FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE CATSKILL/DELAWARE UV FACILITY

4.17. ELECTRIC AND MAGNETIC FIELDS (EMF) AND EXTREMELY LOW FREQUENCY FIELDS (ELF) ANALYSIS

4.17.1. Introduction

Electric and Magnetic Fields (EMF) surround any electrical devices that carry an electrical charge and/or current. Electric fields exist near electric equipment or devices that carry an electrical current (e.g. outdoor power lines; trains and automobiles; household appliances; electric blankets and shavers; and cellular phones). They are present even when the equipment is turned off, as long as it remains connected to the source of electric power. Magnetic fields are emitted when electrical equipment is operated or the current is being transmitted. Magnetic fields can pass through most materials, while electric fields are easily shielded or weakened by conducting objects such as trees and buildings. Conducting materials also weaken magnetic fields, but not to the same degree as they do it to electric fields. The magnitude of both types of fields decreases with distance from their sources. Fields generated by electric current that is typically transmitted at 50 to 60 cycles per second are considered Extremely Low Frequency (ELF) fields.

The New York City Department of Environmental Protection (NYCDEP) has committed to design the proposed project so that there would be no discernable increase in EMF levels at sensitive nearby receptors. Therefore, an evaluation of electric and magnetic fields under existing and future conditions was conducted to identify potential impacts that could result from the proposed Catskill/Delaware Ultraviolet Light Disinfection Facility (UV Facility) project. Measurements were taken at the Eastview Site along the northern and eastern perimeters of the north parcel and along the potential feeder line locations that would run from the Consolidated Edison Company of New York (Con Edison) Grasslands Substation, which abuts the southeast corner of the north parcel, to the proposed UV Facility. The methodology used to prepare this analysis is presented in Section 3.17, Data Collection and Impact Methodologies, Electric and Magnetic Fields (EMF) and Extremely Low Frequency Fields (ELF) Analysis. To avoid this debate in the context of the proposed UV Facility site, NYCDEP has committed to design the proposed UV Facility so that there would be no discernable increase in EMF levels at sensitive nearby receptors.

4.17.2. Baseline Conditions

In order to properly evaluate electric and magnetic fields, point source and line source measurements were taken. Point sources are specific sources, such as stationary equipment, that emit magnetic and electric fields. Line sources, such as power lines, also emit magnetic and electric fields. The main difference between the two sources is the rate of decay of the magnetic fields they produce (detailed information is presented in Section 3.17, Data Collection and Impact Methodologies, EMF/ELF). Point source magnetic fields decrease inversely with the cube of the distance (1/(distance from the source)^3), while line source magnetic fields decrease inversely with the square of the distance (1/(distance from the source)^2).

While there are no official standards or guidelines, this analysis compares measured electric and magnetic field data to the general guidelines of the International Radiation Protection

Association (IRPA) general public limits and the New York State Right-of-Way (NYSROW) maximum guidelines for electric and magnetic fields.

4.17.2.1. Existing Conditions

Electric and magnetic field measurements were conducted in August 2001 along the northern border of the north parcel and in December 2002 along the proposed feeder route from the Grasslands Substation. Sampling locations E1 to E20 and EVF1 to EVF3 are indicated on Figure 4.17-1. Measurements for these locations are summarized in Table 4.17-1 and Table 4.17-3. Additional measurements were taken March 2004 at the Eastview Site along the north parcel's eastern boundary, next to the Westchester County Correctional Complex. The sampling locations are indicated as E21 to E30, and are indicated on Figure 4.17-1. The sampling locations along the approximate feeder line route, EVF4 to EVF6, are also indicated on Figure 4.17-1. Measurements for these locations are summarized in Table 4.17-2 and Table 4.17-4.

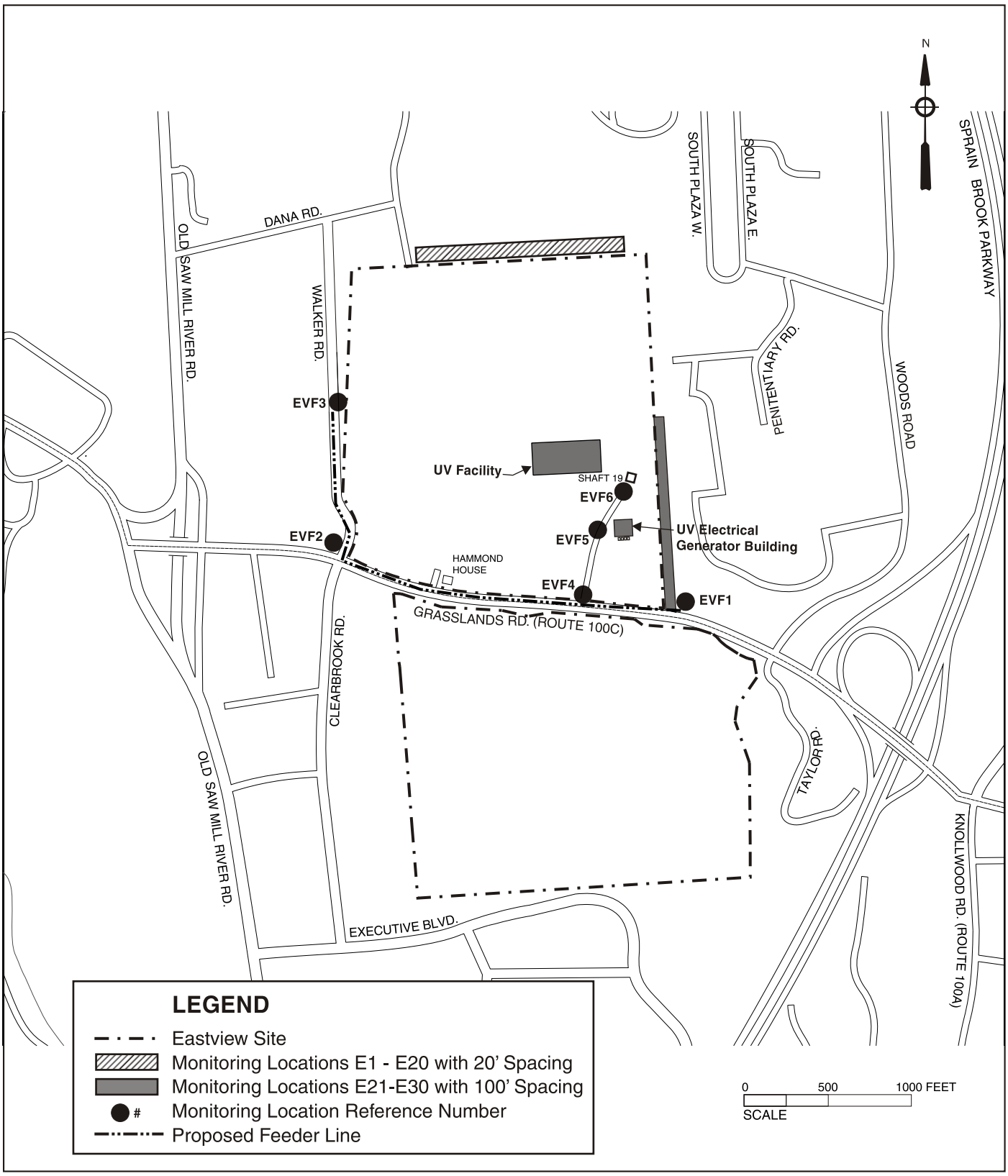
The electric and magnetic field measurements were performed at the Eastview Site using the Holaday meter, following procedures outlined in Section 3.17, Data Collection and Impact Methodologies, EMF/ELF.

The electric supply for the proposed facility would be provided from the Con Edison Grasslands Substation that abuts the southeast corner of the north parcel, via underground feeders using triplexed shield cables. Two feeders would run along the north side of Grasslands Road (Route 100C) and come into the site near the southeast corner of the north parcel. The feeders would run close to the generator building, then to the UV building. Con Edison would run their feeders near the limit of the Route 100C right-of-way. From there, the two feeder lines would run to and within the proposed UV Facility.

According to Con Edison's *Certificate of Environmental Compatibility and Public Need under Article VII Application of the New York State Public Service Law for the Grasslands Project, Westchester County, N.Y., September 2002*, the new substation would supply an anticipated growing demand in the central Westchester County area. The new substation would also supply new developments in the Grasslands Reservation. According to the Article VII Application, "the magnetic fields levels produced by the proposed underground cable circuit(s) at one meter above ground at all locations along the cable route, including directly above the cables, would not exceed relevant exposure guidelines." The new substation was significantly completed in 2004.

4.17.2.1.1. Point Sources

Electric field measurements taken from the points along the northern perimeter of the north parcel in August 2001 as presented in Table 4.17-1; these measurements range from 1.46 to 6.80 volts/meter (V/m). These values are well below the IRPA general public limit for electric field strength of 5,000 V/m. Likewise, they are below the NYSROW maximum guidelines for an electric field of 11,800 V/m.



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EMF/ELF Monitoring Locations at Eastview Site

Catskill/Delaware UV Facility

Figure 4.17-1

Magnetic field measurements taken along the northern perimeter of the Eastview Site are presented in Table 4.17-1; these measurements range from 0.000197 to 0.000204 Gauss. These values are well below the International Radiation Protection Association (IRPA) general public limit of 1.0 Gauss. The IRPA-issued interim standards for electric and magnetic field exposure limits for the general public in 1990 are based upon 1984 World Health Organization guidelines. In addition, New York State (NYS) uses informal guidelines to limit electric and magnetic field strengths along rights-of-way (ROW) for overhead power transmission lines. These guidelines have been designed to ensure that field levels around new transmission lines do not exceed those around the existing transmission lines. Currently, there are no existing guidelines specifically for underground distribution lines. The magnetic field data are well below the NYSROW maximum guideline for magnetic field strength of 0.2 Gauss.

TABLE 4.17-1. AUGUST 2001 EXISTING ELECTRIC AND MAGNETIC FIELD DATA

Sample Location	Holaday Magnetic Field Gauss	Holaday Electric Field Volts/Meter
E1	0.000197	5.40
E2	0.000201	1.46
E3	0.000201	6.00
E4	0.000201	6.20
E5	0.000201	5.00
E6	0.000203	4.70
E7	0.000200	5.70
E8	0.000199	5.20
E9	0.000202	4.70
E10	0.000200	4.90
E11	0.000201	5.80
E12	0.000201	4.90
E13	0.000202	5.70
E14	0.000203	5.60
E15	0.000200	6.80
E16	0.000204	5.60
E17	0.000201	5.40
E18	0.000200	5.70
E19	0.000202	5.50
E20	0.000199	6.20

Additional electric field measurements were taken from several points along the eastern perimeter (closest to the Westchester County Correctional Complex) of the north parcel of the Eastview Site in March 2004. The March 2004 electric field measurements are presented in Table 4.17-2; these measurements range from 1.35 to 6.45 volts/meter (V/m). As with the 2001 readings, these values are well below the IRPA general public limit for electric field strength of 5,000 V/m. Likewise, they are below the NYSROW maximum guidelines for an electric field of 11,800 V/m.

The magnetic field measurements for the eastern perimeter range from 0.00030 to 0.00107 Gauss. These values are well below the International Radiation Protection Association (IRPA) general public limit of 1.0 Gauss. The magnetic field data are also well below the NYSROW maximum guideline for magnetic field strength of 0.2 Gauss.

TABLE 4.17-2. MARCH 2004 EXISTING ELECTRIC AND MAGNETIC FIELD DATA

Sample Location	Holaday Magnetic Field Gauss	Holaday Electric Field Volts/Meter
E21	0.00032	2.07
E22	0.00031	1.35
E23	0.00039	1.50
E24	0.00031	1.37
E25	0.00030	1.40
E26	0.00085	1.41
E27	0.00084	1.72
E28	0.00107	2.03
E29	0.00060	6.04
E30	0.00092	6.45

4.17.2.1.2. Line Sources

In addition to the sampling locations along the perimeter of the Eastview Site, three points were chosen along the proposed feeder route from the Grasslands Substation to examine line sources. The sampling locations EVF1 to EVF3 (measurements taken in December 2002), are shown on Figure 4.17-1. Up to two 13.8-kV feeder lines would supply electrical power to the proposed facility. These feeders would be located below grade along Route 100C, and would enter the proposed facility from the south along a route near the existing Delaware Aqueduct Shaft No. 19 access road. The electric field measurements, taken from sampling locations EVF1 to EVF3, range from 1.48 to 11.50 V/m (Table 4.17-3). They are well below the IRPA general public limit for electric field strength of 5,000 V/m. Likewise, they are below the NYSROW maximum guidelines for an electric field of 11,800 V/m. Although the electric field measurement of EVF1 is higher than EVF2 & EVF3, it is still well below the IRPA general public limit. The increase in the EVF1 electric field measurement is due to the fact that the measurement was taken across the road from an existing transformer unit.

The magnetic field measured along the feeder route ranged from 0.00025 to 0.00281 Gauss (Table 4.17-3). These values are well below the IRPA general public limit of 1.0 Gauss and the NYSROW maximum guidelines for magnetic field strength of 0.2 Gauss.

TABLE 4.17-3. DECEMBER 2002 EXISTING ELECTRIC AND MAGNETIC FIELD DATA ALONG THE PROPOSED FEEDER ROUTE

Sample Location	Holaday Magnetic Field Gauss December 2002	Holaday Electric Field Volts/Meter December 2002
EVF1	0.00281	11.50
EVF2	0.00129	4.57
EVF3	0.00025	1.48

Along with the ten additional sampling locations, there were three line source points chosen at the Eastview Site; these points are shown in Figure 4.17-1. Measurements were taken at these points in March 2004. These line source points chosen start at the edge of the roadway to Shaft No. 19 and continue up the roadway to Shaft No. 19 in order to approximate the path of the feeder line for the UV Facility. The sampling locations EVF4 to EVF6 are shown on Figure 4.17-1. Up to two 13.8-kV feeder lines would supply electrical power to the proposed UV Facility. The two (2) feeders would be located below grade along the north side of Route 100C and would enter the site near the southeast corner of the north parcel. The three points chosen along the proposed feeder route from the Grasslands substation were also used to collect electric field measurements. The electric field measured along the feeder route ranged from 1.62 to 4.46 V/m (Table 4.17-4). They are well below the IRPA general public limit for electric field strength of 5,000 V/m. Likewise, they are below the NYSROW maximum guidelines for an electric field of 11,800 V/m.

The magnetic field measurements range from 0.00023 to 0.00109 Gauss (Table 4.17-4). These values are well below the IRPA general public limit of 1.0 Gauss and the NYSROW maximum guidelines for magnetic field strength of 0.2 Gauss.

TABLE 4.17-4. MARCH 2004 EXISTING ELECTRIC AND MAGNETIC FIELD DATA

Sample Location	Holaday Magnetic Field Gauss March 2004	Holaday Electric Field Volts/Meter March 2004
EVF4	0.00109	1.62
EVF5	0.00025	1.33
EVF6	0.00023	4.46

4.17.2.2. Future Without the Project

The Future Without the Project considers the anticipated peak year of construction (2008) and the first full year of operation (2010) for the proposed facility.

For each year, two scenarios were assessed: one in which the NYCDEP Croton Water Treatment Plant project (Croton project) is not located on the Eastview Site and another in which the Croton project is located on the site, specifically in the northwest corner of the north parcel. By the peak construction year (2008), two additional NYCDEP projects could be located on the Eastview Site, namely a Police Precinct and an Administration/Laboratory Building. The Police Precinct project has been approved by the Town of Mount Pleasant and will be located in the southwest corner of the north parcel. The location of the Administration/Laboratory Building is less certain, however, as the Eastview Site is one of several properties currently being evaluated as a possible site, and no siting decision has been made. In addition to these projects, NYCDEP's Kensico-City Tunnel may be under construction at the Eastview Site starting in 2009. Therefore, the 2010 analysis year considers the possibility of this project.

4.17.2.2.1. Without Croton Project at Eastview Site

In the Future Without the Project, it is anticipated that the Eastview Site and study area would undergo several changes from its existing conditions. However, with the proposed changes, the EMF background values are not anticipated to change significantly from the existing baseline conditions. The NYCDEP projects could anticipate increases in EMF and ELF levels from existing conditions, although these levels are not anticipated to exceed the guidelines and standards presented in Section 3.17, Data Collection and Impact Methodologies, EMF/ELF, and as summarized above.

4.17.2.2.2. With Croton Project at Eastview Site

By the anticipated peak year of construction and if the Croton project were located at the Eastview Site, the project would be under construction. Construction activities associated with the Croton project would require a number of 1,500-kVA diesel generators to be available on a temporary basis for use in a localized construction area (i.e., to provide power to an emergency escape elevator or for dewatering of water from deep excavation). The temporary generators would be located inside the electrical substation area, and the conducting material and distances between these sources and the closest public access would weaken the electrical field. Any increases in electric field levels would therefore be null because of the shielding and also the rapid decrease in field strength from the electrical source.

In addition, four temporary feeders (three online, one backup), each supplying 2,500 kVA, would be provided by Con Edison to supply power during the construction period for the Croton Project. The temporary feeders would originate from the Grasslands Substation southeast of the construction site. The temporary feeders (total 7,500-kVA) source magnetic field strength is anticipated to be less than 0.0035 Gauss based on an estimated magnetic field strength of the larger projected proposed feeders. The distribution feeders would provide electrical power to a temporary on-site substation. These feeders would be buried underground and where

appropriate, would be enclosed in steel conduits that would shield electric and magnetic fields. These feeders would be triplex-shielded cables installed within rigid steel conduits where appropriate. The triplex-shielded cables would adsorb the electric fields emitted from the four feeders and prevent public exposure to the line sources. Any increases in electric field levels would be null because of shielding and/or the rapid decreases in field strength from the electrical source. The four temporary feeders would each be made of three conductors, and these conductors would each produce magnetic fields. In each feeder, the magnetic fields of its conductors would cancel each other out. Therefore, the magnetic fields at maximum operating conditions would have a negligible increase on the existing magnetic field. The contribution of the Croton project temporary substation and feeders to the line source magnetic and electric field are anticipated to be negligible.

By 2010, if the Croton project were located at the Eastview Site, it would serve as a point and line source of electrical and magnetic fields. Design parameters would be incorporated to shield and weaken the electric and magnetic fields by introducing materials and distances between these sources and the closest public access. Within the plant, all major electrical equipment would be located indoors in dedicated electrical rooms. Line sources from the Croton project to the electrical power source (Grasslands Substation) would not create any measurable increases in the electric and magnetic field levels surrounding the plant. The other NYCDEP projects could generate increases in EMF and ELF levels from existing conditions, although these levels would likely not exceed the guidelines and standards presented in Section 3.17, Data Collection and Impact Methodologies, EMF/ELF, and as summarized above.

4.17.3. Potential Impacts

4.17.3.1. Potential Project Impacts

Two scenarios from which to assess the proposed facility's potential impacts have been considered. Both include the proposed NYCDEP Police Precinct, Administration/Laboratory Building, and KCT projects[1], but only one scenario includes the Croton project. The Croton project could be developed in the Town of Mount Pleasant as well, depending on the outcome of the legal challenges to the preferred Mosholu Site. Should the Mosholu Site be determined not to be viable, the Croton project would move forward at the Eastview Site. If this occurs, both the Croton project and the proposed UV Facility would be under construction at the same time.

4.17.3.1.1. Without Croton Project at Eastview Site

There would be two principal sources of electrical and magnetic fields anticipated at the proposed UV Facility: point sources and line sources. The point sources would include the electrical equipment that operates within and/or around the proposed facility (i.e., main disinfection building and Electrical/Generator building). The line sources would include the

[1] In addition, both scenarios would include a qualitative assessment of effects during construction and operation of the proposed UV Facility if the proposed Administration/Laboratory Building is located on the Eastview Site. This project is separate from and independent of the proposed UV Facility and would be evaluated as part of an independent environmental review.

feeder lines that bring power to the proposed facility. In addition, the other NYCDEP projects could anticipate increases in EMF and ELF levels from existing conditions, although these levels are not anticipated to exceed the guidelines and standards presented in Section 3.17, Data Collection and Impact Methodologies, EMF/ELF, and as summarized above.

Point Sources. Since the electrical equipment would be located several hundred feet away from the nearest receptor locations (i.e. property lines), there would be no significant increase above existing magnetic field levels. In addition, all electrical equipment would be housed within an enclosed building, which would further attenuate the magnetic field levels.

Two main isolation transformers would be provided on the incoming utility lines from the Con Edison Grasslands substation. The two 10,000-KVA pad-mounted isolation transformers would be installed in a fenced in area directly adjacent to the Electrical/Generator Building for the incoming utility feeders from Con Edison.. Although magnetic fields near the transformer have the highest magnetic field strength, their small structures allow the field strength to diminish rapidly with distance, as it does from any point source. For this reason, having a transformer located near the proposed facility would not be a major source of concern to the operators on-site or to visitors. In addition to the distance between the potential point sources and the sensitive receptors, all major electrical equipment would be located indoors in dedicated electrical rooms. The Electrical/Generator Building is not intended to be accessible to the general public and would be located to the south of the South Forebay on the proposed UV Facility site.

The Electrical/Generator Building would house the main 13.8kV utility switchgear, 13.8kV generator paralleling switchgear, and 480V distribution equipment (motor control centers, etc. for equipment within the Electrical/Generator Building). Within the main UV disinfection building, equipment would all be located in two main electrical rooms. Electrical rooms would be similar in size and have similar amount and types of equipment. Each electrical room would contain two unit substations that would step the voltage from 13.8kV down to 480V for distribution within the facility. Each substation would provide electrical power for one of the UV quadrants. The substations would consist of fused primary switches, step down transformers, and low voltage draw-out switchgear. Additionally, 480V motor control centers would be housed in the electrical room to supply power to building equipment loads. 13.8kV feeders would run from Electrical/Generator Building to the proposed UV Facility in underground duct banks. A maximum of two service conduits plus a spare conduit would be provided in each duct bank. Two duct banks would be required, and they would be at least 20 feet apart as required by Con Edison. Con Edison would use triplex-shielded cable for underground feeders from their substation to the property line manholes. Conduits for underground feeders would be steel encased in concrete.

Magnetic field levels were measured at two existing New York City-owned facilities, the Wards Island and North River Water Pollution Control Plants (WPCP). These two plants house electrical equipment similar to the proposed electrical equipment to be selected for the proposed facility. Measurements were taken at varying distances from the equipment to determine how the magnetic fields would decrease with distance based on the inverse cube relationship. The maximum magnetic fields and measurement distances from each type of equipment at the two WPCPs are presented below in Table 4.17-5. These maximum magnetic fields (in Gauss) were

used to estimate the magnetic fields strength from the point sources at the proposed facility, shown in Table 4.17-6.

TABLE 4.17-5. COMPARISON OF MAGNETIC FIELD LEVELS FROM POINT SOURCES IN THE EXISTING WPCPs TO THE PROPOSED UV FACILITY

UV Facility Equipment	Measurement Distance from Equipment (ft)	Potential Max. Magnetic Field Strength (Gauss) [1]	IRPA Guidance Limit (Gauss)
13.8 kV Switchgear[2]	1.6	0.0156	1.0
Transformer 10,000 KVA[2]	1.6	0.0725	1.0
Transformer 1,500 kVA[3]	1.6	<0.0725	1.0

Notes:
1. Maximum magnetic field measured at either Wards Island or North River WPCP
2. 13.8kV switchgear located within the Electrical Substation Building
3. Transformer located within the UV Building
kV = kilo-Volt

According to the estimated magnetic fields shown in Table 4.17-5, the proposed UV Facility would have negligible effects on the existing magnetic fields. The maximum magnetic field strength would potentially increase by less than 0.0001 Gauss; the estimated strengths would be well below the IRPA general public limit of 1.0 Gauss.

Extrapolating from the actual measured background magnetic field strengths and using the previously discussed decay equation, point sources would not create any measurable increases in the magnetic field levels surrounding the proposed facility. Since the electrical equipment is located several hundred feet away from the nearest receptor locations (i.e. property lines), there would be no significant increase above existing magnetic field levels. In addition, all electrical equipment would be housed within the proposed UV Facility, which would further attenuate the magnetic field levels.

TABLE 4.17-6. ESTIMATED MAGNETIC FIELD LEVELS FROM POINT SOURCES IN THE PROPOSED UV FACILITY

UV Facility Equipment	Estimated Distance to Nearest Receptor Location (ft) [1]	Estimated Potential Increase Magnetic Field Strength (Gauss) [2]	IRPA Guidance Limit (Gauss)
13.8 kV Switchgear	332	$< 1x10^{-4}$	1.0
Transformer (10,000 kVA)	332	$< 1x10^{-4}$	1.0
Transformer (7,500 kVA)	435	$< 1x10^{-4}$	1.0

Notes:
1. Distance to nearest receptor location from similar equipment planned in the proposed facility. The nearest receptor location would be the Westchester County Correctional Complex.
2. Estimated EMF strength derived from $[X_1 \times (d_1/d_2)^3]$, where X_1 = Max. Magnetic Field measured at WPCPs (Table 4.17-5), d1 = distance (m) to the receptor from a point source at WPCPs, and d_2 = distance (m) to the receptor from a point source at the proposed facility.

Although magnetic fields near the transformer presented in Table 4.17-6 have the highest magnetic field strength, their small structures allow the field strength to diminish rapidly with distance, as it does from any point source. For this reason, having a transformer located near the proposed facility would not be a major source of concern to the operators on-site or to visitors. In addition to the distance between the potential point sources and the receptor, all major electrical equipment would be located indoors in dedicated electrical rooms. Therefore, no significant adverse impacts are anticipated from electric fields.

Emergency power would be provided by diesel generators to operate automatically whenever all Con Edison service is interrupted. Diesel engine-driven generators are recommended because of the reliability of diesel engines. A piped natural gas source is not considered sufficiently reliable as a source of fuel for emergency power facilities. Units would be sized to supply the load required for operation under maximum day flow conditions. The generator room would house four (4) 1,750kW diesel engine generators that would supply standby power (full plant capacity) in the event of a power interruption from the utility. The emergency generators would be used only in case both Con Edison feeders are out of service, and during the one-hour monthly exercising utilizing an on-site load bank. Upon loss of Con Edison power, all generators would start simultaneously, synchronize to the generator switchgear bus, and then tie in to 15 kV distribution switchgear. Emergency power would be used for smoke purging, alarms, communications, UV systems, and other emergency equipment in case of fire or other emergency conditions. The emergency generation facility would have a service interruption duration of 24 hours. The UV system, service water system, fire protection system, emergency lighting, ventilation, and sump pumps must be operable at all times. Additionally, emergency lighting systems would be provided as a life safety measure to provide emergency lighting until the generators are brought online or the utility power is restored. For maximum reliability, the emergency generators would not rely on external systems for their cooling and fuel systems. The generators would have unit-mounted radiators and radiator fan exhausting through sound-attenuated louvers. Individual day tanks with a built-in fuel pump would be included to transfer fuel from dedicated fuel storage tanks. The storage tanks would have capacity for at least 24 hours of continuous full-load operation, and would be installed on-site, above ground, with dike, leak detection, fire alarm, and level measurement. Since the emergency generators would be located inside the building, electric fields would be shielded and weakened by conducting material between the sources and the closest public access area. Therefore no significant impacts from magnetic and electrical fields are anticipated from this facility.

The proposed UV Facility would also contain dedicated rooms for the uninterruptible power supply (UPS) and their associated battery systems. The UPSs are being supplied to provide continuous, uninterrupted power to the UV modules. They would enable the UV lamps to operate uninterrupted during utility system disturbances, and would maintain the UV lamps during the time it takes for the standby generators to automatically start and power the distribution system in the event of a utility failure. All of the electrical equipment in the proposed UV facility would be installed in dedicated electrical or UPS/battery rooms within the facility.

Line Sources. The Con Edison Grasslands substation, abutting the north parcel at the southeastern corner, would supply power to the proposed facility. Con Edison would supply two

13.8 kV underground feeders from the Grasslands Substation to the City's property line. Con Edison's responsibility would terminate at the property line and it would be the responsibility of NYCDEP contractors to continue the underground service feeders to the main substation in the electrical building, which functions as the main electrical distribution center for the proposed UV Facility and other structures on the Eastview Site. It is anticipated that the underground feeders would run north near the existing Shaft No. 19 access road to the proposed Electrical/Generator Building. The underground feeders would be triplex-shielded cables installed within rigid steel conduits, where appropriate. The triplex-shielded cables would adsorb the electrical fields emitted from the 13.8 kV feeders and prevent public exposure to lines sources related to the proposed facility. Any increases in electrical field levels would be null because of shielding and/or rapid decrease in field strength from the electrical source.

The service feeders would be located underground in concrete-encased steel conduits. The magnetic fields generated by the currents in the conductors within the service feeders would cancel each other out. Therefore, the magnetic fields at maximum operating condition would have a negligible increase on the existing magnetic field.

To calculate the projected magnetic field strength from underground feeders associated with the proposed facility, additional field measurements were taken at the Wards Island and North River WPCPs. Since the proposed facility would use 13.8-kV feeders, similar to those already existing at the two WPCPs, the field measurements at the WPCPs are considered representative of field measurements that would occur at the proposed facility. To be conservative, the maximum magnetic field readings at the WPCPs of 0.002 Gauss for Holaday meter at a distance of 2.0 meters away from sources was used to predict magnetic field levels for the proposed facility. Using the formula in Note 3 of Table 4.17-7, the projected magnetic fields strengths for the proposed facility were derived from the measured magnetic fields from North River WPCP and from the values of the proposed route from the Grasslands substation.

Table 4.17-7 shows on a quantitative basis that the magnetic field strength from line sources from the proposed facility would not increase significantly. The Holaday calculations show that the field strength from line sources would range from 0.0020 to 0.0023 Gauss. The calculation shows on a quantitative basis that the magnetic field strength from line sources for the proposed facility would increase but would remain well below the IRPA standard of 1.0 Gauss; therefore, no significant impacts are anticipated from the magnetic fields.

Table 4.17-7. ESTIMATION OF PROPOSED UV FACILITY LINE SOURCE MAGNETIC FIELD STRENGTH

Sample Location [1]	Existing Conditions Magnetic Field (Gauss) [2]	Potential Magnetic Field Strength During Operation (Gauss) [3]	IRPA Guidance Limit (Gauss)
EVF4	0.00109	0.0023	1.0
EVF5	0.00025	0.0020	1.0
EVF6	0.00023	0.0021	1.0

Notes:
1. Sampling locations along the proposed route from the Grasslands substation.
2. Existing conditions for magnetic field measurements were performed in March 2004 along the proposed route from the Grasslands substation (see Table 4.17-4).
3. Projected magnetic field strength from the WPCPs was calculated using the formula $x_1(d_1/d_2)^2=x_2$. Then, $[(x_2)^2+(x_3)^2]^{½}$ was used, where x_1=0.002 Gauss for Holaday meter, d_1=2.0 m (distance from feeder at the North River WPCP), d_2=2.0 m (distance from feeder at the proposed facility), and x_3=existing conditions value above.

The electric and magnetic fields potential project impacts are insignificant individually, as discussed above. The magnetic fields generated would be calculated by multiplying the new magnetic field level calculated for the EVF4 sampling location by two (the maximum number of feeder lines). The two feeder lines would cumulatively emit a magnetic field of 0.0046 Gauss, still an insignificant exposure. The potential electric and magnetic fields from the operation of the proposed facility are insignificant as discussed above. The projected results discussed above, would be well below the IRPA general public limit of 1.0 Gauss. However, the following features would generally be incorporated in the design to ensure that the prospective electric and magnetic fields would be minimized further:

- Providing the remote control/monitoring for personnel to minimize time in electrical equipment rooms.
- Specifying equipment that has negligible harmonic voltages and currents and providing tuned harmonic filters (to prevent/minimize harmonic fields).
- Using computer monitors designed for low magnetic field emissions and active power line conditioners for groups of computers.
- Balancing of electrical systems, as much as possible, such that fields would cancel each other or the residual field would be minimized.
- Reducing the field-producing line currents through energy conservation and power factor correction.
- Project plans include shielding ELF and isolating EMF sources so that the public would not be exposed to significant increases in ELF/EMF. The goal would be to avoid a measurable increase above local background levels.

The UV lamps, which are enclosed within a protective sleeve, are housed inside a stainless steel unit. The UV units would be located within the main UV Facility. The nearest known receptor is the Westchester County Correctional Facility, located 435 feet from the east face of the proposed UV Facility. All of the UV lamp components would be present in an enclosed building; consequently, the magnetic fields at maximum operating condition would have a negligible increase on the existing magnetic field because of the indoor enclosure. Therefore, the estimated strengths would be well below the IRPA general public limit of 1.0 Gauss.

4.17.3.1.2. With Croton Project at Eastview Site

As noted above, the Croton project may be located on the Eastview Site in the Future Without the Project. The incremental effects of EMF/ELF from operation of the proposed facility would be the same in the Future With the Project regardless of whether the Croton project is operating on the Eastview Site. Therefore no significant adverse EMF/ ELF impact is anticipated.

4.17.3.2. Potential Construction Impacts

The Future With the Project considers the anticipated peak year of construction (2008) for the proposed facility. For each year, two scenarios are assessed: one in which the Croton project is not located on the Eastview Site and another in which the Croton project is located on the site, specifically in the northwest corner of the north parcel. Therefore, potential construction impacts have been assessed by comparing the Future With the Project conditions against the Future Without the Project conditions for the year 2008 for both of these scenarios.

4.17.3.2.1. Without Croton Project at Eastview Site

Point Sources. Construction power would be obtained at 4,160 volts from the Con Edison Grasslands Substation. The Contractor would install an overhead pole line with a 4,160-volt feeder from the service point at Route 100C to the vicinity of the construction trailer area. At the trailer area, a new 300 kVA step-down transformer and secondary service, provided by Con Edison, would provide 120/208 volt three phase power to the trailer complex. All feeders for the construction activities are intended and anticipated to be three phase, meaning that there are three wires and a ground wire per feeder. The Contractor would also have the option of providing temporary power through the use of temporary/portable generators as necessary. Any increases in electric field levels would therefore be null because of the shielding and also the rapid decrease in field strength from the electrical source. No significant adverse impacts on the surrounding magnetic and electric fields are anticipated from the emergency power facility.

Line Sources. Temporary feeders supplying up to 4,160 volts would be provided by Con Edison to supply power during the construction period. The temporary feeders would originate from the Grasslands Substation to the City's property line. Con Edison's responsibility would terminate at the property line and it would be the responsibility of NYCDEP contractors to continue the overhead and underground service feeders to the Contractor's trailer area. The temporary service would supply electricity to construction equipment, site lighting, and field offices for the contractors, resident engineers, and the NYCDEP personnel.

The temporary feeders (total 4,160 volts) source magnetic field strength is anticipated to be less than 1.0 Gauss (IRPA general public limit of 1.0 gauss and the NYSROW maximum guidelines for the magnetic field strength of 0.2 Gauss) based on an estimated magnetic field strength of the larger projected proposed feeders. The distribution feeders would provide electrical power to a temporary on-site substation. These feeders would run on an overhead pole line. The triplex-shielded cables would adsorb the electrical fields emitted from the feeders and prevent public exposure to line sources related to the construction activities. Any increases in electrical field levels would be null because of shielding and/or the rapid decrease in field strength from the electrical source. Therefore, the magnetic fields at maximum operating condition would have negligible increase on the existing magnetic field.

4.17.3.2.2. With Croton Project at Eastview Site

As noted above, the Croton project may be located on the Eastview Site in the Future Without the Project. The incremental effects of EMF/ELF from construction of the proposed facility would be the same in the Future With the Project regardless of whether the Croton project is under construction on the Eastview Site. Therefore, no significant adverse EMF/ ELF impact is anticipated.

4.17.4. Relocating the Hammond House

NYCDEP may choose in the future to relocate the Hammond House from the Eastview Site to another location as part of the proposed UV Facility project due to security concerns associated with a private residence being located on the same site as critical components of the City's water system. As shown in Section 7, Alternatives, Figure 7-8, which shows the NYCDEP's comprehensive long-term plan for the site, the Hammond House would be an isolated residential use surrounded by NYCDEP's water supply facilities.

The EMF/ELF readings for the electric supply at the Hammond House are well below the International Radiation Protection Association (IRPA) general public guidelines. With the relocation of the Hammond House, the EMF/ELF background readings and measurements are not anticipated to change significantly from the existing conditions.