine auxiliary systems are per GE's standard design.

18.4 Controls

18.4.1 Instruments and Control Devices

18.4.1.1 General

- Instrument symbols and identifications are in accordance with the latest revision of the ISA "Standards and Practices for Instrumentation and Control".
- Cases, enclosures and cabinets for control equipment not mounted in the plant main (central) control room are dust-tight and drip-tight (NEMA 12) with a corrosion-resistant finish for an indoor location unless otherwise noted in specification.
- Instruments, switches and various control equipment not located in control panels but mounted on or near controlled or monitored equipment have enclosures which are water-tight, dust-tight and corrosion-resistant (NEMA 4X), unless the specific application requires otherwise.
- Electronic instrumentation has RFI/EMI noise immunity in accordance with SAMA Standard PMC-33.1.
- Instrument blowdowns are provided as required by the installation drawings.

18.4.1.2 Primary Flow Elements

- Flow orifices are used for fuel gas flow measurement.
- Flow nozzles and orifices are installed in meter runs having twenty (20) diameters minimum of straight pipe upstream and five (5) diameters minimum of straight pipe downstream of the flow element. Meter runs are of the same material and design strength as the pipe called out in the Project Piping Specification. Straightening vanes are not used to shorten required lengths of straight pipe.
- Nozzles and venturis will meet $\pm$ 2.0 % and orifices meet a maximum of $\pm$ 1-1/2% of reading accuracy over a 4:1 flow turndown ratio without laboratory calibration when installed in the meter runs.
- Construction and installation of the flow elements conforms to the recommendations of ASME Fluid Meters, Sixth Edition.
- Beta ratios are maintained between 0.3 and 0.7.
- Positive displacement flow meters are used for fuel oil flow measurement.

18.4.1.3 Thermocouples, RTDs and Thermowells

- The preferred temperature measurement device is a thermocouple which is wired directly to the control system inputs. RTDs are used when accuracy requirements dictate, if temperature limitations of the RTDs are not exceeded.
- Thermocouples are dual element, ANSI (ISA) Type "E" except where special process, equipment, or project requirements indicate otherwise. Thermocouples will conform to ANSI MC-96.1 and IPTS-68 Tables.
- When RTDs are supplied, they will be dual-element, 100 ohm at 0°C (32°F), platinum, 3-wire, ungrounded and conform to the International Resistance vs. Temperature Standard, DIN 43 760.
- Thermocouples and RTDs are supplied as a complete assembly consisting of the thermocouple (RTD), connection head with ceramic terminal board, grounding screw and chain, thermowell and extension nipple. Thermocouple/RTDs are spring-mounted. Assembly is designed such that contact with the tip of the thermowell is assured upon insertion of the

thermocouple/RTD into the well. Thermocouples are grounded unless system requirements dictate ungrounded.

- The thermowell insertion length and tip thickness are designed for each application to meet the requirements for vibration and stress analysis as outlined in ASME Power Test Code PTC 19.3, latest revision. Thermocouple/thermowell vibration and stress calculations are provided for each thermowell by the vendor.
- Thermowell "lagging extension" is used to locate the nipple screw connection outside the pipe insulation.

18.4.1.4 Electronic Transmitters

- Transmitters are standard type, i.e. 4-20 mA, 2-wire, with externally adjustable span, zero and damping (continuous). Minimum accuracy is equal to or better than $\pm$ 0.25% of calibrated span ($\pm$ 1% for level).
- Temperature transmitters are not used; thermocouples/RTDs are applied.
- Differential pressure transmitters are installed with three (3) valve, stainless steel manifolds with integral and bypass valves.

18.4.1.5 Process Switches

- Switches are dry contact, snap acting DPDT (preferred).
- Repeatability is equal or less than $\pm$ 1% of range (level and temperature = $\pm$ 1% of range).
- Wire insulation is selected for the environment and the operating temperatures. PVC insulation is not used.

18.4.1.6 Local Indicators

- Ranges are normally selected such that the operating point falls between 1/3 and 2/3 of the full scale range.
- Indicators are located such that they are visible from the floor or adjacent operating platforms, where practical.
- Remote mounted gas-filled thermometers are used for high temperature applications or where visibility or access is a problem.
- Indicators have dual scales, if required.

- Measurement accuracy is as required by the application.
- Thermometers are supplied with thermowells as required and where practical.

18.4.1.7 Control Valves

- Valves are designed and rated per ANSI Standards B16.25, B16.34, B31.1. Valves, which are designated "ASME BEP" (Boiler External Piping) in the data sheets, are designed, rated and tested per applicable paragraphs of ANSI 31.1 and ASME Section I, 1986. Valves designated ASME Section I are designed, rated and tested accordingly. Valve face-to-face dimensions are in accordance with applicable ISA standards.
- Each control valve is sized and designed per ANSI Standard 16.34 and ISA Standard S75.01 for compressible and incompressible flow for the conditions specified in Valve Data Sheets. Preventative measures are taken where cavitation, flashing, or high noise conditions exist.
- Valve flow coefficient (CV) at rated (normal) operating conditions does not exceed 80 percent of rated (100 percent open) CV unless stated otherwise on the valve data sheet and valve remains above 10% stroke for minimum controllable flow and below 90% stroke for maximum controllable flow.
- Single seated valves are applied unless the application requires otherwise. Where indicated by the application, control valve body connections to piping are welded. Maintenance such as disassembly, reassembly and such part replacements as actuator, plug, seat, trim and packing, can be achieved readily while valve body is welded in the pipeline. The minimum ANSI class of all "weld-in" valves is ANSI Class 600.
- Valve body size is not less than 1/2 the diameter of the inlet pipe. The body is of pressure sealed or bolted bonnet construction, depending on the pressure classification.
- The design of the valve body, bonnet and bolting conforms to the Unfired Pressure Vessel Code of the American Society of Mechanical Engineers.
- Valves are generally required to meet sound level limits of 85 db(A) at 1 m (3 ft) without insulation.

- Valve actuators are spring and diaphragm or piston type. The actuators are adequate to stroke the valve at the required rate of travel under the maximum differential pressure to which the valve may be exposed.
- Current to pressure (I/P) converters are generally valve mounted unless specified otherwise on the data sheets. Positioners are field reversible.
- Cage guided valves are used predominantly for steam and water for severe service applications where the potential for cavitation, flashing and/or trim noise is present.
- Materials for parts in contact with the process fluid comply with the data from control valve data sheets, piping material specification and ANSI Standard B16.34. Valves in steam service, exposed to pressures exceeding 70 kg/cm^2 (1000 psi) and/or 260°C (500°F), or are subject to cavitation or flashing have hardened trim as required for the intended service. The valve bonnet is of the same basic material as the body.
- Valves are supplied with all required accessories as delineated on the Valve Data Sheets. Electrical accessories have screw terminals. If the valve has more than one electrical accessory they are wired to terminal boxes mounted on the valve assembly.

18.4.1.8 Instrument Installation

- Instruments and control devices covered by this tab are located and installed as shown on the Instrument Installation and Location Drawings.
- Instrument tubing and installation material is designed as required for the intended service.
- Instrument pneumatic tubing lines are designed to be as short as possible and routed adjacent to structures providing protection such as building walls, columns or beams.

18.5 Civil/Structural

- All foundations are of the spread footing or mat type. Foundations required to reach excessively deep bearing strata, piling, soil stabilization, or subgrade improvements, such as overexcavation, are not included. The criteria for the design is based on a minimum soil bearing pressure of 1.5 kg/cm^2 (3000 psf). With this minimum bearing pressure, it is assumed that long term settlement will not exceed 25 mm (1 in.) at a depth of 1 m (3 ft) below final grade. Also, long term differential settlement is not to exceed 0.002L, where L is the distance between any two points that settle differentially, or any two adjacent columns. Freeze protection is not a consideration if the minimum site ambient is above 0°C (32°F). Soil and/or ground water is assumed not to be chemically aggressive.

- Verification of the above minimum soil pressure and maximum settlement is to be made by an appropriate geotechnical investigation.
- Should the geotechnical investigation prove that the above design parameters are not met, thereby requiring piling, deeper excavation to reach good strata, soil stabilization work, or filling underground caverns, etc. to improve soil characteristics, the Owner shall be responsible for the extra cost and any impact to the construction schedule.
- Demolition, removal or relocation of existing structures, pipes or pipelines, electrical lines and other utilities either above or below grade, facilities, equipment, etc. are not included in this proposal.
- The site is assumed to be relatively flat; requiring minimal grading. Stormwater culverts are provided at the roads.
- Storm runoff is by surface drainage to the site boundary limits. No runoff is assumed from adjacent areas. The storm water drainage system is designed to convey the peak 10-year runoff without flooding above the top of the ditches. The system will also be designed to convey the peak 50-year runoff without flooding plant facilities. The runoff, per distribution Type III, is defined by U.S. Bureau Technical Paper No. 40. No provisions are included for treatment, containment, etc., of storm water runoff.
- Rough leveling of the site is a balanced cut and fill operation.
- Fencing is provided around the site boundary limits of the finished site; gates in the fence are manual swing.
- Excavation is accomplished using conventional mechanical equipment such as a backhoe. It is assumed that blasting is not required. Rock is defined as material that cannot be removed by a D9 Caterpillar tractor equipped with a single tooth ripper blade in excavations wider than a D9, or with a 75,000 lb. excavator equipped with a rock bucket in excavations narrower than the width of a D9.
- Excavated existing site material is suitable for structural backfill.

- The natural ground water table is assumed to be below the depth required for excavation. Dewatering is not required. Hydrostatic pressure and flotation are not considered.

- Concrete structures and substructures are to be designed and tested in accordance with the American Concrete Institute Building Code ACI-318. The following strengths based on ACI cylinder tests are to be used as a minimum:

28 Day Concrete Strength (elevated slabs)	280 kg/cm^2 (4000 psi)
28 Day Concrete Strength (turbine pedestal)	210 kg/cm^2 (3000 psi)
28 Day Concrete Strength (other concrete)	210 kg/cm^2 (3000 psi)
Reinforcing Steel (Yield Strength)	4200 kg/cm^2 (60,000 psi)
Cement	ASTM C150, Type I or II

- Expansion anchors are used for all anchor bolts smaller than 20 mm (0.75 in.) diameter and are field furnished and installed.

- Steel structures are designed in accordance with the American Institute of Steel Construction (AISC) using structural steel with a yield strength of 2,500 kg/cm^2 (36,000 psi).

- Finish painting is included. Shop finish painted equipment and materials receive field touch-up as required.

- Refer to the General Plant Description Tab for seismic criteria and wind design information.

- Stack height is a minimum of 1.5 times higher than adjacent plant buildings.

- The following loads are used in the design of the Power Plant:

<table>
<tr><td>Dead Loads:</td><td colspan="2">Own weight of all structures, equipment and associated parts.</td></tr>
<tr><td rowspan="6">Road Load:</td><td colspan="2">Road load is based on fuel oil delivery trucks with 37,850 L (10,000 gal) capacity. Roads shall be designed using the recommendation of the Asphalt Institute's Publication, "Thickness Design - Asphalt Pavement for Highways and Streets," and based on the following:</td></tr>
<tr><td>Life of Pavement (Design Period)</td><td>20 Years</td></tr>
<tr><td>Truck Class</td><td>HS20 (5 axle)</td></tr>
<tr><td>Truck Axle Load</td><td>14,500 kg (32,000 lbs)</td></tr>
<tr><td>Annual Growth Rate</td><td>None</td></tr>
<tr><td colspan="2">For estimating the "Truck Factor" and "Load Equivalency Factor," it is assumed that 5 trucks/day travel these roads.</td></tr>
</table>

- Truck turning criteria is based on WB50 (large semitrailer with a 15 m (50 ft) wheel base). The minimum inside radius of access roads is 13.5 m (45 ft).
- A permanent plant crane or hoist is not provided. All areas will be serviced by mobile equipment.
- The criteria for access and egress is in accordance with applicable US standards (i.e. OSHA, NFPA, NEC).
- Plant facilities do not include provisions for handicapped access.
- Furniture is not included.
- Laboratory facilities are not included.
- Laboratory facilities are not included.

18.6 Environmental

- If applicable environmental regulations require design features, systems or equipment beyond those described in this proposal, they will be included as contract adjustments.
- The site is free and clear of hazardous materials and/or contaminants as defined by local authorities or EPA listing if undefined. If hazardous materials and/or contaminants are suspected prior to or during construction, GE reserves the right to have soil and groundwater sampling and analyses performed to GE specifications at the Owner's expense. Should the analyses show that hazardous materials and/or contaminants exist, GE reserves the right to conduct a Risk Assessment Study at Owner's expense to evaluate acceptable solutions that minimizes environmental impacts to the off-site public, construction workers and plant operators. Removal of hazardous materials and/or contaminants, as defined by the Risk Assessment Study, and agreed by GE and the Owner as the appropriate mitigation measure, is by the Owner at his expense. Removal of hazardous materials and/or contaminants and other necessary mitigation measures that can impact the construction schedule and the cost of construction will be included as contract adjustments.
- Hazardous waste materials generated on-site during the construction phase will be temporarily stored using approved in-country environmental agency methods (or EPA methods if none exist) and removed from site by

the end of construction to a licensed hazardous waste landfill by a licensed hauler.

- Silt fences and hay bales are included for on-site erosion control.
- The storm water drainage system as defined in the Civil/Structural Section is assumed to be acceptable to the local regulating authorities. Any modifications to this system are considered outside the scope of this offering.
- Above ground piping and visible tanks - See Mechanical Section and Spill and Drain Containment table below.
- Below grade tanks used for environmentally hazardous materials are single-wall located in visible containment – see Spill and Drain Containment table below.
- Stack height - see Civil/Structural Section.
- Exhaust stack emissions and stack heights, as defined in this proposal, are assumed to satisfy typical ambient air quality and stack emission regulations. Stack test port location conforms with guidelines per U.S. EPA Method 1. Requirements beyond those described in this proposal will be included as contract adjustments. Air emissions modeling and Continuous Emissions Monitoring (CEM) are available as options.
- Exhaust stack emissions and noise testing are not included but can be offered if required.
- Gas turbine water wash waste is potentially a "hazardous waste" as defined by U.S. EPA regulations, depending on such variables as potential contaminants in the inlet air, type of detergent (solvent) used, etc. Accordingly, it is assumed that the Owner will provide for testing of this wastewater and disposal in accordance with applicable environmental standards. GE recommends that this material not be stored on-site but that arrangements be made to dispose of wash water off-site each time the turbine is washed.
- On-line washing, if used, should be addressed in the air emissions permit as a temporary process emission.
- The following requirements of the World Bank and the U.S. Export-Import Bank are met:
  — Exhaust stack emissions for NOx, particulates and SO_2.

- — Wastewater discharge requirements for effluent quality and discharge temperature when discharging to a river, lake or the ocean.
- — Minimization of hazardous and toxic materials by not using equipment containing polychlorinated biphenyls (PCBs) or chlorofluorocarbons (CFCs) and materials containing asbestos.
- — Secondary containment for processes and chemical storage where a release could result in the contamination of soil, ground water or surface water is provided.
- — Inclusion of fire prevention systems for fuel storage and chemical storage areas.
- — Far-field residential noise requirements of 55 dBA are met at a specified distance. This distance is defined in the Performance Guarantee Tab.

- Spill and drain containments shall be designed per the following specifications.
  - — Below described containment areas are assumed to meet local regulatory requirements.
  - — General containment design philosophy will be to include a sump that will be drained by Owner/Operator after visual inspection.
  - — No penetrations are to be included in the secondary containment structure.
  - — The referenced containment areas are designed for environmental considerations only and DO NOT account for additional capacity for fire protection.
  - — All <u>outdoor</u> chemical and oil storage tank containment areas shall be sized to accommodate 100% of the volume of the largest tank plus sufficient freeboard to contain the rainfall from 24-hr, 100-yr storm even, or 15 cm (6 inches) of rain, whichever is greater.
  - — All <u>indoor</u> chemical and oil storage tank containment areas shall be sized to accommodate 110 % of the volume of the largest tank.
  - — <u>All</u> containment areas shall be designed with a sloped grade to a sump pit unless otherwise noted in the following tables.
  - — The containment provisions for unloading areas are based on a typical tanker compartment size of 3,000 gallons. The containment for oil and chemical unloading areas should be adjusted, if necessary, to hold the maximum capacity of the largest compartment of a tank car or truck loaded/unloaded at each facility.

— The following tables provide design requirements for specific systems. Note the reference to “indoors” and “outdoors” is for typical configurations. The containment area for each system should be designed as appropriate for indoor/outdoor location as specified above.

System	Secondary Containment Required	Description
Fuel Oil Tank (Outdoors)	Yes	**Single-Walled Tanks:** • Single-wall tank with containment sized per noted specifications. • Use of on-site materials for berm (if of sufficiently low permeability) or use of secondary liner or membrane **Double-Walled Tanks:** • Double-walled tank with leak detection between walls (at additional expense) **All Tanks**: • Release prevention barrier and leak detection provided beneath floor of fuel oil tanks
Fuel Oil Unloading (Outdoors)	Yes	• Curbed concrete area with minimum 11.4 m^3 (3,000 gallon) capacity and with a sloped grade to a sump pit
Fuel Oil Forwarding Pumps and Heaters	Yes	• Concrete area with 15 cm (6 in.) curb to contain typical maintenance spillage
Fuel Oil Supply Piping	No – (If Above Ground) Yes – (If Buried)	• Above ground, single-wall piping on sleepers **or,** • If direct buried, double-wall piping with leak detection/ monitoring and coated and wrapped for corrosion protection (at additional expense) • All mechanical connections in piping to be above ground and visible

Water/Antifreeze Mix Water/Ethylene Glycol	Yes	**Water/Ethylene Glycol Mix** – • Treat piping same as fuel oil • Heat exchangers located in curbed concrete containment sized for 100% of heat exchanger volume and elevated piping plus freeboard per noted specifications

System	Secondary Containment Required	Description
Water/Propylene Glycol	No	**Water/Propylene Glycol Mix** – • Single-wall piping acceptable. • Heat exchanger containment not required. • Engineer to proportion water/glycol mixture to achieve proper heat and freeze protection requirement.
Oil-filled Transformers (Outdoors with Fire Walls)	Yes	• Located in a concrete containment with the floor set at grade level. • Containment shall be sized to contain 100% of the transformer oil capacity plus freeboard per noted specifications in Section 8.5, high enough not to create a tripping hazard (minimum 0.75 m / 30 in.). • Alternate containment sizing considerations are required if crushed stone is used or added or water spray/deluge is added (at additional expense) (e.g., the volume of the containment should be adjusted for the void ratio of the stone).
Gas Turbine Lube (Mineral) Oil Tank (All GT Models	Yes	• Located in a curbed concrete containment sized per noted specifications
Gas Fuel Drains Tank (Outdoors)	Yes	• Above ground tank with curbed concrete containment sized per noted specifications **or,** • If below grade, tank in open concrete vault with a sloped grade to a sump pit (at additional expense).

System	Secondary Containment Required	Description
Gas Turbine Drains (False Start/Miscellaneous Base Drains)/Water Wash Drains (Compressor Only) Tank	Yes for Tank No for Pipe	• Partitioned, single tank in open concrete vault with a sloped grade to a sump pit.
Gas Turbine Water Wash Supply Piping	Yes	• Treat piping same as fuel oil supply
Demineralized Water System (e.g., Ion/Resin exchange, RO system, etc. and associated piping) (at additional expense if supplied)	Yes	• Acid-Resistant concrete curbed area sized for 110% of the largest container with a sloped grade to sump pit for transfer to neutralization, if necessary.
Chemical Storage for Demineralized Water System (at additional expense if supplied)	Yes	• **Sodium hydroxide tank** – shall be located in a curbed concrete containment area sized per noted specifications • **Acid tank** – shall be located in a curbed acid resistant concrete containment area sized per noted specifications.
Raw Water Chemical Treatment (at additional expense if supplied)	Yes	• **Sodium hypochlorite tank** – shall be located in a curbed acid resistant concrete containment area sized for per noted specifications.
Chemical Tank Truck Unloading (at additional expense if supplied; outdoors)	Yes	• Acid-resistant concrete curbed area with minimum 11.4 m^3 (3,000 gallon) capacity and with a sloped grade to sump pit.
Diesel Fuel Storage (at additional expense if supplied, outdoors)	Yes	• Located in curbed concrete containment area sized per noted specifications.
Gas Turbine Stack Drains (Natural Gas Only, Outdoors)	No	• Drain to outdoor surface
Gas Turbine Stack Drains Tank (Other Fuels; Outdoors)	Yes	• Tank in open concrete vault with a sloped grade to a sump pit

System	Secondary Containment Required	Description
Oil-free Gas Turbine Startup Air Compressor	No	• Drain to outdoor surface
Oil/Water Separator (Outdoors)	No if Double-walled, direct buried tank Yes If Single-walled tank	• If direct buried, designed as a double-walled system with leak detection (at additional expense) **or,** • Located in a concrete containment area sized for 100% of the total volume of the system plus freeboard per noted specifications (at additional expense) **or,** • Located in an open concrete vault with a sloped grade to sump pit (at additional expense)
Maintenance Building (at additional expense if supplied)	Yes	• Curbed concrete floor, no floor drains.
Fire Water Pumps (at additional expense if supplied)	Yes	• If diesel-driven fire water pumps are used, refer to Diesel Fuel Storage Requirements for out-door diesel storage tank installations. • For indoor installations use double-walled storage tank or curbed containment. • For engine cooling systems using ethylene glycol provide curbed containment for cooling system.
Evaporative Cooler Blowdown	No	

East Hampton Power & Light Company

Calverton Generating Facility

Appendix E

LIPA
Long Island Power Authority
Distributed Resource Management
175 E. Old Country Rd, Hicksville, NY 11801

VIA Airborne Express

May 16, 2003

Mr. James A. Heller
President
East Hampton Power & Light
P.O. Box 805
Middle Island, NY 11953

Re: Transmittal of Electric System Impact Study Agreement

Dear Mr. Heller:

Attached you will find an "Electric System Impact Study Agreement" for your East Hampton Power & Light Project. Please complete the required areas and return two signed copies to my attention.

An executed Electric System Impact Study Agreement is required prior to the commencement of any LIPA system interconnection studies or agreements.

In addition, an invoice for $10,000 is enclosed. An initial $10,000 non-refundable payment is due prior to the commencement of any work. Please note, all checks should be made payable to "Long Island Power Authority" and mailed to:

Stephen J. Cantore
175 E. Old Country Rd, 2nd Flr., East Office Bldg.
Hicksville, NY 11801
Attn: Distributed Resource Management

Please feel free to contact me at (516) 545-4820 if you have any questions.

Sincerely,

Stephen J. Cantore, C.E.M., C.C.P.
Senior Engineer

LIPA
Long Island Power Authority
Distributed Resource Management
175 E. Old Country Rd, Hicksville, N.Y. 11801

Invoice No. ESISA0033

May 15, 2003

BILL TO:

Mr. James A. Heller
President
East Hampton Power & Light
P.O. Box 805
Middle Island, NY 11953

QUANTITY	DESCRIPTION	AMOUNT
1	Electric System Impact Study Non-refundable initial fee Approx. 69 Person-hrs @ $145/Hr. E. Hampton Power & Light Project	$10,000.00
	Total Amount Due	$10,000.00

Please remit a check payable to "Long Island Power Authority." The payment should be sent to:

Attn: Stephen Cantore
Distributed Resource Management
175 E. Old Country Rd, 2nd Flr EOB
Hicksville, NY 11801

LIPA's taxpayer ID number is 11-1019782.

If you have any questions about this invoice, please call Steve Cantore at (516) 545-4820.

LIPA
Long Island Power Authority

333 Earle Ovington Boulevard
Suite 403
Uniondale, NY 11553
(516) 222-7700 Fax (516) 222-9137
http://www.lipower.org

March 28, 2003

James A. Heller
President
East Hampton Power & Light Company
P.O. Box 805
Middle Island, New York 11953

Dear Mr. Heller:

This is to acknowledge receipt of your proposal to construct a 79.9 megawatt merchant generating plant on the former Grumman property in Calverton. I have forwarded a copy of your proposal to Steve Cantore of KeySpan Electric Services. Steve will contact you about an Electric System Impact Study.

I note that your project will employ General Electric 7EA technology. You may be aware that LIPA had been discussing a 7EA project with a developer last year for a site in North Bellport. While that project never materialized, it should be noted that the DEC in its review of the project's air permit application was considering requiring that a SCR be installed. Indications were that incorporating a SCR on a GE 7EA would have deleterious economic consequences. You may wish to discuss this matter further with the DEC before proceeding with your project.

Please call me at (516) 719-7517 if you have any questions on this matter.

Sincerely,

James J. Peterson
Director of Power Markets Contracts

cc: Richard Bolbrock
Stephen Cantore

LIPA
Long Island Power Authority
Distributed Resource Management
175 E. Old Country Rd, Hicksville, N.Y. 11801

Invoice No. ESISA0033

May 15, 2003

BILL TO:

Mr. James A. Heller
President
East Hampton Power & Light
P.O. Box 805
Middle Island, NY 11953

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Sincerely,

James J. Peterson
Director of Power Markets Contracts

cc: Richard Bolbrock
Stephen Cantore

East Hampton Power & Light Company
P.O. Box 805
Middle Island, New York 11953

August 21, 2003

Mr. Paul Nickerson
Chief, Division of Threatened and Endangered Species
Region Five
300 Westgate Center Drive
Hadley, MA 01035-9589

RE: Threatened and Endangered Species

Dear Mr. Nickerson:

I am writing to consult with the U.S. Fish and Wildlife Service regarding a potential development project in the Township of Riverhead in Suffolk County, New York. The site is a 3-acre parcel located within a 465-acre section known as the Riverhead Industrial Park that is located within a 2,900-acre parcel, which belonged to the United States Government and was previously the site of the Grumman Naval Defense & Research Facility. The entire 2,900-acre site was bequeathed to the Township of Riverhead when the Grumman Facility was relocated. The Township is planning to use the area for a family recreational center and also an industrial park. The 465 acres set aside for the industrial park has been zoned for industrial use only. A map of the site location is attached.

Please provide information regarding any federally listed threatened or endangered species known to occur in the vicinity of the site. Due to the already disturbed character of the site – It was used for a U.S. Naval Aircraft Research, Testing and Assembly Facility complete with two 5,000-foot runways, a control tower and hangars – we expect that the project would have no adverse effect on any threatened or endangered species. If you require any additional information please advise us. We request that you respond to this letter as soon as possible, but no later than within 30 days of receipt.

Sincerely,

James A. Heller
President
East Hampton Power & Light Company

JAH/enclosure

East Hampton Power & Light Company
P.O. Box 805
Middle Island, New York 11953

August 21, 2003

Mr. Greg Edinger
New York Natural Heritage Program
625 Broadway, 5th Floor
Albany, NY 12233-4757

RE: Threatened and Endangered Species

Dear Mr. Edinger:

I am writing to consult with the New York Natural Heritage Program regarding a potential development project in the Township of Riverhead in Suffolk County, New York. The site is a 3-acre parcel located within a 465-acre section known as the Riverhead Industrial Park that is located within a 2,900-acre parcel, which belonged to the United States Government and was previously the site of the Grumman Naval Defense & Research Facility. The entire 2,900-acre site was bequeathed to the Township of Riverhead when the Grumman Facility was relocated. The Township if planning to use the area for a family recreational center and also an industrial park. The 465 acres set aside for the industrial park had been zoned for industrial use only. A map of the site location is attached.

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Sincerely,

James A. Heller
President
East Hampton Power & Light Company

JAH/enclosure

East Hampton Power & Light Company

Calverton Generating Facility

Appendix F

New York State Department of
Environmental Conservation

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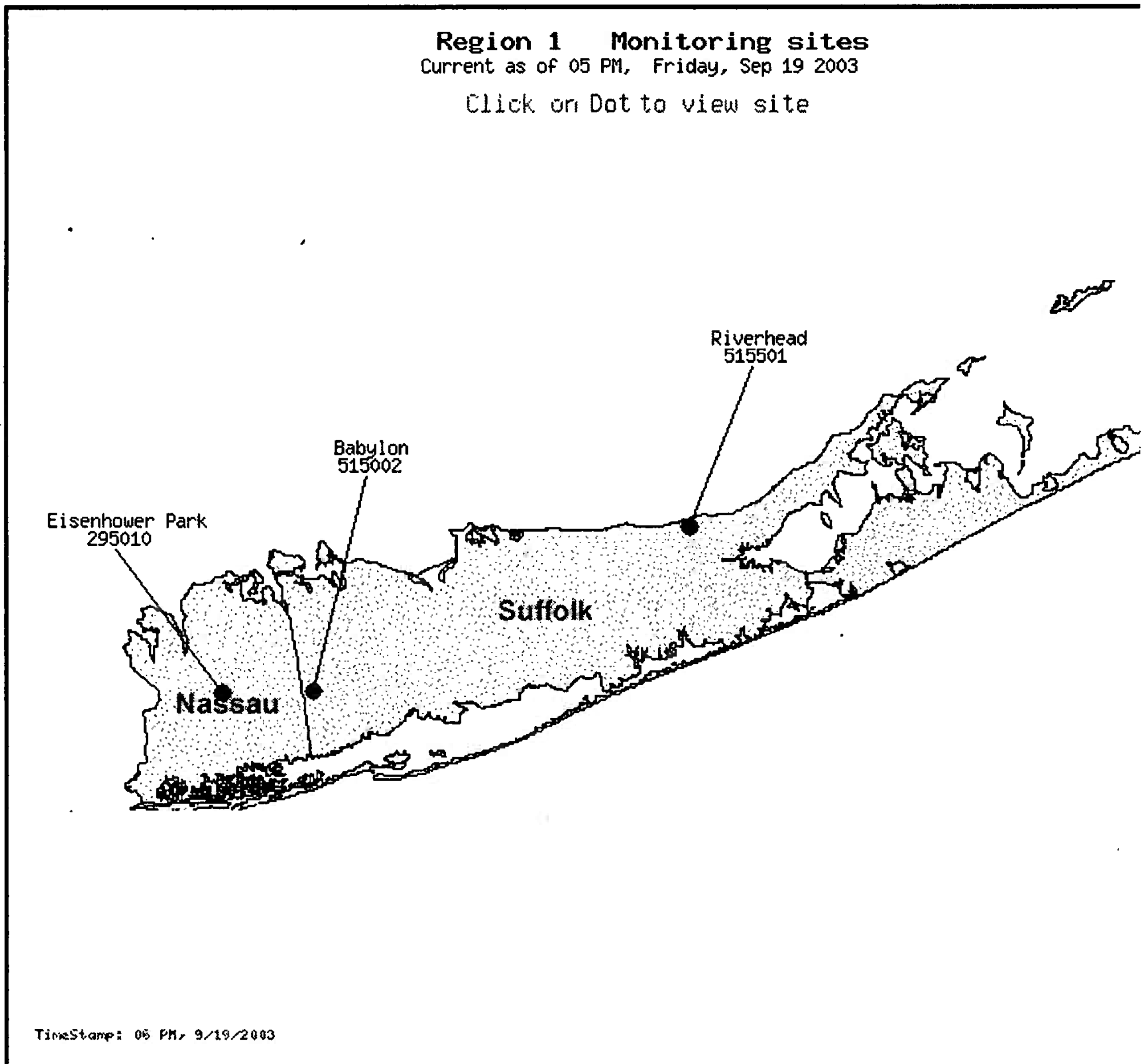
Monitoring Site Index

Region -1

More information from this division:

Site Index



Monitoring Sites			

Region	County	Site ID	Name
1	Nassau	295010	Eisenhower Park
	Suffolk	515002	Babylon
		515501	Riverhead

Last Modified :Friday, September 19, 2003 06:11 PM

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Air Monitoring Data

515002 - Babylon

More information from this division:
Region 1 Monitoring Site Index

Pollutant Levels (1 Hour Values) as of:

Friday, September 19, 2003 06:00 PM
(Click Pollutant name for Graph)
See Ozone notes below

Date	Hour	Ozone	8HrF Ozone	8 hr Ozone
		PPM	PPM	PPM
Sep 18 2003	07 AM	0.032	0.034	0.038
Sep 18 2003	08 AM	0.031	0.035	0.037
Sep 18 2003	09 AM	0.030	0.035	0.036
Sep 18 2003	10 AM	0.032	0.037	0.035
Sep 18 2003	11 AM	0.035	0.038	0.034
Sep 18 2003	12 PM	0.034	0.038	0.033
Sep 18 2003	01 PM	0.038	0.039	0.033
Sep 18 2003	02 PM	0.039	0.039	0.034
Sep 18 2003	03 PM	0.039	0.039	0.035
Sep 18 2003	04 PM	0.037	0.038	0.036
Sep 18 2003	05 PM	0.039	0.038	0.037
Sep 18 2003	06 PM	0.040	0.038	0.038
Sep 18 2003	07 PM	0.041	0.037	0.038
Sep 18 2003	08 PM	0.040	0.036	0.039
Sep 18 2003	09 PM	0.038	0.035	0.039
Sep 18 2003	10 PM	0.036	0.035	0.039
Sep 18 2003	11 PM	0.036	0.034	0.038
Sep 19 2003	12 AM	0.035	0.033	0.038
Sep 19 2003	01 AM	0.035	0.032	0.038
Sep 19 2003	02 AM	0.034	0.030	0.037
Sep 19 2003	03 AM	0.033	ND	0.036
Sep 19 2003	04 AM	0.034	ND	0.035
Sep 19 2003	05 AM	0.035	ND	0.035
Sep 19 2003	06 AM	0.034	ND	0.035
Sep 19 2003	07 AM	0.027	ND	0.033
Sep 19 2003	08 AM	0.022	ND	0.032
Sep 19 2003	09 AM	0.024	ND	0.030
Sep 19 2003	10 AM	ND	ND	ND
Sep 19 2003	11 AM	ND	ND	ND
Sep 19 2003	12 PM	ND	ND	ND

Sep 19 2003	01 PM	ND	ND	ND
Sep 19 2003	02 PM	ND	ND	ND
Sep 19 2003	03 PM	0.032	ND	ND
Sep 19 2003	04 PM	0.035	ND	ND
Sep 19 2003	05 PM	0.039	ND	ND
Sep 19 2003	06 PM	ND	ND	ND

Notes:

8 Hr Ozone : The value reported is an 8 hour running average for 8 consecutive one hour reading and reported as the ENDING hour value. Example, hourly data from a site is collected from 09:00AM through 4:00PM (8 consecutive hours) is reported as a 4:00PM value.

8HrF Ozone:The value reported is an 8 hour running average for 8 consecutive one hour reading and reported as the BEGINNING hour value. Example, hourly data from a site is collected from 09:00AM through 4:00PM (8 consecutive hours) is reported as a 9:00AM value.

Ozone: Data is collected from the start of each hour until the end of each hour. It is REPORTED as the ENDING of that hour. Example, hourly data from a site is collected from 09:00AM through 10:00AM and it is reported as 10:00AM (Or Hour 10).

Click Here for an Ozone Composit Graph

Last Modified :Friday, September 19, 2003 06:11 PM

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Environmental Conservation

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Air Monitoring Data

295010 - Eisenhower Park

More information from this division:

Region 1 Monitoring Site Index

Pollutant Levels (1 Hour Values) as of:

Friday, September 19, 2003 06:00 PM
(Click Pollutant name for Graph)

Date	Hour	SO2	24Hr SO2	PM2.5 *	24Hr PM2.5 *
		PPM	PPM	UG/M3	UG/M3
Sep 18 2003	07 AM	0.005	ND	9.78	ND
Sep 18 2003	08 AM	0.005	ND	10.64	ND
Sep 18 2003	09 AM	0.005	ND	11.26	ND
Sep 18 2003	10 AM	0.004	ND	10.26	ND
Sep 18 2003	11 AM	0.004	ND	11.21	ND
Sep 18 2003	12 PM	0.003	ND	7.65	ND
Sep 18 2003	01 PM	0.003	ND	8.20	ND
Sep 18 2003	02 PM	0.002	ND	7.02	ND
Sep 18 2003	03 PM	0.002	ND	6.15	ND
Sep 18 2003	04 PM	0.002	ND	1.70	ND
Sep 18 2003	05 PM	0.002	ND	5.22	ND
Sep 18 2003	06 PM	0.002	ND	7.19	ND
Sep 18 2003	07 PM	0.003	0.003	7.38	9.56
Sep 18 2003	08 PM	0.003	0.003	8.96	9.32
Sep 18 2003	09 PM	0.003	0.003	10.37	8.95
Sep 18 2003	10 PM	0.004	0.003	13.78	8.89
Sep 18 2003	11 PM	0.004	0.003	13.66	9.02
Sep 19 2003	12 AM	0.003	0.003	15.96	9.26
Sep 19 2003	01 AM	0.002	0.003	14.35	9.45
Sep 19 2003	02 AM	0.002	0.003	15.84	9.74
Sep 19 2003	03 AM	0.002	0.003	13.82	9.93
Sep 19 2003	04 AM	0.001	0.003	15.34	10.17
Sep 19 2003	05 AM	0.001	0.003	15.78	10.45
Sep 19 2003	06 AM	0.001	0.003	15.10	10.69
Sep 19 2003	07 AM	0.001	0.003	13.66	10.85
Sep 19 2003	08 AM	0.001	0.002	14.42	11.01
Sep 19 2003	09 AM	0.001	0.002	14.08	11.13
Sep 19 2003	10 AM	0.001	0.002	15.21	11.33
Sep 19 2003	11 AM	0.001	0.002	14.30	11.46
Sep 19 2003	12 PM	0.002	0.002	13.94	11.72
Sep 19 2003	01 PM	0.002	0.002	13.50	11.95

Sep 19 2003	02 PM	0.002	0.002	14.82	12.27
Sep 19 2003	03 PM	0.001	0.002	14.37	12.61
Sep 19 2003	04 PM	0.001	0.002	13.63	13.11
Sep 19 2003	05 PM	0.002	0.002	15.30	13.53
Sep 19 2003	06 PM	ND	0.002	ND	13.81

Note:* PM2.5 data is adjusted TEOM data values

Meteorological Data as of:

Friday, September 19, 2003 06:00 PM

(Click Pollutant name for Graph)

Date	Hour	Avg WD	Res WD	Avg WS	Res WS	Sigma	Rel Hum	Temp	Precip
		DEG	DEG	MPH	MPH	DEG	%	DEG	INCHES
Sep 18 2003	07 AM	73.40	73.	6.65	6.	19.8	71.59	65.	0.
Sep 18 2003	08 AM	71.34	72.	6.60	6.	24.0	71.56	66.	0.
Sep 18 2003	09 AM	70.19	71.	6.56	6.	22.8	71.29	66.	0.
Sep 18 2003	10 AM	72.34	72.	7.07	7.	25.5	72.34	67.	0.
Sep 18 2003	11 AM	71.27	71.	5.72	5.	23.9	72.10	68.	0.
Sep 18 2003	12 PM	82.47	81.	5.40	5.	27.5	69.87	70.	0.
Sep 18 2003	01 PM	81.12	81.	5.80	5.	23.9	68.28	69.	0.
Sep 18 2003	02 PM	81.30	81.	6.36	6.	25.6	66.39	70.	0.
Sep 18 2003	03 PM	80.19	79.	6.07	6.	30.2	65.80	70.	0.
Sep 18 2003	04 PM	85.05	84.	7.03	7.	23.8	62.50	70.	0.
Sep 18 2003	05 PM	86.41	86.	7.62	7.	22.5	56.79	70.	0.
Sep 18 2003	06 PM	85.81	85.	7.71	7.	30.0	58.83	69.	0.
Sep 18 2003	07 PM	85.28	85.	7.96	7.	23.9	62.09	69.	0.
Sep 18 2003	08 PM	84.20	84.	7.94	7.	23.0	64.90	68.	0.
Sep 18 2003	09 PM	90.62	91.	7.50	7.	28.5	67.77	68.	0.
Sep 18 2003	10 PM	93.65	94.	7.87	7.	22.9	74.32	68.	0.
Sep 18 2003	11 PM	92.25	92.	7.48	7.	23.1	80.12	67.	0.
Sep 19 2003	12 AM	99.69	99.	8.25	8.	21.1	83.64	68.	0.
Sep 19 2003	01 AM	105.59	105.	8.48	8.	24.2	87.08	69.	0.
Sep 19 2003	02 AM	120.29	118.	9.32	9.	20.1	88.85	70.	0.
Sep 19 2003	03 AM	127.67	127.	10.10	10.	15.4	90.43	70.	0.
Sep 19 2003	04 AM	132.06	131.	10.92	11.	15.2	91.48	70.	0.
Sep 19 2003	05 AM	139.45	139.	10.93	11.	14.7	92.11	70.	0.
Sep 19 2003	06 AM	148.55	149.	10.37	10.	12.0	92.55	71.	0.
Sep 19 2003	07 AM	159.37	159.	9.81	10.	12.1	92.91	71.	0.
Sep 19 2003	08 AM	155.80	156.	9.43	9.	14.9	93.04	72.	0.
Sep 19 2003	09 AM	163.17	163.	11.07	11.	12.8	92.80	74.	0.
Sep 19 2003	10 AM	166.04	166.	12.20	12.	11.3	92.09	75.	0.
Sep 19 2003	11 AM	165.90	167.	11.91	12.	12.0	91.09	76.	0.
Sep 19 2003	12 PM	169.71	170.	12.80	13.	11.6	89.62	77.	0.
Sep 19 2003	01 PM	175.87	175.	13.07	13.	11.8	87.35	78.	0.
Sep 19 2003	02 PM	175.13	175.	14.62	14.	10.5	84.80	78.	0.

Sep 19 2003	03 PM	173.06	173.	14.90	15.	9.5	83.21	77.	0.
Sep 19 2003	04 PM	178.19	177.	13.58	13.	11.3	82.01	77.	0.
Sep 19 2003	05 PM	180.81	180.	11.47	11.	12.6	81.06	77.	0.
Sep 19 2003	06 PM	ND	ND	ND	ND	ND	ND	ND	ND

Meteorological Data as of:
Friday, September 19, 2003 06:00 PM

(Click Pollutant name for Graph)

Date	Hour	Bar. Press
		INHG
Sep 18 2003	07 AM	30.17
Sep 18 2003	08 AM	30.17
Sep 18 2003	09 AM	30.17
Sep 18 2003	10 AM	30.17
Sep 18 2003	11 AM	30.17
Sep 18 2003	12 PM	30.15
Sep 18 2003	01 PM	30.15
Sep 18 2003	02 PM	30.14
Sep 18 2003	03 PM	30.12
Sep 18 2003	04 PM	30.11
Sep 18 2003	05 PM	30.09
Sep 18 2003	06 PM	30.09
Sep 18 2003	07 PM	30.06
Sep 18 2003	08 PM	30.05
Sep 18 2003	09 PM	30.05
Sep 18 2003	10 PM	30.04
Sep 18 2003	11 PM	30.03
Sep 19 2003	12 AM	30.00
Sep 19 2003	01 AM	29.97
Sep 19 2003	02 AM	29.94
Sep 19 2003	03 AM	29.91
Sep 19 2003	04 AM	29.90
Sep 19 2003	05 AM	29.89
Sep 19 2003	06 AM	29.90
Sep 19 2003	07 AM	29.92
Sep 19 2003	08 AM	29.92
Sep 19 2003	09 AM	29.92
Sep 19 2003	10 AM	29.93
Sep 19 2003	11 AM	29.93
Sep 19 2003	12 PM	29.93
Sep 19 2003	01 PM	29.93
Sep 19 2003	02 PM	29.92
Sep 19 2003	03 PM	29.91
Sep 19 2003	04 PM	29.91
Sep 19 2003	05 PM	29.90
Sep 19 2003	06 PM	ND

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New York State Department of
Environmental Conservation

Air Monitoring Data

515501 - Riverhead

More information from this division:

Region 1 Monitoring Site Index

Pollutant Levels (1 Hour Values) as of:

Friday, September 19, 2003 06:00 PM
(Click Pollutant name for Graph)
See Ozone notes below

Date	Hour	Ozone	8HrF Ozone	8 hr Ozone
		PPM	PPM	PPM
Sep 18 2003	07 AM	0.030	0.031	0.031
Sep 18 2003	08 AM	0.029	0.032	0.031
Sep 18 2003	09 AM	0.029	0.033	0.030
Sep 18 2003	10 AM	0.029	0.034	0.030
Sep 18 2003	11 AM	0.030	0.035	0.029
Sep 18 2003	12 PM	0.032	0.036	0.030
Sep 18 2003	01 PM	0.035	0.036	0.030
Sep 18 2003	02 PM	0.035	0.036	0.031
Sep 18 2003	03 PM	0.036	0.036	0.032
Sep 18 2003	04 PM	0.037	0.035	0.033
Sep 18 2003	05 PM	0.038	0.034	0.034
Sep 18 2003	06 PM	0.038	0.033	0.035
Sep 18 2003	07 PM	0.037	0.031	0.036
Sep 18 2003	08 PM	0.036	0.030	0.036
Sep 18 2003	09 PM	0.033	0.029	0.036
Sep 18 2003	10 PM	0.031	0.028	0.036
Sep 18 2003	11 PM	0.030	0.028	0.035
Sep 19 2003	12 AM	0.029	0.027	0.034
Sep 19 2003	01 AM	0.028	0.027	0.033
Sep 19 2003	02 AM	0.027	0.026	0.031
Sep 19 2003	03 AM	0.028	0.026	0.030
Sep 19 2003	04 AM	0.028	0.025	0.029
Sep 19 2003	05 AM	0.027	0.024	0.028
Sep 19 2003	06 AM	0.027	0.024	0.028
Sep 19 2003	07 AM	0.026	0.023	0.027
Sep 19 2003	08 AM	0.025	0.022	0.027
Sep 19 2003	09 AM	0.023	0.022	0.026
Sep 19 2003	10 AM	0.022	0.021	0.026
Sep 19 2003	11 AM	0.022	ND	0.025
Sep 19 2003	12 PM	0.022	ND	0.024

Sep 19 2003	01 PM	0.022	ND	0.024
Sep 19 2003	02 PM	0.021	ND	0.023
Sep 19 2003	03 PM	0.021	ND	0.022
Sep 19 2003	04 PM	0.020	ND	0.022
Sep 19 2003	05 PM	0.022	ND	0.022
Sep 19 2003	06 PM	ND	ND	ND

Notes:

8 Hr Ozone : The value reported is an 8 hour running average for 8 consecutive one hour reading and reported as the ENDING hour value. Example, hourly data from a site is collected from 09:00AM through 4:00PM (8 consecutive hours) is reported as a 4:00PM value.

8HrF Ozone:The value reported is an 8 hour running average for 8 consecutive one hour reading and reported as the BEGINNING hour value. Example, hourly data from a site is collected from 09:00AM through 4:00PM (8 consecutive hours) is reported as a 9:00AM value.

Ozone: Data is collected from the start of each hour until the end of each hour. It is REPORTED as the ENDING of that hour. Example, hourly data from a site is collected from 09:00AM through 10:00AM and it is reported as 10:00AM (Or Hour 10).

Click Here for an Ozone Composit Graph

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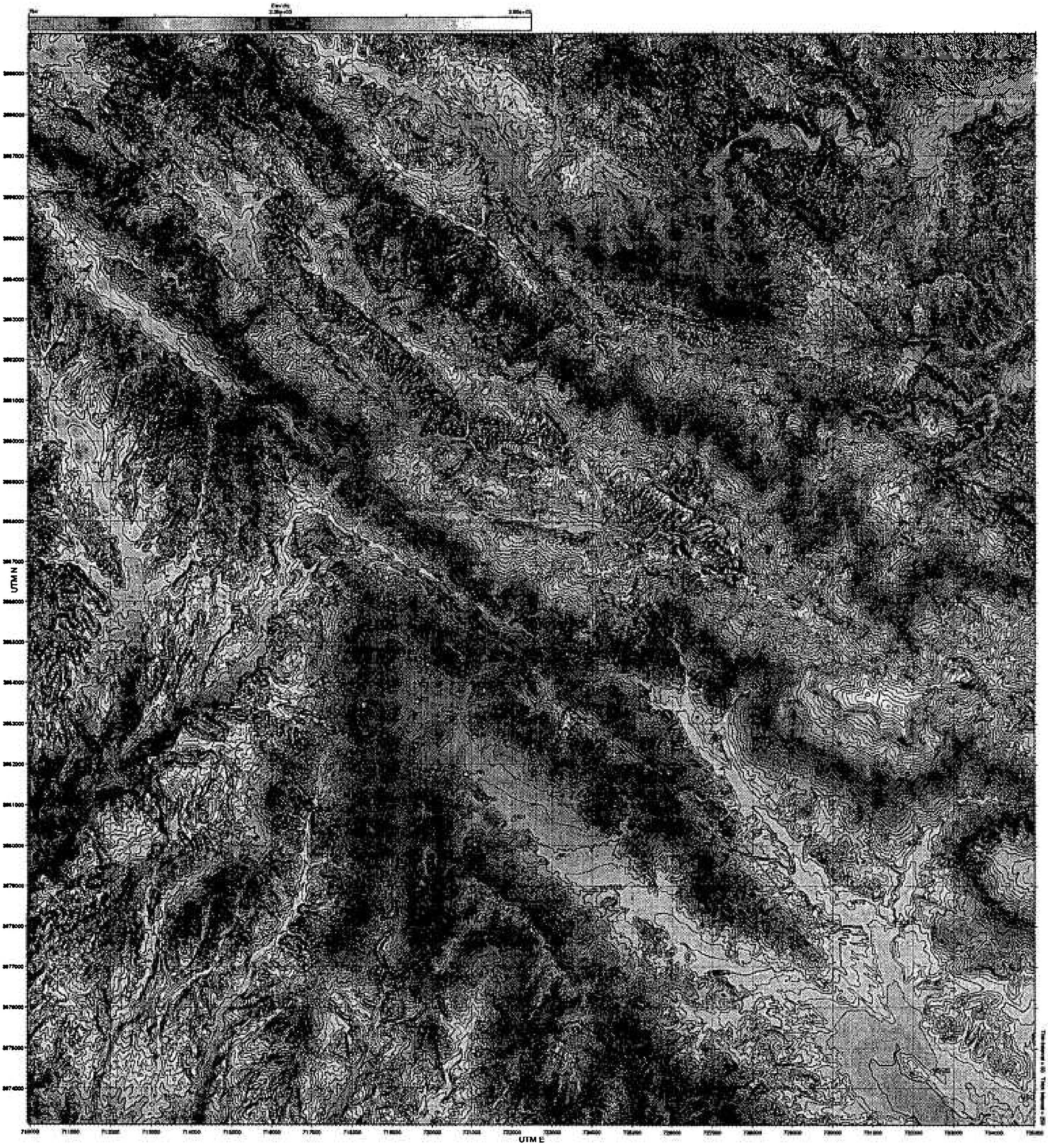
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Appendix G

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Document Summary

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E1527-00 Standard Practice for Environmental Site Assessments: F Environmental Site Assessment Process

Developed by Subcommittee: E50.02

Book of Standards Volume: 11.04

CLICK TO VI LICENSE AG

1. Scope

1.1 Purpose -The purpose of this practice, as well as Practice E1528, is to define go commercial and customary practice in the United States of America for conducting a environmental site assessment of a parcel of commercial real estate with respect to of contaminants within the scope of Comprehensive Environmental Response, Comp and Liability Act (CERCLA) and petroleum products . As such, this practice is intend permit a user to satisfy one of the requirements to qualify for the innocent landown to CERCLA liability: that is, the practices that constitute "all appropriate inquiry into previous ownership and uses of the property consistent with good commercial or cu practice" as defined in 42 USC [section]9601(35)(B). (See Appendix X1 for an outlir CERCLA's liability and defense provisions.)

1.1.1 Recognized Environmental Conditions -In defining a standard of good commer customary practice for conducting an environmental site assessment of a parcel of p the goal of the processes established by this practice is to identify recognized envirc conditions . The term recognized environmental conditions means the presence or li presence of any hazardous substances or petroleum products on a property under c that indicate an existing release, a past release, or a material threat of a release of hazardous substances or petroleum products into structures on the property or into ground, groundwater, or surface water of the property . The term includes hazardou substances or petroleum products even under conditions in compliance with laws. T not intended to include de minimis conditions that generally do not present a mater harm to public health or the environment and that generally would not be the subje enforcement action if brought to the attention of appropriate governmental agencie:

1.1.2 Two Related Practices -This practice is closely related to Practice E1528. Both environmental site assessments for commercial real estate . See 4.3.

1.1.3 Petroleum Products - Petroleum products are included within the scope of botl because they are of concern with respect to many parcels of commercial real estate current custom and usage is to include an inquiry into the presence of petroleum pr when doing an environmental site assessment of commercial real estate . Inclusion petroleum products within the scope of this practice and Practice E 1528 is not base applicability, if any, of CERCLA to petroleum products . (See Appendix X1 for discus petroleum exclusion to CERCLA liability.)

1.1.4 CERCLA Requirements Other Than Appropriate Inquiry -This practice does not whether requirements in addition to appropriate inquiry have been met in order to c CERCLA's innocent landowner defense (for example, the duties specified in 42 USC 9607(b)(3)(a) and (b) and cited in Appendix X1).

1.1.5 Other Federal, State, and Local Environmental Laws -This practice does not ac requirements of any state or local laws or of any federal laws other than the approp inquiry provisions of CERCLA's innocent landowner defense . Users are cautioned th state, and local laws may impose environmental assessment obligations that are be scope of this practice. Users should also be aware that there are likely to be other le obligations with regard to hazardous substances or petroleum products discovered c that are not addressed in this practice and that may pose risks of civil and/or crimir sanctions for non-compliance.

1.1.6 Documentation- The scope of this practice includes research and reporting rec that support the user's ability to qualify for the innocent landowner defense. As sucl documentation of all sources, records, and resources utilized in conducting the inqu by this practice must be provided in the written report (refer to 7.1.8 and 11.2).

1.2 Objectives -Objectives guiding the development of this practice and Practice E 1 to synthesize and put in writing good commercial and customary practice for enviro site assessments for commercial real estate , (2) to facilitate high quality, standardi environmental site assessments , (3) to ensure that the standard of appropriate inq practical and reasonable, and (4) to clarify an industry standard for appropriate inqu effort to guide legal interpretation of CERCLA's innocent landowner defense .

1.3 Considerations Beyond Scope -The use of this practice is strictly limited to the s forth in this section. Section 12 of this practice, identifies, for informational purpose environmental conditions (not an all-inclusive list) that may exist on a property that beyond the scope of this practice but may warrant consideration by parties to a com real estate transaction.

1.4 Organization of This Practice -This practice has several parts and two appendixe 1 is the Scope. Section 2 is Referenced Documents. Section 3, Terminology, has def terms not unique to this practice and descriptions of terms unique to this practice ai acronyms. Section 4 is Significance and Use of this practice. Section 5 describes Use Responsibilities. Sections 6 through 11 are the main body of the Phase I Environme Assessment, including evaluation and report preparation. Section 12 provides additi information regarding non-scope considerations (see 1.3). The appendixes are inclu information and are not part of the procedures prescribed in either this practice or F E1528. Appendix X1 explains the liability and defense provisions of CERCLA that wil user in understanding the user's responsibilities under CERCLA; it also contains othe important information regarding CERCLA and this practice. Appendix X2 provides a recommended table of contents and report format for a Phase I Environmental Site Assessment Report.

1.5 This standard does not purport to address all of the safety concerns, if any, asso its use. It is the responsibility of the user of this standard to establish appropriate s health practices and determine the applicability of regulatory limitations prior to use

Description of Changes

In general, the standards have a stronger emphasis on business environmental risk driving force for due diligence in order to reflect the specific business needs and cor users.

Specifically, among the 74 revisions to the standards, major areas of change include

- Additions and deletions in the terminology sections, including the addition of as business environmental risk, activity and use limitations, engineering cont institutional controls, historical recognized environmental condition, and mate
- Additions to users' responsibilities, such as the requirement to make known t for performing the ESA if other than to qualify for the innocent landowner def CERCLA.
- The requirement to provide all supporting documentation in the report or hav adequately referenced to facilitate reconstruction of the assessment by anoth

environmental profession
- The addition of guidance to assist users in the preparation for and selection o environmental professional to conduct a Phase I Site Assessment.

2. Referenced Documents

E1528 Practice for Environmental Site Assessments: Transaction Screen Process

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Index Terms

Assessment; Commercial real estate; Contamination; Environmental control/fate; Environmental site assessment (ESA); Site reconnaissance; environmental site asse (ESA)-phase I: assessment process; 13.020.30

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Appendix H

New York State Department of
Environmental Conservation

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Freshwater Wetlands Program

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Division of Fish, Wildlife and Marine Resources
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Program Information

Who's Who in Freshwater Wetlands at DEC?
Wetland Functions and Values
Freshwater Wetlands Status and Trends
Programs to Conserve Wetlands
Wetlands Mapping

Our Mission

It is the mission of the Freshwater Wetlands program to protect, maintain, enhance, and restore freshwater wetlands ecosystems so they provide a broad array of wetlands functions and benefits to the people and the environment of New York.

Wetlands are areas where land and water meet. They are transitional areas between aquatic and upland plant and animal communities, and often have some of the qualities of both. Wetlands also occur where the groundwater occurs near or at the surface, saturating the soil and the root zone of the plants that grow there. Society and scientists have created numerous definitions of wetlands, depending on how they -- both the definitions and the wetlands -- will be used. The state's freshwater wetland act contains a lengthy definition in Environmental Conservation Law §24-0107.1); a simple definition would be:

FRESHWATER WETLANDS are those areas of land and water that support a preponderance of characteristic wetlands plants that out-compete upland plants because of the presence of wetlands hydrology (such as prolonged flooding) or hydric (wet) soils. Freshwater wetlands commonly include marshes, swamps, bogs, and fens.

Some wetlands occur where the groundwater emerges at the surface of the ground, usually on a slope; these commonly are known as hillside seeps or slope wetlands. Probably the most well-recognized wetland is where surface water, such as a pond or lake slopes up to land, where wetlands develop; these are known as fringe wetlands. Riparian wetlands occur in the floodplain adjacent to streams and rivers. Another wetland type is where a depression in the land reaches down into the groundwater; these are the famous prairie potholes of the American Midwest, and the vegetated ponds on Long Island. Finally, wetlands can occur where surface water is trapped in shallow depressions by soil that will not allow the water to seep downwards. These are called depressional or flat wetlands and are common on clay soils in the Lake Plains of western New York.

When scientists look at wetlands, they usually look at a few key characteristics. The most relevant one is water. Water, or the wetland's hydrology, is why the wetland exists. But it also is very elusive. Hydrology changes throughout the year -- ponds get low, streams dry up, wells go dry. It also varies between years. So scientists look for signs that water was there at some recent time and for extended periods of time. Indicators of hydrology include leaves that have turned black from being in the water for a long time, or silt marks on tree trunks.

Vegetation is a more dependable and useful indicator that a wetland is present. Certain plants, known as "hydrophytes," have adapted to survive with their roots growing in water for at least part of the growing season. Some of these plants, known as "obligates," require water to survive or to out-compete other plants. Typical obligates include cattails, pond lilies, and skunk cabbage. Other plants, known as "facultative" plants, are able to grow in either wet or dry conditions. Common facultative species include red maple and green ash. They can only tell you that a wetland MIGHT be present. Finally, other types of plants, known as upland species, cannot grow and survive in situations where their roots are wet for long periods of time in the growing season. Examples are black locust, black oak, and multiflora rose.

Soils are the other commonly used indicator that wetlands may be present. Wet soils, known as "hydric" soils, develop when they are flooded or saturated for long periods of time, especially if part of the time occurs during the growing season. If the ground is wet for all or most of the year, organic, peat-types of soils (sometimes called muck) develop. When the soils dry out for part of the year, the peat material oxidizes, or breaks down. Then, other signs help indicate wetness: rust stains may develop along the roots of plants, or the color of the soil changes.

When evaluated together, hydrology, soils and vegetation can indicate whether an area is a wetland. Some are obvious: marshes along the coast. Others are very subtle: seasonally flooded red maple swamps.

This page was last revised on Thursday, April 3, 2003.

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Appendix I

4. Hydrology and Water Quality Overview

4.1 Introduction

Environmental Conservation Law Article 57 requires that the Central Pine Barrens (CPB) comprehensive land use plan be designed to preserve the ecology and ensure the high quality of groundwater within the CPB, and that preparation of the plan be based on previously undertaken and current ecological and groundwater studies (Sections 57-0121(1) and (5)). Information on such topics as CPB ground and surface water hydrology, water quality, and water supply pumpage was therefore compiled to meet this requirement. Although Article 57 does not specify that such information be included in the plan (*see* E.C.L. Section 57-0121(6)), a summary is presented here to allow a more complete understanding of plan derivation.

Hydrologic and water quality information is important to the planning process because it allows the development of conceptual, statistical, analytic, and numerical models of the ground and surface water systems, which, in turn, help in understanding how these systems work and provide a means for predicting system responses to future conditions. The following discussions identify the major types and sources of information that are applicable to the CPB planning process, and provide summaries of relevant data and concepts. Referenced sources include U.S. Geological Survey (USGS) studies, Brookhaven National Laboratory (BNL) and Suffolk County Department Health Services (SCDHS) monitoring data, and recent work by State University of New York (SUNY) at Stony Brook and SCDHS on the Peconic River and Estuary system.

4.2 Hydrogeology

Issues concerning surface water ecology and water supply generally involve the two uppermost major geologic units the upper glacial deposits, and the older, deeper deposits of the Magothy formation. However, sophisticated modeling of the hydrologic system also requires an understanding of the deeper formations; the bedrock, Lloyd Sand, and Raritan clay. (Figure 4-1). This section will focus on the shallowest units. Data and discussions on the deeper units can be found in De Laguna (1963), Jensen and Soren (1974), and Soren and Simmons (1987).

4.2.1 Ronkonkoma Moraine and Outwash Plains

The most prominent topographic feature of the CPB is the Ronkonkoma glacial moraine (Figure 4-2), which traverses the area west-east, bisecting the western portion, dipping south of Brookhaven National Lab, and treading along the northern portion of the South Fork. (Jensen and Soren 1974). The moraine influences surface drainage patterns, but is not a significant factor affecting groundwater flow. To the south of the moraine lies a relatively flat glacial outwash plain composed of sand and gravel that contains very little silt or clay; to the north lie a series of shallow basins (Selden, Manorville, Riverhead) filled with similar outwash deposits from both the Ronkonkoma moraine and the Harbor Hill moraine, which runs along the north shore. (De Laguna 1963). These highly permeable outwash deposits comprise the major portion of the upper glacial aquifer. (*see* Upper Glacial Aquifer, below). For a more detailed history of Long Island glaciation, see Sirkin (1994), and Sanders and Merguerian (1994).

4.2.2 Surficial Silt and Clay Deposits

At the close of the glacial period, mud and silts are believed to have been deposited in swamps and lakes in the low lying area between the moraines. (De Laguna 1963; Warren et al., 1968). This deposition, in combination with the reworking of wind-eroded glacial material (loess), produced shallow silt and clay deposits that now are found locally, particularly in lowlands along the Peconic River and in minor headwater tributaries. These deposits are at most 5 to 10 feet thick, and are generally found less than 30 feet below grade. They retard recharge, forming swampy areas or ponds that persist even when the surrounding water table declines, thus creating perched or semi-perched surface water systems.

Figure 4-1: Hydrogeologic Cross Section D-D'
(Please see the printed version of the Plan for this illustration.)

It is not known whether such deposits underlie all of the freshwater ponds and wetlands in the headwater areas of the Peconic and Carmans Rivers.

4.2.3 Glacial Clay Units

The stratigraphy of the upper glacial deposits is complex, and includes a number of local, and possibly subregional, clay units that affect groundwater movement. Within the sequence of glacially-derived sediments is a thick clay unit that has been identified in the western portion of the CPB area as Smithtown Clay. Beginning at elevations ranging from 10 to 70 feet above sea level, it extends downward in thicknesses of 30 to 100+ feet. (Krulikas and Koszalka 1983). This unit is believed to have been deposited in a lake or series of lakes that formed north of the Ronkonkoma moraine, and the sequence "outwash-clay-outwash" is typical of much of the intermorainal area as far east as the North Fork . (Long Island Regional Planning Board (LIRPB) 1992). At Manorville, a clay unit (possibly related to the Smithtown Clay) was found to extend from sea level to a depth of -30 to -60 feet, although it was not identified below BNL. (De Laguna 1963). Where present, these clays can be expected to impede the downward flow of groundwater, resulting in water table "mounding," and may also confine deeper groundwater in areas such as the central and lower Peconic River valley. (*see* Upper Glacial Aquifer Flow and Magothy Aquifer Flow, below).

4.2.4 Upper Glacial Aquifer

The sequence of glacial deposits within the CPB area is generally on the order of 200 feet thick. Exceptions are found on the Ronkonkoma moraine, and in areas where the Magothy was eroded, including north-central Brookhaven, where 600-700 feet of glacial deposits fill a northeast-southwest treading valley running from Rocky Point to Centereach. (Koszalka 1984; Soren and Simmons 1987). The saturated portion of this sequence, comprising the upper glacial aquifer, is generally on the order of 150 feet thick below the outwash plain south of the Ronkonkoma moraine, but much greater to the north where the Magothy was eroded. (*see* above). The combination of high aquifer permeability and moderate thickness limits the effects of glacial pumping wells on water table elevations; for example, a typical supply well extracting 1,000 gallons per day (gpm) would produce calculated drawdowns of 2 feet at a distance of about 300 feet, 1 foot at a distance of about 1,000 feet, and one-half foot at a distance of about 2,000 feet. (SCDHS 1987). It should be noted, however, that even such modest reductions in water table elevations, when they occur long-term, may have negative impacts on sensitive wetland ecosystems. (SCDHS 1987).

4.2.5 Gardiners Clay Unit

The Gardiners Clay unit is generally present as a 10-20 foot thick mixture of clay and sand lying about 100 feet below sea level separating glacial and Magothy deposits throughout much of the region south of the Ronkonkoma moraine. (De Laguna 1963). De Laguna also identified a clay unit below BNL as being Gardiners, although this determination was not reflected in later USGS reports. (Jensen and Soren 1974; Soren and Simmons 1987). In any case, these clays are not believed to be a significant hydrologic barrier to the recharge of the Magothy from the upper glacial aquifer within the CPB area. (De Laguna 1963).

Figure 4-2: Glacial Moraines and Basins
(Please see the printed version of the Plan for this illustration.)

4.2.6 Magothy Aquifer

Below the southern portions of the CPB, the deposits of the Magothy formation are found at 100-150 feet below sea level and range in thickness from 800 to 900 feet. In the northwestern portion of the CPB, where the Magothy surface was eroded, the top surface of the Magothy is found as deep as 500-600 feet below sea level, and may be only 100 feet thick. (Jensen and Soren 1974; Soren and Simmons 1987). Magothy deposits consist primarily of clayey sands or sandy clays, which have lower hydraulic conductivities than the overlying glacial deposits. (De Laguna 1963). The lower 100-200 feet of the Magothy generally consists of coarse sands and gravel beds with higher conductivities. (Jensen and Soren 1974). Localized clay lenses, some as thick as 50 feet, are believed to be present throughout the formation, but are not believed to be a major barrier to groundwater movement. (De Laguna 1963).

4.3 Ground and Surface Water Hydrology

This section describes the various components of the hydrologic cycle: rainfall, recharge, and stream discharge as well as the movement of groundwater through the aquifer system.

4.3.1 Precipitation

All naturally occurring fresh water in the CPB area, as in all of Suffolk County, originates as precipitation. Long-term (40-year) average precipitation rates for Brookhaven National Lab (Upton) have been reported as 46.3 inches per year for 1943-1982 (Krulikas 1986) and 48.4 inches per year for 1950-1989. (Naidu 1992). Annual rates generally decrease by a few inches from the center of the island shoreward, and from west to east, possibly due to influences of land topography (e.g., the Ronkonkoma moraine) and the prevailing west to east direction of wind and storm movement. (*see* Miller and Frederick 1969). Precipitation at BNL reached a high of 68.7 inches in 1989, and a low of 31.8 inches (or 34% below the long-term average) during the drought in 1965. Lows approaching those of 1965 were also experienced in 1980 and 1985. (Naidu 1992). Monthly precipitation rates are fairly consistent throughout the year, so that no distinct wet or dry seasons are distinguishable. March, August, November, and December are the wettest months at Upton, averaging about 4.5 inches, while June, July, and September are the driest months, averaging between 3 and 3.5 inches. (Krulikas 1986).

4.3.2 Recharge

The amount of precipitation recharged to the aquifer system is reduced by the amount lost to evaporation and plant transpiration (cumulatively referred to as evapotranspiration) and by the amount lost through direct runoff to streams or tidal water bodies. Evapotranspiration has been calculated, using the Thornthwaite method for average precipitation conditions, to range from 22.4 inches per year for shallow-rooted vegetation in sandy loam soils in Riverhead, to 23.9 inches per year, for deep-rooted vegetation in silty loam soils in Upton. (Peterson 1987). Direct runoff for the CPB area has been estimated to be only about 0.5 inches per year (Krulikas 1986), so that recharge to the aquifer system under average precipitation conditions is calculated to range from 22 to 26 inches per year (or 1.05 to 1.24 million gallons per day (mgd) per square mile), with recharge patterns reflecting precipitation patterns. (Peterson 1987). Total recharge for the 100,000 acre (156 square mile) CPB area, therefore, is on the order of 164-193 mgd.

4.3.3 Hydrogeologic Zones

The CPB area encompass regions of deep aquifer recharge on both sides (north and south) of the groundwater divide, which traverses central Brookhaven and splits into North and South Fork branches, beginning in the area near the northwest corner of Brookhaven National Lab, and extending eastward. (Figure 4-3; *see* Upper Glacial Aquifer Flow, below). The boundaries of the CPB area approximate those of deep-flow Hydrogeologic Zone III, with the exception of the westernmost portion of the zone, as defined by the 208 Study (LIRPB, 1978) and later delineated by the SCDHS for the Suffolk County Sanitary Code (Figure 4-3). The Peconic River and upper reaches of the Carmans River drain the east-central and south-central portions of Hydrogeologic Zone III, respectively, and represent subsystems with shallow flow components within the deep recharge area. The CPB also includes areas surrounding the lower freshwater portion of the Carmans River, which extends into shallow-flow Hydrogeologic Zone VI.

4.3.4 Water Table and Depth to Water

The water table within the CPB reaches a maximum elevation of 50-55 feet above mean sea level along the divide in the westernmost portion of the area, and drops off to the north, south, and east, being about 25-35 feet at North Country Road (Route 25A), 40-45 at the LIE in Medford, 35-50 feet at BNL, and generally less than 30 feet on the South Fork. Long-term average annual water table fluctuations due to seasonal variations in precipitation are generally less than a few feet; however, declines as great as 4 feet (10%) from the long-term average were observed at BNL during the 1960s drought. (Krulikas 1986). Depths to the water table from land surface range from over 150 feet along the moraine, to about 80 feet north of the main divide, and 40 feet on the southern outwash plain and between the divides, declining to less than 10 feet in areas near the Peconic River and drainage ways at its headwaters. (Wallace et al., 1968). Maps of areas with less than 4 feet from land surface to seasonal high water table elevations were prepared and used in CPB Plan preparation.

4.3.5 Upper Glacial Aquifer Flow

The rate of vertical flow in the upper glacial aquifer is greatest at about 6 feet per year near the divides, and decreases to a negligible amount at the shoreward boundaries of deep-flow Hydrogeologic Zone III. (SCDHS 1987). Horizontal groundwater flow velocities within the upper glacial aquifer are generally on the order of one-half foot per day near the main divide and on the South Fork portion of the CPB, based on water table gradients of about 2-3 feet per mile, and about one foot per day for most other portions, based on a gradient of 5 feet per mile.

The directions of horizontal flow follow water table gradients, and are primarily north and south on the respective sides of the main groundwater divide, with a small easterly component throughout most of the CPB (except directly to the east of the Carmans River, where flow is south-southwest). The influence of the Peconic River extends westward just beyond Brookhaven National Lab, where the main groundwater divide splits into a northern branch that approximately bisects the Navy's Calverton facility, and a southern branch that generally follows the topographic high formed by the Ronkonkoma moraine. (Figures 4-2 and 4-3; *see* Jensen and Soren 1974; LIRPB 1992). Most of the recharge in the region between the divides discharges to the Peconic river via shallow flow. The shallow-flow groundwater contributing area of the Peconic River was delineated by Krulikas (1986), and his work was utilized by the SCDHS for the Brown Tide Comprehensive Assessment and Management Program (BTCAMP). (SCDHS 1992).

4.3.6 Magothy Aquifer Flow

Recharge of the Magothy from the upper glacial aquifer is greatest near the main groundwater divide, and gradually decreases seaward, until it is negligible at the deep recharge zone boundaries. Groundwater within the Magothy moves slower than in the upper glacial aquifer. It moves generally 0.1-0.2 feet per day even though head gradients are similar which reflects the lower hydraulic conductivity of the deeper unit. Residence times are thus much greater for the Magothy, taking hundreds of years for water recharged near the divide to be discharged at the shoreline. (Buxton and Modica 1992). The Magothy has an easterly component of flow below the entire CPB area, and Magothy water contributes to the underflow to the Peconic Estuary east of the Peconic River. (SCDHS 1992).

Figure 4-3: Hydrogeologic Zones and Groundwater Divides
(Please see the printed version of the Plan for this illustration.)

4.3.7 Water Supply Pumpage

Seven Suffolk County Water Authority (SCWA) public water supply wellfields are located within the CPB boundaries (Figure 4-4): Bailey Road (Middle Island), Bridgewater Drive (Ridge), William Floyd Parkway (Yaphank), Country Club Drive (Moriches), Moriches- Riverhead Road (Riverside), Old Country Road (Westhampton), Spinney Road (East Quogue). Pumpage for 1992, which was a year of average precipitation, totaled about 3 mgd, of which 2.6 mgd or 87%, was pumped from the upper glacial aquifer. The largest public pumpage occurred at the William Floyd Parkway wellfield, where two glacial wells produced 0.8 mgd, and one Magothy well produced 0.2 mgd. Other withdrawers within the CPB included Brookhaven National Lab (4.2 mgd), the Hampton Bays Water District (Bellows Road wellfield, 0.46 mgd), Calverton Hills Association (0.05 mgd), and Grumman-Calverton (0.2 mgd, estimated). Another 6.8 mgd was pumped in 1992 by the 13 public supply wellfields located just downgradient of the CPB area, which probably pump water originating within the CPB. (Figure 4-4). Total withdrawals from the CPB area in 1992, therefore, were as much as 14.5 mgd, which is equivalent to about 8% of recharge, but only a small percentage of this pumpage is believed to be used consumptively. Most pumpage is returned to the aquifer system in the general area from which it was pumped, although in some cases this may be outside (south) of the CPB area boundary. The largest consumptive use occurs at BNL, where on the order of 1 mgd of cooling water is lost to the atmosphere. (Naidu, 1993).

Figure 4-4: Public Water Supply Wellfields
(Please see the printed version of the Plan for this illustration.)

4.3.8 Streamflow

A significant portion (on the order of 25%) of the precipitation recharged within the CPB area leaves the groundwater system via streamflow, primarily in the Peconic and Carmans Rivers. The Peconic River system derives flow from areas as far west as BNL, and perched marshlands located just west of William Floyd Parkway, although this flow across the western portion of the lab is intermittent, usually occurring only after heavy rainfalls or during times of high water table elevations. Streamflow at the downstream (eastern) boundary of BNL is often minimal (Naidu 1992), but overall has been estimated to average 0.6 mgd. (Warren et al., 1968). Farther east, at Wading River-Manorville Road, flow averages around 2 mgd, but has been measured to vary from 1 to 28 mgd, reflecting water table fluctuations and the intensity of rainfall events. (Warren et al., 1968). Flow on the lower Peconic River, as measured at the USGS gauging station located 0.4 miles west of Riverhead, has ranged from 10.4 mgd (1966) to 43.9 mgd (1984), with a long-term (1942-92) average of 24.0 mgd (Spinello et al., 1993); an estimated 1.4 mgd, or 6% of the long-term average flow, is runoff. (SCDHS 1987). At the mouth of the river, just east of County Route 105, the average total freshwater flow rate is estimated to be 34 mgd, which includes 14 mgd of groundwater estimated by the USGS to be discharged to the river downstream of the USGS gauging station. (SCDHS 1992).

The Carmans River flows south through a gap in the Ronkonkoma moraine from its headwaters located in the area of Artist Lake in Middle Island. (*see* Figure 4-2). It reaches the dividing line between Hydrogeologic Zones III and VI at Yaphank, about six miles from its headwaters, with flows measured at the USGS gauging station ranging from 8.3 mgd (1967) to 24.3 mgd (1979), and a long-term (1942-92) average of 15.6 mgd. (Spinello et al., 1993). Farther south, the rate of discharge of groundwater to the river increases as it traverses the outwash plain, and by the time the river reaches the boundary of the CPB at Route 27, some 12 miles south of its starting point, the average flow rate has increased to about 35 mgd. The southernmost 3 miles of the river are tidal, where it gains an estimated additional 11.5 mgd of groundwater, bringing the total freshwater discharge into Bellport Bay at the mouth of the river to 46.5 mgd. (Warren et al., 1968).

4.4 Pond and Wetland Hydrology

The general status of knowledge concerning wetland hydrology has been characterized as "inadequate" (Kusler 1987), and this characterization holds true for the wetlands of the CPB area, where no systematic investigation of each individual wetland and its relation to groundwater has been made. Five of the six dominant surface hydrologic cover types associated with wetlands in glaciated regions (Hollands 1987) have been identified in the CPB area: open water bodies (ponds), vegetated wetlands other than cranberry bogs, inactive cranberry bogs, perennial streams, and ephemeral streams. Only active cranberry bogs are no longer present. Many of these wetlands have been altered by man through the creation of small channels (such as those interconnecting the Manorville ponds), the erection of small dikes and embankments to create cranberry bogs, and the construction of mill dams on the Peconic and Carmans Rivers to create artificial lakes.

Many of the CPB wetlands are found in kettle holes, which were formed by the melting of detached, buried blocks of glacial ice. These steep-sided depressions generally have no drainage outlet, and the wetlands at their bottoms can be either perched or groundwater fed. The rates of sediment input from runoff and dust, and the creation of organic sediments due to biological activity within CPB wetlands without surface outlets, can be assumed to have been minimal prior to development, or they would have long since filled in. Wetlands without surface outlets may both receive and discharge to groundwater, with a net balance favoring discharge, since rainfall generally exceeds open water evaporation rates for Long Island, estimated to be 34 inches per year. (Pluhowski and Kantrowitz 1964). Where stormwater runoff is directed into such ponds, they may rise above the water table and create small, localized recharge mounds. Perched and semi-perched systems, including ephemeral (post-precipitation) streams, have been identified around BNL. (Warren et al., 1968). These systems lie above the water table and can drain in any direction, independent of underlying groundwater flow.

4.5 Ground and Surface Water Quality

This section describes the known quality of water throughout the various stages of the hydrologic cycle within the CPB, beginning with input from rainfall, followed by movement through surface wetlands and groundwater, and concluding with output as streamflow and underflow.

4.5.1 Precipitation

Precipitation inputs to the CPB's hydrologic system are related to natural processes and to recent, anthropogenic sources such as fossil fuel combustion emissions and agricultural fertilizers, which can add nutrients and various contaminants to fragile wetland ecosystems and groundwater. Precipitation on Long Island, as elsewhere, is naturally acidic, but has been made more so by air pollution. pH values now generally range from 3.5 to 6 (Spinello et al., 1983), with a long-term (1965-89) average at BNL of 4.3. (Schoonen and Brown 1994). The input of plant nutrients is of greater concern. While concentrations of phosphorus are generally negligible (<0.1 ppm; Spinello et al., 1983), nitrogen, in the form of nitrate and ammonia, was found at BNL during 1969-1973 to range from non-detect to 2.8 ppm, with an average of 0.5 ppm. (Frizzola and Baier 1975). More recent data (1982-89) from BNL also indicate an average total nitrogen concentration of about 0.5 ppm (Schoonen and Brown 1994). Data from the New Jersey Pinelands (Morgan and Good 1988) and recent work by SUNY at Stony Brook with data collected at BNL during 1986-1989 (Proios and Schoonen 1994) demonstrated a distinct difference between storms originating over the ocean which contribute sea salt aerosols containing ions of sodium, chloride, magnesium and storms coming across the continent which also contain nitrate, ammonia, sulfate, potassium, and calcium ions from soil and mineral dust, agricultural activities, and industrial air pollution. These relationships have been used by Stony Brook researchers to estimate atmospheric loadings to the Peconic River watershed based on the frequency of various storm types. (Proios and Schoonen 1994).

4.5.2 Groundwater Quality

Shallow groundwater within the CPB area has a wide range of quality conditions, reflecting the nature and extent of local development. At one extreme is near "pristine" water found in undeveloped areas; it cannot be called truly pristine due to the low levels of contamination now introduced by rainwater. Such water is naturally acidic, and very low in plant nutrients such as nitrate-nitrogen (0.02-0.3 ppm), ammonia-nitrogen (0.02-0.2), sulfate (5-6 ppm), and total phosphorus (0.01-0.05 ppm), since these are readily taken up by vegetation in the nutrient-poor CPB ecosystem. It is also very low in dissolved minerals such as potassium, calcium, and magnesium. (Soren 1977; SCDHS unpublished data). Iron and manganese, however, are sometimes found at concentrations exceeding drinking water standards, although the low dissolved oxygen conditions associated with high metals concentrations are generally limited to deeper parts of the glacial aquifer and the Magothy aquifer.

At the other quality extreme are areas within or adjacent to major facilities such as BNL, Grumman, and Westhampton Airport, and areas near smaller commercial establishments such as gas stations along Route 25, where significant localized contamination of groundwater with petroleum products and/or organic solvents has occurred. Radiological impacts have been detected southeast of BNL, where a number of private wells have been impacted by tritium discharged by the Lab's sewage treatment plant, although at levels within the drinking water limit. (Naidu 1992).

Groundwater quality below residential areas reflects the impacts of sanitary sewage and lawn chemicals, which on occasion have contaminated shallow private wells beyond drinking water standards in more densely developed areas. Overall, however, residential development has not caused significant degradation of water quality in terms of water supply, and public supply wells have generally continued to produce water of excellent quality (i.e., nitrate-nitrogen less than 1-2 ppm, with no detectable organics). Exceptions have occurred in agricultural areas, where fertilizers and pesticides have leached to groundwater. (LIRPB 1992). For example, the SCWA's shallow glacial well at Spinney Road (East Quogue), located immediately downgradient of a farming area, has had nitrate-nitrogen over the 10 ppm drinking water standard, and is currently blended with the deeper, less contaminated glacial well water. Both have aldicarb concentrations high enough to prompt the voluntary installation of Granular Activated Carbon (GAC) filters. Nutrients and pesticides related to turf management may also be a problem in some areas. (LIRPB 1992). For example, tetrachloroterephthalic acid (TCPA), a breakdown product of the herbicide Dacthal, has been detected in a glacial well at SCWA Bridgewater Drive (Ridge), and the SCWA's two glacial wells at Country Club Drive (Moriches) have nitrate-nitrogen in the 3-4 ppm range, with elevated sulfates, probably related to current turf management and past farming activities in nearby upgradient areas. (Figure 4-4).

4.5.3 Pond and Wetland Water Quality

Chemical concentrations in the ponds and other wetlands of the CPB area have not been comprehensively documented, but present evidence indicates that these systems are similar to those in the New Jersey Pinelands. Specifically, they are highly acidic and nutrient deficient when in the undisturbed state. In New Jersey, phosphorus appears to be the primary nutrient that limits biological productivity in even marginally disturbed systems, while both phosphorus and nitrogen may limit productivity in undisturbed, pristine systems. (Morgan and Philipp 1986; Schoonen and Brown 1994). The sources, quantities, and significance of human inputs are now being investigated, including atmospheric pollution and stormwater runoff that may contain road salts, fertilizers, and pesticides. Septic system effluents and fertilizers may also be a source of nitrogen to groundwater-fed wetlands, but are probably not a significant source of phosphorus, since phosphate is relatively immobile in groundwater. (De Laguna 1964; NYSDOH 1969). Hydrologic factors are also believed to affect wetland water quality and ecology, including the presence of surface water inlets and outlets, the relationship to the water table, which may control the routes of contaminant input and the response to rainfall variations, and the water depth and bottom sediment composition, which control plant species, and therefore waterfowl populations and other fauna.

4.5.4 River and Underflow Water Quality

Water quality conditions in the Peconic and Carmans Rivers are monitored by the USGS, SCDHS, and BNL, and have recently been the subject of investigation by SUNY at Stony Brook. (Schoonen and Brown 1994). The average total nitrogen concentration measured by SCDHS at the USGS gauging station on the Peconic River during 1988-1990 was 0.5 ppm, with nitrate and organic matter contributing approximately equal amounts of nitrogen to annual loadings. A distinct seasonal variability in nitrate-nitrogen concentrations was observed, however, reaching as high as 0.6 ppm during the winter months when biological uptake is minimal. (SCDHS 1992). Total phosphorus at the gauging station during the same time period averaged 0.1 ppm. (SCDHS 1992). Traces of freon and 1,1,1-trichloroethane have also been found routinely in the river. (SCDHS unpublished data).

While these concentrations are relatively low, they do not reflect pristine conditions, and it must be emphasized that the river is a major source of nutrients to environmentally-stressed Flanders Bay, even with the relatively low levels of current development within the Peconic River watershed. (SCDHS 1992). The nutrient loadings derived from the estimated 14 mgd of shallow groundwater gained by the Peconic River downstream of the gauge are also significant, given the higher levels of development and agricultural activity in this area. (SCDHS 1992). The underflow that discharges directly to Flanders Bay has also experienced significant degradation due to nitrogen loading from agriculture and development (SCDHS 1992), although the contribution of Magothy water to underflow pollution loadings is probably minimal, given the present high quality of Magothy water emanating from the CPB area.

Evaluations of the significance of pollution sources within the Peconic River watershed are ongoing by the SCDHS, BNL, and SUNY at Stony Brook. Chemical budgets developed by Stony Brook and water quality data collected at multiple points along the river implicate road salts, fertilizers, and lime used on turf as factors in river quality degradation. (Schoonen and Brown 1994). Other Stony Brook data indicate that inorganic chemical concentrations in the headwaters of the Peconic River can increase after a rainfall, while those near the mouth decrease; the reasons for this response are as yet unknown. (Choynowski and Schoonen 1994). Based on a BTCAMP investigation of the relationship between groundwater and surface water quality in the Peconic River and Flanders Bay areas, the SCDHS has proposed stringent development controls in the Peconic River groundwater-contributing area. This includes limiting new residential development to no less than two acres per dwelling unit, or its equivalent in the remaining, undeveloped portions of the Peconic River groundwater shed, and establishing a policy of no net increases in nitrogen loading from point sources. (SCDHS 1992).

Water quality data collected by the SCDHS at the USGS gauging station on the Carmans River at Yaphank indicate total nitrogen concentrations are in the 1-2 ppm range, which are higher than those observed for the Peconic River. (Spinello et al., 1993). Intermittent traces of 1,1,1- trichloroethane have also been detected. (SCDHS unpublished data). Thus the Carmans River represents a significant source of nutrients, and possibly other contaminants, into poorly-flushed Bellport Bay.

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East Hampton Power & Light Company

Calverton Generating Facility

Appendix J

MINIMUM REQUIREMENTS for STRUCTURE and CONTENT for the STORMWATER MANAGEMENT and EROSION CONTROL PLAN

At a minimum, a stormwater management and erosion control plan should:

- provide background information about the scope of the project.
- provide a statement of stormwater management objectives.
- compare post-development stormwater runoff conditions with pre-development conditions.
- describe proposed structural and vegetative stormwater measures to ensure that the quantity, temporal distribution and quality of stormwater runoff during and after development is not substantially altered from pre-development conditions.
- identify the type and frequency of maintenance required by the stormwater management and erosion control facilities utilized.

Within the above context, the following outline details the structure and content of a stormwater management and erosion control plan.

BACKGROUND INFORMATION

PROJECT DESCRIPTION

Provide a base map containing boundary lines of the project site, sub-catchments, and contributory watersheds at a scale agreed upon by the municipality and developer.

Provide an analysis of site limitations and development constraints by including such factors as slope, soil erodibility, depth to bedrock, depth to seasonal high water, soil percolation, etc., to facilitate evaluation of site suitability for proposed stormwater and erosion control facilities in relation to the overall development proposal.

Provide a statement describing how this project will meet stormwater management objectives established by the municipality.

Provide a general description of the approaches which will be taken to control erosion and sedimentation and stormwater runoff.

Provide an analysis of potential impacts from the proposed development to natural resource features on-site and off-site such as streams, lakes, wetlands, water supplies, coastal estuaries, etc. A determination as to whether the proposed development will affect any designated primary or principal aquifer should also be included

EXISTING (PRE-DEVELOPMENT) CONDITIONS

Provide map showing topography (contours) under existing conditions. On this same map, show drainage patterns, including ditches, culverts, permanent streams, intermittent/ephemeral streams or drainages, wetlands, or other waterbodies, and existing roads. Indicate sizes of existing culverts. Delineate watershed and sub-watershed boundaries on the map.

Provide a map showing existing land use, open space, public facilities, utility lines, water supply wells on site, and predominant vegetation cover types (forested, brushland, grassland, cropland, pasture, etc.).

Obtain soils survey information and, by sub-catchment, provide tabular information detailing the area in acres that are in each of the Soil Conservation Service (SCS) Hydrologic Soil Groups A, B, C or D in Table 10 in Chapter III. Soils information should be obtained by conducting a site-specific soil survey.

Provide hydrologic data describing rainfall characteristics. This should include:

Precipitation data for several return periods (i.e., the 1-year, 2-year, 10-year, and 100-year storms for a 24-hour duration).

Provide stream channel survey data by sub-catchment showing channel conditions including roughness and vegetation.

PROPOSED FUTURE (DEVELOPMENT) CONDITIONS

Provide a map showing by sub-catchment, the completed project, including lot layout, approximate location of buildings, streets, and other paved surfaces, final contours, utility lines, water supply wells, individual sewage disposal systems, and location and types of easements.

Provide tabular information, by sub-catchment, showing the acres of impervious area created in the proposed development as well as the extent of lawn and areas where the land has been made more impervious than pre-development conditions.

By sub-catchment, show on a map changes to land surface, including areas of cuts and fills, changes in vegetative cover types, and final contours. Indicate by sub-catchment, land-clearing and earth moving start-up and completion dates.

Indicate construction schedule including estimated completion date(s) and proposed winter shutdowns.

COMPARISON OF PRE-DEVELOPMENT WITH POST-DEVELOPMENT RUNOFF METHODOLOGIES

Describe or identify the methodology used to compare and evaluate pre- with post-development runoff conditions in terms of volumes, peak rates of runoff, routing, and hydrographs. (Chapter III. describes several commonly used hydrologic models for computing runoff.)

Peak discharge rates and total runoff volumes from the project area for existing site conditions and post-development conditions for the 2-year and 10-year, 24 hour storm events should be calculated. The relevant variables used in this determination, such as curve number and time of concentration should be included.

Downstream analysis of the 100-year, 24 hour event, including peak discharge rates, total runoff volumes and evaluation of impacts to receiving waters and/or wetlands should be evaluated.

Storage volume and surface area requirements necessary to provide flood control for runoff generated during 2-year, 10-year and 100-year, 24 hour storm events should be calculated.

Discharge provisions for the proposed control measures, including peak discharge rates, outlet design, discharge capacity for each stage, outlet channel design, and a description of the point of discharge should be provided.
Sufficient detail should be provided to show that the stormwater facility(ies) is/are capable of withstanding the discharge from the 100-year storm event.

Describe or identify the methodology used to compare and evaluate pre- with post-development pollutant loading. Contaminants to be compared include total suspended solids, total phosphorus, total nitrogen, and biological oxygen demand. Pollutant loading coefficients may be used. (Chapter III. describes several commonly used models for calculating pollutant loading.)

Water quality treatment facilities should be designed to control the first 1/2 inch of runoff or runoff from the 1-year, 24 hour storm event, or whichever is greater.

The necessary storage volumes should be calculated and the proposed stormwater measure(s) should be described in detail. The plans should provide sufficient detail of the water quality control measures to ensure that the relevant design criteria will be met.

Specific information may include surface area dimensions, depths, inlet designs, planting specifications for use of aquatic vegetation, percent solids removal expected, discharge rates and outlet design.

CALCULATIONS

- State any assumptions used in making the calculations.
- Provide assumptions and coefficient values used in the hydrologic calculations for making above comparisons.
- Evaluate the post-development effect of stormwater runoff on identified flood plains or designated flood hazard areas in the community.
- Compare pollutant loading between before and after conditions. Provide computations.

STORMWATER MANAGEMENT

STORMWATER MANAGEMENT FACILITIES

1. Describe in a narrative and show on a map, by sub-catchment, proposed stormwater management facilities. A soil profile to at least one foot below the stormwater management facility should be provided.

2. Provide designs of proposed structural stormwater management facilities. Pursuant to the provisions in Chapter V. for peak flow attenuation and water quality management, indicate which facilities will be used to attenuate peak flows, which will be used to enhance stormwater runoff quality, and which facilities will serve a dual role. Identify the materials to be used in constructing these facilities.

3. Calculations for sizing stormwater facilities should be provided.

4. Provide designs and calculations for siting and sizing such specialized measures and devices as filter strips, water quality inlets (oil/grit separator) forebays, etc., which will be used to remove sediment, oil-based products, and other contaminants found in urban runoff.

5. Provide an evaluation of the amount of treatment or level of pollutant reduction that can be expected from the proposed stormwater management facility(ies). Contaminants to be considered in this evaluation include total suspended solids (TSS), total phosphorus (P), total nitrogen (N), biological oxygen demand (BOD) and thermal pollution. Evaluation of the effectiveness of stormwater management practices can be based on reports on the effectiveness of comparable stormwater facilities on similar sites. Pollutant loading coefficients for total P, total N and BOD, and models for making this evaluation are identified and briefly discussed in Chapter III. Guidance for evaluating the level of reduction of TSS (and other pollutants attached thereto) that can be expected from selected stormwater management facilities can be found in the publication entitled "Methodology for Analysis of Detention Basins for Control of Urban Runoff Quality". 1 Also, the BMPSOFT model and P8 Urban Catchment Model referred to in Table 14 in Chapter VI may be used to calculate the level of reduction of TSS (and other pollutants) that can be expected from selected stormwater management facilities.

6. Provide information on the design provisions that address safety considerations (e.g., gentle slopes and benches in ponds) and accommodate maintenance needs (including access to conduct maintenance operations).

STORMWATER CONVEYANCE SYSTEM

Describe in a narrative and map by sub-catchment the stormwater conveyance (drainage) system. Indicate which segments of the drainage system are open channels and which segments are piped (culverts). Provide rationale and justification for installing piped segments.
Provide plan view and cross-sectional designs of stormwater conveyance systems. Hydrologic calculations for siting and sizing the stormwater conveyance system should be provided. Identify materials to be used.

Provide plans, designs and identify materials to be used for preventing erosion in channel sections of stormwater conveyance systems. Show how erosion at culvert inlets and outfalls will be prevented.

EROSION AND SEDIMENT CONTROL

TEMPORARY EROSION AND SEDIMENT CONTROL FACILITIES
(to be used during land clearing, land grading and the construction phases)

Describe temporary structural facilities and vegetative measures which will be used to control erosion and sedimentation.

Provide a map showing, by sub-catchment, the location of temporary vegetative and structural erosion and sediment control facilities.

Provide dimensional details of proposed erosion and sediment control facilities and identify the materials that will be used in developing these facilities. Calculations used in siting and sizing sediment basins should be provided (see New York Guidelines for Urban Erosion and Sediment Control).

Identify temporary erosion and sediment control facilities which will be converted to permanent stormwater management facilities.

Provide an implementation schedule for the staging of temporary erosion and sediment control facilities.

Provide a maintenance schedule for soil erosion and sediment control facilities.

B. PERMANENT EROSION AND SEDIMENT CONTROL FACILITIES
1. Describe permanent structural and vegetative practices which will be used to provide long-term control of erosion and sedimentation when construction activities are completed and the project site is restored.
2. Provide a map showing, by catchment, the location of permanent erosion control facilities, including both structural and vegetative.
3. By sub-catchment, provide an implementation schedule for restoring the project site with permanent erosion and sediment control facilities.

IMPLEMENTATION SCHEDULE AND MAINTENANCE

- Provide an implementation schedule for staging of all stormwater management facilities. Describe how this schedule will be coordinated with the staging of erosion and sediment control facilities and construction activities.
- Provide a description of the arrangements which will be made for ensuring long-term maintenance of stormwater management and erosion control facilities.
- Back-up contingency plans should be provided and described.
- Those responsible for performing maintenance should be identified.

ACCOUNTABILITY DURING PLAN IMPLEMENTATION

Significant progress has been made in preparing improved development plans that address stormwater and erosion control concerns. Quite often, however, there is a breakdown between what is called for in the plan and what is actually delivered during the plan implementation phase. Frequently erosion and sediment controls during construction tend to fail because they are either not properly installed or properly maintained. Deposition of sediment in a stream, lake, or other receiving waterbody is the end result.

There are two things that a municipality can do to ensure that stormwater management and erosion and sediment control practices are being properly installed and maintained during the construction phase of the project:

- If the municipality has an inadequate inspection and enforcement staff, it can extract a fee from the developer(s) to retain staff to do the inspections and provide enforcement.
- The municipality also can require the developer(s) to establish a dedicated fund, such as a surety bond or irrevocable letter of credit. In the event the developer fails to properly install and maintain required stormwater management and erosion control practices, the municipality can draw upon the fund to do the necessary work itself or to have it done by another firm. In such case, the municipality should require an easement for the purpose of entering onto the property to install, maintain or repair stormwater and erosion control practices.

East Hampton Power & Light Company

Calverton Generating Facility

Appendix K

NEW YORK STATE DEPARTMENT OF STATE
COASTAL MANAGEMENT PROGRAM

Coastal Assessment Form

A. INSTRUCTIONS (Please print or type all answers)

1. State agencies shall complete this CAF for proposed actions which are subject to Part 600 of Title 19 of the NYCRR. This assessment is intended to supplement other information used by a state agency in making a determination of significance pursuant to the State Environmental Quality Review Act (see 6 NYCRR, Part 617). If it is determined that a proposed action will not have a significant effect on the environment, this assessment is intended to assist a state agency in complying with the certification requirements of 19 NYCRR Section 600.4.

2. If any question in Section C on this form is answered "yes", then the proposed action may affect the achievement of the coastal policies contained in Article 42 of the Executive Law. Thus, the action should be analyzed in more detail and, if necessary, modified prior to either (a) making a certification of consistency pursuant to 19 NYCRR Part 600 or, (b) making the findings required under SEQR, 6 NYCRR, Section 617.11, if the action is one for which an environmental impact statement is being prepared. If an action cannot be certified as consistent with the coastal policies, it shall not be undertaken.

3. Before answering the questions in Section C, the preparer of this form should review the coastal policies contained in 19 NYCRR Section 600.5. A proposed action should be evaluated as to its significant beneficial and adverse effects upon the coastal area.

B. DESCRIPTION OF PROPOSED ACTION

1. Type of state agency action (check appropriate response):

   (a) Directly undertaken (e.g. capital construction, planning activity, agency regulation, land transaction) ____
   (b) Financial assistance (e.g. grant, loan, subsidy) ____
   (c) Permit, license, certification ____

2. Describe nature and extent of action: ____________________

   ____

   ____

3. Location of action:

____________________	____________________	____________________
County	City, Town or Village	Street or Site Description

4. If an application for the proposed action has been filed with the state agency, the following information shall be provided:

(a) Name of applicant:______________________________

(b) Mailing address:______________________________

(c) Telephone Number: Area Code (____)________________________

(d) State agency application number:________________________

5. Will the action be directly undertaken, require funding, or approval by a federal agency?

Yes _____ No _____ If yes, which federal agency?________________________

C. COASTAL ASSESSMENT (Check either "YES" or "NO" for each of the following questions)

1. Will the proposed activity be located in, or contiguous to, or have a significant effect upon any of the resource areas identified on the coastal area map:

		YES	NO
(a)	Significant fish or wildlife habitats?	__	__
(b)	Scenic resources of statewide significance?	__	__
(c)	Important agricultural lands?	__	__

2. Will the proposed activity have a significant effect upon:

		YES	NO
(a)	Commercial or recreational use of fish and wildlife resources?	__	__
(b)	Scenic quality of the coastal environment?	__	__
(c)	Development of future, or existing water dependent uses?	__	__
(d)	Operation of the State's major ports?	__	__
(e)	Land and water uses within the State's small harbors?	__	__
(f)	Existing or potential public recreation opportunities?	__	__
(g)	Structures, sites or districts of historic, archeological or cultural significance to the State or nation?	__	__

3. Will the proposed activity involve or result in any of the following:

		YES	NO
(a)	Physical alteration of two (2) acres or more of land along the shoreline, land under water or coastal waters?	__	__
(b)	Physical alteration of five (5) acres or more of land located elsewhere in the coastal area?	__	__
(c)	Expansion of existing public services of infrastructure in undeveloped or low density areas of the coastal area?	__	__
(d)	Energy facility not subject to Article VII or VIII of the Public Service Law?	__	__
(e)	Mining, excavation, filling or dredging in coastal waters?	__	__
(f)	Reduction of existing or potential public access to or along the shore?	__	__
(g)	Sale or change in use of state-owned lands located on the shoreline or under water?	__	__
(h)	Development within a designated flood or erosion hazard area?	__	__
(i)	Development on a beach, dune, barrier island or other natural feature that provides protection against flooding or erosion?	__	__

4. Will the proposed action be located in or have a significant effect upon an area included in an approved Local Waterfront Revitalization Program? __ __

D. SUBMISSION REQUIREMENTS

If any question in Section C is answered "Yes", AND either of the following two conditions is met:

Section B.1(a) or B.1(b) is checked; or
Section B.1(c) is checked AND B.5 is answered "Yes",

THEN one copy of the Completed Coastal Assessment Form shall be submitted to:

New York State Department of State
Division of Coastal Resources
41 State Street, 8th Floor
Albany, New York 12231

If assistance of further information is needed to complete this form, please call the Department of State at (518) 474-6000.

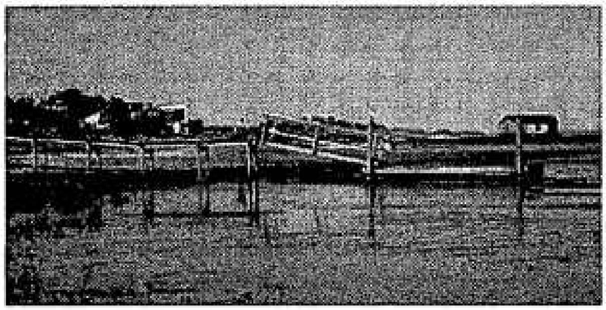
E. REMARKS OR ADDITIONAL INFORMATION

Preparer's Name:______________________________
(Please print)

Title:____________________ Agency:____________________

Telephone Number: (___)____________________ Date:__________

NYS Department of State Coastal Resources


Dock at low tide. (Image links to 25KB jpeg)

- What Is Consistency Review?
- When Is a Consistency Review Used?
- State Consistency
- Consistency Forms
- Coastal Management Program Policies
- Federal Consistency
- Contact Information

WHAT IS CONSISTENCY REVIEW?

The *Division of Coastal Resources* reviews projects and activities of federal agencies for consistency with the policies of the New York State Coastal Management Program (CMP) and approved Local Waterfront Revitalization Programs. State agencies are also required to ensure consistency of their projects and activities with the state and local program policies.

COASTAL MANAGEMENT PROGRAM POLICIES

The state's Coastal Management Program establishes New York's vision for its coast by clearly articulating specific policies on the following:

- Development Policies
- Fish and Wildlife Policies
- Flooding and Erosion Hazards Policies
- General Policy
- Public Access Policies
- Recreation Policies
- Historic and Scenic Resources Policies
- Agricultural Lands Policy
- Energy and Ice Management Policies
- Water and Air Resources Policies

The state coastal policies are also available to download as a single PDF file. See the section entitled Consistency Forms below for more information.

WHEN IS A CONSISTENCY REVIEW USED?

While both federal and state agency activities must be consistent with the policies of the New York State Coastal Management Program, the review is conducted differently for each:

Federal Activities (e.g., development projects, permits, and funding) are reviewed by the *Division of Coastal Resources* to ensure adherence to the state program or an approved Local Waterfront Revitalization Program. Over 800 federal activities are reviewed each year.

State Activities (e.g., development projects, permits, funding, and planning) are reviewed by the agency conducting the activity. Under Article 42 of the New York State Executive Law, the agency must modify the activity if it would adversely affect the state's coastal resources and thus conflict with the policies of the New York State Coastal Management Program or an approved Local Waterfront Revitalization Program. The *Division of Coastal Resources* advises the agencies on the consistency of their activities with the state or local program.

FEDERAL CONSISTENCY

The consistency provisions of the federal Coastal Zone Management Act of 1972 require federal agency activities to be consistent with the state's federally approved Coastal Management Program. This requirement applies to all federal activities and federally authorized activities within, as well as activities outside, the state's coastal zone that affect the zone. Applicants for federal agency approvals or authorizations are required to submit copies of federal applications to the Department of State, together with a Federal Consistency Assessment Form and consistency certification; so that the Department can review the consistency certification and proposal for consistency with the Coastal Management Program. Applicants for federal funding must submit an identification of the proposed funding source and a description of the project. If the Department of State determines that the proposed activity would be inconsistent with the state's Coastal Management Program, federal agencies may not fund or approve the proposal. Direct activities by federal agencies are subject to similar requirements.

STATE CONSISTENCY

No state agency involved in a Type I or unlisted action may carry out, fund, or approve the action until the agency has complied with the provisions of Article 42 of the New York State Executive Law and implementing regulations in 19 NYCRR Part 600. The law and regulations require certain state agency actions in the coastal area to be consistent with the coastal policies in 19 NYCRR Part 600.5, or a state-approved Local Waterfront Revitalization Program (LWRP). Type I and unlisted actions are required to be evaluated for possible effects on coastal policies or approved LWRPs. As soon as an agency determines its action is being contemplated in the coastal area, and prior to making a determination of significance pursuant to the State Environmental Quality Review Act, the agency must complete a Coastal Assessment Form (CAF) to assist it in making determinations of coastal consistency and environmental significance. For state agency actions involving an Environmental Impact Statement (EIS), the EIS must include an identification of the applicable coastal policies and a description of the effects of the action on those policies, whether the agency is acting as the lead or the involved agency. State agencies may not make a final decision on the action until the state agency has made a written finding that it is consistent with the coastal policies in 19 NYCRR Part 600.5 or an approved LWRP.

CONSISTENCY FORMS

Consistency Assessment Form	**Federal Consistency Assessment Form**	**State Coastal Policies** (excerpted from the NYS Coastal

(CAF - state agency actions only)
[Download 10KB PDF file]
[Download WP file]
(3 pages)

[PDF File Download Information]

(FCAF - applications for federal authorization only)
[Download 13KB PDF file]
[Download WP file]
(3 pages)

Management Program and referenced in the FCAF and CAF)
[Download 252KB PDF file]
(47 pages)

For more information, contact:

Steve Resler
New York State Department of State
Division of Coastal Resources
41 State Street, Albany, NY 12231-0001
Phone: (518) 473-2470; Fax: (518) 473-2464
E-mail: sresler@dos.state.ny.us

East Hampton Power & Light Company

Calverton Generating Facility

Appendix L

Town of Riverhead

200 Howell Avenue, Riverhead, NY 11901
631-727-3200

Proposed Town of Riverhead Comprehensive Plan, June 2003

Richard Hanley - Department Head

Phone: 727-3200 ext. 267
Fax: 727-6712
Hrs: Mon. - Fri. 8:30 a.m. - 4:30 p.m.

Disclaimer

Please find below the Proposed Town of Riverhead Comprehensive Plan, submitted to the Riverhead Town Board by the Riverhead Planning Board, pursuant to Section 272-a of the Town Law. This document is the culmination of a multi-year effort by the Riverhead Planning Board, the Town's Planning consultants, the designated Citizen Advisory Committee and the Planning Department; such effort involving an extensive series of community meetings, together with the drafting and re-drafting of the document. The public should be aware that this document is a draft and that additions and deletions are expected as a result of the required public hearing process.

The contemplated review and adoption of the Comprehensive Plan is expected to take the following critical path:

I. Review of the document by the Citizen Advisory Committee September, 2002.

II. Public hearings to be held by the Riverhead Planning Board - October-November, 2002.

III. Town Board acceptance of the New York State Environmental Quality Review Documents - July-August, 2003.

IV. Town Board adoption of the Comprehensive Plan in whole or in part - August, 2003.

V. Consideration and adoption of zoning legislation to implement the approved Comprehensive Plan elements - September, 2003.

1. Introduction

Riverhead is a community rich in natural, historic, and scenic resources that is experiencing powerful forces of change. Riverhead continues to be the most important agricultural community in Suffolk County and one of the most important in the State. Riverhead's unique landscape also includes waterfront areas on the Great Peconic Bay, Flanders Bay, and Long Island Sound; portions of the Central Pine Barrens and the scenic Peconic River; and distinctive bluffs and woodlands along the Sound. The Town has an historic Main Street and hamlet centers, like Jamesport and Aquebogue.

With change, there are both opportunities and risks. Enterprise Park at Calverton promises to attract new businesses and jobs. Increasing tourism is drawing more visitors into downtown, Jamesport hamlet, and the wine country, where they spend money on overnight accommodations, cultural events and attractions, meals, and specialty items like antiques and crafts. Retailers along Route 58 are drawing shoppers from the entire East End, as well as in the western part of Suffolk County.

At the same, local residents know the downsides of growth all too well: disappearing open space; increasing threats to natural resources; worsening traffic congestion; overburdened community facilities; proliferation of unattractive sprawl and strip development; and worst of all, a diminishment of the Town's unique countryside character that attracted so many residents in the first place.

Recognizing these opportunities and pressures, the Town Board, with the assistance of the Planning Board, embarked upon the preparation of this Comprehensive Plan in the late 1990s. Early on, the Town established a goal to develop a plan that fully takes into account the concerns of the community and strives for fair, balanced solutions to complex problems. Working with local consultants, the Town coupled extensive research and field work with a multifaceted community outreach process.

1.1 COMMUNITY OUTREACH PROCESS

For the purposes of the Comprehensive Plan, the Town's outreach process included everything from public workshops, to surveys, to interviews with key stakeholders. By using a variety of techniques, the Town was able to hear from a broad range of townspeople, including downtown business leaders, concerned residents, farmers, social service organizations, environmental advocacy groups, participants of Riverhead Vision 2020, and many others.

Although public outreach increased the time involved with preparing the Comprehensive Plan, it was time well spent. The outreach process was extremely effective in soliciting concerns, ideas, and opinions from the public. The comments that were obtained played *the* essential role in writing and rewriting the goals and policies in this document, ultimately resulting in a better plan for the community's future.

CITIZENS ADVISORY COMMITTEE

At the beginning of the Comprehensive Plan process, the Planning Board established and organized a Citizens Advisory Committee (CAC) to oversee the preparation of plan. The members of the CAC included local residents, property owners, businesspeople, representatives of neighborhood groups, members of Riverhead Vision 2020, and other representatives of the community. Serving in an advisory capacity to the Planning Board, the CAC was responsible for raising issues of concern and reviewing and commenting on first drafts of chapters in the plan as they were released. (CAC members are listed on the Acknowledgments page.)

Two rounds of CAC meetings were held, as discussed below. All CAC meetings were held in Town Hall, were open to the general public, and were noticed in local newspapers. Through the CAC meetings, anyone interested in the Town's future was invited to express his or her viewpoints.

Round One Workshops

The first series of CAC workshops was held in the spring and summer of 1999. During the very first workshop, facilitators from the firm of Abeles Phillips Preiss & Shapiro conducted a "SWOT" analysis. The acronym "SWOT" stands for Strengths, Weaknesses, Opportunities and Threats. The exercise was intended to identify those attributes of the Town that people liked or disliked (strengths and weaknesses) and those evolving trends that had the potential to positively or negatively impact the Town (opportunities and threats).

The session was an interactive, audience-based discussion of the whole Town. People called out ideas, and facilitators wrote them down on large sheets of paper. As the pages were filled, one by one, they were pinned up throughout the room. By the end of the session, the walls were literally papered with the issues, concerns, and ideas that were ultimately considered and explored in drafting the Comprehensive Plan. Members of the Planning Board and staff from the Town's Planning Department and the Community Development Department attended many of the meetings.

The SWOT analysis was just the beginning. What followed were 12 separate workshops, each focusing on a particular topic of concern. Like the SWOT analysis, the format of these subsequent workshops was interactive and audience-based, where people could call out ideas, and facilitators took notes. The discussion topics were as follows:

- Downtown
- Transportation
- Business Districts
- Parks and Recreation
- Natural Resources
- Waterfront
- Infrastructure
- Economic Development
- Agriculture

- Scenic and Historic Resources
- Community Facilities and Services
- Housing

Round Two Workshops

During the Round One workshops, two notions quickly became apparent. First, CAC members and the general public were most immediately concerned about downtown revitalization and agricultural land preservation. Second, CAC members wanted to be closely involved in the drafting of each element of the Comprehensive Plan. Thus, it was decided that first two steps of the Comprehensive Plan drafting would be to prepare (1) a Downtown Revitalization Strategy (portions of which would eventually be incorporated into the Plan) and (2) the Agriculture Element of the Comprehensive Plan. It was also decided that a second round of workshops would be necessary, so that CAC members would have an opportunity to review and comment on first drafts of the plan's elements.

The first workshops during Round Two were held in early 2000 for the purposes of reviewing and discussing the Downtown Revitalization Strategy. Based on comments received from the CAC meeting, the Strategy was revised and approved by the CAC in summer 2000, and subsequently adopted by the Planning Board. In summer and fall 2000, workshops were held on the first drafts of the Agriculture Element. Subsequently, between early 2001 and early 2002, the remaining Round Two workshops were held.

During each workshop, the Town's consultants presented one or more draft elements of the Comprehensive Plan. Multiple copies of the draft chapters as well as executive summaries were made available at the beginning of each meeting. Presentation-size maps and diagrams were prepared and used as the basis for discussion. Draft chapters and maps were also made available on the Town's web site, <www.riverheadli.com>. PowerPoint presentations were made for some of the chapters. Many of the Round Two workshops were videotaped and later aired on cable, helping to keep informed those members of the community who might not have been able to attend a workshop.

Throughout the Round Two workshops, members of the CAC and the general public were invited to pose questions, offer suggestions, proffer new ideas, point out omissions or corrections in the draft text, or make any other comments. Again, the consultants noted all the points raised during the workshops. Subsequent to the meetings, some individuals and organizations also submitted written letters and comments to the Town on the draft chapters.

Surveys and Interviews

While the CAC meetings were taking place, the Town was also busy conducting two additional outreach initiatives: surveys and interviews. Multi-page surveys were distributed to all households on the topic of the downtown area. The purpose of the survey was to assess shopping trends and understand concerns about the downtown area. The results of the survey were instrumental in preparing the Downtown Revitalization Strategy, as well as the goals and policies related to downtown in this document. The survey also included an invitation for people to get involved in the CAC workshops.

Also, the Town's consultants conducted interviews with various public, private, and non-profit organizations in order to obtain their unique perspectives on the Town's needs. Among the organizations interviewed were:

- Atlantis Aquarium;
- Business Improvement District (BID) in downtown Riverhead;
- Merchants and property owners in downtown Riverhead;
- Merchants in Aquebogue, Jamesport, and Wading River;
- Parking District in downtown Riverhead;
- Riverhead Central School District;
- Riverhead Free Library;
- Riverhead Senior Center;
- Riverhead Vision 2020;
- Riverhead Volunteer Ambulance Corps;
- Social service providers;
- Suffolk County Department of Health Services, Riverhead Health Center;
- Suffolk County Department of Heath;
- Suffolk County Historical Society;
- The proposed Science Center children's museum;
- The Town's four fire districts;
- Various Town departments, including Police, Engineering, Recreation, and Community Development

RIVERHEAD VISION 2020

Finally, the outreach process for the Comprehensive Plan was coordinated with Riverhead Vision 2020, an independent, grass roots initiative organized by resident (and CAC member) August Field with the purpose of developing a long-range vision for the Town's future.

The Vision 2020 process was composed of a series of "study circles" in which participants raised issues of concern and brainstormed new ideas. Among some of the recurrent themes discussed in those meetings were the need for growth, cultural traditions, the rural atmosphere of Riverhead, recreation needs for youth, and improved connections between business, civic, health and human service organizations. More than 200 people attended study circles in spring and summer 2000.

The process culminated in a Vision Fair in June 2000, where participants voted on potential actions for improving the Town's quality of life, particularly in the downtown area. Many of these recommendations were compatible with the proposals in the Downtown Revitalization Strategy, such as the improvement and expansion of Grangebel Park. In addition to August Field, other members of Riverhead Vision 2020 were active participants in the Town's CAC meetings. In this way, there was cross-fertilization between the two processes.

1.2 CONTENTS OF THE COMPREHENSIVE PLAN

The Comprehensive Plan is composed of eleven different elements, each dealing with a distinct topical area of the community. Each element contains goals and recommendations specific to that topic area. The Proposed Land Use Plan in Chapter 2 weaves together those goals and recommendations into a single, coherent plan for development and conservation, providing a snapshot of what the Town would be expected to look like in the future. The other ten elements of the plan are organized as follows:

- Chapter 3: Agriculture Element
- Chapter 4: Natural Resources Conservation Element
- Chapter 5: Scenic and Historic Resources Preservation Element
- Chapter 6: Business Districts Element
- Chapter 7: Economic Development Element
- Chapter 8: Housing Element
- Chapter 9: Transportation Element
- Chapter 10: Utility Service Element
- Chapter 11: Parks and Recreation Element
- Chapter 12: Community Facilities Element

The first drafts of many of these chapters included a detailed inventory and analysis of demographic data, economic and business trends, land use patterns, transportation infrastructure, public facilities and programs, and other background information. This information is presented in summary form in the elements listed above; the detailed inventory and analysis has been moved to the appendices. The reason for doing so was to make the plan more concise and easier to read.

1.3 RELATIONSHIP TO OTHER PLANS

Preparation of the Comprehensive Plan was undertaken concurrently with two other planning efforts: the Downtown Revitalization Strategy, which was completed in August 2000; and the Local Waterfront Revitalization Program (LWRP), which was being prepared as of June 2002.

The Downtown Revitalization Strategy provides a plan for "retooling" Main Street toward tourists and visitors, building off of the North Fork's emerging tourism market. The strategy was reviewed and approved by the CAC and subsequently adopted by the Town Board. Many of the recommendations in the Downtown Revitalization Strategy have been folded into Chapter 6, the Business Districts Element. Also, the Downtown Revitalization Strategy is hereby incorporated in full as part of the Comprehensive Plan, meaning that the recommendations in that document should be treated as Comprehensive Plan recommendations.

The LWRP provides specific recommendations with regard to the use of waterfront areas on Long Island Sound, the Great Peconic Bay, Flanders Bay, and the Peconic River. Particular attention is given to the issues of environmental protection, dredging, and waterfront access. Because the Comprehensive Plan and the LWRP were prepared concurrently, background information between the two planning efforts was shared, and policies and recommendations were coordinated, such that the two plans would not be at odds.

The Plan is also being sent in draft form to Suffolk County, neighboring towns, the Regional Plan Association, State and County transportation agencies, the Central Pine Barrens Commission, and other concerned and interested agencies and organizations. It is Riverhead's hope that the draft plan will be reviewed by those entities and that they will provide constructive comments. It is important that the Riverhead Comprehensive Plan be compatible with the plans of neighboring towns as well as State and County agencies.

1.4 IMPLEMENTATION OF THE COMPREHENSIVE PLAN

Implementation of the Comprehensive Plan, once it is approved, will be an incremental process. When the Comprehensive Plan is completed, the Town's zoning ordinance will be updated to reflect all of the newly adopted goals and policies in this document. Then, as development proposals come forward from the private sector, those new projects will have to conform to the new zoning provisions. State and County agencies, when undertaking projects in Riverhead (e.g. roadway improvements) will be required to take the Comprehensive Plan into account.

This document was distributed to the public for comment in July 2002. Approximately one month prior to its distribution, a scoping hearing was held to initiate the preparation of a Generic Environmental Impact Statement (GEIS). ~~At that time, it started to undergo an~~ as part of the environmental review process~~, as~~ required by State law. In addition, two public hearings were held to gather comments and feedback, and examine the impacts of the Comprehensive Plan. ~~As noted, copies will also be sent to the County and neighboring municipalities for their review and comment. Depending on the comments received and the findings of the environmental review process, the Town Board will decide whether to adopt the plan as is, adopt it with changes, or not to adopt the plan, meaning that the current plan would remain in effect.~~

The Riverhead Planning Board played a pivotal role in reviewing, editing, and amending the Comprehensive Plan. Subsequent to its July 2002 release and the two public hearings, the Planning Board spent several months critiquing and reworking the Comprehensive Plan in light of the commentary gathered at the hearings and correspondence submitted by various civic groups. The Planning Board held regular work sessions, open to the public, to evaluate all of the public input while taking into consideration accepted planning principles and practices. Throughout the process, the Planning Board deliberated the goals and policies of the Plan and parsed each line of the document. Once consensus was reached among the members of the Planning Board, the

Planning Board unanimously recommended that the Town Board hear and approve the amended Comprehensive Plan.

Once the Comprehensive Plan is adopted by the Town Board, ~~assuming that it is in fact adopted~~, implementation will be relatively inexpensive and cost-effective. Because many aspects of the Comprehensive Plan would be implemented incrementally over time, those implementation tasks would be folded into the Town government's day-to-day administrative tasks. New development will be required to conform to the revised zoning provisions, as subdivision and site plan applications are submitted. Thus, implementation for the most part would cost no more than the normal costs that the Town already incurs for the purposes of administration. There would be a one-time cost involved with updating the Town's zoning regulations.

The Comprehensive Plan includes some recommendations for new, expanded, or improved public facilities, like parks, roads, or maintenance facilities. However, the Comprehensive Plan does not make budgetary decisions. The Town Board would have to decide whether and how much money to spend on implementing such public facility improvements when approving the Town's budget on an annual basis.

East Hampton Power & Light Company

Calverton Generating Facility

Appendix M

2. Land Use Element

2.1 VISION STATEMENT FOR RIVERHEAD'S FUTURE

Riverhead is already one of the most dynamic and exciting places on Long Island, and in the future, it will become a preeminent center for tourism, agriculture, business, shopping, recreation, and living on the East End. As in recent years, the Town will continue to experience growth and change in coming years. ~~Current opportunities should be harnessed to promote a~~ Economic development and environmental conservation should be balanced, to not only sustain expansion of Riverhead's strong economic base, ~~but new growth should also be shaped and managed to~~ but also promote livable communities, preserve farmland and agricultural activity, and protect ~~Riverhead's~~ its natural, historic, and scenic resources. In the future, Riverhead should have the following characteristics:

- A revitalized downtown that is retooled for tourism, with unique cultural attractions, a bustling Main Street, protected historic buildings, and an expanded and improved waterfront park;
- Walkable hamlet centers that serve as centers for community life and provide day-to-day shopping and services for residents, as well as specialty shopping for tourists.
- Attractive residential neighborhoods clustered around downtown, the hamlet centers, and north of Sound Avenue;
- A thriving commercial corridor along Route 58, with reduced traffic congestion and an attractive visual quality;
- A dynamic office/industrial center in and around Enterprise Park at Calverton;
- Regional recreational and entertainment facilities at Enterprise Park at Calverton;
- A greenbelt of farmland and open space with a prosperous agricultural industry, where housing is clustered and open space permanently preserved;
- A system of parks and greenways that provide abundant recreational opportunities for all age groups;
- Improved access to waterfront areas for recreational purposes, including the Peconic River, Flanders Bay, the Great Peconic Bay, and Long Island Sound;
- Protected streambeds, wetlands, woodlands, bluffs, beaches, and other natural areas, including habitat areas for plant and animal species;
- A strong Town identity and heritage, with protected scenic vistas and beautifully restored and reused historic buildings;
- A reputation as a place that has the best of both the past and the present, and the best of both natural and built environments.

The Land Use Element is the ~~lynchpin~~ centerpiece of the Comprehensive Plan. It synthesizes all of the goals and policies of the other ten elements into a single, coherent vision. It also ~~provides a general idea of the "end-state" or~~ forecasts and compares several "build-out" scenarios that ~~will~~ would result from the ~~Comprehensive Plan~~ existing zoning patterns and the Proposed Land Use Plan. ~~Assuming that the Town were to grow and evolve from today forward in accordance with the Comprehensive Plan, the "buildout" tells us how many people would be living in Riverhead.~~ A build-out estimate is useful because it indicates the future potential amount of housing units and, by extension, the saturation population or future population, that would exist when all available land is developed to the maximum extent in accordance with zoning patterns.

2.2 THE PROPOSED LAND USE PLAN

The Proposed Land Use Plan, shown in Figure 2-1, summarizes in map form many of the goals and policies in the Comprehensive Plan. The Proposed Land Use Plan is an outgrowth of the Town's public outreach process. It was prepared in spring and summer 2002, <u>after</u> the completion of the Citizens Advisory Committee's (CAC) Round Two Workshops (see Chapter 1, the Introduction). The Round Two Workshops were sessions during which members of the CAC and the general public were able to review and comment on the first drafts of the other ten elements of the Plan. Following those workshops, the comments received were used to revise and refine those elements and, finally, to prepare this synthesizing element, which brings all of them together.

~~After the Comprehensive Plan is adopted (assuming that it is adopted),~~ The Proposed Land Use Plan is authoritative and sets a precedent for future development because once it is adopted, it will become the Town's new zoning map. As such, it will directly influence future development patterns. ~~Development proposals~~ All future subdivisions and site plans will have to conform to the map and the new zoning designations included in this Element.

CHANGES FROM THE TOWN'S CURRENT ZONING MAP

While some parts of the Proposed Land Use Plan are ~~relatively~~ ~~unchanged, as compared to the Town's current zoning map;~~ consistent with the existing zoning patterns, other parts are significantly different. In particular, several new zoning districts and overlay districts are being proposed. These new districts are intended to help implement proposals in the various elements of the Comprehensive Plan, particularly the Agriculture Element (Chapter 3), the Natural Resources Conservation Element (Chapter 4), the Business Districts Element (Chapter 6), and the Economic Development Element (Chapter 7).

Table 2-1 provides a list of the ~~new~~ proposed zoning districts. Table 2-2 lists the ~~old~~ existing zoning districts that are being ~~kept~~ retained in the Proposed Land Use Plan, and Table 2-3 shows the ~~old~~ existing zoning districts that are being eliminated. Properties that ~~were~~ are located in any of these eliminated zoning districts have been rezoned as shown in Figure 2-1. ~~Many other properties have been rezoned as well. That is, some of the zoning district~~

Figure 2-1: Proposed Land Use Plan

Back of Figure

~~boundaries throughout Riverhead have been altered~~ In order to implement the goals and policies found throughout the Comprehensive Plan, many other properties have been rezoned as well. In particular, the Proposed Land Use Plan modifies existing zoning patterns and boundaries to bring about farmland and open space preservation, prevent sprawl, and create well planned pedestrian and transportation-friendly communities.

~~New~~ Proposed Zoning Districts

As shown in Table 2-1, most of the ~~new~~ proposed zoning districts are commercial districts, which provide a new framework for development in downtown, along Route 58, and in the hamlet centers. A detailed description of each ~~new~~ proposed zoning district is provided in Section 2.3. The Downtown Center (DC) zone is broken up into several ~~subzones~~ subdistricts, each tailored to a distinct part of the downtown area. These ~~subzones~~ subdistricts, each with subtle differences, are intended to carefully balance downtown land uses and development patterns in a manner that fits into the historic and natural context of the area.

The other districts are suited to different types of commercial development: shopping centers (SC); small roadside commercial establishments like drive-through banks and gas stations (BC); major regional shopping ~~attractions~~ centers (DRC); small country crossroads (HC); and historic village centers (VC). These zones are ~~mixed and matched~~ integrated along Route 58 and in the hamlet centers to best suit the ~~conditions in those areas and the~~ localized market trends in these areas.

Table 2-1: ~~New~~ Proposed Zoning Districts

<u>Industrial</u>					
IR	Industrial/Recreational				
<u>Commercial</u>					
DC	Downtown Center				
		DC-1	Main Street	DC-4	Office/Residential Transition
		DC-2	Waterfront		
		DC-3	Office	DC-5	Residential
HC	Hamlet Center				
VC	Village Center				
BC	Business Center				
SC	Shopping Center				
CRC	Commercial/Residential Campus				
DRC	Destination Retail Center				
RLC	Rural Corridor				
TRC	Tourism/Resort Campus				

Table 2-1: Proposed Zoning Districts (continued)

Overlay Zones	
AOZ	Agricultural Overlay Zone & Agricultural TDR Sending Overlay Zone
ROZ	Agricultural TDR Receiving Overlay Zone
HDROZ	High Density Residential Overlay Zone

The new Industrial/Recreational (IR) zone is intended to provide a mix of commercial recreation uses and moderate-scale industrial development in the areas generally between Enterprise Park in Calverton and the terminus of the LIE. The current zoning ~~provides only~~ encourages traditional industrial development. By ~~allowing~~ permitting commercial recreation as well, the Town ~~is allowing~~ would provide an additional ~~outlet~~ area for the development of recreational attractions that would appeal to tourists.

The two new overlay districts are intended to protect the Town's agricultural greenbelt and also implement the Transfer of Development Rights (TDR) program discussed in Chapter 3, the Agriculture Element. The Agriculture Overlay Zone (AOZ) uses two main strategies to preserve farmland: mandatory cluster development and the ~~TDR~~ program transfer of development rights ("TDR"). ~~Using~~ By participating in the TDR program, a landowner in the AOZ could sell his or her property's development rights to a landowner in the Receiving Overlay Zone (ROZ), with the result that the site in the AOZ would be preserved as ~~farmable~~ tillable open space.

~~Old~~ Existing Zoning Districts that are Being ~~Kept~~ Retained

As noted, some of the Town's ~~old~~ existing zoning districts (i.e., those shown on the Town's current zoning map) are being ~~kept~~ retained and carried forward and into the new Proposed Land Use Plan. Others are being eliminated. The districts that are being ~~kept~~ retained are listed in Table 2-2. The reasons for keeping these districts are twofold:

- Many parts of Riverhead have already been developed according to the provisions of these districts. Eliminating or changing them would serve little purpose.
- Many of the regulations within ~~those~~ these districts have generally worked well and should therefore be continued in~~to~~ the future. Changing the regulations in some of these areas could result in the creation of ~~extensive~~ non-conforming buildings and lots, which could potentially complicate infill development, expansions, or alternations in already built-~~up~~ out areas.

At the same time, some of the provisions within these zones are being changed, where necessary and appropriate. For instance, pursuant to Chapter 3, the Agriculture Element, the ~~regulations pertaining to~~ minimum lot areas of the Agriculture A, ~~and~~ Residence A, and certain Residence C districts ~~zones~~ are being ~~changed~~ upzoned from 40,000-square foot to

80,000-square foot lots. These and other changes are discussed throughout the Comprehensive Plan.

~~Another important change shown in Table 2-2 is the creation of the Residence A-1 zone. Residence A-1 is necessary because of the significant change being made to the Residence A zone with regard to minimum lot size (i.e., the increase from 40,000 to 80,000 square foot lots). If applied uniformly to all areas designated Residence A on the Town's current zoning map, this lot size change would create significant and unnecessary non-conforming buildings and lots in those areas of the Residence A zone that have been largely developed. This would tend to increase the number of variance applications from those areas without any real benefit to either the Town or the neighborhood.~~

Table 2-2: ~~Old~~ Existing Zoning Districts that are Being ~~Kept~~ Retained

Residential/Agriculture	
A	Agriculture
RA	Residence A
	~~RA-1~~ ~~Residence A-1 (variation of Residence A)~~
~~RB~~	~~Residence B~~
RC	Residence C
RD	Residence D
RRC	Residence RC - Retirement Community
RRDC	Residence RDC - Redevelopment Community[1]
Industrial	
PRP	Planned Recreational Park
PIP	Planned Industrial Park
IA	Industrial A - Light Industry
IB	Industrial B - General Industry
Recreational, Open Space & Conservation	
OSC	Open Space Conservation
NRP	Natural Resources Protection
RN	Recreational
Overlay Zones	
IROZ	Industrial Receiving Overlay Zone[1]
PBOZ	Pine Barrens Overlay Zone[2]

1. ~~The are "floating" zones.~~ These are overlay zones. As such, they are not mapped on the Proposed Land Use Plan or the Town's Zoning Map, but added by the Town Board pursuant to rezoning procedures outlined in the Town's zoning ordinance.
2. Covers ~~that~~ the area in the Town of Riverhead included within the Core Preservation Area of the Central Suffolk Pine Barrens.

~~To avoid this negative impact, the Residence A-1 would continue to have the 40,000 square foot lot size and would be designated in those areas of the Residence A that were largely built out at the time that this Comprehensive Plan was adopted: (1) the area north of Sound Avenue and Route 25A, west of Wildwood State Park; and (2) the area west of Camp Wauwepex, between Route 25A and Middle County Road.~~

Notably, the Residence RDC and the Industrial Receiving Overlay Zone are not shown on Figure 2-1. This is not an oversight. These are ~~"floating" zones~~ overlay districts that may be added to the map by the Town Board at its discretion. ~~To date, these zones have not been used. However, because~~ Since these ~~zones~~ districts serve important purposes identified by the Town in past years, they are being retained. ~~That is, in the future, the Town will continue to have the authority to add these zones to the zoning maps if they are deemed necessary and appropriate.~~ In addition, the Pine Barrens Overlay Zone covers those parts of Riverhead located within the Core Preservation Area and Compatible Growth Area of the Central Suffolk Pine Barrens. This area is ~~roughly sketched out~~ depicted on the Proposed Land Use Plan. ~~It is concentrated in the areas southwest of Enterprise Park.~~

~~Old~~ Existing Zoning Districts that are Being Eliminated

Because the Proposed Land Use Plan includes a whole new set of commercial zoning districts, all of the old commercial zones and two commercial overlay zones are being eliminated. The Defense Institutional (DI) district, which covered the Naval Weapons Industrial Reserve Plant (NWIRP) site and open space areas north of this site, was eliminated in September of 1999 and rezoned for industrial, recreational, and open space uses. ~~Another significant change is the elimination of the DI zone that used to cover the Naval Weapons Industrial Reserve Plant (NWIRP) site, which has since been converted into the Enterprise Park and rezoned as PRP. Government owned areas dedicated to the Calverton cemetery and open space areas north of Enterprise Park, which were also zoned DI, have been rezoned as OS, which would allow those current uses to remain in intact.~~

Table 2-3: ~~Old~~ Existing Zoning Districts that are Being Eliminated

Industrial	
DI	Defense Institutional [eliminated in September 1999]
Commercial	
BA	Business A - Resort Business
BB	Business B - Shopping Center
BC	Business C - Neighborhood Business
BCR	Business CR - Rural Neighborhood Business
BD	Business D - General Business
BE	Business E - Highway Commercial Service
BG	Business G - Tourist Business
BPB	Business PB - Professional Service Building
OS	Office/Service
MRPO	Multifamily Residential Professional Office
Overlay Zones	
~~BFOZ~~	~~Business F - Manufacturers Outlet Center Overlay Zone~~
~~DCPO~~	~~Destination Commercial Planned Overlay Development Zone~~

2.3 PROPOSED LAND USE DESIGNATIONS

The new zoning districts shown on Figure 2-1 and listed in Table 2-1 are explained in detail in this section. Each district is summarized in a single table, starting on the next page. Each table includes a purpose statement, a list of ~~allowable~~ preferred land uses, and a description of "design concepts," which includes proposed regulations for building design, parking, landscaping, open space requirements, and other factors.

The zoning use districts adopted pursuant to public hearing will provide more detailed dimensional requirements and performance standards than outlined in these tables. ~~ordinance regulations, once adopted, may go beyond the provisions outlined under the "design concepts". For example, most of the tables do not discuss building height, but maximum heights are currently and will continue to be regulated under the zoning ordinance.~~ The "design concepts" ~~lists~~ discuss only the most critical regulations necessary to achieve the ~~generally~~ desired patterns of land use and development in ~~the zone~~ each district.

Table 2-4: Downtown Center (DC)

Purpose: To make downtown the civic and cultural center of Riverhead, by providing a vital, high-density, mixed-use environment for shopping, eating out, cultural activities, entertainment, and professional services year-round.

Preferred Land Uses	***Design Concepts***
DC-1: Main Street • Retail Stores, Personal Services • Indoor Public Market • Art Galleries • Restaurants, Cafes, Bars • Banquet Facilities • Live Entertainment • Theaters, Cinemas • Funeral Homes • Banks • Bed-and-Breakfasts, Inns • Offices (not on ground floor) • Museums, Libraries • Aquariums • Schools • Places of Worship • Parks and Playgrounds • Apartment buildings (not on ground floor)	***DC-1: Main Street*** • Small stores clustered along a traditional "Main Street" • No minimum lot size • No front or side setbacks for buildings • Full lot coverage allowed • Tallest buildings in town • Sidewalk-oriented entrances, window displays and signs • Parking behind or beside buildings • Shared parking incentives (e.g., 20% reduction in required parking spaces) • Parking waivers with fees • Significant landscaping requirement in parking lot (e.g., 15% = 1.5 times existing regulation); landscaped planter or tree every 10-15 parking spaces, not just around the lot's edges
DC-2: Waterfront • Parks and Playgrounds • Marinas • Concession Stands	***DC-2: Waterfront*** • Continuous waterfront walking paths/trails • Strict limits on impervious surfaces • High open space and landscaping requirements
DC-3: Office • Retail Stores, Personal Services • Restaurants, Bars, Cafes • Banquet Facilities • Art Galleries • Funeral Homes • Banks • Offices • Museums • Libraries • Schools • Places of Worship • Parks and Playgrounds • Apartment buildings • Live/work Space • Townhouses • Retirement housing • Residential Health Care • Home Offices	***DC-3: Office*** • Compact lots • Relatively narrow front and side yards • Sidewalk-oriented entrances, window displays and signs • Parking behind or beside buildings, not in front • Shared parking incentives (e.g., 20% reduction in required parking spaces) • Parking waivers with fees • Significant landscaping requirement in parking lot (e.g., 15% = 1.5 times existing regulation); landscaped planter or tree every 10-15 parking spaces, not just around the lot's edges *continued on next page*

Table 2-4: Downtown Center (DC), continued

Purpose: To make downtown the civic and cultural center of Riverhead, by providing a vital, high-density, mixed-use environment for shopping, eating out, cultural activities, entertainment, and professional services year-round.

Preferred Land Uses	***Design Concepts***
DC-4: Office/Residential Transition ***Commercial*** • Offices ***Civic and Cultural*** • Places of Worship • Public Offices • Parks and Playgrounds ***Residential*** • Cottage Accommodations • Apartment buildings • Live/work Space • Townhouses • Retirement housing • Residential Health Care • Home Offices	***DC-4: Office/Residential Transition*** • Mix of housing and offices • Compact lots • Relatively narrow front and side yards • Front door faces the street • Front porches • Garages set back from front facade or placed in backyard • No parking in front yard
DC-5: Residential • Live/work Space • Single-family Houses • Two-family Houses • Townhouses • Cottage Accommodations • Apartment buildings • Retirement housing • Home Offices • Parks and Playgrounds	***DC-5: Residential*** • Mix of housing types and sizes • Compact lots • Relatively narrow front and side yards • Front door faces the street • Front porches • Garages set back from front facade or placed in backyard • Multi-family restricted along Main Street

Table 2-5: Destination Retail Center (DRC)

Purpose: To provide a location for large retail centers along Route 58 that attract customers from the East End, Long Island, and beyond, while linking development to open space protection along the Route 58 corridor and in Agricultural zones.

Preferred Land Uses	***Design Concepts***
Commercial • Outlet Centers • Shopping Centers (minimum 100,000 square feet) • Cinemas • Hotels • New Auto Dealerships ***Non-Commercial*** • Nursing homes • Life care ***Recreational*** • No golf courses or commercial recreational uses (allowed in IR zones west of LIE)	• Campus-like layouts • No strip development/freestanding businesses • Large minimum lot size • Significant open space requirement, located in front yard (e.g., 50% = double current Tanger Mall standard) • Low base FAR (e.g., 0.10 = 2/3 times current 0.15); higher as-of-right FAR inside Sewer District (e.g., 0.15 = one-half current 0.30); even higher FAR with purchase of Agriculture or Pine Barrens TDRs (e.g., 100% to 0.20 or 0.30 FAR) • Outfitted with sidewalks within one-quarter mile of Downtown Center, Village Center or Hamlet Center zones • Limited entrances from arterial • Aligned entrances from Route 58Xsimplifying and reducing traffic lights • Dense, vegetated buffering adjacent to residential uses and zones • Significant landscaping requirement in parking lot (e.g., 15% = 1.5 times existing regulation); landscaped planter or tree every 10-15 parking spaces, not just around the edges of the parking lot (not currently required)

Table 2-6: Shopping Center (SC)

Purpose: To provide adequate locations for medium-size convenience shopping centers, mainly on Route 58, where residents can purchase daily necessities like groceries, in central locations that are accessible by car, transit, walking, and biking from adjacent residential neighborhoods.

Preferred Land Uses	***Design Concepts***
Commercial • Shopping Centers (minimum 50,000 square feet) • Professional Office Campus • Health Spas/Clubs • Restaurants	• Large-scale and ancillary small-scale stores in shopping center layouts • Office buildings arranged in a campus-like layouts • Limited strip development/freestanding businesses • High minimum lot size • High open space requirement, located in front yard (e.g., 25%, same as Tanger Mall) • High landscaping requirement (e.g., 10%) in parking lot (not currently required) • Low base FAR (e.g., 0.15); higher FAR inside Sewer District (e.g., 0.20); further increases (e.g., by 50%) with purchase of Agriculture or Pine Barrens TDRs (to 0.225 or 0.30 FAR) • Aligned entrances from Route 58—simplifying and reducing traffic lights • Limited entrances from arterial • Dense, vegetated buffering adjacent to residential uses and zones and on frontage along arterial • Significant landscaping requirement in parking lot (e.g., 15% = 1.5 times existing regulation); landscaped planter or tree every 10-15 parking spaces, not just around the edges of the parking lot (not currently required)

Table 2-7: Business Corridor (BC)

Purpose: To allow for small, freestanding, roadside commercial uses, mainly along Route 58, between Destination Retail Centers and Shopping Centers.

Preferred Land Uses	***Design Concepts***
Commercial • Retail Stores • Personal Services • Restaurants • Cafes • Funeral Homes • Banks • Health Spas/Clubs • Gas Stations • Auto Repair Shops • Car Washes • Drive-through Windows • ~~Auto Dealerships~~ • Recreational vehicle dealerships	• Freestanding businesses • Low minimum lot size • Low base FAR (e.g., 0.15); higher FAR inside Sewer District (e.g., 0.20); further increases (e.g., by 50%) with purchase of Agriculture or Pine Barrens TDRs (to 0.225 or 0.30 FAR) • Cross-access agreements, wherever possible • Consolidated entrances, wherever possible • Limited entrances from arterial • Aligned entrances from Route 58—simplifying and reducing traffic lights • Dense, vegetated buffering adjacent to residential uses and zones and on frontage along arterial • Shared parking incentives (e.g., 20% reduction in required parking spaces) • High landscaping requirement (e.g., 10%) in parking lot (not currently required)

Table 2-8: Commercial/Residential Campus (CRC)

Purpose: To provide locations for offices, which offer essential legal, medical, accounting, real estate, travel, and other services to Riverhead residents; to provide additional housing alternatives convenient to services and arterials.

Preferred Land Uses	***Design Concepts***
Commercial • Medical Arts Offices • Municipal Offices ~~***Residential***~~ • ~~Townhouses~~ • ~~Multifamily Residences~~ • ~~Residential Health Care~~ ***Civic and Cultural*** • School • Public Office • Parks and Playgrounds	• Professional offices or apartments in a campus-style setting • High minimum lot size • High open space requirement, located in front yard (e.g., 25%, same as Tanger Mall) • Low base FAR (e.g., 0.15); higher FAR inside Sewer District (e.g., 0.20); further increase (e.g., by 50%) with purchase of Agriculture or Pine Barrens TDRs (e.g., to 0.225 or 0.30 FAR) • Limited and aligned entrances • Densely vegetated buffers (min 50 feet) adjacent to residential uses and zones and fronting roadway • High landscaping requirement in parking lot (e.g., 15% = 1.5 times existing regulation); landscaped planter every 10-15 parking spaces, not just around the edges of the parking lot (no provision, currently)

Table 2-9: Village Center (VC)

Purpose: To make village commercial nodes into vibrant "Main Streets" with small shops, restaurants, and professional services and a traditional pattern of development and design in a compact, pedestrian-oriented setting.

Preferred Land Uses

Commercial

- Retail Stores
- Indoor Public Markets
- Art Galleries
- Personal Services
- Restaurants
- Cafes
- Banquet Facilities
- ~~Funeral Homes~~
- Live Entertainment
- Theater
- Cinemas
- Banks
- Professional Offices
- Art Galleries
- Bed-and-breakfasts
- Inns
- Funeral Homes

Civic and Cultural

- Museums
- Libraries
- Schools
- Places of Worship
- Parks and Playgrounds

Adjoining Residential

- Single-family Houses
- ~~Cottage Accommodations~~
- Two-family Houses
- Townhouses

Mixed Uses

- Upper-floor offices and apartments in business districts
- No ground-floor offices or apartments in business districts

Design Concepts

Along Arterial

- Small stores clustered along a traditional AMain Street"
- Small minimum lot size (e.g., 5,000 sq.ft.)
- No front or side setbacks for buildings
- Full lot coverage
- Sidewalk-oriented entrances, window displays and signs
- Parking behind or beside buildings, not in front
- Shared parking incentives
- Parking waivers with fees and/or land dedication
- Significant landscaping requirement in parking lot (e.g., 15% = 1.5 times existing regulation; landscaped planter or tree every 10-15 parking spaces, not just around the edges of the parking lot (not currently required)

Adjoining Residential Areas

- Mix of housing types and sizes
- Compact lots
- Relatively narrow front and side yards
- Front door faces the street
- Front porches and stoops
- Garages set back from front facade or placed in backyard

In All Areas

- Site-specific historic and design standards, as appropriate
- Outfitted with sidewalks and accessible on foot
- Pedestrian connections from retail to residential areas

Table 2-10: Hamlet Center (HC)

Purpose: To provide a small cluster of shops and professional services in a rural setting with a rural and residential character.

Preferred Land Uses	***Design Concepts***
Commercial • Retail Stores • Art Galleries • Personal Services • Restaurants • Cafes • Banquet Facilities • Funeral Homes • Professional Offices • Bed-and-breakfasts ***Civic and Cultural*** • Museums • Libraries • Schools • Places of Worship • Parks and Playgrounds ***Adjoining Residential*** • Single-family Houses • Two-family Houses ~~• Cottage Accommodations~~ ***Mixed Uses*** • Apartments Above Stores	***Along Arterial*** • Small stores clustered in a limited node in a rural setting • No minimum lot size • Front and side setbacks consistent with residential district • Sidewalk-oriented entrances, window displays and signs • Cross-access agreements, where possible • Consolidated entrances, wherever possible • Parking behind or beside buildings, not in front • Shared parking incentives upon the same parcel (e.g., 20% reduction in required parking spaces) • Parking waivers with fees and/or land dedication • High landscaping requirement in parking lot (e.g., 15%) ***Adjoining Residential Areas*** • Mix of housing types and sizes • Compact lots • Relatively narrow front and side yards • Front door faces the street • Front porches • Garages set back from front facade or placed in backyard ***In All Areas*** • Site-specific historic and design standards, as appropriate • Outfitted with sidewalks and accessible on foot • Pedestrian connections from retail to residential areas

Table 2-11: Rural Corridor (RLC)

Purpose: To allow a very limited range of roadside shops and services in a rural setting along a corridor leading into Downtown, a Village Center, or a Hamlet Center (mainly along Route 25).

Preferred Land Uses	***Design Concepts***
Commercial • Antique Stores • Craft Stores • Farmstands • Nurseries • Agriculture Business Services • ~~Funeral Homes~~ • Professional Offices • Bed-and-breakfasts • Wine Tasting ***Civic and Cultural*** • Museums • Libraries • Schools • Places of Worship • Parks and playgrounds ***Residential*** • Single-family Houses • Two-family Houses ***Agriculture*** • Crop Cultivation • Animal Pastures	• Small freestanding stores with wide yards and landscaped areas • Large minimum lot size (e.g., 50,000 sq.ft.) and limited building size (e.g., maximum FAR of 0.10) • Minimum 50-foot front setback • In case existing parcels are subdivided, require a 500-foot open space buffer from the edge of the roadway • Other yard and side setbacks consistent with residential district • Alternatively: RC is an overlay district with non-residential uses requiring 2 times the lot and setback requirements of underlying zone • Commercial buildings must conform with residential design character: pitched roof, small footprint (e.g., under 2,000 sq.ft.), front door facing street, plate glass window, etc. • Require landscaped planter every 10-15 parking spaces, not just around the edges of the parking lot; or required use of permeable parking lot surface • Cross-access agreements, where possible • Consolidated entrances, wherever possible • Outfitted with sidewalks within one-quarter mile of Downtown Center, Village Center or Hamlet Center zones • High (e.g., 25%) landscaping requirement in parking lot, and landscaping required along the street frontage

Table 2-12: Tourism/Resort Campus (TRC)

Purpose: To provide opportunities for overnight accommodations and recreational amenities in a campus setting surrounded by picturesque open space preserves.

Preferred Land Uses	*Design Concepts*
Accommodations • Motel • Resort/Spa • Country Club ***Recreational*** • Golf Course • Parks and Playgrounds • Marina • Equestrian Facilities ***Civic and Cultural*** • Museums • Libraries ***Commercial (accessory only)*** • Banquet Hall • Retail Stores • Art Galleries • Restaurants • Cafes • Live Entertainment • Health Spas/Clubs	• Campus-style setting • High minimum lot size • High open space requirement (e.g., 70%, same as AOZ) • Low base FAR (e.g., 0.15); not included in TDR receiving areas, in order to keep low-density. • Limited and aligned entrances • Densely vegetated buffers (min 50 feet) adjacent to residential uses and zones and fronting roadway • High landscaping requirement in parking lot; landscaped planter every 10-15 parking spaces, not just around the edges of the parking lot

Table 2-13: Industrial/Recreational (IR)

Purpose: To allow a mix of light industrial and commercial recreation uses in the area between Enterprise Park and the terminus of the Long Island Expressway.

Preferred Land Uses	***Design Concepts***
Industrial • Offices • Warehouses • Light Manufacturing • Mechanical Contractor's Offices (e.g., construction, plumbing, etc.) • Wholesale • Outdoor storage as an accessory use ~~(with restrictions)~~ ***Recreational*** • Golf Courses • Parks and Playgrounds • Equestrian Facilities • Outdoor Theater • Sports Arena • Commercial Sports Facilities	• Campus-like layouts • Large minimum lot size • Significant open space requirement (e.g., 25%) • Low base FAR (e.g., 0.20 = 1/2 what is permitted in the IA) • Dense, vegetated buffering adjacent to residential uses and zones • Significant landscaping requirement in parking lot (e.g., 15%); landscaped planter or tree every 10-15 parking spaces, not just around the edges of the parking lot (not currently required)

2.4 RESIDENTIAL BUILD-OUT & SATURATION POPULATION ~~ESTIMATE~~ SCENARIOS

Based on the Proposed Land Use Plan, this section presents ~~the anticipated~~ Town-wide future build-out and saturation population estimates ~~of the Town in the future~~ and compares ~~it~~ them to ~~the~~ a baseline residential build-out scenario that would ~~have been~~ be anticipated under the Town's ~~current~~ existing zoning ~~map~~. As shown in Table 2-14, adoption of the Proposed Land Use Plan would ***reduce*** the anticipated buildout by roughly 5,000 housing units and would ***lower*** the saturation population of the Town by approximately ~~7,400~~ 11,000 year-round residents. As such, the "No TDR" scenario of the Proposed Land Use Plan would reduce the baseline residential build-out by 21 percent. The reduced-density zoning of the Agriculture A, ~~and~~ Residence A, and Residence C ~~zones~~ districts is the primary factor contributing to this reduction.

~~**Table 2-14: Buildout Estimate under the Proposed Land Use Plan**~~

	~~*2000 U.S. Census*~~	~~*Buildout under Current Zoning*~~	~~*Buildout under Proposed Land Use Plan*~~	
			~~*No TDR*~~	~~*Full TDR*~~
~~Total Housing Units~~	~~12,479~~	~~25,000~~	~~22,000~~	~~21,700~~
~~- Year Round Units~~	~~11,314~~	~~22,750~~	~~20,020~~	~~19,750~~
~~- Occupied Year Round Units~~	~~10,749~~	~~21,610~~	~~19,020~~	~~18,760~~
~~Total Year Round Population~~	~~27,680~~	~~55,800~~	~~49,100~~	~~48,400~~

Table 2-14: Residential Build-out and Saturation Population Scenarios

	2000 U.S. Census	*2003 Housing & Demographic Estimates*[1]	*Build-out under Current Zoning*[3]	*Build-out under Proposed Land Use Plan*[3]	
				No TDR	*Full TDR*[4]
Total Housing Units	12,479	14,323[1]	23,800	18,700	19,200
- Year-Round Units	11,314	13,034	21,658	17,017	17,472
- Year-Round Households[2]	10,749	12,382	20,575	16,166	16,598
Total Year-Round Population[2]	27,860	30,956	51,438	40,415	41,496

1. *The total amount of housing units was calculated by adding 1,844 new privately-owned estimated residential units, which were authorized by building permit from January 2[illegible] through April 2003, to the 12,479 units reported by the 2000 U.S. Census.*
2. *According to the LIPA 2002 Long Island Population Survey, November 2002, Riverhead had 11,223 year-round households and a total year-round population of 28,862.*
3. *It was assumed that the percentages of seasonal housing units, year-round households, and average household size would be the same at saturation as they were in 2000.*
4. *The "Full TDR" assumes that one-half of the transferred development rights will be residentially absorbed and the other half will be commercially absorbed.*

Sources: Town of Riverhead Planning Department, 2003; Suffolk County Planning Department, 2000; U.S. Census Bureau, 2000-2003; LIPA Long Island Population Survey, 2002.

In the column "Buildout under Proposed Land Use Plan," two buildout estimates are shown. One of the key recommendations of the Proposed Land Use Plan is to establish an Agricultural Overlay Zone (AOZ) that would either result in: (1) ~~development~~ on-site cluster development ~~on clustered lots~~, based on ~~an~~ 80,000-square foot lots ~~size pre-cluster~~; or (2) the transfer of development rights, where ~~the number of rights is based on a 40,000 square foot lot size~~ one (1) development right equals 43,560 square feet of real property. The number on the left assumes that all landowners in the AOZ choose to build on-site and do not transfer their development rights ~~(i.e., they do not use TDR at all)~~. The number on the right assumes that all landowners in the AOZ would choose to transfer their development rights and fully participate in the TDR program ~~(i.e., full use of the TDR program)~~.

~~Because the AOZ calculates transferable development rights based on 40,000 square foot lots,~~ The "Full TDR" scenario of the Proposed Land Use Plan results in a slightly higher build-out estimate ~~as compared to~~ than the "No TDR" scenario. It is assumed that approximately 50 percent of the development rights would be translated into commercial floor area in Enterprise Park and the Town's business districts and 50 percent of the development rights would be absorbed into the residential receiving areas. ~~However, as shown in the table, the resulting number of housing units is actually less under "Full TDR". This is because the portion of the development rights would be expected to be translated into commercial floor area in Enterprise Park and the Town's business districts, permanently eliminating those potential housing units from the Riverhead's building stock.~~ In general, a "Full TDR" build-out estimate would be higher than a "No TDR" scenario because property owners in the AOZ would be granted a higher development yield calculation for TDR than they would otherwise by permitted to build on-site.

Under the Proposed Land Use Plan, the concentration and distribution of ~~the~~ future ~~population~~ development would be different from ~~the~~ current Town zoning ~~map~~ patterns~~. In the AOZ,~~ Under the "No TDR" scenario, all development in the AOZ would be clustered in nodes. ~~Also, if TDR is used,~~ Under the "Full TDR" scenario, the build-out of the AOZ would be further reduced, with corresponding increases in development north of Sound Avenue, in and around the hamlet centers, in and around downtown, along Route 58, and in Enterprise Park.

~~Over the course of 1990s, Riverhead's population grew at an average annual rate of about 1.9 percent.~~ According to the U.S. Census, Riverhead's total year-round population grew 20.3 percent or 2.03 percent per year over the course of the 1990s, from 23,011 in 1990 to 27,680 in 2000. ~~If this rate of growth were to continue into the future~~ At an average annual growth rate of 2 percent, the Town would ~~expected to~~ reach its ~~build-out~~ saturation population ~~(as envisioned under the Proposed Land Use Plan)~~ by about 2017 under the Proposed Land Use Plan. However, if the population growth rate slows down to ~~about~~ 1 percent per year, ~~(~~which ~~would be~~ is more consistent with the County's ~~as a whole, which grew at an~~ average annual growth rate of 0.7 percent ~~in the 1990s)~~, then ~~buildout~~ ~~may~~ Riverhead would not reach its saturation population ~~occur~~ until about 2030. In the year ~~2023~~ 2013, ~~(20 years but~~ one decade after ~~from~~ the completion of this Plan~~)~~, ~~the anticipated buildout~~ ~~of the Town~~ saturation population would fall in the range of ~~34,400 people (1 percent growth rate) to 41,900 (1.9 percent growth rate)~~ approximately 34,200 persons at a 1 percent growth rate and 37,700 persons at a 2 percent growth rate.

METHODOLOGY

The build-out and saturation population analysis consisted of three tasks: 1) geographical analysis of all land available for development by zoning classification; 2) calculation of the future potential housing units on the land available for development; 3) calculation of the future potential households and saturation population. The following steps were taken to estimate future build-out and saturation population under current zoning, under the Proposed Land Use Plan (No TDR), and under the Proposed Land Use Plan (Full TDR):

1. Geographical Analysis of Land Available for Development

In order to locate developable land within the Town and project future development potential, Riverhead's land available for development GIS database was acquired from the Suffolk County Department of Planning. All vacant, agriculturally used, underutilized and redevelopable parcels were inventoried in the County's GIS database according to existing zoning classifications. Since the GIS database was finalized in late 1999, the Riverhead Planning Department updated the database to remove any parcels that have been preserved through open space acquisition, residentially/commercially developed or approved for development through June 2003.

Once the GIS database was updated, all of the developable parcels were sorted and queried according to their zoning classifications, acreage, and location. The land available for development data was then imported into a spreadsheet application to calculate the potential number of dwelling units that could be accommodated on the developable parcels.

2. Calculation of Potential Housing Units and Residential Build-out

The number of potential housing units was calculated by multiplying the acreage of each developable parcel by a dwelling unit yield factor corresponding to its minimum lot area. The dwelling unit yield factor was derived by the Long Island Regional Planning Board to estimate the average amount of units per acre. The yield factor assumes a 20 percent reduction in lot area to account for the construction of roads and infrastructure, as well as the presence of natural constraints that reduce the buildable area of a parcel, such as wetlands or steep slopes. Thus, a 40,000 square-foot lot yields 0.8 units per acre. To the extent that the yield factor is a useful planning tool for build-out analysis, it is not a substitute for a subdivision yield map.

As Table 2-14 illustrates, the build-out estimate under current zoning involved adding the number of existing housing units (14,323) to the number of potential housing units (9,477), for a total build-out of 23,800 housing units. While the "No TDR" and "Full TDR" build-out scenarios were calculated in the same way as the build-out under current zoning, they each yielded a smaller number of potential housing units because of the upzoning of the Agriculture A and Residential A districts. The reduced build-out under the "No TDR" scenario yielded 18,700 housing units and the "Full TDR" scenario yielded 19,200 housing units.

3. Calculation of Future Potential Households and Saturation Population

Suffolk County's *Saturation Population Analysis, June 2001* report was used to calculate the Town-wide saturation population. Several steps were taken to determine the saturation population under the current zoning build-out scenario, as well as under the "No TDR" and "Full TDR" Proposed Land Use Plan scenarios. For demonstration purposes, the build-out under current zoning scenario is shown below as an example.

a) The amount of potential year-round housing units was calculated by subtracting the percentage of seasonal units from the total number of housing units. According to the U.S. Census, approximately 9 percent of all housing units were assumed to be seasonal in 2000. It was assumed that the percentage of seasonal housing would be the same at saturation as in 2000. Under this assumption, approximately 2,100 seasonal units and/or second homes were subtracted from the total build-out of 23,800 housing units to yield roughly 21,700 potential year-round housing units.

b) The amount of potential households was calculated by subtracting the number of vacant housing units from the total number of year-round housing units. According to the U.S. Census, approximately 5 percent of all year-round housing units in Riverhead were assumed to be vacant or unoccupied in 2000. Thus, the 5 percent reduction in year-round units yielded approximately 20,600 potential households.

c) The final step in determining the saturation population involved multiplying the average number of persons per household by the number of potential households. According to the U.S. Census, the average household size in Riverhead was 2.5 persons per household in 2000. Yet again, it was assumed that the average household size would be the same at saturation as it was in 2000. The final calculation yielded a saturation population of approximately 51,400 in the current zoning build-out scenario.

- ~~STEP #1: Using Suffolk County's GIS database (current as of late 1999), acreage estimates of vacant, developable land were calculated. Please note, underutilized or redevelopable parcels were not included in these acreage estimates, although this figure is expected to be very low relative to the acreage of vacant land. The acreage estimates were organized by residential zoning categories.~~
- ~~STEP #2: Based upon the required minimum lot sizes under current and proposed regulations, the number of housing units that could be developed on those residentially zoned parcels were then calculated.~~
- ~~STEP #3: The number of new housing units was then added to the number of existing housing units, based on the 2000 U.S. Census, yielding the "Total Housing Units" figure shown in Table 2-14.~~
- ~~STEP #4: Consistent with the 2000 Census, approximately 9 percent of all housing units are assumed to be seasonal, and subtracting out those units yields the "Year Round Units" shown in the table.~~

- ~~STEP #5: Then, "Occupied Year Round Units" were calculated by subtracting out the 5 percent of units that are expected to be vacant at any given time, on average.~~
- ~~STEP #6: Finally, the "Total Year Round Population" was calculated by multiplying the "Occupied Year Round Housing Units" by Riverhead's estimated household size. According to the 2000 U.S. Census, this number is about 2.58 persons per household.~~

ASSUMPTIONS

The following assumptions were used to complete the buildout estimates:

- For the purposes of the acreage estimates, "vacant, developable" land was assumed to include all those parcels in the County's GIS database shown as "vacant" or "agricultural" in use. ~~Based on information provided by the Town,~~ Permanently preserved agricultural parcels (i.e., from which development easements were purchased ~~as of 2002~~) were subtracted out.
- For vacant, developable ~~sites~~ parcels in single-family zoning districts, the minimum required lot ~~size~~ area was used to determine the number of lots (and housing units) that could be built. Given the required lot size, the dwelling unit yield factor conversion table ~~prepared by Suffolk County in *2001 Land Available for Development Sending/Receiving Areas: Town of Riverhead*~~ in Suffolk County's *1999 Land Available for Development* report was used to determine the number of lots that could be carved out of ~~the tract~~ each parcel.
- All underutilized or redevelopable parcels less than five acres were excluded from the land available for development database.
- ~~For multi family sites, it was assumed that 10 percent of the site would be set aside for common open space, drainage easements, conservation easements, and/or roads. The remaining land area (90 percent) could be used for building sites. Special consideration was given to KeySpan site on Long Island Sound. It was assumed that only 30 percent of the site would be developed, with the remaining areas of the site preserved as open space or parkland.~~
- For the Proposed Land Use Plan, all areas within the Agriculture A and the Residence A zones would have base zoning of 80,000-square foot lots. For the current zoning map, a minimum lot size of 40,000 square feet was assumed.
- As noted, within the AOZ, development would be permitted on-site (yield based on 80,000-square foot lots) *or* the development rights could transferred (yield based on 40,000-square foot lots).
- In the ROZ, the base zoning would require a minimum lot area of 80,000 square feet. ~~in the Agriculture and Residence A zones and 20,000 in the Residence C zone.~~ If development rights are purchased and transferred, the residential yield could be increased to a maximum of one (1) dwelling unit per 40,000 square feet for single family residential subdivisions and further increased to a maximum of one (1) dwelling unit per 20,000 square feet for attached units. ~~from sites in the AOZ, then~~

~~the minimum lot size can be reduced to 20,000 square feet in the Agriculture and Residence A zones.~~

- All of the areas within the ROZ and with base zoning of Agriculture A or Residence A lie within Suffolk County's Groundwater Management Zone IV or Zone VIII, which allow 20,000 square foot lots on septic. Thus, even though densities will be increased in these areas, septic will still be a viable means of wastewater disposal.

- ~~Areas within the ROZ and with base zoning of Residence C — regardless of the County Groundwater Management Zone — would not be able to use septic if development rights were purchased and lot sizes were reduced to 10,000 square feet. For the purposes of this analysis, it is assumed that on-site package treatment facilities would be utilized to achieve the more compact lot sizes in these areas.~~

- It is assumed that most sites within the Commercial/Residence Campus zones would be developed with commercial uses. Only two 15-acre parcels in the Route 25A business district are anticipated to be developed with residential uses, because the surrounding existing residential and open space uses are conducive to residential development. In all other areas (i.e., commercial areas of Route 25A, East Main Street, and Route 58), commercial development would be expected.

- In the Residence RC and Commercial/Residence Campus zones, the base zoning regulates building size via floor area ratio (FAR) limitations. Based on the maximum possible building size, the potential number of residential units is determined by assuming that each dwelling unit would be approximately 1,000 square feet.

- In the Downtown Center zone, there are two vacant 5,000 square foot lots in the residential area north of Main Street and east of Roanoke Avenue. It is assumed that each lot would be developed with two housing units. These two units could be in the form either of a single-family home with an accessory unit, or a two-family home.

- In the "Full TDR" scenario of the "Buildout under the Proposed Land Use Plan," it is assumed that approximately ~~75~~ 50 percent of the development rights are transferred from the AOZ to Agriculture A, Residence A, and Residence C ~~base zones~~ districts in the designated ROZ. In addition, it is assumed that the remaining 50 percent of development rights would be converted to commercial rights to allow additional commercial floor area to be built. By increasing the floor area of buildings in commercial and light industrial districts through the conversion of residential development rights, residential development pressures would be reduced in the agricultural core and north of Sound Avenue. ~~It is then assumed that:~~

    - ~~200 development rights would be used to add accessory units to existing single-family housing units in the Residence A, Residence A-1, and Residence B zones, pursuant to Chapter 8, the Housing Element.~~

    - ~~The remaining development rights would be redeemed by commercial sites in the Destination Retail Center, Shopping Center, Business Corridor, and~~

~~Commercial/Residential Campus zones, as well as the Planned Recreational Park zone (Enterprise Park). The residential development rights from the AOZ would be translated into an equivalent FAR that would allow additional commercial floor area to be built.~~

2.5 GOALS & POLICIES

Goal 2.1: Adopt a land use plan for Riverhead that embodies the goals and policies of the Comprehensive Plan.

As discussed in Section 2.1, the Vision Statement for Riverhead's Future, the Comprehensive Plan ~~strives to reduce the potential for residential and commercial sprawl~~ provides growth management techniques to limit both residential and commercial sprawl. Goals and policies stated throughout the plan ~~are intended~~ have been devised to protect open space and farmland, while concentrating development into ~~strong, clustered~~ compact nodes.

Policy 2.1A: Adopt Figure 2-1 as the Town of Riverhead's new zoning map, and update the Town's zoning ordinance to include the new zoning districts shown on Figure 2-1 and described in this Element.

The Proposed Land Use Plan in Figure 2-1 embodies a number of key principals, as discussed throughout the various chapters of the Comprehensive Plan:

1. The Town's agricultural greenbelt should be preserved to the greatest extent possible, through the use of cluster ~~development~~ subdivisions, ~~the~~ transfer of development rights, purchase of development rights, and other preservation mechanisms.
2. The zoning for business districts should be ~~recast~~ amended ~~in order~~ to better address various ~~different~~ types of commercial demand and downtown revitalization efforts. Downtown zoning, as well, should be ~~recast to be~~ tailored to support the unique historic character ~~along~~ of Main Street.
3. Business district zoning along Route 58 should be expanded to allow "destination retail" uses at the western end of Route 58, while the zoning along other parts of the corridor should be ~~sealed back~~ amended to be less intensive. This will help create smaller, but ~~stronger~~ more concentrated commercial nodes~~ that are more concentrated and less sprawling~~.
4. ~~Likewise,~~ The zoning ~~in~~ of the hamlet centers should be ~~sealed back in size~~ amended to limit sprawl.
5. A variety of recreational, business, light industrial, and open space uses should continue to be permitted in Enterprise Park at Calverton~~, in a campus-like setting~~.
6. A mix of light industrial and recreational uses should be permitted between Enterprise Park and the terminus of the Long Island Expressway.

7. Higher-density housing should be concentrated around the downtown areas, ~~as well as the~~ hamlet centers, and upon appropriate parcels in the vicinity of the proposed Destination Retail District. ~~Higher-density~~ Under the TDR program, low- to moderate-density housing should also be permitted ~~along~~ north of Sound Avenue~~, provided that development rights are purchased from the agricultural belt, taking~~ to take advantage of the ~~strong~~ unique housing demand in that area.

These ~~generalized~~ refined development patterns ~~are intended to help~~ foster a more sustainable and promising future for the Town of Riverhead. By encouraging compact development around downtown and the hamlet centers, ~~there will be~~ the Proposed Land Use Plan provides greater opportunities for walking, biking, and transit, while reducing automobile-dependency in the future. Through preservation efforts in agricultural areas and more concentrated business district zoning, the potential for sprawl is reduced under the Proposed Land Use Plan.

East Hampton Power & Light Company

Calverton Generating Facility

Appendix N

12.2 SCHOOLS

The Town of Riverhead has three separate school districts, shown on Figure 12-1: (1) Riverhead Central School District (CSD), which occupies most of the Town; (2) the Shoreham-Wading River School District, in the Town's northwestern corner; and (3) the Laurel School District, which includes a narrow strip of land along the Town's eastern border with Southold.

The CSD operates seven schools (five elementary schools, one middle school, and one high school), six of which are located in Riverhead. Only one of the schools in the Shoreham-Wading River School District is located in Riverhead. That school is located on Manorville Road, just north of Route 25A. The Laurel School District has no school sites in Riverhead itself.

As Riverhead continues to grow in population, additional schools may be needed in all of the school districts. In particular, the CSD will be under the greatest pressure for school expansion, as the district includes large areas of open space that may be subdivided for residential development. Each school district monitors its own needs on a continuous basis, and each prepares its own budget and facility plans. The Town, therefore, is not the primary decision-maker with respect to future school facility expansions. However, in the context of the Comprehensive Plan, the Town can express preferences for the location of future school sites and can work with the districts to ensure that residents are being provided with adequate and appropriate facilities.

RIVERHEAD CENTRAL SCHOOL DISTRICT

Additional classrooms are needed to accommodate population growth in the CSD between 2000 and 2009. In June 2000, Western Suffolk BOCES completed a *Long Range Planning Study* for the CSD. Tables 12-1 and 12-2 compare school capacity with enrollment, both for 1999 and 2009 (projected). Currently, many of the schools in the CSD are operating at or over capacity; that is, they are overcrowded. The CSD relies on the use of portable units for extra space at some of the school sites. Despite a number of expansion plans, many of the schools are still expected to be operating over capacity in 2009.

In the 2001-2002 school year, the CSD reorganized the grades in order to use its space better and therefore relieve some of the overcrowding problem. Fourth graders were moved from the Pulaski Intermediate School to the elementary schools, such that the K-3 schools were converted into K-4, with full-day kindergartens. Sixth graders were moved to Pulaski from the Middle School. This change will help alleviate some of the current overload at the Pulaski and Middle schools, but it will not eliminate the need for additional school expansions by 2009.

Figure 12-1: Community Facilities

Back of Figure

Table 12-1: School Capacity and Enrollment, ~~1999~~

	Functional Capacity 1999	*Enrollment ~~1999~~ June 2003*	*Enrollment vs. Capacity*
Aquebogue Elementary (K-3)	301	~~313~~ 448	~~104%~~ 149%
Phillips Elementary (K-3)	473	~~416~~ 532	~~88%~~ 112%
Riley Elementary (K-3)	413	~~462~~ 593	~~112%~~ 144%
Roanoke Elementary (K-3)	346	~~401~~ 369	~~116%~~ 107%
Pulaski Intermediate ~~(4-5)~~ (5-6)	575	~~709~~ 776	~~123%~~ 135%
Riverhead Middle ~~(6-8)~~ (7-8)	996	~~992~~ 715	~~100%~~ 72%
Riverhead High (9-12)	1288	~~1260~~ 1387	~~98%~~ 108%

Sources: Riverhead Central School District, June 2003; Western Suffolk BOCES Office of School Planning & Research for the Riverhead Central School District, Long Range Planning Study, *June 2000 - Final Report.*

Table 12-2: Projected School Capacity and Enrollment, 2009

	Planned Functional Capacity 2009	*Projected Enrollment 2009*	*Enrollment vs. Capacity*
Aquebogue Elementary (K-4)	595	414	70%
Phillips Elementary (K-4)	629	550	87%
Riley Elementary (K-4)	583	609	104%
Roanoke Elementary (K-4)	313	510	163%
Pulaski Intermediate (5-6)	575	797	139%
Riverhead Middle (7-8)	996	836	84%
Riverhead High (9-12)	1288	1755	136%

Source: Western Suffolk BOCES Office of School Planning & Research for the Riverhead Central School District, Long Range Planning Study, *June 2000 - Final Report.*

Elementary Schools (K-4)

Expansions are being planned for three elementary schools: Aquebogue, Phillips, and Riley. These expansions will be able to accommodate large increases in student enrollment. Riley will still be expected to have a shortage of space in 2009 and will require two additional classrooms by that time. Although Aquebogue and Phillips Schools would have space to absorb some of the Riley overflow, those two schools are located far from the residential areas in the west side of the CSD and would require long bus or car rides for students. In the long run, the preferred option may be to build another addition to the building. Because the Riley School is located on a 15-acre site, it has plenty of room to accommodate such an addition.

Roanoke School — located in downtown Riverhead — is extremely cramped for space. By 2009, seven additional classrooms will be needed, and expansions will be required for the cafeteria, the library, and the gymnasium as well. The problem at the Roanoke School is that the existing site is too small to accommodate an addition. The Aquebogue School (located three miles to the east) could potentially absorb some of the overflow after current expansion plans are completed. An alternative is to build another elementary school on a new site and to convert the Roanoke School building into Board of Education offices or some other civic or cultural use (such as a library, a museum, a performance space, a community center, or Town Hall offices). This idea is currently being considered by the Board of Education.

Intermediate School (5-6)

Enrollment at the Pulaski School is expected to increase rapidly, mainly because sixth grade classes have been moved there from the more cramped Riverhead Middle School. Although the Pulaski School will be able to absorb the increase fully at first, it will require an expansion before 2009 in order to accommodate the long-term enrollment increases. By 2009, five additional classrooms, an additional support room, and additional space in the cafeteria and library will be needed. The front and side yards of the school site could potentially be used to accommodate an expansion.

Middle School (7-8)

Riverhead Middle School is currently operating at capacity. The plan to move the sixth grade to Pulaski School was intended to reduce the overcrowding. However, now that the sixth grade is gone, Middle School enrollment for the remaining two grades is still expected to increase quickly. Additional space will probably not be needed before 2009, but may be necessary at some time thereafter. If and when additional space is required, the Middle School will need to look off-site, as its 10-acre site is already built out.

High School (9-12)

Riverhead High School will require a significant expansion by 2009, as enrollment is expected to exceed capacity by about 470 students. The Boces report has determined that the high school will require an additional 13 classrooms, as well as an art room, a home/career room, and a music room. The six science rooms may also need to be expanded to handle slightly larger class sizes. Furthermore, additional space may eventually be needed for the gymnasium, the cafeteria, and the library. This represents the single largest expansion need for the CSD in the near future.

As with the Middle School, the high school site is almost entirely built out. The CSD is seriously considering a proposal to build a new high school in Enterprise Park at Calverton, allowing the existing high school to be used for the middle, intermediary and/or elementary school purposes.

SHOREHAM-WADING RIVER SCHOOL DISTRICT

The Wading River Elementary School is located on Manorville Road on the north side of Route 25A. The school serves the entire northeastern corner of the Shoreham-Wading River School District, one of the fastest growing areas of Suffolk County. A school expansion may be necessary prior to 2010, in which case the site behind the school should be set aside as a potential expansion site.

LAUREL SCHOOL DISTRICT

A very limited area in the eastern part of Riverhead is located in the Laurel School District. This area consists of a narrow strip of land east of Herricks Lane along the Southold border. The predominant land use in this area is agricultural, with a few clusters of residences along Herricks Lane, Route 25, and Peconic Bay Boulevard. No school sites are located in this part of Riverhead.

SCHOOLS: GOALS & POLICIES

Goal 12.1: Provide adequate land for school expansions or new schools, while ensuring that school buildings fit into their surrounding neighborhoods.

Policy 12.1A: Continue working with the school districts to identify appropriate sites for new schools.

The four schools in the downtown area, all of which will face a shortage of classroom space in the near future (i.e., within the next ten years), have difficult land constraints. Although the Pulaski School could potentially accommodate additions in its side yards, the High School, the Middle School, and the Roanoke School have no additional room to expand.

Beyond 2012, population levels will continue to grow, as will the school-age population. There will be two countervailing demographic trends in coming years. One the one hand, the senior population will grow, as the baby boom generation enters retirement. At the same time, many people reaching retirement age may move away to more affordable parts of the State or the country, because seniors tend to have more limited incomes. As seniors move, families with young children will continue to be attracted to Riverhead, because it has a housing stock popular with families (single-family detached homes) and the good schools and recreational amenities that families want.

For these reasons, it is uncertain exactly how many school children may need to be accommodated in local schools in 2020 or 2040. Nevertheless, additional school sites will be needed, and the Town should be proactive in identifying potential school sites. The Town may want to consider purchasing and banking sites that could be used for school, recreational, or other public purposes in the future.

Policy 12.1B: Encourage the Riverhead Central School District to consider expanding downtown school sites before developing new schools in outlying locations.

The four downtown schools are located in the geographical center of the Riverhead CSD, which includes a large portion of the northern part of Southampton Town. The downtown location is convenient for students, who can easily walk to Main Street shops, Pulaski Street, Stotzky Park, or the downtown Library after school.

Policy 12.1C: Work with the school districts to explore the feasibility of purchasing vacant parcels or open space/farmland sites adjacent to existing school sites.

The Wading River Elementary School, if an expansion becomes necessary, would not have room to expand on its current site, but the large vacant site next to the school could be set aside for a future expansion project. Vacant sites next to other schools should be identified and considered for potential purchase as well.

Policy 12.1D: If school expansions are undertaken, ensure that the design of the additions is consistent with the design of the original building.

The Pulaski School has an attractive facade from the early 20th century that contributes to the civic character of downtown. It lends a beautiful impression to the street. To the greatest extent possible, the front facade should not be altered or obscured from view.

Policy 12.1E: Work with the school district to ensure that the architectural design of school buildings is compatible with the surrounding neighborhood.

Policy 12.1F: Ensure that the school districts reduce or mitigate traffic impacts resulting from school expansions or new school development, to the greatest possible extent.

Goal 12.2 Generally, locate school expansions and new schools in downtown or hamlet centers, but also consider alternate locations that provide excellent educational or recreational opportunities for students.

Policy 12.2A: Work with the school districts to identify appropriate sites for new schools in downtown and in hamlet centers.

Because the downtown location is ideal for many reasons, a new school would be well-sited in the downtown area. There are several large vacant sites in the vicinity of Stotzky Park, as well as sites on East Main Street. If downtown sites are not available or feasible, sites near the business districts of Jamesport, Calverton, Aquebogue, or Route 25A should be considered. In these locations, schools would be well-located relative to student populations and would contribute to the civic character of those centers.

Policy 12.2B: Continue working with the Riverhead Central School District to determine the feasibility of locating a new high school in the vicinity of Enterprise Park at Calverton.

From a land use planning perspective, schools should be ideally located in downtown or the hamlet centers. However, for a several reasons, it makes sense to consider locating a new high school facility in Enterprise Park.

- First, because the land is currently owned by the Town, it could be offered at a reasonable price to CSD, saving the taxpayers who live in the CSD a significant sum.
- Second, the school site could be located next to the Central Pine Barrens Core Preservation Area, Robert Cushman Murphy Peconic River County Park, and the newly proposed Town park (see Chapter 11, Parks and Recreation Element). The location of a new school in this particular place provides great educational and recreational opportunities for students.

Nevertheless, there are two potential constraints that could make the siting of high school in the Calverton area less than ideal. First, the school would be located on the western edge of the CSD district, meaning that some high school students would have travel about 15 miles through Town to reach the site. Some students would be bused, but others would be driven by their parents, guardians, or friends, and still others would drive their own cars. The Town should make certain that the CSD has a workable transportation scheme that prevents undue traffic impacts on Town roads and ensures the safety of students traveling those distances.

Second, there is still ongoing discussion about the potential for an active ~~commercial~~ airfield supporting the commercial and industrial uses to be developed at Enterprise Park at Calverton, even though the airport referendum was defeated in November 2001. The Town should consider the possibility that an airfield could have negative impacts on an adjacent school. The Town should make sure that the high school is so situated that children are not placed at risk. In particular,

1. The high school should not be located within the crash hazard zone for the airport, as determined by the Federal Aviation Administration (FAA). These zones are typically found at the beginning and end of runways.
2. The high school should not be located within high noise-impact areas, as determined by the FAA and in accordance with the FAA's guidebook *Land Use Compatibility and Airports: A Guide for Effective Land Use Planning* of September 1999. Areas impacted by high noise levels are not just the immediate areas around the airport, but those areas within the runway flight path.

12.3 LIBRARIES

RIVERHEAD FREE LIBRARY

The Riverhead Free Library is a "free association library," which is chartered under the Board of Regents of the State of New York to operate as a public library. A "free association library" is operated by a non-profit association, rather than a municipality or a school district. The Library has an agreement with the Riverhead Central School District (CSD), whereby the library provides services to the schools in exchange for a portion of the tax revenues raised by the district. Because the Library is an independent entity, the Town cannot make decisions regarding Library facilities and programs. However, the Comprehensive Plan can express preferences for future Library locations and can work with the Library to ensure that resident needs are being met.

The Library building, conveniently located in downtown, recently underwent an expansion and upgrade. The total size of the building was expanded from 19,000 to 30,000 square feet. New offices, study rooms, meeting rooms, book stacks, and storage facilities were added. Another expansion will probably not be needed for many years. However, as the population grows, additional Library space may eventually become necessary.

Resources and Programs

Professional librarians and library volunteers are on-hand in the Library to help patrons find the materials they need. In addition to the large on-site book collection, the Free Library participates in the Suffolk County Cooperative Library System, which allows patrons to borrow books from other libraries. Tanger Mall recently made a donation to the Library, for use in compiling a "wellness" collection. These funds are being used to purchase books on cancer, a cancer database, and to staff a "cancer room" in the Library.

Through a Gates Foundation Grant, the Library has been able to buy new hardware and software for the computer lab, which currently has ten computers and offers internet access. The Library offers internet training to seniors and allows school-age children to use the internet for research projects. The Library maintains a web site with searchable electronic databases.

The Riverhead Free Library also sponsors programs, events, and courses, functioning as a quasi-community center. The Library hosts more than 500 programs, events, and courses during the year. Programs have included children's storytelling, defensive driving courses, cooking classes, and training for U.S. Census volunteers. The Library also sponsors games and other events for seniors.

The Library basement has several activity rooms, one of which contains a small performance space, and another of which contains a kitchen for cooking classes. The Library also has a children's room, a crafts room, a quiet study room, and several meeting rooms. Central Suffolk Hospital sponsors seminars in the Library meeting rooms, and community groups use the activity rooms for their meetings and functions. There are plans to add a café to the Library as well.

In the future, as more and more Library resources become available online, many people will be able to access Library materials from the comfort of their own home. However, the internet will never fully replace the Library, which provides resources that are unavailable online, such as hard-copy materials, original and historical documents, and research assistance from experienced librarians. Also, the Library will continue to play a strong role as a community center.

Parking

The Free Library currently has 115 parking spaces, which are usually adequate. However, during summertime (when school is out) and special events, it is not unusual for the Library to experience a parking shortage. In the future, population expansion will attract more visitors and lead to more frequent parking shortages. The Downtown Revitalization Strategy calls for additional municipal parking to be developed along Court Street. More parking in the area would benefit the Library, because patrons could park there when the Library lot fills up.

OTHER LIBRARIES

In addition to the Riverhead Free Library, there are two other public libraries in Town. The Suffolk County Historical Society, located on West Main Street in downtown, maintains a library of historical documents and books. In addition, the Baiting Hollow Free Library serves as a small neighborhood facility for local residents. It is located on Sound Avenue.

LIBRARIES: GOALS & POLICIES

Goal 12.3: Provide adequate library space.

Policy 12.3A: If additional Library space becomes necessary, work with the Riverhead Free Library to consider expanding the downtown site.

While the downtown site has little space left, one of the adjacent properties could potentially be purchased and used to accommodate an expansion. A second floor could also potentially be added. The advantage of expanding the Library building is that all Library resources would be concentrated in one place, promoting efficiency, saving costs, and creating "one-stop" convenience. Also, because of its central location, the existing site is convenient to most Riverhead residents. It also adds to the sense of community and civic role in downtown Riverhead. Parking shortages could worsen as the result of an expansion, so consideration would also have to be given to the availability of parking on-site and in adjacent areas.

Policy 12.3B: As an alternative to expanding the downtown Library site, work with the Riverhead Free Library to consider establishing branch libraries in other parts of Riverhead.

Although branch libraries would be more expensive to operate and maintain, the Library could achieve cost efficiencies by co-locating branch libraries with schools, community centers, fire stations, and other public facilities. Branch libraries have significant advantages. They provide residents with some local Library resources (such as hard-copy books, magazines and newspapers, internet access) and a quieter alternative to the busier central Library. Also, developing branch libraries could eliminate the need to undertake a difficult or costly expansion of the existing downtown Library.

If branch libraries are developed, they should be located in hamlet centers, next to schools, or near senior living facilities. The majority of library users are school children and senior citizens, many of whom do not have access to car. Branch libraries in these locations would be more easily accessible to people who need to reach the Library on foot, by bike, or via transit. Another concept to explore is to give the branch Library its own unique theme, targeted to a user group. For example, a branch library could become the "kids' branch" that specializes in programs and books for elementary school children.

Goal 12.4: Continue to expand library services and programs.

Policy 12.4A: Encourage the Riverhead Free Library and the Baiting Hollow Free Library to continue expanding library collections and providing special programs in areas of interest to Riverhead residents.

The Riverhead Free Library currently provides an array of programs for seniors and children, and it has unique collections, such as the center for cancer research.

Policy 12.4B: Encourage the Riverhead Free Library to expand the role of the Library as a community center.

The library already functions as a community center, with programs appealing to all age groups. The library's "community center" role should continue to be expanded.

Policy 12.4C: Encourage the Riverhead Free Library to explore the feasibility of leasing Library space and facilities to telecommuters and work-at-home professionals.

With the growth of the second-home population, ever-increasing LIE traffic, and the trend toward telecommuting, more people than ever before are working out of a home office one or more days each week. While many workers have faxes, computers, and internet connections at home, they often lack amenities such as photocopy machines, reference materials, teleconferencing capabilities, and meeting rooms. The Riverhead Free Library should consider using a portion of the downtown facility or any future branches as business technology centers, where telecommuters or work-at-home professionals can use a portion of the Library as a workspace. The Library could consider charging professionals for the use of specific services, such as the use of meeting rooms, classrooms, computers, internet connections, printers, and photocopiers. In considering this idea, the Library should take into account the demand for such services, the amount of space that could be dedicated to such uses, possible fees, and any potential impact on other services provided by the Library.

12.4 TOWN OFFICES AND FACILITIES

Riverhead has a relatively modern Town Hall, located just east of downtown on Howell Avenue. Town Hall houses all municipal offices except the Recreation Department, which is located in Stotzky Park. The Police Department is located on the same site as Town Hall, but in a separate building to the rear of the property.

Although Town Hall has served Riverhead's needs very well for many years, ~~it is extremely cramped for space nowadays~~ office space is currently at a premium. Town Hall was built in the early 1970s, when the Town's population was about 18,000 to 19,000 residents. As of the year 2000, the population had increased to nearly 28,000 residents. With more people living in Riverhead, Town services have been expanded, and the Town has had to hire more employees. Additional space will be needed in the future to accommodate additional service and staff needs, as the population grows to ~~more than 48,000, as estimated in Chapter 2, the Land Use Element~~ those levels forecasted in the Land Use Element of this Comprehensive Plan.

Town maintenance facilities (i.e., garages, storage facilities) are adequately serving Riverhead's needs. However, the Town may need to consider expanding its facilities and/or establishing additional sites as the population grows.

TOWN OFFICES AND FACILITIES: GOALS & POLICIES

Goal 12.5: Consider a variety of options for increasing space for Town Hall offices, while ensuring that Town Hall remains in the downtown area.

Policy 12.5A: Explore the feasibility of relocating the Police Department to another site and use the vacated space to expand Town Hall offices.

As discussed in Section 12.5, the Police Department is cramped for space as well and could be better served by a new building in a non-downtown location, where access for patrol vehicles may be easier.

Policy 12.5B: Consider the feasibility of building or renovating a "landmark" building in downtown Riverhead in the vicinity of the County Courthouse, including the Roanoke School, to serve as a new Town Hall or to provide space for "satellite" Town Hall offices.

The Riverhead Central School District is considering closing the Roanoke School due to its small size and relocating those students to another facility. As a landmark building in the center of downtown, the Roanoke School would be an ideal location for a new Town Hall. The Town should work with the Riverhead CSD to explore the feasibility of utilizing the Roanoke School as a new Town Hall, in case that building is no longer needed for school purposes.

Another option is to utilize a portion of the Roanoke School or another building as a satellite office, while keeping the main Town Hall facility in its current location at 200 Howell Avenue. In this scenario, the remainder of the satellite building could be used for other public purposes, such as a community center, a teen center, a senior center, or a Town museum.

Policy 12.5C: If Town Hall is moved to a new facility, develop a plan for the reuse of the existing Town Hall facility.

The facility could be reused for either public or private purposes. Office campuses are found along East Main Street, so one option is to sell the facility to an investor/developer for the purpose of converting it into private-sector office space. Other options include: expansion of the Police Department into the facility, and/or establishment of a second senior center, and/or establishment of a community center. Whatever the use, the Town should not move from the site unless there is a clear plan in place for disposing of or reusing the site, lest the facility were to lie vacant for an unwarranted period of time.

Policy 12.5D: Locate all Town Hall satellite offices in downtown, even if those offices are not in a single building.

Town offices, if not located in Town Hall itself, should still be located in downtown. This ensures greater ease of communication and coordination between various Town offices. It also ensures that people requiring Town services do not have to make circuitous trips to various offices in different parts of the Town. Also, keeping ~~all~~ these Town offices in downtown would reinforce the civic role of downtown Riverhead.

Policies 12.5A through 12.5C provide various options for how Town Hall offices could continue to be maintained in the downtown area. If necessary, the Town could also consider leasing privately owned space in downtown, whether in a second-floor space above a Main Street shop, in a freestanding converted home in the Office/Courts District, or in one of the office campuses along East Main Street.

Goal 12.6: Ensure adequate space for Town maintenance facilities.

Policy 12.6A: If any new sites become necessary in the future, consider locations easily accessible to major arterial roads.

This facilitates road maintenance work and snow plowing tasks. It would also make those facilities easier to access by residents (e.g., for the purpose of dropping off brush and leaves).

Policy 12.6B: Ensure that existing and new Town maintenance facilities minimize impacts surrounding areas.

Any new facilities abutting a residential use should be buffered with some combination of berms, vegetation, and fencing, in order to reduce off-site impacts. Ideally, facilities should not be located on local residential streets, but on collector arterial roads in non-residential areas. This would reduce the exposure of residential neighborhoods to truck activity. Also, recycling storage and sale bins are just some of the uses that may be found on a Town maintenance facility, and such uses are inappropriate in a residential area.

12.5 POLICE

The Riverhead Police Department provides patrol and detective services throughout the entire Town. The Police headquarters is located at 210 Howell Avenue, behind Town Hall, and it has a relatively modern, 17,000-square foot facility, which was built in the 1980s. Despite being in a relatively new building, the Police Department is outgrowing its space because of increasing calls, and it needs additional room to accommodate new technological equipment and services. The Police Department has also taken on additional responsibilities, such as emergency management, that requires additional space and manpower.

The department has 76 officers, plus 33 additional civilian staff members. According to Riverhead's Police Captain, the department is understaffed. Each police officer is responsible for handling an excessive number of calls, creating a drag on response times and follow-up on reported crimes. Outdated technology (i.e., manual system of records management) also makes the department less efficient.

In the past, as new development has occurred, police services have been impacted. When Tanger Mall was built, for example, the Town was left with a shortage of police officers to handle the shoplifting problems there. Also, increasing tourism in Riverhead has attracted larger numbers of seasonal residents and vacationers, which also result in more police calls. As the Town population and employment base continue to grow, additional police services will be needed.

POLICE: GOALS & POLICIES

Goal 12.7 Continue to ensure the safety of Riverhead residents and employees by maintaining adequate response times and service levels.

Policy 12.7A: If necessary, consider the feasibility of expanding the police headquarters, or moving the headquarters to an alternate location in a larger building.

Moving the police station could potentially solve several problems. First, it could provide more space for the department because a larger building could be built. Second, the existing building could provide spillover space for Town Hall offices.

Policy 12.7B: As an alternative to expanding or moving the police headquarters, consider establishing substations in hamlet centers and business districts.

Substations provide additional places for Townspeople to go in case of emergencies, and could provide a base from which officers can do walking or biking patrols. Substations are most useful in major activity centers such as a shopping center or a hamlet center, where there is a great deal of foot traffic. Building substations can help avoid the difficulty of expanding the Howell Street site, which would be difficult or costly to expand.

The Town should identify parcels that could be purchased for use as police substations, particularly in hamlet centers (i.e., Route 25A in Wading River, Jamesport), and major business centers (i.e., downtown, Tanger Mall, Enterprise Park).

Policy 12.7C: Allow the Police Department to comment on major development applications.

During the normal review process for subdivisions and development applications, the Police Department should have the opportunity to review and provide written comments on site plans. The department can assess the potential impact, if any, on police services that would result from the new project. Potential impacts could include constraints on police vehicle access in new subdivisions, an increase in demand for police responses, and other related issues.

Goal 12.8: Ensure the safety of Riverhead residents and employees in case of a terrorist attack or other form of violent attack.

Policy 12.8A: Develop an emergency response plan that coordinates the efforts of the Police Department, the fire districts, the Volunteer Ambulance Corps, and Town departments in the event of a terrorist attack.

As part of this plan, the Town should consider two scenarios: one where Riverhead or a nearby town is attacked; and another where New York City is attacked. In the unlikely event of an attack in or near Riverhead, the Town should consider establishing emergency shelters that provide temporary housing for displaced families. In case of an attack on New York City or another employment center where some Riverhead residents may be working, the plan should include strategies for helping Riverhead families contact their loved ones or emergency relief/assistance agencies. The plan should also consider ways to help evacuate Riverhead residents from those employment centers or to provide police, fire, or ambulance assistance to those places.

Policy 12.8B: Coordinate the town's emergency response plan with federal, State, and County plans.

The federal government is currently developing strategies to improve and coordinate emergency response. The Town should work with all other public agencies to ensure a coordinated response.

12.6 FIRE

Riverhead is divided into four fire districts: Jamesport, Riverhead (downtown area), Wading River, and Manorville. District boundaries are shown on Figure 12-1. Each district levies a fee on all properties within its boundaries and provides fire-fighting services to those properties. The Manorville District is based in the Town of Brookhaven, but includes the southwestern portion of Riverhead, including Enterprise Park.

New development will likely require additional fire-fighting staffing, equipment, technology and facilities. The Comprehensive Plan does not enumerate the specific needs of fire districts, because these needs are best determined by fire-fighting professionals on an ongoing basis. However, the Comprehensive Plan can plan ahead for any new fire stations that may be needed by identifying potential sites.

JAMESPORT

Currently, the Jamesport Fire District has a single station on Manor Lane, near the Jamesport hamlet center. The station was recently enlarged and has adequate equipment to serve the existing development in the district. The equipment inventory includes 3 pumpers, 1 tanker, 1 rescue truck, 2 police vans, 1 brush truck, and 1 boat. The district has one employee who oversees the operation of the facility, and 85 volunteers serve as fire fighters.

The district also owns land for a future substation at the corner of Pier and Sound Avenues. Although there are no ready plans to build a substation, the substation is expected to be necessary in order to serve new residential development in the future. The substation would serve the northern half of the Fire District.[1] The substation would also help avoid the traffic that interferes with response times from the headquarters, which is located near the busy intersection of Route 25 and Manor Lane.

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[1] Discussion with Jamesport Fire District, Chairman of the Board, June 1, 1999.

RIVERHEAD

The Riverhead Fire District serves the central part of Town, roughly from the east side of Enterprise Park to Jamesport. It includes downtown, Route 58, and Aquebogue, and it extends from the Southampton border to Long Island Sound. The headquarters is located in downtown, on Second Street, and three substations are located throughout the district.

The district is currently planning to build a new training facility near the intersection of Cross River Drive and Northville Turnpike. The district currently has a shortage of training space for its 180 volunteers. The new facility would also potentially serve as the district's new headquarters. The existing headquarters in downtown is cramped for space, and engine access into and out of downtown is limited by heavy traffic and narrow street widths. Some participants in the CAC meetings expressed concern about the location of a training facility in an agricultural and residential area. Fire training facilities have simulation drills with live (albeit controlled) fires, which could have visual, noise, air quality, and other impacts on adjacent areas.

The district's fire-fighting equipment is relatively new, as most vehicles were purchased within the last 8 years. Equipment levels are generally adequate to serve existing development. The district has 4 pumpers, 1 tanker, 1 rescue truck, 2 police vans, 3 brush trucks, 1 hook-and-ladder, and 1 combined pumper/hook-and-ladder. The district has 7 paid employees.[2]

WADING RIVER

The Wading River Fire District has its headquarters on North Country Road, near the Wading River hamlet center. A substation is located on Hulse Landing Road, next to Wildwood State Park. The district has 5 employees and an all-volunteer fire-fighting force.[3] The district expanded the headquarters in 1987 to cope with past and anticipated development in the Wading River area, as well as growing district needs.[4]

MANORVILLE

The Manorville Fire District is based in the Manorville section of Brookhaven, near the southwestern corner of Riverhead. The district headquarters is located on Silas Carter Road, and another substation is located on Cranford Boulevard in Mastic. The part of the district that lies within Riverhead is primarily served from the headquarters.

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2 Discussion with Riverhead Fire District, Supervisor, June 1, 1999.

3 Discussion with Wading River Fire District, District Manager, June 14, 1999.

4 Letter from the Wading River Fire District to the Riverhead Town Master Plan Committee c/c Fire Marshall Bruce Johnson, January 5, 2002.

The district in recent years has experienced little development overall, since much of its land area lies in the Pine Barrens Core Preservation Area. Current equipment levels are generally adequate to serve existing land uses. The district has 5 pumpers, 1 tanker, 2 police vans, 3 brush trucks, and 1 combined pumper/hook-and-ladder. However, future development at Enterprise Park may require additional facilities and equipment.

Enterprise Park lies within the district and is served by the Manorville headquarters. Prior to the closing of the runways, the site was entirely served by its own government-run fire-fighting squad, as required by the Federal Aviation Administration (FAA). Currently, the Manorville district would have a 15-minute response time to the south entrance of the site and potentially 20 to 25 minutes to an individual building within the site. The Wading River Fire District covers the portion of Enterprise Park that fronts on Route 25.

Although having a fire substation at Enterprise Park could — in theory — provide better fire coverage, this is not necessarily true. With volunteer districts (Manorville and Wading River both rely on volunteer firefighters, primarily), it is actually more practical to locate the fire station closer to the locations from which volunteers will be coming. Currently, there is no large pool of residents and/or employees in the Enterprise Park area who can serve as volunteers. A substation would actually require volunteers to travel a longer distances to the station in their individual cars, potentially resulting in no better a response time to the buildings in Enterprise Park.

ISSUES AFFECTING ALL FIRE DISTRICTS

Roadway Connections

Roadway design and traffic can potentially reduce the response time of fire vehicles. Currently, Riverhead roadways are designed with a minimum right-of-way width of 50 feet and a pavement width of 30 to 35 feet, which is adequate to allow fire truck access. However, even though new streets may be wide enough, residential subdivisions often lack connecting through streets to other subdivisions. Also, street segments tend to be short and looping, and many streets dead-end into cul-de-sacs. These street patterns can impede fire truck access and reduce response times.

Often, developers create circuitous and short streets intentionally, in order to keep through-traffic out of the neighborhood. However, there are a variety of other traffic-calming strategies that can be used to limit through-traffic and reduce traffic speeds without compromising emergency access. These are discussed in more detail in Chapter 9, the Transportation Element.

Coordination

The various fire districts in Riverhead coordinate with one another through two organizations: the Town Fire Chief's Council and the Town Fire District's Council. The Town

Code requires detailed building plans and plans for major subdivisions be provided to the Fire Districts. The plans need to show the location of doors, windows, and walls, and they need to indicate the presence of utilities and flammable materials. The Town should continue working, through the Fire Marshall, to ensure that fire districts have all the information they require.

Staffing

Adequate fire district staffing is expected to become an issue in Riverhead over the next 20 years. Currently, fire fighters in all districts are volunteers. As the population grows, volunteers may be more difficult to find for several reasons:

- Many current volunteers no longer work in Town — whether on farms, at home, or in local offices — but in employment centers outside Riverhead. Thus, many volunteers are not able to respond to emergency calls.
- Many current volunteers are older, long-time residents of Riverhead and have plans to retire in the next 10 to 20 years.
- Fewer volunteers offer their time, because of competing personal and professional commitments. Also, training requirements have increased, making it more difficult for volunteers to commit the minimum required time for both training and service.

FIRE: GOALS & POLICIES

Goal 12.9: Ensure that Enterprise Park has adequate fire fighting services.

Policy 12.9A: Continue working with the Manorville Fire District to ensure that adequate fire-fighting services, with adequate response times, are provided at the Enterprise Park at Calverton.

Establishment of a new fire substation in or adjacent to Enterprise Park has been proposed. However, as noted, establishment of a new station may not make sense, if volunteers are not available in the immediate area.

Policy 12.9B: ~~Consider charging developers an impact fee for building a new fire substation in or near Enterprise Park.~~ Explore methods available to require developers to finance the construction of a substation at EPCAL.

The need for a fire substation in Enterprise Park would be generated primarily by new commercial development on the site. Thus, since the future developers of the site will be the primary beneficiaries of the new substation, consideration should be given to ~~requesting~~ developers to assist in the provision of a new fire station.

~~***Policy 12.9C: Explore the feasibility of establishing a paid firefighting force for Enterprise Park.***~~

~~This would resolve the problems associated with getting volunteers to the site, whether to an existing station or new substation.~~

Goal 12.10: Maintain adequate response times and service levels.

Policy 12.10A: Continue to work with the Riverhead Fire Marshall and fire districts to ensure that subdivision and site plans provide adequate street connections and access points for emergency fire vehicles.

Subdivisions should have adequate street connections in order to facilitate access for emergency fire vehicles. In particular, the number and length of cul-de-sac streets ought to be limited; at least two access points should be provided to a subdivision; and at least one through-street should be provided (i.e., a street that links two major streets, or which connect a major street with an adjacent subdivision). Typically, a street grid is easier to navigate than a curvilinear street pattern, but a grid need not be required, as long as adequate access points and connecting streets are provided. ~~The Town should work with the Fire Marshall to revise street requirements in new subdivisions.~~ These standards should be made part of the new highway specifications currently being prepared by the Planning Board.

Policy 12.10B: Continue to ensure that Fire Districts receive detailed site plans building plans for new buildings within their districts, as well as plans for major and minor subdivisions.

The Town's fire districts use site plans to plot fire-fighting and rescue strategies. Detailed site plans should show the location of all exterior and interior walls, doors, and windows and should indicate the presence of utilities and flammable materials. Copies of plans should be forwarded to the appropriate fire district upon issuance of a Building Permit. Fire districts should also be notified of changes in land use, where there is no addition or reconstruction.

~~***Policy 12.10C: Explore the feasibility of establishing a paid fire-fighting force in Riverhead fire districts.***~~

~~Today, the fire districts generally have an adequate number of volunteer fire fighters. However, in the future, fewer volunteers are expected to be available, because Riverhead residents work in faraway locales and cannot respond to emergency calls quickly during the daytime. A paid fire-fighting force would solve the anticipated future personnel shortage, but would require an increase in fire district taxes. The Town, in considering this option, should determine how much additional revenue would be needed over time to support a standing staff of fire fighters and should consider strategies that would reduce the need for a tax increase.~~

Goal 12.11: Ensure that fire fighting facilities fit into the surrounding areas.

Policy 12.11A: Work with the Riverhead Fire District and local landowners to ensure that the potential impacts of the proposed training facility on Northville Turnpike are properly mitigated.

Residents have expressed concern about the potential traffic, visual, noise, and other impacts associated with the facility, which is proposed to include a "burn building" facility. Buffers, setbacks, and other mitigation measures could be used to reduce or eliminate such impacts.

12.7 AMBULANCE

The Riverhead Volunteer Ambulance Corps, Inc. (RVAC) is under contract with the Riverhead Ambulance District (RAD) to provide ambulance services to all areas in Town except Wading River, including most of Enterprise Park. The RAD is a special assessment district that collects a separate line-item tax from all properties in the district and does not obtain funding from the Town's general fund. In the Wading River area, the Wading River Fire Department provides emergency response services.

Suffolk County encourages ambulance districts to maintain response times of four to five minutes. A variety of factors influence response time. The factors that can be addressed in the Comprehensive Plan are (1) the location and size of facilities and (2) traffic and property access. The RVAC has response times of four to nine minutes, suggesting that there is room for improvement. Wading River — with ambulances at two different locations and a smaller district — has been able to maintain very short response times.

RIVERHEAD AMBULANCE DISTRICT

Emergency calls have increased every year since the RAD was founded in 1978, and much of this increase has resulted from the Town's ongoing population growth. Although young families moving into Riverhead place little demand on ambulance services, retirees and seniors place a large demand on these services. To keep up with needs, the Town built a small ambulance facility on Manor Road across from the Jamesport Firehouse in 1987 and then built the main ambulance facility on Osborn Avenue in 1989.

The main facility has three ambulance bays, staff rooms, and offices, but is already too small to meet the current level of calls, which reached nearly 2000 in 1999. The facility needs at least one more bay, additional storage and office space, training classrooms, parking, and space for equipment and uniform cleaning, which are required under OSHA standards. However, building an expansion on the site may be difficult, because the property is oddly shaped and largely built out. As of December 2000, the RAD was considering purchasing sites for a new facility on Route 58, between Osborn Avenue and Mill Road, which would replace the Osborn Avenue facility.

The Jamesport facility has only one bay and may require expansion to meet the needs of new development. The land area of the Jamesport facility is sizeable and could accommodate an expansion of at least another bay and staff area. It is conceivable that a new facility could be necessary in the western part of town to better serve Enterprise Park, particularly if the current headquarters is not expanded or moved to a larger building. However, as noted in the discussion of fire districts (Section 12.6), the lack of volunteers living in Calverton would make a station location there inconvenient; response times would not necessarily improve.

WADING RIVER EMS

Over the course of the 1990s, Wading River had increased in size from roughly 5,000 to 7,000 households, sharply increasing the need for emergency response services. The district's existing main facility and substation — each equipped with an ambulance — have been adequate to meet the growing needs of the area. In the future, however, additional facilities and equipment may be required.

ISSUES AFFECTING BOTH AMBULANCE DISTRICTS

Traffic and Property Access

For both the RAD and the Wading River EMS, traffic impedes response times. Ambulances struggle to pass through congested corridors and intersections, where cars have little or no room to pull over. Also, State law prohibits the use of lights and sirens in situations that are non-life-threatening, meaning that ambulances have to sit in traffic with other cars.

Three roads — Sound Avenue, Route 58, and Route 25 — create the most traffic problems for the RAD. In particular, congestion at the traffic circle on Route 58 makes access to Central Suffolk Hospital difficult. The Wading River ambulance team experiences delays on Route 25A as well. Also, circuitous streets, driveways, and parking lot entrances can be difficult or confusing to navigate in an emergency. Within buildings, narrow hallways and doors make the use of stretchers more difficult. These factors can all increase the amount of time that an ambulance takes to response to an emergency.

Senior Housing

The Town's large senior population is expected to grow even bigger in the future, as the baby boom generation enters retirement. Senior housing — while it is a critical need — increases the demand for ambulance service, as seniors are more prone to illness and injury. Also, seniors tend to increase the demand for non-emergency calls or "false alarms." To cope with increasing calls (emergency and non-emergency) many ambulance corps have been charging for services rendered.

Staffing

Both the RAD and the Wading River EMS are all-volunteer organizations. However, the trend Countywide has been toward the use of non-for-profit paid paramedics for emergency services. Due to work, childcare, and travel demands, volunteers are difficult to find and may not be able to respond to emergencies during weekdays. Also, some volunteers are teenagers who eventually leave for college, and some others are older adults or retirees whose age may eventually prevent them from serving. Paid positions may help create more stability and reliability in the emergency response services.

AMBULANCE: GOALS & POLICIES

Goal 12.12: Maintain adequate response times and service levels.

Policy 12.12A: Consider establishing a new ambulance facility in Enterprise Park.

In conjunction with new development, a new ambulance facility may be needed there. If determined to be necessary, the site should be located in an area such that it can also serve the western portion of the RAD area. As noted in Section 12.6, volunteers generally do not live in the Calverton area, and thus, a substation there would not necessarily help improve response times. The Town should continue working with the RAD to evaluate future needs.

Policy 12.12B: Identify a long-term strategy for expansion or replacement of the Osborn Avenue ambulance facility.

The RAD and the Town should work together to develop a long-term strategy for expansion or replacement of the facility. Although the site, as currently configured, may not be able to accommodate an expansion, there are adjacent underutilized sites that could potentially be purchased to create room for an expansion.

Goal 12.13: Improve emergency access and ambulance circulation.

Policy 12.13A: As part of subdivision and site plan review, discourage circuitous streets, driveways, and parking lot designs.

Elimination of circuitous streets and driveways will allow easier emergency access. This does not mean that a street grid must be built in new residential subdivisions. However, excessively looping or confusing streets should be discouraged. Also, the length and number of cul-de-sacs in a subdivision should be limited, and at least one through-connecting street should be required. All these provisions will help reduce response times in the case of an emergency.

Policy 12.13B: Concentrate senior housing and nursing homes in central locations.

Senior housing generates a greater need for emergency response services than non-age-restricted housing. Thus, it makes sense to located senior housing in places where emergency response services and medical facilities are more concentrated, particularly in the downtown area. Ideal locations for senior housing are in downtown and hamlet centers.

~~*Policy 12.13C: Consider establishing fire lanes on Route 58.*~~

~~Because traffic hampers response times, designation of fire lanes can be considered as a way of allowing better traffic management during an emergency. A fire lane is a regular travel lane that is marked with the words "Fire Lane." During a fire or medical emergency, cars are responsible for vacating that particular lane for emergency vehicles. When motorists hear the approach of an emergency siren, they know ahead of time which lane they need to vacate. Although fire lanes do not eliminate traffic problems, they reduce some of the friction that emergency vehicles experience.~~

~~*Policy 12.13D: Improve traffic conditions along Route 58 and eliminate the traffic circle at the Route 58-Roanoke intersection.*~~

~~Chapter 9, the Transportation Element, discusses strategies for traffic improvement along Route 58. From an emergency perspective, elimination of the traffic circle would help improve ambulance access to Central Suffolk Hospital. It could also eliminate some of the long back-ups along Route 58 at that intersection, further helping ambulance circulation.~~

Policy 12.13E: Explore the need for expanding emergency roadway shoulders Townwide.

Emergency shoulders allow vehicles to more easily pull over in case of an oncoming emergency vehicle. This issue is further discussed in Chapter 9, the Transportation Element.

Goal 12.14: Improve funding mechanisms for ambulance services and work to reduce the need to respond to non-emergency calls.

Policy 12.14A: Consider charging patients for ambulance services.

These fees would supplement the money contributed to the RAD and the Wading River Fire District.

Policy 12.14B: Consider requiring senior housing and residential health care facilities (i.e., nursing homes, assisted living senior housing) to provide their own non-emergency ambulance services.

Such facilities are typically the greatest generators of non-emergency calls.

12.8 HEALTH AND MENTAL HEALTH SERVICES

HEALTH SERVICES

Central Suffolk Hospital serves the Riverhead area and is centrally located near the intersection of Route 58 and Roanoke Avenue. The Hospital runs an emergency room and provides specialized medical services, such as surgery, radiation therapy, geriatric care, and child birth. The Hospital helps staff the Suffolk County Clinic, which provides primary care and prenatal care to people who lack health insurance. Many people without insurance also use the Hospital emergency room as a de facto primary care center. By law, the Hospital cannot turn away anyone who goes to the emergency room seeking treatment.[5]

Because of increasing health care costs and the shift to managed care, administrators at Central Suffolk Hospital — like all hospitals throughout the country — have had to become more strategic with regard to financial planning. Central Suffolk Hospital has worked to protect its "customer" base by establishing local affiliated doctor's offices throughout the Riverhead area. Affiliated doctors refer their patients to the Hospital for blood work, x-rays, surgery, and other procedures. This strategy has helped keep the Hospital financially solvent, while other hospitals throughout the country have closed or merged.

In the mid-1990s, the Hospital formed a joint parent company with Eastern Long Island Hospital in Greenport and Southampton Hospital in Southampton. This new parent company appoints the boards of the three hospitals, approves capital budgets and master plans, and negotiates with health care providers. This coordinated venture helps the three hospitals achieve economies of scale and save costs, because they now share a single laboratory and warehouse, as well as some administrative responsibilities.[6]

MENTAL HEALTH SERVICES

Mental health is a growing concern for many Americans, and growing numbers of people are seeking out mental health services and/or taking medication to address problems like depression or anxiety. As discussed in Section 12.12, people with developmental disabilities receive treatment from institutions, hospitals, group homes, and outpatient services. People who are not mentally disabled but who nonetheless suffer from chronic mental illness usually obtain mental health services from private practicing psychiatrists or psychologists on an outpatient basis. In addition, some public and non-profit organizations provide affordable outpatient services.

The Riverhead Mental Health Center provides mental health services with sliding scales which are available for people without health insurance. In addition, the Veterans' Affairs

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[5] Interview with Joseph Turner, Central Suffolk Hospital, September 11, 2000.

[6] When the parent company was formed, the U.S. Justice Department found that the new company would not result in "restraint of trade" for hospital services on the East End.

office provides a mental health clinic in Riverhead, and the Family Service League of Suffolk County provides a variety of mental health services for families and children.

HEALTH AND MENTAL HEALTH SERVICES: GOALS & POLICIES

Goal 12.15: Improve access of low-income households to free or affordable health and mental health services.

Policy 12.15A: Work with the Suffolk County Clinic and local service providers to expand outreach to immigrant farm workers and their families with regard to health and mental health services.

Seasonal farm workers and their families often have no health insurance, and as a result, they receive minimal health care and typically no mental health services. Some take advantage of free health care services at the Suffolk County Clinic, and others use the hospital emergency room as a de facto primary care unit. Because many farm workers are immigrants who speak little English, they are often unaware of the services that are available to them at the Clinic. The Town should work with Clinic staff and local service providers to inform immigrant farm workers about their opportunities for obtaining health care and mental health services.

Policy 12.15B: Explore the feasibility of sponsoring a health services shuttle that links transit-dependent patients with Suffolk County Clinic, Central Suffolk Hospital, the Riverhead Mental Health Center, and doctor's offices.

Another limitation on obtaining adequate health care is transportation. People without cars are often unable to get to the doctor, the clinic, or the hospital, unless they take the bus, whose routes or schedules may not be convenient. County paratransit services require advance reservations and will only take people to destinations within a 3-/4-mile distance of Suffolk County Transit bus routes. The only alternative to the bus or paratransit currently is a taxi, which often requires a long wait and a steep fare. An on-call shuttle service would provide a low-cost, relatively efficient alternative to a bus or taxi. The Town should conduct a feasibility study in order to determine the demand for such a service, the appropriate user fee, and the overall cost of operation.

Goal 12.16: Improve the Town's ability to address health and human services needs throughout the community.

In 2001, the Town Board established a Human Services Advisory Board to assess the services provided by the Town and other agencies. The Advisory Board surveyed local service providers working in health care, senior services, youth services, mental wellness, and other human service fields.

Policy 12.16A: Consider establishing a Department of Health and Human Services with credentialed staff in the areas of health services, as well as senior and youth services.

Programs that could be handled or coordinated by such a department could include at-risk youth intervention and adult day care, among others. The department would serve as a liaison between the Town and local service providers, and it could help coordinate the independent functions of those agencies. On an ongoing basis, the department would play a critical role in identifying human service needs and securing grant funding.

12.9 CHILD CARE

Similar to most other communities, Riverhead parents have a difficult time finding adequate, affordable child care. Although there are several child care facilities in Riverhead, most are filled to capacity, and openings are rare. In the future, population increases will only increase the need for child care services, resulting in a lack of options for parents and increasing costs.

There is a particular shortage of infant care services. Only one facility offers infant care for children six weeks old, and that facility is full. There are more opportunities for older children. Most of the child care facilities in Riverhead accept children who are over 18 months old. The Town's two Head Start programs provide education and care for children between three and five years old. An after-school program takes in school-age kids at the end of the school day, but this program is also full.

Parents who work in agro-business (particularly migrant workers) have seasonal child care needs that are going unmet. The Agri-Business Child Development Center is working to develop a free child care program for these seasonal workers. In 2001, the Center came forward with a proposal to build an eight-classroom, 7,000-square foot facility for 76 children from 6 months to 6 years of age. The facility would be located on Doctor's Path near Northville Turnpike. In addition, some parents who work evenings and weekends (i.e., waitresses, shopkeepers, nurses) have difficulty finding odd-hour child care.

Finding affordable day care is difficult for many families. Infant care, in particular, is offered at a premium. Several churches in Riverhead are developing child care programs for low-income households.[7] The proposed Peconic YMCA would also potentially provide affordable child care and babysitting services, as well as a pre-school.[8]

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[7] Phone interview with Carol Slippen, Counselor at the Child Care Council of Suffolk County, June 22, 2000.

[8] Joe van de Wetering, Proposed Peconic YMCA Information Packet.

CHILD CARE: GOALS & POLICIES

Goal 12.17: Increase child care options.

Policy 12.17A: Allow small day care centers (six children or less) to be established in single-family detached homes as an accessory use.

The Town's zoning ordinance already allows day care facilities (seven children or more) by special permit in most residential and commercial zones. Allowing such large day care centers through special permit is appropriate since there are particular recreational and safety needs associated with these facilities. For example, automobile traffic and circulation ought to be regulated in detail, in order to prevent danger to youngsters.

At the same time, the zoning ordinance should allow the resident of a single-family home to establish a small day care center of six children or less in his or her household. This would allow a stay-at-home parent to care for other children, in addition to his or her own, and to receive payment for the service. Such a facility would still have to be licensed by the State and should still be subject to approval of a special permit, so that the Town can ensure safety and adequate parking. Allowing in-home day care could potentially increase the available day care services in Riverhead and help relieve the Town's current shortage of facilities.

Policy 12.17B: Allow day care centers to be established in places of worship as an accessory use.

Religious facilities often have community rooms and adequate parking to support a child care facility. Also, many parents would like to have the option to leave their children in a faith-based facility. The facility would still need to be licensed.

Policy 12.17C: Organize a forum of major employers to discuss job/parenting conflicts and potential solutions.

The purpose of the forum would be to generate ideas and initiatives for reducing job/parenting conflicts. Ideally, all employers would be willing to provide or subsidize child care, but as an alternative, employers could allow employees to have flex-time schedules, to work at home, or to have other flexible working arrangements. The forum should also identify actions that the Town could undertake in order to improve child care opportunities, especially infant care (children less than 1 year old).

Goal 12.18: Promote affordable child care.

Policy 12.18A: Actively solicit child care facilities that serve low-income families, or provide evening or weekend child care, or offer infant care.

Infant care and evening and weekend child care are costly services, because of the special care needs of infants and the odd hours. Low-income families have particular difficulty paying for such services, even though they are the more likely to require them. Many low-income occupations (i.e., waitresses, shopkeepers, cashiers, nurses) require people to work irregular hours; these people often need evening and weekend child care. Low-income women are also less likely to have maternity-leave benefits and therefore are more likely to require infant care. The Town should actively seek out organizations that offer specialty services like weekend care, evening care, and infant care and help them set up facilities in Riverhead.

Policy 12.18B: Consider reducing the property tax rate for child care facilities that serve low-income families, or provide evening or weekend child care, or offer infant care.

Because such facilities would provide a vital community service, the tax reduction would be justified. If the child care facility rents their space from another property owner, the owner would be able to take advantage of the tax reduction, provided that they pass on the savings to the child care facility in the form of a reduced rent.

12.10 YOUTH

Riverhead does not have a youth center, but the proposed Peconic YMCA would provide a forum for youth programs and activities in Riverhead. In addition to recreational activities, the YCMA would provide opportunities to participate in team sports and offer education on issues like alcohol and drugs. It would also offer a day camp in the summer and a teen center.

Riverhead schools work with social service agencies to offer youth-oriented educational and awareness programs. The Suffolk Network on Adolescent Pregnancy runs after-school programs, and the Community Awareness Program runs school education programs on alcohol and drug addiction. The Cornell Cooperative Extensive runs the 4-H program, which educates school-age children on issues of teen pregnancy, substance abuse, environmental concerns, and consumer and nutrition issues.[9]

In response to the national epidemic of school shootings, Family Service League started the Anti-Violence Program in 2000 to teach young children (first graders) how to manage anger

[9] Peconic Community Council web site, www.pccouncil.org/directory.html.

and solve problems without resorting to violent behavior. This trial program may be expanded to older children, depending on the initial results.[10]

Even the best early intervention programs are not foolproof. If a youngster becomes pregnant, develops an alcohol or drug addiction, or exhibits particularly hostile behavior, the child at that point needs individual assistance. The Family Service League and other organizations provide assessment, crisis intervention, counseling, and advocacy services.

YOUTH: GOALS & POLICIES

Goal 12.19: Provide additional after-school activities for school-age children.

Policy 12.19A: Help the Peconic YMCA to identify a suitable site in Riverhead.

A portion of a site on Riverside Drive was initially set aside for the Peconic YMCA, as part of a proposed condominium project. As of summer 2001, it was uncertain whether the condo/YMCA project would meet with Town approval. In spring and summer 2002, another site in the Indian Island County Park was being considered, although it was uncertain whether the County would allow the use on parkland. Town should work with the Peconic YMCA to identify a feasible site, preferably in the downtown area or a hamlet center, so that the site is centrally located and easily accessible from most parts of Town. The YMCA should be in a location that is or can be well-served by transit and accessible by bicyclists and pedestrians.

If no downtown site is deemed suitable, other locations to be considered include sites adjacent to existing schools or Enterprise Park. While not as centrally located as other potential sites, a site at Enterprise Park would be located near the Town's new 60-acre, community-wide park (see Chapter 11, the Parks and Recreation Element), creating the possibility for shared use of the two recreation facilities. It would also be located near the potential new high school site (see Section 12.2), Peconic River County Park, and the Core Preservation Area of the Central Pine Barrens. Also, the Calverton location would offer the financial incentive of the "Empire Zone", which provides tax credits and incentives for new businesses. The Town could consider offering land to the YMCA at no cost or a reduced cost.

Policy 12.19B: Explore the feasibility of establishing a Riverhead youth center.

The need for a youth center will only increase as the population continues to grow. Between 2000 and 2010, the number of teenagers in Riverhead is expected to increase significantly, as the children of baby boomers grow up. Although the Peconic YMCA would have some youth-oriented programs, a Town youth center could serve as a clearinghouse for the full range of youth services and programs. In particular, the youth center could provide a location for 4-H programs, information on youth services, mentoring or big-brother/big-sister

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[10] Interview with Bernadette Gilday and Larry Weiss, Family Service League, June 28, 2000.

programs, counseling sessions, summer classes and activities, sports outings, and social events.

Goal 12.20: Promote youth educational and intervention programs.

Policy 12.20A: Encourage the Riverhead Central School District and other school districts to continue working with social service agencies to provide intervention and education programs.

The cooperative effort between Riverhead schools and local social service agencies has been extremely effective. The Town should encourage the school district to continue, monitor, and continually improve programs for youth.

12.11 SENIOR CITIZENS

Senior citizens make up a large portion of the Town population and have special needs, due to their frail health. Many seniors choose Riverhead as a retirement home, because of the proximity to East End attractions and the relatively affordable housing, compared to other East End towns. In 1999, about 30 percent of the population was over the age of 55, compared to 22 percent countywide. In 2000 to 2020, the senior population is expected to increase, as retirees continue to move in, and as life expectancy increases.

Seniors require access to a range of housing types and health services, from independent living (for those in good health) to community living, to assisted living, to nursing homes (for those in the poorest health). Senior housing is discussed in Chapter 8, the Housing Element. Seniors also require outpatient medical services, convenient access to shopping, opportunities for socializing, and transportation. The Town already has several facilities and programs that serve the elder population. As the senior population grows, additional services and facilities will be needed.

Riverhead has no congregate care or assisted living facilities. This is a significant gap in services, as seniors who require intermediate-level care (between independent living and a nursing home) would have to leave Riverhead. There are only two nursing homes in Riverhead: the skilled nursing facility at Central Suffolk Hospital (60 beds) and the Riverhead Nursing Home (181 beds).[11] These facilities typically operate near capacity, so additional nursing home facilities may be required in the future as well. Also, Riverhead lacks a hospice, and there is a need for such a facility in order to provide care to people in the last stages of life. The nearest facility is the East End Hospice in Westhampton Beach.

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[11] Intercounty Health Facilities Association, Inc., *Consumer Resource Directory* pamphlet.

SENIOR CENTER

The Riverhead Senior Center, which is funded through the Town, provides a variety of programs and services for senior citizens, including:

- *Adult day care*. Three days per week; for frail elderly and seniors diagnosed with early Alzheimer's Disease or related dementia.
- *Dial a Ride*. Free transportation within the Riverhead Town limits for seniors without transportation.
- *Home Chore*. Minor home repairs for Riverhead homeowners.
- *Home Aid*. Housekeeping, shopping, laundry, errands for a fee.
- *Meals on Wheels*. Hot noontime meals delivered weekdays to homebound seniors unable to cook for themselves.[12]
- *Recreational Activities*. Group-oriented events and games.

According to staff members at the Senior Center, inadequate transportation is a major concern of senior citizens. Many seniors loose the ability to drive and must rely on either family members with cars, transit, or free services like dial-a-ride. Some senior living communities, including Riverhead Landing, provide free shuttle service throughout the Town, but demand for the shuttle service has reportedly outstripped the availability. Seniors would also like to have an improved Senior Center building and additional recreational facilities. The proposed Peconic YMCA would be oriented to seniors, as well as other groups.

SENIOR CITIZENS: GOALS & POLICIES

Goal 12.21: Continue to provide adequate household, meal, and transportation services for senior citizens.

Policy 12.21A: Expand Adult Day Care, Dial a Ride, Home Chore, Home Aid, and Meals on Wheels services through the Riverhead Senior Center.

As senior citizens live longer and long-term care becomes more expensive, more seniors will choose to live independently, whether or not they are able to perform daily functions on their own. Some senior citizens will choose to live with family members, who can provide some care, but many adult family members also have work and child care responsibilities and cannot provide senior citizens with the full attention they require. This means that seniors will require more in-home services, particularly for meals, household chores, and errands. The services currently offered at the Center may need to be expanded to meet the increases in demand.

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[12] Town of Riverhead, *Senior Citizens' Programs and Services* brochure.

Policy 12.21B: Proceed with plans to replace the Town Senior Center, but consider retaining a "satellite" center in downtown Riverhead.

The senior center is in need of additional recreational space and general rehabilitation. The Town recently considered a proposal to build a new center, and has acquired a property in Aquebogue that is currently being renovated for the purpose of relocating the senior center. The Aquebogue site will provide a much larger and more up-to-date facility for senior citizens. In the future, the senior population is expected to grow, as the baby boom generation enters retirement. Even thought the new property in Aquebogue is expected to meet current needs, additional space for seniors may be needed in the future.

If a second Senior Center is determined to be necessary, a downtown location should be considered. The downtown area is the most centrally located and accessible place, and it is close to the major senior housing sites in Town. It is also well-served by transit. The Town should work with Suffolk County Transit to provide adequate bus service to the new senior center, with a bus stop in front of the site.

12.12 SPECIAL NEEDS POPULATIONS

PEOPLE WITH DEVELOPMENTAL DISABILITIES

Developmentally disabled patients who live outside group homes (discussed in Chapter 8, the Housing Element) require outpatient services, including medical, therapeutic, educational, and counseling services. Social service agencies like East End Disability Associates, Inc. already provide a range of services, including case management.[13] Case managers work with outpatient developmentally disabled persons to find and coordinate services for them. The County Center also sponsors mental health clinics, and agencies like Synergy Center provide vocational training and drop-in counseling for people with development disabilities.[14] The trend of deinstitutionalization suggests that the need for outpatient services will continue to grow.

PEOPLE WITH HIV OR AIDS

With the advent of protease inhibitors, people with HIV and AIDS have much longer life expectancies. As a result, while HIV/AIDS is still life-threatening, it is also a chronic condition that people live with for many years. Riverhead does not have an organization that specializes in providing services or counseling to people living with HIV or AIDS, although the Riverhead Health Clinic and Central Suffolk Hospital do treat people with HIV and AIDS. Other Towns on the East End have a variety of AIDS service organizations, advocacy groups, and referral agencies. Major service organizations include:

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[13] Peconic Community Council web site, www.pccouncil.org/directory.html.

[14] Mental Health Association of Suffolk County, *Directory of Mental Health Services*, p. 24-25.

- *The East End AIDS Wellness Project (EEAWP).* Started in 1993, the EEAWP is located in Sag Harbor. In collaboration with Southampton Hospital, it provides support, advocacy, and case management for HIV-positive people. The program is based in office space donated by the Village of Sag Harbor.
- *The East End HIV/AIDS Center.* Located in East Hampton, the Center provides outpatient medical care, psychiatric services, and medical service for people with HIV or AIDS.
- *Long Island Association for AIDS Care (LIAAC).* Located in Huntington Station, LIAAC is a multi-service agency offering case management, crisis intervention, support groups, meal delivery, respite care, legal clinic/advocacy, and prevention education.

The Suffolk County Clinic provides testing for HIV and other sexually transmitted diseases (STDs). Treatment for STDs is also available there. Unlike HIV, most other STDs have a cure and are not life-threatening. Housing is a critical need for people with HIV or AIDS. Many people live with the disease for years, but are nonetheless unable to work — making it very difficult to pay basic living expenses. HIV/AIDS housing is discussed in Chapter 8, the Housing Element.

SUBSTANCE ABUSERS

Riverhead does not have any in-patient facilities for substance abusers, and many of the in-patient facilities in other East End towns have closed. Managed care has reduced the funding for in-patient centers, and the State's reduction in Medicaid recipients has limited those who are eligible for in-patient care. Seafield Center in Westhampton Beach is one of the last remaining for-profit, in-patient treatment centers on the East End. Southampton still funds a recovery center in Hampton Bays.

As in-patient centers have closed, the trend has been toward outpatient services. The Suffolk County Department of Health Services is the primary provider of outpatient rehabilitation and detoxification services in the Riverhead area. It is located just south of downtown Riverhead in Southampton. It is one of the only facilities of its kind on eastern Long Island.

VICTIMS OF DOMESTIC VIOLENCE

The victims of domestic violence require a variety of services: from psychological support, to emergency housing, to legal assistance, to childcare. The Suffolk County Coalition Against Domestic Violence provides confidential support groups and counseling for the victims of domestic violence. The organization also runs a 24-hour hotline. Nassau/Suffolk Law Services for Low Income Legal Assistance has a Riverhead office located on West Main Street in downtown. The agency runs a Domestic Violence Project that provides legal aid to victims. The County also offers domestic violence referrals.

SPECIAL NEEDS POPULATIONS: GOALS & POLICIES

Goal 12.22: Continue to support community living in Riverhead.

Riverhead is required by federal law to allow group homes to be built in residential neighborhoods, as discussed in Chapter 8, the Housing Element. Transportation and accessibility are issues that all group homes struggle with.

Policy 12.22A: Ensure that group homes make transportation services available to residents.

Many special needs patients may not be able to drive or take public transportation to their service providers. As a condition of approval, the Town should require group home operators to make transportation service available to residents, who may need to travel beyond the group home for outpatient services, doctor appointments, shopping, or other needs. Moreover, some residents may require physical assistance in traveling or specialized vehicles, and a group home-sponsored service should be able provide such assistance, as appropriate to the group home population.

Goal 12.23: Provide additional out-patient services or walk-in services for special needs populations.

Policy 12.23A: Work with Suffolk County and Central Suffolk Hospital to explore the feasibility of establishing an HIV/AIDS clinic and/or service organization in Riverhead.

HIV cases are still on the rise nationwide. Moreover, because of recent advances in HIV/AIDS treatment, HIV is no longer a "death sentence." It is a manageable, chronic disease, meaning that people may live with HIV a long time, requiring household help, meal services, and constant health care. A clinic and/or service agency would help provide needed services to people with HIV or AIDS.

Policy 12.23B: Work with Suffolk County to explore the feasibility of establishing a detoxification clinic and/or addiction recovery agency in Riverhead.

Because in-patient facilities are few and far-between, out-patient services are necessary to assist people in their recoveries from alcohol or drug addition. A clinic would supplement the services provided by the County.

Policy 12.23C: Work with Suffolk County and local non-profit service providers to expand outreach efforts for the victims of domestic violence.

Victims often feel ashamed to come forward, or they are prevented from doing so by their abusers. Improved outreach efforts can encourage victims to seek out help. Spanish-language counselors and information should also be made available.

East Hampton Power & Light Company

Calverton Generating Facility

Appendix O

5. Scenic and Historic Resources Preservation Element

5.1 VISION STATEMENT

Riverhead has a distinctive scenic and historic character, comprised of farmland, open space, historic hamlet centers (including downtown Riverhead), historic structures and sites, and unique natural resource areas such as the Pine Barrens. Because these resources play a key role in maintaining Riverhead as a desirable tourist destination and as an attractive place to live and work, these resources should be protected and carried forward into the Town's future, as development continues to occur.

Riverhead possesses a variety of important scenic and historic resources, ranging from expansive views of working agricultural landscapes; to scenic roadways like Sound Avenue; the historic structures and landscape of the Hallock Homestead; the scenic bluffs along Long Island Sound; historic hamlet centers like Jamesport, as well as the historic buildings and compact layout of downtown Riverhead. These resources and features reflect the richness and diversity of the East End's historic, cultural and natural landscape. They also contribute strongly to Riverhead's long-term economic vitality and business development due to their ability to attract visitors and tourists.

Though often treated separately, scenic and historic resources are in fact intertwined and best addressed jointly. Historic structures contribute to the visual quality of the community, and areas that are valued for their visual quality — such as hamlet areas, downtown centers, and agricultural zones — may be historically important as well. Because of this interrelationship, Riverhead's scenic and historic resources are considered here together in a single chapter. Elements of the scenic landscape are also discussed in Chapter 3, the Agriculture Element, and Chapter 4, the Natural Resources Conservation Element. Historic preservation in downtown and the hamlet centers is also discussed in Chapter 6, the Business Districts Element.

5.2 SUMMARY OF BACKGROUND RESEARCH

SCENIC RESOURCES

Because Riverhead's scenic character helps maintain the Town's economic vitality and overall quality-of-life, it is important to understand the factors that contribute to the scenic character. These include:

- ***Natural Features***. Riverhead has unique natural features that are visible from many locations and which contribute to the Town's character. Generally, these include:
  - *Hills and Contours*. The picturesque bluffs along Long Island Sound, for example, are part of the natural landscape and give a unique and special feeling to the northern part of Riverhead.
  - *Trees and Woodlands*. Areas such as the Pine Barrens and other wooded areas throughout the Town contribute to the feeling of open space. There are many old growth trees throughout Riverhead, including many notable stands along Sound Avenue.
  - *Meadows*. Some former farms lie fallow and have reverted into meadows. These tend to become reforested over time if left untouched.
  - *Shorelines, Rivers, Streams, Ponds, and Wetlands*. Major water bodies and their shorelines or banks serve as scenic vistas in and of themselves: Long Island Sound, Flanders Bay, the Great Peconic Bay, and the Peconic River.

Views of and access to water bodies are important in defining Riverhead as a coastal community.

- *Native Plants*. Also of importance are areas with significant expanses of native vegetation, which can be found in woodlands, wetlands, or meadows. Native plants are valuable not only from an ecological point of view but also as historic elements of the Town's landscape. Strategies for protecting and promoting native plants are discussed in Chapter 4, the Natural Resources Conservation Element.

- ***Agricultural Landscape***. The agricultural landscape, characterized by cultivated fields, vineyards and orchards, pastures, and farm stands, is crisscrossed by a network of rural roads. The area where this scenic quality is predominant is in the central part of Riverhead and is still relatively intact. These agricultural views are integral to Riverhead's identity as a rural community and play an important role in attracting tourists who support a growing number of agriculture-associated retail businesses.
- ***Scenic Roads and Corridors***. Many people experience the Town's rural and natural landscape from the Town's roads, whether they are traveling by car, by bus, on foot, or via bicycle. Also, people who hike or bike on off-road trails or who go canoeing or kayaking on the Peconic River experience the scenic qualities of those corridors.
- ***Historic Structures and Sites***. Older homes, barns, and churches, whether found on individual sites or in small clusters, can contribute to scenic views, particularly in rural areas and along scenic corridors. For example, an historic home or church situated at a crossroads can endow that place with a special character. An old farmhouse, cemetery, or stone wall adds to the rural character of a farm as much as the presence of cultivated fields or grazing farm animals.

Peconic River Waterfront

The Peconic River is a major scenic feature in Riverhead's landscape. It contributes to the character of the Pine Barrens region as well as downtown Riverhead, and the Town's name and identity is closely tied to the Peconic. In the future, visual and physical access to the waterfront will continue to be important for Town residents. Under New York State's *Wild, Scenic, and Recreational Rivers Act*, the Peconic River is designated as "scenic" west of the Long Island Railroad (LIRR) bridge, located west of the Long Island Expressway, and "recreational" between the LIRR bridge and the dam in Grangebel Park in downtown Riverhead. Most new development along the riverfront is strictly limited, but recreational trails and paths *are* permitted. This is generally consistent with the Town's long-term vision for the waterfront, both within and outside the downtown area.

HISTORIC RESOURCES

The Town of Riverhead possesses a wealth of historic resources. A detailed list of recognized historic structures and sites is included in Appendix C. This is not a definitive collection of historic resources and information, but rather an indication of the kind of information available. In essence, these findings are intended to provide an indication of the status of present research and documentation and some directions for further research.

Ongoing research and documentation of the Town's historic resources is essential if they are to be acknowledged and integrated into the Town's planning process. Such research and documentation may best be accomplished through volunteer efforts of interested individuals and organizations, or possibly through consultants. The chronological, thematic, and locational concepts outlined in this element can provide a framework for documentation efforts.

General History of Riverhead

The history of the Town of Riverhead stretches from the life and times of the Corchoug Indians — before the arrival of the first white settlers to Long Island in 1640 — through the Revolution, the Civil War, and the suburbanization of the late 20th century.[1] The following paragraphs provide an overview of the historic trajectory.

Pre-1640: Indian Settlements

The Corchougs, one of thirteen Algonquin tribes inhabiting Long Island prior to white settlement, originally occupied the limits of the Town of Riverhead.[2] The Corchoug "villages [were found in] places now called Aquebogue, Cutchogue, Mattituck and Hashamomuk.[3]" These locations at the head of the Peconic River allowed the Corchougs access to both fresh water and saltwater landings. The riverfront provided the Corchougs with ready access to food sources.

1640 to 1776: White Settlements, Land Divisions, and Early Farms and Mills

In the 1640s, white settlers from Massachusetts established a permanent settlement in Southampton.[4] In 1649, settlers from Southold purchased the main portion of Riverhead from the Corchougs as part the "Aquebogue Purchase".[5] By 1671, there was also a small settlement

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1 The history of Riverhead during the Colonial period is fairly well documented through a number of secondary sources. However, there is a lack of secondary source information from the late 19th century to the present day. Those sources that exist are summarized below, providing a framework for further research into the significance of existing historic resources within the Town.

2 Hood, Peter. A History of North Sea Beach Colony.

3 The Bicentennial Book Committee. Riverhead Bicentennial Album.

4 Pelletreau, op. cit.

5 History of Suffolk County, New York, 1.

in Wading River.[6] In 1680, the settlers of Wading River joined with a contingent from Southold to divide up the available land between their two settlements.[7]

Between the late 1600s and the time of the Revolutionary War, settlers established farms for both local consumption and trade. The first farmers in the Riverhead area grew grains for trade as well as fruits, vegetables, and livestock for local consumption. As farms were established, colonists laid out roads (including King's Highway from Southold to Wading River by 1710), and established a County jail, courthouse, and seat in Riverhead. The selection of Riverhead as the seat was a compromise between Southampton and Southold.

In conjunction with farming activity, Africans were imported as slave laborers. Slave labor in Suffolk County accounted for significant contributions to the agrarian and maritime economies. After the Revolutionary War, the State passed a series of laws that gradually emancipated New York slaves by 1827.[8]

Riverhead's location at the mouth of the Peconic River made it an ideal site for water-powered mills. Riverhead has the oldest flour milling establishment in the State of New York — the Hallett Brothers flour mill of 1696.[9] By 1800, mills dotted the length of the river and included a number of sawmills, iron forges, fulling mills, and gristmills.

1776 – 1870: Town Incorporation and the Growth of the Agricultural Industry

In 1792, Riverhead separated from Southold and started to evolve into a Town in its own right with a distinct identity. Agriculture continued to be the mainstay of the local economy and way of life. Part of what fueled the growth of the agricultural industry was the expansion of the road network and the advent of the railroad. Beginning around 1800, three main roads were built along the length of Long Island: North Country Road along the north shore; South Country Road along the south shore beaches; and Middle Country Road. The first railroad line to run through Riverhead was the Greenport line in 1834.[10] The primary freight carried by the railroad was agricultural products, and prior to 1875, the primary agricultural product transported on the railroad was the potato. Potato production began as early as the 1700's, but did not become a standard crop until the railroad facilitated transportation.

Long Island's shorelines are well-suited for building small sea-faring vessels, and the outfitting of ships became a thriving industry in the towns of Northport, Sag Harbor, Port Jefferson, and Greenport starting in the early 1800s. A small shipyard located near the public beach in Wading River built many of the produce sloops active along the Sound coast.

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6 The Riverhead Story, 9.

7 Long Island, A history of Two Great counties, Nassau and Suffolk, 1949, 183-184.

8 Marcus, Grania, B., A Forgotten People: Discovering the Black Experience in Suffolk County (NY).

9 The Boroughs of Brooklyn and Queens, Counties of Nassau and Suffolk, Long Island 1609-1924, 727.

10 Kramer, Frederick, Long Island Rail Road.

Riverhead shipyards along the north bank of the Peconic built larger boats, many of which carried passengers to and from eastern Long Island.[11]

In this period, Riverhead grew in terms of population and in the number of civic and cultural institutions. Some of the major landmarks built during this time frame include: the Female Seminary (1834), the First Methodist Church (1834), the First Congregational Church (1841), and the County Clerk's Office (1846).[12] By 1875, Riverhead had six churches, two grist mills, two moulding and planing mills, a paper mill, three hotels, twenty stores, a cigar factory, a wagon jack factory, an organ factory, many shops and offices, and a population of 1,600.

1870 to 1945: Thriving Agricultural Industry and a Small Town Character

Riverhead continued to grow into a thriving agricultural community in the late nineteenth and early twentieth centuries. In 1867, John W. Duryee of Mattituck introduced cauliflower to Suffolk County. Cauliflower production grew rapidly and eventually peaked in 1949 with 5,500 acres planted.[13] In 1873, the first seven Peking Ducks were imported from China, and within twenty years, Long Island (Riverhead in particular) became the center of duck production in the U.S. By 1898, Riverhead boasted the world's largest duck farm.[14] Duck production eventually reached its peak just after World War II, when there were approximately 788 duck farms in Suffolk County, raising two-thirds of all ducks produced in the U.S. Like the potato, the duck and cauliflower industries were able to build off the availability of railroad transportation.

The railroad also allowed farmers to grow and sell vegetables and fruits that required rapid transport to market, such as cabbage, beets, sprouts, and cranberries. Return shipments on the rail lines contained tubs of manure from New York City streets and stables for Long Island farmers to use as fertilizer. By about the 1920s, truck farming was on the rise as well. Trucks allowed even faster, more flexible transport of produce to market and freed farmers from railroad schedules and costs.

Another important industry on eastern Long Island in the second half of the nineteenth century was the cordwood business. Firewood was in great demand, not only in New York City, but all along the Hudson River. Much of the cutting was done during the winter months, hauled to the Wading River Landing by sled, and transferred to sloops.[15] Ice was also in demand, for use in cooling perishables as well as making ice cream. The Peconic River, with

11 Wading River, founded in 1671.

12 The Boroughs of Brooklyn and Queens, Counties of Nassau and Suffolk, Long Island 1609-1924, 727.

13 Journey Through Time, 29.

14 Between Ocean and Empire: An Illustrated History of Long Island.

15 Wading River, founded in 1671.

its large quantity of clean, clear water was a great source of ice. Many icehouses were built near the millponds along the Peconic River. In 1886, the Suffolk County Ice Company built the largest icehouse on the Peconic River.[16]

With the enormous growth and industrialization of New York City after the Civil War, eastern Long Island, particularly the South Fork, started to become a popular summer destination for families eager to escape the city during the hottest months of the year. Tourism was facilitated by train service to the East End. It was at during the early 20th century that the Hamptons first became a well-known vacation destination for wealthy New Yorkers. As more and more people purchased personal automobiles, many seasonal residents and visitors eschewed the railroad and drove their cars instead.

1945 to Present: Suburbanization, North Fork Tourism, and their Impacts

Between World War II and the present day, Riverhead has remained the center of Long Island's agricultural industry. In the early 1990s, the Town had 20,000 acres in production. While potato, cauliflower, and duck production have declined, crops such as grapes, sod, and greenhouse growing, which require fewer acres but yield higher profits, have maintained Suffolk County as the leading agricultural producer in New York State.

Riverhead underwent an important transformation in the 1950s and 1960s with the construction of the Naval Weapons Industrial Reserve Plant (NWIRP) in Calverton. The NWIRP was a major employment center for many years until being closed by the federal government in 1995. The site is now being planned for development with a mix of office, industrial, recreational, hotel and related uses, which will add another component to the growing local economy.

Construction of the LIE made Riverhead easily accessible to the rest of the New York metropolitan region, further facilitating truck farming but also opening up the Town to new development pressures. Because the LIE made the Town so accessible, Riverhead also started changing into a fringe suburb of the job centers in Nassau County and western Suffolk County. Low-density subdivisions were built throughout the Town, particularly in the Wading River area and around downtown Riverhead, and strip-style shopping centers were constructed along Route 58. Downtown and the hamlet centers lost much of their pedestrian activity and commercial vitality.

In the 1980s and 1990s, the North Fork wine industry emerged and the East End started gaining both national and international recognition as an important wine-producing region. This trend not only added a new element to the agricultural industry, but also introduced the concept of agro-tourism to the East End. Following the model of Napa Valley, wine makers now offer wine tasting, tours, shops, and banquet facilities to attract tourists and visitors. In

16 The icehouse burned to the ground in 1922. Lapham, Elisabeth. Echoes From the Past, 7.

addition, many vacationers are being priced out of the exclusive Hamptons and exploring the North Fork as an alternative destination.

Within an increasing population and more tourist traffic, there has been increasing concern about the impacts of sprawl, such as the loss of open space, threats to the natural environment, worsening traffic congestion, and loss of the Town's rural character. With the preparation of this Comprehensive Plan, the Town has a unique opportunity to channel and direct the prevalent growth pressures in an appropriate way, so as to ensure that the Town maintains a high quality of life.

Inventory of Historic Resources

As noted earlier, the Town of Riverhead possesses a wealth of historic resources. Four properties within the Town of Riverhead are currently listed on the National and State Register of Historic Places.

- Vail-Leavitt Music Hall, in downtown Riverhead
- Hallock Homestead, in Northville
- U.S. Post Office, in downtown Riverhead
- Suffolk County Historical Society building, in downtown Riverhead

A database maintained by the State's Office of Parks, Recreation and Historic Preservation contains the Survey Listing of Historic Sites throughout the Town of Riverhead. These include houses, commercial and civic buildings, churches, farms, cemeteries, and other notable sites. Historic sites are concentrated in the hamlets of Wading River, Jamesport, and Aquebogue, as well as downtown Riverhead. The full listing, which can be found in Appendix C, can be summarized as follows:

- ***South Jamesport***: approximately 25 houses; 1 prehistoric site; several other buildings and sites, including a schoolhouse and a store.
- ***Jamesport***: approximately 46 houses; 2 cemeteries; 1 prehistoric site; a number of other buildings and sites, 8 farms and a camp meeting district with 15 cottages.
- ***Aquebogue***: approximately 48 houses; 3 prehistoric sites; 1 cemetery; a number of other buildings, sites and structures including a windmill base, a post office and a former schoolhouse
- ***Northville***: approximately 20 houses; 1 prehistoric site; 1 cemetery; a number of other buildings and sites, including a church and 2 schoolhouses;
- ***Manorville***: approximately 6 houses; 1 prehistoric site; 1 historic site; several other structures and sites, including a "cranberry bogs district".
- ***Wading River***: approximately 31 houses; 2 cemeteries; numerous other structures and sites, including 2 churches, 2 parsonages, an old post office, a school and the Wildwood State Park Survey District

- ***Calverton***: approximately 19 houses, 2 prehistoric sites; a number of other structures and sites, including the site of a pickle factory, several farms, and a hotel/inn
- ***Baiting Hollow***: approximately 19 houses; 1 prehistoric site; several other structures and sites, including several water towers, a church, a pond and a number of farms.
- ***Riverhead***: approximately 210 houses; 2 prehistoric sites; 1 historic site; 1 cemetery; many other structures and sites, including a wide assortment of historic commercial and civic buildings and sites, churches, and farms.

Due to its location along the Peconic River and Flanders Bay, Riverhead was — in pre-colonial times — an attractive fishing, hunting, and gathering grounds for local Indians. Many archeological sites have been identified since the nineteenth century and are recorded in the State's Office of Parks, Recreation, and Historic Preservation.

LANDMARKS PRESERVATION COMMISSION

For nearly 30 years, Riverhead has had a Landmarks Preservation Commission, which is appointed by the Town Board and serves in an advisory capacity to that body. The Commission may entertain applications designating a structure or place as a landmark, landmark site, or historic district, and can either approve or deny applications. Town Board approval is also necessary for the place to be recorded as a landmark, landmark site, or historic district with the Building Department and the Assessor's office. The Landmarks Commission is responsible for reviewing plans for the moving and alteration, construction, alteration or repair, landscaping or demolition of designated structures or sites. The Commission must ensure that changes are visually consistent with historic materials and architectural styles.

ARCHITECTURAL REVIEW BOARD

The Architectural Review Board (ARB) is appointed by the Town Board upon the recommendation of the Planning Director. It is responsible for reviewing certain commercial projects (i.e., those subject to site plan review) for the quality of their exterior design. ARB decisions are currently advisory. The body has no specific design standards to follow in conducting its reviews.

5.3 GOALS & POLICIES

Goal 5.1: Protect farmland, woodlands, grasslands, wetlands, riparian corridors, waterfront areas, geological features, old-growth trees, and other open space areas and natural features that contribute to Riverhead's scenic quality.

Policy 5.1A: Undertake a study to identify locations throughout Riverhead with significant views.

Policy 5.1B: Support and partner with local non-profit advocacy organizations to protect open space areas that contribute to Riverhead's scenic quality.

In eastern Long Island, organizations such as the Long Island Chapter of The Nature Conservancy and the Peconic Land Trust work with landowners to protect natural resources, scenic vistas, water quality, and productive farmland through various mechanisms. Since these organizations help maintain the scenic character and quality of life in Riverhead, the Town should cooperate with these organizations, facilitating their work wherever possible.

Policy 5.1C: Develop a scenic easement provision to allow a tax abatement (i.e., a tax credit) for property owners.

Easements are an effective tool for protecting scenic and natural resources. In order to preserve priority scenic and natural resources, the recording of 247 Conservation Easements on appropriate private parcels should be encouraged by the Town. ~~an easement provision should be incorporated into Riverhead's zoning code.~~ This would provide the ability for landowners to place a scenic easement on their property voluntarily in exchange for a reduction in tax valuation for the property under easement.

Policy 5.1D: Coordinate scenic preservation initiatives with other community enhancement programs, including open space acquisition, natural resource conservation, park and recreation development, and business district improvement efforts.

Many policies throughout the Comprehensive Plan are intended to help preserve open space areas and natural features of the landscape. Farmland preservation efforts are discussed in detail in Chapter 3, the Agriculture Element. Additional policies for protecting natural features (such as the bluffs overlooking Long Island Sound) are expressed in Chapter 4, the Natural Resources Conservation Element. In Chapter 6, the Business Districts Element, the design standards and guidelines proposed for downtown, the hamlet centers, and Route 58 are intended to reduce the proliferation of unattractive strip-style commercial development. These initiatives should take into account the existence of scenic vistas, and should help protect such scenic vistas, wherever possible.

Policy 5.1E: Establish design guidelines and subdivision standards for cluster development, such that scenic views are protected to the greatest possible extent.

Cluster development, in and of itself, helps to preserve scenic views, by keeping large land areas undeveloped. However, scenic views can be further protected and enhanced through high-quality design, which can be encouraged through appropriate development and design standards.

A number of elements make up a scenic view, including such natural and agricultural features as woodlands, meadows, cultivated fields, vineyards and orchards, pastures, stone walls, streams, ponds, hills and contours, and wetlands. Historic farm buildings can also contribute to a scenic view. Notably, each individual site is different in terms its particular scenic characteristics. Also, it is important to recognize that not <u>all</u> the scenic elements of a site may be able to be preserved while still accommodating the development and meeting State and federal environmental requirements (particularly regarding wetland protection). Thus, development and design standards should be flexible enough to (1) deal with the unique qualities of different sites; and (2) not hamstring development. The main idea, in the end, is to make the resulting development seem like it fits comfortably into the landscape, respecting those elements that contribute to its scenic views. The allowing of increased heights of multi-family residential buildings (condominiums and homeowners associations) with transferred development rights would provide for scenic views and result in less disturbance of natural resources where applicable.

The preferred approach is to require the applicant of a cluster subdivision to submit a map that identifies those site characteristics that contribute to the vistas existing upon and from the property ~~scenery~~. The applicant must also demonstrate how the proposed subdivision plan takes those elements into account. That is, on some sites, the dominant landscape element may be a meadow, in which case the building lots may best be located within the wooded areas of the site. On another site, a grove of trees and a pond may be more dominant, suggesting that development outside the woodland would be preferred. As another example, on a site with sweeping views, clustering all lots into one location, out of site, may be preferable. On a site with smaller, intermittent views, creating a few separate clusters may be better. The Town should prepare a series of guidelines instructing applicants as to what visual features should be considered in conducting their evaluation of the site and preparing their map. This effort should occur subsequent to the study proposed in Policy 5.1A of this section.

Policy 5.1F: Consider shifting responsibility for site plan review from the Town Board to the Planning Board.

The Planning Board as a body is particularly well-suited to the review of site plans. It is currently ~~responsible~~ authorized to review land subdivision approvals only, with site plan review requiring a similar understanding of basic site design as well as State, County, and Town regulations ~~and site plan approval requires an understanding of many of the same Town and County requirements~~. The Planning Board could also be well equipped to implement the more detailed design, parking, and landscaping requirements that will be added to the zoning code after the completion of the new Comprehensive Plan. Attention to such features is critical in order to protect and enhance the visual quality of the Town's corridors and scenic views. Though this change is conceptually desirable, the policy must be logistically refined with regard to Planning Board and Planning Department time management issues.

Goal 5.2: Maintain and increase waterfront access and views.

Riverhead is a community in many ways defined by its proximity to significant water features. Access to and views of the water are important in determining and maintaining the Town's overall quality of life. Public access to and views of water currently exist at certain points throughout Riverhead. The Town should work to increase public access to and views of water even further. Recommendations for improved waterfront access are presented in Chapter 11, the Parks and Recreation Element.

Policy 5.2A: Undertake a study to identify locations throughout Riverhead with significant waterfront views.

Shoreline areas as well as stream corridors should be examined.

Policy 5.2B: Consider waterfront views when contemplating open space acquisition for preservation or recreation purposes.

Waterfront views are only one factor to consider in prioritizing open space preservation initiatives. The presence of farmland or natural resources, the need to provide critical linkages in the proposed greenway system (see Chapter 11, the Parks and Recreation Element), the imminence of a parcel's development, and the presence of a willing landowner are some of the other factors that should be considered.

Policy 5.2C: Support and facilitate the efforts of non-profit organizations like The Nature Conservancy and the Peconic Land Trust to acquire lands in coastal areas for the purpose of increasing public access to or views of water.

Specific areas that should be targeted for acquisition include South Jamesport and areas along the Peconic River. Waterfront acquisition can not only increase scenic quality, but help maintain the ecological integrity of fragile coastal areas as well, by decreasing the potential for development near the water's edge.

Goal 5.3: Continue to identify and document historic resources in Riverhead, and promote public awareness of historic resources.

The first step toward ensuring the long-term survival of the Town's historic assets is to identify and document those resources. Awareness of such resources by the public helps ingrain them into the Town's identity and help create interest in and enthusiasm for preservation.

Policy 5.3A: Complete a comprehensive survey of historic resources in Riverhead.

Identified resources should include individual buildings, groups of buildings (such as a hamlet area), and sites and landscapes (e.g. cemeteries, archaeological sites) that are important to the historic character of the Town. Completing a comprehensive survey of historic resources and identifying historic districts may make the Town eligible for Certified Local Government (CLG) status through the State Historic Preservation Office. CLG status carries with it increased access to federal survey and planning funds, which are distributed annually.

~~Policy 5.3B: Establish a volunteer program in which volunteers would survey the Town and help identify potential historic resources.~~

~~Provide training and guidance to volunteers by hiring a consulting professional to work with them or by designating a Town staff member to serve as a coordinator. The Town should explore the possibility of applying for grant funding to help undertake the program.~~

Policy 5.3B~~C~~: Coordinate local research initiatives on historic resources with State and federal programs, as well as the initiatives of individual researchers, academic institutions, independent volunteer groups, and non-profit historical associations.

Information on local historic places may have already been compiled under the auspices of the National and State Registers. Historical scholars and architectural experts may be able to provide insights into local historical resources. The Suffolk County Historical Society and other organizations may also have valuable historical information.

Policy 5.3C~~D~~: Develop an integrated public signage program that identifies and explains the scenic, historic, and natural resources of the Town.

Such signs should be located along scenic corridors, in front of or attached to historic structures, and posted in public areas within historic districts. These signs will allow residents and visitors to recognize, understand, and better appreciate the various points of historic, scenic, and natural interest throughout the Town.

Goal 5.4: Protect identified historic resources from destruction, neglect, or diminishment of character, and encourage the faithful restoration and adaptive reuse of historic structures.

Policy 5.4A: Building off of the comprehensive survey of historic resources (see Policy 5.3A), prepare a Town Register of Historic Places.

The comprehensive survey can be christened — in whole or in part — as the Town's Register of Historic Places. By using the State's documentation forms, the Town Register can be coordinated with the State's Register of Historic Places. Parameters for demolition and modification of properties listed on the Register should be developed.

Policy 5.4B: Strengthen the role of the Landmarks Preservation Commission by allowing that body to develop design standards for historic districts.

Currently, the Landmarks Preservation Commission only determines whether architectural styles of proposed development projects are consistent with historic styles. The Commission should also be allowed to examine and comment upon the proposed use, orientation, and location of structures, particularly proposals in an historic district. The proposed standards would have to be approved by the Town Board and then could be used by the Landmarks Preservation Commission to review proposed projects related to historic districts.

Policy 5.4C: Allow historic sites to obtain variances that protect their historic character.

Variances for land use, parking, bulk, and other requirements should be permitted for threatened historic and cultural landmarks. Also, continue to monitor State initiatives to update the Building Code to be more flexible toward historic structures.

Policy 5.4D: Establish subdivision and site planning guidelines and standards to protect scenic and historic resources when development is planned on scenic and historic properties or in historic districts.

Policy 5.4E: Provide tax abatement for the protection of any property listed on the Town Register of Historic Places.

This is a particularly effective strategy for commercial or mixed-use developments to encourage the protection of historic assets.

Policy 5.4F: Strengthen the role of the Architectural Review Board by implementing design guidelines and review standards.

During the CAC meeting, there was a suggestion that ARB decisions should be made binding rather than advisory, but others argued that binding decisions would create excessive unpredictability for applicants, wildly increasing costs and delays associated with development. The compromise reached during the CAC meeting was to keep the ARB advisory, but to establish design guidelines and review standards in order to create continuity of building design on a hamlet basis. This would create more predictability for applicants, by clarifying what aspects of design the ARB should focus on and base its decisions upon. Different guidelines and standards specific to each district should be adopted. They should be developed through a public outreach process that solicits ideas from local businesses and residents. Guidelines should indicate which design elements are mandatory and which are advisory.

Policy 5.4G: ~~Consider requiring~~ Maintain required ARB review for development in Enterprise Park, as well as large-scale single-family residential subdivisions and large-size single-family homes at the request of the Planning Board in land subdivision review.

Each large project greatly affects the character of the Town and individual neighborhoods. ARB review may be appropriate in such cases.

Goal 5.5: Protect the visual quality of scenic corridors throughout Riverhead, and work to improve the scenery along other roads.

Scenic corridors are roads, streams, trails, and other linear paths that are characterized by an exceptional visual quality along the sides of the corridor. Many factors may contribute to their visual quality: views of agricultural landscapes; forested tree cover; the presence of historical sites; vistas of bluffs, wetlands, water bodies, or other natural features; and so on. These corridors attract tourists and visitors, who enjoy driving, walking, biking, or traveling through Riverhead's scenic landscape. These corridors are the vantage points from which most people — residents and visitors alike — experience Riverhead's rural landscape.

Policy 5.5A: Identify scenic corridors.

The Town should identify scenic corridors in Riverhead through an interactive public outreach process. ~~At a minimum~~ By way of illustration, the following corridors should be considered:

- Edwards Avenue

- Deep Hole Road ~~(currently unused)~~
- Flanders Bay waterfront
- Fresh Pond Avenue
- Herricks Lane
- Horton Avenue
- Long Island Sound waterfront
- Manor Lane
- Northville Turnpike, north of Doctor's Path
- Osborne Avenue
- Peconic River corridor (West Main Street)
- Reeves Avenue
- Roanoke Avenue
- Route 25
- Sound Avenue
- Tuthills Lane
- Wading River-Manorville Road
- Greenway System (see Chapter 11, the Parks and Recreation Element)

Policy 5.5B: Develop a process for officially designating scenic corridors.

Scenic corridors should be officially designated, so that the Town could then regulate development in those corridors more closely, ensuring that new development would be in keeping with the scenic character. The Town Board should be responsible for designating scenic corridors, based on recommendations from the Planning Board or any other group deemed suitable by the Board.

Although Sound Avenue was designated as an historic corridor by the State in 1974, this designation — according to participants in the CAC meetings — has not actually resulted in concrete protections for the roadway. Scenic corridor designation for Sound Avenue, therefore, is critical. Moreover, all scenic corridors should be regulated carefully in order to ensure appropriate development and attention to the visual quality of roadside areas.

Policy 5.5C: Establish a framework for regulating new development along designated scenic corridors, such that new development is compatible with a corridor's character.

Designated Scenic Corridors should have certain minimum design standards associated with them. Topical areas that should be addressed include: roadway widening and traffic control, drainage, signage, utilities, and parking lots. The Planning Board would be responsible for implementing this new regulatory framework, as new development applications come forward. Structures used for agricultural purposes should be exempt from new design standards. Nothing shall be construed to limit agricultural uses permitted by the Town zoning code and by any applicable State or County regulation.

Policy 5.5D: Develop and adopt tailored standards for roadway widths and drainage systems along designated scenic roads.

Roadway standards, particularly the width of the road, are extremely important for scenic corridors. As business and traffic increases along scenic roads, so will pressure to widen the road beyond two lanes. While seemingly beneficial, such a change would have significantly negative impacts on the scenic character of the road. As an alternative to widening, less drastic improvements can be undertaken to improve traffic flow, such as turn pockets at congested intersections. The width of scenic roads should be limited to two traffic lanes (one lane in each direction), with a shoulder and/or bicycle lane on each side, resulting in a total curb-to-curb width of about 25 to 40 feet. Also, stormwater runoff from these roads should be handled through natural drainage systems via swales, as opposed to the traditional curb and gutter.

Policy 5.5E: Develop and adopt signage standards and guidelines for designated scenic corridors.

Specific signage standards for scenic corridors should be adopted to ensure that the number, height, material, lighting, and size of the signage is not detrimental to the visual quality of the road corridor. Guidelines should be more stringent than those currently outlined in the Town's zoning regulations (e.g. monument signs only, stricter size limitations, etc.).

Policy 5.5F: Prohibit on-street parking and adopt parking lot design standards along designated scenic roads.

On-street parking and the proliferation of parking lots along scenic corridors will be increasingly of concern as the number of public-oriented establishments such as farmstands, pick-your-own outlets, and wineries expands along designated scenic corridors. If not handled effectively, parking can become a safety hazard and detract from the scenic. On-street parking should be prohibited. Parking lot standards that limit access points should be implemented, and parking lots should be significantly set back from the road, such that the roadway frontage remains green. Also, paved surfaces should be kept to a minimum, and trees and other plantings should dot the parking lot.

Policy 5.5G: Coordinate with local utility companies to place utility lines underground along designated scenic corridors.

By coordinating schedules for repaving and line replacement, the undergrounding of overhead wires can be accomplished in a cost-effective manner. The wires can be placed in the road right-of-way either at the edge of the pavement or within the shoulder. The underground utility easement should be placed in such a manner as not to harm existing trees along the road corridor.

Policy 5.5H: Require all new development within 250 feet of any designated scenic corridor to be subject to architectural review and additional buffering requirements.

Current regulations require architectural review and extensive landscape buffering for *residential* development within 250 feet of either side of Sound Avenue, but not for other uses. Also, no other corridors are currently subject to this requirement. The current regulations should be expanded to include all new development along Sound Avenue, and then, once scenic corridors have been identified and designated, the requirement should be extended to those additional roadway corridors as well.

Policy 5.5I: Plant the proposed Route 58 median with native species that evoke the character of Riverhead and the East End.

Policy 5.5J: Maintain greenery alongside designated scenic corridors.

In case sites are subdivided, the Town's zoning and subdivision regulations should require a 250-foot to 500-foot buffer along the roadside, in order to preserve the visual quality.

East Hampton Power & Light Company

Calverton Generating Facility

Appendix P

10. Utility Service Element

10.1 VISION STATEMENT

Utility infrastructure is critical to the health, safety, and welfare of the community. Water, sewer, electric, natural gas, and telecommunications facilities are relied upon by residents and businesses for day-to-date activity and contribute to the Town's economic wellbeing. Utilities should continue to be expanded to meet Riverhead's growing needs. At the same time, the Town should strive to limit any potential negative impacts from new infrastructure on the natural environment or Riverhead's historic or scenic resources.

10.2 SUMMARY OF BACKGROUND RESEARCH

ELECTRICITY AND NATURAL GAS

Since the breakup of the Long Island Lighting Company (LILCO), the Long Island Power Authority (LIPA), as a public entity, has been responsible for electric distribution. Gas distribution has been the responsibility of LILCO's successor company, Keyspan, a private, regulated corporation.

LIPA operates and maintains the power grid that serves Riverhead and hooks up new users into the system. While LIPA is responsible for delivering electricity to homes and business, residents and employers have the option of purchasing these energy sources from other suppliers. This flexibility in the energy market was made possible by federal deregulation of the energy sector in the late 1990s. Since LIPA is a public entity of the State of New York, power supply and distribution are still closely regulated by the State.

As of 2001, the combined forces of utility deregulation and aging power plants have raised the specter of a nationwide energy crisis. So far, Riverhead has not experienced chronic blackouts or brownouts. If the New York City metropolitan region is afflicted by an energy crisis, it is conceivable that Riverhead could experience rolling blackouts or energy shortages, along with other communities. LIPA is currently undertaking several projects to secure a more reliable power supply. These include the Cross Sound Cable project (high voltage underwater cable that would connect the electric transmission grids of new England and Long Island), the installation of new turbines at LIPA plants, the use of portable generators for emergency backup, and the development of a program for off-shore wind power. Either power plant expansions and/or conservation measures may be needed in the future to serve the Long Island's growing economy and population.

Keyspan has been more active in the expansion of its natural gas infrastructure than had LILCO. Service in Riverhead has been expanding. As a general rule, Keyspan will install 100 feet of new main at no cost for each new prospective customer. Recently, the company has indicated it would embark upon a more aggressive expansion plan, to the point that it would make installation more favorable to residents. During focus groups, participants have indicated an interest in maximizing the availability of natural gas service in Riverhead.

SANITARY SEWERS

The Town has a sanitary sewer district with a full sewage treatment plant. This facility provides sanitary waste treatment and disposal for the area around downtown Riverhead, including most of the Route 58 corridor. The facility recently underwent an $8.5 million upgrade. It is sized at 1.3 million gallons per day (gpd) and provides a 100,000 gpd scavenger waste disposal point which is one of the only two such disposal points available in Suffolk County, the other being at Bergan Point in the Town of Babylon, near the southwestern end of the County.

The Riverhead plant has tertiary treatment, but only for nitrates. Plant effluent is discharged into the Peconic River. The Suffolk County Department of Health Services (SCDHS) believes that this effluent does not adequately dissipate since the extreme west end of the Peconic Estuary is not adequately flushed due to its small size and the distance to the mouth. ~~Although the SCDHS found that past breakdowns at the plant had resulted in substantially untreated discharges, plant performance has very significantly improved since the upgrade. The plant is now thought to be working very well.~~ The ~~sewer district is~~ Riverhead Town Board, as the sewer district commissioners, and the SCDHS are exploring ~~with the County~~ the possibility of using the Indian Island Golf Course for ~~some disposal~~ recharge after treatment (i.e. application of gray water to the ground).

The Riverhead Town Board extended the appurtenances of the Riverhead Sewer District westerly within the bed of County Route 58 to the terminus of the LIE. Due to forecasted sanitary flows emanating from the development of this area, the District is currently at full capacity. The conclusions of the Peconic Estuary Study indicate that there are no plans for increasing the capacity of the district treatment facility without certain technological changes.

However, the Town Board has established the Calverton Sewer District to collect and treat industrial wastewater and sanitary sewage generated by the development of the real property within Enterprise Park at Calverton ("EPCAL"). The existing treatment facility serving EPCAL was originally constructed to serve the Calverton Naval Weapons Industrial Reserve Plant (NWIRP) and has a capacity of 62,000 gallons per day. The Calverton Sewer District will eventually expand to serve all users within EPCAL.

Riverhead currently has one (1) privately owned sewage treatment plant (STP), which serves the condominium development known as Willow Ponds, located at Sound Avenue, Roanoke. The Willow Ponds STP is rated at a capacity of 70,000 gallons per day with expected total flows of 50,355 gallons per day. Due to this under capacity, the Willow Ponds development could sustain higher development yields and is a unique parcel to accept transferred development rights.

~~The Town currently has no plans for the expansion of the main sewer district, but it is involved in the formation of a second sewer district to handle effluent flow from Enterprise Park in Calverton. The Calverton facility that served the original U.S. Navy property has a rated capacity of 62,000 gpd. The Town intends to construct a 500,000 gpd sewage treatment plant to replace the existing facility.~~

~~Riverhead, unlike most Long Island towns, currently does not have any private or Suffolk County-run "package" treatment facilities. The Town's first private package plant, which will serve Mill Pond Estates, was under construction as of early 2002. Some older package plants in other communities have outdated technology that is now in need of replacement; they have also suffered from deferred maintenance. Today's technology, however, is far improved, and there may be further potential for use of package plants in Riverhead, provided that they are properly maintained.~~

SOLID WASTE AND RECYCLING

Riverhead operated a sanitary landfill for its solid waste until it was required to close on December 18, 1990, in accordance with the "Long Island Landfill Law" enacted by the New York State Legislature in 1983. That law mandated the closure of all solid waste landfills on Long Island except for those outside the deep flow recharge areas, which were allowed to accept only the "product of Resource Recovery Facilities."

Since 1990, Riverhead had selected a course which is different from most other towns. Riverhead created six districts for residential collection of solid waste and recyclables, all managed by the Riverhead Solid Waste Collection District. Each district bids a contract for the collection of solid waste and recyclables without providing a guaranteed disposal point such as a resource recovery plant or a transfer station. The private carter is responsible for disposal as well as collection. The service is provided to single-family and two-family residences on a user fee basis. All commercial and multi-family uses are responsible for arranging their own private haulers. The system has worked well to date.

The Town's Sanitation Department picks up and processes recyclable materials for single-family and two-family residences. Town residents are provided with blue recycling bins. Newspapers, corrugated cardboard, and chipboard are picked up on Wednesdays. On alternate Wednesdays, mingled plastic, tin, glass, and aluminum are picked up as well. Household hazardous waste drop-off is scheduled four times per year. Leaves are picked up curbside seasonally, and residential yard waste is accepted at the Town's Osborn Street daily.

The Town has recently completed a pilot program of landfill remediation by mining. After evaluation, the Town intends to determine if part or all of the landfill should be mined, with the remainder, if any, capped in accordance with Part 360 of the New York State Department of Environmental Conservation requirements. Landfill mining is a long and difficult process that can have odor impacts on the community, but the advantage is that the property can then be available for reuse. Landfill mining has seldom proven to be cost effective.

The Town intends to obtain funds from the State to assist the funding of the capping or mining. Unfortunately, during the 2001-2002 budget year of New York State, the Governor's recommended spending level of $250 million statewide for environmental purposes was never approved. This year's proposal of $125 million includes only $10 million for solid waste and recycling statewide, with none set aside for capping under the assumption that little capping is required statewide since most has been completed. In the near term, the earliest that funds could be available would be late in 2003, after the approval of the 2003-2004 budget.

DRINKING WATER

The Town of Riverhead has demonstrated a strong commitment to providing high-quality drinking water to residents. The Riverhead Water District has been expanded to include a substantial portion of the Town. In most other towns in Suffolk County, the Suffolk County Water Authority (SCWA), a public agency, provides most of the public water. Some towns have turned over their local water districts to SCWA for operations and/or outright ownership. Currently, there are only four other local districts in the County other than Riverhead: one is Hampton Bays and the other three are in the southern part of the Town of Huntington.

The Riverhead Water District has almost 6,000 customers. It currently has 9 wells, 4.35 million gallons of storage, almost 1,300 fire hydrants, and a capacity of over 12 million gpd. The quality of the water is considered to be very good. The saltwater intrusion problems of the North and South Forks of Long Island ~~do not seem to be~~ are not a problem in Riverhead. In addition to the Water District, there are two small private suppliers ~~of water for two trailer~~ serving manufactured home parks located off Forge Road ~~(extension of Kroemer Avenue)~~. All other residents and businesses are supplied by private wells.

Currently, the SCWA and the Riverhead Water District work together to assist each other on a need basis. There are already two metered cross-connects which allow interchange of water, the Southold part of the SCWA being the major beneficiary. The SCWA would like to add two cross-connects to the existing system: one at the Brookhaven-Riverhead border on Route 25; the other at the Southold-Riverhead border on Sound Avenue. This would assist the SCWA in serving Southold.

Nationally, the trend is toward consolidation of water services. Small water districts are being absorbed into large entities. Larger organizations have a greater competitive advantage, because of lower per-unit administrative and capital costs. Also, because of more restrictive National Water Standards, all districts have increasing costs related to testing-monitoring, treatment, and technology. These costs are relatively easier to absorb for a larger entity. As an example of the consolidation trend, American Water Works has grown into a major national water purveyor that serves 16 million people in 29 states. American Water itself is currently being purchased by RWE AG. The major advantage of a small, local water district is that it can be more attuned to local needs. Because it is directly accountable to Town government (and thus, Town voters), the Riverhead Water District has a special interest in providing a reliable, high-quality supply of water.

TELECOMMUNICATIONS

Telephone and the Internet

As a former Bell Company, Verizon operates and maintains the telephone wires that run throughout Riverhead and is responsible for delivering basic telephone service (i.e., dial tone) and dial-up internet service to the Town's households and businesses. As new buildings are built, Verizon is required to link new buildings into the telephone system. As a result of the deregulation of the telecommunications industry in the 1990s, telephone customers can now choose different service providers for both local and long-distance calling.

A number of companies, such as Easy Access and Direct TV, are now also offering high-speed DSL connections in the Riverhead area. The DSL network is still in the process of being expanded nationwide, and there may be parts of Riverhead (as in every city and town) where DSL is not currently available. DSL speeds can vary widely, depending on the service package, but residential DSL is typically about 30 kb/second, whereas business DSL can reach as high as 125 kb/second.[1]

Cable

Riverhead's primary cable provider is Cablevision, which offers both basic cable (with multiple television channels) and digital cable (offering a larger number of channels at a higher quality). However, digital cable is not currently available everywhere in the Cablevision system, and some parts of Riverhead may not yet be serviceable. Cablevision and other companies also offer internet cable service in some parts of the Town. Cable internet connections can typically upload data at speeds of 150 kb/second, consistently one of the fastest connections available. By way of comparison, a typical residential DSL line has a speed of about 30 kb/second, and a dial-up 56k modem has a speed of 6 kb/sec.

Cellular Communications

Over the last decade, cities and towns nationwide have been inundated with applications for cellular antennae, which are used to provide continuous service to the users of cell phones and other wireless devices. Cellular companies have particularly targeted areas in major metropolitan centers and along major highways, where their customers travel. ~~Cell towers have been installed primarily on the rooftops of buildings, providing additional rental income to those properties. They have also been attached to free-standing poles.~~ Although cellular antennas have been installed primarily upon towers on private property, the Town has recently encouraged installation upon water district water towers and standpipes. The Town ~~can~~ expects to receive more and more applications for cellular towers in coming years, particularly for areas along the Route 58, Route 25, and Sound Avenue corridors. As such, the Town has and will continue to encourage the co-location of antennas on existing towers.

Because cellular technology is relatively new, its potential health impacts are uncertain. Reports were circulated in the late 1990s suggesting that cell phone use could be linked to cancer or other health problems, but those reports were never confirmed. It is unknown whether residents living in proximity to a cell tower could be subject to some of the same health hazards, if such hazards do in fact exist.

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[1] www.cable-modem.net.

10.3 GOALS & POLICIES

Goal 10.1: Ensure that Riverhead's homes, businesses, and institutions are provided with adequate, reliable, high-quality electric, natural gas, cable, and telecommunications services.

Policy 10.1A: Continue to require new subdivisions to install electric, natural gas, ~~and~~ telephone, and cable television lines ~~along~~ in the beds of new roadways and to provide new lots with connections.

This policy is already standard practice for the Town and ensures a basic level of utility service to Town residents and businesses.

~~Policy 10.1B: Unless it is cost prohibitive, require new subdivisions to install natural gas and cable lines along new roadways and to provide new lots with connections.~~

~~Although some houses or businesses are not served by natural gas or cable, a great many do use such services. If natural gas and cable lines have to be installed underneath public roadways after paving, installation is more costly and disruptive.~~

Policy 10.1B~~C~~: Strongly encourage the expansion of ~~DSL, internet cable, and other high-speed internet services~~ the latest internet technologies throughout Riverhead.

High-speed internet services provide residents and businesses with crucial connections to the world wide web, which provides a wealth of information, services, and business opportunities. Through high-speed services, the ability of residents and businesses to take full advantage of the internet is increased.

Policy 10.1C~~D~~: ~~Encourage LIPA to continue exploring new ways and implementing strategies to provide a stable, reliable source of electricity to Town residents and businesses.~~ Pursue the construction of an electric power generator at EPCAL to provide less expensive electric power at EPCAL and to customers town-wide.

Goal 10.2: Ensure that Riverhead's homes, businesses, and institutions are provided with an adequate, reliable, high-quality supply of drinking water.

Policy 10.2A: Continue to expand the Riverhead Water District and the district's capacity, as necessary, to serve current and future Riverhead residents.

Policy 10.2B: Continue to monitor the water supply provided though the Riverhead Water District and strive for high standard of water quality.

Currently, the Town's water district is considered to have high-quality water. The Town should continue to ensure that this high standard is maintained into the future.

Policy 10.2C: Require adequate buffers around public wells, in order to reduce the potential for negative impacts on well systems or groundwater.

Policy 10.2D: Require that private wells are sited and built so as to avoid the risk of being negatively impacted from nearby development.

Policy 10.2E: Require that septic systems, package treatment plants, and other discharge-to-ground wastewater systems are sited and built so as to avoid the risk of negatively impacting public or private wells.

As discussed in Chapter 4, the Natural Resources Conservation Element, the location and design of septic systems should also be such that groundwater and surface water resources are protected.

Goal 10.3: If possible, expand areas around downtown Riverhead, Enterprise Park, and the hamlet centers that can be served by sewer.

Policy 10.3A: With changes to zoning districts in downtown Riverhead and along Route 58, explore the feasibility of expanding the boundaries of the Town's sewer district.

It has been estimated that the area within the sewer district boundaries, if built out under current zoning, would use up the remaining capacity of the sewage treatment plant. The Proposed Land Use Plan in Chapter 2, the Land Use Element, includes a rezoning for areas within the sewer district, resulting in lower intensities of development in some places. ~~As a result~~ Thus, there may be some excess capacity to be allocated, ~~and expansion of the district boundaries should be considered~~, resulting in the potential expansion of the District. The first priority for expansion would be to include additional areas along Route 58 or just north of Route 58.

~~Additional areas to be considered should include the hamlet centers. If sewer lines are extended to hamlet centers beyond downtown (i.e., Jamesport, Aquebogue, Calverton), there could be pressure for new development along the sewer corridor to tap into the line. This could encourage further sprawl development along some of the Town's most attractive scenic corridors (western and eastern legs of Route 25. To avoid such development, the Town should ensure that sewer main connections between downtown and the hamlet centers are restricted for the sole use of the hamlet center. That is, properties along the sewer line should not be able to connect.~~

Policy 10.3B: Consider the feasibility of expanding the Town's sewage treatment ~~plant in the future~~, taking into account the nitrate flushing ~~problem~~ dynamic in the western end of the Peconic Estuary.

As noted, Riverhead's treatment plant discharges effluent into the Peconic River. Nitrates are not as effectively flushed from this area as compared to others, due to its location at the western edge of the estuary. Another option is to explore the expansion of sewage capacity using a combination of ground and surface water discharge.

Policy 10.3C: Continue to explore the need and feasibility of an expanded sewage treatment plant for Enterprise Park.

The Town ~~is currently establishing~~ has established a second sewer district to ~~handle~~ collect and treat effluent from Enterprise Park. The Town is exploring the possibility of expanding the former facility that served the original site from a capacity of 62,000 gallons per day (gpd) to 500,000 gpd.

Policy 10.3D: ~~Work with the County to expand use of privately owned and operated package treatment plants.~~ Suspend the collection and treatment of wastewater generated by out-of-district users.

By contrast, the Riverhead Sewer District currently collects and treats wastewater generated by Suffolk County facilities located within the Town of Southampton. The average daily flow processed from these facilities is estimated at 200,000 gallons per day.

The Riverhead Sewer District should convince the County of Suffolk to be in a position to collect and treat this wastewater by the end of the contract term, which would provide capacity for necessary development within the Town of Riverhead, particularly work force housing.

~~The Town should explore new technologies that have improved the successful use of package plants in the past.~~

Goal 10.4: Encourage energy conservation and efficient use of utility infrastructure and services.

~~Policy 10.4A: Promote sensible use of electricity, water, natural gas by making information available on the techniques, benefits, and potential cost savings of energy conservation in Town Hall, the Riverhead Free Library, and on the Town's web site.~~

~~Policy 10.4B: Consider requiring low-flow faucets and low-flush toilets for new development.~~

Policy 10.4A: Encourage water saving plumbing devices to be utilized town-wide.

This would make more efficient use of the capacity of the Town's sewage treatment plant or private package treatment plants.

Goal 10.5: Ensure that the physical infrastructure associated with utility services is respectful of the Town's natural, scenic, and historic resources.

Policy 10.5A: Require all new utility lines to be installed underground.

This is intended not only to reduce visual blight, but to promote public safety. Overhead wires, in particular, can pose safety hazards to residents.

Policy 10.5B: Work with utility providers to underground existing above-ground utility lines.

Although this is a costly undertaking, there may be cost-effective ways to move utility lines underground over time. As roadway widening and improvement projects occur, requiring the movement of utility poles, utility providers could take advantage of the roadway work to underground the lines. Facilitating access to underground lines for maintenance purposes should also be addressed.

Policy 10.5C: ~~Consider restricting the location and/or height of cellular towers in order to reduce visual blight along the Town's roadways.~~ Add cellular towers to the Type I list pursuant to § 61-14 of the Town Code and require the preparation of an Environmental Impact Statement (EIS) to support special permit petitions for new cellular towers.

The addition of new cellular telephone antennas to the existing network is necessary to fill service gaps. In the review of special permit petitions for the construction of cell towers to house new antennas, the Town Board should determine the dimension and location of service gaps and verify the public need to fill such gaps through the SEQR process.

~~Also, although there are no confirmed health risks associated with cell phones or cell towers currently, the Town should continue to monitor cell-related health research. If warranted, the Town may consider additional regulations on cell towers in the future, for the purposes of public health and safety.~~

Policy 10.5D: Strive for increased gray water irrigation on active recreational fields and golf courses.

The Town is currently ~~working~~ participating with the County of Suffolk ~~to explore~~ in a study to assess the feasibility of gray water irrigation on Indian Island Golf Course. ~~Other County sights should be considered as well~~. In the event that such application of treated wastewater is environmentally acceptable, a pilot program should be pursued at the golf course and other suitable sites. Other sites that should be considered include Town parks and private and public golf courses Townwide. This policy would result in the reduced discharge of treated wastewater into the Peconic Estuary, reducing the potential for long-term environmental impacts to surface waters.

Policy 10.5E: Explore the feasibility of expanding tertiary treatment of the Town's sewage treatment plant.

The Town currently does tertiary treatment for nitrates only.

Goal 10.6: Continue to provide a high-quality solid waste disposal program.

Policy 10.6A: Continue to review the annual performance of solid waste pick up done through the Riverhead Solid Waste Collection District and its six subdistricts by contracted haulers.

Policy 10.6B: Work with private property owners to review the annual performance of solid waste pickup done for commercial and multi-family sites by contracted haulers.

Goal 10.7: Continue to provide a high-quality recycling program that strives to reduce the amount of solid waste that Riverhead sends to landfills.

Policy 10.7A: Prepare an updated solid waste management plan to be approved by the NYS Department of Environmental Conservation.

Policy 10.7B~~A~~: Consider adding mixed paper and white paper to the list of recyclable items that the Town will pick up curbside in residential areas.

~~The Town currently picks up newspaper only.~~

Policy 10.7C~~B~~: Consider adding expanding the list of recyclable items that the Town will require to be picked up by private haulers on non-residential sites.

Policy 10.7D~~C~~: In conjunction with the ~~issuance of demolition permits~~ approved solid waste management plan, explore the feasibility of requiring the recycling of building debris or materials.

Policy 10.7E~~D~~: Continue to review the annual performance of recycling and leaf pick-up, and if necessary, consider adjusting pick-up schedules to better serve the public.

Policy 10.7F~~E~~: Continue to work with State and County officials to monitor and improve the recycling program as necessary.

New York State reached its goal of 40 to 42 percent recycling by 1997, which was established in the 1987 New York State Solid Waste Management Plan. The Town should continue to strive for a 40 to 42 percent recycling rate, consistent with Statewide goals. If necessary, the Town can consider applying for State grant funding, under the Municipal Waste Reduction and Recycling

Program. Examples of the types of projects that can be funded by the grant include: waste reduction capital, planning, and promotion costs; recycling equipment; and recycling structures and materials recycling facilities.

Goal 10.8: ~~Remediate and reuse~~ Continue to mine the former Town landfill and prepare a reclamation plan.

~~As noted, the Town is currently determining the potential for remediation of the site by mining. If mining is determined to have excessive odor impacts or to be too costly, capping may be the preferred option. If capped, potential future commercial or residential use of the site would be more limited, but reuse as park space could be feasible.~~

Policy 10.8A: Continue to pursue State funding for mining ~~or capping~~.

State funding may be available during coming years for ~~these purposes~~ this purpose. ~~Riverhead's landfills~~ The former Town landfill is one of the few remaining sites in the State that requires remediation, ~~and thus, its remediation should be made a priority~~ making it a priority site by definition.

~~Policy 10.8B: Develop a reuse plan for the landfill site.~~

~~Depending on whether mining or capping is done, the Town should determine what uses might be appropriate for the site.~~

~~Policy 10.8C: As an interim measure, consider requiring densely wooded buffers for new development around the landfill.~~

~~If mining is undertaken, there could be serious odor impacts on adjacent uses. Requiring buffers for new development abutting the site could help limit such impacts. If mining is determined not to be a feasible course of action, such buffers would not be needed.~~

East Hampton Power & Light Company

Calverton Generating Facility

Appendix Q

4. Natural Resources Conservation Element

4.1 VISION STATEMENT

The natural resources present in Riverhead today — including stream corridors and wetlands, the Central Pine Barrens region, and the aquifer that provides high quality water to the Town — are integral to Riverhead's long-term health, safety, and well-being, as well as its identity and economic vitality. As such, the ecological integrity of Riverhead's natural resources must be maintained and protected.

Riverhead occupies a unique place within the much admired landscape of eastern Long Island. Riverhead lies literally "at the head of a river" — the Peconic — which is Suffolk County's largest. The Town also serves as the geographic bridge between the north and south forks of the East End, lying as it does at the juncture of these two landforms, and the Peconic River is the lynchpin of the juncture. The fact that the community derives its name from a major natural feature goes to show how much that natural environment shapes the Town's identity.

Riverhead is a coastal community, bounded by water on much of its perimeter. In addition to its waterfront along the Peconic Estuary system (which includes the Peconic River, Flanders Bay and the Great Peconic Bay), Riverhead is bounded to the north by Long Island Sound. Many of the shoreline and coastal areas in Riverhead are scenic — particularly the Sound waterfront, with its picturesque bluffs — and all of them have distinctive plant and animal communities. Finally, the Town is an agricultural community, where natural resources play an important role in the livelihood of residents, property owners, and businesspeople.

In all these ways, the natural environment shapes the way of life in Riverhead. Through the Comprehensive Plan, Riverhead has an opportunity to plan for new development in such a way that the natural environment can be better preserved. The condition and quality of natural resources not only affect public health and safety, but play a significant role in the local economy. The local agricultural economy, for example, relies upon the Town's water and soil resources for business. This Element discusses three major categories of natural resources:

- ***Water Resources***. The surface waters of Long Island Sound and the Peconic Estuary are unique natural and scenic resources that are used for fishing and recreational activities (like canoeing, kayaking, sailing, and swimming). Other sensitive water resources include non-coastal surface waters, such as rivers, ponds and intermittent streams. Protection of surface water from contaminated runoff is critical for the protection of both the fishing and tourism industries. Less visible but equally critical are the underground water aquifers. Protection of aquifer recharge areas is essential to maintaining the thousands of wells, public and private, that the community depends upon for drinking water.
- ***Soils and Topography***. The characteristics of soils and landforms determine those areas best suited for agricultural use. Many of the soil types in Riverhead are particularly well-suited to agriculture. (Chapter 3, the Agriculture Element, provides a more detailed discussion of farmland resources and farmland preservation strategies.) Also, by affecting whether septic systems can successfully be installed and used, soils may shape the type and density that development that can be accommodated. Topography is an important economic resource as well. The Town's rolling landscape and coastal bluffs contribute to the unique visual character of the community, attractive to residents and visitors alike. Erosion and flooding issues are also addressed in this chapter.
- ***Plant and Animal Communities***. Found in woodlands, meadows, and freshwater and tidal wetlands, these communities are important for a number of reasons. Many of

them are rare or special; some provide food and habitat for other species; they contribute to Riverhead's natural heritage; and they perform important environmental and ecological functions. In particular, plants filter the water that flows into the region's aquifers and water bodies, removing pollutants and sediments, and their roots act as sponges to absorb the surge of excess water that comes with storms and flooding. In this way, plant communities can help reduce the potential for groundwater contamination and reduce the risks to life or property during a flood.

4.2 SUMMARY OF BACKGROUND RESEARCH

WATER RESOURCES

Water resources are important economic assets to the community. In Riverhead, local fishermen depend upon the water for their livelihood; fish and shellfish must be safe to eat and must occur in high enough abundance so that fish populations are sustainable. Because of the scenic beauty of the Town's water bodies, many of the waterfront areas in Riverhead attract water sports enthusiasts, as well as hikers, bikers, motorists, and tourists. Thus, from the point of view of the tourism industry, water bodies serve as attractions that draw potential customers. Residential property values are also tied to water resources and their quality. Coastal property is generally valued higher, because of the views.

At the same time, while water bodies and waterfront areas may be desirable economically, they are often some of the most fragile areas from an environmental standpoint. Human activity can easily upset the delicate environmental balance of those areas. Insensitive site planning, poor building design, or badly conceived planning efforts can compromise the beauty and integrity of these fragile and sensitive areas. Landscaping practices of both homeowners and businesses can put these waterfront areas at risk. Chemicals applied to field crops, golf courses, parkland, and athletic fields (i.e., herbicides, pesticides and fertilizers) can also harm a community's water resources.

Another important quality of the Town's water bodies is the unique plant and animal life found there. Water bodies, particularly freshwater and tidal wetlands, serve as critical habitat areas that support distinctive plant and animal populations.

Long Island Sound

Long Island Sound is approximately 110 miles long from east to west and is about 21 miles across at its widest point. More than 8 million people live within its watershed. According to research commissioned by the Long Island Sound Study (LISS), more than $5 billion is generated annually in the regional economy from boating, commercial and sport fishing, swimming and beachgoing associated with the Sound.[1] The ability of the Sound to support

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[1] See "References," at the end of this "Findings" section.

these activities depends on the quality of its waters, living resources and habitats – all of which are affected by the amount and type of development that occurs along the borders of the Sound and throughout its watershed. Communities, like Riverhead, along the north shore of Long Island are closely tied to the Sound and its overall health and visual character.

An Estuary of National Significance

Long Island Sound is an estuary,[2] a place where fresh and salt water mix. Like other estuaries, Long Island Sound is rich in fish, shellfish, and waterfowl. It provides feeding, breeding, nesting, and nursery areas for diverse animal and plant life and is an important component of the overall landscape and economy of the region.

Estuarine environments are among the most biologically rich on earth, creating more organic matter each year than comparably-sized areas of forest, grassland, or farmland. Estuaries provide habitat for more than 75 percent of America's commercial fish catch, and 80 to 90 percent of the recreational fish catch. Other benefits of estuaries include educational and recreational opportunities, provision of migratory habitat for birds, and provision of coastal wetland areas. Wetlands filter water from upland areas, serve as natural buffers between the land and ocean (absorbing floodwaters and dissipating storm surges), and help prevent erosion and stabilize the shoreline.

In 1987, as part of the National Estuary Program (NEP), Long Island Sound was designated an "Estuary of National Significance." Two years earlier, in 1985, the Sound's importance had been formally recognized by citizens and government through the formation of the Long Island Sound Study (LISS), a cooperative endeavor focused on analyzing and correcting the Sound's most pressing environmental problems.

As part of that effort, a group of stakeholders — known as the LISS Management Conference — first met in 1988 and has continued to work together collectively to implement the Comprehensive Conservation and Management Plan (CCMP) for the Sound that was released in 1994. The group of stakeholders working on this project includes citizens, environmental groups, businesses and industries, academic institutions and local, State, and federal agencies. Four threats to the Sound's water quality were identified by the LISS Management Conference group:

1. ***Low Dissolved Oxygen (Hypoxia)***. Just as people need oxygen to breathe, so do marine organisms. The oxygen used by marine organisms is "dissolved" in the water in which they live; when the level of dissolved oxygen falls below a certain

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[2] An estuary is a partially enclosed body of water that is formed where freshwater from rivers and streams flows into the ocean. Estuaries are characterized by the mixing of freshwater and salty sea water. Although influenced by the tides, estuaries are protected from the full force of ocean waves, winds, and storms by reefs, barrier islands, or fingers of land, mud, or sand that define an estuary's seaward boundary.

point, the organisms become stressed. They may become ill, die, or move to more oxygen-rich waters, thus decreasing the health and vitality of the water body. One of the major contributing factors to low dissolved oxygen is the release of nitrogen from land-based sources, such as sewage treatment facilities, stormwater runoff, and agriculture. Nitrogen over-fertilizes the Sound, fueling the growth of algae, which ultimately sinks to the bottom and decays, depleting oxygen in the bottom waters.

2. ***Toxic Contaminants***. Of the 55,000 chemicals in use today, many are toxic. In high concentrations, some of these substances can kill marine life. Others can have more subtle effects on behavior and reproduction, or may impact intricately balanced food webs. Additionally, toxic substances can accumulate at high levels in the tissue of marine organisms, creating a health risk for seafood consumers. Fortunately, pollution controls and changes in manufacturing trends have decreased the amount of contaminants discharged into the Sound, resulting in lower concentrations of contaminants in the surface sediments.
3. ***Pathogen Contamination***. Disease-causing bacteria and viruses can enter the Sound from inadequately treated human sewage and animal waste (domestic or wild). People can become sick by swimming in waters contaminated by pathogens or by eating raw or partially cooked shellfish that contains pathogens. Some of the primary sources of the Sound's pathogens are overflowing sewer systems; malfunctioning septic systems or sewage treatment plants; and illegal connections to storm sewers. Another source is the discharge of sewage from boats.
4. ***Floatable Debris.***

These four items represent problems that are created primarily by human activity and/or development practices and impacts. Some of these conditions and their development-related impacts are described more fully in Appendix B.

Taxpayer dollars have been and will continue to be invested in the Sound to deal with contamination issues. New York State citizens have shown their support for efforts to protect and improve the quality of their natural resources through legislation such as the 1996 Clean Water/Clean Air Bond Act. The act included $200 million for projects to address the priorities identified in the Long Island Sound CCMP, including the reduction of nitrogen releases. To date, $83.2 million has been committed for projects to upgrade and improve sewage treatment plants, restore critical aquatic habitat, purchase open space and reduce non-point sources of pollution.

The Peconic Estuary

Many of the issues identified above for Long Island Sound are also of concern for the Peconic Estuary system, with extends from the mouth of the Peconic River out to the Atlantic Ocean and includes a portion of Block Island Sound. It also includes what is known as the "stormwater runoff-contributing watershed" and the "groundwater contributing area."

Altogether, the system is composed of more than 100 distinct bays, harbors, embayments, and tributaries spanning more than 110,000 acres of land and 121,000 acres of surface water. It encompasses 340 miles of coastline.

Riverhead is at the western end of the estuary system, which includes Flanders Bay and the mouth of the Peconic River. The Peconic River supports a wide variety of plants and animals, both within its water and along its banks. The shores of the bay contain an 800-acre, undisturbed salt marsh complex, which is considered a rich marine ecosystem that serves as a nursery for a variety of marine life.

Although the Peconic Estuary system generally has high water quality, development in its watershed areas, wastewater effluent, and dirty stormwater continue to threaten water quality and other important resources associated with the estuary.[3] Water quality in the western end of the system (mouth of the Peconic River and Flanders Bay, near Riverhead) is particularly vulnerable, because the waters there are poorly flushed compared to waters further east.

The Economic Value of the Peconic Estuary

As part of a project to help the Peconic Estuary Program and coastal managers determine priorities for managing and protecting the Peconic Estuary, the Department of Environmental and Natural Resource Economics at the University of Rhode Island has assessed the economic value of the Peconic Estuary. As part of that study, 29 estuarine-dependent economic sectors were identified. For the Peconic Bay, these included over 1,000 establishments that employ more than 7,000 people, pay wages in excess of $117 million and have total annual revenues of over $400 million. Overall estuarine-dependent economic activity accounted for about 20 percent of the local economy. Tourism and recreation establishments make up more than 80 percent of the estuarine-dependent economy.[4]

The Peconic Estuary Program

The Peconic Estuary is one of 28 estuaries in the National Estuary Program (NEP), administered by the U.S. Environmental Protection Agency (EPA), and was accepted into the program as an "Estuary of National Significance" in 1992. The Peconic Estuary Program

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[3] The National Estuary Program. *Coastlines: Information About Estuaries and Near Coastal Water (August 1999, Issue 9.4).* National Estuary Program, U.S. Environmental Protection Agency, 1999.

[4] Grigalunas, Thomas A. and Jerry Diamantides. *The Peconic Estuary System: Perspective on Uses, Sector and Economic Impacts.* (February 1996; unpublished technical report submitted to the Peconic Estuary Program); Opaluch, James J.; Thomas A. Grigalunas, Jerry Diamantides, Marisa Mazzotta and Robert Johnston. *Recreational and Resource Economic Values for the Peconic Estuary System.* (February 1999; unpublished technical report submitted to the Peconic Estuary Program); The National Estuary Program. *Coastlines: Information About Estuaries and Near Coastal Water (August 1999, Issue 9.4).* National Estuary Program, U.S. Environmental Protection Agency, 1999.

(PEP) is part of the NEP and is sponsored by the EPA, the State's Department of Environmental Conservation (DEC), and the Suffolk County Department of Health Services (SCDHS). The SCDHS operates the program and provides day-to-day management, as well as technical and administrative support.

In 2001, a group of citizens, technical experts, and federal, State, and local officials — known as the PEP Management Conference — completed the Comprehensive Conservation and Management Plan (CCMP) designed to protect and preserve the Peconic Estuary system. The CCMP was endorsed by Governor Pataki in July 2001 and was forward to the EPA, with the hope that the federal agency would allocate funding to help implement the plan.[5]

In addition to pathogen contamination and toxic chemicals (two of the same issues affecting Long Island Sound), the CCMP also identified "brown tide" and "nutrient pollution" as serious issues in the estuary system. Also, as discussed in the subsection on plants and animals, the CCMP also expressed concern about ongoing threats to habitat areas and living resources.

Brown Tide

An algae bloom caused by a small and previously unknown species (*Aureococcus anophagefferens*), Brown Tide was first detected in June 1985 and has appeared and re-appeared sporadically since then. Its onset, duration, and cessation have been unpredictable. Although advances have been made regarding the identification and characterization of the brown tide organism and its growth needs, the causes of the brown tide are not known.

The impacts of the recurring Brown Tide blooms are widespread, having a serious effect on natural resources, the local economy, and the general aesthetic value of the estuary. Brown Tide has been particularly devastating to shellfish resources. The estuary's scallop harvest accounted for 28 percent of U.S. landings in 1982 with a dockside value of $1.8 million dollars. By 1988, the scallop harvest had dropped from 150,000 to 500,000 pounds per year (pre-Brown Tide) to only 300 pounds per year (post-Brown Tide). By 1994, the scallop population had rebounded but was then hit with a brown tide in 1995 which caused significant scallop mortality again.[6]

In 1992, the SCDHS released the Brown Tide Comprehensive Assessment and Management Program Report (BTCAMP) in response to the Brown Tide problems. The BTCAMP study recommended that a host of pollution abatement strategies be pursued in the Peconic Bay area, including:

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[5] "Governor Pataki Endorses Peconic Estuary Conservation Plan" Press Release, New York State, Office of the Governor, July 19, 2001, <www.state.ny.us/governor/press/year01/july19_01.htm>.

[6] Peconic Estuary Program, Office of Ecology. *Draft Comprehensive Conservation and Management Plan – September 1999.* Suffolk County Department of Health Services, September 1999, Riverhead: New York.

- Upgrading of the Riverhead Sewage Treatment plant;
- Stricter zoning;
- Restoration of wetlands and eelgrass beds;
- Stormwater runoff management;
- Boating and marina controls; and
- Further monitoring of water quality and the Brown Tide.

Nitrogen

Prior to the establishment of the Peconic Estuary Program, the ground and surface water quality of the Peconic Estuary and its surrounding watershed was studied in some depth. The primary emphasis at that time was on the western estuary, including the Peconic River and Flanders Bay — the area of the estuary bordered by the Town of Riverhead. At that time, significantly elevated nitrogen concentrations were found along the North Fork (typically 5 to 7 mg/liter). These elevations were attributed to agricultural and residential influences, resulting in part from the fertilizers used in these areas.

At that time, studies also found that groundwater in the Peconic River was of relatively high quality. This was attributed to that fact that much of that land draining into the river was at the time vacant, consisting primarily of undeveloped land, parkland, or nature preserves. As land in the Peconic River watershed becomes more highly developed, the river's water quality would tend to degrade, unless adequate land use planning and site design requirements are established. Careful attention is required not only to streamside development, but to any development projects Townwide that could impact groundwater resources.

Studies also revealed another area of concern, namely the need to control point source loading — most notably nitrogen — into the Peconic Estuary system from the municipal sewage treatment plant whose discharge location is at the mouth of the Peconic River. The PEP has adopted "no net increase" nitrogen loading recommendations for the tidal Peconic River and Flanders Bay. This nitrogen level "freeze" is being implemented through point source discharge permits for the three sewage treatment plants in the area.

AQUIFER AND GROUNDWATER RESOURCES

Central Pine Barrens

The Central Pine Barrens helps maintain the water quality of the sole source aquifer that provides drinking water for more than 2.5 million residents on Long Island. This aquifer is regularly replenished by rainwater. Water percolates downward into the soil through a hydrological phenomenon known as "deep flow recharge." Because the soils in the Pine Barrens area are so porous, they are very good at recharging the aquifer.

The Central Pine Barrens once covered approximately 250,000 acres in central Suffolk County. However, due to landscape changes wrought by development, the ability of portions of the original area to serve their original ecological function as aquifer recharge areas has been diminished or lost. As a result, the Central Pine Barrens area now consists of less than half its original area, covering approximately 100,000 acres of relatively undeveloped land.

The soil features that make the Central Pine Barrens an ideal area for groundwater recharge also make the drinking water supply especially vulnerable to the risk of pollution. Because the soils are so permeable, they are not as capable of filtering contaminants as well as some other soils. Thus, contaminants can enter, and in sufficient quantity, contaminate the aquifer system.

Comprehensive Land Use Plan

Because of the importance of the Central Pine Barrens, many important laws and policies were adopted at the County, State, and federal levels to protect it from the negative impacts of development throughout the 1970s and 1980s. These initiatives culminated in 1993, when the State adopted the Long Island Pine Barrens Protection Act. The act established a 5-member Central Pine Barrens Joint Planning and Policy Commission and mandated that the Commission prepare the *Central Pine Barrens Comprehensive Land Use Plan*. This plan was adopted in June 1995.

The plan identifies two regions within the Central Pine Barrens — the Core Preservation Area and the Compatible Growth Area. The Core Preservation Area consists of 55,000 acres (4,720 in Riverhead), in which all new development is essentially prohibited, with limited expansion of existing agricultural uses being permitted. The Compatible Growth Area consists of 47,500 acres (5,484 in Riverhead), in which appropriate patterns of compatible residential, commercial, agricultural, and industrial development are permitted.

The plan includes a strategy for the public acquisition of private vacant property in the Core Preservation Area, with a goal of purchasing 75 percent of the remaining privately owned vacant land. To this end, a transfer of development rights (TDR) program called the Pine Barrens Credit (PBC) Program has been created. Property owners in the Core Preservation Area may transfer the right to develop a parcel in the Core to another parcel outside the Pine Barrens region.

SOILS AND TOPOGRAPHY

Geological Formations

Over time, a variety of forces have shaped and continue to shape the landscape of Long Island. These forces have included the advance and retreat of glaciers thousands of years ago; the weathering action of rain that erodes the landscape over time; the movement of soil particles through the landscape by rivers and streams; and the shifting of landforms created by the movement of large water bodies, particularly those that are tidally influenced. The most prominent landforms in Suffolk County are:

- Two hilly ridges (called moraines) that extend in long strips from west to east;
- Two gently sloping outwash plains that fall to the south of each moraine;
- Eroded headlands found along the northwestern shore of the county;
- Barrier beaches of the south shore; and
- Tidal marshes.

The moraines and outwash plains were formed by the action of glaciers. The weathering effect of rainfall that has occurred over many hundreds, even thousands of years, has slowly eroded those hills and other upland features. Meanwhile, the barrier beach and tidal marshes have probably been formed in relatively shorter time frames by water movement and particle deposition, from streams, rivers, oceans, and bays. Elevation in the County ranges from almost 400 feet at West Hills to sea level.

Glacial Formations

The advance and retreat of glaciers played a primary role in forming the soils and landforms of Long Island. The Wisconsin stage, the last of four major glacial stages, produced Long Island Sound as well as many of the significant topographic features apparent on Long Island today. In Suffolk County and Riverhead, glacial landforms define the overall landscape character and correlate strongly to the existing soil associations.

During the earlier part of the Wisconsin stage, the glacier moved south across what is current-day Long Island. The glacier acted much like a bulldozer, pushing a complex mix of soil and glacial debris ahead of it. When the glacier retreated, the pile of debris was left behind, forming an extensive, irregular, hilly mound called a moraine. This moraine, known as the ***Ronkonkoma moraine*** extends in a long band from the Nassau County line (near Smithtown) to Montauk Point. Part of this moraine passes through Riverhead, along the southern edge of the town, in the area of course-textured, excessively drained soils just north of the Peconic River. This area corresponds to the Plymouth-Carver Rolling and Hilly soil association.

Following this period of glacial retreat, the glacier advanced one last time. However, with this final advance, the glacier did not advance as far south before beginning its retreat. Once again, the bulldozer effect of the glacier left behind a hilly pile of morainal debris. In Suffolk County, this second moraine — known as the ***Harbor Hill moraine*** — forms the northern shore of the county, extending in a long band from the western edge of the county all the way to Orient Point. In Riverhead, this morainal landform is found along the northern edge of the town, in the hilly strip that borders Long Island Sound. This area corresponds to the Carver-Plymouth-Riverhead soil association described below.

Each time the glacier reached its southern limit, it began to melt. As the glacier melted, streams flowed south away from the glacier and its morainal deposits. These "meltwater" streams carried large amounts of sand and gravel that were deposited in a more or less flat plain, forming broad, flat landscape features known as outwash plains. There are two outwash plains in Suffolk County:

- One outwash plain lies between the Ronkonkoma moraine and the Atlantic Ocean and forms the southern edge of the County.
- The other outwash plain lies between the Harbor Hill moraine and the Ronkonkoma moraine. In Riverhead, this outwash plain occupies the majority of the Town's land area, extending from west to east in a broad band across the entire Town. This central landform, framed by the Harbor Hill moraine to the north and the Ronkonkoma moraine to the south, forms the agricultural core of Riverhead. This area corresponds to the Haven-Riverhead soil association described below.

Riverhead Soils

Seven important soil types are found in Riverhead; these are described below. The first three soil types are key to understanding the geographic makeup of the Town. They cover the majority of the land area within Riverhead and occur in three bands parallel to Long Island Sound. The remaining four soil types are unique or especially fragile soil types that cover a much smaller percentage of land area and are found in pockets or narrow strips near the coastal edges.

- ***Carver Plymouth Riverhead Association (Harbor Hill Morainal Area — North Shore).*** "Deep, rolling, excessively drained to well-drained, coarse and moderately coarse textured soils." Located mainly along the Sound. In the eastern part of the area covered by these soils, there are some sharp slopes. Many areas are currently wooded. The sandy texture and steep slopes make the soil poorly suited to farming. Slope is the dominant limitation to the use of these soils as building sites. Steep slopes are also more prone to erosion, particularly if construction, grading, or clearing are being conducted.
- ***Haven-Riverhead Association (Outwash Plain Area — Central Agricultural Zone).*** "Deep, nearly level to gently sloping, well-drained, medium-textured and moderately coarse textured soils." These soils are located in a wide band across the central area of the Riverhead. Soils are typically level and have short, gentle slopes along shallow drainage ways. Some areas are pitted by steep-sided kettle holes. Most of the areas covered by this soil in Riverhead have been cleared, and a large part is being used for farmland. These soils are well-suited to agriculture, as they have moderate-high moisture capacities, and crops respond well to applications of lime and fertilizer. Because drainage is good in these soils, and they can be excavated with ease, this association also has excellent potential for housing developments and similar uses. In some places, the water table is high limiting development potential.
- ***Plymouth-Carver Association, Rolling and Hilly (Ronkonkoma Morainal Area — South).*** "Deep, excessively drained, coarse-textured soils." Steep slopes, ranging from 8 to 35 percent. Soils of this association are course-textured and prone to

drought. Permeability is rapid, and natural fertility is low to very low, making them ill-suited to farmland. Development is severely limited due to steep slopes. Some areas have high water tables, which also limit potential development. Rapid permeability has the potential to result in groundwater contamination. These soils are located in a narrow band along the southern edge of the Town, bordering the Peconic River and Flanders Bay.

- ***Beaches (Bc)***. Made up of sandy, gravelly, or cobbly areas that develop between dunes and escarpments and the line of water at mean sea level. The slope of beach soils is nearly level in most areas but it is as much as 16 percent in some places on the Atlantic shore. All beaches along Long Island Sound are gravelly and cobbly. In most places, beaches on the bays are sandy, but varying amounts of gravel are mixed with the sand.
- ***Escarpments (Es)***. Escarpment soils are made up of bluffs that have slopes greater than 35 percent. In Riverhead, *Es* occurs along the north shore. With such steep slopes, there are highly subject to erosion. Except for a few scattered areas, soils are generally devoid of vegetation. Along the north shore of Long Island, the material in the escarpments is sand. Many escarpments have large boulders embedded in the soil, which roll to the beach as the escarpment erodes. Escarpments are used as habitat by some species of songbirds.
- ***Muck (Mu)***. Muck is made up of very poorly drained organic soils that have formed from partly decomposed or almost completely decomposed woody or herbaceous plants. Muck is made up of 16 to 48 inches of spongy, black or dark-reddish organic material over loose sand and gravel. The water table is at or near the surface most of the year. Muck areas are nearly level and occur in the bottom of closed depressions and along streambeds. In Riverhead, most areas are found along the Peconic River in depressions that are irregular in shape. Most of this land type is covered with woodland or marsh grass. It is best suited to habitat for wetland wildlife.
- ***Tidal Marsh (Tm)***. Tidal marsh soils are made up of wet areas that occur throughout the County around the borders of calmer embayments and tidal creeks. These level areas are not inundated by daily tide flow, but they are subject to flooding during abnormally high moon or storm tides. Tidal marsh soils have an organic mat on the surface that ranges from a few inches to several feet in thickness. The organic mat overlies pale-gray or white sand. In many places the profile of the marsh is made up of alternating layers of sand and organic material, that has developed as a result of sand being deposited on the organic mat during abnormally high storm tides. These very poorly drained areas are not suitable to any kind of farming. They are best suited to use as habitat for types of wildlife.

WOODLANDS

The most well-known woodland area in eastern Long Island is the Central Pine Barrens region, which as noted, is composed of nearly 100,000 acres of Pitch Pine and Pine Oak forests. The Central Pine Barrens is protected from nearly all future development, due to its function as a groundwater recharge area. The forest is considered a unique and rare habitat area for both plant and animal species.

Another important woodland area is found along the shoreline of Long Island Sound in Riverhead. The moraine that forms the Long Island shoreline has a mix of rocky bluffs and sand hills, which extend roughly from Wading River to Northville. Along the upland ~~this stretch~~ of the escarpment lies the Coastal Oak Beech woodland, which is considered old growth. In certain areas along the escarpment are stands of dwarf beech considered globally rare by the New York Heritage Program of the New York State Department of Environmental Conservation. ~~one of the most unique areas is found in the area of Baiting Hallow and Friar's Head: a series of sandhills with unique vegetation. The area is increasingly referred to as the Grandifolia Sandhills. The bluffs and sand hills are known for their rare dwarf beech and maritime woodlands. Much of the woodland area is relatively old growth.~~

In 1994, New York State Department of State, Division of Coastal Resources, stated: "portions of the Riverhead Bluffs around Friars Head are covered by a maritime beech forest, a unique plant community on the Sound considered by the NYS Natural Heritage Program to be globally rare. It is one of three known maritime beech forests in New York (and in size, the largest, by far), and one of three known along the east coast. The tree extent of the maritime beech forest is not known, but it may stretch beyond the immediate area of Friars Head." Other occurrences of dwarf beech forest have been found in Wildwood State Park ~~(about 3 miles west of Grandifolia Sandhills);~~ and sites about 2 to 3 miles east of Friar's Point.[7]

PLANTS AND ANIMALS

In protecting plants and animals, the focus is often on individual species of plants and animals, those that are especially rare, endangered or at risk. However, it is also important to understand that these native species are part of a larger ecological framework — one that is often visualized as a community. The individual species are part of a larger, interrelated whole that involves complex relationships between many species and their surroundings. Plants and animals are woven together into a complex web of food, water, and shelter relationships. Thus, when a particular plant or animal is endangered or threatened, its broader habitat must be adequately protected from adverse impacts in order to ensure the continued existence of the species.

The natural environment of Riverhead includes a variety of unique and highly productive ecosystems, some aquatic and some terrestrial. These ecosystems support a diverse array of living species, including microscopic plants and animals, seaweed, fish and shellfish, crustaceans, birds, sea turtles, and marine mammals (associated with aquatic habitats), as well

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[7] ~~Eric Lamont, "The Grandifolia Sandhills: One of Long Island's Great Natural Wonders," *Long Island Botanical Society Newsletter*, Vol. 8, No. 3, Special Issue, 1998; <pbisotopes.ess.sunysb.edu/molins/libs/sandhills/sandhills.html>.~~

as trees, flowing plants, insects, amphibians and mammals (associated with terrestrial habitats).

Riverhead is part of the Peconic Region, which encompasses the watershed of the Peconic Estuary and spans the area between the western edge of the Central Pine Barrens to the tips of the North and South Forks. The Peconic Region provides habitat for one of the highest concentrations of rare plants and animals in the state. Of these, 21 species are globally rare. Additionally, the beaches in the Peconic Region provide habitat for two federally endangered shorebirds — the Piping Plover and the Roseate Tern.

Native Species

Plants and animals that are "native," or indigenous, to the region are considered particularly valuable. They are part of the region's natural and environmental heritage, and they also contribute to the natural scenery, which appeals to not only nature enthusiasts, visitors, and tourists, but also local residents. Many residents moved to the East End from more urbanized areas to live closer to nature. In many areas, agricultural and landscaping practices introduce "non-native, invasive" species that choke out the more fragile native species. While only a few such plants may be planted, their seeds are easily transferred by wind, water, birds, or insects. One example is the popular landscaping plant Norway Maple (*Acer platinoides*), whose seeds quickly spread into natural areas and new plants end up taking over native plant and animal communities.

Native plants and animals are an essential part of the ecological, scenic, historic and economic fabric of the community. Protection of native plants and animals promotes ecological diversity, thereby ensuring the survival and sustainability of a wide range of plant and animal species. Native plants and animals are also important as educational and scientific resources. In addition, native plants and animals are part of the scenic and recreational amenities of a region; they provide opportunities for enjoying and observing nature and contribute to the community's unique identity.

Plants and Animals of the Estuaries

Riverhead's estuarine environments — which include the Long Island Sound and Peconic systems — support unique communities of plants and animals specially adapted to life at the interface between land and water, and between salt water and fresh water. Many different habitat types are found in and around estuaries, including shallow open waters, freshwater and salt marshes, sandy beaches, mud and sand flats, rocky shores, oyster reefs, river deltas, tidal pools, sea grass and kelp beds, and wooded swamps. Estuaries are ecologically diverse and scenically varied environments.

The salt marshes and submerged eelgrass beds found within estuary give food and shelter to commercially important fish and shellfish. Sea turtles, such as the Kemp-Ridley, seals, whales, and countless shorebirds also use the estuary for breeding or feeding grounds.

The productivity and variety of estuarine habitats results in abundant and diverse wildlife and plant communities. Shore birds, fish, crabs and lobsters, marine mammals, clams and other shellfish, marine worms, sea birds, and reptiles are just some of the animals that make their homes in and around estuaries. They provide important habitat, as well as spawning and nursery grounds, for fish (e.g., bay anchovy, Atlantic silverside, scup or porgy, summer flounder or fluke, winter flounder, windowpane flounder, weakfish or grey sea trout, and tautog or blackfish) and shellfish (e.g., bay scallops, hard clams). These animals are linked to one another and to an assortment of specialized plants and microscopic organisms through complex food webs and other interactions.

As noted, both Long Island Sound and the Peconic Estuary are wrestling with the combined threats of hypoxia, toxic contamination, pathogen contamination, floatable debris, brown tide, nitrogen loading, and nutrient pollution. All of these are areas of concern for the plants and animals of the estuary systems.

Shellfish

Long Island Sound produces some of the best shellfish in the nation. Oysters are the dominant commercial shellfish. However, commercial and recreational shellfishers also harvest hard clams (or quahogs), soft-shell clams (or steamers), bay scallops, blue mussels, surf clams, and razor clams. At the end of the nineteenth century, oyster farming had developed into a major industry in the Sound. Today, after a period of decline, the Sound's oyster industry is once again one of the largest in the nation. The Sound's oysters are marketed nationally, and their high quality commands a premium price. The oyster is, by far, the most economically important shellfish harvested in Long Island Sound.

Lobster Landings

The American lobster is one of the most important and valuable seafood products harvested in New York. Long Island Sound's lobster fishery was the third largest in the country behind Maine and Massachusetts, earning a dockside value in New York alone of over $29 million in 1998. However, the health of the Long Island Sound lobster industry is now in question. Lobster fishermen and dealers began reporting dead and dying lobsters in their gear in the western third of Long Island Sound in mid-September of 1999. Continuing through 1999 and 2000, the die-off was unprecedented in scope and catastrophic to the lobster fishery.

Scientists are unsure what is causing the lobsters to die in the western Sound, although all the dead lobsters had the same protozoan parasite called *Paramoeba*. Research is under way to determine whether changes in weather conditions (such as storms or average temperature fluctuations), pollutants in the water or sediments, hypoxia (lack of oxygen), dietary change, or management practices (such as dredging and pesticide applications) could have weakened the animals so that they became susceptible to diseases and parasites.

Estuarine and Coastal Birds

There are more than 125 species of birds, mainly waterfowl, water birds, and raptors that rely on the estuary systems of eastern Long Island for food and habitat. Bird populations in and near eastern Long Island vary seasonally. In winter, mergansers, scaups, scoters, mallards, black ducks, loons, cormorants, and Canada geese are found in large concentrations. Spring brings the annual migration of a wide variety of plovers, terns, sandpipers, waterfowl, herons, egrets, and songbirds. During the summer months, birds are busy tending their nests and young. Fall, once again, brings masses of birds migrating along the coast to southern wintering grounds.

The Peconic Bay region is considered an "Important Birding Area" (IBA) by the New York State Audubon Society. An IBA is a site providing essential habitat to one or more species of breeding or non-breeding birds. The region is an important breeding area for American Oystercatchers; Piping Plovers; Common Terns; Least Terns; Black Skimmers. In addition, Ospreys nest in the Peconic Bay region and forage in the wetlands. The area is also important as a wintering and staging area for waterfowl, loons, and grebes, particularly Common Loons, Canadian Geese, American Black Duck, Scaup, Long-tailed Duck, and Red-breasted Mergansers.

The populations of Piping Plovers and Least Terns are lower now that in the past. Increasing development and recreational use of the species' essential habitat — Long Island's beaches — is the cause of their decline. Specific threats include:

- Loss of coastal habitat available for nesting and feeding, due to commercial, residential, and recreational development.
- Both eggs and the young birds are very well camouflaged, putting them in danger of being stepped on or otherwise disturbed by humans. Off-road vehicles pose a serious threat.
- Even innocent sunbathing can have its effects on the birds; if the beach is crowded with people, feeding is interrupted and young birds may not get the nourishment they need to survive. Those that do survive need to be strong enough for the long migration south.
- Dogs roaming unleashed disturb the birds. Cats prey on chicks and adults at night.
- Predation can be a major limiting factor on nesting success. Predators such as foxes, gulls, crows, raccoons, and skunks feed on eggs and young plover and tern chicks. Picnic waste attracts predators to the beach.

Eelgrass

Eelgrass is an aquatic plant that grows in shallow water generally less than 10 feet deep, and is found in temperate coastal bays and estuaries around the world. Eelgrass is important because it provides critical habitat for shellfish and finfish. Its long blades create an aquatic jungle that provides a hiding place for many juvenile fish. Without this nursery habitat, many young fish would not be able to escape from predators. It also performs other important functions within estuarine systems, including bottom stabilization and nutrient cycling. Eelgrass is very efficient at capturing nutrients from the water column and helps to reduce eutrophication (a buildup of nutrients). The roots stabilize the sediment and the plants themselves slow currents and allow suspended sediments to settle out — all of which helps improve water quality. The Long Island Chapter of The Nature Conservancy highlighted the importance of eelgrass in 2000 by naming it "Species of the Year."

In the Peconic Estuary, eelgrass is mostly found east of Shelter Island (anecdotal evidence suggests that eelgrass once existed in Flanders Bay), and eelgrass beds are currently declining in the Peconic Estuary. Exact causes are not known, but it is believed that the beds have been impacted by the effects of the brown tide and by poor water quality conditions including high levels of nitrogen and suspended sediment (which are often side effects of human development, building, and other activities). Other factors causing declines in eelgrass include eelgrass wasting disease, dredging and filling operations, and disturbance by power boats. Loss of eelgrass beds may eliminate other species by no longer providing them with specific habitat requirements.

Plants and Animals of the Central Pine Barrens

Ecologically, the Central Pine Barrens is a mosaic of regionally distinctive — and in some cases globally rare — plant and animal communities. A low, flat forest on nutrient-poor, glacially deposited sandy soils, the Pine Barrens region includes a globally rare natural community of Dwarf Pine Barrens. Also found within the Pine Barrens area are Pitch Pine and Pine-Oak forests, Coastal Plain Ponds, marshes, and streams.

The region contains an unusually high concentration of species that have officially been classified as endangered, rare, or subject to the protection of federal laws. Among the more important species inhabiting the Central Pine Barrens are the Tiger Salamander, the Red-Shouldered Hawk, the Northern Harrier, the Mud Turtle, the Common Nighthawk, and the Whip-poor-will. The area includes the last remaining viable grassland bird community on Long Island with breeding Upland Sandpipers, Vesper Sparrows, and Grasshopper Sparrows. Other characteristic pine barren species found in the Central Pine Barrens area include: Brown Thrashers, Blue-winged Warblers, Pine Warblers, Prairie Warblers and Field Sparrows.

Calverton Ponds Preserve

Contained within the Central Pine Barrens area, and located within the ~~boundaries of~~ Towns of Riverhead, Brookhaven and Southampton is the Calverton Ponds Preserve, a 350-acre assemblage of pine barrens and coastal plain ponds that comprises one of the rarest and most fragile wetland ecosystems in ~~North America~~ New York State. The preserve is cooperatively owned and managed by The Nature Conservancy and Suffolk County Parks.

Coastal plain ponds are characterized by nutrient-poor, acidic water and gently sloping shores. Most coastal plain ponds are not stream-fed, but are directly connected to groundwater. Pond water levels rise and fall with the water table, reflecting seasonal and annual rainfall patterns. As a result, a unique community of plants grows along the pond shores. Periods of both low and high water levels are essential for their survival.

Calverton Ponds Preserve and the headwaters of the Peconic River contain one of the highest concentrations of rare and endangered species in New York State, with more than 30 rare plants, including three that are globally threatened. The ponds are home to several rare amphibians, fish and insects, including Tiger Salamanders and Banded Sunfish. White Cedar swamps are found in the vicinity of the Calverton Ponds Preserve.

In February of 1999, the New York State Department of State, Division of Coastal Resources Habitat, issued an ecological assessment of the waters, wetlands and uplands of the Peconic River Basin. The document assessed the ecosystem rarity, species vulnerability, human use, population levels and replacibility of the Peconic River with a focus upon the aforementioned Coastal Plain Pond Resource. In the overall assessment, the resource was deemed irreplaceable.

As a result of being connected to groundwater resources, coastal plain ponds and their associated plant and animal communities are extremely sensitive to fluctuations in water levels and to any physical or chemical change in the water, such as increased nutrient loads. Changes in ground and surface water level due to human activity such as building and development could alter the normal hydrological conditions of the ponds and thereby endanger these communities. Even development located at some distance from these ponds has the potential to alter groundwater conditions.

Other Significant Plant Communities

In addition to the plant and animal species and communities described above, there are several other significant native plant communities in Riverhead. These communities, which have been identified and tracked by the New York Natural Heritage Program, are listed in Table 4.1. Potential threats to these communities include:

- Displacement from filling;
- Cutting of trees;
- Spread and invasion of non-native, invasive species;
- Impacts from road runoff;
- Alterations in hydrology;
- Removal of downed wood;
- Loss of surrounding forest integrity;
- Increase in trails;
- Impacts from development and building;

- Impacts from recreational use;
- Changes in vegetation due to fire suppression;
- Impacts from residential development (septic tanks);
- Impacts from fertilizer use, weeding, and mowing;
- Erosion; and
- Changes associated with stormwater runoff.

Table 4.1: Significant Plant Communities

Community Name	*Acres in Riverhead*
Maritime Beech Forest	97
Coastal Oak-Beech Forest	410
Coastal Plain Pond	3
Coastal Plain Pond Shore	162
Coastal Plain Poor Fen	10
Pine Barrens Shrub Swamp	26
Pitch Pine-Oak Forest	500

FLOODING AND EROSION

The coastal bluffs found along the Long Island shoreline are important barriers against erosion. Tidal marshlands found along the Peconic Estuary, and along the north shore, perform important ecological functions. They filter water from upland areas, cleanse it of sediments, nutrients and other pollutants, and ultimately release cleaner and clearer water to larger bodies of water. Wetland plants and soils also act as natural buffers between the land and ocean, absorbing flood waters and dissipating storm surges. These wetland areas help alleviate potential damage to valuable real estate from storm and flood damage. Finally, salt marsh grasses and other estuarine plants help to prevent erosion and stabilize the shoreline.

There are significant threats to Riverhead's natural resources, including tidal wetland areas and plant communities. These include: displacement from filling; cutting of trees; spread and invasion of exotics; impacts from road runoff; alterations in hydrology; removal of downed wood; loss of surrounding forest integrity; increase in trails; impacts from development and building in surrounding landscape; impacts from recreational use; changes in vegetation due to fire suppression; impacts from residential development (septic tanks); impacts from fertilizer use, weeding, mowing; erosion; and changes in plant and animal communities due to changes associated with stormwater runoff.

Coastal Erosion Hazard Areas

~~New York State's Environmental Conservation Law, Article 34 (6NYCRR Part 505) intends~~ Chapter 12 of the Riverhead Town Code was promulgated to protect and preserve the natural protective features such as dunes and bluffs of coastal areas, limit erosion, and ensure that erosion control structures are properly constructed. In Riverhead, these regulations apply to Long Island Sound, the Atlantic Ocean, and its connecting water bodies, bays, harbors, shallows and wetlands.

There are two categories of regulated areas: Natural Protective Features and Structural Hazard Areas. "Natural Protective Features" (NPFs) include: the nearshore, beaches, bluffs, primary dunes, and secondary dunes. "Structural Hazard Areas" (SHAs) are located landward of the NPFs and are found on shorelines that have a demonstrated long-term average annual recession rate of one foot per year or greater. The SHA is determined by multiplying the recession rate (x 40) and is measured from the landward limit of the NPF, if the recession rate is less than one foot per year or cannot be accurately established, then there is no SHA. Permits are required from the State's Department of Environment Conservation (DEC) for development along sensitive shoreline areas subject to erosion.

According to the Federal Emergency Management Agency (FEMA), which publishes the Flood Insurance Rate Maps (FIRM) for land areas throughout the country, there are several critical flood hazard areas throughout Riverhead. Nearly all of these are found along the Peconic Estuary and Long Island Sound. More land areas along the Peconic are prone to floods, because those areas are relatively low lying. Areas along the Sound tend to be more buffered from flooding impacts, due to the presence of the bluffs. Major 100-year flood hazard areas include:

- Areas along Wading River, west of Sound Road, from the Wading River hamlet going north.
- Parts of the NYS Conservation Area and the Boy Scout Camp in Baiting Hollow.
- Portions of Iron Pier Beach and Park, as well as some of the adjacent residential areas and open spaces.
- Portions of the open space areas included in the Central Pine Barrens region located south and southwest of Enterprise Park in Calverton. These areas drain into the Peconic River.
- Most of the banks along the Peconic River are subject to flooding. The width of the flood hazard area varies greatly, from 50 feet in some areas to about 200 feet in others, to as much as 1,000 feet in a few spots. East of the LIE, the flood hazard area is contained south of both the LIRR rail line and Route 25. In downtown, Grangebel Park and the parking lots on the south side of Main Street are subject to flooding, and the buildings on the south side of Main Street could be impacted by floods. The portion of the Peconic east of the dam in Grangebel Park is influenced both by the coastal tides and the freshwater flow from upstream.

- Many of the beachhead areas and stream corridor along Flanders Bay and the Great Peconic Bay could be subject to flooding:
  - Large portions of Indian Island County Park and the Riverhead Golf Course;
  - Areas along Meetinghouse Creek, extending as far north as Route 25;
  - Areas along Reeves Creek, extending as far north as the LIRR;
  - A wetland area between Reeves Creek and Simmons Point, extending as far north as Route 25;
  - All of Simmons Point and Mianogue Lagoon;
  - All of Mianogue Point, including the residential area along South Jamesport Avenue south of Peconic Bay Boulevard;
  - All of East Creek Marina and East Creek extending north past the LIRR tracks; and
  - Portions of Browns Point, reaching north past Peconic Bay Boulevard.

4.3 GOALS & POLICIES

Goal 4.1: Protect and preserve the ecological integrity of Riverhead's Central Pine Barrens area and the water quality of Long Island's sole source aquifer.

The Central Pine Barrens area and its associated aquifer are among the most critical natural resource areas in the Town, from a public health point of view, because the aquifer provides drinking water to about 2.5 million people. In 1995, the *Central Pine Barrens Comprehensive Land Use Plan* was adopted by the State, Suffolk County, and the Town. The plan defines a series of interrelated areas, including a Core Preservation Area, a Compatible Growth Area, and Critical Resource Areas and is designed to ensure protection of the area's critical natural resources while directing development appropriately. This plan is essential to protecting natural resources that are critical to both Riverhead and the region for the long-term, and the Town should continue to abide by and support its directives.

Policy 4.1A: Continue to fully support and implement the Central Pine Barrens Comprehensive Land Use Plan, and abide by or exceed the development standards and guidelines in the plan.

Policy 4.1B: Continue to provide ample receiving zones for Pine Barrens Credits in Riverhead.

In Chapter 2, the Land Use Element, there are descriptions of several new commercial zoning districts, which would be applied to Route 58, downtown Riverhead, and the Town's hamlet centers. Many of these zoning districts would be eligible for floor area bonuses if they purchase Pine Barrens Credits.

~~Policy 4.1C: Cooperate and partner with local non-profit organizations who are working to acquire and protect lands in the Central Pine Barrens area.~~

Policy 4.1C~~D~~: Protect the Central Pine Barrens area from potential contamination (i.e., nutrient/nitrogen loading, toxic contamination) or altered hydrological patterns as a result of new development, business practices, or household practices in adjacent areas.

Goal 4.2: Protect the quality of ground water and surface waters throughout the Town.

Surface waters that warrant protection include Long Island Sound, the Peconic River, and the entire Peconic Estuary system, as well as the small inland wetlands and streams found throughout the Town.

Policy 4.2A: Strive to reduce potential contamination of surface waters by continuing to meet or exceed water resource protection standards established by the New York State Department of Environmental Conservation.

Policy 4.2B: Work cooperatively with all federal, State, and County agencies that may regulate the region's water resources.

Wetlands are regulated at both the federal and state level. The State's Department of Environmental Conservation Division of Water Resources regulates surface water resources, including freshwater wetlands and tidal wetlands. In addition, the County's Planning Department and Water Authority work to protect water quality countywide.

Policy 4.2C: Communicate ~~Cooperate~~ with and administratively support the efforts of ~~local, non-profit conservation organizations like the Peconic Land Trust,~~ The Nature Conservancy, ~~and the North Fork Environmental Council~~ to protect sensitive, unique, and/or rare habitat areas~~, including wetlands~~.

Policy 4.2D: Work to limit new inputs of nitrogen, other nutrients, and toxic materials into surface waters emanating from developed areas and sewage treatment plants.

Sensitive landscape practices and appropriate stormwater management techniques can help limit the potential for contamination. The Town should encourage environmentally friendly landscaping practices and require appropriate stormwater management for new development. Sewage effluent should continue to be properly treated and disposed, so as to reduce the potential for contamination.

Policy 4.2E: Ensure that in all areas where wastewater is discharged to the ground (i.e., septic systems, constructed wetlands, and package treatments plants) are built with the

appropriate densities and appropriately designed so as to prevent nitrogen contamination of groundwater or surface water.

~~This policy is particularly important in light of cluster development requirements in the AOZ. In some parts of the AOZ, cluster development will use of package plants or wastewater disposal means, other than individual septic systems.~~

Policy 4.2F: Improve enforcement of requirements for proper waste discharge from boats and houseboats.

Boating is a popular recreational attraction in Riverhead~~, and houseboats contribute to the Town's housing stock and character~~. Boats are required to discharge wastewater into the sewer connections available at Town docks. However, there have been cases of boats improperly discharging their wastewater directly into the Sound or the Peconic Estuary. The Town should continue to track and monitor wastewater discharges from boats, enlisting the assistance of the State, County, of federal agencies, if possible.

Policy 4.2G: Determine whether flushing, dredging, and/or other improvements are needed ~~needs~~ for small water bodies adjacent to the Sound: Baiting Hallow, Iron Pier, Wading River.

Some participants of CAC ~~members~~ meetings cited the need for improvement at these locations. Siltation and mosquitoes have been cited as problems at Baiting Hallow and Wading River, and dredging has been suggested as a possible solution to increase flushing. The Town should investigate the environmental merits of such actions and provide that administrative support commensurate with its findings ~~what environmental impacts could result from such actions~~.

Policy 4.2H: Require any future development proposals on ~~the Key Span site, the Broad Cove Duck Farm, or other~~ key waterfront sites to be regulated by Planned Development District Zoning ~~subject to Planned Development.~~

Planning Development District is a zoning technique whereby the landowner is required to develop and follow a detailed master plan for the site. The development of such a plan would allow the opportunity to plan out development and conservation on those sites in a sensible way, with the intent of protecting natural resources and scenic views and promoting waterfront access. Some of the uses suggested for ~~the Key Span~~ key waterfront sites include water-dependent uses, boat basin, resort, public recreation, open space, public access, additional setbacks, bluffs, clearing.

Policy 4.2I: Determine whether dredging and/or other improvements may be needed at East Creek Marina or other docking facilities in Riverhead.

Policy 4.2J: Require golf courses to be designed in an environmentally friendly manner, such that the potential for contaminated run-off is reduced to a minimum.

The golf course industry has in and of itself taken steps to become far more environmentally friendly in recent years. The Town can require that golf course meet the high environmental standards that are being employed on courses throughout the country. Requirement should include the following:

- Golf course grading should be consistent with a stormwater management plan, and the grading should be designed to result in stormwater being collected and retained on-site. Collection ponds can provide stormwater management, flood control, and water supply for irrigation purposes, reducing the demand on off-tract water supplies.
- A water resource monitoring program should be provided, and it should be designed to minimize the use of off-tract surface water and groundwater resources while maximizing the use of stormwater retained on site.
- Water quality should be tested for nutrients, pesticides, and potential contaminants.
- Drought-tolerant turf and landscaping material should be used, and irrigation practices should be explained.
- An integrated pest management and turf management plan should be provided and should define the nature and use of the pesticides and other chemicals and fertilizers involved. Turf should absorb and filter fertilizers, pesticides, herbicides, and other pollutants to minimize contamination of streams and groundwater.
- ~~New plantings should be native, non-invasive species.~~

Goal 4.3: Limit risk of personal injury or property damage by addressing flooding concerns throughout the Town, but particularly along the Peconic River.

Recognizing that portions of downtown Riverhead have historically suffered from flooding of the Peconic River, it is essential that steps be taken to limit the potential for flooding events.

Policy 4.3A: Develop regulations requiring that new development utilize state-of-the-art best management practices to better manage stormwater.

This strategy would help ensure that non-point stormwater runoff does not contribute unmitigated additional flow to the Peconic River.

Policy 4.3B: Implement impervious surface coverage limits to development Townwide, so as to limit the amount of stormwater runoff.

This policy is further articulated under Goal 4.11. Another option to be explored for Riverhead is the increased installation of detention basins for commercial sites, such that the stormwater is prevented from flowing directly into nearby streams and exacerbating floods.

Also, detention ponds reduce the amount of pollutants that flow into surface waters, because some of the contaminants settle to the bottom of the detention pond itself.

Policy 4.3C: Limit new development and the addition of new impervious surfaces within flood hazard areas.

Because of the Peconic River's designation as a ~~Wild and~~ Scenic and Recreational River, ~~development along the immediate banks of the river is strictly limited by State law~~ State law strictly limits development along the immediate banks of the river. Also, as discussed in Chapter 11, the Park and Recreation Element, it is a goal of the Town to purchase land along the Peconic River waterfront from walking trails. These combined factors, in effect, will limit increases in impervious surfaces along the river's floodplain. Continued application and enforcement of Chapter 65 of the Riverhead Town Code will protect the floodplain resources of the Peconic Estuary.

Policy 4.3D: Explore the potential for retrofitting existing stormwater conveyance devices and structures so as to provide stormwater quantity and quality control.

Policy 4.3E: Continue working with the State to reduce property damage or personal injury for residents living in coastal flood hazard areas.

Goal 4.4: Conserve ~~Preserve~~ the bluffs and woodlands ~~sandhills~~ overlooking Long Island Sound and the sensitive woodland and habitat areas found between Sound Avenue and the Sound.

The hilly bluffs along Long Island Sound are an important area of natural and scenic beauty. Moreover, the dwarf beech and maritime beech forests constitute a unique ecological area that is sensitive to development impacts. While development can continue to occur in this general area, it should be planned and designed in such a way as to conserve ~~preserve~~ the bluffs and the woodlands, ~~that~~ which make the area so unique and so valuable for low-density residential development.

An important component of Chapter 3, the Agriculture Element, is the preservation of the agricultural area south of Sound Avenue. The Element calls for the use of transferable development rights (TDR) to shift development from the agricultural greenbelt to areas north of Sound Avenue, as well as to the Town's hamlet areas, Enterprise Park, Route 58, and areas within and around downtown. This would result in a higher density of residential development than would be permitted within the AOZ. ~~This could result in higher potential density of development in that area, above what has been permitted in the past.~~ The following recommendations are intended to limit the impacts of additional development in the subject ~~that~~ area.

Policy 4.4A: Require new development to provide significant open space setbacks from Long Island Sound.

~~The Town will have to determine~~ In development review, the Town should determine the appropriate width of the setback, based on a careful analysis of the extent of the woodland areas along the Sound, as well as existing lots sizes. The setback would prohibit any building from being erected within the stated distance from the waterfront.

In the case of a large-scale subdivision, the actual land area in the setback can be set aside as part of the subdivision's park or open space requirements. Alternatively, the land area could be included in private lots, but the setback would still apply. Thus, those lots would have to be large enough to accommodate the distance, such that no buildings would have to be built in the setback. Also, deed restrictions would have to be required for those lots, such that no structure could be built in that area.

Policy 4.4B: Establish woodland clearing limits for properties located along Long Island Sound.

Clearing limits ~~can~~ would be a very effective means of preserving ~~woodland areas~~ tree stands along the bluffs and within the Coastal Oak Beech woodland ~~sandhills~~. These limits should be integrated into the zoning code. The Town could research clearing techniques that have been employed by other communities throughout the country. The clearing limits should be targeted to areas along the shoreline, and they should be effective in providing ~~continuous~~ contiguous forest cover (as opposed to individual ~~trees~~ tree protection).

Policy 4.4C: Establish Town-wide environmental performance standards that carefully regulate development along Long Island Sound.

In particular, environmental performance standards need to ensure that septic systems are so located and designed that they do not ~~bear~~ result in any detrimental environmental impacts on the bluffs, the woodlands or the Long Island Sound Estuary ~~the sandhills, the woodlands, or the Sound~~. Stormwater control is also a critical concern and should be addressed in the performance standards.

Policy 4.4D: Continue to require that new development along Long Island Sound ~~to~~ be consistent with State and local coastal management policies.

The Town is currently preparing a Local Waterfront Revitalization Program to be integrated within the Town's Comprehensive Plan. The LWRP would result in the establishment of a local coastal commission and the establishment of coastal management policies for all sites along Riverhead's shorelines. This commission would review all development ~~with~~ to determine compliance with ~~those~~ these policies and generally evaluate any potential impacts of development proposals on the Sound and the shoreline.

Policy 4.4E: Ensure that the Local Waterfront Revitalization Program includes policies that will help protect the bluffs, ~~sandhills,~~ ~~and~~ woodlands and the Long Island Sound Estuary ~~along the Long Island shoreline.~~

~~Policy 4.4F: Development a best practices manual for bluff and sandhill maintenance, and distribute the manual to landowners whose properties include bluffs or sandhills.~~

~~This can help prevent erosion or other influences that could degrade the quality of the bluffs and sandhills.~~

Goal 4.5: Limit development on soils that are particularly well-suited to agricultural use.

~~Chapter 3, the Agriculture Element, includes a comprehensive program for farmland preservation. Although prime soils are not specifically targeted for preservation, the mandatory clustering would result in the preservation of 70 percent of farmland parcels in the AOZ, where the best farmland in Riverhead is found.~~

The area lying between Sound Avenue and the Long Island Sound from Baiting Hollow East to Northville contains areas of prime agricultural soils that have been historically tilled. Although these soils are not targeted for preservation, such soils should be considered to the greatest extent practicable through cluster subdivision review while maintaining established clearing standards for Coastal Oak Beech woodlands.

Goal 4.6: Continue to protect rare and/or endangered plant and animal species and their habitat areas.

The best habitat areas for plant and animal species are concentrated in the Central Pine Barrens, along shoreline areas, along riverbeds and streambeds, and in woodland areas. These policies are intended to target such areas for conservation.

Policy 4.6A: Require open space setbacks along river and stream corridors.

Setbacks do not necessarily need to be established along the Peconic River, because development is strictly limited within 500 feet on either side of the riverbanks, under the State's Wild and Scenic Rivers Act. Creek ~~Stream~~ corridor buffers, however, should be required along creeks feeding the Peconic Bay Estuary. ~~other streams running throughout Riverhead.~~

Policy 4.6B: Require open space setbacks along Flanders Bay and the Great Peconic Bay.

The appropriate size of the setback needs to be determined by examining the size of existing lots, ~~as well as~~ current development patterns, the extent of floodplains, and existing topography. Policy 4.4B calls for open space setbacks along Long Island Sound as well.

Goal 4.7: Encourage the preservation and planting of native plants and avoid the planting of invasive plants.

Policy 4.7A: Compile a list of resources where residents and developers can obtain information about native and invasive plants.

Potential sources include the Cornell Cooperative Extension, local landscaping businesses, local nurseries, the U.S. Department of Environmental Protection, the NYS Department of Environmental Conservation (DEC), the Invasive Plant Council of New York State, the Peconic Land Trust, and the North Fork Environmental Council. This information should be made available at Town Hall and the local libraries.

Policy 4.7B: Encourage developers to identify and protect existing native plants on properties that are subject to development or redevelopment.

Some participants in the CAC meetings suggested that all existing native plants be protected and preserved on undeveloped land. It would be onerous to require a land developer to document all such species, which could include anything from a wildflower to an old-growth tree, and could number in the hundreds. Even if full documentation were possible, the effort to protect all such plants already in the ground could complicate or prevent effective site planning.

Developers are already and will continue to be required to protect areas where such species are likely to be concentrated — wetlands, ~~and~~ stream and creek corridors. ~~In addition, development in the AOZ is required to have an open space set aside that is 70 percent of the size of the total parcel.~~ Open space preservation helps protect native species that may already exist. Beyond these measures, the Town should encourage but not require developers to protect any native plants that they have on their sites. Making information available on native plants (see Policy 4.7A) would allow developers to recognize native species on their properties.

~~***Policy 4.7C: Require that all new landscaping required in the zoning code be non-invasive native plants.***~~

Policy 4.7C~~D~~: Explore grant opportunities to fund the landscaping of ~~Undertake an initiative to landscape all~~ Town-owned properties with non-invasive native plants.

Policy 4.7D~~E~~: Continue to encourage County and State agencies to plant native species alongside roadways or in roadway medians when they have jurisdiction.

Policy 4.7E~~F~~: Work with the Cornell Cooperative Extension and local non-profit and advocacy organizations to assess experiences with using native plant species in Riverhead.

Generally, native plants would be expected t thrive in their home environment, requiring less water and maintenance than non-native plants. However, such a study could highlight any problems or issues that arise with their use. It could help identify whether there are certain native species that take to the local soils and microclimate better than others. It could also help understand the conditions under which native species have the best success. The results of the study should be made available at Town Hall and the local libraries, and should be distributed to local landscaping and nursery businesses.

Goal 4.8: Support initiatives for natural resource conservation and open space preservation undertaken by private property owners, non-profit organizations, and other public agencies.

Policy 4.8A:* *In order to protect and preserve natural resources and open space, administratively support ~~and partner with~~ organizations like The Nature Conservancy, the Peconic Land Trust, ~~and~~ the North Fork Environmental Council, and other legitimate not-for-profit environmental organizations. ~~to protect and preserve natural resources and open space.~~

In eastern Long Island, non-profit conservation organizations work with landowners to protect natural resources, scenic vistas, water quality, and productive farmland. They use a variety of preservation techniques, including: gifting, purchase of land or conservation easements, property leases or exchanges, and cooperative ventures with government agencies. ~~The Town should help facilitate their work wherever possible.~~

Policy 4.8B: ~~Develop a~~ Continue to employ conservation and scenic easement provisions to allow tax abatement for property owners.

In order to preserve priority natural and scenic resources, this provision would provide landowners with the ability to place a conservation or scenic easement on their properties in exchange for a reduction in tax valuation for that portion of the property under the easement.

Policy 4.8C: When appropriate, and on a case by case basis, structure the Town's preservation and conservation efforts such that they dovetail with the initiatives of federal, State, and County agencies.

Certain taxes paid by Riverhead residents help support federal, State, and County efforts for natural resource conservation. Riverhead should optimize the use of those tax dollars by ensuring that the Town's own initiatives build off of the efforts being undertaken in other levels of government. This creates a larger pool of resources for and greater momentum behind conservation efforts, resulting in a greater potential ~~for success~~ preservation of environmentally sensitive lands.

Goal 4.9: Increase public education with regard to best practices for natural resource conservation.

On rare occasions, environmental degradation may result from catastrophic disasters (such as an oil spill, as a hypothetical example), but on a day to day basis, degradation can also result from the incremental actions of residents, businesses, and developers. Although these individual actions may be small and environmentally insignificant in and of themselves, their cumulative impacts may have serious environmental consequences that are widely felt throughout the Town or the region. The Town should endeavor to work with the Cornell Cooperative Extension, in order to educate the general public about ways to avoid environmental degradation through construction practices and day-to-date household and business activity.

Policy 4.9A: ~~Prepare~~ Work with the Cornell Cooperative Extension or similar academic institutions to prepare a best practices manual that instructs environmentally friendly techniques to residents, property owners, businesses, and developers. ~~with regard to environmentally friendly techniques to~~ The manual would be used in construction, site planning and architectural design, landscaping, property maintenance, septic maintenance, disposal of hazardous materials, and other day-to-day practices.

With regard to site planning and landscaping, key issues to be addressed in the manual are stormwater management and landscaping materials, including the benefits of reduced hardscape, turf areas, and the impact of plant selections. The use of species native to the East End should be encouraged, and the use of invasive plants discouraged. Where appropriate, the manual should also discuss federal, State, and/or County laws and requirements (i.e., with regard to wetland protection or hazardous waste disposal). Also, steps to be taken in case of septic system malfunctions should be described. The information in the manual should also be made available on the Town's web site. The Town should consider whether there are any types of incentives that can be given to homeowners to encourage environmentally-friendly building and landscaping practices.

Policy 4.9B: ~~Partner with~~ Administratively support local non-profit organizations to develop and distribute information and to organize a public education campaign to educate property owners, homeowners, businesspeople, developers, and contractors about environmentally friendly practices.

By ~~working with~~ supporting non-profit organizations, the Town can build off of their knowledge, enthusiasm, manpower, and financing to distribute accurate information and reach more people. The public education campaign may include — but should not be limited to — the distribution of brochures, the sponsoring of public workshops, and the posting of information to the Town's web site. Organizations such as The Nature Conservancy and the Long Island chapter of the Wild Ones (a national organization dedicated to promoting environmentally friendly landscaping) are examples of some of the types of groups with which the Town could work.

Policy 4.9C: Educate Town landscape workers about environmentally-friendly landscaping design and practices, and implement those techniques on Town properties.

Potential sites include Town Hall, Stotzky Park, and other parks. This intiative would help demonstrate the effectiveness and achievability of environmentally-friendly landscaping.

Policy 4.9D: ~~Prepare~~ Work with Sea Grant to make available a best practices manual that instructs boat owners and operators with regard to proper vessel discharge practices.

The appropriate legal requirements for vessel discharges should be outlined in the manual. Regulating agencies and resources for more information should be cited as well.

Goal 4.10: Increase the Town's administrative resources for working on natural resource conservation efforts.

Policy 4.10A: ~~Hire an additional staff member to help implement the goals and recommendations of this element.~~ Provide the human resources necessary to help implement the goals and recommendations of this element.

~~A number of recommendations in this element call upon the Town to partner with other public agencies, as well as non profit organizations on various conservation initiatives. In addition, recommendations call for the preparation of best practices manuals on environmentally friendly practices, as well as the improvement of stormwater management regulations and zoning provisions. The responsibility of implementing many of these recommendations will fall to the Town's Planning Department, which has limited staff. The addition of a new staff member would help the department achieve the ambitious program outlined herein.~~

A number of the recommendations of this element call upon the town to utilize its resources to administratively support public agencies, academic institutions and not-for-profit environmental organizations in the implementation of conservation initiatives. Further, certain recommendations call Town efforts in the preparation of best management practice manuals and general public educational materials. As the responsibility of administrative and technical support to these ends will fall to the Town Planning Department, it is necessary to provide the Department with human and technical resources necessary to succeed in the implementation of the program contained herein. In order to achieve this goal, it is recommended that an additional staff person be provided to the Planning Department; that access to Geographic Information Systems (GIS) be provided in a user-friendly way; and that the time of the Environmental Planner position be readily available to Cornell Cooperative Extension and the Riverhead Conservation Advisory Council at the direction of the Planning Director.

Policy 4.10B: Improve enforcement of environmental regulations in Riverhead.

Improved enforcement capabilities ~~is~~ are needed with regard to ~~wetland regulations~~ all environmental regulations contained in the Town Code of the Town of Riverhead. Currently, the Town is also expected to play a role in enforcing the provisions of the Wild and Scenic

Rivers Act. In the future, a great deal of open space monitoring will be required ~~too~~ as well, to ensure that open space set asides in cluster subdivisions and open space setbacks along shoreline areas and streambeds are not being cleared, developed, or otherwise inappropriately used.

In order to meet these obligations, it is recommended that the Town employ an additional Code Enforcement Officer to work on the enforcement of environmental regulations and private covenant restrictions exclusively.

Goal 4.11: Limit future increases in impervious surfaces and stormwater runoff

This goal is intended to help reduce flood impacts, as well as surface water pollution. Increases in impervious surfaces results in increased water flow into storm drains, which dump into the Town's creeks and streams. Stormwater runoff may be polluted with a variety of contaminants, such as:

- Excess fertilizers, herbicides, and insecticides from agricultural lands, residential areas, and golf courses;
- Oil, grease, and rubber particles from cars and trucks, which are deposited on paved roadways and parking lots;
- Toxic chemicals from energy production and improper disposal of hazardous waste;
- Sediment from improperly managed construction sites, crop and forest lands, and eroding streambanks;
- Bacteria and nutrients from livestock, pet wastes, and faulty septic systems.[8]

Limiting stormwater runoff is particularly critical in Riverhead, as much of the Town drains into the environmentally sensitive Peconic Estuary.

Policy 4.11A: Establish maximum impervious coverage limits on all new development in Riverhead.

Policy 4.11B: Require detention basins for large-scale residential and commercial development.

Detention basins collect stormwater into a closed area, and stormwater is eventually evaporated and/or absorbed into the groundwater, rather than being discharged into the stormwater system. This helps prevent ~~flooding impacts on~~ adverse impacts upon downstream ~~areas~~ resources.

Policy 4.11C: Review and revise the Town of Riverhead highway specifications, and off-street parking regulations ~~bulk, parking, setback, and other similar requirements~~ to provide stormwater quantity and quality control.

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[8] U.S. Environmental Protection Agency, www.epa.gov/owow/nps/qa.html, visited July 18, 2002.

The requirements to be reviewed include street design, curbs and gutters, parking ratios and lot design, setbacks and frontages, sidewalks, driveways, buffer systems, stormwater outfalls, and tree and land conservation.

Goal 4.12: Protect properties from risk of damage and persons from risk of injury as a result of wildfires.

Policy 4.12A: Tap into the expertise of the Central Pine Barrens Wildfire Task Force to protect properties, residents, employees, and visitors from wildfires.

Due to a combination of human activity and dry weather conditions, the Central Pine Barrens region occasionally experiences wildfires. The Central Pine Barrens Commission has established a Wildfire Task Force, which prepared a Fire Management Plan in 1999. The Task Force has amassed a considerable repository of knowledge that can be used to protect Townspeople from wildfire impacts.

Policy 4.12B: Continue to enforce State building code requirements that are intended to help prevent and/or stop fires and to reduce the potential for damage as a results of fires.

Fire sprinklers, fire extinguishers, and use of fire-resistant materials are required for some types of development. These requirements help protect safety and reduce the potential for property damage.