LONG ISLAND POWER AUTHORITY

EXHIBIT 3—ALTERNATIVES

PREPARED PURSUANT TO 16 NYCRR PART 86.4

A. INTRODUCTION

This exhibit addresses the requirements of 16 NYCRR § 86.4 which requires an application to include a description of any reasonable alternatives including routes for the facility and alternate technologies. The proposed project, Riverhead to Wildwood 138kV upgrade from 69kV, involves the replacement of insulators on existing steel poles with insulators of increased Basic Insulation Level (BIL) which are capable of supporting the higher voltage. Three new steel riser poles and an underground cable will be required at the Wildwood Substation to support the new termination facility. The length of the route is 10.6 miles and consists of approximately one hundred and seventy (170) steel poles.

The following sections discuss alternative routes for the transmission line as well as alternative technologies.

B. ALTERNATIVE ANALYSIS

ALTERNATIVE ROUTES AND CONSTRUCTION

Two alternative routes are addressed in this Exhibit. These alternative routes, although feasible from a construction standpoint, are expected to cause more public objections from an aesthetic and safety point of view. In addition, either alternative will be more costly than the proposed route. A large portion of the proposed route traverses farmland and only 30% of the proposed route is within sixty (60) to one-hundred(100) feet of residential and/or commercial properties. In contrast, the alternative routes would proceed through congested residential and commercial areas and would require the installation of many more new poles. The alternative routes offer an improvement in terms of maintenance and repair, since they are along public roads; however these alternative routes, would disrupt the community in terms of traffic, especially during construction as well as during routine maintenance. Aesthetics (i.e. taller poles) would also be an issue to the community. Permitting, therefore, may be problematic for the alternative routes. Most importantly there would be safety concerns as the new wood poles would have greater risk to accidents from vehicles and interference from the general public. Other alternative routes were evaluated along Country Road 58 (Old Country Road) and Mill Road. However these routes were expected to initiate serious objections by local municipalities based on LIPA's experience during the Riverhead to Tuthill Transmission Project. During this project, the Town of Riverhead had objections to the visual impact on the commercial establishments in Riverhead and permits were denied and/or delayed. The alternate routes, addressed in this Exhibit, avoids county roads based on this experience.

1. PROPOSED

The existing overhead transmission route consists of three (3) right of way segments. The entire LIPA right of way has been occupied by the 69kV pole line, which is planned for upgrade to 138kV operation, and an adjacent 138kV pole line, for a minimum of fifty (50) years. The segments are as follows:

Segment One (Town of Southampton & Town of Riverhead) – 1.8 miles:

Starting from LIPA's Riverhead Substation (which is located on the south side of NYS Route 25 east of Mill Road in the Town of Southampton), the circuit proceeds west for 0.8 miles on LIPA right of way. The circuit than proceeds north for one(1) mile, traversing over the Peconic River and Long Island Railroad right of way. The circuit continues north crossing NYS Route 25 (Middle Country Road) and Suffolk County Road 58 (Old Country Road). North of the Peconic River, the area is primarily commercial. See route drawings in Exhibit 5.

Segment Two (Town of Riverhead) - 6.0 miles:

The line proceeds west from the north side of Suffolk County Road 58 (Old Country Road), along a right of way, through farmland; roads cross include: Middle Road, Twomey Ave., Riley Ave., Edwards Ave., Fresh Pond Ave. and Hulse Landing Road (Country Road 54). See route drawings in Exhibit 5.

Segment Three (Town of Riverhead & Town of Brookhaven) – 2.8 miles:

The last portion of the right of way is near approximately 85 residential structures and approximately 10 commercial establishments. The closest structures vary from approximately sixty (60) to one-hundred(100) feet from the existing steel pole line. Roads traversed in this portion include: Sound Ave., North Country Rd., Overhill Rd., Dogwood Rd., Gateway Dr., and Randall Rd.. This portion is the west end of the circuit and is closest to the Wildwood Substation. The last three hundred feet will be an underground cable, just outside the Wildwood Substation fence on the south side of the property, into the ring bus termination equipment.

The description of this underground cable is as follows:

The cable will be a solid dielectric design with cross-linked polyethylene insulation rated at 138,000 volts AC (138kV). It will be constructed of 3947 kcm (2000 mm sq), copper conductor approximately 2.15 inches in diameter, having cross linked polyethylene insulation approximately 0.85 inches thick rated at 138 kV AC. A corrugated metallic sheath will surround the insulation to provide mechanical protection and prevent water migration into the cable. An outer polyethylene jacket will encase the metallic sheath. In all, each cable will measure approximately 5.6 inches in diameter.

The transmission line will consist of three cables. Each cable shall be installed within a 12 -inch high-density polyethylene ("HDPE") conduit starting from an overhead to underground transition structure consisting of three steel poles, 60 feet above grade, three single phase 138kV solid dielectric copper cables will be installed into a set of 3 – 12 inch HDPE conduits with a trefoil (triangular) configuration, buried nominally at 42 inches below-grade along the designated route.

The last 0.9 miles of this segment is within the Town of Brookhaven. See route drawings in Exhibit 5.

2. ALTERNATIVE 1 (OVERHEAD WITH TWO (2) UNDERGROUND CABLE DIPS):

This alternative route would entail overbuilding a 138kV transmission line above existing overhead distribution facilities. Approximately one-half of the existing distribution wood poles, along this route, would be replaced with taller transmission wood poles to support the new 138kV conductors. Two sections would require an underground cable dip (due to a conflict with an existing overhead transmission line and restrictions at Interstate Route 495). Total length is approximately 9.9 miles.

Segment One (approximately 2 miles)- from Riverhead Substation via NYS Route 25 & Interstate 495 (Towns of Riverhead and Southampton)

This segment would follow NYS Rte. 25 west from LIPA's Riverhead Substation (which is located on the south side of NYS Rte. 25 east of Mill Road in the Town of Southampton). The line would continue west on NYS Rte 25 – approximately two (2) miles to the area just west of Interstate Route 495. Existing distribution wood poles (which are primarily on the south side of NYS Rte. 25) would be replaced with taller transmission wood poles. Existing poles vary in height, from thirty (30) to forty (40) feet above grade; these poles would be replaced with taller poles with a higher strength rating. The new transmission poles would be twenty (20) to thirty (30) feet taller than the existing distribution poles. Not every distribution pole would need to be replaced. It is anticipated that every other pole would require replacement as the transmission conductors can typically traverse mid-span distribution poles.

Additional guy wire easements would be required to support the new transmission poles in critical areas where the conductors turn or where there is a significant line angle. It is estimated that four (4) new guy wire easements would be required from private property owners on this portion. Each new easement would need to be negotiated with the property owner. These easements would vary in size, but are typically six (6) feet wide by thirty(30) feet long. A sketch and a legal document would need to be prepared for each site and presented to each property owner for negotiation and signature. These guy wires are typically on front lawns which may cause opposition from the property owners.

Two (2) underground cable dips would be required on this portion. The first underground cable dip would be near Kroemer Avenue, which is approximately 1300 feet from the Riverhead Substation on NYS Route 25. The cable dip is required underneath the existing 138kV overhead circuit (circuit number designation is 138-890). The description of the cable size and type is similar to what is described above (see Segment Three of the proposed or existing route). The length of this underground section would be approximately five-hundred (500) feet. An underground cable is required because the only other way to traverse the existing conductors would be the application of an extremely tall pole (well over one-hundred feet), which would be aesthetically objectionable. In addition, LIPA prefers to avoid two overhead transmission circuits crossing at the same location due to reliability concerns (i.e. the possibility of losing two transmission circuits simultaneously if one should fail). This area is predominantly residential with some vacant land. The transition from overhead conductors to underground cable would be on three wood poles (one for each phase); each pole varying in height, approximately sixty, seventy and eighty feet above grade. A second underground cable would be needed under Interstate Route 495 (Long Island Expressway) near the intersection of NYS Route 25 and River Road, west to NYS Route 25 and Twomey Avenue . The length of this underground section would be approximately 3000 feet. The underground cable size, configuration and transition

would be similar to the 500 foot cable dip, near Kroemer Avenue, as described above. However, in this case, two(2) manholes would be required for cable splices, one approximately 1000 feet west of River Road, and another approximately 1000 feet east of Twomey Ave. The manholes would be fabricated from concrete and their size would be 18 feet (long) by 8 feet (wide) and 11 feet (deep). There are no existing overhead facilities in this area and it is anticipated that Federal, State, County and/or Town authorities would oppose the installation of a new overhead transmission line and road crossings.

Approximately forty-five (45) wood transmission poles would be required for this portion, most of which would require distribution attachments.

This alternate route, along this segment, has approximately 37 homes and 15 commercial establishments. These structures would be closer to the transmission facilities than on the existing, (proposed) route. On the existing, (proposed) route, the structures are 60' to 100' from the transmission line. On this alternate route, along this section, the transmission line would be 30' to 60' from the residential and commercial establishments. As such, it can be expected that the electric and magnetic fields generated by the transmission line, although low in value, will be higher than that on the proposed route.

Segment Two (approximately 5.6 miles) – via NYS Route 25 (near Interstate Route 495) to the intersection of NYS Route 25A & Sound Ave. (Town of Riverhead)

This part of the route continues west on NYS Route 25, just east of Interstate Route 495, from the point where the underground cable would transition back to overhead wire (near Twomey Ave. and NYS Route 25).

The existing distribution wood pole line is primarily on the south side of NYS Route 25; and the new transmission line would be determined by the location of the existing distribution facilities. It is preferable to overbuild on existing distribution poles so as to avoid possible community objections with the addition of a new wood pole line on the opposite side of the street. Similar to Segment One, it is anticipated every other distribution pole would be replaced with a taller and stronger transmission pole. New pole sizes would vary from seventy (70) to eighty (80) feet above grade (approximately twenty to thirty feet taller than existing poles).

The route would proceed north on Parker Road (aka NYS Rte 25A). The existing distribution facilities are on the west side of this road; the new transmission facilities would follow this pole line.

Approximately one-hundred and fifteen (115) new wood transmission poles would be required for this segment.

The surrounding environment on this portion consists mostly of residential properties (approximately 60 homes or farmland structures), and commercial establishments (approximately 22) and runs adjacent to Calverton National Cemetery property on Parker Road (aka NYS Rte 25A). The approximate distance from the line to the existing structures is sixty to seventy feet.

Segment Three (approximately 2.3 miles) – Via NYS Route 25A & Sound Avenue to Wildwood Substation (Town of Riverhead and Town of Brookhaven)

This piece continues west on NYS Route 25A to the driveway leading to what was the Shoreham Nuclear Power Station (SNPS) just west of Randall Road (also known as Lilco Road).

The transmission poles would replace existing distribution poles which are primarily on the south side of NYS Route 25A. A new wood pole line would be constructed on the LIPA right of way 500 feet west of Randall Road. This right of way proceeds 800 feet north to the Wildwood Substation. The last three hundred feet would be an underground cable, just outside the Wildwood Substation fence on the south side of the property, into the ring bus termination equipment. The transition from overhead conductors to underground cable would be on three steel poles (one for each phase); each pole varying in height, approximately sixty, seventy and eighty feet above grade.

The description, type and configuration of the underground cable would be similar to what is described on the proposed route (see Segment Three above).

There are approximately 34 residential homes and 24 commercial structures on NYS Route 25A along this segment. These structures are approximately fifty (50) to seventy (70) feet from the existing (proposed) line. As such, it can be expected that the electric and magnetic fields generated by the transmission line, although low in value, will be higher that of the proposed route.

It is anticipated four (4) or five (5) new guy wire easements on some front lawns or corner properties and approximately forty-five(45) new wood transmission poles would be required for this part.

The surrounding environment on this portion consists mostly of commercial and residential properties.

Positive aspects for Alternative 1:

a. The overall route is shorter by approximately 0.7 miles.
b. Accessibility for repairs/maintenance would be improved due to the fact that all the facilities are on State roads as opposed to remote right of way.

Negative aspects for Alternative 1:

a. Overbuilding transmission facilities on existing distribution wood pole lines may incite community opposition to the project. Several locations, especially along NYS Route 25 and NYS Route 25A are near residential homes and stores.
b. The integrity of the transmission line will be jeopardized due to the increase in possibility of hit poles which may trip out the line and create public safety concerns.
c. Ten (10) to fifteen (15) new guy wire easements would need to be negotiated with the property owners. Some guy wires may be intrusive to property owners as they will be on front lawns.
d. Even though the overall length of the route is slightly less than the existing route, the cost for this alternate route is expected to be more due to the additional pole installations, easements to be negotiated and acquired, additional underground cable dips and cost to transfer the distribution facilities.
e. Directional drilling under Interstate Route 495 is expected to be costly.
f. Exposure to electric and magnetic fields are expected to be greater than the existing route because there are more residential and commercial structures

along this alternate route and the structures would be closer (approximately 192 existing structures along the alternate route compared to approximately 114 structures along the proposed route).

g. Pre-mature abandonment of the existing steel pole line asset (built in 2002) will be cost prohibitive.

The alternate overhead route, as described above, is not recommended by LIPA.

3. ALTERNATIVE 2 (OVERHEAD AND UNDERGROUND - HYBRID):

This alternative route would entail overbuilding a 138kV transmission line above existing distribution facilities on Segment One and Two (same route as above). As to Segment Three, it would follow the same route as described under Alternative 1 except it would be entirely underground. This portion was chosen to be underground because this piece is closest to existing commercial and residential homes; and underground is generally considered to be more aesthetically acceptable.

An underground electric three-phase transmission line of approximate distance of 2.3 miles would utilize underground solid dielectric cable design with cross-linked polyethylene insulation rated at 138,000 volts AC (138kV). The solid dielectric cable would be constructed of 3947 kcm (2000 mm sq), copper conductor approximately 2.15 inches in diameter, having cross linked polyethylene insulation approximately 0.85 inches thick rated at 138 kV AC. A corrugated metallic sheath would surround the insulation to provide mechanical protection and prevent water migration into the cable. An outer polyethylene jacket would encase the metallic sheath. In all, each cable would measure approximately 5.6 inches in diameter.

The transmission line would consist of three cables. Each cable would be installed within a 12 - inch high-density polyethylene ("HDPE") conduit. The cable conduits would be installed in a set of three with a trefoil (triangular) configuration, buried nominally at 42 inches below-grade along the designated route. The cables would be spliced at manholes spaced approximately 1500 ft apart. At the Wildwood substation and at the location where the underground cable transitions to overhead wire, the cable would be terminated at a terminal structure. The terminal structures would be installed within a security fence that provides gated access for periodic maintenance.

Positive aspects for Alternative 2:

a. The overall route is shorter by approximately 0.7 miles.
b. Accessibility for repairs/maintenance would be improved due to the fact that all the facilities are on the road than on remote right of way.
c. The transmission facilities that run through the Villages of Wading River and East Shoreham, would be underground and create less of a visual impact than Alternative 1 (which would be an overhead installation).
d. Electric and magnetic fields are expected to be less on Segment Three than for Alternative Route 1 because this portion will be placed underground.

Negative aspects for Alternative 2:

a. Overbuilding transmission facilities on existing distribution wood pole lines may incite community opposition to the project (Segments 1 and 2).
b. Five (5) to ten(10) new guy easements on private property would be required (Segment 1 and 2) and will generate public opposition because they would be located on or near front lawns.
c. The integrity of the transmission line will be jeopardized due to the increase in possibility of hit poles and digging near the cable which may trip out the line and create public safety concerns.
d. Construction of the underground portion (Segment 3) will disrupt the community and commercial establishments along Route 25A (villages of Wading River and East Shoreham).
e. Premature abandonment of the existing transmission steel pole line asset (built in 2002) would be cost prohibitive.
f. More customers will be directly impacted during construction since there are more existing structures along this alternate route than on the proposed route (approximately 192 existing structures along the alternate route compared to approximately 114 structures along the proposed route).
g. Additional cost for undergrounding of Segment Three is expected to be costly.

The alternate overhead/underground route, as described above, is not recommended by LIPA.

C. ALTERNATIVE TECHNOLOGIES

This section discusses alternative technologies that were evaluated to determine if they could fulfill the energy requirements of the Project. The alternative technologies considered are:

No Action;
Generation;
Demand Side Management;
Underground transmission;
High voltage direct current (HVDC) technology; and
Alternative transmission voltages

1. NO ACTION

This action was rejected as it does not solve the thermal overloads or the potential outages in the East Brookhaven or East End LIPA system. This would require reliance on local (East End) generation and addition of load shedding to alleviate the potential overloads. Therefore, this option was deemed unacceptable.

2. GENERATION

This option consists of using generation to satisfy the level of demand so as to eliminate the need for the Project. As explained in Exhibit 13, East End currently has a generation capacity of approximately 97 MW. This generation, when in service, reduces the amount of power transmitted through East of Brookhaven into Riverhead substation. In addition, dispatching Shoreham generation units also slightly offloads the 138 kV circuits into Riverhead by pushing more power on the 69 kV circuit. However, by about 2013, the system will be at a point where the East End generation will be insufficient in preventing and alleviating thermal overloads on the Wildwood to Riverhead 138 kV circuit. While dispatching Shoreham units might enable the project to be postponed by no more than one year, the units are uneconomic and would not normally be dispatched during peak conditions. As noted in the Riverhead to Southampton Article VII Application (Exhibit 3-2), there is limited oil storage located on the South Fork, so additional generation would require the addition of a costly, new, natural gas pipeline to supply a new unit. In addition, East Brookhaven and East End areas have a considerable amount of land under preserve as well as strong residential opposition that would make installation of a new unit in those areas difficult.

3. DEMAND SIDE MANAGEMENT PROGRAMS

This option consists of using Demand Side Management (DSM) Programs including conservation to reduce the demands on the East End so as to eliminate the need for the Project. As noted in the original Riverhead to Southampton Article VII Application (Exhibit 3-3), this option is inadequate to meet the growing demands in the area. LIPA continues to implement DSM programs across its system that are helping to reduce system demands. The impacts of these programs are incorporated in LIPA's load forecast and although they reduce the demand, they do not eliminate the need for this Project. The following paragraphs discuss LIPA's current and proposed programs

As part of LIPA's energy efficiency and demand side management program (EE & DSM Program), LIPA has implemented the Clean Energy Initiative (CEI), LIPA *edge* and the Peak Reduction Program (PRP). The CEI, originally approved for a five-year period in 1999, has produced approximately 1,341 gigawatt hours (GWh) of energy savings and approximately 269 megawatts (MW) of peak demand savings through 2005. In 2004, LIPA extended the CEI for another five-year period and has committed $185 million in funding for that initiative. LIPA *edge* and PRP combined allow LIPA to control approximately 125 MW of electric demand during peak periods. Some of the elements of the programs include:

- Residential Lighting & Appliances Program: The program is designed to transform specific components of the residential lighting and appliance market through comprehensive and coordinated market intervention strategies. The program has about 2.5 million participants.
- Residential Cool Homes (HVAC) Program: The program encourages customers to purchase and install energy-efficient central air conditioning (CACs) and geothermal heat pumps by providing financial incentives to offset a portion of the equipment's higher initial cost. The

program's long-range goal is to encourage contractors to use energy efficiency as a marketing tool, thereby stocking and selling more efficient units and moving the entire CAC and heat pump market toward greater efficiency. The program has over 36,000 participants.

- Geothermal Projects: Geothermal systems use the energy stored in the earth to provide heating, cooling and hot water in both commercial and residential applications. The program has over 170 participants.
- Stay Cool Summer Campaign: LIPA in partnership with New York State Energy Research and Development Authority (NYSERDA) and New York Power Authority (NYPA) launched its Stay Cool Room Air Conditioner promotion in May 2007. The Stay Cool promotion is the successor to the previous year's Keep Cool Program. This modified program does not feature a rebate as in years past but rather focuses on educating consumers with tips to save energy during the summer.
- Residential Energy Affordability Partnership (REAP) Program: The program is dedicated to improving energy affordability for lower income households through the direct installation of a comprehensive set of cost-effective efficiency measures, extensive energy education and counseling. The program has over 26,000 participants.
- Customer-Driven Efficiency Program: The Customer Driven Efficiency Program provides assistance to both residential and commercial customers wishing to make energy efficiency improvements not covered in any of LIPA's other CEI programs. The program also provides technical, on-site energy analysis and audits to help commercial/industrial customers evaluate potential energy-saving opportunities. LIPA provides financial incentives for those opportunities shown to be cost effective.

In addition, the EE & DSM Program makes available a commercial/industrial audit report, which is used to identify savings, to verify/refute claims of savings from manufacturers, and to understand the energy bills. It has also been used as a bid document for construction projects seeking energy services contracts and setting budgets for capital projects. This program has over 2,600 participants.

Other available services include:

- Commercial Construction: The program promotes the application of a broad range of energy-efficient electric technologies and energy efficient designs. It is comprised of three components: Prescriptive, Custom and Comprehensive Whole Building Design. The program has over 2,800 participants.
- Solar Pioneer: LIPA's Solar Pioneer Program provides residential and commercial customers the opportunity to supplement their energy needs with clean, renewable solar power. The program has approximately 600 participants.
- NY Energy Star Homes: LIPA launched its Residential New Construction Program, New York ENERGY STAR® Labeled Homes in 2004. The program seeks to improve the energy efficiency of the residential new construction market. This program is a collaborative effort between LIPA and NYSERDA. The program has about 75 participants.

- Residential Information/Education Program: LIPA's Information & Education Program provides energy-saving information to customers through printed materials, advertising and marketing, a student component, an Energy Infoline, the LIPA Web site and energy audit services. LIPA's free Home Energy Audit, which is a big part of the program, helps customers analyze and lower their energy costs by answering a series of questions about their home and how it uses energy. "ENERGYsmart" is a CD-ROM-based program that lets customers perform their home energy audit quickly, simply and on-line.

Going forward, LIPA staff proposes to implement a new energy efficiency program in January 2009. The new program will succeed and expand upon LIPA's current energy efficiency program and contains new initiatives to promote even greater levels of energy efficiency for electric utilities within the State of New York. Since 1998, LIPA has provided a portfolio of energy efficiency programs to its customers through its CEI program, as summarized above. Since the authorization for CEI is expiring at the end of 2008, LIPA has been working on designing a successor program. The proposed program is highly cost-effective and shows the largest benefit of any capacity resource option LIPA has studied to date.

As designed, the program is comprised of five initiatives that separately target residential and commercial customers and address energy efficient products and buildings in both the existing and new construction markets. The five initiatives are:

- Efficient Products — purchases of lighting, appliances, consumer electronics and pool pumps by residential customers from retail outlets.
- ENERGY STAR Labeled Homes — includes building shell upgrades, Heating Ventilation Air Conditioning (HVAC), hot water, duct seals, lighting and high efficiency appliances.
- Existing Homes — duct sealing and tune-ups for central air conditioners, whole house retrofit assistance and installation services, REAP, and properly installed higher-than-code efficiency central air and heat pump equipment.
- C&I New Construction — targets all new buildings and major renovations.
- C&I Existing Buildings — addresses equipment purchases stemming from natural replacement at the end of useful life and retro-fits (discretionary replacement of functioning inefficient equipment).

The proposed program differs from CEI in its design and implementation. Whereas CEI focused mainly on new construction markets, the proposed program targets both new construction markets and the significant energy efficiency potential in existing homes and businesses.

In summary, LIPA is extensively involved in existing and proposed additional EE and DSM programs. These programs and their impacts are incorporated into LIPA's forecasted demands. To the extent that this reduces the rate of growth in LIPA's electric demand it allows LIPA to adjust the need dates of its system improvements. However, all of the efforts described above will not reduce demand in the load sufficiently to eliminate the need for the Project. LIPA's

programs are expected to reduce all of Long Island's growth in demand by about 100 MW by 2010. This is less than one-half of the capability of the Project's capacity of 227 MW. The estimated 100 MW reduction is based on the load in the entire LIPA service territory. EE and DSM program reductions that could be achieved in the East End and Brookhaven area will be well below the territory-wide 100 MW estimate. Accordingly, expected EE and DSM penetration for the area is unable to completely satisfy the need for the Project.

4. UNDERGROUND TRANSMISSION

Underground transmission lines are one of the traditional methods of expanding transmission capacity within utility service areas. Given that the poles and conductors are already in place with only insulators being in need of upgrade, construction of an underground cable is redundant and economically unfeasible. Moreover, an underground alternative would represent a major new construction project with associated impacts. LIPA believes that use of the existing overhead circuit for the entire route of this Project is supported, if not mandated, for both economic efficiency and environmental reasons. Upgrading of the existing overhead circuit for this Project results in virtually no environmental or land use impacts.

5. HIGH VOLTAGE DIRECT CURRENT (HVDC) DESIGN TECHNOLOGY

With respect to design technology, the use of high voltage direct current (HVDC) technology was considered. Use of HVDC technology is appropriate for connecting utility systems over long distances, where control of the power is required, where the control of electrical losses is important, or where there is a difference in operating frequency between power grids. HVDC technology requires converter stations, which are costly and require significant amounts of land for their placement. In the case of this Project, none of the typical justifications for use of HVDC exist because the circuit is to be connected and be part of an existing integrated AC system. Consequently, HVDC technology would not be warranted for this Application, and the more common alternating current technology would be most appropriate.

6. ALTERNATE TRANSMISSION VOLTAGES AND RE-CONDUCTORING

Lastly, alternative transmission voltages other than as proposed or re-conductoring is not really an option given the capacity needed to meet the anticipated overall eastern part of East Brookhaven and East End load growths. The existing Wildwood to Riverhead 69 kV circuit (circuit proposed to be upgraded under this Project) is already built with 1192 ACSR. This conductor has one of the highest ratings possible on an overhead transmission line; as a result, additional re-conductoring without major structural modifications (e.g., bundled conductor) is not possible. Use of 138 kV is compatible with the existing infrastructure at the two substations and is consistent with the future plans for the East Brookhaven transmission system. The Riverhead and Wildwood substations, to which the Project will interconnect, consist of transmission equipment operating at both 69 kV and 138 kV levels.

Addition of another overhead 69 kV line would be limited to approximately 170 MW of capacity, thus two circuits (the existing Wildwood to Riverhead 69 kV circuit and the new

circuit) would be required to provide approximately the same level of supply as the proposed Line Upgrade. This would increase the potential environmental impact since there is no room on the existing ROW, as well as add material and construction costs and line losses from the new circuit. By upgrading the 69 kV circuit into 138 kV operation, the proposed upgraded line will be able to transmit as much as 332 MW of power, which will be adequate to meet the anticipated demand in the East Brookhaven and East End.

In conclusion, given the ability to upgrade the existing Wildwood to Riverhead 69 kV circuit to 138 kV operation with minimal environmental and economic impact (as most of the poles are already in place) while satisfying the required capacity, the upgrade from a 69 kV to a 138 kV AC transmission line, is deemed the most appropriate technology to meet the needs of East Brookhaven and the East End.

D. ALTERNATIVE COST ISSUES

This section provides cost information regarding the alternative routes as well as alternative technologies. With respect to routes, LIPA's proposed transmission line, exclusive of substation upgrades and interconnection costs (see Exhibit 9), is estimated to cost approximately $6-8 million and will provide an additional performance benefit of approximately 150 MW. Using the median cost of $7 million, the unit cost is approximately $0.05 million/MW. The Alternate 1 is primarily overhead (with 2 underground dips) transmission route and is estimated to cost approximately $20-22 million and will provide an additional performance benefit of approximately 150 MW. Using the medium cost of $21 million, the unit cost is approximately $0.14 million/MW. The easements associated with Alternate 1, and included in the above-stated unit cost, are estimated to cost approximately $200K. The Alternate 2 is the same transmission route as Alternate 1 except the facility will be an underground/overhead hybrid with over 20% of the route being entirely underground. Alternate 2 is estimated to cost approximately $38-40 million and will provide an additional performance benefit of approximately 150 MW. Using the median cost of $39 million, the unit cost is approximately $0.26 million/MW. The easements associated with Alternate 2, and included in the above-stated unit cost, are estimated to cost approximately $100K.

With respect to alternative technologies alternative costs and MW supply were collected for generation, and demand side management options. Based on information being collected for LIPA's Energy Plan, LIPA estimated the typical capital cost for the following simple cycle peaking facilities:

- Dual LM6000s (79.9 MW), and
- LMS 100 (105 MW)

The cost data collected for the units above was for generic installations on Long Island and provide relative information of costs for comparison purposes only. Given the lack of gas supply and the expected difficulty in siting a new generating unit on the South Fork of Long Island, the actual costs, if a facility could somehow be sited, would be much higher.

Information on smaller scale generation projects were also developed and they include:

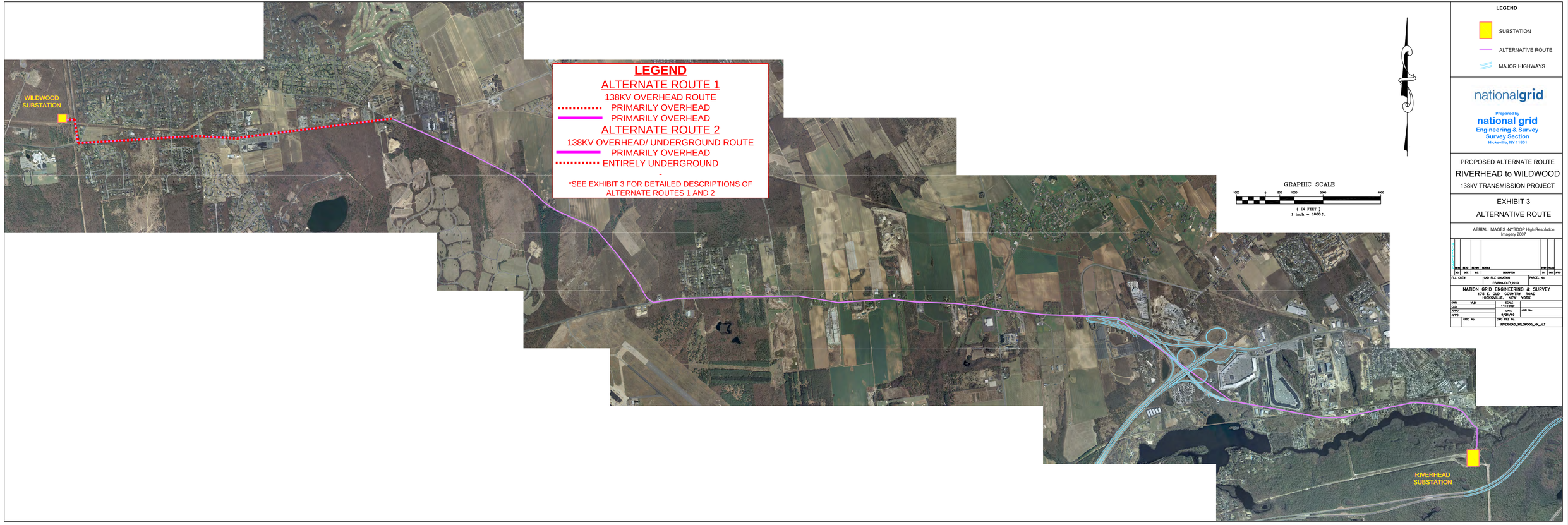
- Renewable resources (200 kW photovoltaic roof panel),
- Distributed generation (10 MW biodiesel combustion turbine)

With respect to demand side management a cost estimate based on LIPA's Clean Energy Initiative for the period 1999-2008 with a projected peak demand savings of 166 MW was developed.

The comparative costs for these alternates are summarized in Table 3.1.

Table 3.1
Comparison of Capital Costs
Millions per MW

Transmission and Route Options	
Proposed Route	$0.05
Alternate 1	$0.14
Alternate 2	$0.26
Technology Options	
Peaking Unit: LMS100	$0.98
Peaking Unit: Duel LM6000	$1.29
DSM: CEI Program	$2.14
Distributed Generation: Biodiesel	$2.82
Solar Photovoltaics	$9.06


WILDWOOD
SUBSTATION
LEGEND
ALTERNATE ROUTE 1
138KV OVERHEAD ROUTE
PRIMARILY OVERHEAD
PRIMARILY OVERHEAD
ALTERNATE ROUTE 2
138KV OVERHEAD/ UNDERGROUND ROUTE
PRIMARILY OVERHEAD
ENTIRELY UNDERGROUND
-
*SEE EXHIBIT 3 FOR DETAILED DESCRIPTIONS OF ALTERNATE ROUTES 1 AND 2
GRAPHIC SCALE
1000 0 500 1000 2000 4000
(IN FEET)
1 inch = 1000 ft.
RIVERHEAD
SUBSTATION
LEGEND
SUBSTATION
ALTERNATIVE ROUTE
MAJOR HIGHWAYS
nationalgrid
Prepared by
national grid
Engineering & Survey
Survey Section
Hicksville, NY 11801
PROPOSED ALTERNATE ROUTE
RIVERHEAD to WILDWOOD
138kV TRANSMISSION PROJECT
EXHIBIT 3
ALTERNATIVE ROUTE
AERIAL IMAGES-NYSDOP High Resolution Imagery 2007
NATION GRID ENGINEERING & SURVEY
175 E. OLD COUNTRY ROAD
HICKSVILLE, NEW YORK
DWN VLB
CKD
APVD
ATVD
SCALE 1"=1000'
DATE 9/21/10
JOB No.
GRID No.
DWG FILE No. RIVERHEAD_WILDWOOD_HR_ALT