ORIGINAL

INITIAL CONSULTATION DOCUMENT FOR THE ROOSEVELT ISLAND TIDAL ENERGY PROJECT (FERC NO. 12178)

VERDANT POWER, LLC
New York, New York

OCTOBER 2003

4640 13th Street, North
Arlington, VA 22207-2102
Phone: 703-528-6445
Fax: 703-812-8157

October 22, 2003

To: Attached Mailing List

Re: Licensing of RITE Project (FERC No. 12178)
Initial Consultation Document

Dear Sir/Madam:

By letter dated May 24, 2002, Verdant Power LLC (Verdant) applied to the Federal Energy Regulatory Commission (FERC) for a preliminary permit to obtain a license to develop and operate the Roosevelt Island Tidal Energy (RITE) hydropower project. To initiate the licensing process in accordance with FERC regulations (18 CFR §4.38), Verdant must consult with appropriate state and federal agencies, as well as interested Indian Tribes while providing the public the opportunity to provide input to Verdant during the preparation of the application to license the hydroelectric project. The initial stage of consultation is triggered by Verdant's issuance of an Initial Consultation Document (ICD) and the scheduling of a joint agency/public meeting. The purpose of the meeting will be to review the information in the ICD with regard to the resources associated with the Project and to discuss the study program proposed by Verdant to evaluate these resources. Accordingly, enclosed please find a document entitled "INITIAL CONSULTATION DOCUMENT FOR THE ROOSEVELT ISLAND TIDAL ENERGY PROJECT (FERC. NO 12178)".

As indicated in Section 1.4 of the attached ICD, Verdant plans to prepare the application to license the RITE Project before January 30, 2005. In keeping with this schedule, studies to evaluate the Project must be started in the spring of 2004.

Verdant intends to conduct the above referenced joint agency/public meeting(s) (one afternoon and one evening session) and site tour between November 24 and December 19, 2003. An itinerary and newspaper notice pertaining to this meeting, as required under 18 CFR §4.38(b)(2), will follow. At this meeting, members of the public are entitled to participate fully in the meeting and to express their views regarding resource issues that should be addressed in the ensuing new license application to be prepared by Verdant for the Project. Transcripts and/or audio recordings of this meeting will be made by Verdant. Interested resource agencies are called upon to provide written comments that identify recommended resource studies or comments pertaining to Verdant's proposed study program, if appropriate.

In order that we might select optimum dates for the joint agency/public meeting, if you, or someone from your organization intends to attend this meeting, please fax the attached Meeting Availability Form to contact Mr. Jim Gibson at (315) 641-1626 by October 31st and advise us of your intent to attend the meeting and availability between November 24 and

December 19. Verdant must issue notices pertaining to this meeting at least 15 days prior to the meetings.

Also please note that on the attached form we are requesting any corrections to your mailing address and some additional contact information. Please provide the requested information for our database so that we can be sure to keep you informed in a timely manner throughout the licensing process. Lastly, if you would like to be removed from our distribution list for this proceeding please indicate this on the form.

Please read the enclosed ICD in anticipation of the above-referenced joint agency/public meeting. Written comments on this ICD must be submitted to the undersigned no later than 60 days following the date of the joint agency/public meeting.

If you have any questions in the meantime or have any recommendations for others to receive this ICD, then please do not hesitate to contact me at (703) 528-6445.

Very truly yours,

Trey Taylor

William H. ("Trey") Taylor
President

Encl.
cc w/enc: Attached distribution List

VERDANT POWER
ROOSEVELT ISLAND TIDAL ENERGY PROJECT
JOINT AGENCY/PUBLIC MEETING
RESPONSE FORM

PLEASE FAX TO JIM GIBSON @ (315) 641-1626 BY OCTOBER 31, 2003. THANK YOU.

NAME: _____

ORGANIZATION: _____

MAILING ADDRESS (if the address we have used for this mailing is correct, write "OK" here):

_____

_____

PHONE: _____

FAX: _____

E-MAIL: _____

CHECK ONE PLEASE

I Plan to Attend the Joint Agency/Public Meeting: DAY_____EVENING_____

I do not plan to attend the meetings, but please keep me on your distribution list:_____

I will not attend the meetings and do not need to be copied on further information regarding this project:_____

MEETING AVAILABILITY

	DAY	EVENING
Monday, November 24th		
Tuesday November 25th		
Monday, December 1st		
Tuesday, December 2nd		
Wednesday, December 3rd		
Thursday, December 4th		
Friday, December 5th		
Monday, December 8th		
Tuesday December 9th		
Wednesday, December 10th		
Thursday, December 11th		
Friday, December 12th		
Monday, December 13th		
Tuesday, December 14th		
Wednesday, December 15th		
Thursday, December 16th		
Friday, December 17th		

Category		First	Last	Title	company/agency/organization	street	city	state	zip
FED	Mr.	Richard	Bennett	Acting Regional Director	United States Department of the Interior, United States Fish and Wildlife Service	300 Westgate Center Drive	Hadley	MA	01035-9589
FED	Mr.	David	Stilwell		United States Department of the Interior, United States Fish and Wildlife Service	3817 Luker Road	Cortland	NY	13045
FED	Mr.	David	Clark		United States Department of the Interior, National Park Service	15 State Street	Boston	MA	02109
FED	Ms.	Kathleen	Clark	Director	United States Department of the Interior, Bureau of Land Management	Interior Building, 1849 C. Street N.W.	Washington	DC	20240
FED	Mr.	Robert	Hargrove	Chief	United States Environmental Protection Agency, Environmental Impacts Branch - Region II	290 Broadway (26Th Floor)	New York	NY	10007-1866
FED	Mr.	Duncan	Hay		United States Department of the Interior, National Park Service	15 State Street	Boston	MA	02109
FED	Mr.	James	Kardatzke		United States Department of the Interior, Bureau of Indian Affairs, Eastern Regional Office	711 Stewarts Ferry Pike	Nashville	TN	37217
FED	Mr.	Mike	Ludwig		National Marine Fisheries Service, Habitat and Protected Resource Division	212 Rogers Avenue	Milford	CT	06460
FED					National Marine Fisheries Service/NOAA/US DoC	1315 East-West Highway	Silver Spring	MD	20901
FED					National Marine Fisheries Service/NOAA/US DoC -- Northeast Regional Office	One Blackburn Drive	Gloucster	MA	01930
FED	Mr.	Kevin	Mendik		United States Department of the Interior, National Park Service	15 State Street	Boston	MA	02109
FED	Mr.	Ernie	Morton	Commander	United States Coast Guard	120 Woodward Ave.	New Haven	CT	06512-3628
FED	Hon.	Gale	Norton	Secretary of the Interior	United States Department of the Interior	1849 C Street NW	Washington	DC	20240
FED	Mr.	John	O'Dowd	Commander and District Engineer	Unites States Army Corps of Engineers	26 Federal Plaza	New York	NY	10278
FED	Mr.	Andrew	Titler		United States Department of the Interior, Office of the Solicitor	One Gateway Center, Suite 612	Newton	MA	02458-2881
FED					United States Department of Energy	26 Federal Plaza, Rm 3206	New York	NY	10278-0004
FED	Mr.	Mark	Tedesco	Director	United States Environmental Protection Agency, Long Island Sound Office	888 Washington Blvd	Stamford	CT	06904-2152
FED	Mr.	Anton	Sidoti	Director	Federal Energy Regulatory Commission (FERC) NY Regional Office	19 W. 34th Street, Room 400	New York	NY	10001
FED	Hon.	Magalie	Salas	Secretary	Federal Energy Regulatory Commission (FERC)	888 First St.	Washington	DC	20246
FED					Bureau of Land Management, Department of Interior -- Branch of Lands (ES-930)	7450 Boston Blvd.	Springfield	VA	22153
LOCAL				Director	The Port Authority of New York	225 Park Avenue South, 15 Floor	New York	NY	10003
LOCAL				Commissioner	NYC Department of Environmental Protection	59 - 17 Junction Blvd, 10th Floor	Flushing	NY	11373
LOCAL				Commissioner	NYC Department of City Planning -- City Planning Commission	22 Reade Street	New York	NY	10007-1216
LOCAL					NYC Economic Development Corporation	110 William Street	New York	NY	10038
LOCAL	Ms.	Iris	Weinshall	Commissioner	NYC Department of Transportation	40 Worth Street	New York	NY	10013
LOCAL	Mr.	Herb	Berman		Roosevelt Island Operating Corporation	591 Main Street	Roosevelt Island	NY	10044
LOCAL	Mr.	Matthew	Katz	President	Roosevelt Island Residents Association	625 Main Street, # 743	Roosevelt Island	NY	10044
LOCAL					Department of Buildings	280 Broadway	New York	NY	
LOCAL					Community Board 8 - Manhattan	505 Park Avenue, Suite 620	New York	NY	10024
LOCAL				County Commissioner	New York County				
LOCAL				County Commissioner	Queens County				
NGO	Mr.	Bruce	Carpenter		New York Rivers United	P.O. Box 1460, Market Street In Griffis Technology Park	Rome	NY	13442-1460

NGO	Mr.	Henry	Coeselman		New York State Conservation Council	822 County Route 1	Oswego	NY	13126
NGO	Ms.	Linda	Curch-Ciocci	Executive Director	National Hydropower Association	1 Massachusetts Ave., NW Suite 850	Washington	DC	20001
NGO	Mr.	Andrew	Fahlund	Policy Director of Hydropower Programs	American Rivers Inc.	1025 Vermont Avenue NW, Suite 720	Washington	DC	20005
NGO	Mr.	Alec	Giffin	Director	Low Impact Hydro Association	34 Providence street	Portland	ME	04103
NGO	Mr.	Alden	Hathaway	Director, Clean Power Program	Environmental Resources Trust	1612 K Street, N.W, Suite 1400,	Washington	DC	20006,
NGO	Ms.	Alexis	Kelley	Director, Program Development	Environmental Resources Trust	1612 K Street, N.W, Suite 1400,	Washington	DC	20006,
NGO	Mr.	Alex	Matthelesen	Riverkeeper and Executive Dir.	Riverkeeper	26 Wing & Wing, Garrison	Garrison	NY	10524-0130
NGO	Mr.	David	Miller	Alex Matthelesen, Riverkeeper & Exec. Dl	National Audubon Society	200 Trillium Lane	Albany	NY	12203
NGO	Ms.	Jodie	Rousell		American Council on Renewable Energy	1825 I Street NW, suite 400	Washington	DC	20006
NGO	Mr.	Matthew	Katz	President	Roosevelt Island Residents Association	c/o 625 Main Street #743	New York	NY	10044
NGO	Mr.	Richard	Rose-Collins		Natural Heritage Institute	2140 Shattuck Avenue, Fifth Floor	Berkeley	CA	94704
NGO	Mr.	Tom	Fox	CEO	New York Water Taxi	58 Broad Street, 20th Floor	New York	NY	10004
NGO					Environmental Defense	252 Park Ave. South	New York	NY	10010
NGO					Natural Resources Protective Association	PO Box 050328	Staten Island	NY	10305
NGO	Mr.	Joseph	Vignola	Plant Manager	KeySpan-Ravenswood Facility	38-54 Vernon Blvd.	Long Island City	NY	11101
NGO					EPL-Environmental Advocates of New York	353 Hamilton St.	Albany	NY	12210
					Natural Resources Defense Council	40 W. 20th St.	New York	NY	10011
NGO					Citizen's Environmental Coalition	33 Central Ave.	Albany	NY	12210
STATE	Hon.	Bernadette	Castro	Commissioner	New York State Office of Parks, Recreation and Historic Preservation	Agency Building 1, Empire State Plaza	Albany	NY	12238
STATE	Mr.	Richard	Drake	Program Manager	New York State Energy Research and Development Authority	17 Columbia Circle	Albany	NY	12203-6399
STATE	Mr.	Kevin	Klapert	Project Manager	New York State Department of Environmental Conservation,Office of Administration, Division of Environmental Permits	625 Broadway, fourth Floor	Albany	NY	12233-1750
STATE	Mr.	Keith	Silliman	Project Manager	New York Power Authority	123 Main Street	White Plains	NY	10601-3170
STATE	Mr.	Gerald	Barnhart	Director, Division of Fish, Wildlife and Marine Resources	New York State Department of Environmental Conservation, Office of Natural Resources and Water Quality Division of Fish, Wildlife and Marine Resources	625 Broadway	Albany	NY	12233-4750
STATE	Mr.	William	Little		New York State Department of Environmental Conservation, Division of Legal Affairs	625 Broadway, 14th Floor	Albany	NY	12233-1500
STATE	Mr.	Chris	Hogan		New York State Department of Environmental Conservation	625 Broadway, fourth Floor	Albany	NY	12233-1750
STATE	Ms.	Sandra	Allen	Director, Division of Water	New York State Department of Environmental Conservation, Office of Natural Resources and Water Quality, Division of Water	625 Broadway	Albany	NY	12233-6500
STATE	Mr.	Robert	Nyman	HEP Director	New York State Department of Environmental Conservation, New York/ New Jersey Harbor Estuary Program	290 Broadway, 24Th Floor	New York	NY	10007 1866
STATE	Mr.	David	VanLuven	Program Director	New York State Department of Environmental Conservation, New York Natural Heritage Program	625 Broadway, 5th Floor	Albany	NY	12233-4757
STATE					Connecticut Department of Environmental Protection, Long Island Sound Program (LIS)	79 Elm Street	Hartford	CT	06106-5127

STATE					NY State Office of General Services, Real Estate Development - Land Management	Corning Tower, 28th Floor, Empire State Plaza	Albany	NY	12242-0001
STATE	Mr.	Joseph	Sayer	Project Manager	NY State Energy Research and Development Authority	17 Columbia Circle	Albany	NY	12203-6399
STATE					Department of Transportation, Office of General Services Real Estate Development- Land Mangement- Land Underwater Program	Corning Tower, 28th Fl.	Albany	NY	12242
STATE	Mr.	Steve	Reesler		Department of State - Division of Coastal Resources and Waterfront Revitalization	41 State St., 8th Flr.	Albany	NY	12231
STATE	Mr.	Steve	Zahn		New York State Department of Environmental Conservation, Region 2, Bureau of Marine Habitat Protection	1 Hunters Point Plaza, 47-40 21st Street	Long Island City	NY	11101-5407
LOCAL	Mr.	Gifford	Miller	Speaker	New York City Council	336 East 73rd Street (Suite C)	Manhattan	NY	10021

INITIAL CONSULTATION DOCUMENT FOR THE ROOSEVELT ISLAND TIDAL ENERGY PROJECT (FERC NO. 12178)

TABLE OF CONTENTS

TABLE OF CONTENTS

(Continued)

TABLE OF CONTENTS

(Continued)

INITIAL CONSULTATION DOCUMENT FOR THE ROOSEVELT ISLAND TIDAL ENERGY PROJECT (FERC NO. 11278)

LIST OF FIGURES

LIST OF FIGURES
(Continued)

INITIAL CONSULTATION DOCUMENT FOR THE ROOSEVELT ISLAND TIDAL ENERGY PROJECT (FERC NO. 11278)

LIST OF TABLES

Executive Summary

The Roosevelt Island Tidal Energy (RITE) Project is the first "free-flow" tidal energy project to be deployed in the United States and the world for commercialization as a distributed renewable energy solution. Free-flow hydropower uses the kinetic energy from natural water flow of tides, rivers, and other man-made structures such as aqueducts and tailraces. Significant kinetic energy is available in rapidly flowing water, faster than two to three knots, which can be used as a renewable energy source without civil works and/or impoundments. The RITE Project is the initial demonstration and commercialization of free-flow hydropower in the United States.

The RITE Project has a preliminary permit from the Federal Energy Regulatory Commission (FERC) as FERC Project No. 11278. The proposed project will be up to a 10 MW hydropower generating station to be owned and operated by Verdant Power, LLC (Verdant, or "the Company"). The proposed project will be located on the East River along the east shore of Roosevelt Island, Manhattan Borough of New York City, New York County, New York. The preliminary permit for the project was issued September 9, 2002 and is effective until September 1, 2005.

Although the requirements of free-flow hydropower are significantly different and the impacts much less than traditional, conventional hydropower installations, Verdant intends to license the project using the framework of FERC's traditional licensing process. Verdant will integrate cooperative consultation throughout this process consisting of regularly scheduled meetings with interested groups and organizations to address study needs, review study reports and results, and develop a set of mutually agreeable resource enhancement measures for inclusion in the license application. Verdant will file an initial license application with FERC no later than September 1, 2005, the expiration date for the preliminary permit.

This Initial Consultation Document (ICD) describes the overall setting of the proposed project including the location, physical description, operation, tidal flow, and environmental resources. Additionally, the ICD describes licensing resource evaluations and general methodologies, which might be employed to gather additional information to aid development of mutually agreeable resource enhancement measures to integrate into the license application for the RITE Project.

Section 1
Introduction

1.1 Description of the Applicant

The RITE Project is being developed by Verdant as licensee of the project. Verdant is responsible for all financial, regulatory, and operational aspects of the project, and is based in Arlington, Virginia.

Verdant is a start-up company established to develop and deploy a new, innovative renewable energy technology in the U.S.—free-flow hydropower systems. Verdant, a sustainable energy company, is a systems integrator and a developer of free-flow turbine systems that generate utility and village-scale electric power from natural underwater currents. Verdant's systems do not require any water impoundments or dams, which greatly reduces environmental impact and siting constraints. In addition to delivering affordable and safe electrical energy, the systems can be adapted for use in other community-based services, such as developing irrigation, operating desalinization, creating potable water, oxygenating anoxic waters, and producing hydrogen through electrolysis.

Increasing demand for electricity, as well as concerns about environmental degradation and global warming, has accelerated the mandate to develop renewable sources of power. The same economic, environmental, and social factors that limit the growth of traditional hydropower will work to the advantage of small-scale hydropower. The market for free-flow turbine systems is opening up because of deregulation in the U.S. and privatization abroad; also, because of advancements in design knowledge, materials, and technology.

At the core of Verdant's energy systems being developed for the RITE Project in New York City are axial-flow turbines. Like underwater wind turbines, the bi-directional turbines will convert kinetic hydro energy from the free-flowing currents of the East River's tidal waters into electric power. Other types of free-flow, or instream energy generation turbines will be used elsewhere, depending on the condition of the waters in which they will operate. Each type of turbine will produce no by-products such as greenhouse gases.

Verdant offers a "water-to-wire" solution. The Company will act as a systems integrator by first identifying and analyzing sites—including ascertaining buyers of power, and addressing permitting and licensing issues. Next, the Company will determine the hydropower technology best suited to each site. Finally, Verdant will implement the full solution, delivering properly conditioned power through the grid, or directly to end-users. The absence of civil works and automated operations means that the Company's installation, and operation and maintenance (O&M) costs, will be low. In addition, short construction periods and low up-front capitalization costs mean fewer financial hurdles and earlier returns to developers. Verdant's systems will have higher capacity factors and greater capacity values than either wind or solar power because of the predictability and reliability of water flows. They will emit no greenhouse gasses and will be more sustainable than other sources of distributed generation power.

The Verdant management team has more than 190 years of combined experience in energy, business, and start-ups. The Company also has world-class Boards of Directors, Advisors, and Technology Advisors, and a well-developed network of scientists, professional engineers, and independent service firms.

1.2 Purpose of the ICD

This Initial Consultation Document (ICD) describes the overall setting of the project including location, physical description, operation, tidal flow, and environmental resources. Additionally, the ICD describes licensing resource evaluations, studies, and general methodologies that might be employed to gather additional information to aid the development of mutually agreeable resource enhancement measures to integrate into the license application for the RITE Project.

1.3 History of the RITE Project

The RITE Project (FERC No. 12178) is being developed as a distributed, electric generation station. The proposed project is to install up to a 10 MW field of renewable kinetic hydropower, underwater at Roosevelt Island in New York City. The proposed build site is in the non-commercially navigable East Channel of the East River, where, using Verdant's free-flow

turbine systems or Kinetic Hydro Power (KHP) systems, the field is proposed to be completed over the next three to five years in three phases, as discussed below.

In Phase I of the project, the Company designed and built a working prototype. For the first time in the U.S., a free-flow, kinetic, hydro turbine was demonstrated and its performance documented in a live site in real-time. These tests took place in the East River for three weeks during December 2002 and January 2003. The turbine's performance met predicted performance of 43 percent efficiency. Phase I, completed in September 2003, included: computational testing of a KHP-system-turbine with the Department of the Navy's David Taylor Model Basin; testing of a 10-foot turbine on a surface-based, pontoon-mounted platform at the RITE Project site; preliminary development of an alternative FERC licensing process for kinetic hydro systems for the East River site; and preliminary design for a KHP system at the site.

In Phase II of the project, Verdant will design, fabricate, deploy and operate a multi-turbine, water-to-wire KHP system at the site for at least six months. Phase II includes completing all required environmental studies, permitting, and licensing requirements in preparation for the Phase II has been divided into two stages: The first stage of the project, Phase IIA, will be to complete the commercial multi-turbine, water-to-wire, KHP system design, including all system components; and fabrication and testing of the initial single-turbine KHP system in preparation for fabrication, deployment, and on-site operation of the multi-turbine KHP system (100 to 150 kW) during the second stage, Phase IIB, in 2004.

The Phase II multi-turbine KHP system could consist of up to six turbines. This "six-pack" will be used as the basis for studies performed in conjunction with this licensing process. The test and studies will be conducted during the period from January 2004 through January 2005. It is important to note that this temporary installation will have no permanent impacts. The turbines can be retrieved as easily as they will have been deployed. The support piles will be sheared off at the river bottom, which will quickly become covered with sediment. There will be very little, if any, environmental impact as a result of this temporary deployment, and it will provide a valuable opportunity to study operations and impacts during the licensing consultation process. Phase III will be the build-out of the up to 10 MW commercial underwater field.

KHP systems offer a significant contribution to renewable and sustainable electric power. The systems use turbines, similar to underwater windmills, to capture kinetic energy in the natural flowing water currents of rivers, tidal estuaries, or manmade channels to generate electricity. Mechanical power from the turbines is applied through speed increasers to internal generators or to hydraulic pumps that in turn drive on-shore generators. The KHP system does not require dams or impoundments and does not have many of the environmental impacts typically associated with traditional hydropower projects.

New York State leadership, in implementing KHP systems through New York State Energy Research and Development Authority (NYSERDA), provides significant regional economic stimulus for global, climate-sensitive technology development. This momentum is expected to increase during the next decade of worldwide climate action and clean power initiatives.

The project will develop a new source of renewable energy for the public. This new source of electric power has numerous benefits, including:

- It is clean and renewable without the environmental impacts associated with traditional hydropower projects that have dams;
- The project further diversifies energy sources as distributed generation; and
- The project will have negligible impacts on aquatic habitats and fish and wildlife.

New York State's power-demand growth currently exceeds the increase of in-state generating capacity. For example, recent estimates by New York Independent System Operators (NYISO) and NYSERDA indicate approximately 5,000 MW of new generating capacity is needed in the next few years, with an additional 7,400 MW required by 2020. Based on a New York University (NYU) study and recent work, the estimated potential of kinetic hydro-energy sources in New York State, and the surrounding area, is approximately 600 MW.

Verdant has assembled a highly experienced group of professionals with a strong focus on New York industry and support services. For example, Verdant has retained The Hudson Valley Technology Development Center (HVTDC) to assist in identifying New York sources of

professional support, as well as manufacturers and component suppliers to support a New York economic cluster in kinetic hydropower, as the industry emerges. With NYSERDA support, the company also has had initial discussions with New York suppliers for providing components and manufacturing support throughout Phase II design and operations. The social, economic, and technical achievement of this public-private-academic-sector effort will result in the commercialization of this new source of power, bringing worldwide positive environmental and energy benefits, and added employment to New York State.

1.4 Licensing of the Roosevelt Island Tidal Energy Hydropower Project

Verdant has applied for and received a preliminary permit for the RITE Project. The permit was issued by FERC on September 9, 2002 and is effective until September 1, 2005. Verdant intends to license the project using the framework of FERC's traditional licensing process.

Verdant initiated consultation with local governments, federal, state and city agencies, non-governmental groups, and the general public in late 2001. Verdant has held approximately forty meetings with over twenty-five potential stakeholder groups and agencies (see list below and Section 9). The purpose of these meetings has ranged from providing general information to discussing specific state, local, and federal permitting/licensing issues. Verdant believes that its outreach efforts have laid the groundwork for a cooperative consultation process with all stakeholders. Although Verdant will be utilizing FERC's traditional licensing process, Verdant will continue to integrate cooperative consultation throughout this process, consisting of meetings with interested groups and organizations to address study needs, review of study reports and results, and develop a set of mutually agreeable resource enhancement measures for inclusion in the license application.

Verdant has also informed stakeholders and regulators of its intent to deploy up to six experimental units in the spring of 2004. Since this is the first tidal power project to proceed through the FERC licensing process, Verdant believes that this experimental deployment will provide an invaluable opportunity to study the environmental impacts of tidal power installations.

Verdant will file a new license application with FERC no later than September 1, 2005, the expiration date for the preliminary permit. A detailed schedule of the consultation process with interested groups and organizations will be developed as the licensing process unfolds. Below is a general schedule of the major licensing process milestones.

October 2003

- Transmit ICD to resource agencies and non-governmental organizations (NGO)

December 2003

- Conduct Joint Agency/Public Meeting

January to March 2004

- Scope studies

April to June 2004

- Deploy experimental units ("six-pack") and conduct studies

July 2004 to September 2004

- Prepare study reports, and draft license application

October 2004 to December 2004

- Transmit draft license application to resource agencies and NGO's for 90-day review; meet with stakeholders to refine licensing proposals

January 2005

- Revise and finalize license application and file with FERC

1.5 Interested Groups and Organizations

The following list of interest groups and organizations is not intended to be all-inclusive, or to preclude any group that is not listed from participating in this licensing process.

1.5.1 The Applicant

Verdant Power, LLC is the proposed Licensee for the Roosevelt Island Project.

1.5.2 Municipal and County Governments

- New York City, including:
  - Department of Environmental Protection (NYCDEP)
  - Department of City Planning (NYCDOCP)
  - Economic Development Corporation (NYCEDC)
  - Community Board 8
- New York County
- Queens County

1.5.3 Agencies of the State of New York and Connecticut

- New York State Department of Environmental Conservation (NYSDEC), including:
  - Office of Natural Resources and Water Quality, Division of Fish, Wildlife and Marine Resources (DFWMR)
  - Office of Administration, Division of Environmental Permits (DOEP)
  - Office of Natural Resources and Water Quality, Division of Water (DOW)
  - New York/New Jersey Harbor Estuary Program (NY/NJ HEP)
  - New York Natural Heritage Program (NYSNHP)
- New York State Office of Parks Recreation and Historic Preservation (NYSOPRHP)
- New York State Energy Research and Development Authority (NYSERDA)
- New York Power Authority (NYPA)
- New York State Department of Transportation, Office of General Services (NYSDOT)
- Connecticut Department of Environmental Protection, Long Island Sound Program (LIS)
- Roosevelt Island Operating Corporation (RIOC)
- New York State Department of State, Division of Coastal Resources (NYSDOS)
- Port Authority of New York/New Jersey

1.5.4 Agencies of the United States

- Federal Energy Regulatory Commission, New York Regional Office (FERC-NYRO)

Section 2

Location of the Project

2.1 East River

The East River is a 17-mile-long tidal strait connecting the waters of Long Island Sound with those of the Atlantic Ocean in New York Harbor. The river flows through the City of New York, New York County, separating the Boroughs of Manhattan and Queens (see Figure 2.1-1). The project will be located in the East Channel of the East River alongside Roosevelt Island (see Figure 2.1-2).

2.2 Roosevelt Island Tidal Energy (RITE) Project

All lands within the project boundary are identified in Figure 2.2-1. These include lands bordering the site that run along the eastern side of Roosevelt Island from the Queensboro Bridge to approximately the intersections of East Road and Central Road North on Roosevelt Island. The site is bordered by Queens to the West. However, it will occupy only one-half of the non-commercially navigable East Channel of the East River off Roosevelt Island. The area covered by the site is approximately 1.08 miles by 280 feet, or 37.5 acres.

The Phase II, multi-turbine (six-pack) test and study field will be located just north of the Roosevelt Island Bridge, and next to Roosevelt Island (see Figure 2.2-2). The area of this site is approximately 427 feet by 197 feet, or 1.93 acres.

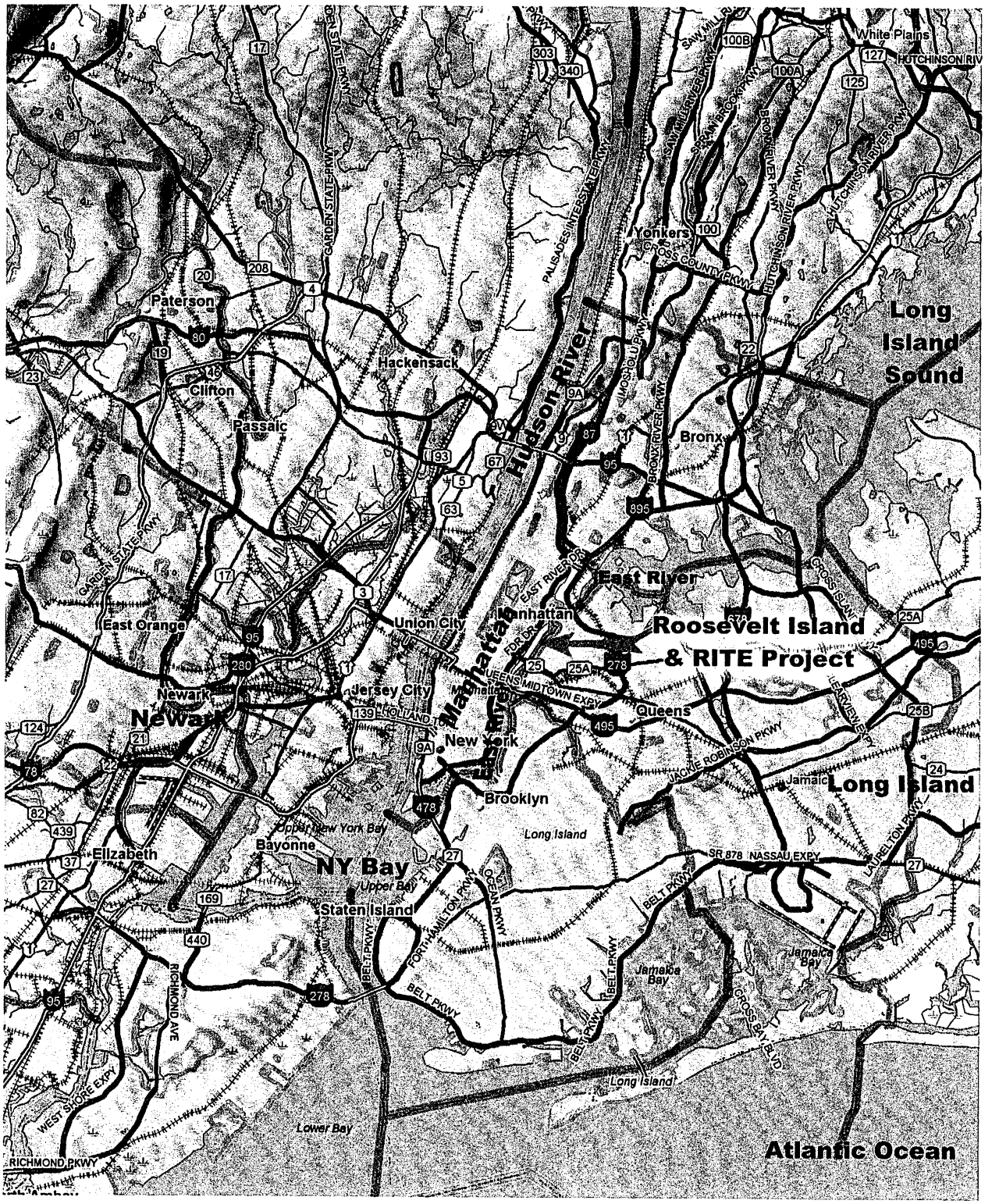


FIGURE 2.1-1
NEW YORK CITY AREA MAP

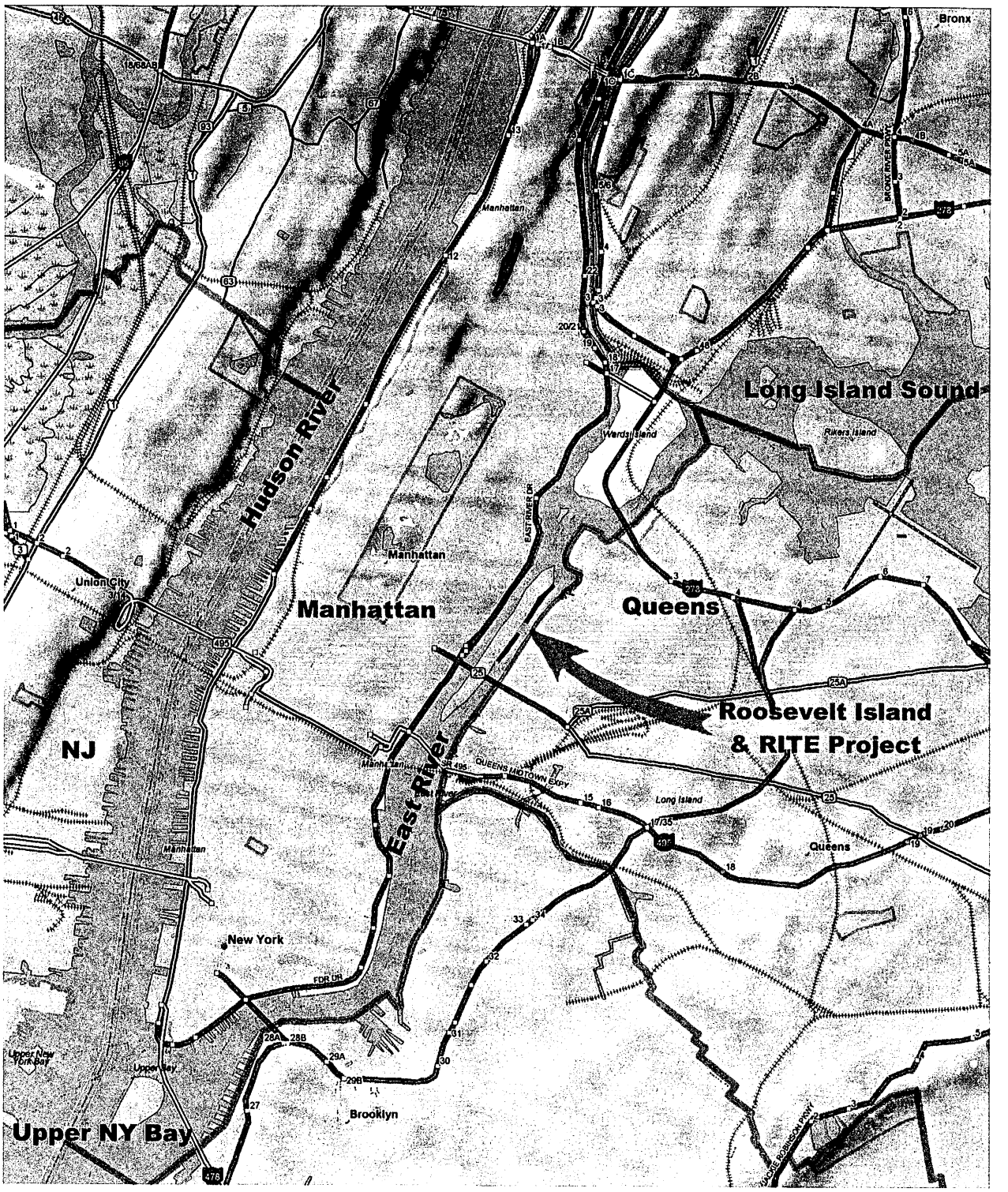


FIGURE 2.1-2
NEW YORK CITY LOCAL MAP

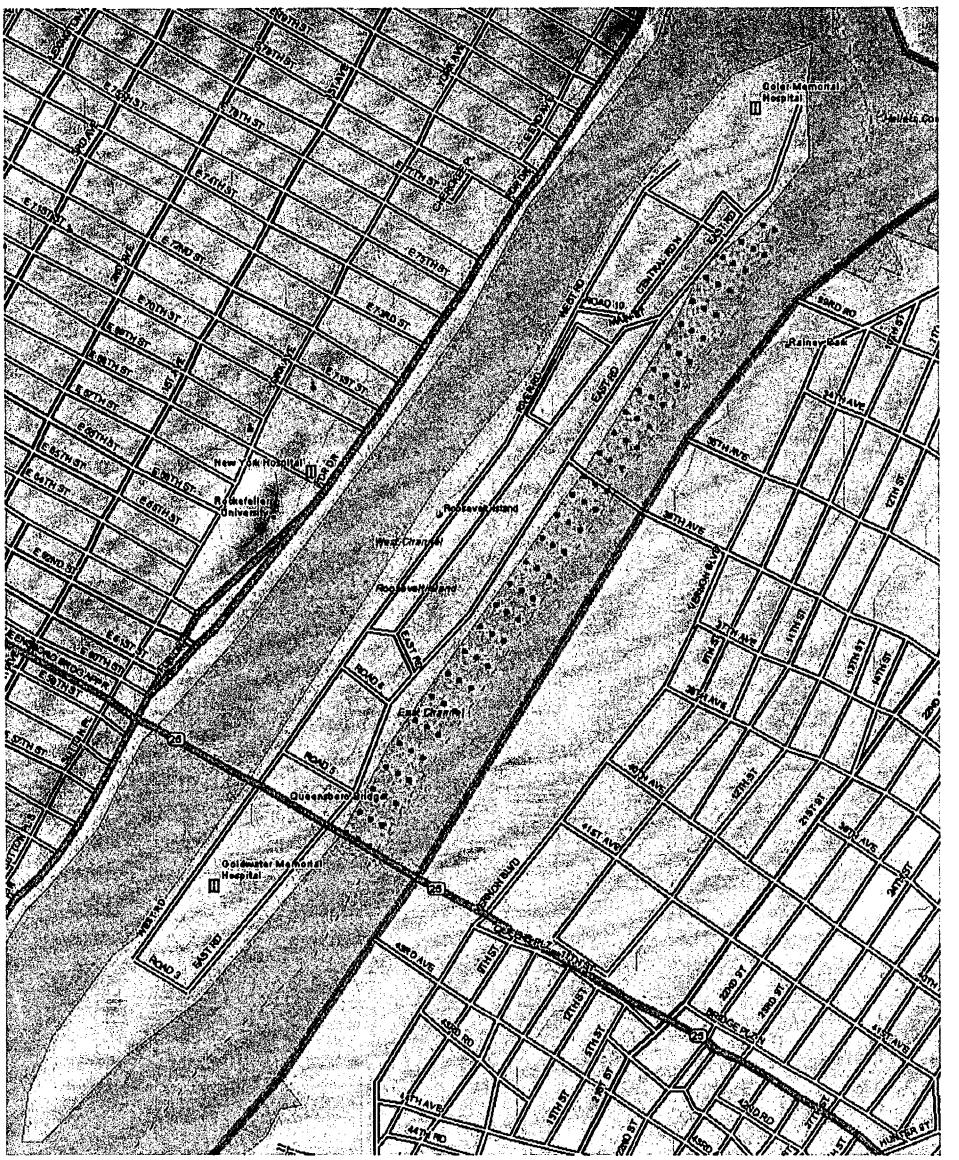


FIGURE 2.2-1
PHASE III FULL FIELD SITE MAP

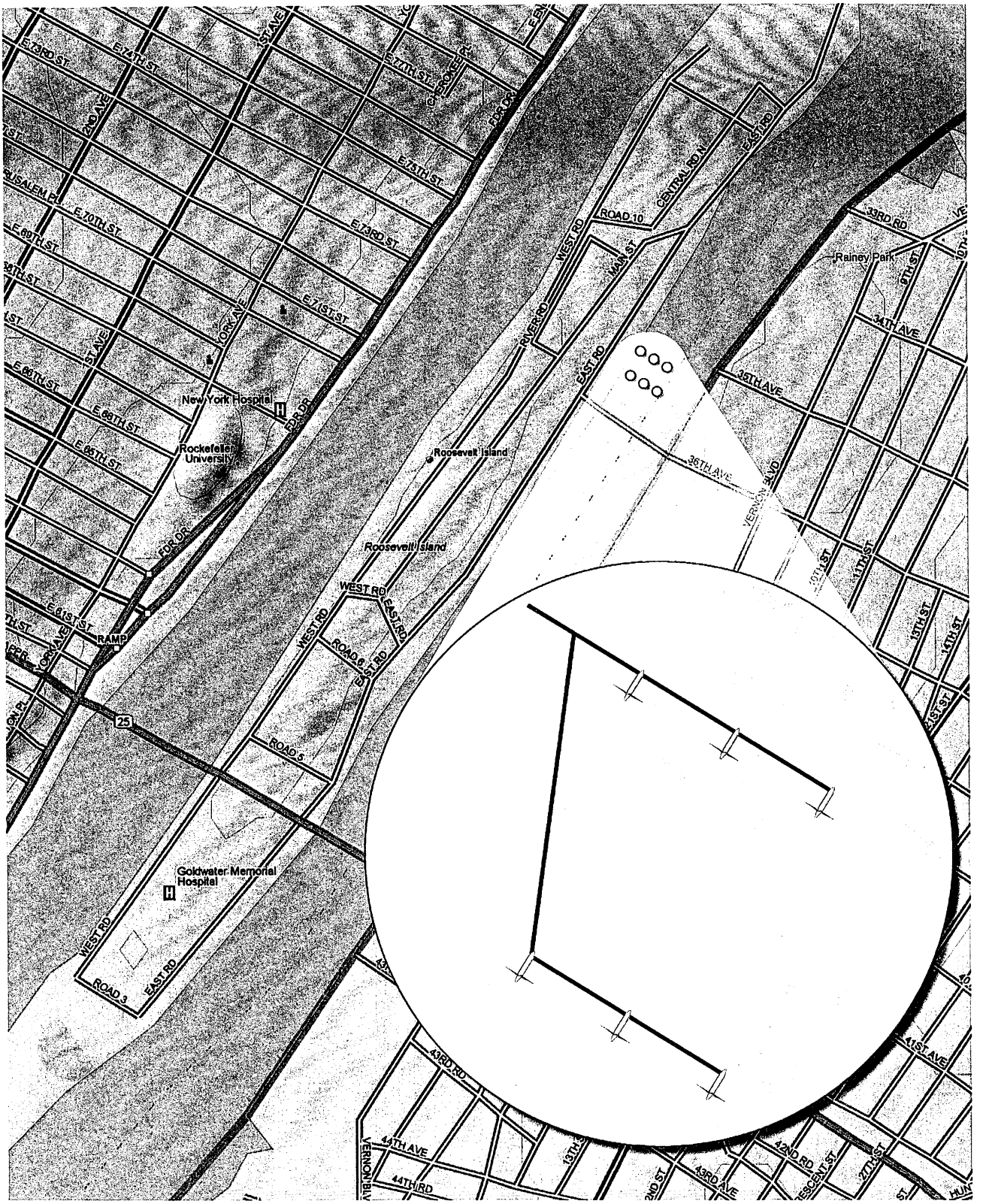


FIGURE 2.2-2
PHASE II MULTI-TURBINE ("SIX-PACK") SITE MAP

Section 3
General Engineering Design of the Project

The general engineering features of the project are described below and illustrated in the project drawings (Figures 3.3-1 through 3.3-4) located at the end of this Section.

3.1 Civil Works

This project is underwater in the East Channel of the East River. The only civil works will be 18 to 24 inch individual piles driven into the river bottom on which the individual turbines will be mounted. Pile driving is a well-known, routine operation that will result in minimal impact and footprint on the river bottom.

3.2 Impoundment

There are no impoundments associated with this tidal project, which will consist solely of free-flow turbines.

3.3 Turbines, Generators, and Appurtenant Equipment

This section describes each of the following components of the project technology: turbine design, rotor, generator, drivetrain, nacelle, pylon, yaw bearing, mounting adapter, mounting, deployment, generator control and interconnection, and array configurations. Two figures show the turbine design: Figure 3.3-1 shows a deployed turbine mounted on a monopole; and Figure 3.3-2 shows the individual components and design aspects of the KHP turbine system described below.

Turbine Design

The RITE Project KHP unit uses a five-meter-diameter, horizontal axis, axial flow, unducted turbine.

The basic platform of the turbine is with a downstream rotor that will cause passive yaw through about 170 degrees. The rotor is at the end of a nacelle, 30 inches in diameter, and about seven feet long. The nose-end of the nacelle and the tail end of the rotor hub have fairings. The nacelle is mounted to a nine-foot-long, vertical pylon that contains a yaw bearing assembly with an inner fixed stem that mounts, by a flange, to an adapter at the top of the mounting pile.

Rotor

The five-meter-diameter, KHP rotor is a three-bladed, unducted, axial flow rotor. The blades are fixed-pitch, with varying thickness, chord length, and twist, as a function of radius, as designed according to Glauert blade theory, with modifications. The three blades are mounted on an effectively cylindrical hub with a diameter of 30 inches, and an axial length of about 17 inches.

The blades are fabricated of glass and/or graphite-fiber, reinforced-epoxy-composite, with a steel skeleton. Verdant has developed an improved mounting system in which the hub is essentially a triangular structure allowing strong, simple fabrication and flat bolting surfaces for improved hub machining and blade interchangeability.

Generator

The key, to effectively and efficiently utilizing the power available at the rotor, is to match it to a generator system that near-optimally loads the rotor.

Because of the power characteristics of this rotor in water, it is possible to load it near-optimally with a quasi-fixed speed generator even though the water current speed varies from zero to a maximum of about 2.1 m/s (four knots). A simple and rugged induction generator will be connected to the electric grid (see interconnection below). This significantly reduces expense and avoids the use of slip rings, or an electronic control system, which would add significantly to cost while reducing overall efficiency.

The KHP's generator is a standard 480 VAC, 1,800 rpm (four-pole) induction motor with a nominal maximum power of 37 kW (50 hp), with design elements intended for a hostile, humid environment. It has the ability to handle greater power levels for short periods.

Drivetrain

The drivetrain consists of a five-inch-diameter main shaft on which the rotor hub is mounted. The main shaft is support in twin-tapered roller bearings installed in the main bearing housing, which is a fabrication that includes the main shaft seal mounted in the nacelle endplate. Seawater is excluded from the nacelle by the main shaft seal, which is a standard carbon-ceramic face seal.

The inner end of the main shaft drives a speed increaser (gearbox) through a flexible coupling. The coupling isolates the gearbox from shocks and all loads on the main shaft, other than torque. The gearbox is a flange-mounted, planetary-type, designed to increase the rotor speed of about 30 rpm, to that of the generator, about 1,850 rpm at full power. The final gear ratio for the new five-meter rotor will be determined during the initial dynamometry phase as described below.

All drivetrain components are designed to operate conservatively, well below any speed and stress ratings, in order to provide long maintenance cycles and long life. The nominal target maintenance period is two years.

Other Major Turbine Components

- Nacelle: This is a cylindrical, equipment housing made of mild steel with stainless steel end flanges that contain O-ring grooves for sealing. The nose end has a reinforced fairing. The nacelle is a main structural member that carries the weight, torque, and other forces operating through the main bearing housing from the rotor and other equipment, back to the pylon.

- Pylon: The vertical pylon, which is faired to minimize flow disruption, is bolted at its top and has a fairing to reduce the "tower shadow effect,"— a distortion or interruption in flow that causes the blade immediately behind the pylon to lose power, which could inject a three-per-revolution power fluctuation. Within the area of the nacelle/pylon flange are the watertight electrical connectors. Electrical cables travel through the pylon assembly, down to the riverbed, and then to the shore.

- Yaw-bearing: The outer pylon pipe rotates around an inner stem that is fixed to the pile at its lower end. The yaw bearing is water-wetted and comprised of acetal plastic (Delrin) bushings running on stainless steel bearing surfaces applied to the inside of the pylon pipe and the outside of the stem pipe. The pylon rotation is stopped to prevent wind-up of the power and signal cable, while avoiding the use of slip-rings and the need to seal the pylon and yaw bearing assembly.

- Mounting adapter: (Also see "Mounting," below.) The vertical mounting stem of the turbine unit emerges from the bottom of the pylon, ending in a flange. It must be rigidly fastened to the mounting pile so that the pylon is plumb. An adapter is first clamped to the top of the pile using captive bolts. When the turbine is ready for installation, the bottom flange of the turbine pylon assembly is bolted to the adapter's top plate.

Mounting

Each turbine unit will be mounted to the river bottom by means of an individual pile. The piles are 24-inch-diameter, open-pipe, driven about 20 to 40 feet into the bottom, as required by the bottom material, to provide the lateral resistance necessary for the turbine. These piles provide a minimal footprint with a readily available, and well-proven and understood technology. The pile mounting system has been developed in conjunction with Han-Padron Associates of New York City, a highly experienced marine engineering firm.

Once the pile is driven to sufficient depth, it will be cut, if necessary, to within five to six feet of the bottom. A pair of divers will attach the mounting adapter described above to the top of each

pile. During each six-hour period there is a slack tide, with current below one knot for one hour, during which time the divers can work.

Deployment

After the turbine units are fabricated, assembled, and tested, they will be shipped to the site and reassembled and prepared for deployment at an on-shore staging area. Once the piles with mounting adapters are ready, the turbine units will be placed on a crane barge that will locate them over each pile. The turbine cable will be attached to a bottom cable that leads onshore to the control room. The turbine will be lowered for attachment by divers. At this point, the divers will fasten the mounting flange bolts, and orient the yaw stop assembly. Finally, an external rotor-preventer will be released, allowing the rotor to turn.

Generator Control and Interconnection

The induction generator must be connected to a grid in order to generate power, since the grid supplies the generator's excitation. However, unlike synchronous or variable-speed generators, the induction machine is basically connected across the line using a contactor. For the RITE Project, the nearby access to a strong power grid, that can readily accept the power from the KHP units, makes the induction generator the most appropriate system.

During the initial study phase of the project, the generators will be connected to the 460V customer-side of the grid. Verdant is holding discussions with the RIOC with regard to tying-in to their connection located at Main Street, to the west of the Roosevelt Island Bridge. This would simplify the connection for the first two array phases, and result in providing power to offset the demand of RIOC's facilities, and those of its commercial tenants.

The interconnection will meet the standards (Specification EO-2115) required for protective relaying and power quality by the Consolidated Edison Co of New York, Inc. (ConEdison, the local distribution utility), the State of New York, and other relevant standards organizations. Initial conversations with ConEdison's energy services staff indicate no insurmountable barriers

to interconnection. Verdant's contracted professional electrical engineer will provide the interconnect design, drawings, and documentation necessary to ConEdison and regulatory authorities. Power-factor correction capacitors will also be provided for as required. If the starting current of the generators proves problematic to the local grid, a soft-start unit can be added.

A simple control system strategy will control the cut-in and cutout of the generators, as the tidal currents change speed and direction. This system connects the generators to the grid, as speed grows high enough to generate power, and disconnects them as power declines towards zero. Each turbine will operate independently. In the array format, the individual generators may be linked logically so that they are prevented from starting simultaneously, so as not to impose significant voltage fluctuations on the local grid.

The underwater power cable from each turbine unit will lead to the Verdant Power House where it will be connected via Verdant switchgear to a common power bus that is, in turn, connected to the grid. In this onshore facility, Verdant will also conduct testing and monitoring of the KHP systems. Verdant is holding discussions with the RIOC with regard to locating the Power House in its facilities near the Roosevelt Island Bridge.

Array Configurations

- First unit, testing, final design parameters - KHP turbine Unit 1 will be installed in the East Channel site, initially in a dynamometry configuration. In this mode, it will have a remotely controllable, air-applied, water-cooled brake to apply a load to the rotor. The Data Acquisition and Control System (DAC) will be augmented for this phase to measure the physical parameters required for dynamometry, and to protect the equipment. The brake load will be reacted through a torque sensor, while rotor speed will be measured by a tachometer. The speed of the water approaching the turbine will also be measured, and the performance of the rotor will be fully characterized for the entire range of water speeds, and load levels, from no-load to rotor stall. The full family of rotor power curves will be generated, and the final gear ratio of the gearbox, to drive the generator, will be selected.

A detailed water-velocity survey will be conducted around the operating rotor, which will provide data on the recovery of water-velocity. This will guide the final cross-stream and downstream spacing of the subsequent array.

- 100 to 150 kW Array - Approximately four to six KHP turbine units will be deployed. At this level, the array will be comprised nominally of two crosswise rows of three turbines each. As described above, each KHP turbine will be mounted on its own pile. The nominal turbine spacing will be three-rotor-diameters (15m) crosswise to the flow, and eight diameters (40m) downstream. Since the flow is bi-directional, but not omni-directional, the rows will be offset crosswise such that a turbine is located in the gap between adjacent turbines in the previous row.

  The layout of the 100 to 150 kW array is as shown in Figures 2.2-2 and 3.3-3. Modification to this design may result from the flow survey around Unit 1 in the test phase described above. It is important to note that the unobstructed area required around the array is larger than the area actually occupied by the turbines, to ensure clean water flow.

- Full field 5 to 10MW Array - Utilizing the testing in previous phases, an optimal configuration will be determined that balances individual turbine performance with total power generation. The array layout will also be modified by local depth, current speed, bottom condition, and regulatory authority limitations related to navigation, safety, and security. The full-field array or configuration (see Figure 3.3-4) will consist of potentially 200 to 400 turbines, arrayed to provide the most cost-effective delivery on power.

Sub-Station and Transmission Lines

- Substation - Cable from each turbine will route to a substation within which the cable will connect to a 460V bus, switchgear, and protective relaying. Substation transformers will step-up the power to 13.8 kV for interconnection to a ConEdison-Roosevelt Island feeder line or to a local customer(s) as may be found on Roosevelt Island.

- Control Room - A local control room will house the instrumentation, switchgear contactors, and communication equipment for system and turbine performance monitoring, and automatic and manual system control.

- Transmission Lines - The system will connect with ConEdison 13.8 kV feeders located on Roosevelt Island.

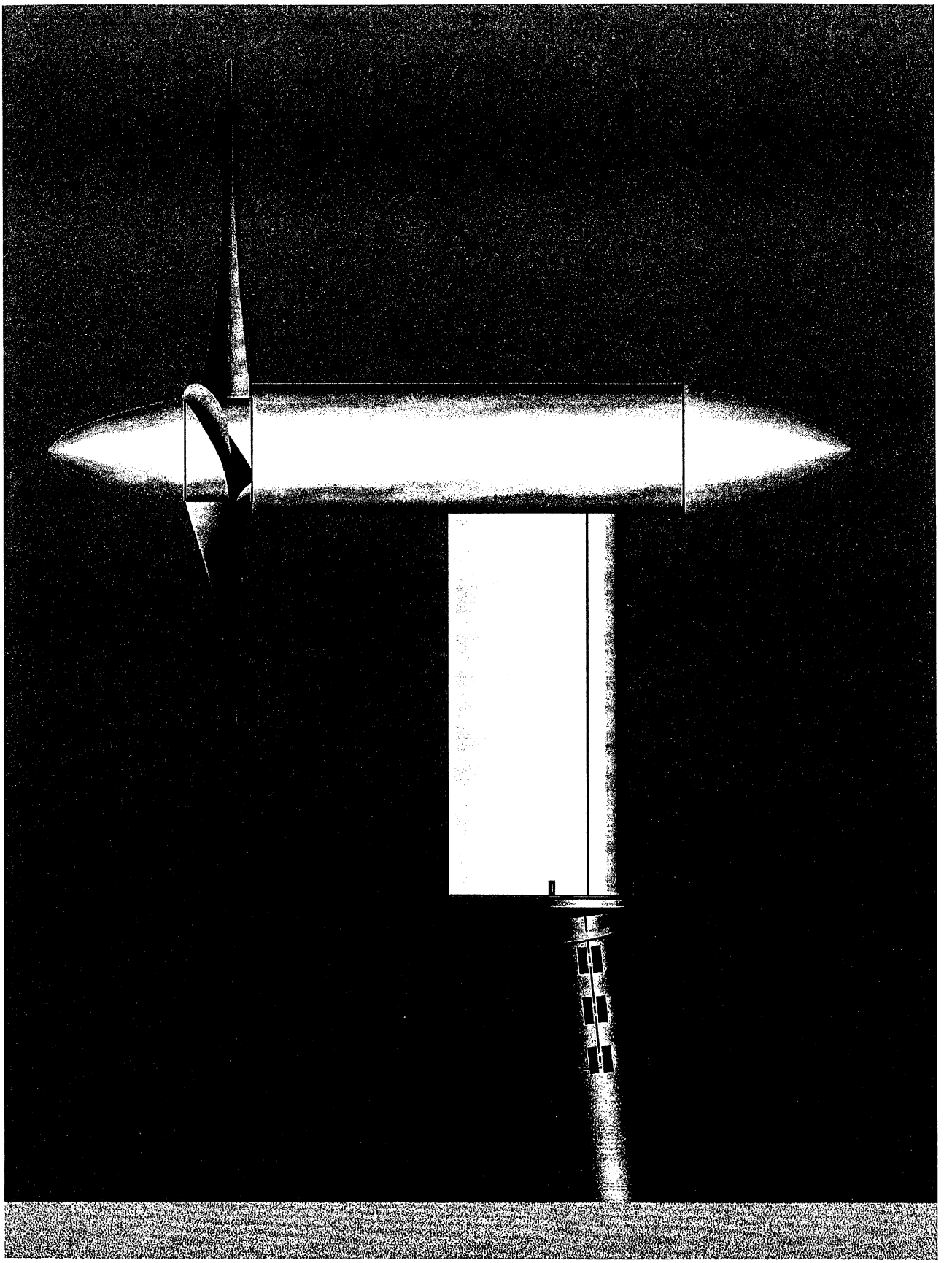


FIGURE 3.3-1
ILLUSTRATION OF TURBINE ON A MONOPILE

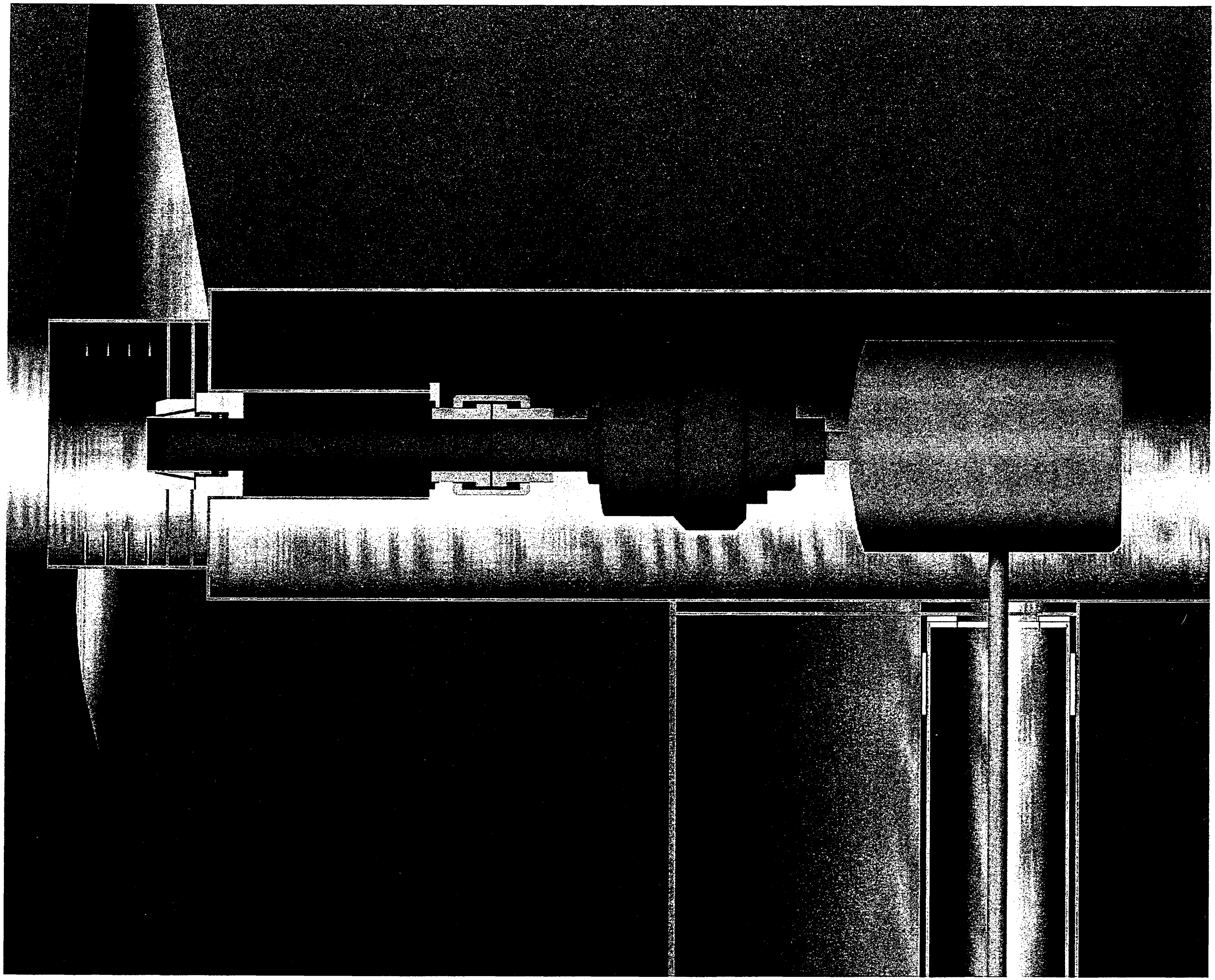


FIGURE 3.3-2
CROSS-SECTIONAL VIEW OF TURBINE

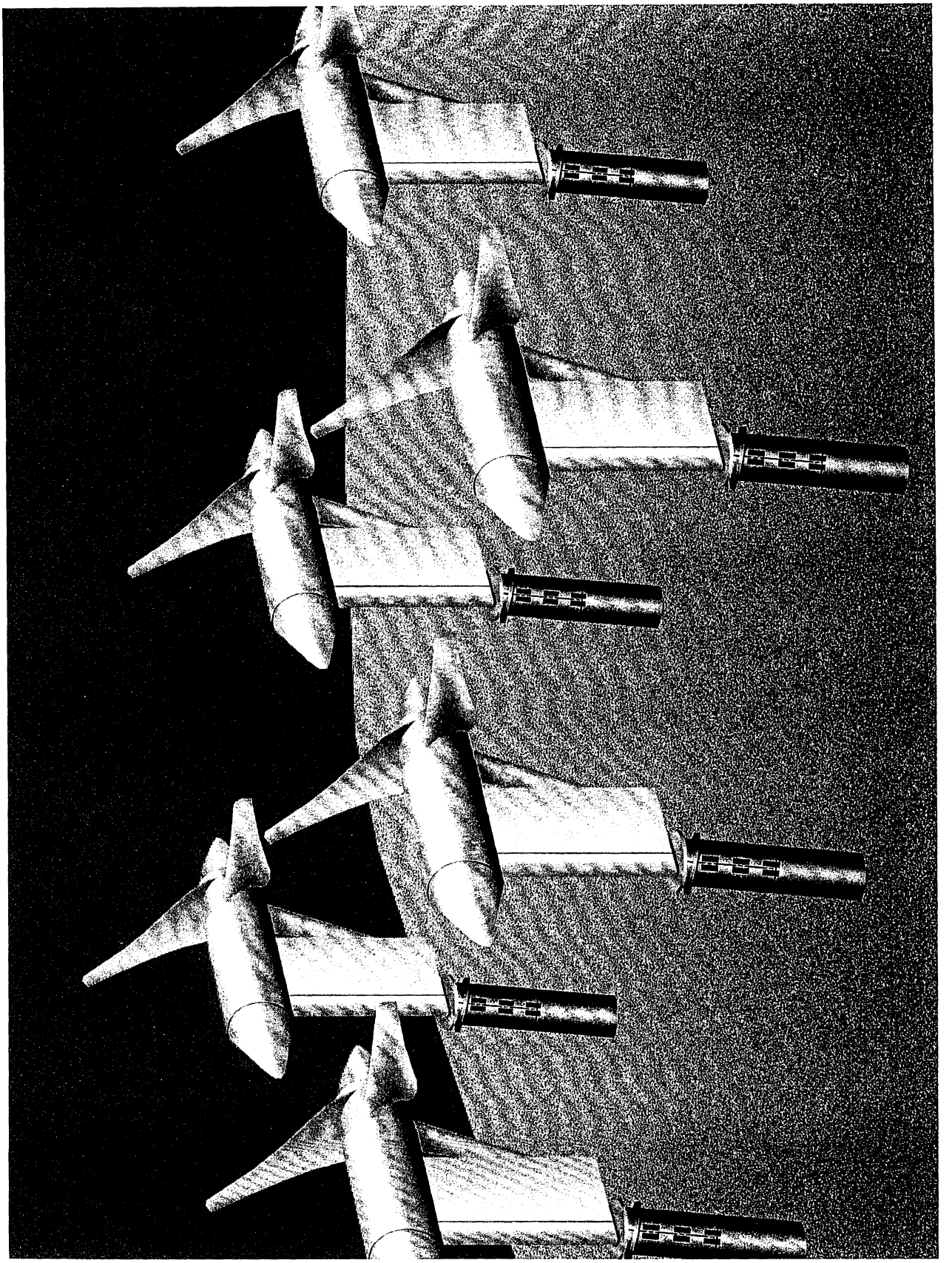


FIGURE 3.3-3
PHASE II FIELD OF SIX TURBINES

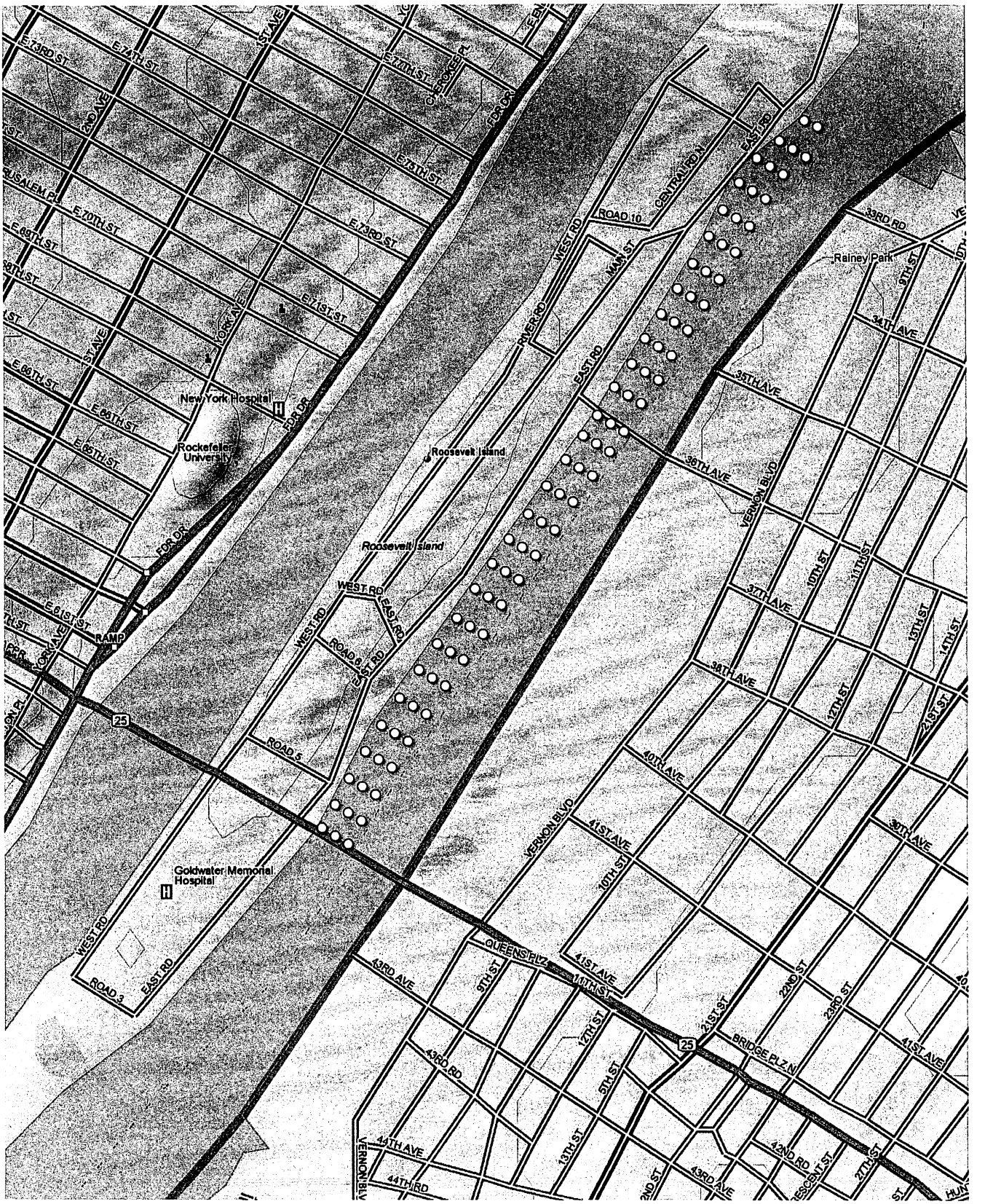


FIGURE 3.3-4
FULL FIELD CONFIGURATION

Section 4
Project Operation

The general operations, including deployment of the systems, are described below.

4.1 Current Operations

At the time of drafting of this document, there are no systems installed at the project site. There are neither civil works, nor equipment located at the project site that is controlled or directed by the Applicant.

4.2 Future Operations

This discussion includes information relative to the deployment of the initial nominal six-pack configuration, its operation and maintenance, as well as deployment, operation, and maintenance of the expanded 10 MW field.

4.2.1 Deployment of the Systems

Verdant has studied a number of varying deployment approaches with an overriding concern to minimize any effect of the system's introduction and operation on the environment, while simultaneously providing for efficient operation and use of the water resources. The analysis included a number of alternative mounting structures, such as floating platforms, river-bottom mounted platforms, and intricate bottom based grid assemblies. Exhaustive research was conducted, and continues, to identify existing information regarding the subsurface strata below the planned field location. In some areas, additional test borings or new seismic soundings may still be required to develop a reliable river bottom profile of the complete field area.

The optimal design for this particular project is a system-mounting configuration of individual, driven-steel piles, each supporting one-turbine unit. Pile driving is a cost-effective, routine marine operation that is well developed by local marine construction contractors in the project region. The piles are expected to be between 18 and 24 inches in diameter and will extend

approximately six feet above the river bottom (Figure 4.2-1). Piles will be driven by equipment mounted on a typical construction barge, whose position is maintained by anchors. In this manner, the barge can be repositioned by heaving or slacking the anchor cables to drive several piles for each evolution.

The initial set of piles for the nominal six-pack will be driven at intervals that are based on Verdant's engineering and hydrologic projections, formulated on existing performance data developed to date. Subsequent deployments may reflect different spacing patterns and distances between the systems should additional field-testing reveal more optimal lateral and/or longitudinal settings. Factors that will be considered to assess the size and density of the field include energy requirements; environmental considerations, aesthetics, and traditional waterway uses. To this end, members of the local community, state and municipal environment agencies, USACOE, USCG, various NGOs, and private organizations with interests in the environment, water quality, water uses, water and open space access, and energy security, have been identified as major stakeholders to whom the opportunity for early participation in the planning process has been extended.

Current plans call for the piles for the initial six-pack-system configuration to be deployed in less than two to three days. As experience is gathered, and the underwater field more thoroughly surveyed, it is envisioned that significantly more piles will be driven during each workday in subsequent installation stages, thus minimizing any inconvenience to the community. Allowing adequate time for study of the initial six-pack-system-array, and subsequent federal, state, and municipal licensing and permitting follow through, the initial build-out should occur in the spring/summer of 2005, with the deployment of approximately 36 or more units. Later build-out of the entire field, commencing in the spring/summer of 2006, will include approximately 300+ additional units. When assembled and operational, each turbine center will be approximately 12 feet above the river bottom, and have at least five feet of water above the turbine tips as a surface cushion (Figure 4.2-2).

The electrical generation portion of the components, including the turbine blades and nacelle assembly, will be mounted and calibrated onto the top portion of the pile. This will be

accomplished during a process, separate from, and subsequent to, the installation of the piles. These portions will be brought to the site from an industrial staging area via barges, thus alleviating any necessity to construct or expand any nearby road systems, bridges, etc., on Roosevelt Island or in the nearby residential communities.

During the initial six-pack installation, and the field build-out, transmission cables from each turbine system will be collected and routed along the river bottom, to electric grid system connection-points ashore. Verdant intends that the initial 2004 six-pack phase will be configured with separate system-to-shore cable lines for all six units. Later, underwater cable installations will be minimized by installing sets of turbines that will feed a single, larger cable-line to connection-points ashore. Planning of the cable routes, connection strategy, and agreement on the specifics of required grid safety and monitoring equipment is underway with ConEdison and the RIOC engineering department.

Maritime safety and field security are two additional critical factors. Local ferry and commercial shipping operators, as well as recreational pleasure boat users have been involved in the planning process and will continue to be consulted in evaluating field design options. Verdant intends to maximize the energy conversion potential of the waterway without impeding traditional, responsible waterway use. A floating port security barrier will be installed around the field's periphery. The barrier will be sized small enough to be inconspicuous from shore, while still large enough to deter errant pleasure boaters from encroaching into the system array area. In addition, the field boundaries will be marked with lights and/or buoys acceptable to the USCG. The field will be off limits to marine traffic and recreational fishing. A security zone, similar to those routinely established around bridges and electrical power generation facilities, will be delineated. Ultimately, the field will be included on nautical charts produced by the National Oceanographic and Atmospheric Administration (NOAA) and the security zone will be described in Coast Pilot and Title 33 of the Code of Federal Regulations. A facility security plan, acceptable to the US Coast Guard and other interested parties, will be filed with the FERC as part of Verdant's operating license request.

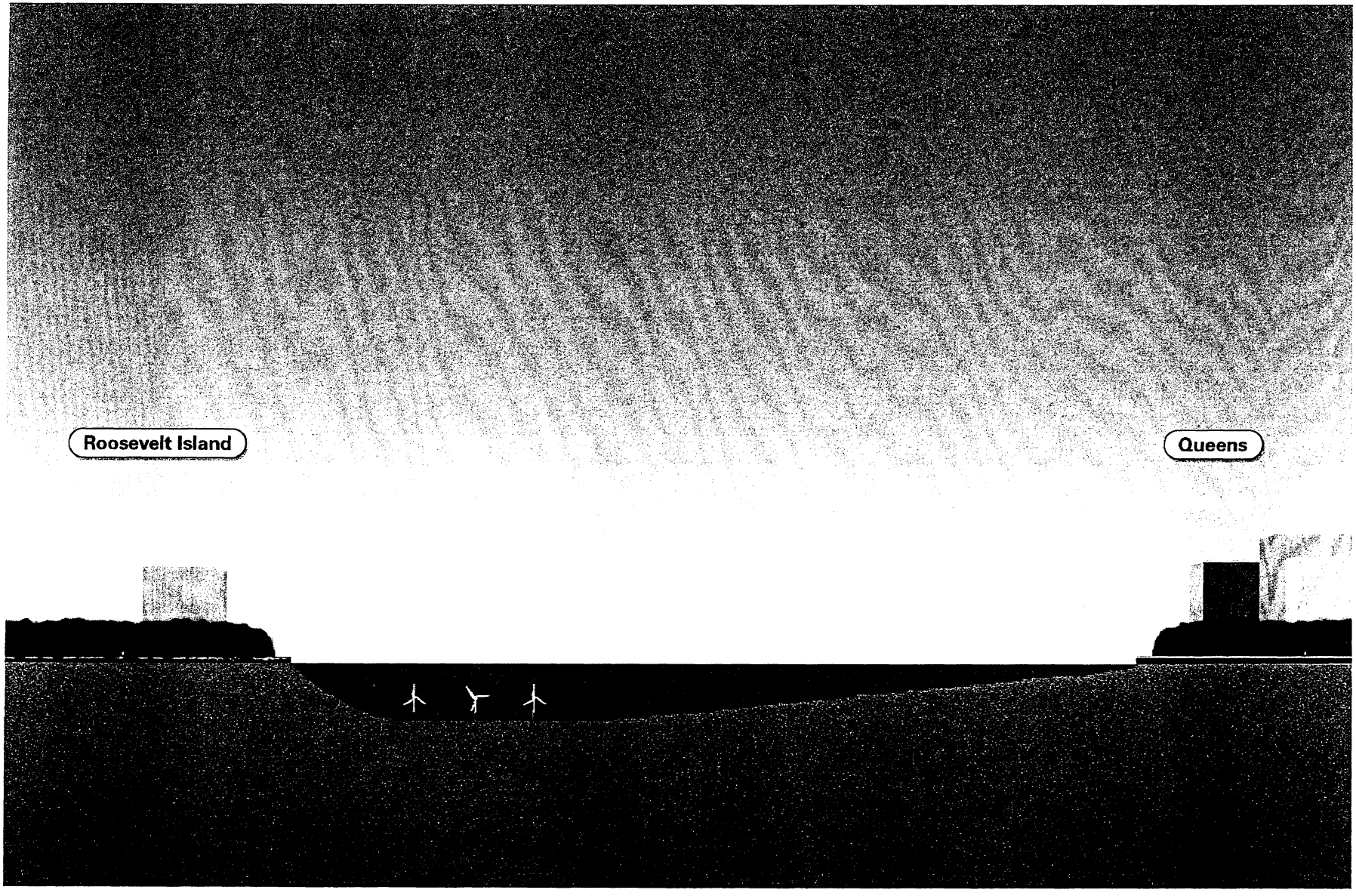


FIGURE 4.2-1
CROSS SECTION ILLUSTRATION OF FIELD

FIGURE 4.2-2
CROSS SECTION OF EAST RIVER AT ROOSEVELT ISLAND

4.2.2 Operations

The turbine field extends roughly from the Queensboro Bridge to the north end of the island, across the channel from the Costco building, a distance of a little more than one mile. Initially, for the first set of turbines, a temporary enclosure will function as the local control center for the systems. The center will house equipment and personnel monitoring the performance and power output of the small set of systems. Each turbine assembly incorporates sensors for measuring vibration, leak detection, generator temperature, bearing and gearbox temperature, speed and torque, voltage, current, power factor, power quality, yaw angle, and nacelle pitch. The sensor monitoring system is totally digital and ensures the capability to examine both field performance and individual turbine conditions.

In its final configuration, the field will encompass several-hundred turbine systems. However, the final field configuration will need to consider the existing cable area and security zones (see Figure 4.2-3). If those designated areas are to be avoided altogether, then most likely that means extending the field south of the Queensboro Bridge to the northern boundary of the Federal Channel (see Figure 4.2-4). Each turbine will be individually monitored by a small operations center, in a manner similar to that of a typical small power plant. This ability to monitor and troubleshoot individual turbine performance and conditions remains a necessary capability of the overall system design. In this regard, Verdant intends to retain the ability to add and upgrade equipment components, including sensors, in a modular fashion as improvements become available.

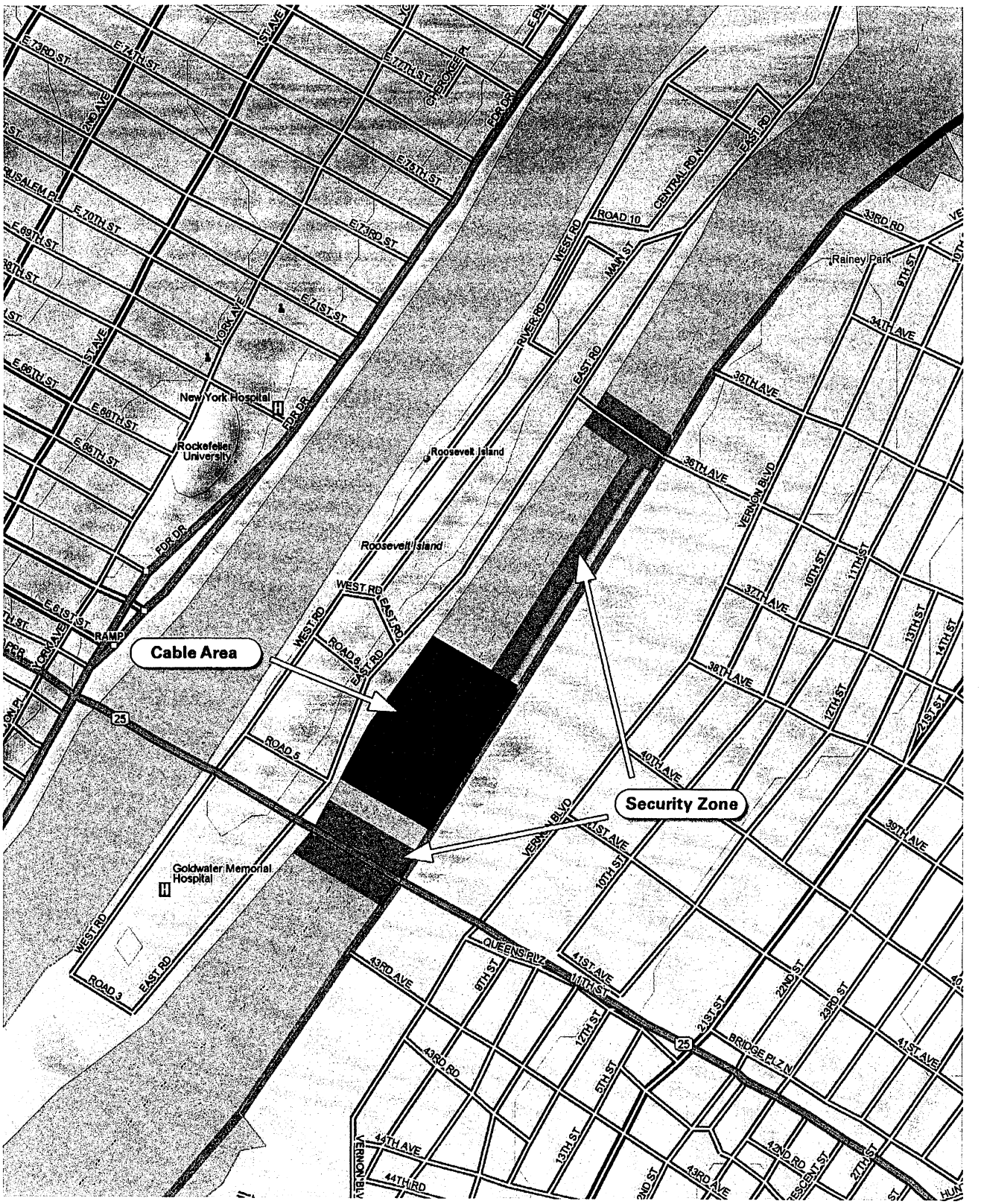


FIGURE 4.2-3
EXISTING CABLE AREAS AND SECURITY ZONES

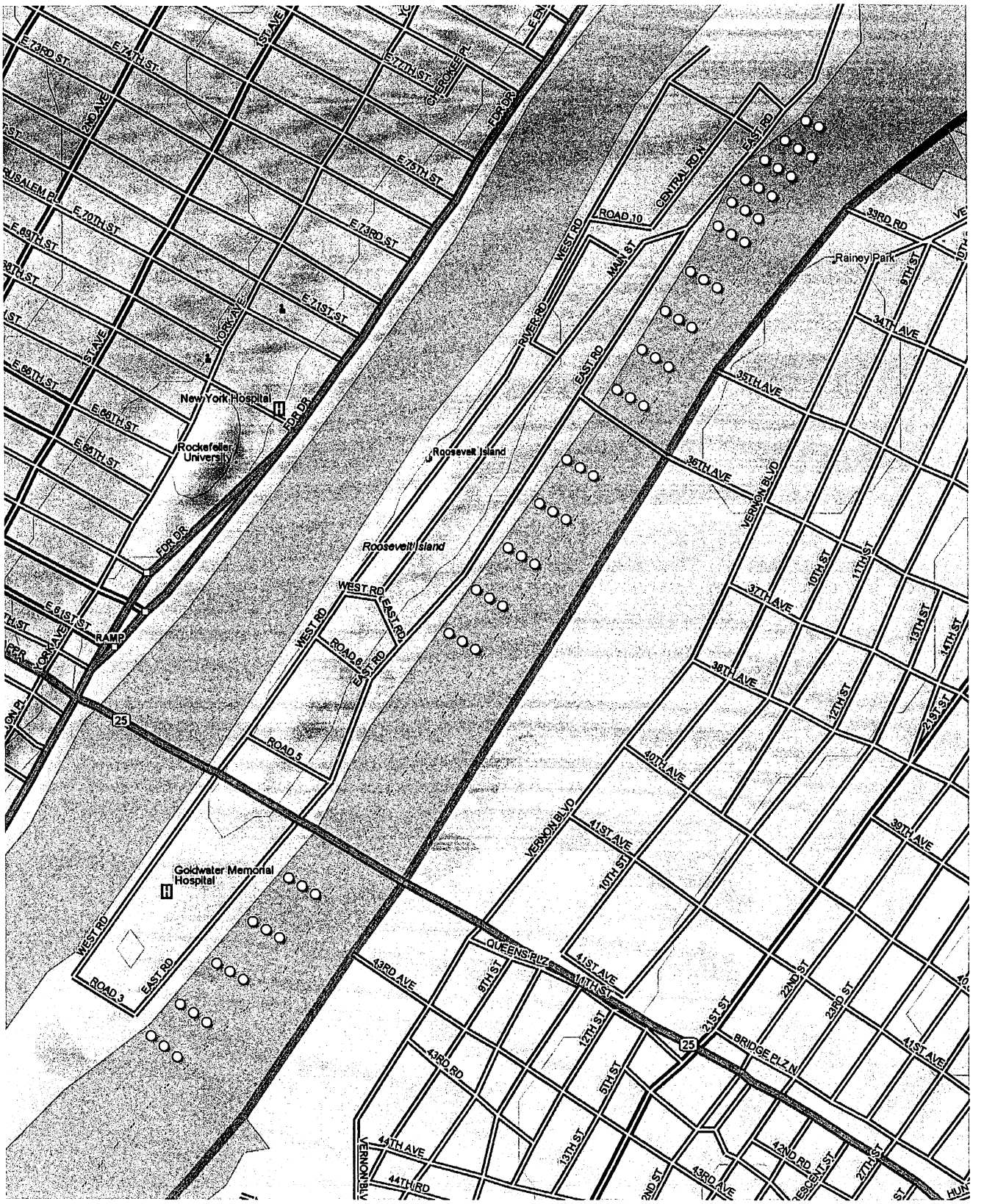


FIGURE 4.2-4
ALTERNATE FULL FIELD CONFIGURATION

4.2.3 Maintenance

While separate components of the underwater turbine system are well tested, with documented maintenance histories, little experience exists in their operating together in the maintenance arena presented at Roosevelt Island. It is the maintenance on these individual components that will drive the maintenance procedures and intervals. For many reasons, including, among others, reliability, cost, navigational disruption, and visual disturbance, the components are designed for a 30-year life cycle for all external components, with a multi-year inspection and replacement schedule for internal components. Equipment that fits within this philosophy will be chosen during the initial six-pack deployment and upgraded throughout the subsequent build-out of the expanded field. To the maximum extent possible, the components and resulting systems are designed to operate for prolonged periods of time on a "maintenance free" basis. Even so, certain components will require periodic inspection, lubrication, and/or replacement. Current plans for a systematic replacement of all turbine units, at scheduled intervals, are projected to be in excess of two years from each deployment. Subsequent models of systems should operate with even longer replacement intervals, as anticipated technological improvements are integrated into the systems in the future. Only the portion of the turbine system that contains the internal components will be lifted off of its pile and replaced with a new or refurbished unit. The pile will remain affixed to the river bottom during the maintenance activity.

Replacement of the turbine-generation components will be accomplished using specially designed service boats to facilitate assembly-line replacements by trained field maintenance teams. Thus, major portions of the entire field can be rejuvenated on a rapid basis with minimal disruption to the field's electricity production. Units that are retrieved will be refurbished off-site and available for deployment, either back in this location, or elsewhere.

Section 5
Streamflow and Water Regime Information

5.1 East River

The East River is a 17-mile long tidal strait that connects the upper New York/New Jersey Harbor with the Long Island Sound. The East River separates the New York City Boroughs of Manhattan and the Bronx from Brooklyn and Queens. The Harlem River flows from the Hudson River and connects with the East River at Hell Gate. The River is not a freshwater river normally described in a FERC application, but a saltwater conveyance passage for tidal flow. There is some freshwater influence from the Harlem River and some direct drainage area from the surrounding metropolis, but the river is predominantly controlled by tidal influence.

The RITE Project is located along Roosevelt Island in the East Channel of the East River, outside the navigation channel maintained for shipping by USACOE. The project is planned to be located near the Queensboro Bridge, as shown in Figure 3.3-4.

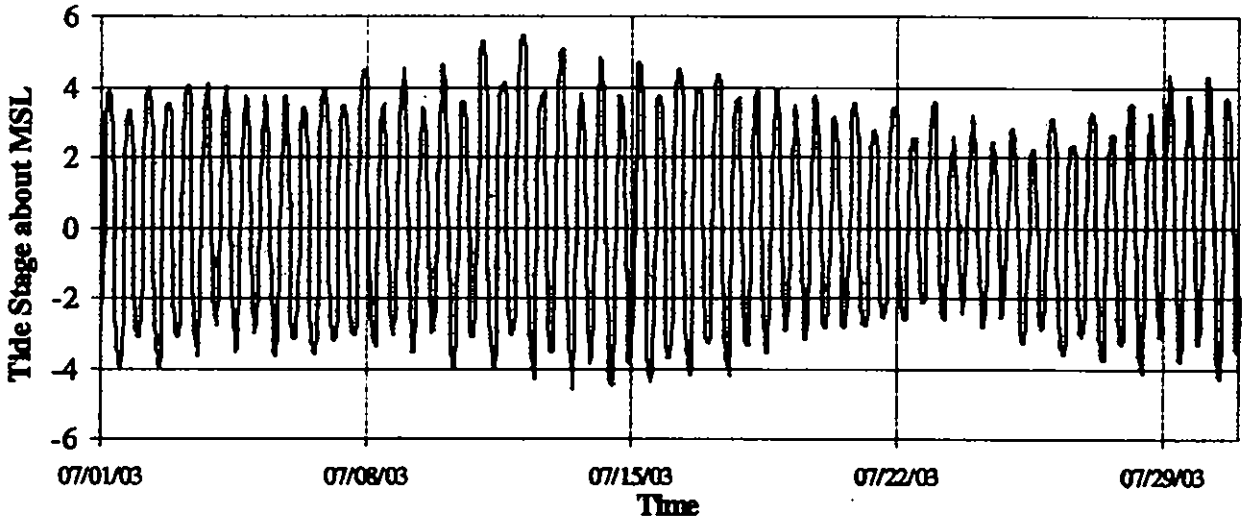
5.2 Tides

A tide is the cyclic rise and fall of the ocean water surface as a result of tide-generating forces, which are the gravitational forces between the earth, sun and moon, and the rotational forces of the planets during their orbits. A discussion of the causes of the tides is outside the scope of this document, however, the National Oceanic and Atmospheric Administration (NOAA) has produced and maintains a number of documents discussing the celestial forces and the origins of the tides (NOAA, 2003a, 2003b).

High tides are produced in the ocean waters by the elliptically-shaped "heaping" action resulting from the horizontal flow of water toward two regions of the earth representing positions of maximum attraction of combined lunar and solar gravitational forces. The low tides are produced by a corresponding withdrawal of water from regions around the earth midway between these two "humps". The alternation of high and low tides is caused by the daily (diurnal) rotation of the earth with respect to these two tidal humps and two tidal depressions.

Tidal forces are not constant, and vary with the orbits of the planet producing tides of varying magnitudes throughout a cycle. The gravitational attractions (and resultant tidal force envelopes) produced by the Moon and the Sun reinforce each other at times of new and full moon to increase the range of the tides, and counteract each other at the first and third quarters of the lunar cycle, thereby reducing the tidal range. The solar and lunar cycles reinforce each other twice a month, increasing the tidal range, which is called "Spring Tide". Also, twice a month the solar and lunar influences counteract one another to produce a lesser tide than normal, which is called the "Neap Tide". A typical monthly tidal stage cycle is represented by Figure 5.1-1.

FIGURE 5.1-1
EXAMPLE MONTHLY TIDAL CYCLE FOR LONG ISLAND SOUND



5.3 Tidal Gages

NOAA has two active tidal gages (stations) near the project site, with one station at the southern tip of Manhattan in Battery Park, and the other to the north on Kings Point in Long Island Sound. The Battery NOAA station (8518750), has been in service since 1920. The Kings Point NOAA Station (8516945) has been in service since October 1998.

The mean tide range at The Battery is reported as 4.5 feet (NOAA), and represents the difference between mean high water and mean low water. The mean tide range for the station at Kings Point is reported as 7.2 feet within Long Island Sound (NOAA, 2003c).

5.4 Tidal Currents

The complex interaction of the tides between the New York Harbor and Long Island Sound create tidal currents coincident with changes in the tidal stage. The tidal currents in the East River are semidiurnal, having two flood periods and two ebb periods per tidal day (24.84 hours). The reversing flood and ebb currents are of opposite direction, but with similar current velocity profiles. The tidal velocities are at a maximum when the tide stage is near the mean level, and are at a minimum when the tides are at high and low stages. The project equipment will extract energy from the tidal currents flowing in both directions; similar to the operation of a wind turbine, and has a yaw system enabling the unit to orient to the direction of the flow.

Tidal current charts are available from NOAA (2003c), and were empirically transformed from the tidal station to the project site. In order to accurately quantify and calibrate the currents and tidal current data, Verdant deployed a hydrographic team to the site to collect a full month of velocity data. This data was analyzed and combined with the NOAA Hell Gate tidal current data to form a four-month representative tidal current cycle. The velocity data from the four-month period was used to calculate the Tidal Velocity Exceedence Curve, which is presented as Figure 5.1-2.

FIGURE 5.1-2
TIDAL VELOCITY EXCEEDENCE CURVE

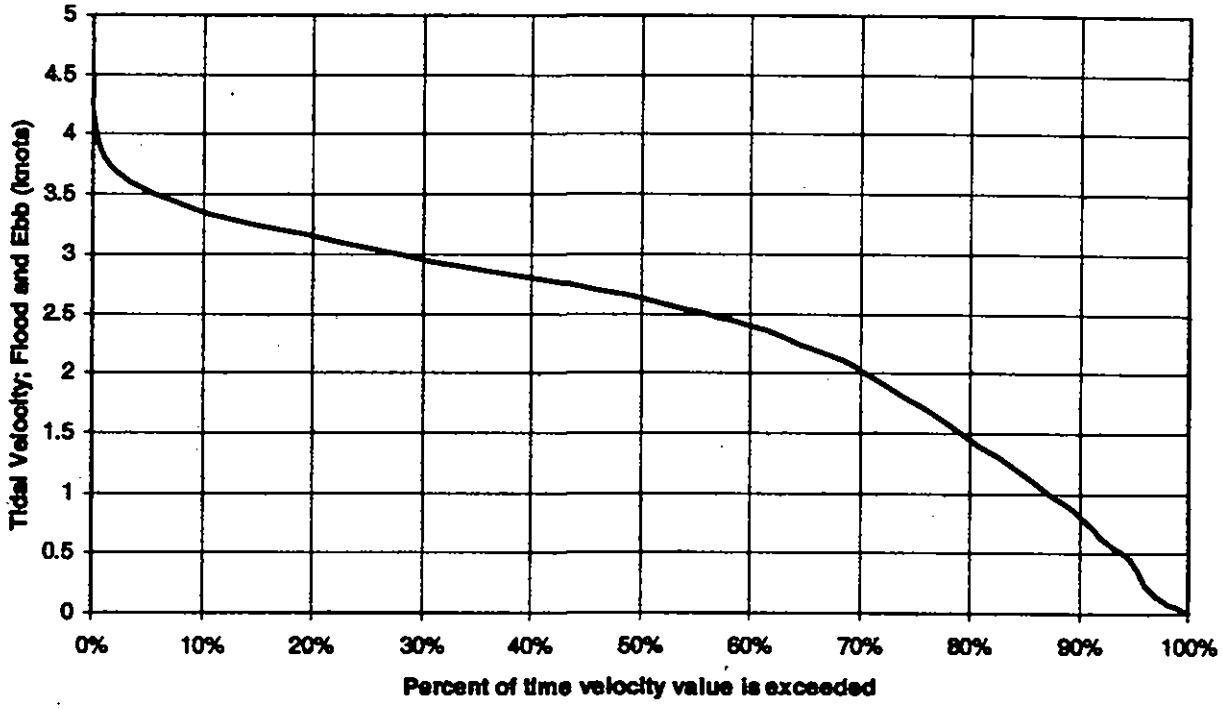


Figure 5.1-2 shows that the median tidal current velocity at the site is approximately 2.6 knots, or 4.4 feet per second (3 miles per hour).

Section 6
Existing Environmental Resources

6.1 General Description of Project Area

6.1.1 Location

Project Area

The proposed RITE Project will be located on the East River along the east shore of Roosevelt Island, in the Manhattan Borough of New York City, New York County, New York (Figures 2.1-1 and 2.1-2). Roosevelt Island is a 147-acre island with dense residential and commercial development that is operated by the RIOC.

The East River is part of the Inner New York Harbor. The harbor consists of the upper bay, lower Hudson River, East River, Long Island Sound, and tributary waterways. The inner harbor is connected with the outer harbor via The Narrows.

The East River is a 17-mile-long tidal strait that connects upper New York Harbor with the Long Island Sound. The East River separates the New York City Boroughs of Manhattan and the Bronx from Brooklyn and Queens. The Harlem River flows from the Hudson River and connects with the East River at Hell Gate. The nine-mile reach from the Battery to Lawrence Point is commonly referred to as the lower East River. The reach from Lawrence Point to Throngs Neck is considered the upper East River.

Regional Setting

Despite its urban locale, the East River is located within an area where significant environmental studies have been conducted, including inventories and research conducted in association with regional watershed/estuary management and planning programs, and federal, state and New York City regulatory programs. Accordingly, there is a wealth of environmental information available for the region. The East River lies on the border of the New York/New Jersey Harbor

Estuary and the Long Island Sound Estuary, so portions of the East River are often included in the study and planning regions of both programs. However, East River specific data for some resources are integrated in reports and data sets covering relatively large geographic and ecological scope, and, as such, frequently are not applicable to the immediate project area. During preparation of this ICD, documents from numerous regional programs were reviewed, and pertinent information was incorporated herein to the extent that the particular resources that they encompass are proximate and ecologically relevant to the project area.

To aid in understanding the source of various resource descriptions provided throughout Section 6 of this ICD, the following is a brief description of the study/planning/regulatory regions discussed. It should be recognized that this ICD does not attempt to summarize all of the available information from each program. Readily available information determined to be most applicable to the project has been incorporated to present this initial description of project area resources. Verdant expects that through the licensing consultation process, the agencies and other organizations that are most familiar with the extensive data available from these programs will assist in identifying the information that is truly pertinent to assessing the potential impact of the RITE Project on area resources.

New York Bight Region

The East River lies within the large hydrologic region known as the New York Bight (Figure 6.1-1). The New York Bight Region includes the New York/New Jersey Harbor Estuary and associated bays and the lower Hudson River Estuary (from Troy Dam, downstream to the southern tip of Manhattan); the open Atlantic Ocean south of Long Island and east of New Jersey, known at the New York Bight proper; and the watersheds of Southern Long Island. The New York Bight Region encompasses 20 million aces (31,276 square miles), including 6.5 million acres of upland watershed and 13.5 million acres of marine/estuary waters. Although the New York Bight Region is one of the most densely developed urban portions of the country, it encompasses a hydrologically interconnected mix of upland watersheds, open-ocean, coastlands and estuaries that are of tremendous ecological significance and diversity (USFWS, 1997).

The proposed RITE Project is located within the Urban Core of the New York Bight Region (Figure 6.1-2). Within this densely developed sub region, there are complexes that provide significant habitat for fisheries and wildlife. Available literature for these complexes — "The Narrows" and the "Lower Hudson River Estuary" (Figures 6.1-3 and 6.1-4) — are relied upon herein, particularly to describe terrestrial and aquatic resources. The primary source document for New York Bight environmental data used in this ICD is the 1997 document: *Significant Habitats and Habitat Complexes of the New York Bight Watershed* (USFWS, 1997).

Long Island Sound and New York/New Jersey Harbor Estuary Programs

The East River lies along the border of the study and planning regions for both the LIS and NY/NJ HEP (Figures 6.1-5 and 6.1-6). The LIS and NY/NJ HEP are National Estuary Programs developed pursuant to the 1987 Clean Water Act Amendments. As designated national estuaries, the programs have each developed Comprehensive Conservation and Management Plans (CCMP) (NY/NJHEP, 1996; LISEP, 2000) to aid in the identification of key causes of ecosystem impairment within each estuary and to guide ongoing research and the development of regulatory programs.

The LIS estuary includes 1,300 square miles, extending from New York City (at the Battery in Manhattan), and 100 miles east to The Race. The drainage area of the LIS is more than 16,000 square miles, encompassing almost the entire state of Connecticut, portions of New York City, and portions of Westchester, Suffolk and Nassau counties in New York State (NYSDEC and CTDEP, 2000).

The NY/NJ Harbor Estuary encompasses the waters of New York Harbor and the tidally influenced portions of the river and streams that flow to the Harbor. The core area of the Harbor includes the NJ/NJ waters of the Hudson, Upper and Lower Bay, Arthur Kill, Kill Van Kull, and Raritan Bay; the NY waters of the Harlem and East Rivers and Jamaica Bay; and in NJ the waters of Hackensack, Passaic, Raritan, Shrewsbury, Navesink and Rahway Rivers and Newark and Sandy Hook Bays. The Bight proper includes the ocean to approximately 100 miles offshore (NY/NJ HEP, 1996).

Portions of the upper East River are incorporated in the LIS, while the lower river is addressed in some NY/NJ HEP documents. One of the primary focuses of the CCMPs for these programs is protection of water quality. Accordingly, they were referenced in development of the water quality section of this ICD.

State and City Municipal Divisions

Roosevelt Island lies within the Manhattan Borough of New York City, and within New York County. The recreation, cultural and land use resource discussions in this ICD encompass the City proper, the County, districts within Manhattan, and Roosevelt Island. The geographic scope of resource descriptions was selected to provide the most relevant information available, and, in some cases, is limited based upon available information. For example, the discussion of recreational resources focuses on the resources available on Roosevelt Island because these would be most readily available to island residents, and because a complete discussion of recreational facilities in all of New York City would be unnecessarily broad. However, the section does include a listing of the state parks within New York City, and a summary of the city parks system because these major, regionally significant resources would be likely utilized by island residents.

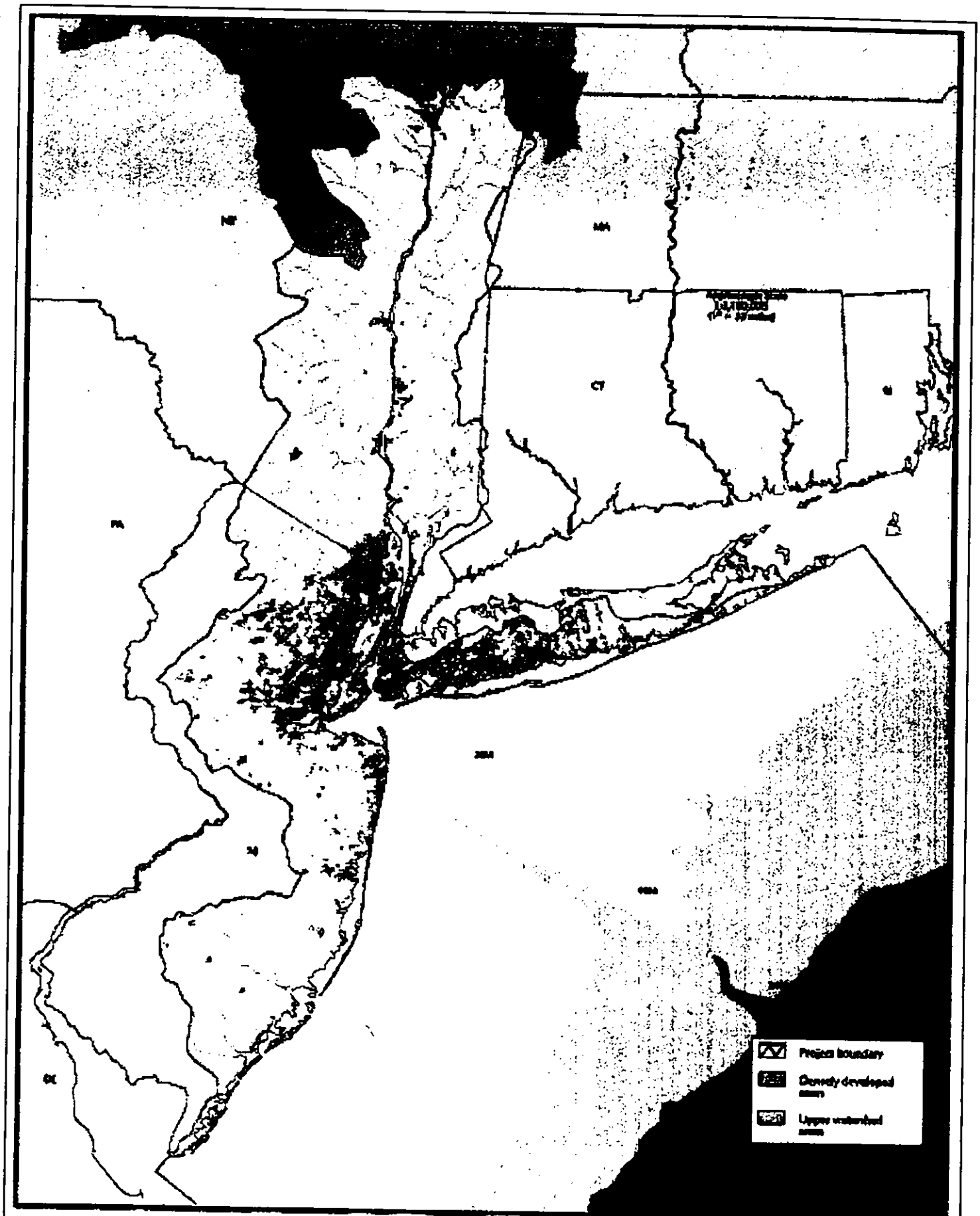
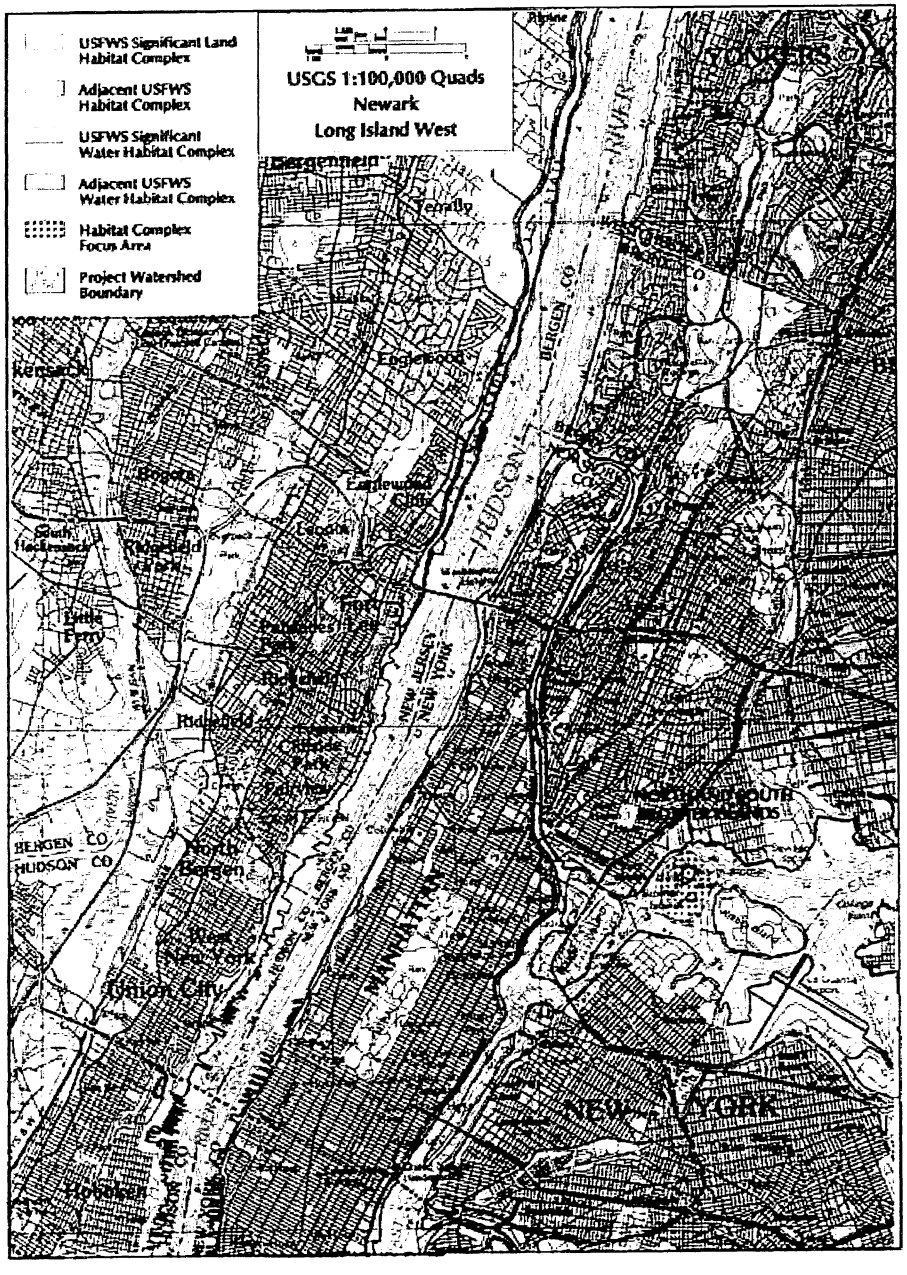


FIGURE 6.1-1
NEW YORK BIGHT REGION

FIGURE 6.1-2
URBAN CORE OF THE NEW YORK BIGHT

The Narrows - Map 1 of 4



The Narrows - Map 2 of 4

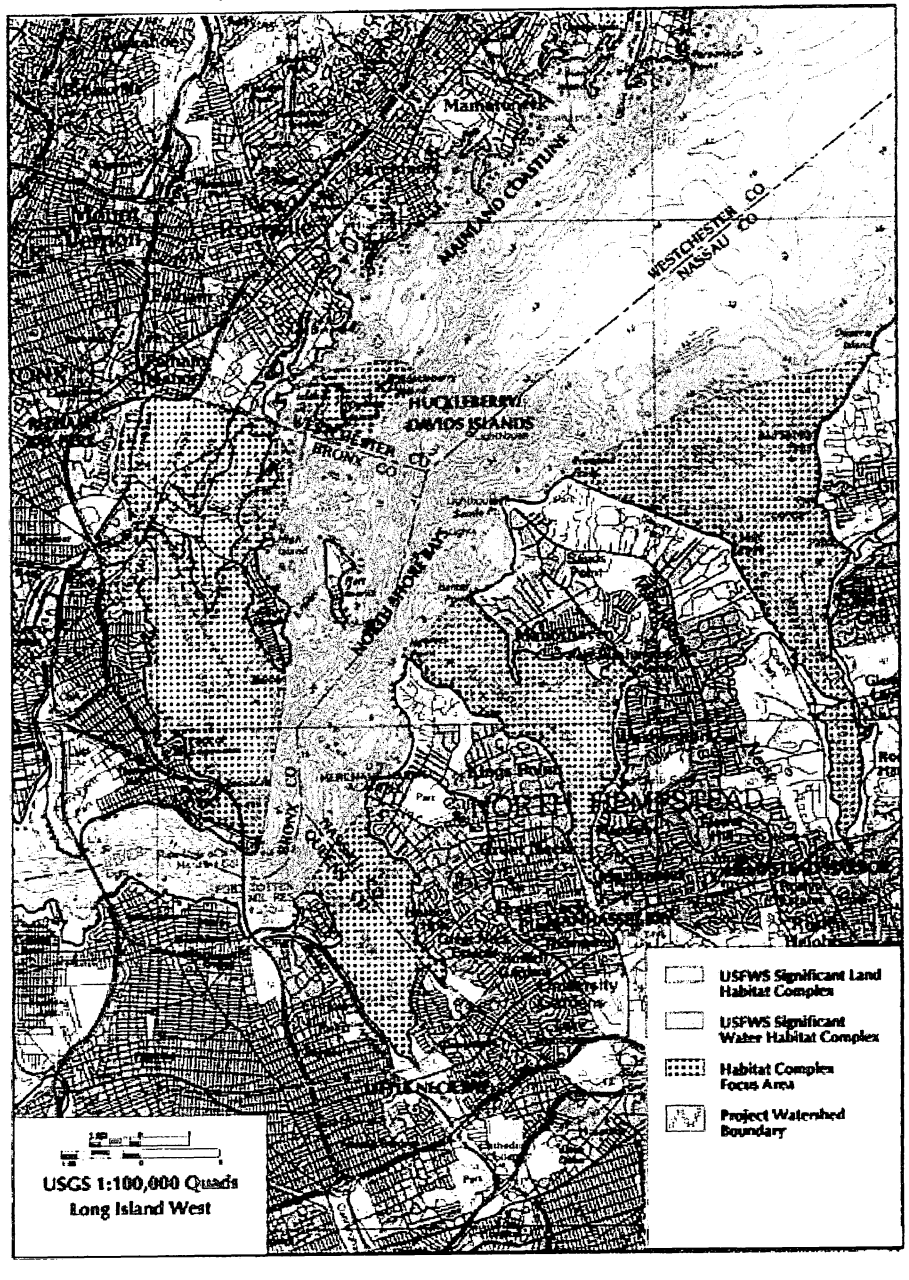
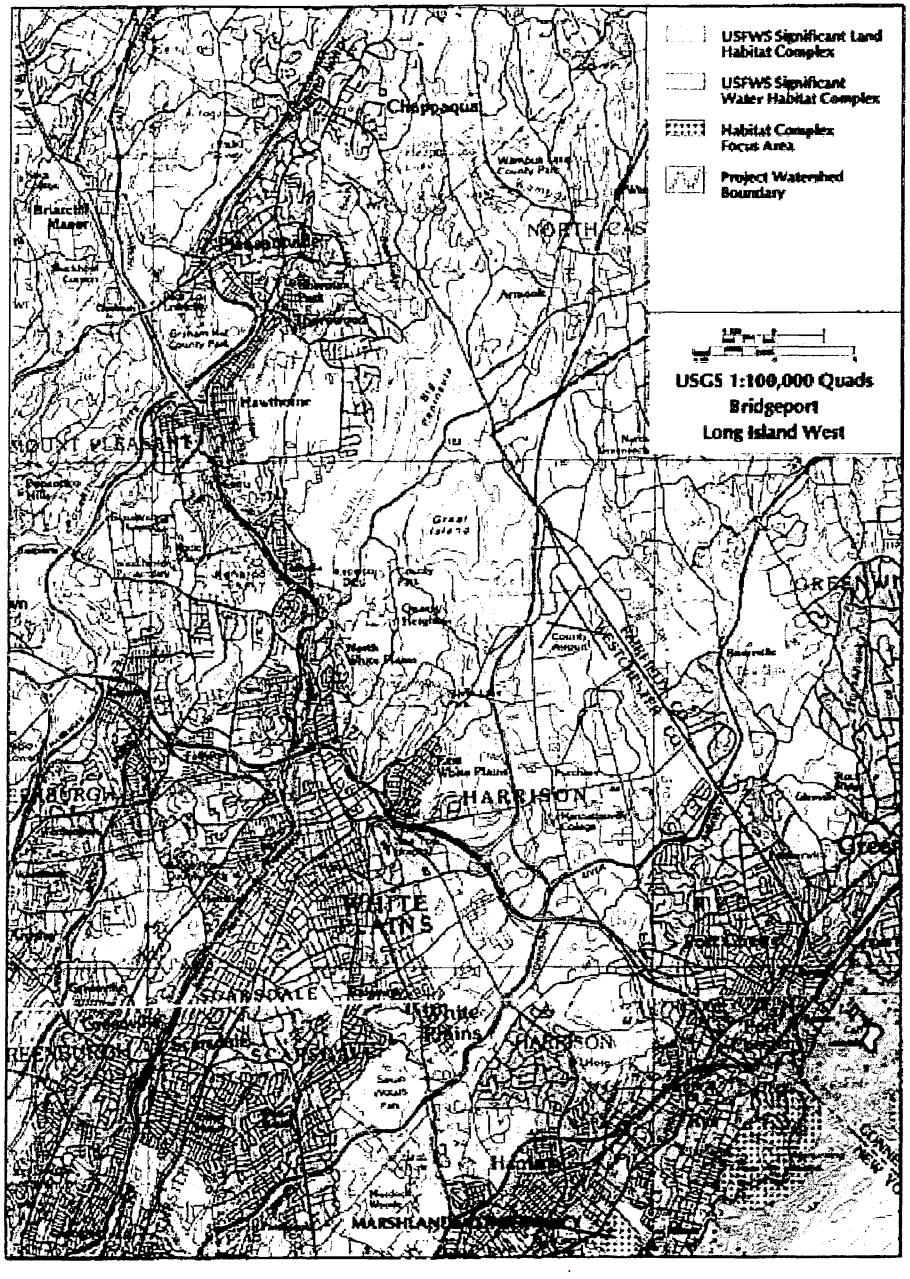


FIGURE 6.1-3
THE NARROWS COMPLEX

The Narrows - Map 3 of 4



The Narrows - Map 4 of 4

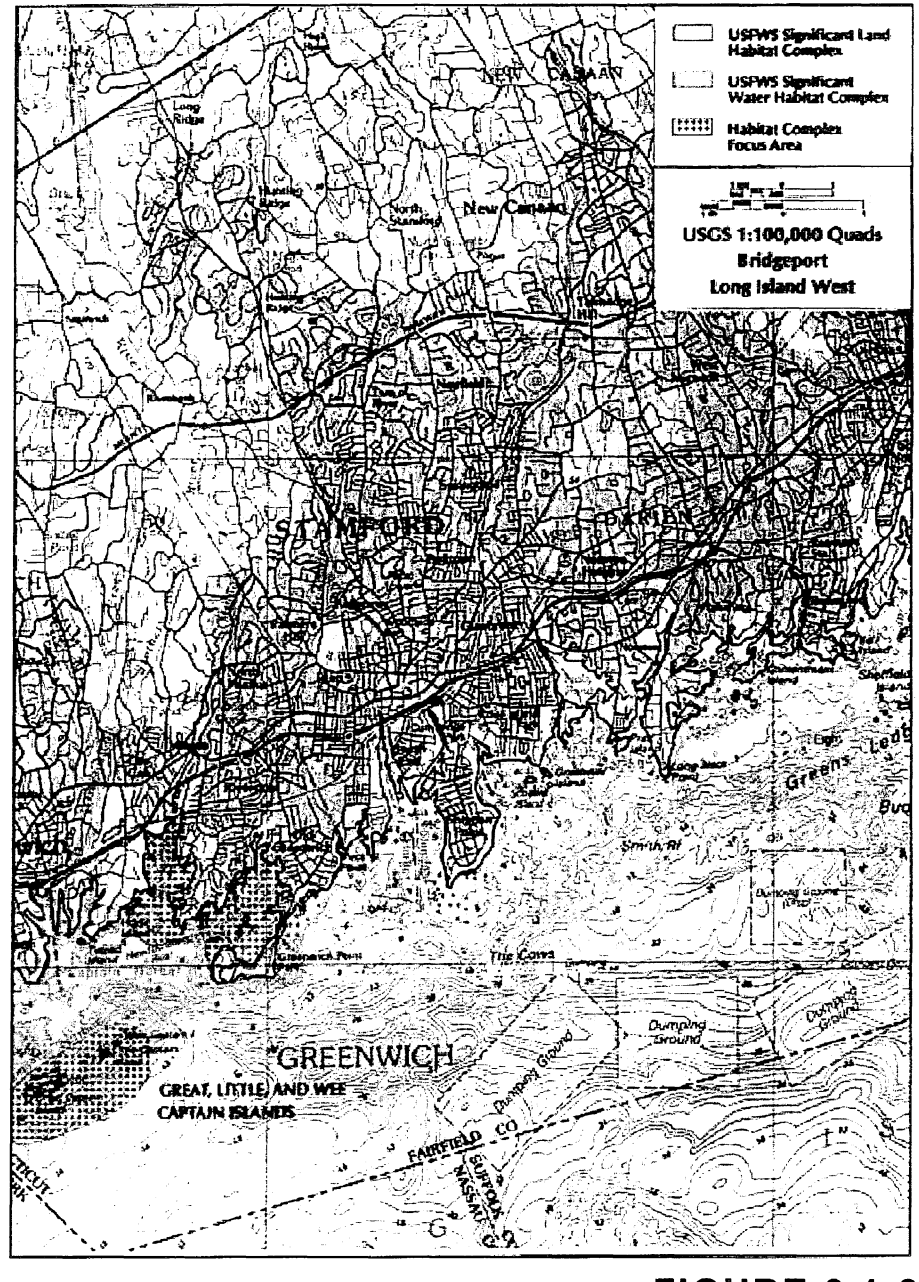
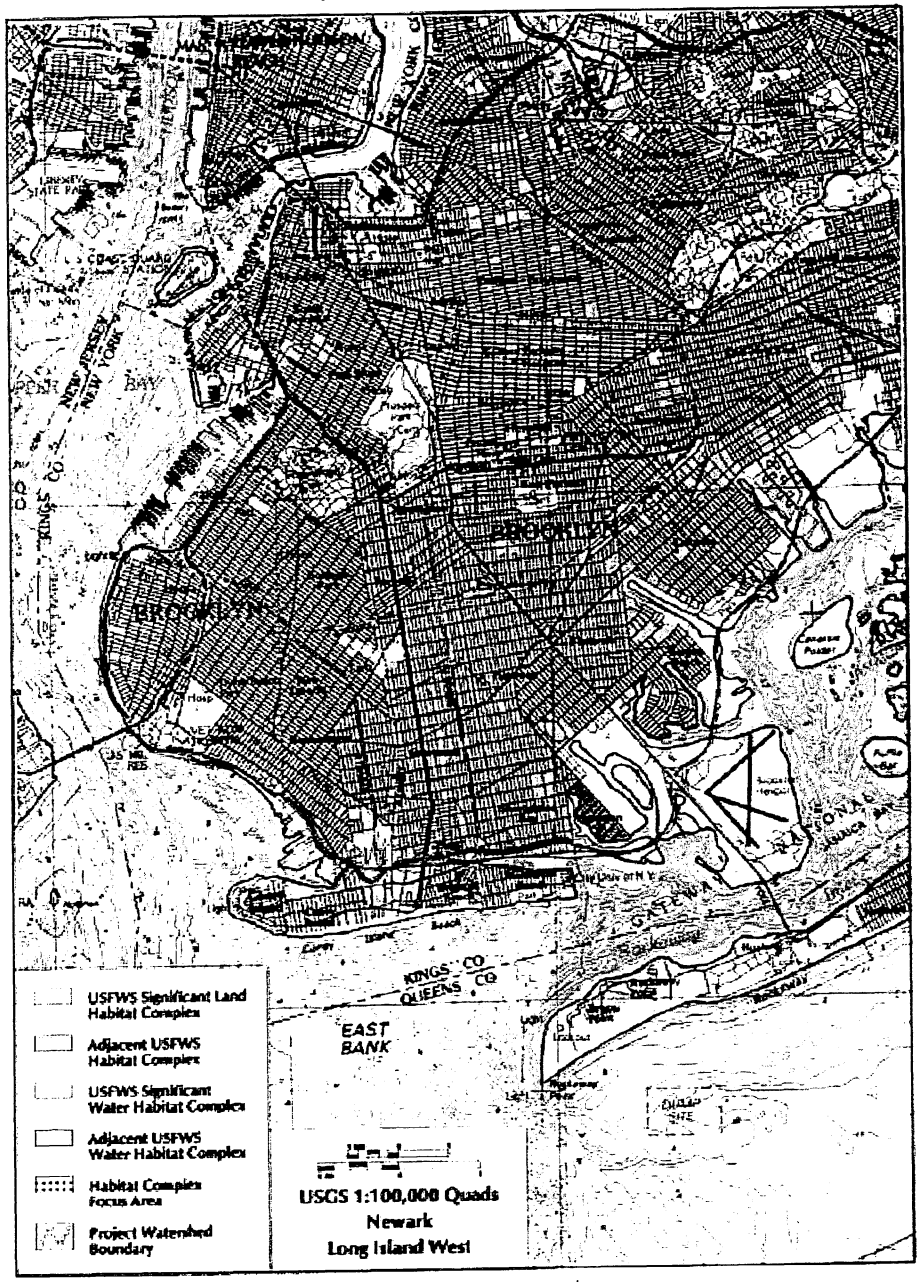


FIGURE 6.1-3
THE NARROWS COMPLEX

Lower Hudson River Estuary - Map 1 of 4



Lower Hudson River Estuary - Map 2 of 4

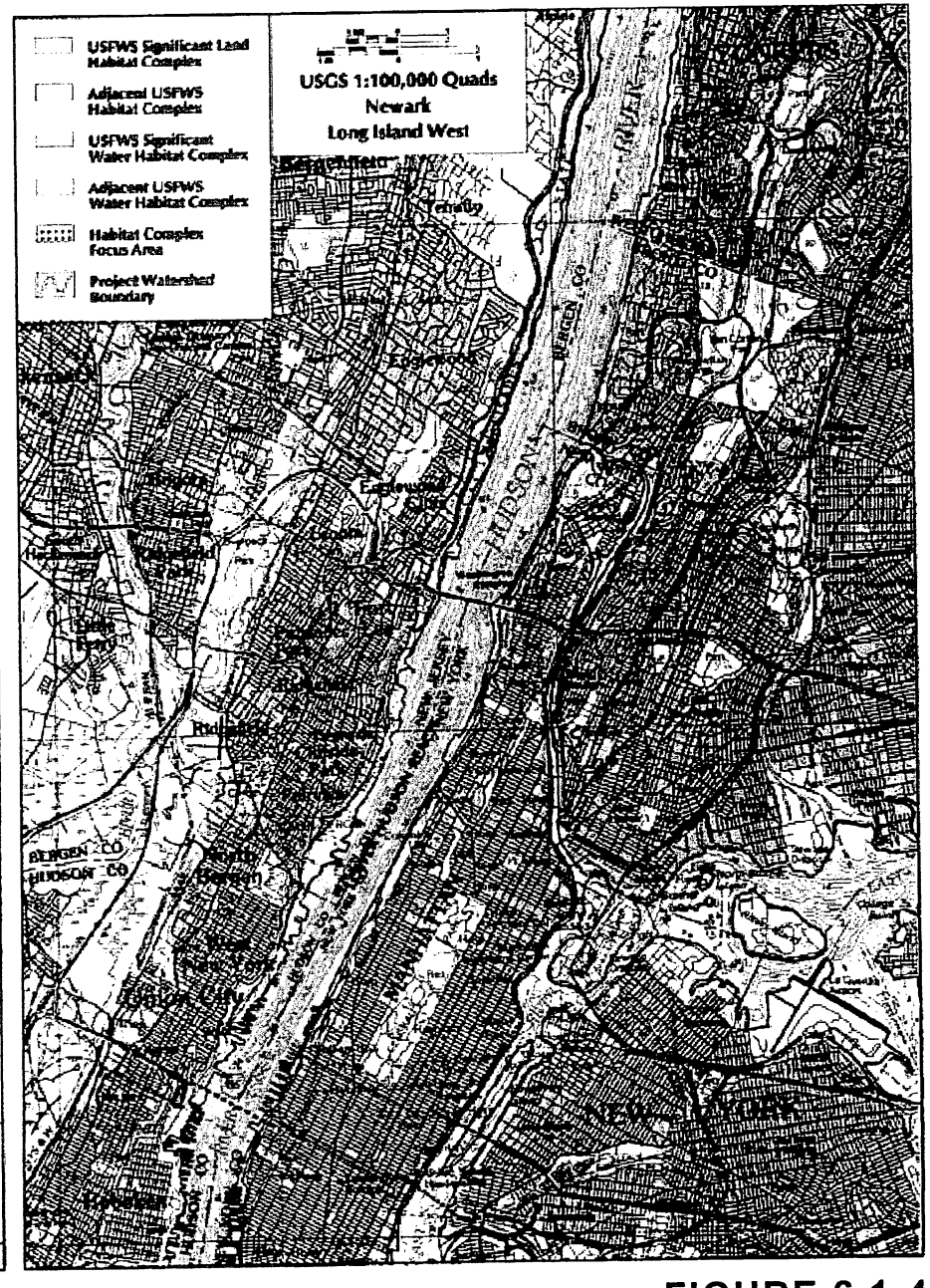


FIGURE 6.1-4
THE LOWER HUDSON RIVER ESTUARY COMPLEX

FIGURE 6.1-4
THE LOWER HUDSON RIVER ESTUARY COMPLEX

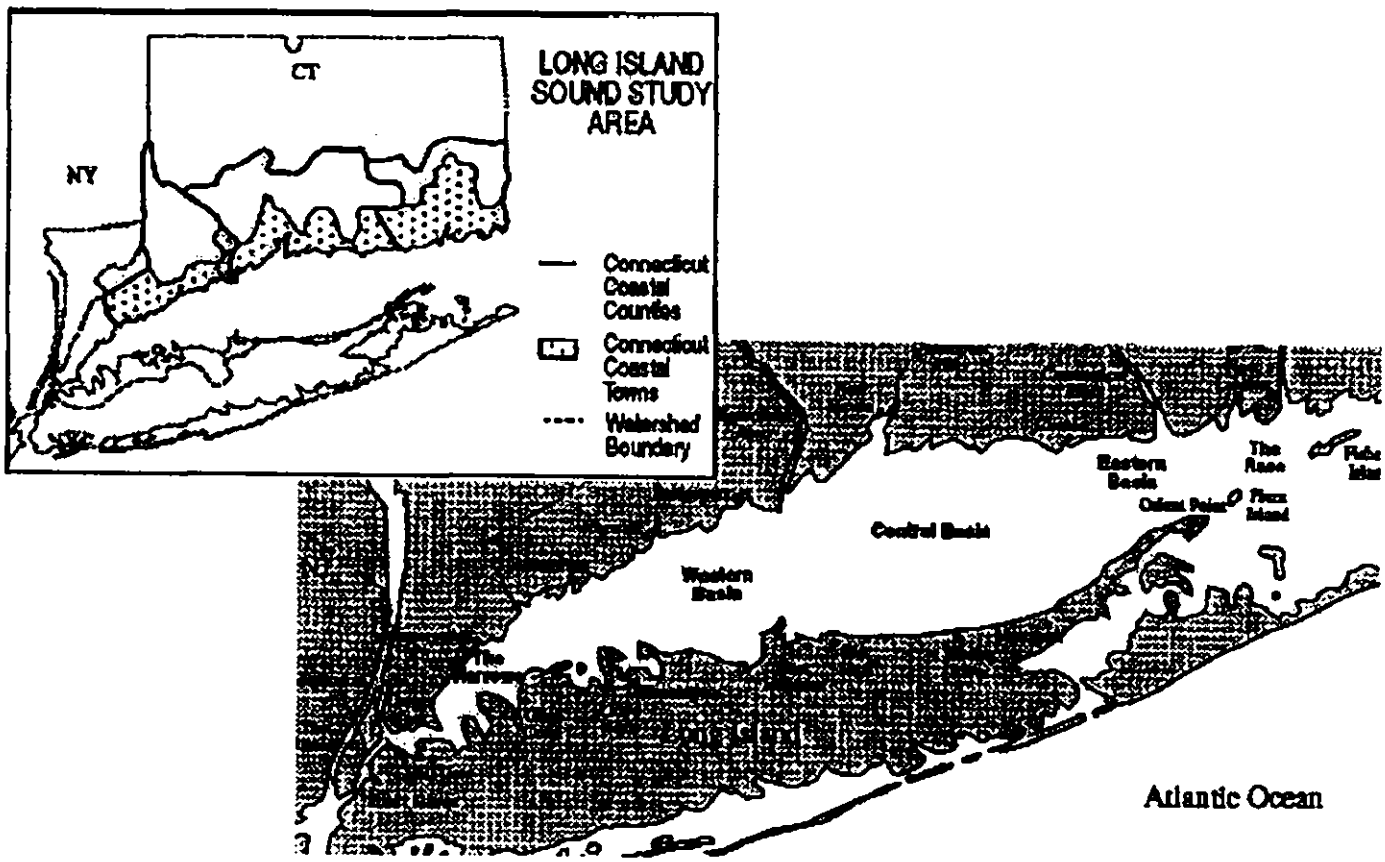


FIGURE 6.1-5
BOUNDARIES OF THE LONG ISLAND SOUND ESTUARY

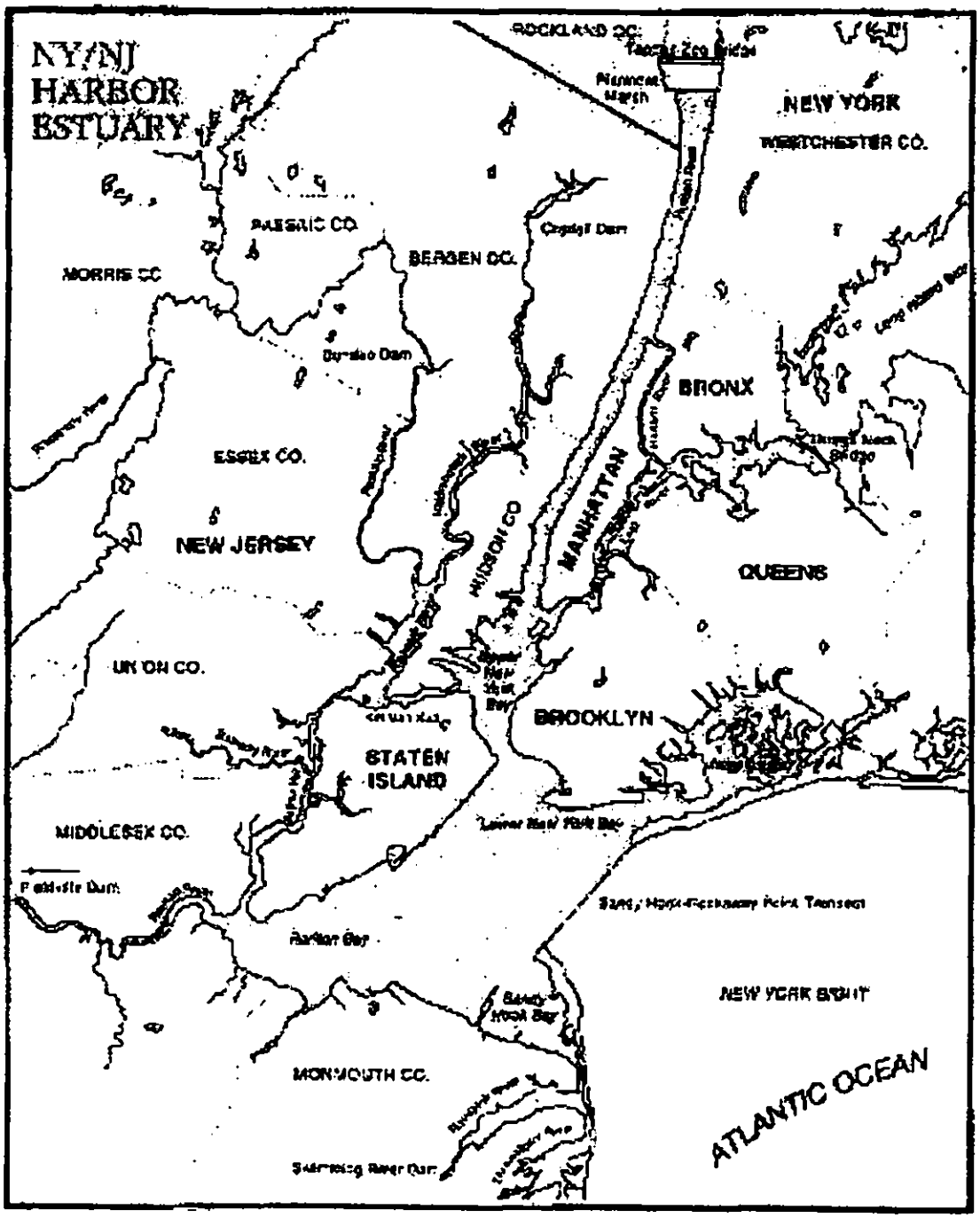


FIGURE 6.1-6
BOUNDARIES OF THE NEW YORK/NEW JERSEY HARBOR ESTUARY

6.1.2 Climate

In the New York City region/RITE Project area winters are cold, with temperatures ranging from 23 to 37 degrees Fahrenheit. The average summer temperature range is 66 to 84 degrees Fahrenheit. The region averages 47.2 inches of precipitation annually and 28.1 inches of snowfall. The average date of the last spring freeze is April 1 and the first fall freeze averages November 11.

6.1.3 Geology

The Urban Core of the New York Bight is situated along the boundaries of three distinct physiographic provinces: the Piedmont Province; the New England Province, and the Atlantic Coastal Plains (Figure 6.1-7). The convergence of these provinces provides for a diversity of landforms, soils, botanical communities, and habitats within the Urban Core (USFWS, 1997). Each of these provinces is briefly described below.

Piedmont Province

The Piedmont province extends from Alabama north to the Hudson River. Situated between the Appalachian Mountains and the Atlantic Coastal Plain, this province is generally a non-mountainous plateau. The Bight lies within the Piedmont Lowlands section of the province. Reddish shales, mudstones and sandstones predominate in this section also know as the Newark Basin or Triassic Lowlands. This section is well suited for agriculture and urban development because of its low rolling hills and broad valleys with fertile, arable soils. The erodable sedimentary sandstones and shales are interrupted by ridges of igneous traprock that provide for unique geologic features in some portions of the province. Large glacial lakes are also present, such as Lake Passaic and Lake Hackensack in northeastern New Jersey.

New England Province

The New England Province extends from New England to the southern tip of Manhattan (Manhattan Prong) and from New England through the Hudson and Delaware Basins to Reading, Pennsylvania (Reading Prong). The province is generally characterized as a plateau upland that rises from the coastline to several mountain ranges and peaks. The New England Province is comprised of five distinct geomorphic sections, including the Taconic Mountains, Green Mountain, White Mountain, New England Upland, and Seaboard sections. The Bight region lies within the New England Uplands and Taconic Mountains Sections.

This province was entirely glaciated and the resulting topography includes rounded bedrock, rock basin lakes, glacial lakes, kames, kame terraces, and eskers. The topography ranges from rugged rock ridges with steep narrow valleys in the upper reaches, to rolling hills and valleys in the lowlands. The New England Uplands Section geology is characterized by erosion-resistant, metamorphosed gneisses and schists, and marble overlain by glacial till. Limestone occurs in the lower valleys. The Taconic Mountain Section has metamorphic shales, slates, phylites, quartzite, schists, gneisses, and graywaycke in the uplands, while carbonates, limestone, and marble occur in the lower valleys. The upland soils are acidic course textured and shallow glacial tills, while more fertile soils are intermixed with thin stony soils in the lowlands.

Atlantic Coastal Plain Province

The seaward slope of the Atlantic Coastal Plain Province forms much of the eastern seaboard of the U.S., extending from Cape Cod to Florida. The New York Bight lies within the Embayed Section of the plain, which encompasses an area from Cape Cod south to North Carolina. This section includes the New Jersey Inner and Outer Coastal Plains, Long Island Coastal Lowlands, and the Barrier Beach System. The Inner and Outer Coastal Plains consist of marine sedimentary sands, gravel, and clays overlain by interglacial soils. The Inner Plain has fertile soils that are well suited for agriculture. The outer plain has more sandy, excessively well-drained materials that form significant aquifers in the region. The Long Island Coastal Lowlands underlie Long Island and consists of moraine deposits, glacial drift and outwash materials. The Barrier Beach System is characterized by its marshes and saltwater bay lagoons. Highly erodable glacial moraines and till form the beaches and offshore bars of this region.

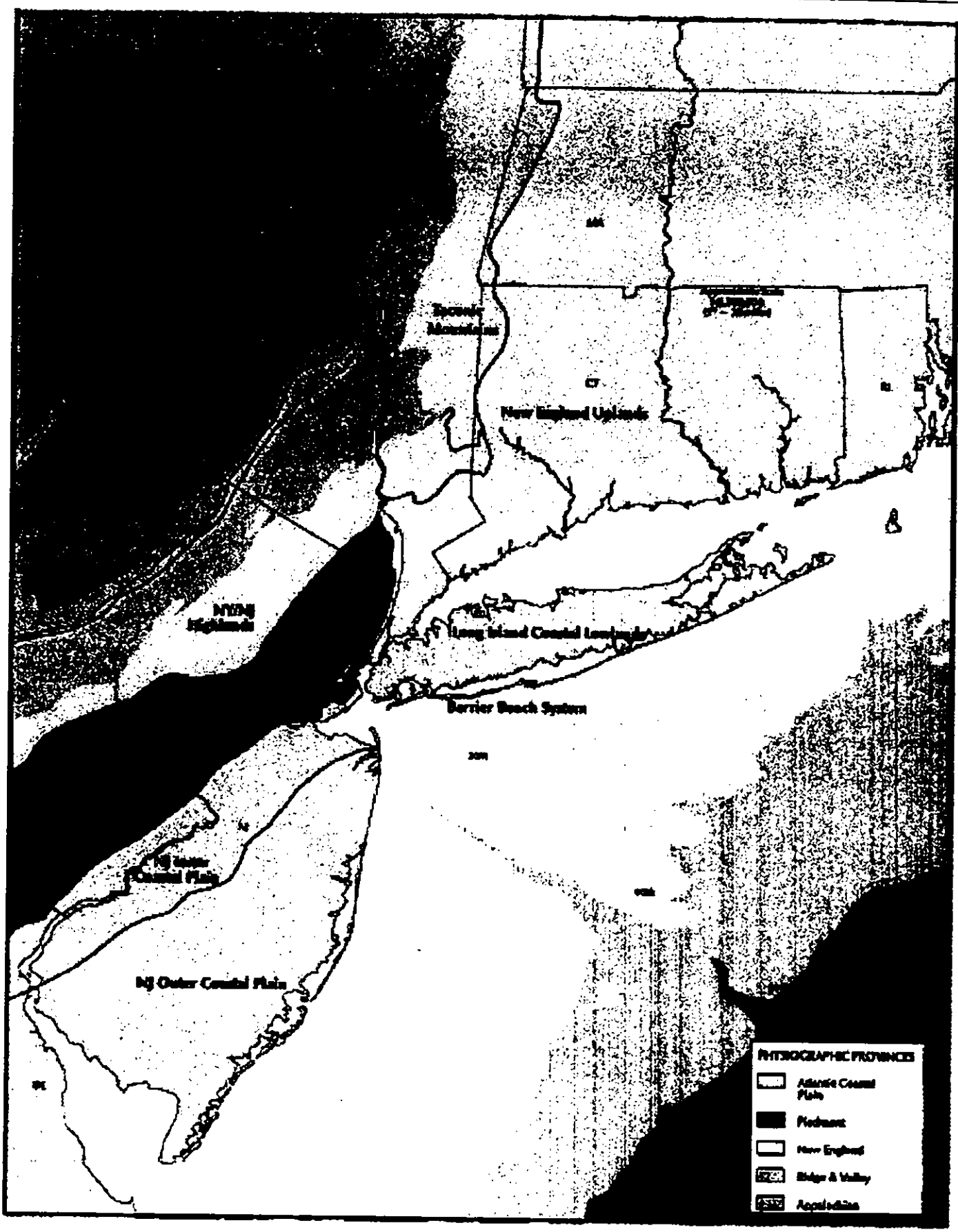


FIGURE 6.1-7
PHYSIOGRAPHIC PROVINCES OF THE NEW YORK BIGHT

6.1.4 Population

The RITE Project is located in the Manhattan Borough of New York City, New York County, New York. This region is one of the most densely populated, urban regions of the county. The following table presents the population of Roosevelt Island, Manhattan Borough, and New York City over the last 10 years.

TABLE 6.1-1
POPULATION OF RITE PROJECT AREA, 1990-2000

	1990 Population	2000 Population	Percent Change
Roosevelt Island	8,345	9,520	14%
Manhattan Borough	1,487,536	1,537,195	3.3%
New York City	7,322,564	8,008,278	9.4%

Source: U.S. Census Bureau, 2003; RIOC, 2003a

6.2 Water Use and Quality

6.2.1 Water Uses

Water Withdrawals

Industrial and commercial facilities, including thermoelectric power plants (fossil fuel), utilize water from the East River for process/cooling water purposes; however, no listing of such users was identified during preparation of this ICD. It is anticipated that other withdrawal uses would be very limited due to the quality and salinity of these waters.

Water Discharges

There are several large industrial and municipal wastewater treatment plants that discharge to the East River. Table 6.2-1 lists these licensed dischargers and the maximum licensed volume for each.

TABLE 6.2-1
LICENSED DISCHARGES TO THE EAST RIVER

Plant	Type	Volume
NYC Hunt's Point STP	Municipal	200 mgd
NYC Newtown Creek STP	Municipal	310 mgd
NYC Tallman's Island STP	Municipal	80 mgd
NYC Red Hook WPCP	Municipal	60 mgd
NYC Wards Island STP	Municipal	250 mgd
NYC Bower's Bay STP	Municipal	150 mgd
Consolidated Edison 60th Street Steam Generating Station	Electric	NA
Consolidated Edison East River Facility	Electric	541 mgd
New York Plaza Building	Cooling	26 mgd
866 UN Plaza Associates	Cooling	6 mgd
Astoria WWTF	Combined	NA

Source: NYSDEC, 1999; USEPA, 2003
STP= Sewer Treatment Plant
WPCP= Water Pollution Control Plant
WWTF= Wastewater Treatment Facility
mgd = million gallons per day

Navigation

The project will be located in the East Channel of the East River, which is typically not used for navigation. However, there is some recreational use of the East Channel and, occasionally, for security purposes, traffic is rerouted to the East Channel. Verdant has initiated discussions with the Coast Guard regarding navigation issues in the project area.

6.2.2 Stream Classification and Water Quality Standards

According to the NYSDEC, the reaches of the East River are classified as saline I and SB as follows:

- River Mile 0 to 14.5 Class I
- River Mile 14.5 to 17.0 Class SB

Table 6.2-2 lists the New York State Standards for Classes I and SB.

TABLE 6.2-2
NEW YORK STATE AMBIENT WATER QUALITY STANDARDS
FOR CLASSES I AND SB

	Class I	Class SB
Uses	Secondary contact recreation and fishing	Primary and secondary contact recreation and fishing
Aquatic Habitat	Shall be suitable for fish propagation and survival	Shall be suitable for fish propagation and survival
Dissolved Oxygen	4.0 mg/L	5.0 mg/L
Fecal Coliform Bacteria	The monthly geometric mean from a minimum of five examinations shall not exceed 2000 per 100 ml.	The monthly geometric mean from a minimum of five examinations shall not exceed 200 per 100 ml.

Sources: NYCDEP, 2003; NYSDEC 2000

6.2.3 Existing Water Quality

305(b) and 303(d) Listing

Section 305(b) of the Clean Water Act requires states to report to the USEPA on whether waters of the state are supporting the designated uses and standards of the state's water laws. The state's waterbody inventory and priority waterbody list (WI/PWL) are used to inventory the data obtained by state monitoring programs (including the New York State Rotating Intensive Basin Studies [RIBS] program) and to track known or suspect water quality problems. Waterbodies where designated uses are threatened, stressed, precluded, or impaired, are identified on the PWL and in the 305(b) report.

The East River is included in the New York State 305(b) listing. A 3,520-acre section of the lower East River estuary, and a 3,200-acre section of the upper East River estuary, are listed as impaired for aquatic life due to high oxygen demand from combined sewer overflows. A 1,280-acre portion of the lower East River estuary is also listed as impaired for public bathing due to pathogens from combined sewer overflows. All three segments are listed for sediment contamination that precludes or impairs fish consumption (NYSDEC, 2000; 2002).

Pursuant to section 303(d) of the Clean Water Act, states must develop Total Maximum Daily Loadings (TMDL's) for waterbodies identified on the state's PWL that cannot meet standards after application of best available technology. The TMDL's apportion the allowable daily loading of pollutants amongst point, non-point, and natural sources. The East River has been identified, as a priority for development of TMDL's to address the impairments discussed above.

New York City Harbor Program

The NYCDEP conducts annual monitoring of the waters of New York Harbor for four indicator parameters: dissolved oxygen; fecal coliform; chlorophyl a; and turbidity. This monitoring has been conducted since 1908 and currently includes 53 stations. The data obtained is used to monitor water quality trends and to correlate improvements with advances in wastewater treatment and other environmental protection measures. Overall, the program has documented significant improvements in all parameters due largely to the construction and upgrade of wastewater treatment plants that discharge to the harbor (NYCDEP, 2003).

In the inner harbor (which includes the lower East River Hudson River, Upper New York Bay, Arthur Kill, and Kill Van Kull), bottom dissolved oxygen levels have risen from approximately 3 mg/l in the early 1970s to 5 mg/l presently. Since 1992, summer surface dissolved oxygen levels have averaged 6.1 to 6.5 while mean bottom levels have ranged from 5.3 to 5.8 mg/l. In this region, a site near Newtown Creek in the East River has historically had the lowest dissolved oxygen levels, with average summer levels of 4.7 and 4.6 mg/l respectively. Fecal coliform levels in the inner harbor have improved from summer geometric means in excess of 2,000/100 ml in the early 1970s to below 100/100ml currently. Chlorophyll a levels throughout the inner harbor have generally been below 10 ug/l since 1992 and have shown no discernable trends. Turbidity in the inner harbor, measured as secchi depth, has shown variability between areas. Data collected since 1986 shows that the Hudson River has secchi transparency to depths of two to four feet, the lower East River and Upper Bay to four to seven feet, and the Kills to four to five feet. Long-term trends show a slight increase in turbidity throughout the inner harbor (NYCDEP, 2003).

In the upper East River region of the harbor (which includes the East River north of Roosevelt Island, western Long Island Sound to Hart Island, and the Harlem River), bottom dissolved oxygen levels have risen from approximately 3.0 to 3.5 mg/l in the early 1970s to above 6 mg/l presently. Over the past two years, however, dissolved oxygen levels have been lower, with average summer 2002 levels falling to 5.7 mg/l at the surface and 4.6 mg/l at the bottom. This was the first time levels were below 5 mg/L since 1991. Fecal coliform levels in the upper East River have improved from summer geometric means in excess of 2,000/100 ml in the early 1970s to below 50/100 ml in recent years. Chlorophyll a levels throughout the upper East River region have generally been between 10 to 15 ug/l since 1992. Turbidity in the upper East River has shown variability between areas of the region, with the Harlem River secchi depths of three to four feet and the East River at four to six feet transparency. Long-term trends show a slight increase in turbidity (NYCDEP, 2003).

Long Island Sound and New York New Jersey Harbor Estuary Program

The East River lies along the border of the study and planning regions for both the LIS and NY/NJ HEP (Figures 6.1-5 and 6.1-6). The LIS and NY/NJ HEP are National Estuary Programs developed pursuant to the 1987 Clean Water Act Amendments. As designated national estuaries, the programs have each developed CCMPs to aid in the identification of key causes of ecosystem impairment within each estuary and to guide ongoing research and the development of regulatory programs (NY/NJ HEP, 1996; LIS, 2000).

The CCMPs for each program identify the primary causes of human use and ecosystem impairment. The CCMPs for LIS and NY/NJ HEP lists the primary cause of impairment as:

LIS	NY/NJ HEP
Toxic Substances	Toxic Contamination
Pathogens	Pathogens
Floatable Debris	Floatable Debris
Living Resource and Habitat Management	Habitat Loss and Degradation
Land Use and Development	Nutrient and Organic Enrichment
Hypoxia	

The CCMPs set forth specific action plans for addressing each of these causes. Verdant intends to consult with the LIS and NY/NJ HEP programs to ensure that the licensing and future operation of the RITE Project is consistent with their respective program efforts.

6.3 Aquatic Resources

6.3.1 Aquatic Invertebrates

The Urban Core of the New York Bight Watershed offers aquatic and benthic habitats that support large numbers and diversity of planktonic and benthic fauna (USFWS, 1997). Benthic communities vary dependent upon salinity and habitat types. In the higher saline marine benthos areas, marine worms and crustaceans are the dominant invertebrate species. Freshwater snails, clams, chironomids and insects are more dominant in the lower saline reaches, and a mixture of these communities occurs in estuary waters (USFWS, 1997). Upper and Jamaica Bays support the widest diversity of habitat types in the NY/NY Harbor region, including shelfish beds, ampiphod mats, and sandy and silty bottom communities (NOAA *et al*, 2000). Bowery and Flushings Bays on the East River have primarily silty bottom habitats (NOAA *et al*, 2000).

Aquatic invertebrate species have been documented to be abundant in the harbor region, with 179 taxa documented in the lower bay region, and 105 taxa in the lower Hudson River (Gandarillas and Brinkhuis, 1981 and Ristich *et al*, 1977 in USFWS, 1997). The lower bay supports over 300 taxa of phytoplankton, and 38 taxa of zooplanton (Olsen and Cohn, 1979 and Sage and Herman, 1972 in USFWS, 1997).

A study conducted in the lower East River reported the benthic habitat was characterized as hard with rocks and gravel, with interspersed soft areas. The hard substrate areas were dominated by sandworms with smaller populations of mussels, ampiphods, isopods, and oligochaetes. Soft bottom areas were dominated by soft-shelled clams with some polychaetes (NYSDEC, 1982).

6.3.2 Fish Community

Community Composition

New York Bight

The Urban Core of the New York Bight Watershed offers aquatic habitats that support large numbers and diversity of marine, estuary, freshwater, and migratory fish (USFWS, 1997). Fish species common to the Urban Core are listed in Table 6.3-1.

The NY/NJ HEP conducted a study of the estuary fish community from 1979 to 1989 (Woodhead, 1991), which documented 101 species of fish, including marine (70 percent), migratory (10 percent), freshwater (10 percent) and estuarine (10 percent) species. Studies conducted by ConEdison between 1974 and 1990 documented 139 total taxa (annual average of 80 taxa) in the lower Hudson region (ConEdison, 1992 in USFWS, 1997). Studies have also identified 117 fish taxa in the lower bay (Walfords, 1971, in USFWS, 1997).

The New York Bight watershed provides important habitat for numerous migratory species, including American eel, alewife, American Shad, Atlantic menhaden, Atlantic sturgeon, Atlantic tomcod, bay anchovy, blueback herring, rainbow smelt, shortnose sturgeon and striped bass. The East River is believed to be used by migratory species as a passageway and as a temporary seasonal habitat (USFWS, 1997, Henderson, 2002).

East River

In reviewing a number of fish sampling surveys that have been done in the East River in the vicinity of the site, Henderson (2002) reports:

> *...the dominant fish species found in the East River are winter flounder, Atlantic tomcod, grubby, striped bass, and bay anchovy. Their abundance changes seasonally as they move between the East River, Long Island Sound, and the*

Hudson River. There appear to be few, if any, permanent resident species in the East River. Species such as American shad, alewife, blueback herring, Atlantic tomcod, striped bass and white perch are seasonal in occurrence. These species are generally migrating through the East River to over-wintering areas offshore or spawning grounds further upriver in the Hudson.

The only two relatively common species found in the East River over most life stages are Atlantic silverside and northern pipefish. Both of these species are abundant in the shallow, highly vegetated nearshore waters of Long Island Sound. Early life stages of some species, such as winter flounder, bay anchovy, grubby, fourbeard rockling, windowpane, and bluefish are found in the East River. Their occurrence is probably linked to spawning in the marine waters of the Atlantic Ocean, New York Harbor or Long Island Sound region.

Recreational and Commercial Fishery

The New York/New Jersey Bight Urban Core estuary system supports significant recreational and commercial fisheries. Recreational fishing represents approximately two million angler-days annually, with primary target species including flounder, scup, American eel, bluefish, striped bass, Atlantic mackerel, black sea bass and weakfish (USFWS, 1997). The commercial fishery includes the Hudson River fishery (American shad, striped bass, American sturgeon, herring and baitfish); the lower estuary fishery (hake, scup, flounder and tautog); and the near shore and mid-water fishery (flounder menhaden, bluefish, weakfish, and mackerel). Within the East River itself, commercial shellfishing and fishing are restricted or prohibited for most species due to contamination.

Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act, directs the NMFS to develop Fisheries Management Plans (FMP) to protect Essential Fish Habitat (EFH) for federally managed species. NMFS develops FMPs and

identifies the EFH for target species and life stages, and coordinates with state and federal agencies to develop habitat enhancement and conservation measures.

In the Mid-Atlantic region, FMPs have been developed for Summer Flounder, Scup, Black Sea Bass, Dogfish, Bluefish, Atlantic Surfclam, Ocean Quahog, Atlantic Mackerel, Squid, Butterfish and Tilefish. Table 6.3-2 lists the offshore geographic extent of the EFH for each species and the specific estuaries within the New York/New Jersey Harbor and Long Island Sound region that are designated EFH. The East River lies within the estuarine EFH ranges for several of these species and life stages. However, Verdant will need to formally consult with NMFS in order to determine whether the East River contains suitable habitat for these species/life stages, and whether the project could have any potential effects on EFH.

Rare, Threatened, and Endangered Species

The USFWS (1997) has identified listed and species of concern that may be present in the various habitat complexes of the New York/New Jersey Bight Watershed. Within the Urban Core complexes of this region that are closest to Roosevelt Island ("The Narrows" and the "Lower Hudson River Estuary" habitat complexes), one federally listed fish species, the shortnose sturgeon, was identified. However, the NYSDEC states that the shortnose sturgeon is only found in the lower Hudson from the southern tip of Manhattan (RM 0) to the Federal Dam in Troy (RM 152) NYSDEC, 2003a.

Verdant will formally consult with NYSDEC and USFWS to determine the status of rare, threatened, or endangered fish species, including the short nosed sturgeon, near the project area.

TABLE 6.3-1
FISHES OF THE NEW YORK BIGHT URBAN CORE

Marine	Common Name
	American sandlace
	Atlantic mackerel
	Black Sea Bass
	Bluefish
	Blackfish
	Butterfish
	Cunner
	Four beard rockling
	Four-spot flounder
	Grubby sculpin
	Lined seahorse
	Longhorn sculpin
	Lookdown
	Naked goby
	Nothern puffer
	Northern searobin
	Red hake
	Rock gunnel
	Round herring
	Seaboard goby
	Scup
	Silver hake
	Smallmouth flounder
	Spotted hake
	Striped searobin
	Summer flounder
	Tautog
	Weakfish
	Windowpane
	Winter flounder
Migratory	American eel
	Alewife
	American Shad
	Atlantic menhaden
	Atlantic sturgeon

	Atlantic tomcod
	Bay anchovy
	Blueback herring
	Hickory shad
	Rainbow smelt
	Shortnose Sturgeon
	Striped Bass
Estuarine	Atlanitc silverside
	Banded killifish
	Hogchoker
	Inland silverside
	Mummichog
	Northern Pipefish
	Striped killifish
	Striped mullet
	Tidewater silverside
	3-spine stickleback
	4-spine stickleback
	White perch
	White catfish
Freshwater	Bluegill
	Brown bullhead
	Carp
	Gizzard shad
	Golden shiner
	Pumpkinseed
	Redfin pickerel
	Spotttail shiner
	Tessellated darter
	Yellow perch

Source: USFWS, 1997

TABLE 6.3-2
OFFSHORE AND ESTUARY ESSENTIAL FISH HABITAT FOR MID-ATLANTIC MANAGED SPECIES AND LIFESTAGES

SPECIES	LIFE STAGE	OFFSHORE EFH		ESTUARY EFH		
		Habitat	Range*	Long Island Sound **	S. Shore Bay Complex **	Hudson R/ Raritan B.**
Summer Flounder	Eggs	Pelagic; 30-360 ft; seagrass beds	1			T,M,S
	Larvae	Pelagic; nearshore (12-50ft offshore) 30-230 ft; seagrass beds	1			M,S
	Juveniles	Demersal	1	M,S	M,S	M,S
	Adults	Demersal	1		M,S	M,S
Scup	Eggs	N/A	2	S		S
	Larvae	N/A	2	S		S
	Juveniles	Demersal	3	S	S	S
	Adults	Demersal	3	S	S	S
Black Sea Bass	Eggs	N/A	2			
	Larvae	Pelagic/sponge beds	3			
	Juveniles	Demersal; rough bottoms; shellfish/eelgrass beds; man-made structures	3	S		
	Adults	Demersal; natural and manmade strcutures; sand and shell substrates	3		S	
Bluefish	Eggs	Pelagic	4			
	Larvae	Pelagic	4			
	Juveniles	Pelagic	4	M,S	M,S	M,S
	Adults	Pelagic	4	M,S	M,S	M,S
Surfclam	Juveniles	Throughout substrates to 3 ft; beach zone to 300 ft	5			
	Adults	Throughout substrates to 3 ft; beach zone to 300 ft	5			
Ocean Quahog	Juveniles	Throughout substrates to 3 ft; 30-800ft offshore	5			
	Adults	Throughout substrates to 3 ft; 30-800ft offshore	5			
Atlantic Mackerel	Eggs	Pelagic; shore to 50 ft offshore	3	S	S	S
	Larvae	Pelagic; shore to 33 to 425 ft offshore	3	S	S	S
	Juveniles	Pelagic; shore to 1050 ft offshore	3	S	S	S
	Adults	Pelagic; shore to 1250 ft offshore	3	S	S	S
Loligo	Pre-Recruit	Pelagic; shore to 700 ft offshore	3			
	Recruit	Pelagic; shore to 1000 ft offshore	3			
Illex	Pre-Recruit	Pelagic; shore to 600 ft offshore	3			
	recruit	Pelagic; shore to 600 ft offshore	3			
Butterfish	Eggs	Pelagic; shore to 6000 ft offshore	3	S	S	S
	Larvae	Pelagic; 33 to 6000 ft offshore	3	S	S	S
	Juveniles	Pelagic; 33 to 1200 ft offshore	3	S	S	S
	Adults	Pelagic; 33 to 1200 ft offshore	3	S	S	S
Dogfish	Juveniles	Depths of 33 to 1480 ft	1			
	Adults	Depths of 33 to 1480 ft	1			

* Offshore Habitat Range Codes:

1. Atlantic Coast to limits of EEZ; Gulf of ME to Cape Canaveral Fl.
2. None designated offshore
3. Atlantic Coast to limits of EEZ; Gulf of ME to Cape hattaras, NC
4. Atlantic Coast to limits of EEZ; Gulf of ME to Key West, Fl.
5. Gulf of Maine to George's Bank, throughout the Atlantic EEZ

** Estuary Habitat Type Codes:

T: Tidal freshwater with salinity <0.5 ppt
M: Mixed waters with salinity 0.5-25 ppt
S: Seawater with salinity >25 ppt

Source: MAFMC, 1998

6.4 Terrestrial Resources

6.4.1 Botanical Resources

General

The proposed RITE Project will be located on the East River along the east shore of Roosevelt Island, in the Manhattan Borough of New York City, New York County, New York (Figure 3.3-4). Roosevelt Island is a 147-acre island that is developed with residential and commercial development. Due to its location and extent of urban development, the upland plant communities are predominately landscaped parks and greenways. The extent and size of natural botanical communities are significantly limited. Wetland community types include tidal wetlands and submerged aquatic macrophyte vegetation communities. A discussion of each of these vegetative communities is presented below.

Upland Plant Communities

Upland plant communities on Roosevelt Island are predominated by urban landscaped species and invasive species. Natural communities are limited. Table 6.4-1 lists plant species recorded for the New York County area.

Wetland Plant Communities

Wetland development in the immediate project area and around Roosevelt Island is limited by the extensive shoreline development (including docks, piers, etc) and various forms or armoring (riprap, bulkheads etc) that have been constructed. Verdant will formally consult with NYSDEC to determine the locations and extent of any tidal wetlands within the RITE Project area.

Significant Ecological Communities

No significant ecological communities have been identified along the East River in the immediate vicinity of Roosevelt Island. The upper East River/Long Island Sound area is designated as a Special Natural Waterfront Area by the New York City Office of Planning Waterfront Revitalization Program (see Section 6.7). The USFWS has identified significant habitats in The Narrows and Lower Hudson River Estuary Complexes of the New York/New Jersey Harbor Bight Watershed; however, none are proximate to the proposed project area (USFWS, 1997). Verdant will formally consult with NYSDEC and the New York Natural Heritage Program to determine whether any records of significant ecological communities occur within the Roosevelt Island Project area.

Rare, Threatened, and Endangered Species

Table 6.4-2 lists the New York Rare Plant Active and Watch List species for New York County (Young and Weldy, 2003). As part of the licensing process, Verdant will formally consult with NYSDEC and the New York Natural Heritage Program to determine whether any of these rare, threatened, or endangered (RTE) plant species occur within the project area.

6.4.2 Wildlife Resources

Wildlife Community

Because of the dense urban development, the availability of wildlife habitat within the Urban Core of the New York/New Jersey Bight watershed, particularly in the New York City vicinity, is relatively limited. However, there are nearby complexes that provide valuable habitats, particularly for migratory species (USFWS, 1997).

The fragmentation of habitats that occurs in urban project areas limits the terrestrial wildlife species that may occur to primarily those opportunistic species that have adapted to living in very urbanized settings. Habitat for herptile species is also limited due to fragmentation and the

lack of freshwater habitats in the project area. Habitats for birds are more diverse and available because the nearby New York/New Jersey Estuary, Long Island Sound Estuary, and small pockets of forests and fields provide habitat for many species year round. In addition, the area provides important seasonal habitat for migratory bird species.

Table 6.4-3 lists bird species of the New York County region that could inhabit the project area. Table 6.4-4 list the mammal and herptile species that may occur within the Urban Core Habitat Complexes of the New York/New Jersey Bight watershed.

Rare, Threatened, and Endangered Species

The USFWS (1997) has identified listed, and species of concern, that may be present in the various habitat complexes of the New York/New Jersey Bight Watershed. Within the Urban Core complexes of this region that are closest to Roosevelt Island ("The Narrows" and the "Lower Hudson River Estuary" habitat complexes), eight listed or special concern species were identified (Table 6.4-5). It should be noted that these habitat complexes might not be entirely representative of the more urban habitat of Roosevelt Island.

Henderson (2002) summarized information on state and federal RTE species that were reported as possibly located in the East River in the vicinity of the nearby Astoria site (located about one mile upstream of the project):

> *USFWF stated that no federally listed endangered or threatened species or USFWS designated "critical habitat" have been documented of observed in the vicinity of the Astoria site...NMFS stated that four species of sea turtles may occur in the vicinity including: the Kemp's Ridley (Lepidochelys kempii), the green (Chelonia mydas), the leatherback (Dermochelys coriacea), and the loggerhead (Caretta caretta). The first four are listed as endangered (federal and state lists) and the loggerhead is listed as threatened on both lists...*
>
> *...With the exception of a few leatherbacks, most of the turtles in nearshore waters are small juveniles. The loggerhead is the most abundant, followed by the Kemp's Ridley.*

Their preference for shallow waters and blue crabs makes the Kemp's Ridley the most likely sea turtle species to venture into the NY/NJ Harbor area. There has been some evidence of sea turtle occurrence in the New York and New Jersey Harbor and surrounding waters, but no evidence of their occurrence in the East River. Field surveys conducted in the East River have not collected sea turtles though they were conducted in areas where sea turtles might have been expected to be encountered. USFWS used a variety of gill nets, fyke nets, and otter trawls to extensively sample Upper New York Bay. No turtles were captured. Other studies in both Upper and Lower New York Bays revealed no sea turtles after extensive sampling and monitoring.

It would therefore seem unlikely that sea turtles are presently using the East River in appreciable numbers.

Henderson (2000) also reported that: "DEC stated that peregrine falcons *(Falco peregrines)* were sighted in 1989 at the Hell Gate Railroad Bridge at Wards Island. This species is listed as Endangered by DEC, and has also been the subject of reintroduction efforts by the state."

Verdant will formally consult with NYSDEC and USFWS to determine the status of RTE wildlife species and habitats near the project area.

TABLE 6.4-1
PLANT SPECIES RECORDED FOR THE NEW YORK COUNTY AREA

Scientific Name
Acalypha australis
Acer negundo
Acer platanoides
Acer pseudoplatanus
Acer rubrum
Acer saccharinum
Achillea millefolium
Adiantum pedatum
Agalinis maritima
Agastache nepetoides
Agrostemma githago
Agrostis gigantea
Agrostis perennans
Ailanthus altissima
Allium vineale
Alnus incana
Alnus serrulata
Alopecurus geniculatus
Alopecurus myosuroides
Althaea officinalis
Amaranthus albus
Ambrosia artemisiifolia
Amelanchier arborea
Amorpha fruticosa
Ampelopsis brevipedunculata
Anagallis arvensis
Anaphalis margaritacea
Anemone canadensis
Anemone cylindrica
Anemone quinquefolia
Anemone virginiana
Anthoxanthum odoratum
Apera spica-venti
Aquilegia canadensis
Arabidopsis thaliana
Arabis laevigata
Arenaria serpyllifolia
Aristida dichotoma
Aristolochia serpentaria
Aronia arbutifolia
Artemisia ludoviciana
Asclepias syriaca
Asparagus officinalis
Asplenium platyneuron
Asplenium trichomanes
Aster spp.
Astragalus neglectus
Atriplex patula
Atriplex prostrata
Aureolaria virginica
Avena fatua
Baccharis halimifolia
Bellis perennis

Scientific Name
Berberis thunbergii
Betula populifolia
Bidens bipinnata
Boehmeria cylindrica
Borago officinalis
Botrychium dissectum
Botrychium virginianum
Brassica napus
Bromus commutatus
Bromus hordeaceus
Bromus pubescens
Bromus secalinus
Bromus sterilis
Bromus tectorum
Broussonetia papyrifera
Bulbostylis capillaris
Calamagrostis epigeios
Caltha palustris
Cannabis sativa
Carex spp.
Carya cordiformis
Carya glabra
Carya ovalis
Carya ovata
Carya tomentosa
Castanea dentata
Catalpa bignonioides
Ceanothus americanus
Celastrus orbiculata
Celastrus scandens
Celtis occidentalis
Cenchrus longispinus
Cerastium fontanum
Chamaecyparis thyoides
Chamaesyce nutans
Chamaesyce vermiculata
Cheilanthes lanosa
Chenopodium album
Chenopodium ambrosioides
Chenopodium multifidum
Chenopodium urbicum
Chimaphila maculata
Chimaphila umbellata
Circaea lutetiana
Clematis virginiana
Clethra alnifolia
Commelina communis
Comptonia peregrina
Consolida ajacis
Convolvulus arvensis
Corallorhiza odontorhiza
Cornus alternifolia
Cornus florida

Scientific Name
Cornus foemina
Corydalis sempervirens
Corylus americana
Crotalaria sagittalis
Crypsis schoenoides
Cuphea viscosissima
Cuscuta pentagona
Cycloloma atriplicifolium
Cynoglossum officinale
Cynosurus cristatus
Cyperus echinatus
Cyperus flavescens
Cyperus lupulinus
Cystopteris fragilis
Dactylis glomerata
Danthonia compressa
Danthonia spicata
Dennstaedtia punctilobula
Deschampsia flexuosa
Desmodium ciliare
Desmodium nuttallii
Diervilla lonicera
Digitaria filiformis
Digitaria ischaemum
Digitaria sanguinalis
Diospyros virginiana
Dirca palustris
Draba reptans
Dryopteris carthusiana
Dryopteris cristata
Dryopteris marginalis
Dulichium arundinaceum
Echinochloa muricata
Echium vulgare
Eclipta prostrata
Elaeagnus umbellata
Eleocharis erythropoda
Eleocharis halophila
Eleusine indica
Ellisia nyctelea
Elsholtzia ciliata
Elymus canadensis
Elymus hystrix
Elymus virginicus
Elymus x ebingeri
Epipactis helleborine
Equisetum arvense
Eragrostis capillaris
Eragrostis cilianensis
Eragrostis hypnoides
Eragrostis pectinacea
Erigeron annuus
Erigeron philadelphicus

Scientific Name
Brodium malacoides
Erythronium americanum
Euonymus Americana
Eupatorium rugosum
Euthamia graminifolia
Festuca rubra
Praxinus Americana
Praxinus pennsylvanica
Fumaria officinalis
Galactia volubilis
Galearis spectabilis
Galinsoga quadriradiata
Galium lanceolatum
Galium mollugo
Galium obtusum
Galium triflorum
Gaultheria hispidula
Gaylussacia baccata
Gaylussacia frondosa
Geranium carolinianum
Geranium dissectum
Geranium maculatum
Geranium molle
Geranium robertianum
Geranium sibericum
Glyceria acutiflora
Goodyera pubescens
Hamamelis virginiana
Hedera helix
Helianthus tuberosus
Heliotropium arborescens
Heliotropium europaeum
Hemerocallis fulva
Hieracium caespitosum
Hieracium kalmii
Hieracium sabaudum
Hieracium venosum
Holcus lanatus
Hordeum murinum
Humulus lupulus
Hypochaeris radicata
Impatiens pallida
Iva frutescens
Juglans nigra
Juncus articulatus
Juncus gerardii
Juncus greenei
Juncus tenuis
Juncus torreyi
Juniperus virginiana
Laportea canadensis
Lapsana communis
Larix laricina
Lathyrus palustris
Lechea mucronata
Lechea racemulosa
Lepidium densiflorum

Scientific Name
Lepidium virginicum
Lespedeza hirta
Listris borealis
Ligustrum obtusifolium
Limonium carolinianum
Linaria vulgaris
Lindera benzoin
Linum virginianum
Liparis loeselii
Liquidambar styraciflua
Liriodendron tulipifera
Lobelia siphilitica
Lolium perenne
Lolium pratense
Lonicera japonica
Lonicera sempervirens
Lotus corniculata
Lycium barbarum
Lyonia ligustrina
Lyonia mariana
Malus baccata
Malus pumila
Malva neglecta
Medicago lupulina
Melilotus alba
Melilotus officinalis
Menispermum canadense
Mollugo verticillata
Monotropa hypopithys
Morus alba
Morus rubra
Muhlenbergia frondosa
Muhlenbergia schreberi
Muhlenbergia sobolifera
Muscari botryoides
Myosotis verna
Myrica pensylvanica
Nymphaea odorata
Onoclea sensibilis
Onopordum acanthium
Onosmodium virginianum
Origanum vulgare
Ornithogalum umbellatum
Orobanche minor
Orobanche uniflora
Osmunda cinnamomea
Osmunda claytoniana
Osmunda regalis
Ostrya virginiana
Oxalis dillenii
Panicum acuminatum
Panicum dichotomiflorum
Panicum miliaceum
Panicum scoparium
Panicum virgatum
Papaver rhoeas
Parnassia glauca

Scientific Name
Parthenocissus quinquefolia
Parthenocissus tricuspidata
Paspalum setaceum
Pellaea atropurpurea
Petunia axillaris
Phalaris canariensis
Phegopteris hexagonoptera
Phleum arenarium
Phleum pratense
Phlox paniculata
Photinia villosa
Phryma leptostachya
Phytolacca americana
Picris echioides
Pinus resinosa
Pinus rigida
Pinus strobus
Plantago lanceolata
Platanthera flava
Platanthera lacera
Platanus occidentalis
Poa annua
Poa compressa
Poa cuspidata
Poa pratensis
Pogonia ophioglossoides
Polygala sanguinea
Polygala verticillata
Polygonatum biflorum
Polygonatum pobescens
Polygonum arenastrum
Polygonum aviculare
Polygonum cespitosum
Polygonum cuspidatum
Polygonum lapathifolium
Polygonum orientale
Polygonum pensylvanicum
Polygonum ramosissimum
Polygonum scandens
Polypodium virginianum
Polystichum acrostichoides
Populus alba
Populus deltoides
Populus grandidentata
Populus tremuloides
Potentilla argentea
Potentilla norvegica
Potentilla simplex
Prunus mahaleb
Prunus serotina
Ptelea trifoliata
Pteridium aquilinum
Puccinellia distans
Pycnanthemum clinopodioides
Pycnanthemum incanum
Pycnanthemum torrei
Quercus alba

Scientific Name
Quercus montana
Quercus palustris
Quercus prinoides
Quercus rubra
Ranunculus abortivus
Ranunculus arvensis
Ranunculus bulbosus
Ranunculus hispidus
Ranunculus sardous
Ranunculus sceleratus
Rapistrum rugosum
Reseda lutea
Rhamnus frangula
Rhododendron groenlandicum
Rhododendron periclymenoides
Rhododendron viscosum
Rhodotypos scandens
Rhus copallinum
Rhus glabra
Rhus typhina
Robinia hispida
Robinia pseudo-acacia
Rosa micrantha
Rosa multiflora
Rubus allegheniensis
Rubus laciniatus
Rubus occidentalis
Rubus odoratus
Rubus phoenicolasius
Rumex acetosella
Rumex crispus
Rumex maritimus
Rumex salicifolius
Sabatia angularis
Salix discolor
Salix humilis
Salix lucida
Salix nigra
Sambucus canadensis
Sassafras albidum

Scientific Name
Saururus cernuus
Scirpus maritimus
Scirpus novae-angliae
Scirpus verecundus
Scleranthus annuus
Scrophularia auriculata
Scutellaria elliptica
Scutellaria serrata
Sedum acre
Selaginella rupestris
Senecio vulgaris
Setaria faberi
Setaria verticillata
Setaria viridis
Sicyos angulatus
Silene antirrhina
Silene latifolia
Smilax pulverulenta
Smilax rotundifolia
Solanum dulcamara
Solanum nigrum
Solanum sisymbriifolium
Solidago canadensis
Solidago odora
Solidago patula
Solidago rigida
Solidago sempervirens
Sonchus arvensis
Sonchus oleraceus
Sparganium eurycarpum
Spartina alterniflora
Spartina pectinata
Spergularia salina
Sphenopholis nitida
Sphenopholis pensylvanica
Spiraea x vanhouttei
Spiranthes lucida
Staphylea trifolia
Stellaria media
Stylosanthes biflora
Suaeda maritima

Scientific Name
Taraxacum officinale
Taxus canadensis
Taxus cuspidata
Teucrium canadense
Thalictrum dioicum
Thalictrum pubescens
Thalictrum revolutum
Thelypteris noveboracensis
Thelypteris palustris
Thelypteris simulata
Thuja occidentalis
Tipularia discolor
Toxicodendron radicans
Tribulus terrestris
Tridens flavus
Triglochin maritimum
Triodanis perfoliata
Triplasis purpurea
Tripsacum dactyloides
Triticum aestivum
Tsuga canadensis
Ulmus americana
Ulmus pumila
Uvularia perfoliata
Vaccinium corymbosum
Vaccinium macrocarpon
Vaccinium pallidum
Vaccinium stamineum
Verbena simplex
Vernonia noveboracensis
Veronica anagallis-aquatica
Viburnum acerifolium
Viburnum prunifolium
Viburnum rafinesquianum
Vitis aestivalis
Vitis labrusca
Vitis riparia
Vulpia myuros
Wisteria sinensis
Yucca filamentosa

Source: Weldy, Mitchell, and Ingalls. 2002.

TABLE 6.4-2
NEW YORK STATE RARE PLANT LIST
NEW YORK COUNTY ACTIVE AND WATCH LIST SPECIES

Scientific Name	Common Name	County Occurance	Global Rank	State Rank	State Status
ACTIVE LIST SPECIES					
Agalinis maritima	Seaside Gerardia	Extirpated	G5	S2S3	Unprotected
Agastache nepetoides	Yellow Giant-Hyssop	Probable	G5	S2S3	Threatened
Arisolochia serpentaria	Virginia snakeroot	Probable	G4	S1	Endangered
Asclepias purpurascens	Purple Milkweed	Possible	G5?	S2S3	Unprotected
Asclepias variegata	White Milkweed	Probable	G5	S1	Endangered
Aster borealis	Rush Aster	Probable	G5	S2	Threatened
Aster solidagineus	Flax-Leaf Whitetop	Probable	G5	S2	Threatened
Bulboschoenus novae-angliae	Saltmarch Bullrush	Probable	G5	S1	Endangered
Carex abscondita	Thicket Sedge	Probable	G4/G5	S2	Threatened
Carex retroflexa	Reflexed sedge	Probable	G5	S1S2	Endangered
Carex schweinitzii	Schweinitiz' Sedge	Extirpated	G3	S2S3	Threatened
Cheilanthes lanosa	Wolly-Lip Fern	Extirpated	G5	SH	Endangered
Chenopodium rubrum	Red Pigweed	Possible	G5	S2	Threatened
Cirsium altissimum	Tall Thistle	Possible	G5	SX	Unprotected
Commelia erecta	Slender dayflower	Extirpated	G5	SX	Unprotected
Corydalis aurea	Golden Corydalis	Extirpated	G5	S2	Threatened
Crotalaria sagittalis	rattlebox	Probable	G5	S1	Endangered
Cyperus echinatus	Globose Flatsedge	Extirpated	G5	S1	Endangered
Cyperus flavescens	Yellow Flatsedge	Confirmed	G5	S1	Endangered
Cyperus plukenetii	Galingale	Possible	G5	SX	Unprotected
Desmodium ciliare	Little-leaf tick-trefoil	Possible	G5	S2S3	Threatened
Desmodium laevigatum	Smooth tick-clover	Possible	G5	SH	Endangered
Desmodium nuttallii	Nuttall's Tick-clover	Probable	G5	SH	Endangered
Desmodium obtusum	Stiif Tiock-Trefoil	Possible	G4G5	S1	Endangered
Digitaria filiformis	slender crabgrass	Probable	G5	S2	Threatened
Diospyros virginiana	Persimmon	Probable	G5	S2	Threatened
Draba reptans	Carolina Whitlow-Grass	Probable	G5	S2	Threatened
Eclipta prostrata	False-Daisy	Extirpated	G5	S1	Endangered
Elocharis halophila	Salt Marsh Spikerush	Probable	G4	S2	Threatened
Ellisia nyctelea	Ellisia	Extirpated	G5	SX	Unprotected
Eryngium aquaticum	Marsh Eryngo	Extirpated	G4	SX	Unprotected
Euonymus americanus	American Strawberry-bush	Possible	G5	S1	Endangered
Galactia volubilis	Downy Milk-Pea	Extirpated	G5	SX	Unprotected
Gentiana saponaria	Soapwort Gentian	Extirpated	G5	S1	Endangered
Gnaphalium purpureum	Purple everlasting	Possible	G5	S1	Endangered
Lemna perpusilla	Minute duckweed	Possible	G5	S1	Endangered
Liatris scariosa var novae-angliae	Northern blazing Star	Extirpated	G3	S2	Threatened
Lilaeopsis chinensis	Lilaeopsis	Possible	G5	S2	Threatened
Liparis lilifolia	Large Twayblade	Probable	G5	S1	Threatened
Lycopus rubellus	Gypsy-Wort	Extirpated	G5	S1	Endangered
Oldenlandia uniflora	Clustered Bluets	Possible	G5	S1	Endangered
Onosmodium virginianum	Virginia false growell	Extirpated	G4	S1	Endangered
Panicum scoparium	Velvet Panic Grass	Probable	G5	S1	Endangered
Panicum villosissimum	Long Haired Panic Grass	Probable	G5	S1	Unprotected

Scientific Name	Common Name	County Occurance	Global Rank	State Rank	State Status
Paspalum setaceum var setaceum	slender beadgrass	Probable	G5T4?	S1	Endangered
Pedicularis lanceolata	Swamp Lousewort	Extirpated	G5	S2	Threatened
Plantago cordata	Heartleaf Plantain	Possible	G4	S3	Threatened
Plantago maritima ssp juncoides	Seaside Plantain	Possible	G4	S3	Threatened
Plantanthera ciliaris	Orange fringed Orchis	Extirpated	G5	S1	Endangered
Poa cuspidata	Bluegrass	Probable	G5	SH	Endangered
Polygala incarnata	Pink Milkwort	Extirpated	G5	SX	Unprotected
Populus heterophylla	Swamp cottonwood	Possible	G5	S2	Threatened
Pycnanthemum clinopodioides	Basil Mountain-Mint	Extirpated	G2	S1	Endangered
Pycnanthemum muticum	Blunt-Mountain mint	Possible	G5	S2S3	Threatened
Pycnanthemum torrei	Torrey's Mountain-Mint	Probable	G2	S1	Endangered
Ranunculus pusillus	Spearwort	Possible	G5	SX	Unprotected
Rumex maritimus var fueginus	Golden Dock	Probable	G5T5	S1	Endangered
Sabatia angularis	Rose-Pink	Extirpated	G5	S1	Endangered
Sabatia camanulata	Slender Marsh-Pink	Possible	G5	S1	Endangered
Sabatia dodecandra	Large Marsh-Pink	Extirpated	G5?	SX	Unprotected
Sagina decumbens	Small flowered pearlwort	Possible	G5	S1	Endangered
Sceria triglomerata	Whip Nutrush	Possible	G5	S2	Threatened
Scutellaria elliptica	Hairy Scullcap	Extirpated	G5	SX	Unprotected
Scuttellaria serrata	Showy skullcap	Extirpated	G4G5	SX	Unprotected
Smilax pulverulenta	Jacob's-Ladder	Probable	G4G5	S1	Endangered
Solidago rigida	stiff-eafed goldenrod	Probable	G5	S2	Threatened
Sphenopholis pensylvanica	Swampt Oats	Probable	G4	S1	Endangered
Stylosanthes biflora	Pencil-Flower	Extirpated	G5	SX	Unprotected
Tipularia discolor	Cranefly Orchid	Probable	G4G5	S1	Endangered
Triphora trianthiphora	Nodding Pogonia	Probable	G3G4	S1S2	Endangered
Tripsacum dactyloides	Noprthern Gamma Grass	Probable	G5	S2	Threatened
Voila primulifoia	Primrose-Leaf Violet	Possible	G5	S2	Threatened
Vitus vulpina	Winter Grape	Probable	G5	S1	Endangered
WATCH LIST SPECIES					
Agrimonia parviflora	Swamp Agrimony	Possible	G5	S3	Unprotected
Carex albicans var emmonsii	Emmons' Sedge	Probable	G5T5	S3	Unprotected
Carex hitchcockiana	Hitchcok's Sedge	Probable	G5	S3	Threatened
Carex muehlenbergii var enervis	Muhlenberg's Sedege	Probable	G5T5	S3	Unprotected
Cuscuta pentagona	Five-Angled Field-Dodder	Confirmed	G5	S3	Unprotected
Cyperus erythrorhizos	Red-Rooted Flatsedge	Confirmed	G5	S3	Unprotected
Lechea racemulosa	Illinois Pinweed	Probable	GH5	S3	Rare
Silene caroliniana	Wild Pink	Confirmed	G5	S3	Vulnerable

TABLE 6.4-3
LIST OF BIRD SPECIES THAT MAY OCCUR IN THE NEW YORK CITY AREA

Species	Winter (Dec-Feb)	Spring (Mar-May)	Summer (Jun to mid Jul)	Early Fall (mid Jul to mid Sep)	Late Fall (mid Sep to Nov)
Acadian Flycatcher		S			
Alder Flycatcher		S		s	
American Avocet			Vr	vr	
American Bittern (**)	r	R		vr	r
American Black Duck (*)	c	C	U	u	c
American Coot (*)	u	F	F	f	f
American Crow (*)	c	C	C	c	c
American Golden-Plover	vr	Vr	Vr	s	vr
American Goldfinch (*)	u	F	F	f	f
American Kestrel (*)	f	U	S	f	f
American Oystercatcher (*)	r	F	F	f	f
American Pipit	vr			s	u
American Redstart (*)	c	R	C	u	
American Robin (*)	u	C	C	c	c
American Tree Sparrow	f	U			u
American White Pelican		Vr			
American Wigeon (**)	f	U	Vr	c	f
American Woodcock (*)	r	F	S	f	u
Arctic Tern			Vr	vr	
Ash-throated Flycatcher					vr
Atlantic Puffin (p)					
Baird's Sandpiper		R		r	
Bald Eagle	r	R		u	s
Baltimore Oriole (*)	vr	F	F	f	r
Bank Swallow		S			s
Barn Owl (*)	s	S	S	s	s
Barn Swallow (*)		C	C	c	s
Barred Owl	vr	R		r	r
Barrow's Goldeneye	vr				vr
Bay-breasted Warbler		S		s	
Belted Kingfisher (*) (?)	s	U	U	u	u
Bicknell's Thrush		R		vr	
Black Scoter	r			r	f
Black Skimmer (**)		F	C	c	
Black Tern			R	r	
Black Vulture		Vr			vr
Black-and-white Warbler	f	F			
Black-bellied Plover	r	C	S	c	f
Black-billed Cuckoo (*)			S	s	r
Blackburnian Warbler		U		u	s
Black-capped Chickadee (*)	f	F	F	f	f
Black-crowned Night-Heron (*)	s	C	C	f	s
Black-headed Gull	r				
Black-legged Kittiwake (p)	r	R			r
Black-necked Stilt		Vr	Vr		
Blackpoll Warbler		F		u	s
Black-throated Blue Warbler		F		f	u

Species	Winter (Dec-Feb)	Spring (Mar-May)	Summer (Jun to mid Jul)	Early Fall (mid Jul to mid Sep)	Late Fall (mid Sep to Nov)
Black-throated Green Warbler		F		f	s
Blue Grosbeak (*)		R	R	r	r
Blue Jay (*)	c	C	C	c	c
Blue-gray Gnatcatcher (*)		U	R	u	
Blue-headed Vireo	vr	U			u
Blue-winged Teal (*)	r	R	R	u	s
Blue-winged Warbler (*) (?)		U	S	u	
Boat-tailed Grackle (*)	f	F	F	f	f
Bobolink		U		u	s
Bonaparte's Gull	c	F			f
Brant	c	C			c
Brewer's Blackbird		U		u	u
Broad-winged Hawk (*)		U	S	f	u
Brown Creeper		S			s
Brown Pelican		Vr	Vr		
Brown Thrasher (*)	r	U	U	u	u
Brown-headed Cowbird (*)	f	C	F	c	c
Buff-breasted Sandpiper		R		r	
Bufflehead	c	C		s	c
Canada Goose (*)	c	C	C	c	c
Canada Warbler		F		f	
Canvasback	f	R		o	u
Cape May Warbler		U		u	s
Carolina Wren (*)	u	U	U	u	u
Caspian Tern		R		s	s
Cattle Egret (*)		U	U	u	
Cedar Waxwing (*)	u	F	F	f	f
Cerulean Warbler		R			
Chestnut-sided Warbler		U		u	s
Chimney Swift (*)		F	C	f	s
Chipping Sparrow (*)	r	U	U	f	f
Chuck-will's-widow		R			
Clapper Rail (*)	r	U	F	u	r
Clay-colored Sparrow					f
Cliff Swallow		S		s	
Common Eider	vr				r
Common Goldeneye	f	S		s	u
Common Grackle (*)	u	C	C	c	c
Common Loon	u	U		r	f
Common Merganser	u	R		s	u
Common Moorhen (*)		U	F		
Common Murre (p)					
Common Nighthawk (*)		S	F	f	r
Common Redpoll	r			r	
Common Snipe		U		u	u
Common Tern (*)		C	C	c	s
Common Yellowthroat (*)		F	F	c	u
Connecticut Yellowthroat (*)		F	F	c	u
Cooper's Hawk (*) (?)	s	U		s	u
Cory's Shearwater (p)					

Species	Winter (Dec-Feb)	Spring (Mar-May)	Summer (Jun to mid Jul)	Early Fall (mid Jul to mid Sep)	Late Fall (mid Sep to Nov)
Curlew Sandpiper		Vr		vr	
Dark-eyed Junco	c			s	c
Dickcissel	vr	R			r
Double-crested Cormorant (*)	f	C	C	c	c
Dovekie (p)					
Downy Woodpecker (*)	f	F	F	f	f
Dunlin	c	C		f	c
Eared Grebe		Vr		vr	vr
Eastern Bluebird (**)		R		r	r
Eastern Kingbird (*)		F	F	c	
Eastern Meadowlark (*)	s	F	S	f	f
Eastern Phoebe (*)		F	R	f	f
Eastern Screech-Owl (*)	s	S	S	s	s
Eastern Towhee (*)	s	F	C	c	f
Eastern Wood-Pewee (*)		U	S	f	
Eurasian Wigeon	vr				vr
European Starling (*) (i)	c	C	C	c	c
Evening Grosbeak	r			r	
Field Sparrow (*)	s	U	U	u	u
Fish Crow (*)	u	C	C	c	f
Forster's Tern (*)		C	C	c	s
Fox Sparrow	s	U			
Gadwall (*)	f	F	F	f	f
Glaucous Gull	vr				
Glossy Ibis (*)		F	C	c	
Golden Eagle					vr
Golden-crowned Kinglet	s	F		s	c
Golden-winged Warbler		R	R		
Grasshopper Sparrow (**)		R	R	r	r
Gray Catbird (*)	r	C	C	c	u
Gray-cheeked Thrush		R		vr	
Great Black-backed Gull (*)	c	C	C	c	c
Great Blue Heron	s	U	U	f	f
Great Crested Flycatcher (*)		S	S	s	
Great Egret (*)	r	C	C	f	u
Great Horned Owl (*)	u	U	U	u	u
Greater Cormorant	f-u	u-s			u
Greater Scaup	c	F		u	f
Greater Shearwater (p)					
Greater White-fronted Goose	vr				
Greater Yellowlegs	r	F	F	c	f
Green Heron (*)		U	U	u	
Green-winged Teal (**)	f	F	S	u	c
Gull-billed Tern		S	R		
Gyrfalcon	vr				vr
Hairy Woodpecker (*)	s	S	S	s	s
Harlequin Duck	r				r
Henslow's Sparrow					
Hermit Thrush	u	U		u	u
Herring Gull (*)	c	C	C	c	c

Species	Winter (Dec-Feb)	Spring (Mar-May)	Summer (Jun to mid Jul)	Early Fall (mid Jul to mid Sep)	Late Fall (mid Sep to Nov)
Hooded Merganser	f	F		u	f
Hooded Warbler		S		r	
Horned Grebe	u	S			u
Horned Lark (*)	u	F	S	s	u
House Finch (*)	c	C	C	c	c
House Sparrow (*) (i)	c	C	C	c	c
House Wren (*)		F	U	f	r
Hudsonian Godwit		S		u	
Iceland Gull	r				
Indigo Bunting (*)		S	U	u	s
Kentucky Warbler		R		vr	
Killdeer (*)	s	U	F	f	s
King Eider	vr				vr
King Rail (**)					
Lapland Longspur	vr				
Lark Sparrow	r				vr
Laughing Gull (*)	r	C	C	c	u
Leach's Storm-Petrel (p)					
Least Bittern (*)			Vr		
Least Flycatcher		U		u	
Least Sandpiper		C	S	c	
Least Tern (*)		U	F	f	s
LeConte's Sparrow					
Lesser Black-backed Gull	r			r	
Lesser Scaup	f	S		f	f
Lesser Yellowlegs		F	U	c	u
Lincoln's Sparrow		R			r
Little Blue Heron (*)		R	R	r	vr
Little Gull	r				
Little Stint				vr	
Loggerhead Shrike	vr				vr
Long-billed Dowitcher	vr	R		s	r
Long-eared Owl	r				vr
Louisiana Waterthrush		R		r	
Magnolia Warbler		U		u	s
Mallard (*)	c	C	C	c	c
Marbled Godwit		S		u	
Marsh Wren (*)	s	F	F	f	s
Merlin	r	R		s	u
Mississippi Kite		Vr		vr	
Monk Parakeet (*) (i)	u	U	U	u	u
Mourning Dove (*)	c	C	C	c	c
Mourning Warbler		R		s	
Mute Swan (*) (i)	c	C	C	c	c
Nashville Warbler	vr	U		u	s
Northern Bobwhite (*)	r	R	R	r	r
Northern Cardinal (*)	f	F	F	f	f
Northern Flicker (*)	u	F	F	f	f
Northern Fulmar (p)					
Northern Gannet (p)	u	C		s	f-c

Species	Winter (Dec-Feb)	Spring (Mar-May)	Summer (Jun to mid Jul)	Early Fall (mid Jul to mid Sep)	Late Fall (mid Sep to Nov)
Northern Goshawk	vr			vr	vr
Northern Harrier (*)	u	U	S	u	f
Northern Mockingbird (*)	f	F	F	f	f
Northern Parula		F		f	
Northern Pintail (**)	u			u	c
Northern Rough-winged Swallow (*)		U	F	f	
Northern Saw-whet Owl	r			r	
Northern Shoveler (*)	f	U	S	f	c
Northern Shrike	vr				
Northern Waterthrush		U		u	
Oldsquaw	f	U		u	f
Olive-sided Flycatcher		S		s	
Orange-crowned Warbler	r	R		r	r
Orchard Oriole (*)		R	R	r	
Osprey (*)		U	U	f	u
Ovenbird (*)		F		u	
Palm Warbler	r	F		u	f
Parasitic Jaeger (p)					
Pectoral Sandpiper		U		u	r
Peregrine Falcon (*)	s	S	S	s	u
Philadelphia Vireo		R		r	
Pied-billed Grebe (*)	u	S	R	f	u
Pileated Woodpecker	r	Vr			
Pine Siskin	s			s	
Pine Warbler		U			u
Piping Plover (*)		U	U	u	
Pomarine Jaeger (p)		R		r	r
Prairie Warbler	vr	U		u	
Prothonotary Warbler		R			
Purple Finch (*)	r	S		s	
Purple Gallinule				vr	
Purple Martin (*)		S	S		
Purple Sandpiper	f			f	
Razorbill (p)					
Red Crossbill	r			r	
Red Knot	r	F		f	s
Red Phalarope (p)					
Red-bellied Woodpecker (*)	u	U	U	u	u
Red-breasted Merganser	c	F			c
Red-breasted Nuthatch	f	F	F	f	f
Red-eyed Vireo (*)		C	R	f	s
Redhead	r			r	r
Red-headed Woodpecker	r	R		r	
Red-necked Grebe	vr	Vr			
Red-necked Phalarope				vr	
Red-necked Stint				vr	
Red-shouldered Hawk (**)	r	S		s	u
Red-tailed Hawk (*)	f	F	U	f	f
Red-throated Loon	u				f
Red-winged Blackbird (*)	u	C	C	c	c

Species	Winter (Dec-Feb)	Spring (Mar-May)	Summer (Jun to mid Jul)	Early Fall (mid Jul to mid Sep)	Late Fall (mid Sep to Nov)
Ring-billed Gull	c	C	C	c	c
Ringed-necked Pheasant (*)	s	S	S	s	s
Ring-necked Duck	s	S	Vr	r	u
Rock Dove (*) (i)	c	C	C	c	c
Roseate Tern		R	S	s	
Rose-breasted Grosbeak (*)		U	R	u	s
Rough-legged Hawk	s	R			r
Royal Tern				s	s
Ruby-crowned Kinglet	s	F		c	c
Ruby-throated Hummingbird		U	U	u	r
Ruddy Duck (*)	c	C	U	u	c
Ruddy Turnstone	s	C	F	c	f
Ruff		Vr		vr	
Rusty Blackbird	f	F			u
Sabine's Gull (p)					vr
Saltmarsh Sharp-tailed Sparrow (*)	u	U	U	u	f
Sanderling	c	C	S	c	c
Sandwich Tern			Vr		
Savannah Sparrow (*)	u	F	U	f	c
Scarlet Tanager (*)		U	S	u	
Seaside Sparrow (*)	r	S	S	s	s
Sedge Wren					r
Semipalmated Plover		C		c	s
Semipalmated Sandpiper		C	S	c	r
Sharp-shinned Hawk	u	U		u	f
Short-billed Dowitcher		F		c	u
Short-eared Owl (**)	r	R		r	r
Snow Bunting	u				u
Snow Goose (*)	s				f
Snowy Egret (*)	vr	C	C	c	u
Snowy Owl	r				r
Solitary Sandpiper		S	R	s	
Song Sparrow (*)	c	C	C	c	c
Sooty Shearwater (p)					
Sora	vr	S	S	s	vr
Spotted Sandpiper (*)		F	F	f	s
Stilt Sandpiper		U		u	
Summer Tanager		R			
Surf Scoter	u			u	u
Swainson's Thrush		U	U	r	
Swallow-tailed Kite					
Swamp Sparrow (*)	u	F	F	f	c
Tennessee Warbler		U		u	r
Thick-billed Murre (p)					
Tree Swallow (*)	s	C	C	c	c
Tricolored Heron (*)		R	S	r	
Tufted Duck	vr				vr
Tufted Titmouse (*)	f	F	F	f	f
Tundra Swan	r				r
Turkey Vulture	s	U	U	s	u

Species	Winter (Dec-Feb)	Spring (Mar-May)	Summer (Jun to mid Jul)	Early Fall (mid Jul to mid Sep)	Late Fall (mid Sep to Nov)
Upland Sandpiper (*)		R	R	s	
Varied Thrush	vr				
Veery (*) (?)		U	R	u	
Vesper Sparrow		R	Vr	vr	r
Virginia Rail (*)	r	U	U	s	r
Warbling Vireo (*)		U	U	u	
Western Kingbird	vr	Vr		vr	r
Western Sandpiper		U		f	r
Whimbrel		U	S	u	
Whip-poor-will		R			
White-breasted Nuthatch (*)	f	F	F	f	f
White-crowned Sparrow	r	U			u
White-eyed Vireo (*)	vr	U	U	u	s
White-faced Ibis		Vr	Vr		
White-rumped Sandpiper		U		u	
White-throated Sparrow	c	C			c
White-winged Crossbill	r			r	
White-winged Scoter	o				u
Wild Turkey (*)	s	S	S	s	s
Willet (*)	vr	C	C	f	r
Willow Flycatcher (*)		F	F	f	
Wilson's Phalarope				vr	
Wilson's Storm-Petrel			Vr		
Wilson's Warbler		U	U	s	
Winter Wren	r	S			s
Wood Duck (*)	s	U	U	u	s
Wood Thrush (*)	vr	U	S	u	r
Worm-eating Warbler		R		r	
Yellow Warbler (*)		F	F	f	
Yellow-bellied Flycatcher		S		s	
Yellow-bellied Sapsucker	s	U		u	u
Yellow-billed Cuckoo (*)			S	vr	s
Yellow-breasted Chat (*)	vr	R	R	r	r
Yellow-crowned Night-Heron (*)		U	U	u	
Yellow-headed Blackbird					vr
Yellow-rumped Warbler	u	C		c	c
Yellow-throated Vireo		S		s	
Yellow-throated Warbler		R		r	

Legend:

F:	fairly common - usually seen; 3-12 individuals per day in season in habitat
U:	uncommon - seen, but in small numbers; 1-3 individuals per day in season in habitat
S:	scarce – seen in habitat, but not daily
R:	rare – seen, but only a few times per season
VR:	very rare - not seen every season
IL:	introduced - not native to North America/an alien species
P:	pelagic – Atlantic Ocean off of New York City, not normally or only rarely seen from shore
?:	nesting unconfirmed
*:	nests within city limits
**:	formerly nested within city limits

Fowle, et al, 2001

TABLE 6.4-4
LIST OF MAMMAL AND HERPTILE SPECIES THAT MAY OCCUR IN THE URBAN CORE OF THE NEW YORK/NEW JERSET BIGHT WATERSHED

MAMMALS	
Harbor Seal	*Phoca vitulina*
Grey seal	*Halichoerus grypus*
White-tailed Deer	*Odocoileus virginianus*
Feral dogs	*Canus sp.*
Feral cats	*Felis sylvestris*
Racoon	*Procyon lotor*
Opposum	*Didelphis virginiana*
Gray Squirrel	*Sciurus carolinensis*
Eastern Chipmunk	*Tamias striatus*
Muskrat	*Ondatra zibethica*
Cottontail Rabbit	*Sylvilagus floridanus*
Meadow Vole	*Microtus pennsylvanicus*
Norway rat	*Rattus norvegicus*
House Mouse	*Mus musculaus*
White-footed Mouse	*Peromyscus leucopus*
Little brown Bat	*Myotis lucifungus*
Silver-haired Bat	*Lasioncteris noctivans*
Hoary Bat	*Lasiurus cinerius*
Red bat	*Lasiurus borealis*
HERPTILES	
Loggerhead turtle	*Caretta caretta*
Green turtle	*Chelonias mydas*
Leatherback turtle	*Dermochelys coriacea*
Atlantic (Kemp) ridley	*Lepidochelys kempii*
Diamondback Terrapin	*Malaclemys t. terrapin*
Snapping Turtle	*Chelydra serpentina*
Eastern Painted Turtle	*Chrysemys picta picta*
Spotted Turtle	*Clemmys guttata*
Eastern Box Turtle	*Terrapene c. carolina*
Musk Turtle	*Sternotherus odoratus*
Eastern Garter Snake	*Thamnophis sirtalis*

Black Racer	*Coluber c. constrictor*
Northern Brown Snake	*Storeria dekayi*
Northern Ringneck Snake	*Diadophis punctatus*
Northern Copperhead	*Agkistrodon contortrix mokasen*
Eastern hognose Snake	*Heterodon platirhinos*
Black ratsnake	*Elaphne o. obsolete*
Red-spotted Newt	*Notophthalmus viridescens*
Northern slimy salamander	*Plethodon glutinosus*
Spotted Salamander	*Ambystoma maculatum*
Red-backed Salamander	*Plethodon cinereus*
Northern dusky salamander	*Desmognathus F. Fuscus*
Two-lined Salamander	*Eurycea bislineata*
American Toad	*Bufo americanus*
Fowler's Toad	*Bufo woodhousii fowleri*
Northern Spring Peeper	*Pseudacris c. crucifer*
Gray Treefrog	*Hyla versicolor*
Green Frog	*Rana clamitans*
Southern leopard frog	*Rana utricularia*
Pickerel Frog	*Rana palustris*
Wood Frog	*Rana sylvatica*

Source: USFWS, 1997

TABLE 6.4-5
LIST OF SPECIAL CONCERN BIRD, MAMMAL AND HERPTILE SPECIES THAT MAY OCCUR IN THE NARROWS & LOWER HUDSON RIVER ESTUARY HABITAT COMPLEXES OF THE URBAN CORE OF THE NEW YORK/NEW JERSEY BIGHT WATERSHED

Common Name	Scientific Name	Status
Least Tern	*Sterna antillarum*	State listed endangered
Common Loon	*Gavia immer*	State special concern
Common Barn Owl	*Tyto alba*	State special concern
Peregrine falcon	*Falco peregrinus*	Federally listed endangered
Bald eagle	*Haliaeetus leucocephalus*	Federally listed threatened
Osprey	*Pandoin haliatus*	State listed threatened
Piping Plover	*Charadrius melodius*	Federally listed threatened
N. Diamondback Terrapin	*Maclemys t. terrapin*	Federal species of concern

Source: USFWS, 1997.

6.5 Historic Sites and Prehistoric Archaeological Resources

6.5.1 Roosevelt Island History

Roosevelt Island has a unique history linked to the early settlement and urbanization of New York City. Originally called Minnahannock by the Algonquin Indians, the island was purchased by the Dutch in 1637 and renamed Hog Island. After a period in the mid 1600s, during which the Dutch and English battled for control of lands in the region, the island was granted to the sheriff of New York, Captain John Manning, who renamed the island for himself. Manning's daughter later inherited the island and renamed it for her husband, Robert Blackwell in 1686. The island remained in the Blackwell family until 1828 when New York City purchased the island and began to construct various social institutions on the island including nursing homes, hospitals, poor houses and prisons. The island was renamed Welfare Island in 1921 and its use for the city's ill and social outcasts continued into the mid 1900s, when the city began to construct new and larger facilities for these institutions elsewhere.

In 1968 the Mayor of New York City, John Lindsay, established a committee to explore potential uses for the island. The State of New York was granted a 99-year lease for the island in 1969, and plans for a new community were developed by architects Philip Johnson and John Burgee. In 1973 the island was renamed Roosevelt Island, and new residential and mixed residential/commercial development soon began. In 1984, the New York State Legislature created the Roosevelt Island Operating Corporation (RIOC), which continues today to plan and oversee development of the island (RIOC, 2003a).

6.5.2 Roosevelt Island National Register Properties/City Landmarks

There are seven National Register Historic Properties on Roosevelt Island, all of which were listed in 1972 (NPS, 2003). These sites are also designated as landmarks by the New York City Landmark Commission (NYCLC)(ROIC, 2003b). Designation as a city landmark affords these properties similar protection as National Register listing (NYCLC, 2003). Whereas National Register status provides protection under the National Historic Preservation Act (NHPA) when any federal permitting actions are proposed, designation as a City Landmark ensures that similar

review occurs under various state and city regulations and permitting processes (including the State Environmental Quality Review Act [SEQRA] and the City Environmental Quality Act [CEQA]) when any alterations to the structure itself, or nearby construction, are proposed.

The listed properties are described in Table 6.5-1. These sites are all located on Roosevelt Island and are seven of the approximately 650 National Register sites within New York City. Other notable sites near Roosevelt Island and/or along the East River include the Brooklyn Bridge, Manhattan Bridge, Fort Schuyler, JOHN A. LYNCH (ferryboat), ADMIRAL DEWEY (tugboat), AMBROSE (lightship), Brooklyn Heights Historic District, South Street Seaport Historic District, and the Fulton Ferry District (NPS, 2003). None of the sites on Roosevelt Island or those near the island/East River are proximate to the proposed RITE Project.

TABLE 6.5-1
NATIONAL REGISTER OF HISTORIC PLACES
LISTED SITES ON ROOSEVELT ISLAND

Site	Description
Lighthouse	Located on the north end of the island, the lighthouse was designed by architect James Renwick, Jr. and built in 1872. The lighthouse was built using inmate labor from the island's prisons.
Smallpox Hospital	Also designed by James Renwick Jr., the Smallpox hospital was constructed in 1854 to house highly contagious smallpox patients on the island, away from the majority of the city's population.
Strecker Laboratory	Built in 1892 and designed by architects Withers and Dickson, Strecker Laboratory was built as a pathology lab for the City Hospital. It later housed the well known Russel Sage Institute of Pathology.
Chapel of the Good Shepherd	Designed by Frederick Clark Withers the chapel was built in 1888 and later donated to the Episcopal City Mission Society. The mission served the imprisoned and infirmed of the island. Today the building houses the Good Shepherd Community Center.
Blackwell House	The Blackwell House was built in 1794 and is the fifth oldest wooden house in all of New York City.
City Hospital and the Octagon	Listed separately on the National Register these two sites were originally part of the first New York City mental health hospital, built in 1835. Designed by architect Alexander James Davis, the building was one of New York's finest buildings in its time. The facility was renamed Metropolitan Hospital in the 1890s, and remained in use until the 1950s when the hospital was moved to newer buildings in Harlem. Most of the original hospital was demolished in the 1970s, and what remained of it was damaged by fires in 1982 and 1999. Today the Octagon remains and has been incorporated into the new Octagon Apartments and Ecological Park plans.

Source: RIOC, 2003b; NPS, 2003

6.5.3 Prehistoric Archaeological Sites

There are no known prehistoric archaeological sites located on Roosevelt Island. However, as part of its required consultation under Section 106 of the NHPA, Verdant will consult with the State Historic Preservation Officer (SHPO) regarding the presence of archeological resources in the proposed project area. This will include a review of the New York State Archaeological Sensitivity Maps and available documentation for listed National Register prehistoric sites in the project area.

6.5.4 Native American Interests

There are no lands of federally listed Indian Tribes within the proposed FERC project boundary, or within 15 miles of the project. Similarly, no sites of cultural significance to tribes have been identified in the project area. However, as part of its required consultation under Section 106 of the NHPA, Verdant will consult with the SHPO regarding tribal interests in the proposed project area.

6.6 Recreational Resources

The proposed RITE Project will be located on the East River along the east shore of Roosevelt Island, in the Manhattan Borough of New York City, New York County, New York. Roosevelt Island is a 147-acre island operated by the RIOC, which manages and plans the residential and commercial development of the island. Located within one of the most densely populated cities in the country, the types of recreational facilities and opportunities available in the project area are consistent with this predominately urban setting.

6.6.1 Regional Recreational Opportunities

Although there are no state parks on Roosevelt Island itself, there are several in the metropolitan New York City region (NYSOPRHP, 2003). These include Roberto Clemente State Park located along the Harlem River in the Bronx; Riverbank State Park on the Hudson River in Manhattan;

Clay Pit Ponds Preserve on Staten Island; Bayswater Point State Park on the eastern shore of Jamaica Bay in Queens; and Empire-Fulton Ferry State Park on the East River in Brooklyn. The New York City Park System encompasses approximately 13 percent of the city's area and includes over 26,000 acres of parkland. Although the park system is predominantly lands developed for recreation (19,000 acres), there are also 7,000 acres of undeveloped forest, wetlands and meadows (USFWS, 1997).

The East River is a 17-mile long tidal strait that connects upper New York Harbor with the Long Island Sound. The East River is primarily a working river and navigation channel. No documentation of water-dependent recreational activities occurring within the East River has been identified. However, the nearby waterways, including the Atlantic Ocean within Long Island Sound, and the New York/New Jersey Harbor, provide extensive opportunities for pleasure boating, recreational angling, and swimming at the regions numerous beaches. According to the NYDEDC, there are no state boat launches on the East River or Harlem River (NYSDEC, 2003b).

6.6.2 Roosevelt Island Recreational Opportunities

Roosevelt Island lies within Manhattan Community District 8 (see Section 6.7.1). Within the two square miles of this District, 2.7 percent of the land is designated as being in the open space/recreation land use category (NYCDOCP, 2003a). Although none of this land, as mapped, occurs on Roosevelt Island, recreational opportunities on Roosevelt Island do include a sports complex, several sports fields and playgrounds. Roosevelt Island is home to Octagon Park (15 acres), Lighthouse Park (2.8 acres), Northtown Park (2.6 acres); Blackwell Park (3 acres), and Manhattan Park (1.34 acres) (Van Alen Institute, 1997). The popular waterfront promenade that encircles the island north of the Queensboro Bridge offers views of Manhattan and the river, and opportunities for pleasure walking, running, and biking (ROIC, 2003c). Although the walkway is elevated above the shore, there are areas that can be used for shoreline fishing, including a pedestrian pier located on the West Channel of the East River (Van Alen Institute, 1997).

6.7 Land Use, Management, and Aesthetics

The proposed RITE Project will be located on the East River along the east shore of Roosevelt Island, in the Manhattan Borough of New York City, New York County, New York. Roosevelt Island is a 147-acre island operated by the RIOC, which manages and plans the residential and commercial development of the island. Due to its location within one of the most populated cities of the country, the existing land uses are predominantly urban residential, commercial, and industrial development. Future land use management planning focuses on maintaining this urban mosaic while encouraging interspersion of green spaces and balancing the demographic changes and resulting infrastructure needs with the protection of natural resources, notably along the working waterfront.

6.7.1 Description of Existing Project Land Use and Zoning

Roosevelt Island is located within the Manhattan Borough of New York City. Because the city incorporates such a wide variety of land use patterns within each borough, it is necessary to narrow the discussion of local land uses in order to more accurately depict the Roosevelt Island community and its immediate vicinity.

Roosevelt Island is located within Manhattan Community District 8. As shown in Figure 6.7-1, this community is bound by Roosevelt Island to the east, East 59th Street on the south, Fifth Avenue to west, and East 96th Street to the north. Land uses within this two-square-mile district (1,267.3 acres) are predominantly multi-family residential (36.1 percent) and mixed residential/commercial (31.6 percent). Table 6.7-1 provides a complete listing of land uses in this District (2001 statistics). As shown on Figure 6.7-1, Roosevelt Island, which encompasses approximately 12 percent of Manhattan Community District 8, is predominantly mixed residential and commercial, with smaller areas of public facilities and institutions located at each end of the island (NYCDOCP, 2002; 2003).

Residential Land Uses

- 1 & 2 Family Residential
- Multi-Family
- Mixed Residential & Commercial

Non-Residential Land Uses

- Commercial & Office
- Industrial & Manufacturing
- Transportation & Utility
- Public Facilities & Institutions
- Open Space & Outdoor Recreation
- Parking Facilities
- Vacant Land
- All Others or No Data

Base Map: COGIS Tax Lot File Release 02B, clipped to shoreline
Land Use: NYC Department of Finance's Real Property File (August 2002) modified by the Department of City Planning for display of condominiums and parks in appropriate land use category.

FIGURE 6.7-1
LAND USE

TABLE 6.7-1
LAND USES WITHIN MANHATTAN COMMUNITY DISTRICT 8

Land Use	Percent of Area
1-2 Family Residential	4.6
Multi-Family Residential	36.1
Mixed Residential/Commercial	31.8
Commercial/Office	4.6
Industrial	0.7
Transportation/utility	2.1
Institutions	15.4
Open Space/recreation	2.7
Parking facilities	1.0
Vacant Lots	0.4
Miscellaneous	0.6

Source: (NYCDOCP, 2003).

Roosevelt Island is entirely zoned as a General Residence District (R7-2). Within General Residence Districts, all types of residential buildings are allowed. Transportation infrastructure, community facilities and open spaces that are necessary or complementary to the development scheme of the district and beneficial to residents are also allowed (NYCDOCP, 2003).

6.7.2 Waterfront and Coastal Zone Management

The Waterfront Revitalization Program (WRP) is the City of New York's primary plan for managing land use and development within the coastal zone (NYCDOCP, 2002). The WRP was developed in accordance with the Federal Coastal Zone Management Act of 1972 and the New York State Waterfront Revitalization and Coastal Resource Act of 1981. The WRP also serves as a management tool to guide protection of coastal resources under various city and state environmental and zoning-related regulations, including the Uniform Land Use Review Procedure (ULURP), City Environmental Quality Review (CEQR), State Environmental Quality

Review Act (SEQRA), USACOE 401/404 permitting processes, and community-specific ("192-a") plans that address resources within the coastal zone.

The WRP generally encompasses all lands that have a direct impact on coastal waters. The shorelines of Roosevelt Island and the East River are within the WRP boundary. The landward boundary of the zone was developed to encompass important coastal features. In some cases special zones have been established to more precisely delineate:

- Significant maritime and industrial areas;
- Significant coastal fish and wildlife habitats;
- Special natural waterfront areas;
- The Staten Island Bluebelts;
- Tidal and freshwater wetlands;
- Coastal floodplains and flood hazard areas;
- Erosion hazard areas;
- Coastal barrier resources act areas;
- Steep slopes;
- Parks and beaches;
- Visual access and views of coastal waters and the harbor;
- Historic, archaeological, and cultural sites closely associated with the coast; and
- Special zoning districts.

The WRP is a planning document and it does not delineate specific standards for use or development of coastal lands. However, the above-listed coastal resources and attributes are to be considered in planning and permitting actions at the federal, state and local levels.

Within the Roosevelt Island shoreline there are no specially designated areas under the WRP. However, there are several areas along other sections of the East River that have been designated under the plan. Significant Maritime and Industrial Areas have been delineated at the South Bronx, Brooklyn Navy Yard, Newtown Creek, Red Hook, and Sunset Park. Within the Significant Maritime and Industrial Areas, water-dependent and industrial uses, including

necessary infrastructure and utilities, are promoted. The upper East River/Long Island Sound area is designated as a Special Natural Waterfront Area. Within Special Natural Waterfront areas, ecological quality is to be protected and restored. Development or activities that would individually or cumulatively cause adverse impacts to the natural resources of the area or ecological fragmentation are to be avoided or mitigated.

6.7.3 Floodplains in the Vicinity of the Project

The project will not influence flooding in any manner, as the turbines will be erected on pilings anchored to the channel bottom. There is no impounding or significant alteration of stage or flow as a result of the project. Floods and flooding at the site are created by storm surges associated with extreme climactic events, such as hurricanes or nor'easters.

In the 1980s and 1990s, USACOE found that New York City's low-lying, heavily populated neighborhoods are more exposed to the threat of coastal flooding in a hurricane than most people realized. (NewYork City Emergency Management, 2003) Large areas of southern Queens, southern Brooklyn, the lower east and west sides of Manhattan, and the perimeter of Staten Island could all suffer damage from a hurricane's storm surge. In addition, storm surge from a strong hurricane would not be limited to waterfront properties and could conceivably push miles inland in some areas. New York City's unique geography — located at a "bend" in the coastline between New Jersey and Long Island — makes it especially vulnerable. In 1991, the Halloween Nor'easter (popularized by the movie "The Perfect Storm") reduced evacuation routes from southern Queens, due to the primary Coastal Evacuation Route from the Rockaway Peninsula being inundated by coastal flooding. In December 1992, another powerful nor'easter with hurricane-force winds left a forceful mark on New York City when its flooding knocked out electrical service to city subways, forced LaGuardia Airport to close, and submerged uptown parts of the FDR Drive in Manhattan under four feet of water. Coastal flooding from the 1992 nor'easter damaged as many as 20,000 homes and forced almost 2,000 people to take refuge in 36 Red Cross emergency storm shelters.

6.7.4 Aesthetic Resources

The proposed RITE Project is located in one of the most densely populated urban regions of the county. Accordingly, the viewshed from the project area is primarily urban with a mix of residential, commercial, and industrial settings. The aesthetic resources of the project area could include the working waterfront of the East River and manmade scenery such as the famous Manhattan skyline and several bridges. Natural scenic areas occur north of Roosevelt Island within the upper East River/Long Island Sound and southwest of the project area within New York/New Jersey Harbor.

Section 7
Licensing Resource Study Considerations

This Section addresses the environmental and operational issues that Verdant currently anticipates will require further study and/or consultation with regulatory agencies during the licensing process. It must be acknowledged that because this is the first free-flow tidal energy project to be proposed for FERC licensing, there is no existing template for the issues that may need to be addressed. In fact, many of the issues that must be addressed in traditional hydropower projects' licensing process are not relevant to the RITE Project. Alternatively, there may be resource issues that are unique to tidal energy projects. As such, This Section describes issues that can serve as a starting-point for discussion purposes with stakeholders. Verdant expects that throughout the initial-stage consultation process it will work with stakeholders to refine study, and information requests.

As part of its field of studies, Verdant intends to deploy an experimental unit with up to six turbines (six-pack) in the spring of 2004. Verdant believes that this experimental deployment will provide an invaluable opportunity to study the operations and environmental impacts of tidal power installations. Information to be developed with the six-pack deployment is described briefly below.

7.1 Project Operations

Verdant plans to study project operations during the six-pack deployment. All aspects of operations and system performance will be evaluated to provide for a more detailed assessment of generation potential and to refine installation and operations plans. Information obtained will be incorporated into the license application.

7.2 Water Quality

There is considerable data available to document current water quality in New York/New Jersey Harbor and the project area. The RITE Project is not expected to have any negative impacts on water quality. However, to verify this, Verdant proposes to conduct a water quality study in the immediate vicinity of the six-pack deployment. This study will be scoped in consultation with water quality organizations and agencies and other interested stakeholders. Conceptually, this

evaluation will consist of monitoring indicator parameters such as dissolved oxygen, turbidity, temperature and chlorophyll a. These parameters will be monitored within the field, and outside of the influence of the field. Verdant will prepare a report documenting the methodology and findings of the field effort.

7.3 Fish Movement and Protection

Preliminary research has indicated that KHP turbines will have negligible impacts on fisheries. However, to document this, Verdant proposes to conduct a fish movement and protection study. This study will be scoped in consultation with fisheries organizations and agencies and other interested stakeholders. Key issues to be addressed will include fish avoidance/attraction to the units and, if observed, entrainment impacts. Verdant will prepare a report documenting the methodology and findings of the field effort.

7.4 RTE Species Study

Verdant will formally consult with resource agencies regarding the presence of RTE species or critical habitats in the project area. If any species or habitats are identified, Verdant proposes to conduct a study to confirm the presence of species and/or habitats and to assess project related impacts. This study will be scoped in consultation with relevant resource agencies and other interested stakeholders. Verdant will prepare a report documenting the methodology and findings of the field effort.

7.5 Cultural, Archaeological, and Historic Properties

Consistent with Section 106 of the NHPA, Verdant will consult with the SHPO regarding the existence of historically significant properties/structures within, adjacent to, or in the immediate vicinity of, the FERC project boundary. If any resources are identified, Verdant will prepare and execute a Programmatic Agreement (PA) in consultation with the SHPO prior to license issuance. Verdant will incorporate, within the license application, applicable information with regard to implementation of the PA, and development of the Historic Properties Management Plan (HPMP), upon issuance of the license.

Section 8
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Section 9
Correspondence

Project correspondence is attached.

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104.0001.0100
October 20, 2003

Verdant Power, LLC

Preliminary Permit
for the
Roosevelt Island Tidal Energy Site

Submitted to

Federal Energy Regulatory Commission

May 23, 2002

VERIFICATION

STATE OF VIRGINIA

COUNTY OF ARLINGTON

William H. Taylor, being first duly sworn, deposes and says:

That he is agent of the applicant for the preliminary permit, that he has read the foregoing Application and Exhibits attached thereto, and knows of the contents thereof; and the same are true to the best of his knowledge.

William H. Taylor
Agent for Applicant

Subscribed and sworn to before this 23 day of May 2002

Notary Public for Arlington County

Residence: _____

My Commission Expires: 4-30-06

Application for Preliminary Permit

(a) Initial statement: Before the Federal Energy Regulatory Commission Application for Preliminary Permit

(1) Verdant Power, LLC applies to the Federal Energy Regulatory Commission for a preliminary permit for the proposed Roosevelt Island Tidal Energy hydropower project, as described in the attached exhibits. This application is made in order that the applicant may secure and maintain priority of application for a license for the project under Part I of the Federal Power Act while obtaining the data and performing the acts required to determine the feasibility of the project and to support an application for a license.

(2) The location of the proposed project is:

State: New York
County: Manhattan / Queens
Town: New York
Stream of water: East River – East Channel off Roosevelt Island

(3) The exact name, business address, telephone number, FAX number, and E-mail address of the applicant are:

Verdant Power, LLC
4640 13th Street, North
Arlington, VA 22207-2102
Telephone: (703) 528-6445
FAX: (703) 812-8157
E-mail: ttaylor@verdantpower.com

The exact name, business address, telephone number, FAX number, and E-mail address of each person authorized to act as agent for the applicant in this application are:

William H. ("Trey") Taylor
Verdant Power, LLC
4640 13th Street, North
Arlington, VA 22207-2102
Telephone: (703) 528-6445
FAX: (703) 812-8157
E-mail: ttaylor@verdantpower.com

(4) Verdant Power, LLC is a domestic corporation and is not claiming preference under section 7(a) of the Federal Power Act.

(5) The proposed term of the requested permit is 36 months.

(6) There is neither existing dam nor other project facility.

(b) Exhibit 1 – Project Description

(1) There will be no other proposed structures such as dams, spillways, penstocks, powerhouses or tailraces for part of this project.

At the core of Verdant Power's instream energy generation system to be developed at the Roosevelt Island Tidal Energy (RITE) site is a "free-flow" hydro turbine designed to

convert kinetic hydro energy to electric power. It is an axial-flow propeller turbine. Like an underwater wind turbine, the free-flow, bi-directional turbine will create mechanical power from the tidal currents of the East River in the east channel off Roosevelt Island, New York. The best currents are found approximately one-third below the water surface. The mechanical power, derived from the turbine, is applied directly through a speed increaser to an internal generator or a hydraulic pump that in turn drives an onshore generator. The turbine has few moving parts and is anchored beneath the water surface to the water bottom, either by a concrete base or pylon, or by a submersible barrage or other site-specific anchoring device. For ease of periodic servicing, it may be raised from its bottom mountings. The turbine will have self-cleaning blades or a system for deflecting debris away from its blades.

The free-flow turbine can operate alone or in hybrid configurations with other equipment such as diesel generators, storage batteries, and fuel cells. At the RITE site it will be grouped with others into a field of turbines as a "stand alone" system, or as "base power" system for dispatched power through the local distribution grid.

The field at the RITE site has a potential of producing up to 10 MW, or more, of electric power. For reference only, each turbine will be approximately 16 feet in diameter, deployed in about 30 rows with an average of 17 turbines per row. More than 200 feet will separate each row. Thus, the field with a total length of approximately 5,700 feet and a width averaging about 284 feet will support more than 500 free-flow turbines.

Power control modules will be onshore and designed to operate as three-phase 60 Hz power synchronized to the local grid, meeting the latest specifications for distributed generation power in New York State. The modules will insulate customers' systems from equipment malfunctions within six milliseconds by a cutout device.

(2) There are no reservoirs required for this project.

(3) Determined by the local utility company or regional transmission authority, the number, length, voltage, and interconnections for transmission or distribution of energy generated by the pilot project will be part of the feasibility study at this site. The study will include interconnection options such as ConEd's substation on Roosevelt Island, the Varennes substation at Long Island City, New York Subway system at the Queensboro Bridge, Roosevelt Island's Coler Memorial Hospital and the cable car serving Roosevelt Island and Manhattan, and the Astoria Power Plant in Queens.

(4) Estimated average annual energy production: 32,804 MW/h (using 494 turbines)
Installed capacity: 10 MW (9.4 MW)

The site requires no hydraulic head. The estimated number of 16-foot diameter turbines is 494. Each turbine will be designed to deliver grid-ready, average power of 17.9 kW based on a current velocity of 3.5 knots. Each of their generators will have a rated capacity of 21 kW. Based on 3.5 knots, each turbine will be capable of delivering 157 MW/h per year. At the RITE site, each turbine is estimated to deliver 66.5 MW/h per year. That is more than a 40% capacity factor. Both the turbines and generators will be new.

(5) All lands within the proposed project boundary are identified under Exhibit 4. These include lands bordering the site that runs along the eastern side of Roosevelt Island from the Queensboro Bridge to approximately the intersections of East Road and Central Road North on Roosevelt Island. The site is bordered by Queens to the West. However, it would occupy only one-half of the non-commercially navigable east channel of the East River off Roosevelt Island. The area of the site is approximately 1.08 miles by 280 feet

or 37.5 acres. Land on shore for power controls, transformers, etc. may be found at existing substation locations.

(6) The project would develop a new source of renewable energy for the public. This new source of power:

- is clean and renewable with no adverse environmental impacts
- further diversifies energy sources as distributed generation
- provides protection to the local community and maritime commerce
- does not destroy animal habitat nor increase animal mortality

(c) Exhibit 2

(1) General Requirements

(i) Technical / Economical / Financial Studies:

The turbine design has been undergoing testing and development over the last quarter century through the U.S. Department of Energy, New York Power Authority (NYPA), and New York University (NYU). The system design has more recently been tested and developed over the last two years. Funding for further development of the system is expected to come from the New York State Energy and Research Development Authority (NYSERDA) and private capital investments and other funders. As a result, the Electric Power Research Institute (EPRI) believes that this type of system could be hydropower's answer for distributed generation.

Testing and evaluation will occur during all three phases of building out the RITE site. The first phase will include further model and prototype testing with assistance from the U.S. Navy's David Taylor Model Basin. This facility also will help with rapid prototyping for designs most suitable for the site and with evaluations of each unit's reliability. Site analysis and deployment evaluation will be conducted by civil, structural and water resources engineering firms. These firms will assist in determining the best locations of the units within the field described above. They will do so by characterizing the channel bottom topography, subsurface conditions, and documenting channel currents and velocity profiles. These firms also will provide structural engineering services in connection with securing the generator units to the channel bottom.

During the first phase, specific required local and state permits will be sought, as well as any further federal agency review. This will include the involvement of the Global Climate Change Task Force for the New York City and Metropolitan East Coast Region that coordinates all permitting agencies and stake holders in a process of interagency communication and interaction.

The second phase will include a system redesign, strategy and plan to fully exploit the kinetic hydro resources of the site. This phase will include permanent deployment of a limited number of commercial systems as the first stage preceding the full build-out of the 10 MW site potential. This stage will allow further evaluation and studies for FERC licensing. These studies include but are not limited to environmental impact studies and value engineering studies. It is planned that these studies will be conducted in conjunction with NYPA, ConEd, EPRI, NYSERDA, and Columbia University.

Prior to the third phase – the commercial 10 MW build-out in multiple stages – an analysis of available interconnection to the grid and relative cost for establishing the interconnection(s) will be conducted. Also, final economic and financial analysis will be conducted once information on cost of grid connections, unit and system component fabrication and installation, and estimated energy yield data has been collected.

Finally, before any construction of the third phase build-out of the site, all required testing and evaluation as guided by such entities as the U.S. Army Corps of Engineers will be conducted.

(ii) This project will not require any roads to be constructed for the purpose of this project.

(2) The work plan does not call for new dam construction because a dam is not required. However, details of the work plan will be made available once information on the free-flow turbine and its integrated system designed for the RITE site, and supporting studies are available. Verdant Power expects a short construction period at the proposed site. It is anticipated that many of the component parts will be manufactured and assembled in the surrounding New York area and floated by barge to the proposed site. Once there, the units will be attached to devices previously secured to the channel bottom and anchored into position. Thus, installation of the turbines will be conducted by barge operations. This process is intended to minimize any disturbances to the affected area surrounding the site.

(d) Exhibit 3 – Cost and Financing

(1) The estimated cost for carrying out or preparing studies, investigations, tests, surveys, maps, plans and other related specifications is approximately $1,500,000.

(2) More than two-thirds of the cost for the feasibility study, surveys, and modeling tests will be paid by Verdant Power through private capital investment, foundations, and other funders. The balance of financing is expected to come from NYSERDA and its PON 669-01 for which an application has been submitted. Other studies, previously conducted by NYU and NYPA at the same site, will be used.

Once the pilot project has been approved, funding for the development of the site will be through a combination of financing entities including development partners such as an independent power producer, NYSERDA, and NYPA. It is anticipated that any associated costs for coastal protection will be paid by the federal government. Verdant Power plans on paying for the installation of electrical generating components (specifically, the turbines) and associated costs for grid connections.

(3) At this point in the development, there are three market sources for the proposed generated power:

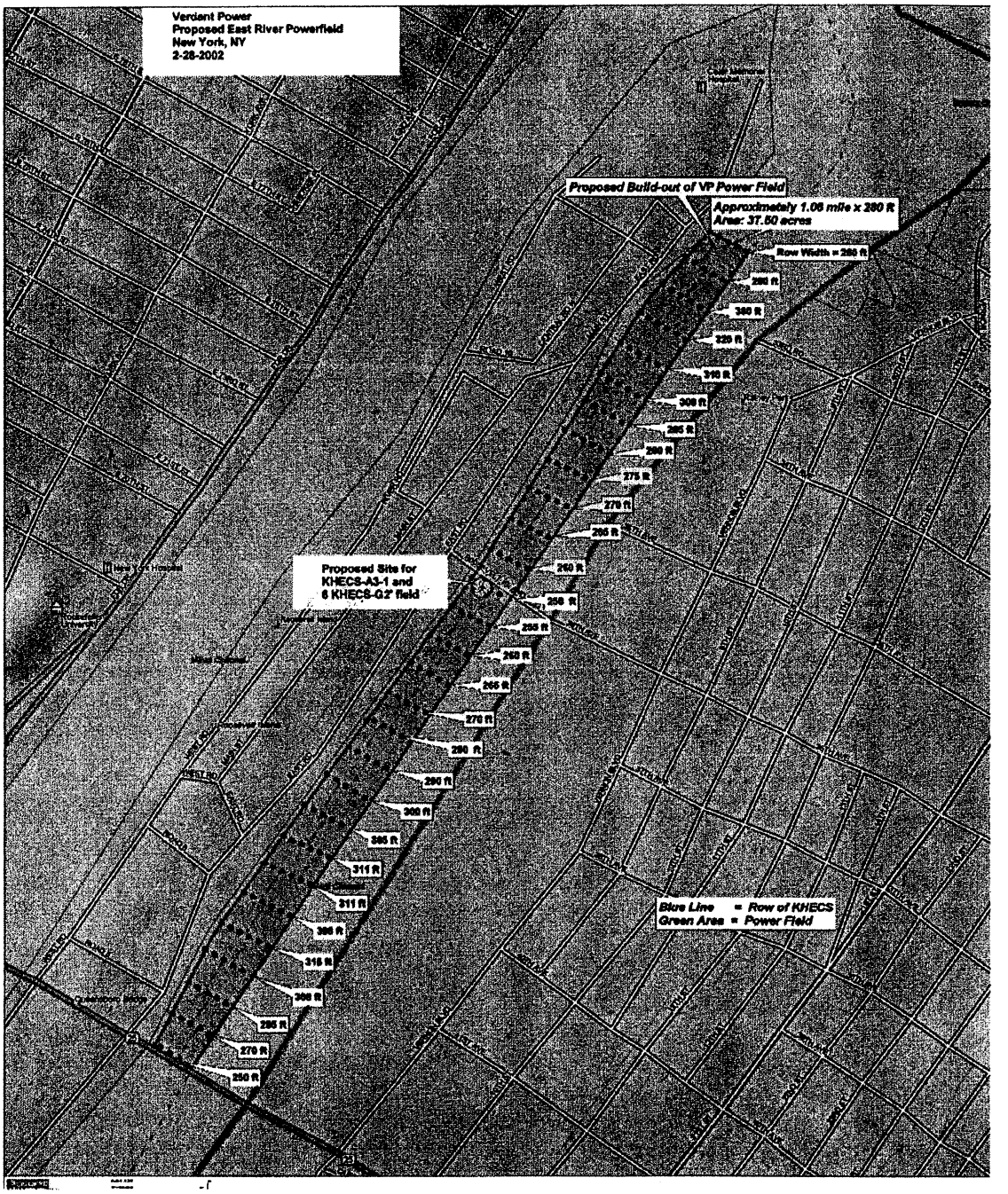
1. Sale to local distribution companies (e.g., ConEd, Long Island Power Authority)
2. Direct power to be marketed to industrial and commercial users (e.g., Coler Memorial Hospital, New York MTA, Costco, Inc.)
3. Wholesale of energy to available markets

The project is consistent with New York Governor's Executive Order 111 and with the objectives set forth by Governor George Pataki in 1999 and 2000 with respect to the New York Energy Plan and Environmental Impact. As the RITE Project will generate electric power with a reduction in acid rain causing emissions, it will improve the sale of SO2 emission allowances, reduce emissions of NOx and improve environmental quality through the greater use and acceptance of high efficiency technologies.

Sale prices of the energy produced by this system are expected to be competitive with coal and natural gas production facilities since there will be no transmission costs associated with delivery of the energy. The goal of this project is to cost effectively market electricity generated by instream free-flow turbine technology. As such, anticipated sale of the energy will be targeted between $.07 per kWh and $.09 per kWh.

(e) Exhibit 4

For the purpose of representing the proposed site, a DeLorne topographic map, derived from the United States Geological Survey, 7.5 minute quadrangle topo map, has been used. This map provides an accurate representation of the site and the surrounding area.



FEDERAL ENERGY REGULATORY COMMISSION
Washington, D. C. 20426

OFFICE OF ENERGY PROJECTS

Project No. 12178-000-NY
Roosevelt Island Tidal Energy Project
Verdant Power, LLC

Mr. William H. Taylor
Verdant Power, LLC
4640 13th Street, North
Arlington, VA 22207-2102

JUN 12 2002

Subject: Acceptance Letter for a Preliminary Permit Application

Dear Mr. Taylor:

Your preliminary permit application for the Roosevelt Island Tidal Energy Project has been accepted by the Commission for filing as of May 30, 2002. Federal, state, and local agencies will be informed in the Commission's public notice that a copy of the application may be obtained from you.

Within 5 days after you receive this letter, please send one copy of the application to the following: the Commission's New York Regional Office; the Department of the Interior, Office of Environmental Affairs; the U.S. Army Corps of Engineers; and the Bureau of Land Management. A list of their addresses is enclosed.

If you have any questions, please contact me at (202) 219-2839.

Sincerely,

James O. Hunter, Jr.

James O. Hunter, Jr.
Division of Hydropower
Administration and Compliance

Enclosures: List of addresses

LIST OF ADDRESSES

Federal Energy Regulatory Commission
New York Regional Office
19 West 34th Street, Suite 400
New York, NY 10001

Department of the Interior
Office of Environmental Affairs
Room 2340 MIB
1849 C Street, NW
Washington, DC 20240

U.S. Army Corps of Engineers
North Atlantic Office
General Lee Avenue
Fort Hamilton Military Community
Brooklyn, NY 11252-6000

Bureau of Land Management
Branch of Lands (ES-930)
7450 Boston Blvd.
Springfield, VA 22153

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Verdant Power, LLC — Project No. 12178-000

ORDER ISSUING PRELIMINARY PERMIT

(Issued September 9, 2002)

On May 30, 2002, Verdant Power, LLC (permittee), filed an application for a three-year preliminary permit under Section 4(f) of the Federal Power Act (FPA)[1] to study the proposed Roosevelt Island Tidal Energy Hydropower Project No. 12178, which would be located in the East River - East Channel off Roosevelt Island, in Queens County, New York. The proposed tidal energy development project would consist of: (1) 494 proposed 16-foot-diameter, 21-kilowatt free-flow turbine generating units, deployed below the water surface in 30 rows with an average of 17 units per row, and (2) proposed power control and interconnection facilities located on Roosevelt Island. The rows would be separated by 200 feet of channel length and the units would be distributed across the western half of the channel. The project would have an annual generation of 32.8 gigawatt hours that would be sold to a local utility.

Public notice of the application was issued on June 12, 2002, establishing August 12, 2002, as the deadline for the filing of comments and motions to intervene. A timely motion to intervene was filed by the New York State Department of Environmental Conservation (NYSDEC), seeking party status.[2] NYSDEC, the U.S. Department of the Interior, and Mr. Philippe Vauthier filed comments. No objections or protests were filed on the preliminary permit application.

NYSDEC comments that permits under New York State laws are likely to be required for in-stream testing of a prototype turbine during the permit term. A preliminary permit does not authorize entry onto state or private properties. Such authorization is a matter between the permittee and the State. NYSDEC and Interior discuss environmental studies to be conducted and agencies to be contacted during the

[1] 16 U.S.C. § 797(f). Three years is the maximum term for a preliminary permit. See FPA Section 5, 16 U.S.C. § 798.

[2] This motion to intervene was not opposed and was therefore granted automatically, pursuant to 18 CFR 385.214(c) (2001).

Docket # P-12178-000

term of the permit. These activities are required by section 4.38 of the Commission's regulations.[3] Mr. Vauthier alleges that Mr. William Taylor, now of Verdant Power, was formerly an employee of UEK Corporation, the previous permittee of a similar project at the same site,[4] and is using materials and knowledge developed by UEK. Mr. Vauthier suggests that we investigate Verdant Power's qualifications. The Commission has long held that it will not inquire at the preliminary permit stage into an applicant's legal or financial competence to construct the proposed project.[5]

The purpose of a preliminary permit is to maintain priority of application for a license during the term of the permit while the permittee conducts investigations and secures data necessary to determine the feasibility of the proposed project and, if the project is found to be feasible, prepares an acceptable development application. The permit confers no authority on the permittee to undertake construction of the proposed project or any part thereof,[6] or to occupy or use lands or other property of the United States or of any other entity or individual.

A permit is not transferable. The named permittee is the only party entitled to the priority of application for license afforded by this preliminary permit. In order to invoke permit-based priority in any subsequent licensing competition, the named permittee must file an application for license as the sole applicant, thereby evidencing its intent to be the sole licensee and to hold all proprietary rights necessary to construct, operate, and maintain the proposed project. Should any other parties intend to hold during the term of any license issued any of these proprietary rights necessary for project purposes, they must be included as joint applicants in any application for license filed. In such an instance, where parties other than the permittee are added as joint applicants for license, the joint application will not be eligible for any permit-based priority. See City of Fayetteville, 16 FERC ¶ 61,209 (1981).

Should the permittee file a development application, notice of the application will be published, and all interested persons and agencies will have an opportunity to intervene and to present their views concerning the project and the effects of its construction and operation.

[3] 18 CFR 4.38 (2001).

[4] 40 FERC ¶ 62,242 (1987).

[5] See Central Vermont Public Service Corporation, 10 FERC ¶ 61,132 (1980).

[6] Issuance of this preliminary permit is thus not a major federal action significantly affecting the quality of the human environment.

The Director orders:

(A) A preliminary permit is issued for this project to Verdant Power, LLC, for a period effective the first day of the month in which this permit is issued and ending either 36 months from the effective date or on the date that a development application submitted by the permittee has been accepted for filing, whichever occurs first.

(B) This permit is subject to the terms and conditions of Part I of the Federal Power Act and related regulations. The permit is also subject to Articles 1 through 4, set forth in the attached standard form P-1.

(C) This order is issued under authority delegated to the Director and constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days from the date of issuance of this order, pursuant to 18 C.F.R. 385.713.

Hossein Ildari
Division of Hydropower
Administration and Compliance

FEDERAL ENERGY REGULATORY COMMISSION

TERMS AND CONDITIONS OF PRELIMINARY PERMIT

Article 1. The purpose of the permit is to maintain priority of application for a license during the term of the permit while the permittee conducts investigations and secures data necessary to determine the feasibility of the proposed project and, if said project is found to be feasible, prepares an acceptable application for license. In the course of whatever field studies the Permittee undertakes, the Permittee shall at all times exercise appropriate measures to prevent irreparable damage to the environment of the proposed project. All test sites shall be restored as closely as possible to their original condition and to the satisfaction of the Commission's authorized representative or, where federal lands are affected, to the satisfaction of the agency administering such lands.

Article 2. The permit is not transferable and may, after notice and opportunity for hearing, be canceled by order of the Commission upon failure of the Permittee to prosecute diligently the activities for which a permit is issued, or for any other good cause shown.

Article 3. The priority granted under the permit shall be lost if the permit is canceled pursuant to Article 2 of this permit, or if the Permittee fails, on or before the expiration date of the permit, to file with the Commission an application for license for the proposed project in conformity with the Commission's rules and regulations then in effect.

Article 4. At the close of each six-month period from the effective date of this permit, the permittee shall file four copies of a progress report with the Secretary, Federal Energy Regulatory Commission, 888 First Street, N.E., Washington, D.C. 20426; and shall serve a copy on the intervenors in this proceeding. The report shall describe, for that report period, the nature and timing of what the permittee has done under the pre-filing requirements of 18 CFR 4.38 and other applicable regulations; and, where studies require access to and use of land not owned by the permittee, the status of the permittee's efforts to obtain permission therefor.

ROOSEVELT ISLAND OPERATING CORPORATION
of the State of New York
591 Main Street
Roosevelt Island, New York 10044
(212) 832-4540
www.rioc.com

George E. Pataki
Governor

Robert H. Ryan
President/Chief Operating Officer

July 10, 2002

Mr. Trey Taylor
Verdant Power
4640 13th Street, North
Arlington, VA 22207-2102

Dear Mr. Taylor:

As discussed, enclosed please find the following information regarding the Roosevelt Island shoreline, docks, water depths, etc.:

- Existing Conditions Section of "Roosevelt Island Seawall Study" prepared by the U.S. Army Corps. Of Engineers, dated June 2001.
- Hydrographic Maps and Pier and Bulkhead Lines drawings prepared by the City of New York Department of Public Works, Division of Engineering, dated August 1945.
- Drawings (29.01, 30.05 and 30.06) of the pier adjacent to the DEP site on the west side of Roosevelt Island, prepared by Langan Engineering and Environmental Services, as-built September 1997.
- Oil dock drawings prepared by Gibbs and Hill, dated August 1995.

If you have any questions or require additional information, please call me at (212) 832-4540, X324.

Sincerely,

Vincent F. Kopicki, P.E
Director of Engineering and Capital Projects

cc: File

4640 13th Street, North
Arlington, VA 22207-2102
Phone: 703-528-8445
Fax: 703-812-8157

FAX

To: John Melia, Vice President
Roosevelt Island Operating Corporation

From: Trey Taylor

Date: November 18, 2002

Re: Roosevelt Island Tidal Energy Project: Phase 1 – Temporary Mooring

Pages (including cover): 7

Note: Roger Bason of E3, Inc. asked that I fax to you copies of the insurance binder naming RIOC as a co-insured during Phase 1 of the Roosevelt Island Tidal Energy Project.

It is included with this fax. I also have included with this fax my letter of November 7 to Rob Ryan outlining the main elements of this first phase of the project. There have been some slight changes due to construction and testing delays:

- The Turbine Evaluation Vessel (TEV) will most likely be moved into position on the eastern channel of the East River on Saturday, November 23, and will remain there for approximately three weeks. It will be removed on or around Monday, December 16, if not sooner.

- Consequently, the two RVs would be moved from their current parking areas in RIOC's bus yard to under the Roosevelt Island Bridge's cork-screw drive on Thursday, November 21.

- Both RVs are self-contained, however, in order to minimize driving each on and off Roosevelt Island for servicing, I would like to explore with RIOC access to electrical and water (possibly phone?) hook-ups for which Verdant Power would gladly pay usage. The Company's engineers and E3 can work with yours in putting meters on the utilities that might be used.

Please do not hesitate to call either me at the number above or Roger Bason at 845-691-4008 if you have any questions or concerns. I look forward to working with you upon our arrival and can be reached during that time on my cell phone. That number is 703-731-9945.

I am most grateful for your support and help.

4640 13th Street, North
Arlington, VA 22207-2102
Phone: 703-528-6445
Fax: 703-812-8157

FAX

To: Brad Harlan
Roosevelt Island Operating Corporation

From: Trey Taylor

Date: November 19, 2002

Re: Roosevelt Island Tidal Energy (RITE) Project: Phase 1 – Demonstration

Pages (including cover): 9

Note: As discussed yesterday, included with this fax are the following supporting documents for issuance of a RIOC permit for Phase 1 of the RITE project during the periods from November 21 through December 16, 2002:

1) A Certificate of Liability Insurance (Policy No. PPS 41490617 & WC 41490641), naming as additional insureds, RIOC, the State of New York, and the City of New York from November 1, 2002 to November 1, 2003;

2) The U.S. Federal Energy Regulatory Commission (FERC) Preliminary Permit (Project No. 12178-000) to study the RITE project;

3) The New York State Energy Research and Development Authority (NYSERDA)'s letter announcing its acceptance of the Rite project – Phase 1 demonstration ([PON] No. 669-01) and its letter of contractual agreement for Phase 1 of the RITE Project (Agreement No. 7272);

4) The New York State Department of Environmental Conservation (NYSDEC), Division of Environmental Permits' letter of November 5, 2002 stating that "no permits under Article 15 of New York's Environmental Conservation Law or Article of New York's Navigation Law are required for the (RITE project) Phase 1 testing;"

5) The U.S. Coast Guard (USCG)'s letter of November 1 giving authorization "to anchor our 35ft by 25ft aluminium pontoon with turbine mast suspended underneath, near 40-45-36.7N 73-56-56.5W" – that is, between Roosevelt Island and Queensboro Bridges.

The USCG has verbally agreed to extend its authorization for anchoring through December 16. A letter stating this revision will be forth coming.

I look forward to working with you. Please let me know if there is any other information that you would need at this time.

4640 13th Street, North
Arlington, VA 22207-2102
Phone: 703-528-8446
Fax: 703-812-8157

FAX

To: Brad Harlan / Chris Baker

From: Trey Taylor

Date: December 23, 2002

Re: The Roosevelt Island Tidal Energy (RITE) Project – Phase I
Permit & Assistance beginning 12/26/02 thru 1/26/03

Pages (including cover): 1

Note:

In addition to the permit being issued, we would appreciate your help with the following:

- Guidance in parking two RVs under the corkscrew drive off of the Roosevelt Island Bridge on Thursday, December 26;
- Electrical hook-up for the two RVs;
- Water hook-up for the two RVs;
- Access to the pier/dock near the Queensboro Bridge (area is behind a locked gate);
- Permission to park a minimum of five cars near the RVs under the corkscrew drive off of the Roosevelt Island Bridge.

If at all possible, we would greatly appreciate being able to hook-up the RVs' utilities prior to Monday, January 6. That is, if the person meeting us on December 26 could point to the electrical outlets and the water faucets behind the metal doors under the corkscrew drive, then we could plug in our cords and screw in our hoses.

Given the skeletal staff on duty during the two-week holiday stretch, we know that this type of help may not be possible sooner than the 6th. If, indeed, that is the case then we are prepared to be self-sufficient for the week and half, until utility outlets can be provided.

Thanks again for your understanding and fine help!

4640 13th Street, North
Arlington, VA 22207-2102
Phone: 703-528-8445
Fax: 703-812-8157

July 27, 2002

Mr. Kent Sanders
Environmental Analyst
New York State Department of Environmental Conservation
Division of Environmental Permits
625 Broadway – 4th Floor
Albany, NY 12233-1750

Re: The Roosevelt Island Tidal Energy (RITE) Project – East River, NYC

Dear Mr. Sanders:

In reply to your request of July 26 for more information regarding the RITE Project, please find the following enclosed:

1) NYSERDA's letter of June 19, 2002 expressing its interest in further pursuing Verdant Power's proposal for Phase I demonstration funding of the RITE Project;
2) Verdant Power's application (without budget forms and appendices) of March 8, 2002 for support of the RITE Project's Phase I demonstration in the form of NYSERDA PON 669-01;
3) FERC's letter of June 12, 2002 announcing its acceptance for filing, as of May 30, 2002, Verdant Power's preliminary permit application for the RITE Project (Project No. 12178-000-NY);
4) Verdant Power's submission on May 23, 2002 to FERC for a preliminary permit for the RITE Site; and
5) A one-page description of the specific technology – an "unducted" free-flow, propeller fan turbine (with an attached illustration) – for the RITE Project's Phase I demonstration unit.

As explained, the ultimate field of free-flow turbines at the RITE Site could produce 10 MW. That objective could take up to five years to obtain and will occur over three phases. The first phase is to demonstrate a prototype model (pontoon-mounted, single turbine/generator) for testing; further site analysis; and to initiate the permitting process. The prototype is a scaled-down model (10-foot diameter turbine) that is expected to produce approximately 5 kW for a load box. As currently planned for Phase I, the model will be in the East River at Roosevelt Island for no more than three weeks, beginning sometime at the end of September or early October 2002.

Once an appropriate agreement with NYSERDA is reached and the work scheduled determined, we will provide you with the Phase I schedule. It will help us both determine what steps need to be taken for the RITE Project to be in NYSDEC compliance now and in preparation for Phase II.

Thank you for contacting us and please let me know if there is anything else you may need.

Sincerely yours,

Trey Taylor

William H. ("Trey") Taylor
President

Enclosures: five (5)

New York State Department of Environmental Conservation
Division of Legal Affairs, 14th Floor
625 Broadway, Albany, New York 12233-1500
Phone: (518) 402-9184 • **FAX:** (518) 402-9018
Website: www.dec.state.ny.us

Erin M. Crotty
Commissioner

July 30, 2002

The Honorable Magalie R. Salas
Secretary
Federal Energy Regulatory Commission
Room 1A East
888 First Street, N.E.
Washington, D.C. 20426

RE: PETITION FOR INTERVENTION
Roosevelt Island Tidal Energy Hydroelectric Project; FERC Project No. 12178-000

Dear Secretary Salas:

Enclosed via the Commission's electronic filing system is a revised petition for intervention in the above-referenced proceeding submitted on behalf of the New York State Department of Environmental Conservation. The petition is revised to include an additional contact person at the Department, to correct the spelling of one contact person's name, and to provide for service upon and submit a certificate of service for the Commission's official service list.

Very truly yours,

William G. Little
Associate Attorney

cc.: L. Kuwik, NYSDEC
K. Sanders, NYSDEC
M. Woythal, NYSDEC
S. Zahn, NYSDEC

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

In The Matter Of Roosevelt Island Tidal Energy Hydroelectric Project — FERC Project No. 12178-000

PETITION TO INTERVENE

Pursuant to Rule 214 of the Rules and Practice and Procedure [18 CFR Section 385.214], the New York State Department of Environmental Conservation [DEC] hereby petitions the Federal Energy Regulatory Commission for an order granting it party status in the above-captioned proceeding.

The name(s) of the person(s) to whom communication regarding this Petition should be addressed and upon whom service of all pleadings or other documents in this proceeding should be made is as follows:

William G. Little
Associate Attorney
Division of Legal Affairs
New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233-1500
Phone: (518) 402-9195

Kent Sanders
Project Manager
Division of Environmental Permits
New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233-1750
Phone: (518) 402-9173

Mark Woythal
In-Stream Habitat Protection Unit Leader
New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233-4756
Phone: 518-402-8847

Steven Zahn
Regional Natural Resources Supervisor
NYSDEC
Hunters Point Plaza
47-40 21st Street
Long Island City, NY11101
Phone: 718-482-6461

Federal Energy Regulatory Commission
Project No. 12178-000

Lenore Kuwik
Chief of Environmental Analysis
Division of Environmental Permits
New York State Department of
Environmental Conservation
625 Broadway
Albany, New York 12233-1750
Phone: (518) 402-9173

As grounds for its Petition to Intervene, DEC respectfully asserts:

1. Petitioner is a duly constituted Department of the Government of the State of New York, charged by law with administrative management of the State's fish, wildlife and water resources.

2. The proposed project will be located wholly within the State of New York and will impact the environment of the State.

3. As the agency of the State of New York responsible for administering the State's Environmental Conservation Law, Petitioner is the state agency most intimately involved with and responsible for analyzing environmental impacts. Petitioner's resources, expertise and familiarity with the locale of the proposed project will be of considerable assistance to the Commission during the course of the above captioned proceeding.

4. Petitioner is the agency for the State of New York charged by law to consider and, upon proper showing, to issue water quality certifications for hydropower facilities pursuant to Section 401 of the Clean Water Act [33 U.S.C. Section 1341].

5. No disruption to this proceeding will result from granting DEC party status.

6. DEC's interest is not adequately represented by any other party to this proceeding.

7. Existing parties will not be prejudiced by, nor will they sustain any additional burden by DEC becoming a party to this proceeding.

WHEREFORE, Petitioner respectfully requests that the Commission grant the New York State Department of Environmental Conservation full party status in this proceeding.

Respectfully submitted,

NEW YORK STATE DEPARTMENT OF
ENVIRONMENTAL CONSERVATION

William G. Little
Associate Attorney
New York State Department of
Environmental Conservation
625 Broadway
Albany, New York 12233-1500
Phone: (518) 402-9195

Dated: July 30, 2002
Albany, New York

Federal Energy Regulatory Commission
Project No. 12178-000

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list compiled in this proceeding by the Secretary to the Commission.

Respectfully submitted,

Lynne Coshun
Division of Legal Affairs
New York State Department of
Environmental Conservation
625 Broadway
Albany, NY 12233-1500
Phone: (518) 402-9188

Dated: July 30, 2002
Albany, New York

New York State Department of Environmental Conservation
Division of Environmental Permits, 4th Floor
625 Broadway, Albany, New York 12233-1750
Phone: (518) 402-9167 • **FAX:** (518) 402-9168
Website: www.dec.state.ny.us

Erin M. Crotty
Commissioner

August 2, 2002

The Honorable Magalie R Salas, Secretary
Federal Energy Regulatory Commission
888 First Street NE
Washington, DC 20426

RE: AGENCY COMMENTS on Preliminary Permit Application, Verdant Power, FERC Project # P-12178-000

Dear Secretary Salas:

The New York State Department of Environmental Conservation is the state agency responsible for the implementation of the Water Quality Certificate program under Section 401 of the Clean Water Act. This Department also administers the Protection of Waters Program under Article 15 of the New York State Environmental Conservation Law (ECL) and portions of the New York State Navigation Law.

This Department has no objection to the issuance of the preliminary permit to Verdant Power LLC. We do however have the following comments.

1. The Application for Preliminary Permit and other background information we have received from the applicant, envisions the placement in the East River of a prototype turbine for approximately 3 weeks. The application lacks sufficient detail as to location, anchoring, and the need for other infrastructure for us to determine exactly what permits will be required for the prototype deployment. However, permits under both the Navigation Law and Article 15 of the ECL are likely to be necessary for the in-stream testing. We strongly suggest that a pre-application meeting be held between the applicant and this Department to more accurately determine both the scope of the in water work associated with the prototype testing and what environmental permits will be required.

2. The applicant makes several statements not supported in the application as to the project being environmental benign and of its low impact on the marine environment. As the resource agency responsible for ensuring that the project meets state water quality standards, this Department is very concerned with the project's impacts on the marine environment, particularly with fish impingement issues and with its effects on the benthic habitats of the East River. Environmental studies and testing during the term of the preliminary permit will be necessary to determine the extent of these impacts and what mitigation efforts are appropriate.

This Department needs to be consulted in the design of these studies so that they can provide data useful in the permitting and design of the project.

3. There are additional State agencies such as the Department of State (Coastal Consistency Certification) and the Office of General Services (Leasing of Underwater Lands) that may have jurisdiction over either the in-stream testing or entire project. The applicant should contact these agencies directly to determine what additional requirements need to be met.

Thank you for the opportunity to comment in this matter.

Sincerely,

Kent P. Sanders
Environmental Analyst

cc: W. Taylor, Verdant Power
DEC Review Team

New York State Department of Environmental Conservation
Division of Environmental Permits, 4th Floor
625 Broadway, Albany, New York 12233-1750
Phone: (518) 402-9167 • FAX: (518) 402-9168
Website: www.dec.state.ny.us

Erin M. Crotty
Commissioner

November 5, 2002

Mr William Taylor
Verdant Power
4640 13th Street
Arlington, VA 22207-2102

Re: Required Permits, Phase I, Roosevelt Island Tidal Energy Project

Dear Mr. Taylor:

Thank you for your presentation concerning the Roosevelt Island Tidal Energy Project on November 1, 2002. Following our discussions I have also reviewed the October 31, 2002 letter of Roger Butturini of Verdant Power.

Based on our consultations, I have determined that no permits under Article 15 of New York's Environmental Conservation Law or Article of New York's Navigation Law are required for the Phase I testing as described in the October 31, 2002 letter. Should your plans for the testing of the prototype or its method of deployment change, then additional consultation as to the need for permits from this Department may be necessary.

As we discussed, the Phase II deployment of bottom mounted turbines will require Article 15 Permits. In addition, Phase II would include the development and completion of environmental studies to determine the potential impacts of the final project. These studies will provide the basis for any State Water Quality Certification necessary for obtaining the Federal License. Therefore this Department needs to be intimately involved with the design and development of environmental studies associated with Phase II.

I look forward to hearing from you in the near future to set up a staff level meeting to begin to work on these issues.

Sincerely

Kent P. Sanders
Environmental Analyst

cc: RITE Review Team

New York State Department of Environmental Conservation
Division of Environmental Permits, 4th Floor
625 Broadway, Albany, New York 12233-1750
Phone: (518) 402-9167 • FAX: (518) 402-9168
Website: www.dec.state.ny.us

Erin M. Crotty
Commissioner

March 18, 2003

MR TREY TAYLOR
VERDANT POWER
4640 13TH STREET NORTH
ARLINGTON VA 22207-2102

Dear Mr. Taylor:

This letter is to let you know that I will be retiring from State service at the end of this month. My last day of work will be March 28. Jack Nasca is assuming my energy project responsibilities in the Division of Environmental Permits - I am confident that you will enjoy working with him.

It has been my pleasure to work on energy projects and associated issues with you. You can be sure that I will be thinking of you as I scan the papers for news of power plants, transmission lines and the future of Article X!

After retirement, my husband and I will continue to reside at 64 Wisconsin Avenue in Delmar. If you would like to be in touch, I can be reached at my home address or by e-mail at lenorekuwik@hotmail.com.

Best regards,

Lenore Kuwik
Assistant Director

4640 13th Street, North
Arlington, VA 22207-2102
Phone: 703-528-8445
Fax: 703-812-8157

September 25, 2002

Lt. (jg) Anthony Paopao
Duty Officer
United States Coast Guard
212 Coast Guard Drive
Staten Island, New York 10305

Re: Roosevelt Island Tidal Energy Project – East River Support Platform

Dear Lt. Paopao:

Our company, Verdant Power LLC, seeks your office's support and clearance for a temporarily anchored, 35ft X 25ft, floating, pontoon-supported platform in the Eastern Channel of the East River, approximately 120 feet south of the Roosevelt Island Bridge and approximately 120 feet off the eastern shoreline of Roosevelt Island. The platform, a research vessel, will support a scale model (10-foot diameter), underwater turbine that is designed to operate from the tidal currents found in that location. We are planning to secure the platform to pre-set temporary anchors for a four-week duration beginning mid-November 2002.

This is the first phase of a three-phase, distributed generation project that has received support from the federal, New York State, and local governments. We have been issued a preliminary permit (No. 12178-000) by the U.S. Federal Energy Regulatory Commission for, what is called, the Roosevelt Island Tidal Energy (RITE) Project. The first phase of this project has received a New York State Energy Research and Development Authority (NYSERDA) grant award (Contract No. 7272). This award was announced by Governor Pataki's office in June 2002. The Project also has the support of the Roosevelt Island Operating Corporation.

We have included with this letter: 1) a hull plan for the research vessel, turbine support platform; 2) the names of key personnel and contact information that will be involved with Phase I of the Project; and 3) a description of the Scope of Work as outlined for NYSERDA. Task 4, "Prototype Deployment in the East River Site" of this Scope of Work, further describes the purpose of pontoon-supported platform. The first phase of this hydroelectric power project is to test and demonstrate the type of turbine to be later deployed, over a five year period, as a field of similar turbines at this site.

If you have any questions, then please contact me. I can be reached at the address or phone number above or by e-mail. That address is ttaylor@verdantpower.com.

Sincerely yours,

Trey Taylor
President

CC: Joe Sayer, NYSERDA, Project Manager; Roger Bason, E3, Inc. & Columbia University

Enclosures: Scope of Work; Key Personnel; Hull Plan

Exhibit B
Key Personnel & Contact Information

Contract 7272
Roosevelt Island Tidal Energy Phase I Demonstration Project

Name	Organization	Role	Phone No.	E-Mail
Ron Smith	Verdant Power	Project Manager	703-328-6842	rsmith@verdantpower.com
Roger Butturini	Verdant Power	Proj. Supervisor	703-863-6472	rbutturini@verdantpower.com
Trey Taylor	Verdant Power	Proj. Coord.	703-528-6445	ttaylor@verdantpower.com
Joe Sayer	NYSERDA	Sr. Proj. Mgr.	518-862-1090	jhs@nyserda.org
Richard Drake	NYSERDA	Program Mgr.	518-862-1090	rld@nyserda.org
Roger Bason	E3/Columbia U.	Proj. Liaison	845-691-4008	rb2071@columbia.edu
Ed Thorkildsen	Collins Engr.	Prof. Engr.	518-479-1430	ethorkildsen@collinsengr.com
Vincent Kopicki	RIOC	Prof. Engr.	212-832-4540	www.rioc.com
Richard Miles	FERC	Permit Support	202-502-8702	ferc.adr@ferc.gov
Kasha Helget	FERC	Permit Support	202-502-8559	ferc.adr@ferc.gov
John Lipscomb	Riverkeeper	River Support	914-806-6753	jlipscomb@riverkeeper.org

U.S. Department of Transportation
United States Coast Guard

Commander
Activities New York

212 Coast Guard Drive
Staten Island, NY 10305
Staff Symbol: (wob)
Phone: (718) 354-4188
FAX: (718) 354-4190

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NOV 1 2002

Verdant Power
Mr. Roger K. Butturini
4640 13th Street, North
Arlington, VA 22207-2102

Dear Mr. Butturini:

We have reviewed your request for the proposed hydrokinetic energy project in the east channel of the East River. You are authorized to anchor a 35ft by 25ft aluminum pontoon with turbine mast suspended underneath, near 40-45-36.7N 73-56-56.5W, from November 11 to November 27, 2002.

The aluminum pontoon must be: 1.) manned 24 hours per day, 2.) lighted in accordance with USCG Navigation Rules COMDTINST M16672.2D, and 3.) pontoon personnel must monitor marine radio VHF-FM channel 16 at all times. In addition, the aluminum pontoon along with turbine mast assembly must be moved out of the channel when two hours advance notice is given by the Coast Guard.

At this time, your request for the 25 yards safety zone around for the pontoon must be denied. However, we will issue a safety voice broadcast for that period of time.

If you have any questions or comments regarding this matter, please contact Ms. Judy Yee at (718) 354-4355.

Sincerely,

D. A. Ronan
Commander, U.S. Coast Guard
By direction of the
Captain of the Port, New York

4640 13th Street, North
Arlington, VA 22207-2102
Phone: 703-528-6445
Fax: 703-812-8157

11 February 2003

Commanding Officer
United States Coast Guard Activities New York
212 Coast Guard Drive
Staten Island, NY 10305

Dear Captain Bone:

I am writing to express our thanks for the assistance given by your Waterways Management Branch during our historic free-flow turbine demonstration in the East River between 31 December 2002 and 22 January 2003. In particular, LT Luis Martinez and Ms. Judy Leung-Yee demonstrated an outstanding appreciation for the challenges we faced and remarkable patience with us as our schedule constantly changed. They were willing to listen to our position on a number of sensitive issues, rather than engaging in direction, and were instrumental in helping ensure the safety of our personnel, our Turbine Evaluation Vessel, and other East River users by arranging for a safety broadcast during the period of our demonstration. In addition, seeing one of your patrol boats periodically motor by also helped us feel in good hands should an emergency arise.

In the end, our efforts to demonstrate electric power generation in the tidal current were supremely successful and suggest a promising future for development of a free-flow turbine field to supply power to Roosevelt Island. We appreciate all of your support and the professionalism demonstrated by your staff. We look forward to working with you again soon during the next phase of our project on the East River.

Best Regards,

Trey Taylor
President
Verdant Power, LLC

United States Department of the Interior

FISH AND WILDLIFE SERVICE
3817 Luker Road
Cortland, NY 13045

May 14, 2003

William H. Taylor, President
Verdant Power
4640 13th Street, North
Arlington, VA 22207-2101

RE: FERC Project No. 12178-000 New York
Roosevelt Island Tidal Energy Hydroelectric Project

Dear Mr. Taylor:

This letter is written to recommend that Verdant Power (Verdant) initiate consultation with the U.S. Fish and Wildlife Service (Service) regarding a proposed project in the East River on the east side of Roosevelt Island, New York County, NY. The Service's New York Field Office joined the April 24, 2003, Joint Permit Processing meeting, held at the U.S. Army Corps of Engineers' (Corps) office in New York City, via telephone conferencing. During the meeting, Verdant Power (Verdant) gave a brief presentation of its proposed project. Verdant advocated a "test as you go" approach to turbine and engineering evaluations. Participating agency representatives including the Corps, the U.S. Environmental Protection Agency, the U.S. Coast Guard, and the National Marine Fisheries Service, voiced their concern about the lack of detail regarding both project testing and final project design. In addition, project-related navigational and environmental issues were briefly discussed.

The project was issued a preliminary permit by the Federal Energy Regulatory Commission (FERC) which gave Verdant 3 years to file a license application. The Service's representative noted that no initial consultation document had been provided to the agencies as required by the FERC's regulations. In addition, a site visit and a public meeting are to be held to initiate agency consultation and determine necessary environmental studies.

The FERC's current regulations found in 18 CFR[1] allow an applicant to take either a traditional or alternative approach to project licensing. However, the involved agencies must agree to an alternative licensing approach, and this approach must be approved by the FERC. It should be noted that the FERC has an ongoing proposed rule making process which may modify some of the licensing requirements. The rule making process is expected to be completed this summer. In either event, potential license applicants will still need to provide the resource agencies with an initial consultation document to initiate project consultation related to necessary studies.

[1]Code of Federal Regulations.

Enclosed are pertinent sections of the FERC's April 2001 Hydroelectric Project Licensing Handbook which outlines consultation requirements.

Finally, we remind you of the FERC's December 27, 2002, letter to you which stated, " . . . you must submit an application to amend your preliminary permit if you plan to change the project as proposed in your initial application. Also, please be advised that your preliminary permit does not authorize construction of any project works." The Service looks forward to Verdant's initiation of project consultation. If you have further questions, please contact Dave Bryson of my staff at 607-753-9334.

Sincerely,

David A. Stilwell
Field Supervisor

Enclosures

cc:

Verdant Power, Arlington, VA (K. Lynch, R. Smith, D. Corren)
Kerns & West, Washington, DC (K. Kerns)
NYSDEC, Long Island City, NY (L. Vogel)
NYSDEC, Albany, NY (W. Little, K. Saunders, M. Woythal)
FERC, Washington, DC (M. Salas, M. Robinson, P. McGovern, A. Mushtaq)
USACE, New York, NY (M. Vissichelli, M. M. Helman)
USCG, Staten Island, NY (A Paopao, L. Martinez, E. Morton)
NMFS, Milford, CT (D. Rusanowsky, M. Ludwig)
USEPA, New York, NY (M. Paula)
FWS, Islip, NY

Verdant Power LLC
4640 13th Street, North
Arlington VA 22207

September 9, 2003

Monte Greges
US Army Corps of Engineers,
New York Region
Ph: 212-264-5620

Mr. Greges,

This letter follows up our conversation on Wednesday morning regarding our interest in work analyzing the river bottom of the east channel of the East River.

Verdant Power, in cooperation with the New York State Energy Research and Development Authority (NYSERDA), is in the process of executing a project to build and license an instream hydropower plant in the east channel of the East River next to Roosevelt Island.

The overall project is to install a 5-10 MW renewable energy "free flow" kinetic hydro underwater hydropower field to be completed over the next three to five years. A first phase on-site turbine system demonstration was conducted during January of this year. We are currently initiating the second phase to design, fabricate, deploy and operate a small, six-turbine, "water-to-wire" Kinetic Hydropower System (KHPS) demonstration underwater field at the site for six months. This is to complete all required environmental studies and permitting and licensing requirements relating to a potential follow-on Phase III build-out of the 5-10MW commercial underwater field.

We will need existing and available information on the riverbed area attached for two purposes. First, we will need any information related to the riverbed environment and other local environmental issues to support permitting and licensing for the proposed project. Secondly, and my current interest, is any work that has been done in the area to assess the geologic structure of the river bottom to identify the depth of bedrock throughout the area or in any subsection or points within the area. In particular, we need to know of any borings that have been done throughout the area. The assessment will support the potential use of mono-piles as mounting devices for the underwater turbines for the initial one to six turbines.

We would greatly appreciate your help in identifying any work and/or documentation that has been done in the area that you or your colleagues are aware of. Thank you very much for your assistance.

Very truly yours,

Ron Smith
Verdant Power LLC
Ph: 703-204-3436 Email: rsmith@verdantpower.com

P.S. Attached are three illustrations: a map of the entire 5-10MW commercial field in the East Channel of the East River; a map of the six-turbine demonstration field in the same site; and a cross-sectional map of the area where the small demonstration field will be deployed.

FERC License

Federal and State Resource Agencies
&
Community Meetings
(December 11, 2001 through September 12, 2003)

Types of Meetings

1. **Permitting/Licensing Regulatory Agency Introductory Meetings**
2. **RITE Project Planning/Operational Meetings**
3. **RITE Project Community Meetings**
4. **New York City and State Government and Political Leadership**
5. **Industry Support Informational Meetings**
6. **Industry Association Informational Meetings**
7. **Department of Energy Coordination Meetings**

AGENCY / ORGANIZATION	DATE
Riverkeeper (Capt. John Lipscomb) (2)	12-11-01
Columbia University (SIPA presentation) (2)	04-22-02
New York Power Authority (5) (Shalom Zelingher, Guy Sliker)	04-23-02
New York Power Authority (KHECS's files) (5)	06-29-02
Roosevelt Island Operating Corporation (2) (Robert Ryan, Robert Antonek, Vincent Kopicki)	07-08-02
National Hydropower Association (6) (Linda Church-Ciocci, David Tuft, Mark Stover)	07-12-02
Department of Energy / Idaho National Engineering & Environmental Laboratory / National Hydropower Association (7) (Peter Goldman, Dick Hunt, David Tuft)	08-01-02
Low Impact Hydropower Institute (Lydia Grimm) (6)	08-02-02
Federal Energy Regulatory Commission (1) (Richard Miles & Kasha Helget)	08-05-02
Federal Energy Regulatory Commission (1) (Chm. Pat Wood III & staff)	08-06-02
Federal Energy Regulatory Commission (1) (Richard Miles & others)	08-28-02
New York Power Authority (Keith Silliman) (5)	09-19-02

Resource Agencies & Community Meetings (page two of three)

AGENCY / ORGANIZATION	DATE
New York State Dept. of Environmental Conservation – Queens (1) (Kent Sanders, William Little, Alex Lechich)	10-03-02
Environmental Resources Trust (2) (Alexia Kelley, Alden Hathaway)	10-18-02
New York State Dept. of Environmental Conservation – Albany (1) (Kent Sanders, Lenore Kuwik, others & NYSERDA's Richard Drake)	11-01-02
Riverkeeper / Pisces Conservation (Dr. Peter Henderson) (2)	11-16-02
Federal Energy Regulatory Commission (1) (Tom DeWitt, Tom Dean, Ann Miles – Deputy Commissioner)	12-18-02
Roosevelt Island Operating Corporation (2) (Chris Baker, Harold Weinman, Robert Antonek)	12-26-02
Roosevelt Island Residents Association / Main Street WIRE / PS 217 (4) (Mathew Katz, Lee Edelman, Dick Lutz, sixth grade students, and many of their parents and teachers)	01-16/17-03
(Roosevelt Island [disseminated post cards describing the first phase of the three-phase RITE Project, signs were hanged on RV and TEV linking vehicles to post cards thus encouraging visitors to both] 12-26-02 thru 01-22-03)	
Columbia University (SIPA presentation) (2)	02-24-03
The Cooper Union College (Dr. Jameel Ahmad – Chairman, Research & Development Foundation) (2)	02-24-03
NYC Economic Development Corporation (Scott Butler) (4)	02-25-03
Department of Interior / US Fish & Wildlife Service (1) (Bill Bettenberg – Director of the Office of Policy Analysis, Malka Pattison, Robin Nims Elliott – Chief, Branch of Federal Activities Division of Habitat Conservation [USFWS])	03-04-03
Oak Ridge National Laboratory (6) (Mike Sale, Glenn Cada, Charles Coutant, Marilyn Brown)	03-10/11-03
NOAA / National Marine Fisheries Service (1) (Kerry Griffin and three others)	03-18-03
Department of Energy (Peter Goldman, Jim Ahlgrimm) (6)	03-18-03

Resource Agencies & Community Meetings (page three of three)

AGENCY / ORGANIZATION	DATE
U.S. Army Corps of Engineers / U.S. Environmental Protection Agency / NYSDEC / U.S. Coast Guard / U.S. Fish &Wildlife Service / NOAA – NMFS (1) (Mark Helman, Leigh Vogel, Drane Rusanowsky, Mike Vissichelli, Mario Paula, Anthony Paopao, Luis Martinez, Ernie Morton, Lorraine Silver, Dave ?)	04-24-03
Columbia University (SIPA presentation) (2)	05-12-03
U.S. Coast Guard (LtC. Ernie Morton) (1)	05-13-03
DOE Energy Information Administration (7) (Dr. Tom Petersik, Zia Haq, Chris Namovicz)	06-16-03
U.S. Hydropower Council for International Development (6) (Debby Stone)	07-10-03
New York City Community Board No. 8 (3)	07-17-03
Honorable Carolyn Maloney (D-NY) (4) (Jennifer Keaton, LA, and Chief of Staff)	07-22-03
RIOC / RIRA / Columbia University (3) (public town-hall meeting on Roosevelt Island)	07-22-03
The Cooper Union College (Dr. Jameel Ahmad) (2)	07-29-03
RIOC / RIRA / Columbia University (3) (public town-hall meetings on Roosevelt Island)	07-29/30-03
Long Island Power Authority (5) (Mark Dougherty, Daniel Zaweski)	07-30-03
NYC Mayor's Office of Environmental Coordination (4) (Bob Kulikowski, Jessica Lappin – Speaker Miller's Office, Karen Mahoney, Ual Hoepker, Edward Carey, Jon Dickinson)	08-07-03
American Council for Renewable Energy (5) (Jodie Roussell)	08-11-03
The Cooper Union College (Dr. Jameel Ahmad) (2)	09-04-03
New York State Office - Washington, DC (Carrie O'Hare) (4)	09-12-03