6.1.2.3 Splinting of open or compounded fractures.

6.1.2.4 Removal of blood or fluid soaked clothing to examine victim.

6.1.2.5 Lifting, carrying or moving a severely injured victim.

6.1.2.6 ANY procedure performed on a person where there is visible blood or other body fluids.

6.2 Exposure Control Plan

6.2.1 All employees covered by the BBP standard will receive an explanation of the exposure control plan during their initial training. It will be reviewed annually.

6.2.2 This exposure control plan will be available for employees to review at any time during their work hours. A copy of the plan will be in the each copy of the Safety Manual, as well as posted at each first aid station.

6.2.3 This plan will be reviewed at least annually and updated as necessary by the Director of Safety.

7.0 ENGINEERING AND WORK PRACTICE CONTROLS

7.1 Engineering and work practice controls shall be used, whenever possible, to eliminate or minimize employee exposure. Where occupational exposure remains after institution of these controls, personal protective equipment shall also be used.

7.2 The areas of the facility where first aid is routinely provided are organized to minimize the possibility of exposure.

7.3 Hand washing facilities are readily accessible. Antiseptic wipes are available in each of the first aid kits.

7.4 Body fluids clean-up kits are located on with each first aid kit.

7.4.1 Each kit contains hypoallergenic gloves, protective mask with eye shield, protective apron, protective booties to cover shoes, decontamination solution, disposable waste scoop, surface disinfectant wipe, antimicrobial hand wipe, biohazard waste bag,

7.5 Employees shall wear gloves (at a minimum) when there is visible blood or body fluids, or when handling items that may have been contaminated.

7.5.1 If there is a potential for blood/body fluids to splash or spray, then the protective mask with eye shield, apron, and booties from the Body Fluid Cleanup Kit **MUST** be worn.

7.6 Contaminated articles will be placed in appropriately marked containers (red biohazard bag). The Site Safety Manager will ensure that the disposal of waste containers complies with all applicable regulations.

7.7 Blood or body fluid spills will be cleaned and disinfected with a solution of one (1) part liquid bleach to ten (10) parts water.

7.8 Absorbent material down for containment of blood/body fluids and disposal in a biohazard bag.

7.9 Contaminated areas should be doused with chlorine solution and let stand to 20 minutes.

7.9.1 Contaminated equipment, tools, floors, etc., must also be cleaned with this solution.

7.10 All employees shall wash their hands and any other exposed body parts with soap and hot water immediately after providing first aid regardless of whether or not PPE was used. Antiseptic wipes may be used as an intermediate step if soap and water are unavailable.

7.11 All contaminated clothing will be removed as soon as feasible after an exposure. Contaminated clothing must be either disposed of or laundered per BBP standards.

7.12 If blood or body fluids are splashed onto mucous membranes, the exposed areas shall be flushed with water as soon as it is feasible to do so.

7.13 No eating, drinking, smoking, applying cosmetics, or handling contact lenses in areas where blood and body fluids may be present.

7.14 No storage of food or drinks where first aid supplies are kept.

8.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

8.1 All personal protective equipment used at this facility will be provided without cost to employees. Personal protective equipment will be chosen based upon the anticipated exposure to blood and other potentially infectious materials.

8.2 All PPE use will be done in accordance with O&G Industries, Inc. Respiratory Protection (Section 16) and Personal Protective Equipment (Section 15) found in this manual.

8.3 Appropriate PPE will be used in all circumstances where there is potential exposure to blood or other body fluids.

8.4 Gloves – Well fitting, disposable, latex or vinyl gloves will be worn when it is reasonably anticipated that employees will have hand contact with blood OR other potentially infectious materials.

8.4.1 Gloves are located in each first aid kit, as well as in the Body Fluid Cleanup Kits, which are located with each first aid kit.

8.4.2 Disposable gloves used are not to be washed or reused.

8.4.3 A supply of gloves to fit all providers will be available.

8.4.4 Gloves that are punctured, torn, or otherwise damaged must be changed as soon as feasible, and the old pair must be properly disposed of.

8.4.5 Gloves will be removed immediately after treatment in order to avoid contamination of other objects in the environment such as pens, phones, doorknobs, etc..

8.4.6 Hands will always be washed with soap and water as soon as is feasible after the removal of gloves.

8.4.7 Eye and Face Protection – If there is a potential for blood/body fluids to splash or spray, then the protective mask with eye shield from the Body Fluid Cleanup Kit must be worn.

8.4.8 Other Protective Clothing - If there is a potential for blood/body fluids to splash or spray or otherwise contaminate an employee's shoes/clothing, then the protective apron, and booties from the Body Fluid Cleanup Kit must be worn.

9.0 HEPATITIS B VACCINATIONS

9.1 The Hepatitis B vaccination series will be made available, at no cost to all first aid/CPR responders (see Appendix A for list of First Aid Responders). The vaccination shall be made available after the employee has had the training required by this plan and within ten days after being assigned first aid responsibilities.

9.2 Participation in a pre-screening program shall not be a prerequisite for receiving the hepatitis B vaccination.

9.3 If an employee initially declines the hepatitis B vaccination, but at a later date while still covered under the standard decides to accept the vaccination, the vaccination shall then be made available.

9.4 All employees who are offered the hepatitis B vaccination shall sign the OSHA required waiver (consent/declination form – Appendix B).

9.5 If a routine booster dose of hepatitis B vaccine is recommended by the U.S. Public Health Service at a future date, such booster doses shall be made available.

9.6 The vaccination will be provided according to the recommendation of the Public Health Service under the supervision of a licensed physician.

10.0 EXPOSURE INCIDENT

10.1 Should an exposure incident occur, it must be reported to the direct supervisor duty and the Site Superintendent as soon as possible.

10.2 Documentation of exposure routes and how the incident occurred will be on the Supervisor's Incident Report Form found in Appendix A of the Accident Procedures (Tab 5 of this Manual).

10.3 Following a report of an exposure incident, the exposed employee shall immediately receive a confidential medical evaluation at the designated provider and follow up, including the following:

10.3.1 A copy of the Exposure Incident Form, the OSHA Standard, and this BBP Procedure shall be sent to the attending physician.

10.3.2 Identification and documentation of the source individual (unless it can be established that identification is not feasible or prohibited by law).

10.3.3 Obtain consent and test source individual's blood as soon as possible to determine HIV and HBV infectivity and document the source's blood test results. If known infectivity exists, testing need not be conducted.

10.3.4 Provide the exposed employee with the source individual's test results and information about applicable disclosure and regulations concerning the source identity and infectious status.

10.3.5 After obtaining consent, collect exposed employee's blood as soon as feasible after the exposure incident and test blood for HBV and HIV serological status.

10.3.6 If the employee does not give consent for HIV serological testing, the blood sample will be preserved for up to 90 days.

10.3.7 Post-exposure measures designed to prevent the transmission of disease, known as prophylaxis, will be provided when medically indicated.

10.3.8 Counseling will be offered as required.

10.3.9 An evaluation of reported illnesses will be provided by the medical examiner.

11.0 OSHA RECORDKEEPING UNDER 29 CFR PART 1904

11.1 Sharps Injuries

11.1.1 Employers must record all work-related needle stick injuries and cuts from sharp objects that are contaminated with another person's blood or other potentially infectious material (as defined by 29 CFR 1910.1030). You must enter the case on the OSHA 300 Log as an injury. To protect the employee's privacy, you may not enter the employee's name on the OSHA 300 Log (see the requirements for privacy cases in paragraphs 1904.29(b)(6) through 1904.29(b)(9)).

11.1.2 All work-related needle stick injuries and cuts from sharp objects that are contaminated with another person's blood or other potentially infectious material (as defined by 29 CFR 1910.1030) must be recorded on the plant's OSHA 300 Log. The case must be entered on the OSHA 300 Log as an injury.

11.1.2.1 To protect the employee's privacy, you may not enter the employee's name on the OSHA 300 Log (see the requirements for privacy cases in paragraphs 1904.29(b)(6) through 1904.29(b)(9)). If the employee is later diagnosed with a bloodborne disease, then the entry on the OSHA 300 Log must be changed from an injury to an illness.

11.1.3 If an exposure incident occurs then the incident must be recorded as an illness on the plant's OSHA 300 Log only if it results in the diagnosis of a bloodborne illness or if it meets one or more of the recording criteria in 29 CFR 1904.7.

12.0 TRAINING

12.1.1 Training has been provided to all O&G Industries, Inc. employees who might be (within reasonable expectations) occupationally exposed to potentially infectious materials. This training is normally done prior to initial assignment and, at least annually thereafter.

12.1.2 Training program includes:

12.1.2.1 An explanation of the Bloodborne Pathogen Standard (29 CFR Part 1910.1030 and its contents.

12.1.2.2 A general explanation of epidemiology and symptoms of blood borne diseases and their transmissions.

12.1.2.3 An explanation of the modest transmission.

12.1.2.4 An explanation of the O&G Industries, Inc. Exposure Control Plan, including:

12.1.2.4.1 Reorganizing tasks involving exposures,

12.1.2.4.2 The use and limitations of methods to prevent exposures,

12.1.2.4.3 The location and use of decontamination equipment and personal protective equipment

12.1.2.4.4 Information regarding the HBV inoculations, and post exposure evaluation procedures.

12.1.3 Training records include:

12.1.3.1 The name and job classification of the employee attending the training;

12.1.3.2 The date of the training;

12.1.3.3 A summary of the items covered in training; and

12.1.3.4 The name and qualifications of the trainers.

Appendix A
Accident Reporting Procedures
Incident Report Form
Section 5 of the O&G Industries, Inc. Safety Plan

Appendix B
Hepatitis B Vaccination Acceptance / Declination Form

O&G Industries, Inc. provides all designated first aid/CPR responder personnel with Hepatitis B vaccinations, at no cost to the employee. This is done because the Company has identified that these employees have a reasonable likelihood of exposure to blood or other body fluids while providing care to an injured or ill employee. However, the employee must make the decision on whether he/she wishes to receive the vaccination.

❑ ACCEPTANCE OF HEPATITIS B VACCINATION:

I _____ (PLEASE PRINT), wish to receive the Hepatitis B Vaccination as offered by O&G Industries, Inc.

Employee Signature: _____

Date: _____

❑ DECLINATION OF HEPATITIS B VACCINATION:

I _____ (PLEASE PRINT), understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with hepatitis B vaccine, at no charge to myself. However, I decline hepatitis B vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring hepatitis B, a serious disease. If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with hepatitis B vaccine, I can receive the vaccination series at no charge to me.

Employee Signature: _____

Date: _____

26 – Emergency Response

1.0 Purpose

1.1 This Emergency Response Plan outlines the methods and practices for situations in and around O&G Industries, Inc. projects that have caused, or have the potential to result in emergencies, cause personal injury, property damage, or pollution of the environment.

1.2 O&G Industries, Inc's Emergency Response Plan provides an outline that must be taken to prepare for and respond to an emergency. This plan defines the actions to be taken and the responsibility assigned for such actions.

2.0 Scope

2.1 The types of Emergencies covered by this plan include:

- Environmental Crises.
- Serious bodily harm and/or deaths;
- Fire/explosion;
- Sever Weather, earthquake, hurricane, tornado;
- Workplace Violence;
- Physical damages;
- Catastrophic Equipment failure.

3.0 Definitions

3.1 **Near-Miss:** an event, circumstance or condition which has the potential to cause injury, unexpected death, or significant property damage, but did not actualize due to chance, corrective action, and/or timely intervention.

3.2 **Assembly Area**: The location that employees, visitors and contractors report to following an evacuation.

3.3 **Contractor**: A non-company employee being paid to perform work in our facility.

3.4 **Defensive Action**: Response to a chemical spill or release that does not require personal protective equipment or hazardous material response training. Examples are: closing an open valve, placing absorbent material in front of a running spill or closing a door.

3.5 **Emergency**: An unplanned event that could jeopardize the safety of people or property in our facility. An emergency can originate on our site or off-site: either can impact the people and property within our facility.

3.6 **Emergency Coordinator**: A staff member who is responsible for decision making during the initial phase of an emergency (generally this stage is defined by: discovery, activating the alarm, evacuation, employee accounting, initial response by off-site emergency services, etc.) An Emergency Coordinator will be assigned whenever the facility is operating.

3.7 **Vendor**: A non-company employee being paid to perform a service in our facility.

3.8 **Assembly Area:** The location that employees, visitors and contractors report to following an evacuation.

4.0 General

4.1 O&G Industries, Inc.'s Emergency Response Plan provides an outline of actions that must be taken to prepare for and respond to an emergency. The plan defines the actions to be taken and the responsibility assigned for such actions. Such situations may include, but are not limited to:

5.0 Team Preparation

5.1.1 Project/Office Action Team

5.1.1.1 Staff at all projects and offices must be familiar with this Emergency Response Plan.

5.1.1.2 Each project and office must have Action Teams that are ready to react to any emergency.

5.1.1.3 A specific training program must be implemented and reviewed/updated periodically.

5.1.1.3.1 Reviews should take place annually, at a minimum, and more frequently in the case of large and/or more complex site/office conditions.

5.1.2 Action Team Responsibilities

5.1.2.1 At the start of every project, Action Team(s) must be established and ready to respond to a crisis.

5.1.2.2 These teams should involve both O&G Industries, Inc. subcontractor staff. Responsibilities should be assigned that include:

5.1.2.2.1 First aid/CPR ;

5.1.2.2.2 Police/Fire departments contacts;

5.1.2.2.3 Monitoring National Oceanic Atmospheric;

5.1.2.2.4 Administration weather in the event of storms or other severe weather event;

5.1.2.2.5 Traffic control/gate security;

5.1.2.2.6 Securing the incident site;

5.1.2.2.7 Phone monitoring;

5.1.2.2.8 Media escort (to guide media representatives to a predetermined media location);

5.1.2.2.9 Power/water/gas shutdown and control;

5.1.2.2.10 Securing equipment;

5.1.2.2.11 Incident Investigation coordination including capturing investigation detail in writing and photos were appropriate;

5.1.2.2.12 All projects will have a predetermined project CPR/First Aid Team developed by the Superintendent/Safety Department at job start up who shall respond to the victim(s) with the basic first aid equipment. This team shall stay with the victim(s) until the emergency medical response team arrives and takes over.

5.1.3 Key 3rd party Support Members

5.1.3.1 There are many parties outside your Project/Office Action Team that need to be consulted in the development of your Emergency Action Plan. These may include:

5.1.3.1.1 Fire/Police departments/ambulance services;

5.1.3.1.2 Property Owner;

5.1.3.1.3 Specialty subcontractors (electrical, HVAC/plumbing, fire protection, etc.);

5.1.3.1.4 Adjacent buildings and the building managers and/or security personnel;

5.1.3.1.5 Highway departments;

5.1.3.1.6 Hospital/local medical facilities;

5.1.3.1.7 Local Police and Fire Departments;

5.1.3.1.8 Utility companies (power, water, gas);

5.1.3.1.9 Insurance carrier(s);

5.1.3.1.10 Other local authorities (Office of Energy Management, Department of Design and Construction, etc.); and

5.1.3.1.11 Security consultants.

5.1.4 Company Management Emergency Team

5.1.4.1 O&G Industries, Inc. VP Team shall be responsible for establishing this team, listing of required information and confirmation with each team member of their duties and responsibilities.

5.1.4.2 Company Management team will provide guidance to the Project/Office Action Team and ensure necessary communication and coordination between O&G Industries, Inc. and outside parties. This team will include:

5.1.4.2.1 O&G President

5.1.4.2.2 O&G Vice President

5.1.4.2.3 Director of Safety and Claims Coordinator;

5.1.4.2.4 Insurance carrier(s) representative; and

5.1.4.2.5 Legal Council.

5.1.4.3 The function of this team is to provide overall management of the crisis; guidance to the Project/Office Action Teams and to ensure necessary communication and coordination is in place between the O&G Industries, Inc. management, site personnel, insurance carriers and counsel.

5.1.4.4 This team will also determine the need for and engage necessary consultants (structural, environmental, critical incident stress counselors, etc.) as required. This team will coordinate all release of information. Including coordination with the Property Owner and other entities involved in the project.

5.1.4.5 The Management Emergency Team will coordinate all potential media communication and public statements with O&G Industries, Inc.'s Public Relations Representative.

5.1.5 Preparation

5.1.5.1 "Dry runs" or "practice drills will be conducted on regular bases and as needed per the risks associated with the project. All project stakeholders will be expected to participate in drills. Training for these drills will be conducted at the start of every project and annually thereafter.

6.0 Event Response Plans

6.1 First Hour Response

6.1.1 The following actions must be taken within the first hour of the emergency:

6.1.1.1 Summon emergency help

6.1.1.1.1 Call 9-1-1;

6.1.1.1.2 Advise of the type of incident, injuries and number of injured and location of incident; and

6.1.1.1.3 Provide an escort to meet emergency personnel when they arrive at the site and direct them to location of the injured.

6.1.1.2 Protect the injured worker(s) and administer CPR/first aid

6.1.1.2.1 Administer first aid if necessary;

6.1.1.2.2 Only attempt to move the injured if they are in immediate danger for further injury;

6.1.1.2.3 If possible attempt to eliminate or remove any other hazards present in the area; and

6.1.1.2.4 Secure the area to eliminate/reduce exposure of others to possible hazards.

6.1.1.2.5 If possible, obtain any specific information concerning from the victim(s) as soon as possible.

6.1.1.2.6 Use practices highlighted in the Bloodborne Pathogens section of this plan, section 24.

6.1.1.3 Emergency Evacuation

6.1.1.3.1 Rally point will be predetermined for every project site;

6.1.1.3.2 A prearranged emergency warning system will be established; and

6.1.1.3.3 All personnel will be accounted for by their respective supervisors and communicated to the Site Safety Manager.

6.1.1.3.4 As the New Haven Crossing project contains numerous job sites individuals muster points and warning systems will be developed as phases come into effect.

6.1.1.3.5 NOTE- Police and fire department personnel may want to know who was in the present at the time of the emergency.

6.1.1.3.5.1 The senior O&G Industries, Inc. site manager will be prepared to provide a workforce personnel incident de-brief prior to personnel leaving the job site.

6.1.1.3.5.2 Any top-line details related to the incident should be provided to minimize the spread of rumors as well as directions on handling media inquires.

6.1.1.3.5.3 Employees should be directed to contact their families immediately to communicate their personal condition.

6.1.1.4 Meet with emergency personnel

6.1.1.4.1 During an emergency a representative of O&G Industries, Inc. or another responsible party must meet with the responding emergency department and advise them of the emergency situation and layout of the site. O&G Industries, Inc. with the help of the subcontractors, will secure the site to bar entry of unauthorized vehicles.

6.1.1.4.2 Any vehicles hindering access from the site entrance must be removed immediately. Security staff with the assistance of O&G Industries, Inc. and subcontractor personnel will work together to ensure vehicles are moved.

6.1.1.4.3 A copy of the sites hazardous chemical (which can be found in the written hazardous communication program and in the MSDS binder) is available to give to responding emergency personnel if needed.

6.1.1.5 Secure the Site

6.1.1.5.1 After an emergency event takes place the site must be secured to not allow unauthorized personnel to enter and maintain the integrity of any evidence that must be documented.

6.1.1.5.2 A "gatekeeper" who controls access to the location must be designated as part of the project/office Action Team.

6.1.1.5.3 Do not allow anyone except authorized personnel to go onto the project site.

6.1.1.5.4 All visitors should be escorted from the project site but remain available for questioning.

6.1.1.5.5 Evidence should not be moved or altered in any way. Destruction of evidence due to the company's failure to secure the site could play a role in determining liability. Steps should be taken to lock up, guard, or photograph any items of crucial evidence.

6.2 Immediate Notification

6.2.1 The following individuals or groups must be notified immediately after an emergency event takes place:

6.2.1.1 O&G Corporate Director of Safety, who will notify OSHA and CT DOT if circumstances warrant;

6.2.1.2 Site Safety Manager

6.2.1.3 Claims Coordinator;

6.2.1.4 Subcontractors as appropriate;

6.2.1.5 Project Manager;

6.2.1.6 Project Executive, Vice President of Division;

6.2.1.7 President

6.2.1.8 Insurance carrier(s), if circumstances warrant; and

6.3 Follow-up Actions

6.3.1 Following and emergency event once all of the first hour response steps have been completed several follow up steps have to be taken. These follow up steps will aid O&G Industries, Inc. in determining root causes and lessons learned in order to better prepare of prevent the situation from happening in the future.

6.3.1.1 Perform incident investigation

6.3.1.1.1 The O&G Corporate Director of Safety or Site Safety Manager will set up and organize an appropriate team to preserve evidence, identify all witnesses and initiate proper incident investigation.

6.3.1.1.2 The Team shall do so in close coordination with the Vice President of that specific Division, insurance carrier(s), and representatives of OSHA and other involved public agencies (e.g. police, fire, Federal Aviation Administration).

6.3.1.2 Accompany any/all regulatory agency investigators

6.3.1.2.1 If OSHA or another regulatory agency investigates the incident, a member of the O&G safety staff and the O&G Corporate Director of Safety, if available, must accompany the Agency Representative(s) to assure they receive accurate, correct information and benefit from our knowledge of the incident.

6.3.1.3 *Post Incident Evaluation and Review*

6.3.1.3.1 The Project Action Team should conduct a post-incident review to determine the root causes of the

incident and any lessons learned to be shared with the Management Team.

7.0 Specific Event Response

7.1 While the initial response for many types of emergency events is the same, specific event response plans have been developed to avoid time loss and confusion during an emergency event. For such contingencies, O&G Industries, Inc .has pre-coordinated response plans that can be initiated by Project/Office Action Teams and Company Management Team upon notification that an event has occurred.

7.2 Each project team will review the following specific event responses and prepare their site specific Emergency Response Plans in accordance with the following outlines. Additionally, the described in the First Hour Response section will remain the same for any of the events following. In all cases, immediate notification must be made to O&G Industries, Inc. Management Emergency Team.

7.2.1 Environmental Crisis

7.2.1.1 An environmental crisis is a chemical release or spill, water spill or discharge:

7.1.1.1.1 Threatens the environment;

7.1.1.1.2 Negatively impacts community/owner relations;

7.1.1.1.3 Violates any state/local/federal environmental regulations; and

7.1.1.1.4 Creates media attention.

7.1.1.2 The Project Superintendent or Safety Manager or senior staff member should immediately attempt to shutoff or contain the release if possible using any available controls including:

7.1.1.2.1 Valves or shutoffs;

7.1.1.2.2 Spill containment equipment (barricades, absorbent materials, etc);

7.1.1.2.3 Notify local authorities; and

7.1.1.2.4 Notify the Company Management Emergency Team and the Project Action Team through the Site Safety Manager or Director of Safety.

7.1.1.2.5 If the spill is associated with a motor vehicle accident on one of the adjacent roads the Fire Department will be notified immediately.

7.1.1.3 Project/Plant/Facility Action Teams should have basic supplies on site that may include:

7.1.1.3.1 Absorption material;

7.1.1.3.2 Drain covers;

7.1.1.3.3 Valve wrenches; and

7.1.1.3.4 Containment drums.

7.1.1.4 Reference should be made to the Environmental Emergency Checklist in Section 9 and 12 of this program element.

7.1.2 Fatalities/Serious Injuries

7.1.2.1 A job fatality, serious injury or other such catastrophic incident sets off a chain of events involving the safety, legal, insurance, communication departments, and other entities.

7.1.2.2 The Emergency Response team should immediately:

7.1.2.2.1 Eliminate further risk to others;

7.1.2.2.2 Provide CPR and First Aid to the injured;

7.1.2.2.3 Seal off the area for later inspection;

7.1.2.2.4 Control access to the incident location;

7.1.2.2.5 Secure witnesses;

7.1.2.2.6 Contact Company Management Emergency Team, Claims Coordinator and Business Unit Director of Safety;

7.1.2.2.7 Deny all unauthorized persons access to the site, including the news media.

6.1.2.2.7.1 All unauthorized persons found on the site will be escorted off the premises.

7.1.2.3 Important: Notification

7.1.2.3.1 O&G Industries, Inc. employee family members**:** Together, a company chairman and Department VP will notify the family;

7.1.2.3.2 Subcontractor employee family members**:** The subcontractor will notify the family. (This plan assumes that each subcontractor has its own program for notification by its management of next of kin and other necessary parties.); and

7.1.2.3.3 OSHA**:** The Corporate Director of Safety or Safety Manager will notify the area office with 8 hours of a fatality or the hospitalization of three or more employees.

7.1.2.4 The O&G President, and O&G Vice President will decide as to whether the project site should be shut down and all workers asked to leave the premises. This is determined by the nature and seriousness of the incident.

7.1.2.5 Reference the Fatality/Serious Injury Checklist in Chapter 13 of this program.

7.1.3 Fire

7.1.3.1 For specific fire protection and prevention procedures see the O&G Industries, Inc. Prevention and Protection Plan. See Section 18 of this Plan

7.1.3.2 The planning of general fire protection and prevention is the responsibility of the Superintendent on a project.

7.1.3.3 Suitable fire-fighting equipment must be readily available at all times.

7.1.3.4 Employees should be trained in basic fire prevention techniques as described in the O&G Industries, Inc .Fire Protection and Prevention Plan and be able to respond to a fire emergency accordingly.

7.1.4 Severe Weather

7.1.4.1 A severe weather plan and team with assigned responsibility is necessary in case of hurricane, earthquake, tornado, flooding, lightning strike or other acts of God. Each specific project may require additional efforts to be ready for a severe weather event.

7.1.4.2 Additional responsibilities include:

7.1.4.2.1 Complete the O&G personnel telephone list at the beginning of each project and continue to update as the project staff changes;

7.1.4.2.2 Review project specific plans with the Owner and subcontractors at the beginning of each job;

7.1.4.2.3 Review the overall Emergency Response Plan with all employees and subcontractors once a year;

7.1.4.2.4 Review the checklist items included at the end of this plan; and

7.1.4.2.5 After a severe weather incident, a debriefing should take place and the plan should be reviewed and revised based on the feedback from the team on what went well and what needs improvement.

7.1.4.3 The O&G President and O&G Vice President shall be involved in project shutdowns and post project inspections with the Owners.

7.1.4.4 Reference should be made to the Severe Weather Checklist in Section 15 of this procedure.

7.1.5 Workplace Violence

7.1.5.1 If a workplace violence report is made, the assigned O&G Industries, Inc. representative will:

7.1.5.1.1 Conduct a brief preliminary interview of the employee(s) who reported the allegation to determine the details of the incident.

7.1.5.1.2 Question employees who have been identified by the alleging employee as being involved in the incident.

7.1.5.1.3 Assess the situation for any ongoing threat or imminent danger to other employees.

7.1.5.1.4 Remove the employee from the worksite and contain the situation.

7.1.5.1.5 Contact law enforcement if warranted and if additional precautions are necessary to protect other workers.

7.1.5.1.6 Do not attempt to reason with someone who is wielding a weapon. Call law enforcement immediately and evacuate the area as quickly as possible. Notification should also be made to your Company Management Emergency Team and your HR representative.

7.1.5.2 Reference should be made to the Workplace Violence Report in Section 11 of this program.

8.0 Media Management

8.1 All inquiries by the news media need to be handled very carefully. Misinformation can create negative public perceptions and/or poor Owner relationships. All inquiries should be referred to O&G Industries, Inc. Corporate Secretary

8.2 The two keys to successful emergency communications:

8.2.1 Decisions have been made ahead of time and the plan is ready to implement at a moment's notice; and

8.2.2 O&G Industries, Inc. is in control of the situation and messages, including cameras and video recorders.

8.3 The O&G President, and O&G Vice President are the spokespeople for O&G Industries, Inc. Therefore, the President is the only one who can deliver media statements for the project.

8.3.1 They have received special training and are the only ones authorized to grant media interviews. This includes informal media inquiries via phone or email.

8.3.2 The Action Team will work with the Project/Office Action Team and will contact the Company Secretary for necessary support, strategy and message development during a crisis.

8.3.2.1 They will also coordinate release of information with the owner and other required entities.

8.3.2.2 The O&G Secretary should be up to date on any and all past experiences where O&G Industries, Inc. received media attention and the media outlets involved in any past investigations.

8.3.3 Below is a brief overview of what should happen before the media arrives on site, and even, ideally, before the emergency happens:

8.3.3.1 Designate a safe area for the media

8.3.3.1.1 Just like all other non-involved personnel, media representatives will not be allowed access to the incident location in order to maintain control of the incident site and for their safety.

8.3.3.1.2 All media representatives should be politely directed to a common location where a designated company representative would provide them with factual information.

8.3.3.1.3 Depending on the incident, the location should be away from the immediate incident, preferably off-

site, such as a meeting room at a local hotel or restaurant. A suitable on-site location may be possible, away from incident, in the Owner's trailer, conference trailer, etc.

8.3.3.1.4 The media should not meet in an O&G Industries, Inc .office facility. The area should be dry and as comfortable as possible with access to phones.

8.3.3.1.4.1 Research possibilities beforehand so you have options to consider if an incident occurs.

8.3.3.2 Designate a media escort

8.3.3.2.1 A media escort should be designated to escort the media to a safe place to wait for information and comment from the spokesperson.

8.3.3.2.2 Everyone on the jobsite, including the Owner, subcontractors and employees, should know who the media spokesperson is and understand that no one but the designated person should talk to the media.

8.3.3.3 News Conferences

8.3.3.3.1 Any news conference needs to be carefully staged and conducted by upper management as it offers an opportunity to establish the company's position.

8.3.3.3.2 A press kit (background materials) is very important.

8.3.3.3.2.1 This kit would include site drawings, renderings, technical information, graphs/charts, company background, project fact sheet, and any other relevant information you want to disseminate.

8.3.3.3.2.2 The O&G Secretary must approve all information disseminated.

9.0 General Emergency Preparedness Checklist

9.1 The level of preparedness for an emergency prior to its occurrence will determine the success of effectively managing the event. A site-specific evacuation plan has been developed and includes emergency warning systems, pre-determined evacuation routes, meeting place and responsibility assigned for head count.

9.2 All project site employees, company personnel and subcontractors must clearly understand their roles. Emergency practice drills are to be conducted annually for project sites and offices.

9.3 Project/Office Action Team has been developed and responsibility assigned for:

9.3.1 First aid/CPR Team;

9.3.2 Police/Fire department contact;

9.3.3 Monitoring National Oceanic Atmospheric Administration weather;

9.3.4 Traffic control/gate security;

9.3.5 Securing the incident site and preserving incident evidence;

9.3.6 Ensuring all personnel are accounted for after an evacuation;

9.3.7 Power/water/gas shutdown and control;

9.3.8 Phone monitoring; and

9.3.9 Media escort (to guide media to a pre-determined media location)

9.4 In addition to the Project/Office Action Team, the following measures have been taken to prepare for emergency situations at each O&G Industries, Inc. project site:

9.4.1 Emergency Phone Lists complete for both Site Action Team & Company Management Emergency Team;

9.4.2 Site Action Team has been trained on project specific Emergency Plan, the O&G Industries, Inc. Fire Prevention and Protection Plan and all Emergency checklists;

9.4.3 Identify a pre-determined command center that is equipped with dedicated phone line and other necessary equipment away from the site;

9.4.4 Site or office specific Emergency Plan has been reviewed with Police/Fire departments and all other relevant local authorities including a copy of the building plans with exit routes identified for each area; and

9.4.5 Practice drills are conducted at least annually and at the start of the project.

10.0 Emergency Phone Lists

10.1 Emergency Action Team

Role	Name	Mobile #	PTP #
Team Lead			
First Aid/CPR Team			
Weather Monitor			
Incident Commander (Floater)			
Police/Fire Notification			
Vice President			
Traffic Control			
Muster Point Headcounter			
EMS Escort			
Utility Shutoff & Control – Electrical			
Phone Monitor			
Command Center Support			
Spokesperson	Ken Merz	860-307-0444	
Outside Contacts			
Police Department	Dial 911		
Fire Department	Dial 911		
Electric Utility			
Water Utility			
Gas Utility			
State Police			
CT DEP Emergency		860-424-3338	

Note: *Each project and office must establish and post this Action Team emergency phone list at proper locations and include it in project safety program materials.*

10.2 Company Management Emergency Team

Role	Name	Work #	Mobile #
President	David Oneglia	860-489-9261	860-485-3313
Vice Chairman	Raymond Oneglia	860-496-4208	561-307-9303
Vice President	John Gemetro	860-601-2567	860-601-2567
Secretary	Kenneth Merz	860-496-4222	860-307-0444
Corporate Director of Safety	Michael Ferry	860-489-9261	860-307-3881
Claims Manager	Sharon Okraska	860-496-4248	860-485-5284
HR Director			
Insurance Carrier(s)			

Note: *Each project and office must establish and have readily available this Action Team emergency phone list.*

11.0 Workplace Violence Incident Summary Report

This form is to be utilized to document any workplace violence. The form should be forwarded to the Corporate Director of safety and your Human Resources Representative

Fax To Corporate Director of Safety _____At: _____

Company: _____Project: _____

Report Completed By: _____

Phone: _____ Date: _____

Name of Victim_____

Type of Incident (Check one)	☐ **Threat** ☐ **Assault/Battery** ☐ **Robbery** ☐ **Other**
Persons Involved (Note all individuals involved)	
Exact Location of Incident (Indicate Project address, location on site, etc)	
Time of Incident	
Outside Emergency Assistance (check one)	☐ **Ambulance** ☐ **Police** ☐ **Fire** ☐ **Other**
Detailed Description of Event: (Include weapons used and employee response)	
Assets / Money Lost or Damaged	
Corrective Management Action Plan	

12.0 Environmental Emergency Checklist

12.1 The level of preparedness for an emergency prior to its occurrence will determine the success of effectively managing the event.

12.2 A site-specific evacuation plan has been developed and includes emergency warning systems, pre-determined evacuation routes, meeting place and responsibility assigned for head count.

12.3 All project site employees, company personnel and subcontractors must clearly understand their roles. Emergency practice drills are to be conducted annually for project sites and offices.

12.4 In the event of an environmental emergency, the following actions must be taken to properly manage the situation:

12.4.1 Summon emergency help;

12.4.2 Provide and administer First Aid/CPR to any injured personnel;

12.4.3 If injured is in immediate danger, take action to eliminate danger if possible;

12.4.4 Only move the injured person from danger;

12.4.5 Secure the area to eliminate/reduce exposure for others;

12.4.6 Assess need for partial or full evacuation;

12.4.7 Evacuate to rally points if necessary; and

12.4.8 Account for all personnel.

12.5 If possible, shut off and/or contain the environmental hazard to avoid further exposure and other possible hazards by:

12.5.1 Place absorption material to contain spill or;

12.5.2 Cover drains to prevent storm water contamination or;

12.5.3 Close any valves;

12.5.4 Turn off all heat, spark or fire sources in the immediate area; and

12.5.5 Notify state/local/federal authorities as appropriate.

12.6 Contact Corporate Safety Manager, O&G Environmental Specialist and Claims Coordinator.

13.0 Fatalities/Serious Injuries Checklist

13.1 The level of preparedness for an emergency prior to its occurrence will determine the success of effectively managing the event. A site-specific evacuation plan has been developed and includes emergency warning systems, pre-determined evacuation routes, meeting place and responsibility assigned for head count. All project site employees, company personnel and subcontractors must clearly understand their roles. Emergency practice drills are to be conducted annually for project sites and offices.

13.2 In the event of an incident(s) resulting in a fatality or serious injury(s) the following actions must be taken to properly manage the situation:

13.2.1 Summon emergency help;

13.2.2 Provide and administer First Aid/CPR to any injured personnel;

13.2.3 Contact your Corporate Safety Manager and Claims Coordinator

13.2.4 If injured is in immediate danger, take action to eliminate danger if possible;

13.2.5 Only move the injured person from danger;

13.2.6 Secure the area to eliminate/reduce exposure for others;

13.2.7 Assess need for partial or full evacuation;

13.2.8 Evacuate to rally points if necessary;

13.2.9 Account for all personnel;

13.2.10 Send designated team member to meet the police/fire/ambulance;

13.2.11 Find out immediately where the injured parties are being taken for treatment;

13.2.12 Secure the incident site to prevent unauthorized access and ensure the preservation of evidence;

13.2.13 Identify witnesses that need to be interviewed prior to anyone leaving the site;

13.2.14 Begin a thorough investigation using sketches, photos to document events, positioning of people and equipment; and

13.2.15 Ensure proper PPE is worn and Universal Precautions are taken when cleaning up the incident site.

13.3 Coordinate communication with the families of the victims

13.3.1 In the case of a fatality and/or serious injury of a O&G employee, the President or an appointed chairman will be responsible to notify families in person.

13.3.2 If the incident involves a subcontractor's employee, the subcontractor will notify the families.

13.3.3 Consideration must be taken relative to the immediate family's needs.

14.0 Fire Response Checklist

14.1 The level of preparedness for an emergency prior to its occurrence will determine the success of effectively managing the event.

14.2 A site-specific evacuation plan has been developed and includes emergency warning systems, pre-determined evacuation routes, meeting place and responsibility assigned for head count.

14.3 All project site employees, company personnel and subcontractors must clearly understand their roles. Emergency practice drills are to be conducted annually for project sites and offices.

14.4 In the event of a fire emergency following actions must be taken to properly manage the situation:

14.4.1 Summon emergency help;

14.4.2 Provide and administer First Aid/CPR to any injured personnel;

14.4.3 Contact your Corporate Safety Manager and Claims Coordinator;

14.4.4 If injured is in immediate danger, take action to eliminate danger if possible;

14.4.5 Only move injured personnel from danger;

14.4.6 Secure the area to eliminate/reduce exposure for others;

14.4.7 Shut down gas feeds and electrical power to the immediate area, if possible;

14.4.8 Assess need for partial or full evacuation (do not use elevators or other man lifts while evacuating during a fire);

14.4.9 Evacuate to rally points if necessary;

14.4.10 Account for all personnel;

14.4.11 Send designated team member to meet the police/fire/ambulance;

14.4.12 Find out immediately where the injured parties are being taken for treatment ;

14.4.13 Secure the incident site to prevent unauthorized access and ensure the preservation of evidence;

14.4.14 Consider the control of potential environmental exposures including chemical releases and storm water discharge contamination;

14.4.15 Contact your Business Unit Safety Manager and Claims Coordinator;

14.4.16 Contact the owner representative; and

14.4.17 The Department VP will work with the senior site manager to assess if it is safe to re-enter the building

14.5 *Reference the O&G Fire Protection Plan for further instructions.*

15.0 Severe Weather Checklist

15.1 The level of preparedness for an emergency prior to its occurrence will determine the success of effectively managing the event.

15.2 A site-specific evacuation plan has been developed and includes emergency warning systems, pre-determined evacuation routes, meeting place and responsibility assigned for head count.

15.3 All project site employees, company personnel and subcontractors must clearly understand their roles. Emergency practice drills are to be conducted annually for project sites and offices.

15.4 Prior to a severe weather event following actions can be taken to properly manage the situation and help to minimize property damage:

15.4.1 Secure all cranes, including off-loading picks and lowering mobile crane booms to the ground;

15.4.2 Shut off all power supplies, turn off all temporary water sources;

15.4.3 Secure all material, check all tie downs on office trailers;

15.4.4 If necessary, have appropriate de-watering equipment delivered to the site and secured;

15.4.5 Check all area and street storm sewer gratings to ensure they are free of debris and protected against runoff from the project;

15.4.6 If necessary have emergency generators delivered and secured;

15.4.7 Deliver all blueprints, permits, inspection logs and other critical documents to O&G's main office or other secure site;

15.4.8 Back up all computers to main office;

15.4.9 Update and post site emergency telephone lists;

15.4.10 Broom clean project site and remove trash;

15.4.11 If appropriate, cover all windows and openings with plywood;

15.4.12 Secure all gates and enclosures;

15.4.13 Establish a phone tree for project team communication;

15.4.14 Conduct an employee and subcontractor debrief on a possible work due to the severe weather and where to call for information; and

15.4.15 Assign one O&G employee to monitor jobsite or office periodically and report any weather related emergencies.

16.0 Specific Severe Weather Considerations

16.1 Earthquake

16.1.1 Place large or heavy objects (tools, material, equipment, etc.) on floor and away from openings.

16.1.2 In offices, hang heavy items such as pictures and mirrors away from chairs, couches and anywhere people sit.

16.1.3 Identify safe places in the building: against inside walls, away from windows where glass could shatter or where heavy objects could fall.

16.1.4 If outdoors, locate safe places in the open away from buildings, trees, telephone and electric lines, overpasses or elevated roadways.

16.1.5 Be prepared for aftershocks; these can often cause additional damage or bring weakened structures down.

16.2 Tornado

16.2.1 Understand the difference between a “tornado watch,” which means that conditions are right for a tornado and a “tornado warning,” which means that a tornado has been sighted on radar.

16.2.2 Monitor weather conditions as necessary.

16.2.3 Designate a safe area(s) in the building or on the project site where all employees can go in the event of a tornado threat.

16.2.4 In the event of a tornado, sound emergency alarm system and direct all personnel to the pre-determined safe area.

16.3 Lightning

16.3.1 If an individual can see lightning and/or hear thunder he/she is already at risk. Louder or more frequent thunder indicates that lightning activity is approaching, increasing the risk for lightning injury or death.

16.3.2 Monitor weather conditions as necessary.

16.3.3 During thunderstorms all outdoor and certain indoor activities shall be suspended at the first sight of lightning or sound of thunder and until 10 minutes past the final sound of thunder.

16.3.4 Designate a safe area(s) in the building or on the project site where all employees can go in the event of a lightning threat.

16.3.5 In the event of a lightning strike to a site, sound emergency alarm system and direct all personnel to the pre-determined safe/grounded area.

17.0 Media Management

17.1 The level of preparedness for an emergency prior to its occurrence will determine the success of effectively managing the event.

17.2 All inquiries by the media need to be handled very carefully. The following steps can be taken to properly manage a media presence onsite:

17.2.1 Designate a pre-determined secure area for the media, away from the project site (The media should not meet at a Joint Venture office facility);

17.2.2 The designated media escort should meet the media and escort them to the secured area;

17.2.3 The Project/Office Action Team will work with the Company Management Emergency Team and the O&G Secretary to coordinate media communications;

17.2.4 Only company officers are to speak with the media;

17.2.5 All communications must be short, concise and factual;

17.2.6 Always align your communications with the property owner;

17.2.7 Do not share emergency plan with anyone other than authorized personnel;

17.2.8 Do not discuss procedures in detail with reporters and other outside parties; and

17.2.9 Do not share plans or site specific policies with unauthorized personnel.

17.3 *If you are unsure about making a statement or giving information to a media member consult a member of the site management team*

18.0 Site-Specific Documents

18.1 This Emergency Response Plan provides an outline of actions that must be taken to prepare for an emergency and to respond in the event of a crisis.

18.2 The plan defines the action steps necessary and the responsibility assigned for such actions.

18.3 An Emergency is any event that has created and/or may still pose an immediate threat to life, property or business as usual. Such situations may include, but are not limited to a fatality or serious accident, environmental crisis, fire, labor dispute, or workplace violence.

18.4 All jobsite staff must be familiar with the specifics of the plan outline and the responsibilities of each staff member to minimize/ avoid loss exposures. This plan is intended to provide direction to O&G Industries, Inc. and Subcontractor management teams. The extent of actions required will be dictated by the severity of the event. Timely and sound judgment is essential to the success of any Emergency Response plan. It is critical that information about the event be quickly communicated up the chain of management for further action.

18.5 First Hour Response: Several immediate actions must take place during an Emergency regardless of the type of event. These actions will be directed by , or in his absence, .

18.5.1 Protect the injured worker(s) and administer CPR/ first aid.

18.5.2 If injured personnel are in immediate danger, eliminate danger or move the injured personnel from danger.

18.5.3 Contact _____to alert CPR/First Aid Team members for immediate assistance with injured worker.

18.5.4 Secure area to eliminate/ reduce exposure to others

18.5.5 Summon Emergency Help:

18.5.5.1 Call 911 with location, extent, and cause of injury.

18.5.5.2 Alert 911 dispatch to what road entry/site access should be used for ambulance entrance.

18.5.5.3 _____to alert _____to receive and escort the emergency medical team to the incident location.

18.5.6 _____will make note of where the injured party is being taken for treatment.

18.5.7 _____to contact O&G personnel.

18.5.8 _____will control all incoming phone calls regarding the situation and designate the incident command center.

18.6 Account for All Personnel: In the event of a crisis, it should be determined if evacuation is required.

18.6.1 If so, the emergency air horns will be blasted 10 times 5 seconds in between and each blast. All employees will report to Muster Area at the _____area located at _____and _____.

18.6.2 In addition, each employee must be accounted for by their respective supervisor. A general foreman may shed that responsibility to an area foreman, in which case the general foreman would be responsible for gathering each area foreman's head count information.

18.6.3 _____will confirm with each subcontractor supervisor at the Muster Area that all men are accounted for.

18.6.4 _____will walk the site and make a sweep of such to confirm that all workers have been evacuated. _____ will then notify _____that the jobsite is fully evacuated.

18.6.5 If it is determined that the jobsite will be shut down for the day, _____will provide a workforce personnel incident debrief prior to personnel leaving the jobsite as well as the start time for the next work day.

18.7 Secure the Jobsite: _____and _____are responsible for allowing only authorized personnel entry into the jobsite. All visitors must be escorted from the site, but remain available for questioning. Also, evidence cannot be moved or altered in any way. Crucial evidence should be locked up, guarded or photographed.

18.8 JOBSITE EMERGENCY CALL LIST

Jobsite Name:
Jobsite Address:

Jobsite Phone #:

In the event of an emergency contact the personnel listed below immediately.

Name:
Home #:
Cell #:

Name:
Home #:
Cell #:

Name:
Home #:
Cell #:
Direct Connect:

Name:
Home #:
Cell #:
Direct Connect:

19.0 Non-Emergency Medical Response

19.1 All incidents regardless of severity must be reported to O&G Industries, Inc. immediately for proper documentation. (Sprains, strains, minor cuts, abrasions, bruises, etc.).

19.2 Once the injured party contacts O&G Industries, Inc., a representative must request and receive a First Report of Injury or subcontractor injury form. All personal information and description of incident must be filled out by the injured party or a representative of the subcontractor he/she works for. If the injured party is an O&G employee, an O&G representative will be required to fill out the Workers' Compensation Report of Accident Form.

19.3 The Accident Report must be completed prior to sending or immediately following the return of the injured party to the _____. You can find all of the material _____. *(Note: Please make copies of this form before the injured party leaves)*

19.4 Provide the injured worker with directions to the medical center. The subcontractor of the injured worker must provide transportation to and from the medical facility. Under no circumstances will an O&G Industries, Inc employee provide transportation to the medical facility unless it is an O&G Industries, Inc. worker who is injured.

19.5 Notify the injured worker that they must show proof of his visit to the medical facility when they return from receiving treatment. A copy of the Patient Visit Form that describes the treatment, diagnosis, and restrictions that the employee received while at the clinic must be kept with the incident report by O&G Industries, Inc.

19.6 Notify _____of the incident. If _____ is not available please reference the team directory to inform the next tier on the contact list.

19.7 Once the injured worker returns to the site, make sure a copy of the patient visit form is kept along with the other documents they received from the medical facility.

If no one from the above list of names is available to submit the injury notification to _____ .

Lastly, please leave all of the documents you have collected on the desk of _____

Subcontractor Safety Officer(s) Jobsite Emergency Contact List

Name	Company	Phone

First Aid/CPR Team Jobsite Emergency Contact List

Name	Company	Phone

EMERGENCY EVACUATION PROCEDURE

**IN THE EVENT OF AN EMERGENCY,
SOUND HORN FOR 5 CONTINUOUS SECONDS,
10 REPEATED TIMES.
THEN REPORT TO YOUR SITE'S MUSTER AREA
WAIT THERE FOR FURTHER INSTRUCTIONS.**

MUSTER AREA

EMERGENCY MGT. DRILL

SUBCONTRACTOR	TOTAL MANPOWER	ALL ACCOUNTED FOR?

26 – Safety Responsibilities

1.0 Purpose

1.1 It is the intent of O&G Industries, Inc. in delegating responsibilities regarding safety and health, that management, employees and subcontractors understand the role of health and safety (H&S) in their job functions, provide accountability through a chain of command and to ensure that there are proper channels of communication in place in case of emergencies or to disseminate information.

2.0 Scope

2.1 Each O&G Industries, Inc. employee or subcontractor shall comply fully with the Company requirements that are outlined in this procedure.

3.0 Responsibilities

3.1 The Site Project Manager will:

3.1.1 Enforce the O&G Industries, Inc. Safety Program at their sites and take disciplinary action against any employee who willfully disregards it.

3.1.2 Notify and require all O&G Industries, Inc. Subcontractors at their site to abide by the guidelines of this Safety Program and to certify this notification in writing.

3.1.3 Report serious accidents involving any death or the hospitalization of three or more employees to the Director of Safety. The Director of Safety will in turn report the incident to the area office of the Occupational Safety and Health Administration (OSHA), within 8 hours.

3.1.4 Advise Site Superintendents, employees, and subcontractors at their site of the Company's Safety Policies and Procedures and their obligation to comply with the most current OSHA standards. Take appropriate action if these individuals fail to comply.

3.2 The Site Superintendent will:

3.2.1 Act as the "Competent Person" as defined by OSHA, on the job and therefore will be responsible for safety as it affects O&G Industries, Inc. employees and/or subcontractors. The Site Superintendent has the authority to suspend operations and/or remove any employee(s) who create(s) an immediate and serious threat to the safety of other employees or the destruction of personal property.

3.2.2 Ensure that emergency medical treatment is readily available at each job site. This means that at least one O&G Industries, Inc. employee on the site must be First Aid/CPR certified and an appropriate first aid kit must be in the site office.

3.2.3 Ensure that Fire Safety Programs and equipment are in place and readily available. This means that the workplace must be kept clean and combustible and flammable substances must not be allowed to accumulate. In addition, fire extinguisher(s) must be within 100 feet of the work areas. In enclosed buildings, a 10BC fire extinguisher must be mounted for every 3,000 square feet and on every floor of the building.

3.2.4 Instruct O&G Industries, Inc. employees and/or subcontractors at their site of the safety practices that are to be followed on the job site.

3.2.5 Conduct safety training for both new and existing field personnel and/or subcontractors at their site of the safety practices that are to be followed on this job site. These can be conducted by means of weekly “tool box talks”.

3.2.6 Provide personal protective equipment (PPE) and other safety materials (for example, safety cans for transporting flammables) for O&G Industries, Inc. employees and certify that subcontractors do the same for their employees.

3.2.7 Investigate all accidents involving O&G Industries, Inc. employees and submit a “First Report of Injury” form to the Project Manager before the end of the work shift. Serious accidents involving death, dismemberment, hospitalization, property damage or injury to members of the public must be immediately reported to the Project Manager and Director of Safety.

3.2.8 Inspect the workplace daily, document the findings and take corrective actions.

3.2.9 Monitor the work practices of subcontractors to ensure they do not create safety hazards for O&G Industries, Inc employees, other subcontractors, or themselves. Any hazards creating imminent danger for any person will be immediately corrected or the activity shutdown until it can be corrected.

3.2.10 Conduct weekly “tool box talks” with O&G Industries, Inc. employees to review safety issues encountered at the site and to discuss corrective actions. A list of meeting attendees and the subjects discussed will be maintained at the site.

3.2.11 Maintain the workplace in a clean and orderly fashion at all times.

3.3 The Job Foreman Will: (in the event of no job foreman, these responsibilities revert to the Site Superintendent)

3.3.1 Notify employees under their direction how to summons emergency medical and fire assistance.

3.3.2 Ensure employees wear, at minimum, hardhats, safety eyewear, and work boots when required. Provide personal protective equipment, if needed.

3.3.3 Be familiar with applicable health and safety rules and regulations and how to effectively implement them at the job site. Instruct employees regarding the safety practices to be followed on the job site.

3.3.4 Inform employees about any chemical hazards in their work areas.

3.3.5 Investigate all accidents involving O&G Industries, Inc. employee under their direction, and immediately report findings to the Site Superintendent.

3.3.6 Inspect the workplace daily and take corrective actions.

3.3.7 Attend all weekly safety "tool box talks" conducted by the Site Superintendent.

3.3.8 Maintain the workplace in a clean and orderly fashion at all time.

3.4 The Director of Safety will:

3.4.1 The Site Safety Manager has the authority to immediately stop work on the project. This work includes activities being performed by any sub contractor.

3.4.2 Provide the means to execute the Health and Safety Policies as stated in the Policy Statement.

3.4.3 Maintain current copies of all applicable federal, state, and local safety regulations that affect O&G Industries, Inc. employees.

3.4.3.1 Keep O&G Industries, Inc. Project Managers informed of new and/or changing OSHA regulations as they affect the Company.

3.4.4 Approve new policies or changes to existing policies in order to maintain the effectiveness of the overall safety program.

3.4.5 Routinely inspect job sites and prepare written reports of safety violations and suggest corrective action.

3.4.6 Occasionally meet with subcontractor's representatives and/or safety representatives to discuss safety issues at the job sites.

3.4.7 Review accident reports and initiate action to avoid recurrences. Review OSHA 300A log to ensure accuracy and timely posting.

3.4.8 Accompany the Worker's Compensation Insurance Carrier on periodic inspection and help implement corrective action recommended by the carrier.

3.5 Employees will:

3.5.1 Understand and follow all safety rules as required by this job site, instructed, discussed, or otherwise recognized as prudent practices.

3.5.2 Not engage in any unsafe acts that might endanger the health and safety of any worker. Use personal protective equipment and or devices when appropriate and as intended by the manufacturer.

3.5.3 Report (or correct) all unsafe acts or conditions to the Foreman, Site Superintendent, Project Manager, or Safety Director immediately.

3.5.4 Maintain the workplace in a clean and orderly fashion at all times.

3.6 Subcontractors Will:

3.6.1 Perform their work in a safe manner in conformance with O&G Industries, Inc., state, and OSHA health and safety rules/regulation. Routine safety inspections will be conducted by the subcontractor to confirm that recognized safe practices are being followed.

3.6.2 Be responsible for the safety of their employees and will fully cooperate with the O&G Industries, Inc representatives and other subcontractors in the implementation and enforcement of safety and health programs.

3.6.3 Submit to O&G Industries, Inc. management, before starting work, the following information:

3.6.3.1 The subcontractor's safety, hazard and communication program.
3.6.3.2 The project safety documentation as required in the contract.

3.6.3.3 Signed receipt that the H/S program has been read, understood, and its principals will be practiced.

3.6.3.4 Notify the O&G Industries, Inc. Superintendent immediately of any incident that results in personal injury or property damage and provide a written report of the incident within 24 hours.

27- Basic Subcontractor Site Safety Rules

1.0 Purpose

1.1 O&G Industries, Inc. strives to provide a safe and healthful work environment for all of our employees and Subcontractors. In order to achieve this goal, it is necessary to set rules and regulations that provide a framework for appropriate conduct of all employees and Subcontractors. It is with the highest consideration of our employees' safety and well being, that these safety rules are set forth.

2.0 Scope

2.1 Each O&G Industries, Inc. subcontractor shall comply fully with the Company requirements that are outlined in this procedure. In addition, all applicable elements of this program will be maintained.

3.0 Hazard Awareness

3.1 Subcontractor recognizes that it and its subcontractors, suppliers, and employees have the obligation to comply with all federal and/or state safety and health laws and regulations.

3.2 Subcontractor specifically acknowledges that it has the primary responsibility to prevent and/or correct all health and safety hazards within the operations for which it and its employees or its Subcontractors and their employees are responsible.

3.3 Subcontractor further acknowledges that it and its Subcontractors, suppliers, and employees have special expertise in recognition and prevention of such hazards in the operations for which they are responsible and that Contractor does not have such expertise and is relying upon such expertise by Subcontractor and its Subcontractors, suppliers, and employees.

3.4 O&G Industries, Inc. (Contractor) retains the right to direct Subcontractor to eliminate all hazards of which Contractor has actual knowledge, but the recognition and abatement of such hazards are the responsibility of Subcontractor and its Subcontractors, suppliers, and employees.

3.5 Subcontractor agrees to indemnify and hold harmless Contractor and all other Subcontractors from claims, damages, losses and expenses,

3.6 Subcontractor, its Subcontractors, suppliers, and employees hereby certifies that it will

not allow on the project site any Subcontractor, supplier, and/or employee who is not fully trained in all safety aspects of the Subcontractor work, and who is not an expert in the operations comprising the Subcontract Work.

4.0 OSHA Requirements

4.1 The Subcontractor hereby acknowledges that it is familiar with the Federal Regulation 29CFR Part 1926 – Safety Health Regulations for Construction and applicable regulations in 29 CFR 1910 – Safety Health Regulations for General Industry. **http://www.osha.gov/**

4.2 The Subcontractor hereby agrees to conform with the requirements of the OSHA regulations and to follow the procedures set forth in the Contractor's Communications Standard identified herein and in accordance with those regulations and that standard shall forward to the Contractor's office to the attention of the Safety Director copies of all "Material Safety Data Sheets" for materials being brought onto the jobsite.

4.2.1 The "Materials Safety Data Sheets" shall be accompanied by a letter of transmittal stating the name of the Subcontractor, the name and location of the jobsite, description of what "Material Safety Data Sheets" are being sent, and any special precautionary measures that should be taken when using these materials.

4.3 The Subcontractor hereby acknowledges and certifies that it is familiar with Federal Regulations 29 CFR, Part 1926, Subart P – Excavations, as revised and printed in the Federal Register on Tuesday October 31, 1989, and the Subcontractor hereby agrees to perform the Subcontract Work in full accordance with all of the requirements set forth in this regulation.

5.0 Basic Safety Rules and Regulations

5.1 The Site Safety Manager has the authority to immediately stop work on the project. This work includes activities being performed by any sub contractor.

5.2 The Subcontractor hereby agrees to comply completely during the performance of the Subcontract work with all of the Contractor's designated safety programs for the project.

6.0 Accident Reporting

6.1 The Subcontractor hereby acknowledges and agrees to orally notify the Contractor's Site Superintendent within twenty-four (24) hours after any of the Subcontractor's employees and/or equipment and/or motor vehicles or any of its lower tier subcontractor's and/or

supplier's employees and/or equipment and/or motor vehicles are involved in a jobsite accident or injury.

6.2 Furthermore, the Subcontractor also hereby acknowledges and agrees to provide the Contractor with a completed first report of injury or accident report within five (5) days after any of the Subcontractor's or any of its lower tier subcontractor's or supplier's employees are injured in a jobsite accident.

7.0 Injury and Illness Data

7.1 The Subcontractor will be required to submit on a monthly basis its OSHA recordable and lost day incident rates for this specific project if specifically required by the Contractor's Project Manager or Project Superintendent.

8.0 Additional Rules and Regulations

8.1 The successful Bidder/Subcontractor, as a condition of employment will be required to comply with all applicable Federal, State, County, Municipal, Client, and Construction Manager SAFETY RULES AND REGULATIONS. (NOTE: Federal OSHA Standards are referenced, however the more stringent of State, Owner, or Local Safety Codes will also apply.)

8.2 Subcontractors found in non-compliance with any of the applicable rules and regulations will receive a "Notice of Violation" either oral or written. Failure to abate the violation or continued failure to comply with the Basic Safety Rules and Regulations may result in a monetary fine.

8.3 Following is a list of the Basic Safety Rules and Regulations, many of which carry the potential for a monetary fine. These Basic Safety Rules are not meant to be all encompassing but intended to serve as a guideline. Unless otherwise noted in the contract the Basic Safety Rules and accompanying fines which could be assessed are:

8.3.1 Subcontractor will submit its company SAFETY PROGRAM/HAZCOM PROGRAM and designate its Jobsite Safety Coordinator prior to starting work. Failure to do so may result in a $500.00 fine assessed to the Subcontractor.

8.3.2 All job related ACCIDENTS AND INJURIES will be reported to the O&G Industries, Inc. Project Superintendent within 24 hours, and a copy of all injury and accident reports shall be submitted to the Project Superintendent within 5 days of occurrence. Failure to do so may result in a $500.00 fine to the Subcontractor.

8.3.3 Subcontractor's employees will report all UNSAFE CONDITIONS AND NEAR

ACCIDENTS to their supervisor and the Jobsite safety officer so that corrective action can be taken.

8.3.4 Subcontractor's employees will attend any Jobsite SAFETY ORIENTATIONS as required. Subcontractor's supervisors shall attend O&G Industries, Inc. Corporation's WEEKLY SAFETY MEETINGS. Subcontractors must hold a "Weekly Tool-Box Safety Meeting" and submit a record of those employees who have attended, along with a list of topics and related information discussed. Failure to comply with any of the above may result in $500.00 fine assessed to the Subcontractor per written incident.

8.3.5 Copies of CERTIFICATIONS FOR SPECIALIZED TRAINING required performing certain types of hazardous work or operating certain tools and equipment will be required to be submitted prior to work commencing.

8.3.6 Subcontractor will provide all required PERSONAL PROTECTIVE EQUIPMENT (PPE) (i.e. head, hearing, eye and face protection) to his employees for their use in order to perform their work safely and in compliance with local and federal codes of safe practices and manufacturers recommendations. All equipment shall be in good working order and all defective equipment shall be discarded and removed offsite immediately. Failure to do so may result in $500.00 fine for each violating employee, assessed to the Subcontractor.

8.3.7 HARD HATS (ANSI Z89.1) will be worn at all times on site. Alterations or modifications of hat or liner shall be prohibited. Failure to do so may result In a $500.00 fine for violating worker assessed to the Subcontractor.

8.3.8 SAFETY GLASSES (ANSI Z.87.1) may be required to be worn 100% of the time on certain jobsites and also inside or around existing manufacturing facilities. Otherwise, safety glasses are required to be worn. Failure to do so may result in $500.00 fine for each violating employee, assessed to the Subcontractor.

8.3.9 HEARING PROTECTION will be worn in areas where noise levels exceed 90 DBA, where exposure to 85-90 DBA exceeds (8) hours per day, or where posted. Failure to wear hearing protection when required may result in a $500.00 fine for each violating employee, assessed to the Subcontractor.

8.3.10 All workers must wear clothing having adequate protection to the body. Sturdy work boots, shirts with sleeves, and long pants must be worn. No sneakers, sandals, tank tops, cut-off shirts, or shorts allowed. Failure to be properly clothed may result in a $500.00 fine for each violating worker, assessed to the Subcontractor.

8.3.11 Subcontractors will implement a RESPIRATORY PROTECTION PROGRAM per OSHA standards as required by their respective trades and working conditions in

field. Failure to do so may result in a $500.00 fine for each day that sub does not conform to OSHA standards.

8.3.12 "HORSEPLAY" on the Jobsite is strictly prohibited. No running on jobsite unless extreme emergencies warrant. Fighting on construction premises will result in immediate dismissal of employee, who shall be excluded from all O&G Industries, Inc. construction projects.

8.3.13 Subcontractor will provide FALL PREVENTION barricades, cover rails, etc. to protect all roof, floor, or wall openings, pits, holes, etc. that have resulted from their work performance. Unsafe conditions must be corrected immediately.

8.3.14 Subcontractors will provide FALL PROTECTION (harness/shock-absorbing lanyards, etc.) as required for their employees where permanent or temporary fall prevention is not in place. Failure to do so may result in a $1000.00 fine assessed to the Subcontractor.

8.3.15 FIREARMS, ALCHOHOLIC BEVERAGES, OR ILLEGAL DRUGS are not allowed on site. Personnel, vehicles and equipment are subject to search upon entering or leaving and while on the site premises. The use of alcoholic beverages or the use and possession of illegal drugs during the workday, either on site, during breaks, or lunch, or before work is prohibited. Anyone caught using illegal drugs or alcohol during any of these times is subject to immediate termination or dismissal from the site indefinitely and a $1000.00 fine may be assessed to the Subcontractor for each violating worker involved.

8.3.16 CAMERAS AND RECORDING DEVICES are not allowed unless approved through the O&G Industries, Inc.'s project Manager's office.

8.3.17 All Subcontractors will keep their respective areas clean and hazard free. HOUSEKEEPING will be done on a daily basis or more frequently if conditions warrant. Failure to do so may result in a back charge to the Subcontractors involved for clean up directed by O&G Industries, Inc.

8.3.18 ALL tools, whether company or personal, must be in good working condition. Defective tools must not be used and should be removed offsite (i.e. chisels with Mushrooms heads, hammers with split or loose handles, saws or grinders guards, etc.) Failure to comply may result in a $500.00 fine assessed to the Subcontractor.

8.3.19 Ground Fault Circuit Interrupters (GFCIs) will be used on all extension cords, electric tools, and portable electric equipment powered from a temporary electric service generator. Tools and equipment will be inspected each week by a Competent Person for defects. If electrical power is used from permanent power system or existing building, the Subcontractor shall provide a GFCI system

between his equipment and permanent power. Substitution of an "assured grounding program" in lieu of 100% GFCI protection requires authorization from O&G Industries, Inc. and compliance to OSHA 1926.404(b) (iii) i.e. written program, competent person, daily inspections, tests, etc. Failure to comply may result in a $500.00 fine assessed to the Subcontractor.

8.3.20 PERMITS, written and properly authorized will be required for work of any type including welding an open flame, electrical "hotwork" excavation, confined spaces, cranes, lockout/tagout, blasting, fire protection, water, powder-actuated tool, etc. Check with O&G Industries, Inc. for work permits required. Failure to do so may result in a $1000.00 fine assessed to the Subcontractor.

8.3.21 Subcontractor will obtain HOTWORK PERMIT for all open flame work as required by the Site Superintendent/Jobsite Safety Manager. During welding, burning, soldering, cutting, grinding, or using gas heaters, or salamanders, adequate fire prevention precautions will be implemented, consisting of removal of flammables and combustibles, protection of adjacent areas, appropriate fire extinguishers or standpipes, and similar measures. If these are not employed, then a fire watch, equipped with an approved portable fire extinguisher is required during and for a sufficient time after, the welding, burning, cutting, or grinding operation. Failure to comply may result in a $500.00 fine assessed to the Subcontractor.

8.3.22 BURNING AND CUTTING EQUIPMENT will be inspected daily before being used. All hoses and manifolds will be removed from bottles and protective caps replaced at the end of each day. Failure to comply may result in a $500.00 fine assessed to the Subcontractor.

8.3.23 Crowfoot connections of COMPRESSED AIR HOSES will be wired to prevent accidental disconnection. Failure to comply may result in a $500.0 fine assessed to the Subcontractor.

8.3.24 LOOKOUT/TAGOUT procedures are enforced and will be followed to protect persons from injury due to inadvertent operation of power-driven equipment, opening of pipeline valves, or energizing of electrical circuits. Coordinate this procedure with O&G Industries, Inc. Failure to do so may result in a $1000.00 fine assessed to the Subcontractor.

8.3.25 Electrical "HOTWORK" is not allowed without written approval from O&G Industries, Inc. Proximity work to electrical equipment is also not allowed without written approval from O&G Industries, Inc. Failure to comply may result in a $1,000 fine assessed to the Subcontractor.

8.3.26 Subcontractor shall provide its own LADDERS, which will be in accordance with OSHA and ANSI specification. All ladders must be in safe condition without broken or defective rungs, rails, and hardware. No metal ladder will be used in or around any electrical work. Ladders will be secured at the top and bottom and

extend 3 feet past the walking surface. Failure to do so may result in a $1,000 fine assessed to the Subcontractor.

8.3.27 SCAFFOLDING of all types will be provided, erected and used in accordance to OSHA 29CFR 1926, Subpart L. Failure to do so may result in a $1,000 fine assessed to the Subcontractor.

8.3.28 CONFINED SPACE procedures are enforced and require an entry permit from O&G Industries, Inc. Confined spaces include manholes, vessels, duct work, etc. where such hazards as oxygen deficiency, hazardous gases, contamination, high fire, and difficulty in escaping are involved. Failure to do so may result in a $1,000 fine assessed to the Subcontractor.

8.3.29 HAZARDOUS MATERIAL procedures are enforced and protection of all personnel from acids, corrosives, flammables and toxics will be in compliance with OSHA 29CFR 1926, Subpart D (Hazard Communication). Failure to follow these procedures may result in a $1,000 find assessed to the Subcontractor.

8.3.30 ALL WARNING SIGNS, barricades and tags will be used to the fullest extent and will be obeyed.

8.3.31 ALL EARTHMOVING AND COMPACTION EQUIPMENT will have working alarms, horns, and protective devices in compliance with OSHA 1926.602 standards. Failure to do so may result in a $500.00 fine for each machine assessed to the Subcontractor.

8.3.32 ALL TRENCHES/EXCAVATIONS will be in accordance with OSHA 29CFR 1926, Subpart P with particular emphasis on excavations over 5 feet and sloping requirements. “Call Before You Dig”, utility companies and facility owners must be notified for verification of utilities prior to digging. Failure to do so may result in a $1000.00 fine assessed to the Subcontractor.

8.3.33 ALL CONCRETE AND MASONRY CONSTRUCTION will be in accordance with OSHA 29CFR 1926, Subpart Q, with particular attention to general requirements of construction loads, guarding of reinforcing steel to eliminate the hazard of impalement, personal protective equipment, fall protection for erecting reinforcing steel, and limited access zone for masonry construction. Failure to follow these procedures may result in a $1,000 fine assessed to the Subcontractor.

8.3.34 ROOFING WORK will be performed in accordance with OSHA 29CFR 1926.500(g) with special emphasis for provision by the roofing contractor of a motion stopping safety monitoring system. Failure to do so may result in a $500.00 fine assessed to the Subcontractor.

8.3.35 ALL CRANES will have a current Certification Sticker by an independent crane

Certification Company, have a current maintenance log, required swing radius protection, and valid operators licenses where required. Failure to do so may result in a $1000 fine assessed to the Subcontractor who rents/leases/owns the crane.

8.3.36 FLAMMABLE LIQUIDS will be stored in approved metal safety cans and contents will be labeled by NFPA standards. Indoor storage of flammable or combustible liquids will not exceed 25 gallons unless stored in approved cabinets. Failure to do so may result in a $500.00 fine assessed to the Subcontractor.

8.3.37 VENTILATION METHODS will be provided to the Subcontractor whenever hazardous substances such as dusts, fumes, mists, vapors, or gases are produced in the course of the Subcontractor's work. The Subcontractor will provide fans, ducts or other means to exhaust substances to the outside. See OSHA 1926.57 for details. Failure to do so may result in a $1000 fine assessed to the Subcontractor.

8.3.38 SEXUAL HARRASSMENT, including verbally or physically offensive behavior on the Jobsite is prohibited. Failure to adhere to this policy may result in a $1,000 fine Assessed to the Subcontractor and the dismissal of the offending employee(s) from the Jobsite.

8.3.39 ALL OTHER SAFETY REQUIREMENTS within OSHA regulations will be complied with at all times by Subcontractor/Vendors of any tier and their employees. Failure of Subcontractor/Vendor to comply with or failure to promptly abate any violation of OSHA regulations, not otherwise herein listed, when requested by O&G Industries, Inc., may result in a $500 fine assessed to the Subcontractor/Vendor for each incidence of occurrence or unheeded request.

8.3.40 NOTE: These Basic Safety Rules and Regulations highlight some of the major components and Requirements of the O&G Industries, Inc. Safety Program. A complete Safety Program Manual will be made available with the Subcontract Agreement or upon request.

28- Regulatory Inspection Procedures

1.0 Purpose

1.1 The purpose of this procedure is to provide guidance to O&G Industries, Inc.personnel regarding company expectations for our response to regulatory agency inspections on our projects. In addition, this procedure should be utilized for advance preparation for regulatory inspections.

2.0 Scope

2.1 Each O&G Industries, Inc. employee or subcontractor shall comply fully with the Company requirements that are outlined in this procedure.

3.0 Procedure

3.1 Right of Access and Notifications

3.1.1 O&G Industries, Inc. will strive to maintain a positive working relationship with all regulatory agencies. By law, any regulatory agency or compliance officer (Authority) has the right to enter and inspect any place of employment during normal working hours. Also, by law, O&G Industries, Inc. has the right to deny entry into our project. It is O&G Industries, Inc.'s policy NOT to deny entry and to fully cooperate with Regulatory Inspectors. The O&G Industries, Inc. Director of Safety must be contacted immediately if the project team intends to deny entry.

3.1.2 The Site Safety Manager or Project Superintendent should meet with the Authority to determine the nature of their visit and to verify credentials, if necessary.

3.1.3 The O&G Industries, Inc. Director of Safety must be contacted immediately upon notification of a regulatory agency inspection.

3.1.4 The Compliance Officer (CO) or Authority has the right to enter any place of employment accompanied or assisted by outside engineers or specialists.

3.1.5 The CO or Authority is entitled to bring cameras, video equipment, tape recorders and other testing equipment that is required to perform their audit.

3.1.6 O&G Industries, Inc .has the right and duty to ensure the CO or Authority is escorted for safety, coordination and property protections. A CO must never be allowed on site without an escort.

3.2 Opening Conference Guidelines:

3.2.1 Ensure that the CO or Authority presents all of the required information in the opening conference.

3.2.2 Ask clarifying questions to thoroughly understand the nature of the inspection. If the inspection is due to a complaint, obtain a copy of the complaint letter.

3.2.3 Inquire how long the CO anticipates the inspection will take so you may estimate your time commitment and level of resources needed to support the inspection.

3.2.4 Verify if the CO or Authority will need to perform any sampling and ensure that action is monitored by an O&G Industries, Inc. staff member.

3.2.4.1 If sampling is anticipated, notify the Director of Safety for guidance in observing the sampling and to determine whether or not the company will collect comparison samples.

3.2.5 Documentation – the following is a list of documentation (not all-inclusive) that is often requested during a regulatory agency inspection:

3.2.5.1 Site Specific Safety and Health Program;

3.2.5.2 Subcontractor Accident Prevention Programs;

3.2.5.3 OSHA 300 Log;

3.2.5.4 Hazard Communication Program;

3.2.5.5 Training Records

3.2.5.6 Safety Training Records;

3.2.5.7 CPR/First Aid Training Records; and

3.2.5.8 Applicable Inspection Records.

4.0 During the Inspection

4.1 An O&G Industries, Inc. representative will remain with the CO or Authority at all times unless they request privacy for interviews with employees or management. O&G Industries, Inc. will remind employees that they are under no obligation to speak privately with the CO or Authority.

4.2 A CO or Authority may request certain documents and duplicate copies may be turned over with concurrence from the O&G Industries, Inc. Director of Safety.

4.3 Discussions and negotiations regarding distribution of company confidential documents will involve the O&G Industries, Inc. Director of Safety. All documentation with employee's names will be blackened out to protect confidentiality.

4.4 During the walk around portion of the inspection, all attempts to correct apparent violations will be made by O&G Industries, Inc. staff and/or the hazard creating subcontractor.

4.5 The CO or Authority will take photographs, videos and measurements during the walk around phase. The O&G Industries, Inc. representative will duplicate each photograph, video and measurement and document the circumstances concerning the alleged violation.

4.6 Never admit guilt or volunteer any additional information than necessary to answer a question concerning an alleged violation.

5.0 Closing Conference

5.1 During the closing conference the CO or Authority will likely state if there will be a follow-up inspection from another agency and any apparent violations noted during the walk around phase.

5.2 All documentation will be forwarded to the O&G Industries, Inc. Director of Safety at the conclusion of the inspection.

29-HAZWOPER

In accordance with 29 CFR 1910.120, O&G Industries, Inc.has developed a specific Health and Safety Plan for work in areas within the site that contain hazardous material and hazardous waste. The HAZWOPER plan is separate and apart from this program and may be obtained from the Manager of Health and Safety upon request. The HAZWOPER health and safety plan will only be referred to in situations where hazardous materials are present.

30 – Demolition

A. Preparatory Operations

1. Prior to initiating demolition activities, an engineering survey of the bridge section is required to be completed by a qualified person to determine the condition of the structure and identify areas subject to unplanned collapse. A copy of this inspection must remain on site throughout the demolition operation. The plan should include:
   - 1.1. Structural hazards or instabilities
   - 1.2. Adjacent structures that may be impacted and provisions used to protect those structures
   - 1.3. Existing conditions survey
   - 1.4. Sequence that ensures structural stability throughout the process, identify load bearing elements
   - 1.5. Temporary bracing and shoring procedures
   - 1.6. Maximum load bearing capacities of slabs, consider live load from mechanical equipment
   - 1.7. Public protection measures
   - 1.8. Dust control techniques
   - 1.9. Fall protection requirements, means and methods
   - 1.10. Employee access

2. Utilities are to be shut off, capped or locked out of service beyond the building line before demolition work is initiated. All piping, pits, crawl spaces that may contain flammable or combustible gases shall be exhausted when applicable (e.g. natural gas piping). In each case, any utility company that is involved should be notified in advance, and its approval or services, if necessary, shall be obtained.

   2.1 If it is necessary to maintain any power, water, or other utilities during demolition, such lines should be temporarily relocated or protected, but always marked out with visual aids (marking paint/color cones). All workers should be informed of the location of any existing or relocated utility service.

3. A hazard assessment (Job Safety Task Analysis) is required to be conducted prior to the start of work to identify any hazardous materials/chemicals, gases, explosives, flammable materials, asbestos / lead containing materials, PCB containing materials (transformers, light ballasts), mercury containing switches and light tubes, or similarly dangerous substances that may have been used on the property. During the hazard assessment process, all safety equipment needs should be determined as well. The required number and type of respirators, personal fall arrest systems, warning signs, and all other personal protection devices must be determined.

   3.1 If, during the demolition operation ‘suspect material’ is uncovered, work in the area is to stop immediately until the material can be identified and/or abated by the owner or their designated abatement contractor. Work will not be allowed to continue until the project receives notification that the area is clean or how to proceed with work safely.

4. Prior to starting work, all contractors onsite shall make provisions for prompt medical attention in case of serious injury. The location of the nearest hospital and walk-in clinic must be posted on the job site. Site foremen/supervisors must have instructions for the most accessible routes to these facilities. The telephone numbers of each facility must also be conspicuously posted.

4.1 A team comprised of individuals with a valid certification from an accredited first aid training organization, must be on hand for immediate assistance with serious injuries/accidents.

4.2 A properly stocked first aid kit must be available at the job site. This first aid kit should contain appropriate supplies and should be inspected/re-stocked on a month-to-month basis.

5. A fire protection and emergency response plan must be developed for the project. These programs should outline the assignments of essential personnel in case of a fire or emergency and all evacuations measures onsite. The program should contain provisions for securing hot work permits and instructions for shutting down all burning and hot work operations one half hour before the end of the work shift. Easy access to all firefighting equipment (stand pipe connections, fire extinguishers, etc.) must be maintained at all times. All firefighting equipment must be inspected periodically for proper operating conditions.

5.1 Equipment powered by an internal combustion engine shall be located so that the exhaust discharges are well away from combustible material. All internal combustion equipment shall be shut down prior to refueling and the fuel shall be stored in a safe location. Sufficient firefighting equipment must be located near all flammable/combustible liquid storage areas. Only approved containers shall be used for the storage and handling of these liquids.

5.2 Smoking shall be prohibited near hazardous operations or materials. All workers in violation will be removed from the project immediately.

5.3 Roadways between and around combustible storage piles shall be at least 15' wide and maintained free from accumulation of rubbish, equipment, or other materials.

5.4 An alarm system for all emergencies shall be established for speedy notification to all site workers and local emergency agencies/departments. This alarm code shall be posted and reported to all site workers during their initial safety orientation class.

6. Prior to the start of demolition, all local ordinances and permitting issues are to be addressed.

B. Protective Structures

1. A variety of protective structures are used to protect demolition workers, as well as the public, from the hazards during the demolition process. Ladders, scaffolds, powered manlifts, when used properly, provide easy and safe access to high elevations. Guardrails and PFAS enable workers to work safely on elevated work areas. Sidewalk canopies, temporary walkways, catch platforms, and fences protect the public from demolition activities. Shoring is a means of retaining structures that are unstable or may become unstable during demolition.

2. Signs and lighting are required during all phases of demolition work. These signs shall be specific to the immediate hazard in/around an immediate area for all workforce personnel, as well as the public.

2.1 Danger signs shall be used only where an immediate hazard exists. Caution signs are used to warn against potential hazards or to discourage unsafe practices. Exit signs are used to indicate which passageways lead to safety during emergencies. Do Not Operate tags are used on equipment under repair or damaged. Men Working Above signs signal to site workers and pedestrians that tasks are being performs at an upper elevation and foreign material could possibly fall in that area below. Demolition In Progress signs are to warn all area personnel that activities such as hoe-ramming, jack-hammering, dismantling are underway.

2.2 Artificial lighting should be provided if there is any question about the ability of workers to work safely under natural light conditions. OSHA requires that construction areas, ramps, runways, corridors, and storage areas shall be lighted to not less than the minimum illumination intensities in the table shown below:

FOOT-CANDLES	AREA OF OPERATION
5	**General construction area lighting**
3	**General construction area lighting, concrete placement, excavation and waste storage areas, loading platforms, and refueling areas**
5	**Indoors: Hallways and exit ways**
5	**Tunnels, shafts, and underground areas**
10	**General construction plants and shops**
30	**First aid stations and offices**

3. Ladders are used extensively in demolition and are classified as either fixed or portable. Fixed ladders are considered to be permanent fixtures that will rarely move, while portable ladders are relocated regularly. Step ladders, straight ladders, and extension ladders are all examples of portable ladders and must be made of wood or fiberglass. Metal/aluminum ladders are not permitted onsite during demolition phases. All ladders must be free of defects (cracks, splits, and other deformities) that may compromise their capacities. Wooden ladders cannot be painted and will be removed from site if found.

3.1 Ladders must be secured and extend 36'' above the entering platform.

3.2 The ideal ladder is set 75 degree, or one foot horizontally away from the structure for every four feet of vertical rise. (Example: 20' ladder should be placed 5' away from structure.)

3.3 The 3:1 ratio for climbing the ladder must always be utilized. This means that for every limb that is not in contact with the ladder at one time, there should be 3 other limbs firmly attached to the rungs (one foot off, both hands and one foot on).

3.4 Safety training for the safe use and inspection of all types of ladders must be conducted by a competent person prior to the start of use. This training must be documented and kept onsite.

4. There are 3 major types of scaffolding that may be used on O&G projects: (1) built-up scaffolding; (2) rolling scaffolds; (3) suspended scaffolding. Scaffolding is also categorized by the max safe load it can support on its platform area. Light duty – 25 lbs. ppsq, Medium duty – 50 lbs. ppsq, and Heavy duty – 75 lbs. ppsq. Prior to installation of scaffolding, the intended usage should be evaluated to determine the correct load capabilities needed. All scaffolds must be constructed to safely support a weight of four times the maximum intended working load.

4.1 Scaffolding must be inspected by a competent person before each shift. The competent person must be able to show competency in all pertinent requirements of 29 CFR Part 1926, Subpart L.

4.2 Guardrails, consisting of a top rail, mid rail, and toe board, shall be provided on all open sides and ends of elevated working platforms. The top rail shall be approximately 42'' above the working surface, the mid rail shall be installed halfway between the top rails and working surface and the toe board must be 4 inches height. All guardrails shall be able to support 200 lbs. of force in all directions. All defects shall be corrected immediately.

4.3 Built-up scaffolds must utilize level mud sills to provide a stable base for scaffolding feet and distribute weight properly. Built-up scaffolds must be secured to the nearest structure at least every 26 feet vertically and 30 feet horizontally. Ladder access or stair access must also be provided as well.

4.4 Rolling scaffolds must have a positive lock on each wheel to prevent unexpected movement. All materials must be secured during moving operations. Each rolling scaffold must be cross braced horizontally.

4.5 Suspended scaffolding outrigger beams, must be secured to a piece of structural steel adequate to carry the load. All manufacturer's recommendations must be followed directly when installing/using/dismantling this equipment. Suspending cables, whether fiber or wire must be capable of supporting at least seven times the total intended load. If open flame (torch use) is intended around the suspending cables, the cables must be protected. Independent fall protection shall be used for all workers on suspended scaffolding. A vertical/horizontal lifeline must be anchored to a structural component of the building or structure in which they are working on.

4.6 Workers using aerial lifts must be trained in the safe use and operation of the equipment by a competent person. A pre-use inspection must be performed on all aerial lifts by the intended occupant. All aerial lifts must be operated on smooth, firm, level surfaces and protected from traffic via barriers or TCDs. A retractable lifeline is the only acceptable form of fall protection during aerial lift use, and must be attached to the manufacturer's supplied anchor point.

4.7 Shoring devices must be made up of wood, steel, or a composite material capable of supporting the temporary load needed. The shoring system must be inspected prior to each shift by a competent person. Vertical shoring may be required when walls/columns/piers are removed. Impact loading of falling debris must also be identified to the engineering pre-assessment phase. Timbers, steel posts or shoring towers may be sued to accomplish vertical shoring. Before tightening, the shoring must be plumbed to prove maximum stability. If a wedge is used, it should be checked after it is installed. Lateral shoring must be installed with proper bracing before demolition begins. Free standing wall sections more than one story must have lateral bracing. Horizontal shores must be properly anchored to a load-bearing member of the nearest structure.

4.8 Before demolition work has begun, every sidewalk or public thoroughfare adjacent to the public or near enough to be affected by the work must be relocated or protected. Whenever possible, pedestrian and vehicular traffic should be prohibited from any area that is closer to the perimeter of the structure being demolished than ¼ of the height of the structure. If this cannot be achieved, a protective canopy must be installed. The canopy must cover the entire route that is adjacent, adjoining, continuous, or abutting the structure to be demolished. The canopy must be 8' above the walking surface and shall be lighted by natural light or artificial means. The roof must be able to support 150 lbs. per square foot, be 2'' thick, and have an extension 2' over the edge of the canopy.

4.9 When pedestrian or vehicle traffic is required to use an area closer to the perimeter than ¼ the height of the structure being demolished, a catch platform or scaffold should be erected. These platforms cannot be further than 40' below the level that is being demolished. Catch platforms should be capable of supporting 150 lbs. per square foot and be at least 7' wide. Debris must not be stored or allowed to be accumulated on the platform and should be removed as necessary.

4.10 All other applicable scaffolding requirements are defined within the O&G Industries, Inc. Site Safety and Health Program under section 14 Scaffolding Safety Program.

C. Personal Protective Equipment

1. It is the employer's responsibility to determine what protective equipment will be used for specific hazards during the demolition process. Supervisors are responsible for making equipment available and for its sanitation and maintenance. It is also the supervisor's responsibility to train each worker on how to properly use and care for the equipment.

1.1 Work clothing shall fit properly to avoid machine parts, protruding objects, or caught-in/on accidents. Proper clothing shall be worn of the specific weather during each work shift to avoid additional stresses on the body (i.e. Heat/Cold Stress).

1.2 Hand protection must be worn to provide adequate protection against hand injuries in demolition work. All workers using sharp object that could cause laceration of puncture wounds must wear gloves during working operations.

1.3 Foot protection must be worn to provide protection against foot injuries in demolition work. All workers must have steel or composite material toe boots to prevent crushing injuries. Rubber sole and thick tread must also be incorporated on the shoe. No open toe or sport sneakers are allowed during demolition activities.

1.4 On a demolition site the use of hard hats must be mandatory. Hard hats are intended to prevent head injuries from flying objects and from bumping one's head. Only ANSI-approved hats should be used, as these provide adequate protection against most head injuries.

1.5 Eye and face protective devices consist of safety glasses, goggles, face shields, welding goggles, and welding helmets. Safety glasses and goggles must be worn to protect the eyes from dust, flying particles, sparks, and splashing liquids. Face shields provide additional protection from the same hazards and shall only be worn over safety glasses or goggles. Welding goggles and hard helmets must be used by all workers engaged in welding and by all workers assisting in these activities.

1.6 The use of protective lenses for welding and cutting is necessary to prevent permanent eye damage from intense ultraviolet and infrared radiation. The degree of protection required depends on the degree of exposure. The use of welding goggles, adequate for light cutting and acetylene welding (tinted to Shade 4), is the minimal requirement. For plasma-arc cutting, shotgun torches, and electric arc welding, a welding helmet (tinted to Shade 6) is necessary. Face protection for lighter cutting is often provided by using a face shield over welding goggles. Similar protection should be afforded to workers who assist in welding and cutting work.

1.7 Hearing protection must be used during all phases of demolition when the decibel level exceeds the PEL per OSHA. Generally, ear plugs will reduce the dB level to a safe exposure level during all demolition work. If this cannot be obtained by just ear plugs, ear muffs will be provided.

1.8 All other applicable personal protection requirements are defined within the O&G Industries, Inc. Site Safety and Health Program under section 15 PPE Program.

1.9 The use of respirators is required whenever entering an area in which the concentration of airborne contaminants exceeds permissible exposure limit (PEL) standards. During demolition

activities, the selection of the proper respirator is imperative and based upon the possible exposure from the materials/chemicals being used in or around the immediate area.

1.10 All other applicable personal protection requirements are defined within the O&G Industries, Inc. Site Safety and Health Program under section 16 Respiratory Protection Program.

1.11 Personal fall arrest systems are designed to protect workers exposed to a fall greater than 6'. The supporting member that a PFAS is attached to is called an anchor point. Vertical lifelines (or droplines) are ropes or cables that hang from one anchor point; horizontal lifelines are stretched between two anchor points of equal height. The choice of systems depends on available anchor points and on whether vertical or horizontal mobility is more important to performing the job. Each vertical lifeline must be capable of supporting one worker who is attached to the lifeline; a horizontal lifeline must be designed and installed by a qualified person and have a safety factor of at least 2.

1.12 A full body harness distributes the shock load over the seat, and thighs. All harnesses must fit the individual wearing it correctly. Thigh straps shall be snug and have less than 1'' of space between the thigh and the strap. The chest strap must also be snug and fit horizontally between the shoulders, running across the sternum. The D-ring must be centered in the middle of the shoulder blades.

1.13 A shock absorbing lanyard is a device which connects the harness to the anchor by means of a double locking snap hook. Retractable lanyards are also available. These are retracting lines that automatically engage and catch the line during a fall. Generally, shock absorbing lanyards come in a 6' length. These lanyards are not applicable in all situations where the fall hazard is less than 18'. Situations of this nature include, but are not limited to; aerial lifts, form work, scaffold erection/dismantling, and all other upper elevation work below 18' to the level or obstruction below.

1.14 All anchors points, cables and slings used for a PFAS shall be capable of supporting a minimum dead weight of 5,000 pounds. All PFAS hardware shall be constructed of drop forged or pressed steel capable of withstanding a tensile loading of 5,000 pounds without suffering deformation. Harnesses and lanyards must be secured directly above the worker to prevent them from swinging into structural members or other workers in the event of a fall. Acceptable anchorage points include, but are not limited to; concrete anchors, beam wraps, beam clamps, steel chokers, and direct tie off to structural steel.

1.15 All other applicable personal protection requirements are defined within the O&G Industries, Inc. Site Safety and Health Program under section 7 Fall Protection Program.

D. Debris Removal

1. Debris removal operations conducted inside the walls of a structure are usually accomplished through floor openings. When they are available, existing floor openings such as elevator and ventilation shafts should be used for this purpose. Otherwise, a qualified person shall be consulted prior to cutting floor openings. Floor openings must not take up more than 25 percent of the aggregate of the total floor area on each level, unless the lateral supports are left intact. Supporting beams must be left intact wherever possible, but when floors are weakened or otherwise made unsafe, they must be shored to carry the intended load from demolition operations. Pre-cast or post-tensioned concrete floors must never be cut, unless a Professional Engineer is consulted.

2. Each entrance to each level with one or more floor openings must be posted with WARNING signs, which indicate the nature of the hazard.

3. During the debris removal, securely fastened bumpers, 4" thick by 6" high must enclose the opening on the uppermost floor from which debris is being dumped. Intermediate floor openings must be barricaded by a substantial guard rail, midrail, and toe board extending 39-45 inches high and located at least 6 feet from the opening. Debris cleaning operations on the bottom floor must not begin until all dumping has stopped.

4. All floor openings, which are not in use as material drops, must be covered with a material capable of withstanding any load. Covers must be properly secured to prevent their movement and should be flush with the floor level. Covers shall be labeled and secured as per 29 CFR 1926.502(i}.

5. Chutes are to be entirely enclosed except for openings at or slightly above the floor level for the insertion of materials.

6. Chute openings are to be protected to prevent an employee from falling into the chute. In addition, chutes are to be taken out of service by barricading the openings while swapping a dumpster or when the chute is being unclogged.

7. Chutes are required to be constructed of fire rated material and are to be installed per local ordinances.

8. Chutes are to be provided with dust control measures and barricades at the point of discharge to eliminate injuries from objects from falling out of the dumpster.

9. Material is not to be dropped to a point outside the building, unless that area is delineated with a protective barricade and the distance to any point does not exceed 20 feet.

10. Removal of any lead based material must follow the guidelines set forth under the O&G Industries, Inc. Lead Health Protection Program and also the O&G Industries, Inc. Site Safety and Health Program under section 19 Lead Protection Program.

E. Equipment Safety

1. This section covers the safe use and operation of cranes, bulldozers, excavators, front-end loaders, and trucks. This equipment represents the largest source of potential hazards on demolition sites. The section will review the essential elements of inspecting, maintaining, operating, and transporting heavy equipment. The information should be used in conjunction with owner's manuals, operator training manuals, and ANSI and OSHA standards. There is no substitute, however, for years of training and experience.

2. Inspections of all equipment must be conducted by the intended operator prior to use of the machinery. In circumstances where the equipment could have been damaged or involved in an accident, the equipment must be inspected again.

   2.1 All pre-operational inspections must be documented by the operator and submitted on a daily basis. Completed inspections must also be maintained on file for at least 30 working days.

3. A thorough daily inspection includes a check to assure that all guards, falling object protective systems and rollover protective systems (FOPS/ROPS) are in place and in satisfactory condition. Machines

equipped with a canopy will protect the operator from the hazards of falling objects and roll over. Seat belts must be worn at all times.

4. Machine guards are required at all pinch points and on all cables and pulleys near points of operation as well as at their adjustments, entrance, and exit. Guards, in the form of control level cover, lockable ignitions, and padlocks on starter-engaging rods are also recommended to prevent accidental activation.

5. Ground conditions during operating must also be inspected prior to each operation or after relocation of equipment. Areas shall be identified where the ground is loose or muddy or where heavy traffic can be expected. When heavy equipment is to be used on floors, the intended loads to be imposed upon the floors must be checked in advance to determine their safety on the basis of accepted engineering requirements. All floor openings must be protected by securely fastened bumpers that will prevent equipment from running over the edge.

6. Prior to transporting any heavy equipment, whether driven, towed, or loaded on a flatbed trailer, a specific route should be planned. Clearances of bridges, tunnels, and other obstacles should be checked, with adequate allowances made for overhanging booms. Congested areas present additional hazards and should be avoided whenever possible. The worker who drives the machine on the truck or trailer should be thoroughly familiar with the equipment. The height and weight of the machine must be obtained and verified. The ramp and truck or tractor/trailer must be adequate to carry the load.

7. All other applicable personal protection requirements are defined within the O&G Industries, Inc. Site Safety and Health Program under section 22 Mobile Equipment and section 23 Vehicle Safety.

F. Welding & Torch Cutting

1. Welding and torch cutting work involve the generation of temperatures at which metals melt. Proper precautions must be taken to protect workers from heat, intense light rays and the gases and fumes that are generated. Fire prevention procedures must be carried out for the protection of workers and property. In electric arc welding, the danger of electric shock is a hazard that must also be dealt with. In gas torch cutting, the handling and storage of compressed gas cylinders present additional hazards which workers must be protected against.

2. Fire prevention is an integral part of all demolition procedures and must be maintained and controlled throughout the duration of each project. Welding and torch cutting operations present a severe fire hazard. When practical, combustibles in the vicinity of the welding or torch-cutting work must be moved to a safe place. If the piece being worked on and the combustibles cannot be separated by moving one or the other, then suitable barriers such as screens or tarps must be placed to separate the two. Hot work permits must be completed prior to any cutting, burning, and welding procedures that have the ability to create an ignition source.

3. In areas where the floors, walls, or ground cover are combustible, these areas must be protected by spraying them with water, spreading damp sand, laying sheet metal, or by equivalent protection. Adequate precautions must also be taken near floor and wall openings where people and combustibles are hidden from view.

4. In cases where a serious fire might quickly develop, a fire watch should be assigned to the area. Fire extinguishing equipment must be readily available and all employees must be trained in its use. A fire watch must be required to remain in the area where welding or torch cutting operations have taken place for a period of time after welding or torch-cutting operations have ceased due to the possibility of smoldering materials which could later ignite.

5. When torch cutting, the use of flammable fuel gases and oxygen pose additional fire hazards. Pure oxygen is extremely dangerous; it can ignite oil or grease, and even explode without a flame or spark.

    5.1 Therefore, oxygen regulators and fittings must never be oiled, greased, or cleaned with oily rags.

    5.2 Oxygen must never be used as a substitute for compressed air. It must not be used in pneumatic tools, in oil preheating burners, to start internal combustion engines, to blowout pipelines, to dust clothing, to create pressure, or used for ventilation.

    5.3 At pressures above 15 psig, or in certain mixtures with oxygen, acetylene can spontaneously explode.

6. In addition to fire and explosion hazards, welders and cutters may also be exposed to health hazards in the form of intense light rays and toxic fumes. The intense flame at the tip of the torch, or the electrode, emits light rays of three types: visible, infrared, and ultraviolet. Infrared light rays produce erythema (sunburn) on exposed skin surfaces. Intense ultraviolet rays can cause "welder's flash", a burn to the eyes.

    6.1 To prevent this, goggles or safety glasses with impact-resistant tinted glass filters must be worn during torch cutting or welding. Tinted lenses drastically reduce visibility and must only be worn while actually torch cutting. Face shields are required when there is a chance that slag will splash in the worker's face.

    6.2 To eliminate skin damage, workers must wear proper protective clothing. Synthetic fabrics should not be worn because they may melt when struck by hot slag. Cuffs and open pockets catch burning metal and should be avoided. Flame-resistant gloves and safety shoes must always be worn while torch cutting. Clothes must be kept free from oil and grease because they present a fire hazard both from sparks and from potential oxygen leaks.

7. Adequate ventilation must be ensured before starting any flame-cutting job in confined spaces. Mechanical ventilation such as a fume eductor (an exhaust fan attached to a hose located near the torch or welding operation) should be used whenever possible. If adequate mechanical ventilation cannot be provided, workers must be equipped with supplied-air respirators and a lifeline that is constantly watched by an outside observer.

8. Pressurized cylinders must never be dropped, dragged, or struck in any way. Pry bars and hammers must never be used on any part of the cutting torch system.

    8.1 Cylinders must always be kept in an upright position and secured. When cylinders are transported or moved at the job site while connected for use, the cylinder valves must be closed and the cylinders secured in place. Valve protection caps must be in place when cylinders are not connected for use.

    8.2 When cylinders are hoisted by crane, they must be secured to an approved cradle or platform. Cylinders must never be lifted by their valve protection caps or with electromagnets.

9. Separate areas for the storage of fuel gas and oxygen cylinders must be designated. These areas should be at least 20 feet apart, or be separated by a 5-foot high, 1-hour fire-rated wall, outside the range of falling debris, and away from heavy traffic areas. Storage areas must be kept clear of combustibles, including fuels, and be designated as "NO SMOKING" areas. Cylinders must not be placed where they might become part of an electrical circuit such as near radiators and piping systems that may be used for grounding electrical equipment such as arc welding machines. Empty cylinders must be treated the same

as full cylinders. Empties must be stored in a designated area after the following procedures have been completed.

10. Once the regulators are in place, the hoses (red for fuel, green for oxygen) are connected and the torch is attached. Fittings should not be forced. Any sign of wear means a hose must be repaired or replaced at once. Friction tape can be used to bind the hose together, but no more than 4 out of 12 inches of hose shall be taped. Hoses which are kept neatly coiled are less likely to become kinked, tangled, or get run over.

11. All other applicable personal protection requirements are defined within the O&G Industries, Inc. Site Safety and Health Program under section 18 Fire Prevention and Protection.

G. Hand Tools

1. Common hand tool injuries are often caused by the worker's attitude that "anyone knows how" to use the tools. The record, however, proves that this is certainly not the case. A survey of injuries in the demolition industry demonstrated that a high percentage of all work-related injuries involved hand tools, including the carrying, using, and storing of such tools.

2. Safe carrying of a hand tool requires taking precautions against injury in the event that a worker slips, trips, or falls. Pointed tools, such as chisels and screwdrivers, should never be carried point-up in any pocket, nor should they be carried point-down in a front pocket. Instead, they should be either hand-carried, with the point or sharp edge held AWAY from the body, or carried in a tool box, tool pouch, or special tool belt. Tools must never be carried in a way that interferes with a worker's ability to use both hands while climbing a ladder or structure. Rather, tools should be raised or lowered by rope (in a bucket, if necessary) before or after climbing a ladder. Tools must not be lowered or raised by their electrical cords or air hoses nor should they be dropped or thrown from one worker to another. Instead, tools should be handed from one to another carefully.

3. All hand tools must be inspected on a regular basis. This includes personal tools that some workers may bring to the job. If personal tools are found to be defective, the worker should be told to get new tools or be provided with company tools. The primary function of regular tool inspections is to assure that there are enough safe tools on hand to do the job. Defective tools must be tagged, repaired, or replaced.

4. Power tools pose extra hazards. Workers can experience electric shock, particles in the eyes, burns, cuts, and strains while using power tools. Most hazards can be eliminated by attention to these rules.

    4.1 Keep power lines and hoses out of passageways. Lines and hoses deteriorate quickly if materials are dropped or driven over. Workers might trip and fall over lines in passageways, presenting the additional danger that the tool may be wrenched out of the operator's control.

    4.2 Keep lines and hoses out of oil and chemicals, away from heat and sharp edges.

    4.3 Disconnect tools from power sources before making repairs or adjustments. Keys must be removed and guards replaced before reconnecting tools to power sources.

    4.4 Before turning on the tool, the area should be checked and potential hazards identified and/or corrected. This permits the operator to concentrate on the work at hand.

5. Electrocution, burns, and shocks when working with electric powered tools can be prevented by observing safe work practices. Only properly grounded or double insulated tools should be used on the job site. Additionally, 110 volt, single phase 15-20 amp outlets which are not part of a permanent wiring system are required to have ground fault interrupters or to be incorporated into assured equipment grounding conductor program. Before each use, electric tools should be inspected for proper grounding, frayed or broken wires, and cracked plugs. All extension cords should also be grounded and ground prongs should never be cut off. Electric tools should not be used when the operator is wet, standing on wet ground or flooring, or in explosive atmospheres. Care should be exercised to avoid cutting through the power supply, a frequent cause of operator injury.

6. Pneumatic power tools present special hazards because their pressurized hoses can be cut, disconnected, or punctured by a careless operator, another worker, falling debris, or from vehicles or equipment running over them. Deterioration from contact with heat or chemical agents or poorly fastened couplings can also cause an air hose to whip. Only approved couplings for the type of hose and working pressure should be used and only with the appropriate coupling safety devices. Air hoses should have a safety device at the source of supply to lower the air pressure in case of hose failure. Hand-held air hammers can become lethal weapons if misused. A tool that is not secured properly can fly out of its retainer with tremendous force and cause serious injury to the operator or to other workers. Pneumatic tools are equipped with deadman switches (automatic shut-off switches) which should never be tied down in the "on" position. All other tool safety devices must always be engaged properly before the tool is used.

7. When using abrasive or carbide tipped blades or carbide tools, it is essential that the proper blade is selected for the particular material being worked on. The blade should be mounted tightly, securely, and in the correct rotation direction, according to manufacturer's instructions. When mounting or changing a saw blade, the power supply must be disconnected. Abrasive blades, used for cutting masonry or metal, should be examined for cracks or scratches before each use. A blade guard must always be used and should cover a substantial portion of the blade. The guard should be replaced when damaged or worn.

   7.1 When operating an abrasive blade tool, the worker should wear appropriate personal protective equipment and position his body to the side of the blade, not directly behind. A full-face shield must always be worn. A back-and-forth-cutting motion should be used. Jamming, grinding, and extensive side pressure on the wheel should be avoided. The worker should concentrate on the work surface, making sure the blade does not come into contact with anything other than the material being cut. Abrasive blades should be stored upright in a dry area and proper maintenance procedures followed.

8. Air compressors are often used by the demolition industry. When misused, however, they can injure and kill. At the source of supply or branch line, there shall be a pressure-reducing valve to reduce air pressure in case of hose failure. When attaching air hoses, all the couplings have small openings that line up. A safety clip or wire can be inserted to secure the couplings. All pneumatic tools shall be secured to the hose or whip by positive means to prevent the tool from becoming accidentally disconnected.

   8.1 Examine the air hoses before each use for deterioration and for positive clamping of the hose to the fittings. When changing air tools, shut off the valve at the source of supply. Under no conditions shall a hose be kinked to stop the airflow. Air hoses shall be kept out of aisle ways or areas where they can be damaged by traffic or falling materials.

   8.2 When using compressed air, personal safety equipment is needed. It is the employer's responsibility to see that the employees wear all necessary safety equipment. Cleaning clothes with compressed air is extremely dangerous and shall not be permitted. Workers shall be informed

that pointing or touching the compressed air hose opening to his own or another worker's body can damage an ear drum, blowout an eye, inflate a part of the body, or can inject air bubbles into the blood stream which can be fatal. Compressors should never be operated in confined spaces unless the exhaust is vented to the outside.

31 – OSHA Inspection Guidelines

OSHA Inspection Guidelines

A. Policy Statement

1. The purpose of this procedure is to provide guidance to O&G personnel on how to respond to Occupational Safety & Health Administration unexpected inspections on our projects/plants/locations. In addition, this procedure should be used to prepare for anticipated regulatory inspections.

A. Procedures

These procedures are to be followed completely when OSHA appears at an O&G Industries, Inc. project or facility.

1. O&G will strive to maintain a positive working relationship with all regulatory agencies. By law, any regulatory agency or compliance officer (Authority) has the right to enter and inspect any place of employment during normal working hours. It is O&G's policy **NOT** to deny entry and to fully cooperate with Regulatory Inspectors.

2. Ask the Compliance Officer(s) why OSHA is there. (Is it a scheduled complaint or referral inspection?) If a complaint, ask for a copy, which they are required to give you.

3. **IMMEDIATELY** notify **Sean McNeill** (O&G's Safety Mgr. – (860) 459-9810). The responding O&G Safety Department staff member will make every effort to arrive at the Project prior to the actual start of the inspection. Next you must contact the Project/Plant Manager & Divisional VP.

4. Once the compliance officer has arrived and introduced themselves, escort them to a pre-determined indoor location (i.e.: job trailer, conference room, office). Keep in mind that this location will serve as the setting for the opening/closing conference, interviews, and documentation audit. Determining this location in advance will help to alleviate any additional stress in the event of an unexpected inspection.

5. The Project Superintendent or Plant Supervisor shall accompany the OSHA Compliance Office during the inspection and all other times OSHA is on site. This also applies if OSHA is on site to only inspect a Subcontractor.

6. The *O&G Industries, Inc. OSHA Inspection Report* is to be started at the beginning of and completed immediately after the inspection. Accurate and complete reporting is very important. Report on everything the Compliance Officer writes down and if OSHA takes a photograph, O&G shall take the same photograph. *Taking multiple vantage point pictures is always best*

7. Do not agree or disagree with any alleged O&G or subcontractor safety violation that the Compliance Officer finds. Anything you say can be repeated in a court of law.

8. Promptly correct all safety hazards and unsafe acts discovered during and after the OSHA inspection.

9. Do not give OSHA copies of any documents without the express approval of O&G's Director of Safety & O&G Senior Management. Limit what you provide to the inspector to the specific documentation requested.

10. When accompanying the OSHA Inspector on the Site Tour, **NEVER** walk in front of the Inspector. You may be unknowingly exposing yourself to a Safety Violation that could result in a fine.

11. If a member of O&G's Safety Department is unable to accompany the O&G Project Superintendent or Plant Supervisor during the OSHA inspection, call **Dan Carey** (HR Director - (413) 552-9858) immediately if any problems or questions arise. Also call at the end of each inspection day or at the end of the inspection, whichever is sooner, with an updated report of OSHA inspection.

12. Complete the *O&G Industries, Inc. OSHA Inspection Report* as soon as possible after the OSHA inspector has left the site, then promptly send the original report to **Sharon Okraska** (860) 496-4248 - sharonokraska@ogind.com (O&G Claims).

OSHA Inspection Form

Project/Facility:_____Project/Facility #.:_____

Project/Facility Supervisor:_____

Project/Operations Manager:_____

Inspection Addresses, Dates & Times:_____

_____

I. Pre-Inspection

A. Person & Title contacted by OSHA_____

_____

B. Did inspector show his credentials? Yes ( ) No ( )
If No, comment:_____

C. Names of OSHA Inspector(s) and their Area Offices:_____

_____

D. What was the reason for the inspection:
1. Employee complaint? Yes ( ) No ( )
(If yes, attach copy. OSHA is required by law to give you a copy)
2. Random scheduled inspection? Yes ( ) No ( )
3. Other (comment):_____

_____

E. Did OSHA review record keeping: Yes ( ) No ( )
If Yes. which of the following records were reviewed:
1. Required OSHA poster, was it posted? Yes ( ) No ( )
2. O&G's Project Safety Program Yes ( ) No ( )
3. OSHA Form #300: Yes ( ) No ( )
4. Minutes of Project Safety Meetings: Yes ( ) No ( )
5. Minutes of Weekly Tool Box Talks: Yes ( ) No ( )
6. Copies of Safety Inspection Reports: Yes ( ) No ( )
7. Hazard Communication Program & MSDS: Yes ( ) No ( )
8. Proof of correspondence to contractors to correct unsafe working conditions: Yes ( ) No ( )
9. Other (comments):_____

_____

_____

_____

II. Opening Conference

A. Names of Contractors, Union representatives and all other attendees titles: (or attach a list) _____

_____

_____

III. Inspection Tour

A. Who from O&G accompanied the OSHA Inspector?_____

_____

Who else joined the OSHA Inspection Group?_____

_____

B. Did the Inspector take any photographs? Yes ( ) No ( )
Did O&G take the same photographs? Yes ( ) No ( )

C. Were safety hazards and unsafe acts observed? Yes ( ) No ( )
If Yes, what were they and who had responsibility?_____

_____

_____

D. Was immediate corrective action taken? Yes ( ) No ( )
If No, comments:_____

_____

E. Special comments regarding inspection:_____

_____

_____

IV. Closing Conference

A. Did OSHA hold closing conference with O&G? Yes ( ) No ( )
With other contractors? Yes ( ) No ( )

B. Names of contractors, their representatives & titles:
(or attach a list)_____

_____

C. What alleged OSHA Violations were discussed and with whom?
(or attach a list)_____

_____

_____ _____
Location Supervisor Date

This OSHA Inspection Report is to be started at the beginning of and completed

immediately after an OSHA inspection.

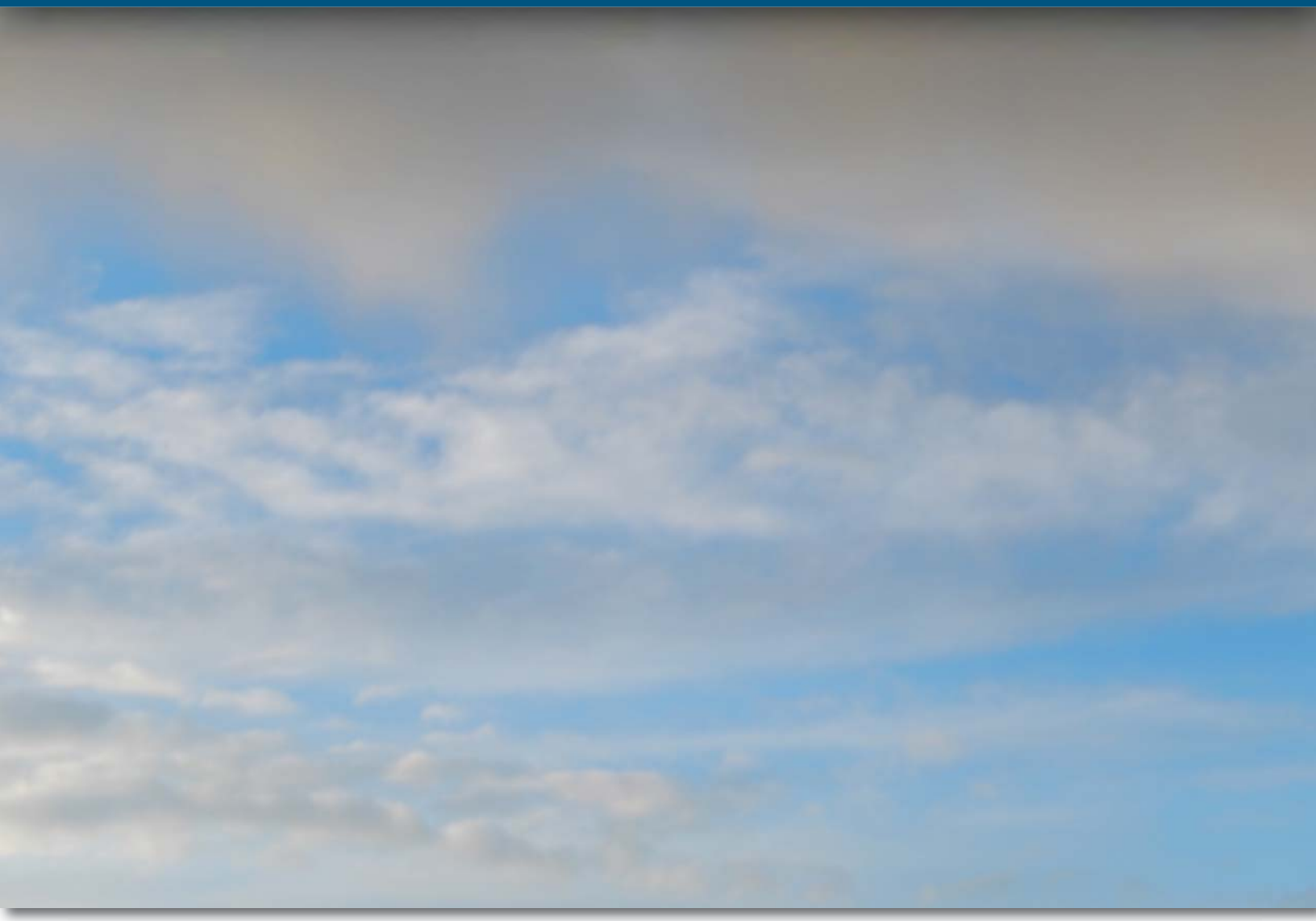
Original: *O&G Director of Safety*
CC: *O&G Divisional VP, O&G Human Resources*

EXHIBIT E

Air Quality Report

TRC
Results you can rely on

Air Quality Regulatory Requirements Review for the Proposed Beacon Falls Energy Park Fuel Cell Project in Beacon Falls, Connecticut



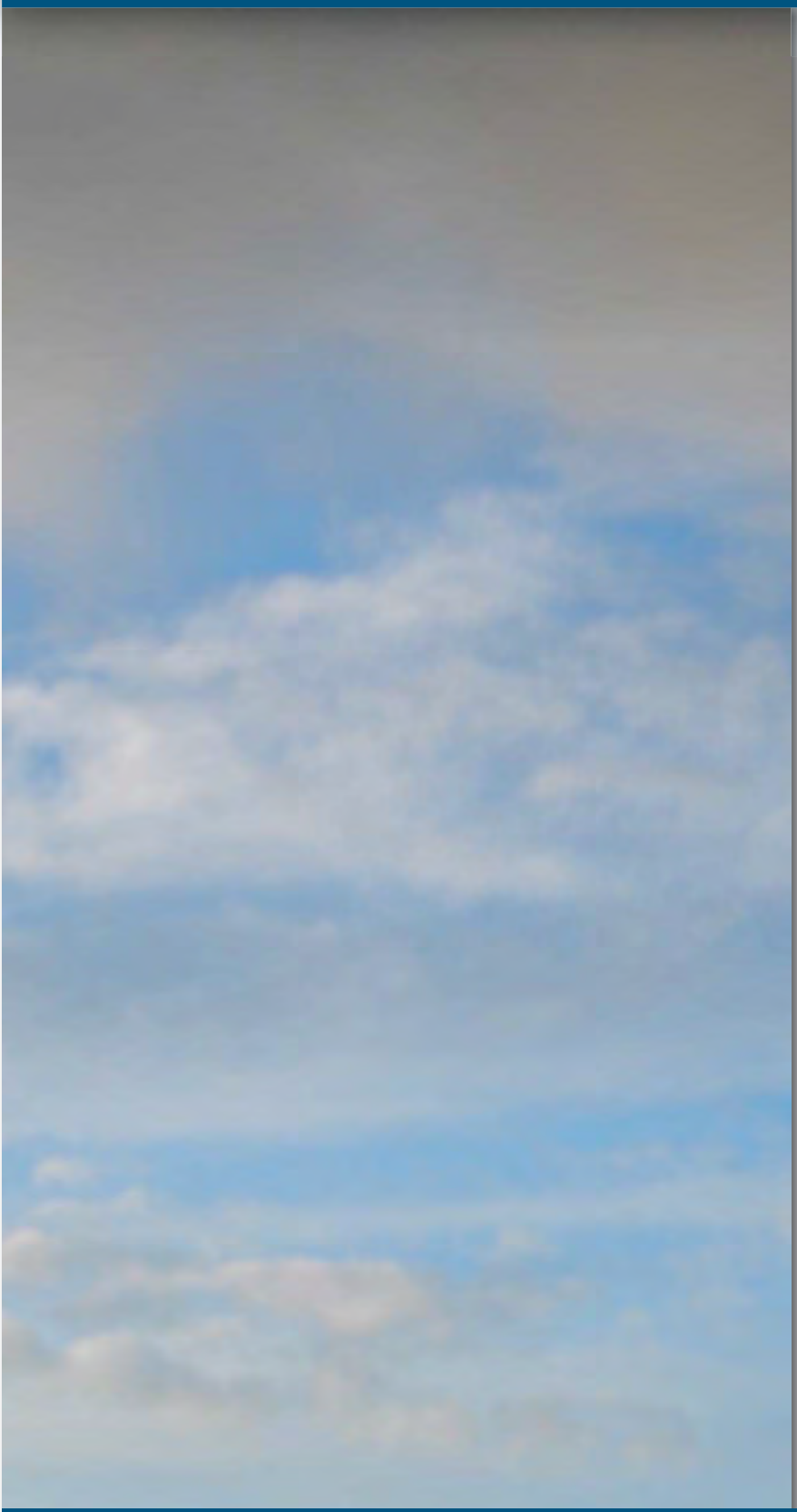
Prepared for:

Beacon Falls Energy Park, LLC

Prepared by:

TRC Environmental Corporation

July 2015



Air Quality Regulatory Requirements Review for the Proposed Beacon Falls Energy Park Fuel Cell Project in Beacon Falls, Connecticut

Prepared for:

Beacon Falls Energy Park, LLC

Prepared by

TRC Environmental Corporation

21 Griffin Road North
Windsor, Connecticut 06095
Telephone 860-298-9692
Facsimile 860-298-6399

TRC Project No. 232127.0000.0000

July 2015

TABLE OF CONTENTS

1 Project Description

Beacon Falls Energy Park LLC has proposed to construct the Beacon Falls Energy Park (the Project), a nominal 63.3 megawatt (MW) base-load fuel cell project in Beacon Falls, Connecticut. The Project would occupy approximately 8 acres of a 25.0 acres plot of land currently owned by O&G Industries (O&G) and located between Connecticut Route 8 and Railroad Avenue. The Project consists of the following

- 5 FuelCell Energy, Inc. HEFC fuel cell plants, each rated at approximately 3.7 MW
- 16 FuelCell Energy, Inc. DFC3000 fuel cell plants, each rated at approximately 2.8 MW
- Switchyard facilities

Each of the 21 fuel cell plants would be equipped with a 10 million British thermal units per hour (MMBtu/hr) air heater, which would operate to maintain the stack temperature only if the associated fuel cell unit were not operating at full power. The Project would use natural gas exclusively as fuel.

2 Project Air Emissions

A fuel cell is a non-combustion, electrochemical device that combines fuel with oxygen from the ambient air to directly generate electricity and heat. The byproducts of the process are water, carbon dioxide (CO_2), and small amounts of criteria air pollutants, including particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$), particulate matter less than or equal to 10 microns in diameter (PM_{10}), sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), and volatile organic compounds (VOC). Tables 1, 2, and 3 provide $PM_{2.5}$, PM_{10}, SO_2, NO_x, CO, VOC, and CO_2 hourly emission rate and potential to emit (PTE) calculations for the HEFC fuel cell plants, DFC3000 fuel cell plants, and air heaters, respectively. These tables present two extreme cases, all fuel cells only operating at full power for 8760 hours per year (Tables 1 and 2), and heaters only operating at full power for 8760 hours per year (Table 3).

Table 4 summarizes the Project emissions. On a pollutant-by-pollutant basis, the annual emissions are the maximum of the fuel cell only case (Tables 1 and 2) and the heaters only case (Table 3). The fuel cell plants and air heaters have inherently low emissions, and do not use add-on emission controls. Hence, the annual emission rates shown in Table 4 also represent the uncontrolled potential emissions.

The Project emissions are much less than the fossil fuel power plants whose operation the Project will tend to displace. The U.S. Environmental Protection Agency (EPA) Emissions and Generation Resource Integrated Database (eGRID)[1] provides data on the environmental characteristics for most of the electric power generated in the United States. eGRID contains information on the average emission rates in pound per megawatt hour (lb/MW-hr) for NO_x, SO_x, and CO_2 for regions and sub-regions in the United States. The 2010 (the most recent year) emission rates for the fossil-fuel power plants in New England are summarized as follows:

- NO_x - 0.48 lb/MW-hr,

[1] http://www.epa.gov/cleanenergy/energy-resources/egrid/ accessed 05/18/15

- SO_x - 2.10 lb/MW-hr, and
- CO_2 - 1,115 lb/MW-hr.

In comparison, the Project's expected emissions are summarized as follows:

- NO_x - 0.011 lb/MW-hr,
- SO_x - 0.005 lb/MW-hr, and
- CO_2 - 960 lb/MW-hr.

3 Regulatory Applicability

Several regulatory requirements may be triggered by the PTE of an individual source and an overall Project. These include the following:

- State Permit to Construct
- Best Available Control Technology (BACT)
- Ambient Impact Analysis
- Nonattainment New Source Review (NNSR)
- Prevention of Significant Deterioration (PSD)
- Title V

In addition, there are other air quality regulatory programs that may be of concern for a new source of air pollutant emissions.

3.1 State Permit to Construct

RCSA 22a-174-1(91) states the following:

> *"Potential emissions" or "potential to emit" means the maximum capacity of a stationary source, including all physical and operational limitations, to emit any air pollutant, including fugitive emissions to the extent quantifiable, provided that:*
>
> *(A) Any physical limitation on such capacity, not including air pollution control equipment, shall be treated as part of the stationary source as determined by the commissioner or Administrator; and*
>
> *(B) Any operational limitation on such capacity, including air pollution control equipment or a restriction on the hours of operation or on the type or amount of material processed, stored or combusted, shall be treated as part of the stationary source if the limitation or restriction is practicably enforceable.*

RCSA 22a-174-3a(a)(1)(D) and (E), respectively, state that a permit to construct is required for a new emission unit with potential emissions of 15 tons or more per year of any individual air pollutant, or a modified emission unit with such a potential emissions increase. The applicability of those requirements is based on the uncontrolled potential emissions (or potential emissions increase) of the subject emission unit. Note that the greenhouse gas (e.g., CO_2) PTE would not by itself trigger the need for a permit to construct. In the context of the

Project, each of the 21 proposed fuel cell plants is considered to be an emission unit. As can be seen in Tables 1 and 2, for no relevant pollutant does the PTE exceed the threshold for a permit to construct.

3.2 BACT

RCSA 22a-174-3a(j)(1)(C) and (D), respectively, state that BACT is required for a new emission unit with potential emissions of 15 tons or more per year of any individual air pollutant, or a modified emission unit with such a potential emissions increase. These BACT requirements are determined based on the uncontrolled potential emissions (or potential emissions increase) of the subject emission unit (without taking into account any proposed operating hour limits). As was stated earlier, the annual emission rates shown in Table 4 represent the uncontrolled potential emissions. As can be seen in Table 4, for no relevant pollutant does the uncontrolled PTE exceed the threshold for BACT.

3.3 Ambient Impact Analysis

RCSA 22a-174-3a(d)(3)(B) and (C) require the owner of any source applying for an air permit to demonstrate that the operation of the source will not cause or contribute significantly to a violation of any federal or state ambient air quality standard or PSD increment. RCSA 22a-174-3a(i) requires this demonstration to include estimates of ambient air quality impacts that use models, databases, and techniques approved by the CT DEEP Commissioner. Owners of sources that are not required to obtain an air permit, such as sources that limit their emissions under RCSA 22a-174-3b, are not subject to the modeling requirements of RCSA 22a-174-3a. As is discussed above, the Project is not required to obtain an air permit under RCSA 22a-174-3a. Therefore, the Project does not require an ambient impact analysis.

3.4 NNSR and PSD

PSD and NNSR were established for pre-construction review of proposed projects in attainment areas and nonattainment areas, respectively. A project can undergo both types of review, depending on its potential emissions and the attainment status of the area in which it is located.

3.4.1 Major Source

Major stationary source (major source) and major modification are defined by State and Federal regulations.

RCSA 22a-174-1(63) states the following:

> *"Major stationary source" means "major stationary source" as defined 40 CFR 51.165(a)(1)(iv), provided that:*
>
> *(A) A stationary source that emits or has the potential to emit twenty-five (25) tons per year of volatile organic compounds or nitrogen oxides as an ozone precursor in a severe ozone nonattainment area is a "major stationary source," and*

(B) A stationary source that emits or has the potential to emit fifty (50) tons per year of volatile organic compounds or nitrogen oxides as an ozone precursor in a serious ozone nonattainment area is a "major stationary source."

40 CFR 51.165(a)(1)(iv)(A) states the following:

"Major stationary source" means:

(1) Any stationary source of air pollution that emits, or has the potential to emit, 100 tons per year or more of any regulated NSR pollutant, … or

(3) Any physical change that would occur at a stationary source not qualifying under paragraphs (a)(1)(iv)(A)(1) or (2) of this section as a major stationary source if the change would constitute a major stationary source by itself.

3.4.2 NNSR

40 CFR 51.165(a)(1)(iv)(B) indicates that any major source of VOC is also a major source for ozone (O_3). 40 CFR 51.165(a)(1)(iv)(C) stipulates that fugitive emissions shall not be included when determining if a stationary source is major, unless that source belongs to one of 27 listed categories. The Project does not belong to one of these 27 listed categories. As such, fugitive emissions are not included in its major source determination. The Project's fugitive emissions are not expected to be significant.

Beacon Falls is located in New Haven County, which is designed as a moderate nonattainment area for the 1997 8-hour O_3 standard and a marginal nonattainment area for the 2008 8-hour O_3 standard. However, New Haven County was designated as a serious nonattainment area for the 1979 1-hour O_3 standard. EPA revoked the 1-hour O_3 standard, but NNSR obligations remain in effect under "anti-backsliding" provisions.

As such, the NNSR thresholds for NO_x and VOC are 50 tons per year (tpy). The Project is not subject to NNSR review for NO_x or VOC because the Project's PTE of these pollutants do not exceed the major source threshold of 50 tpy for either pollutant.

3.4.3 PSD

The PSD program applies to the construction of a new major stationary source of air pollutants, or a major modification to existing major stationary sources of air pollutants, in an attainment area. PSD is intended to prevent the new source from significantly worsening air quality in areas where the air is cleaner than the National Ambient Air Quality Standards (NAAQS). The Project is not subject to PSD review for NO_x, CO, SO_2, and $PM_{10}/PM_{2.5}$ because the Project's PTE of these pollutants do not exceed the major source threshold of 100 tpy for any of these pollutants.

3.5 Other Programs

EPA has promulgated standards for air emission sources categories, such as New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAP). There are no NSPS or NESHAP which are applicable to fuel cell projects.

The State of Connecticut has promulgated Reasonably Available Control Technology (RACT) standards for air pollution source types. There are no RACT standards applicable to fuel cells.

3.6 Title V Permit

A source that falls into one of the following categories is required to obtain a Title V operating permit.

- A major source for criteria pollutants. In New Haven County, a major source is a source with a PTE greater than 100 tpy of $PM_{2.5}$, PM_{10}, SO_2, or CO or greater than 50 tpy of NO_x or VOC.
- A major source of hazardous air pollutants (HAP). A major source is a source with a PTE greater than 10 tpy of a single HAP or 25 tpy of total HAPs.
- A major source under NNSR or PSD.
- An affected source under the Acid Rain Rules. An affected source is a fossil fuel combustion device that serves a generator with a nameplate capacity greater than 25 MW and produces electrical energy for sale.
- A solid waste incinerator under Section 129 of the Clean Air Act.
- Sources subject to certain NESHAP or NSPS.

The Project does not fall into any of the categories listed above.

4 Conclusion

The Project would have air pollutant emission rates much lower than existing fossil fuel power plants in New England. Based on the preceding review, the Project would not require an air permit to construct or operate. Nevertheless, it would be prudent to discuss the Project with the Connecticut Department of Energy and Environmental Protection at the earliest reasonable date.

Table 1: Beacon Falls Energy Park LLC - Potential Emissions
Source: FuelCell Energy HEFC

Output[1]	3.70	MW	**Fuel Sulfur Content**	0.20	grains/100 scf
Heat Rate[1,2]	6,587	Btu/kw-hr, LHV	**Hourly Heat Input**	27.08	MMBtu/hr, HHV (1 unit)
Thermal Efficiency[1,2]	51.8%		**Fuel Consumption**	26,548	scf/hr
Fuel Heating Value[3]	918	Btu/scf (LHV)	**Number of Units**	5	
	1,020	Btu/scf (HHV)	**Operating Schedule**	8,760	hr/yr

Pollutant	**Emission Factor**			**Emissions (1 unit)**		**Emissions (5 units)**	
	lb/MMBtu	**lb/MW-hr[2]**	**Ref**	**lb/hr**	**ton/yr**	**lb/hr**	**ton/yr**
Criteria Pollutants							
$PM_{2.5}$	-	2.28E-05	1,4	8.43E-05	3.69E-04	4.22E-04	1.85E-03
PM_{10}	-	2.28E-05	1,4	8.43E-05	3.69E-04	4.22E-04	1.85E-03
SO_2	6.22E-04	1.14E-04	1,5,6	1.69E-02	7.38E-02	0.08	0.37
NO_x	-	1.14E-02	1	4.22E-02	0.18	0.21	0.92
CO	-	1.14E-01	1,7	0.42	1.85	2.11	9.23
VOC	-	2.28E-02	7	8.43E-02	0.37	0.42	1.85
Greenhouse Gases							
CO_2	118.17		8	3,200	14,015	15,999	70,077

Reference:
1. FuelCell Energy HEFC Product Specification (Appendix A)
2. Includes factors to account for 10% degredation and ±2% variation in efficiency
3. Typical
4. Filterable plus condensable
5. Based on 0.2 grains sulfur/100 scf of natural gas
6. Emissions are the larger of those obtained with vendor data and the assumed sulfur content
7. Based on California Air Resources Board (CARB) Certification of DFC3000 Fuel Cell (Appendix A)
8. Table C-2 to Subpart C of 40 CFR 98 Subpart C

Table 2: Beacon Falls Energy Park LLC - Potential Emissions
Source: FuelCell Energy DFC3000

Output[1]	2.80	MW	**Fuel Sulfur Content**	0.20	grains/100 scf
Heat Rate[1]	7,580	Btu/kw-hr, LHV	**Hourly Heat Input**	23.58	MMBtu/hr, HHV (1 unit)
Thermal Efficiency[1]	45%		**Fuel Consumption**	23,120	scf/hr
Fuel Heating Value[2]	918	Btu/scf (LHV)	**Number of Units**	16	
	1,020	Btu/scf (HHV)	**Operating Schedule**	8,760	hr/yr

Pollutant	**Emission Factor**			**Emissions (1 unit)**		**Emissions (16 units)**	
	lb/MMBtu	**lb/MW-hr**	**Ref**	**lb/hr**	**ton/yr**	**lb/hr**	**ton/yr**
Criteria Pollutants							
$PM_{2.5}$	-	2.09E-05	1,3	5.85E-05	2.56E-04	9.36E-04	4.10E-03
PM_{10}	-	2.09E-05	1,3	5.85E-05	2.56E-04	9.36E-04	4.10E-03
SO_2	6.22E-04	1.04E-04	1,4,5	1.47E-02	6.43E-02	0.23	1.03
NO_x	-	1.04E-02	1	2.92E-02	0.13	0.47	2.05
CO	-	1.04E-01	1,6	0.29	1.28	4.68	20.49
VOC	-	2.09E-02	6	5.85E-02	0.26	0.94	4.10
Greenhouse Gases							
CO_2	118.17		7	2,787	12,206	44,588	195,294

Reference:
1. FuelCell Energy DFC3000 Product Specification (Appendix A)
2. Typical
3. Filterable plus condensable
4. Based on 0.2 grains sulfur/100 scf of natural gas
5. Emissions are the larger of those obtained with vendor data and the assumed sulfur content
6. Based on California Air Resources Board (CARB) Certification of DFC3000 Fuel Cell (Appendix A)
7. Table C-2 to Subpart C of 40 CFR 98 Subpart C

Table 3: Beacon Falls Energy Park LLC - Potential Emissions
Source: Air Heaters

Fuel Heating Value[1]	918	Btu/scf (LHV)	**Fuel Sulfur Content**	0.2	grains/100 scf
	1,020	Btu/scf (HHV)	**Hourly Heat Input**	10.0	MMBtu/hr, HHV (1 unit)
			Fuel Consumption	9,804	scf/hr
			Number of Units	21	
			Operating Schedule	8,760	hr/yr

Pollutant	**Emission Factor**			**Emissions (1 unit)**		**Emissions (21 units)**	
	ppmvd @ 3% O2	**lb/MMBtu**	**Ref**	**lb/hr**	**ton/yr**	**lb/hr**	**ton/yr**
Criteria Pollutants							
$PM_{2.5}$		7.60E-03	2,3	7.60E-02	0.33	1.60	6.99
PM_{10}		7.60E-03	2,3	7.60E-02	0.33	1.60	6.99
SO_2		6.22E-04	4	6.22E-03	0.03	0.13	0.57
NO_x	14.0	0.017	5	0.17	0.74	3.57	15.63
CO	37.9	0.028	5	0.28	1.23	5.88	25.75
VOC	66.3	0.028	5	0.28	1.23	5.88	25.75
Greenhouse Gases							
CO_2e		118.29	6, 7, 8	1,183	5,181	24,841	108,802

Reference:
1. Typical
2. AP 42 Table 1.4-2.
3. Filterable plus condensable
4. Mass balance
5. Email from Mark Benedict (FuelCell Energy) dated 06/02/15
6. Table C-1 to Subpart C of 40 CFR 98 Subpart C
7. Table C-2 to Subpart C of 40 CFR 98 Subpart C
8. Table A-1 to Subpart A of 40 CFR 98 Subpart A

Table 4: Beacon Falls Energy Park LLC - Potential Emissions
Maximum Project Emissions

Pollutant	Emissions (tpy) (1 unit)				Emissions (tpy) (21 units)		
	HEFC	DFC3000	Air Heater	Fuel Cell Plant[1]	Fuel Cells	Air Heaters	Fuel Cell Plants[1]
Criteria Pollutants							
$PM_{2.5}$	3.69E-04	2.56E-04	0.33	0.33	5.95E-03	6.99	6.99
PM_{10}	3.69E-04	2.56E-04	0.33	0.33	5.95E-03	6.99	6.99
SO_2	0.07	0.06	0.03	0.07	1.40	0.57	1.40
NO_x	0.18	0.13	0.74	0.74	2.97	15.63	15.63
CO	1.85	1.28	1.23	1.85	29.73	25.75	29.73
VOC	0.37	0.26	1.23	1.23	5.95	25.75	25.75
Greenhouse Gases							
CO_2	14,015	12,206	5,181	14,015	265,372	108,802	265,372

Reference:
1. When a fuel cell is operating at full power, the air heater will not operate and vice versa.

Table 5: Beacon Falls Energy Park LLC - Potential Emission and Regulatory Limits							
	$PM_{2.5}$	PM_{10}	SO_2	NO_x	CO	VOC	CO_2
Single Unit							
Potential to Emit[a]	0.33	0.33	0.07	0.74	1.85	1.23	14,015
BACT[b] / Permit Threshold[c]	15.00	15.00	15.00	15.00	15.00	15.00	
AERSCREEN Modeling Threshold[d,e,f]	3.00	1.00	3.00	5.00	5.00	-	
Facility (21 Fuel Cell Plants)							
Potential to Emit[a]	6.99	6.99	1.40	15.63	29.73	25.75	265,372
NNSR[g,h] Major Source Threshold	-	-	-	50.00	-	50.00	
PSD[g,j] Major Source Threshold	100.00	100.00	100.00	100.00	100.00	-	100,000 [k]

a. Based on 8,760 hours of operation per year at maximum output without controls

b. Best Available Control Technology

c. Applies to the potential emissions of each Unit

d. July 2009 (Revised December 2009) Ambient Impact Analysis Guideline (AIAG) screening modeling threshold

e. Applies to the uncontrolled potential emissions (or increase) of a single Unit Section 22a-174-3a(a)(1)(D) and (E)

f. Modeling applies irrespective of emissions if stack height is less than 10 meters

g. Nonattainment New Source Review

h. Also triggers Lowest Achievable Emission Rate (LAER) and offsets

i. Prevention of Significant Deterioration

j. Also triggers BACT

k. Applies only if PSD is triggered for another pollutant

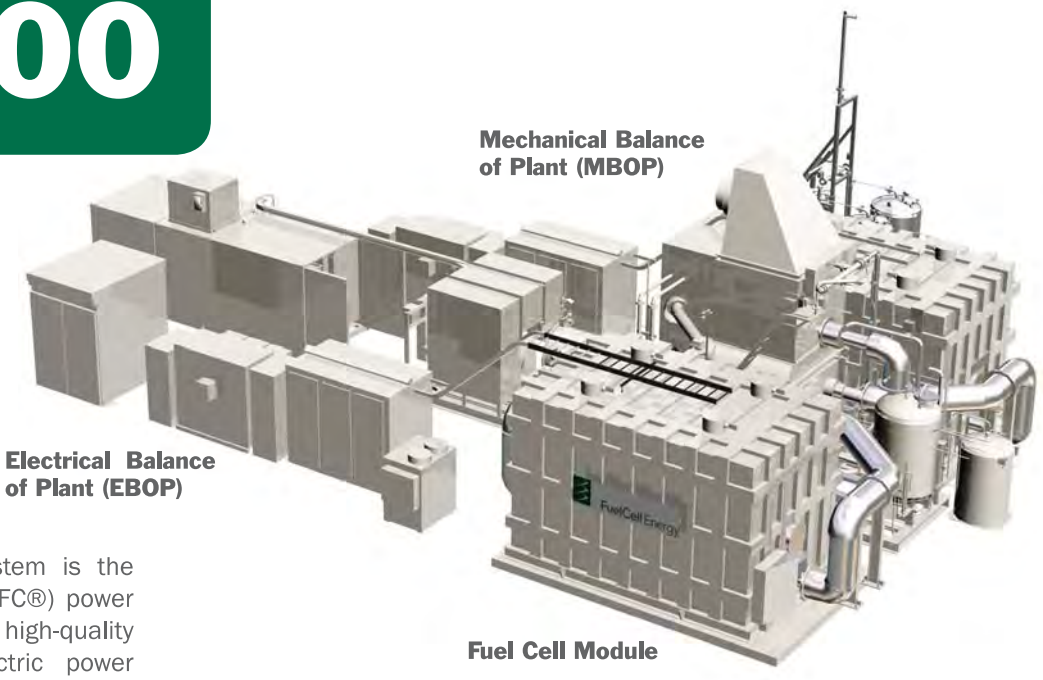
APPENDIX A1

DFC3000 PERFORMANCE SPECIFICATIONS

2.8 MEGAWATTS DFC3000

KEY FEATURES

- **High Efficiency**
- **Low Environmental Impact**
- **Fuel Flexibility**
- **High Reliability**
- **Quiet Operation**



2.8 MW, 13.8 kVAC, 3,110 kVA, 50 or 60 Hz

ADVANTAGES

FuelCell Energy's DFC3000™ system is the largest of the Direct FuelCell® (DFC®) power plant fleet, capable of providing high-quality baseload power with 47% electric power generation efficiency around-the-clock. Scalable for Multi-Megawatt Fuel Cell Parks, the system is especially suitable for applications with larger load requirements such as universities, manufacturing facilities, wastewater treatment plants, and utility/grid support.

PERFORMANCE

Gross Power Output	
Power @ Plant Rating	2,800 kW
Standard Output AC voltage	13,800 V
Standard Frequency	60 Hz
Optional Output AC Voltages	By Request
Optional Output Frequency	50 Hz
Efficiency	
LHV	47 +/- 2 %
Available Heat	
Exhaust Temperature	700 +/- 50 °F
Exhaust Flow	36,600 lb/h
Allowable Backpressure	5 iwc
Heat Energy Available for Recovery	
(to 250 °F)	4,433,000 Btu/h
(to 120 °F)	7,460,000 Btu/h
Fuel Consumption	
Natural gas (at 930 Btu/ft^3)	362 scfm
Heat rate, LHV	7,260 Btu/kWh

Water Consumption	
Average	9 gpm
Peak during WTS backflush	30 gpm
Water Discharge	
Average	4.5 gpm
Peak during WTS backflush	30 gpm
Pollutant Emissions	
NOx	0.01 lb/MWh
SOx	0.0001 lb/MWh
PM10	0.00002 lb/MWh
Greenhouse Gas Emissions	
CO_2	980 lb/MWh
CO_2 (with waste heat recovery)	520-680 lb/MWh
Sound Level	
Standard	72 dB(A) at 10 feet

FuelCell Energy

Ultra-Clean, Efficient, Reliable Power

SPECIFICATIONS

DFC3000

WEIGHTS

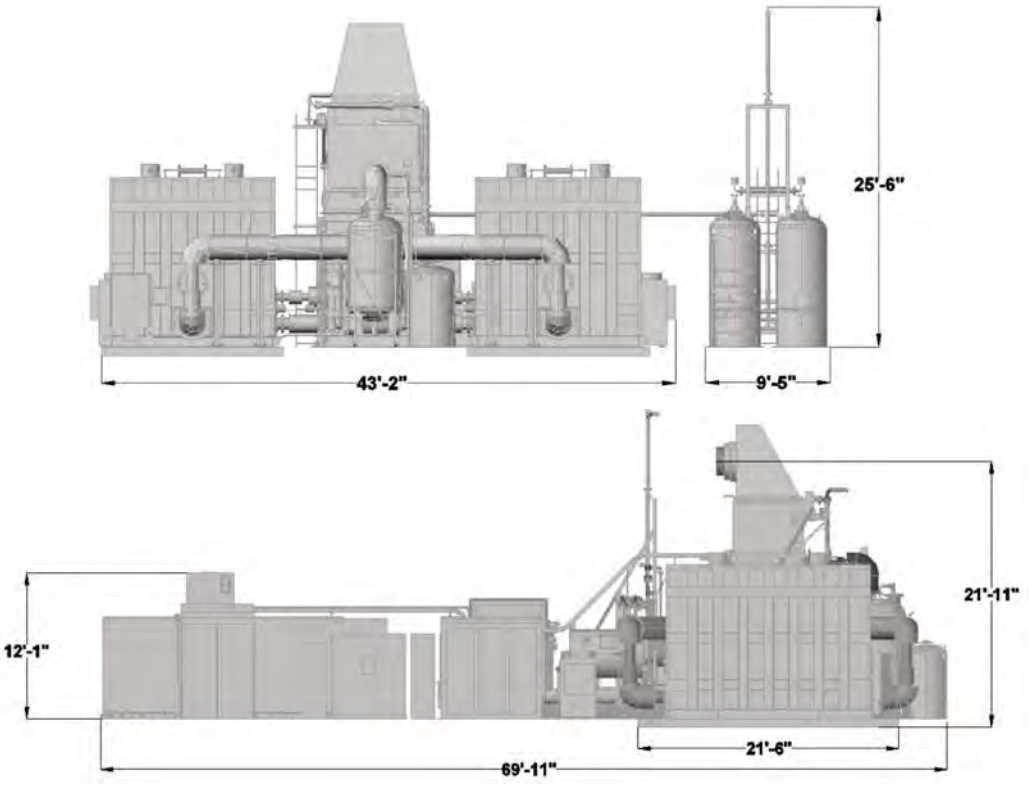
Water Treatment Skid
20,000 lb

Main Process Skid
50,000 lb

Desulfurization
15,000 lb

Electrical Balance of Plant
52,000 lb

Fuel Cell Module
107,000 lb *(each module)*



EXPERIENCE & CAPABILITIES

Direct FuelCell® power plants are generating ultra-clean, efficient and reliable power at more than 50 locations worldwide. With more than 300 megawatts of power generation capacity installed or in backlog, FuelCell Energy is a global leader in providing ultra-clean baseload distributed generation to utilities, industrial operations, universities, municipal water treatment facilities, government installations and other customers around the world. The Company's power plants have generated more than 1.7 billion kilowatt hours of ultra-clean power using a variety of fuels including renewable biogas from wastewater treatment and food processing, as well as clean natural gas.

This brochure provides a general overview of FuelCell Energy products and services. This brochure is provided for informational purposes only. Warranties for FuelCell Energy products and services are provided only by individual sales and service conracts, and not by this brochure. This brochure is not an offer to sell any FuelCell Energy products and services. Contact FuelCell Energy for detailed product information suitable for your specific application. FuelCell Energy reserves the right to modify its products, services, and related information at any time without prior notice.

FuelCell Energy's fleet of Direct FuelCell power plants are certified to or comply with a variety of commercial and industrial standards, such as: ANSI/CSA America, UL, CARB, OSHA, IEEE and NFPA.

FuelCell Energy
Ultra-Clean, Efficient, Reliable Power

3 Great Pasture Road | Danbury, CT 06813-1305 | 203 825-6000 | **www.fuelcellenergy.com** | **YouTube.com/FuelCellEnergyInc**

APPENDIX A2

DFC3000 EMISSIONS SPECIFICATIONS

Emissions Specification

Exhaust Emissions

The DFC3000 is designed for ultra-low emissions. The DFC3000 meets or exceeds the requirements of California Air Resources Board 2007 (CARB 07) Distributed Generation emissions limitations. The DFC3000 emissions are as follows:

Table 3: DFC3000 Exhaust Emissions at 100% Load

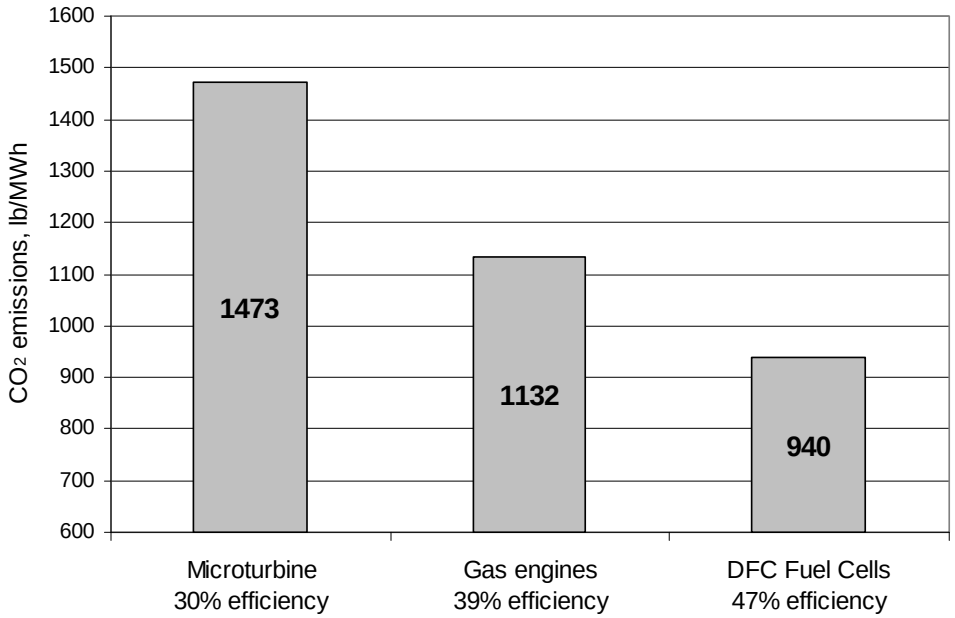
Emissions	lb/MWh	ppm dry	Tons/yr[1]
NOx	< 0.01	< 0.4	< 0.1
SOx	< 0.0001	< 0.01	< 0.001
CO	< 0.10	< 10	< 1.0

Notes:

(1) Assumes 2.8MW power generation @ 95% availability.

Carbon Dioxide Emissions from Distributed Generation (DG) Technologies

The following chart compares typical CO_2 emissions from fuel cells with CO_2 emissions from other currently available distributed generation technologies (Emissions based on theoretical conversion of methane at stated efficiency).



APPENDIX A3

CARB CERTIFICATION OF DFC3000 FUEL CELL

State of California
AIR RESOURCES BOARD
Executive Order DG-033
Distributed Generation Certification of
FuelCell Energy, Inc.
DFC3000 Fuel Cell

WHEREAS, the Air Resources Board (ARB) was given the authority under California Health and Safety Code section 41514.9 to establish a statewide Distributed Generation (DG) Certification Program to certify electrical generation technologies that are exempt from the permit requirements of air pollution control or air quality management districts;

WHEREAS, this DG Certification does not constitute an air pollution permit or eliminate the responsibility of the end user to comply with all federal, state, and local laws, rules and regulations;

WHEREAS, on August 4, 2010, FuelCell Energy, Inc. applied for a DG Certification of its 2.8 MW, DFC3000 fuel cell and whose application was deemed complete on September 9, 2010;

WHEREAS, FuelCell Energy, Inc. has demonstrated, according to test methods specified in title 17, California Code of Regulations (CCR), section 94207, that its natural-gas-fueled DFC3000 fuel cell has complied with the following emission standards:

1. Emissions of oxides of nitrogen no greater than 0.07 pounds per megawatt-hour;

2. Emissions of carbon monoxide no greater than 0.10 pounds per megawatt-hour; and

3. Emissions of volatile organic compounds no greater than 0.02 pounds per megawatt-hour;

WHEREAS, FuelCell Energy, Inc. has demonstrated that its DFC3000 fuel cell complies with the emission durability requirements in title 17, CCR, section 94203 (d);

WHEREAS, I find that the Applicant, FuelCell Energy, Inc., has met the requirements specified in article 3, title 17, CCR, and has satisfactorily demonstrated that the DFC3000 fuel cell meets the DG Certification Regulation 2007 Fossil Fuel Emission Standards;

NOW THEREFORE, IT IS HEREBY ORDERED, that a DG Certification, Executive Order DG-033 is granted.

This DG Certification:

1) is subject to all conditions and requirements of the ARB's DG Certification Program, article 3, title 17, CCR, including the provisions relating to inspection, denial, suspension, and revocation;

2) shall be void if any manufacturer's modification results in an increase in emissions or changes the efficiency or operating conditions of a model, such that the model no longer meets the DG Certification Regulation 2007 Fossil Fuel Emission Standards;

3) shall expire on the 29th day of October, 2015.

Executed at Sacramento, California, this 29th day of October 2010.

James Goldstene
Executive Officer
by

/S/

Richard Corey, Chief
Stationary Source Division

APPENDIX A4

HEFC PERFORMANCE SPECIFICATIONS

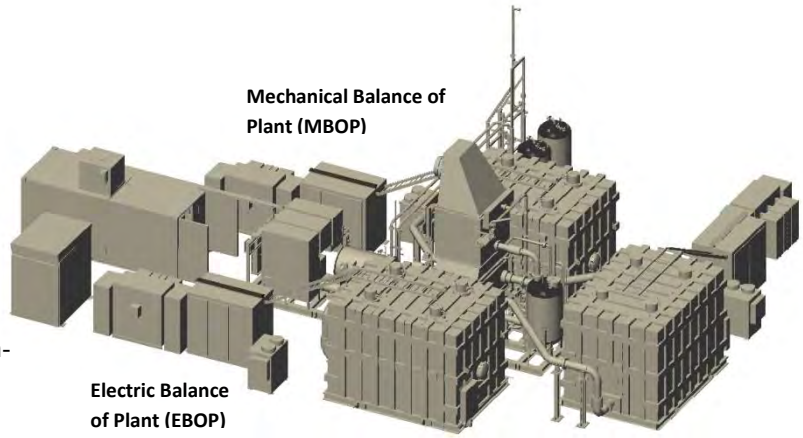
FuelCell Energy
Ultra-Clean, Efficient, Reliable Power

HEFC™

HIGH EFFICIENCY FUEL CELL

Key Features

- High Efficiency
- Low Environmental Impact
- Fuel Flexibility
- High Reliability
- Quiet Operation



Advantages

FuelCell Energy's HEFC™ system is capable of providing high-quality baseload power with 60% electric power generation efficiency. Scalable to more than 50 MW, the system is especially suitable to applications with larger load requirements and limited waste heat utilization such as data centers and utility/grid support.

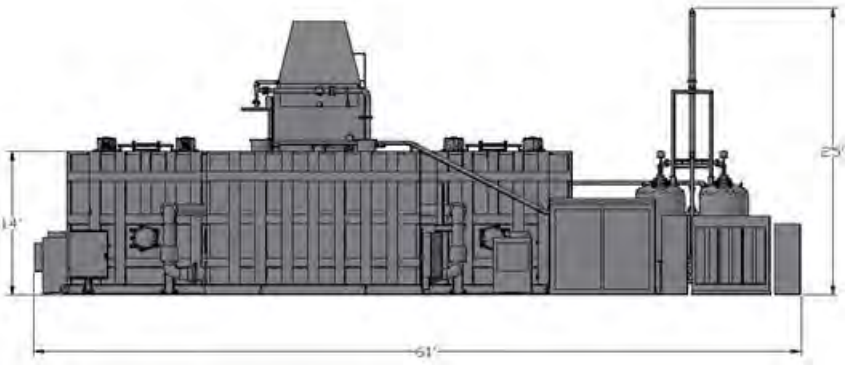
Performance

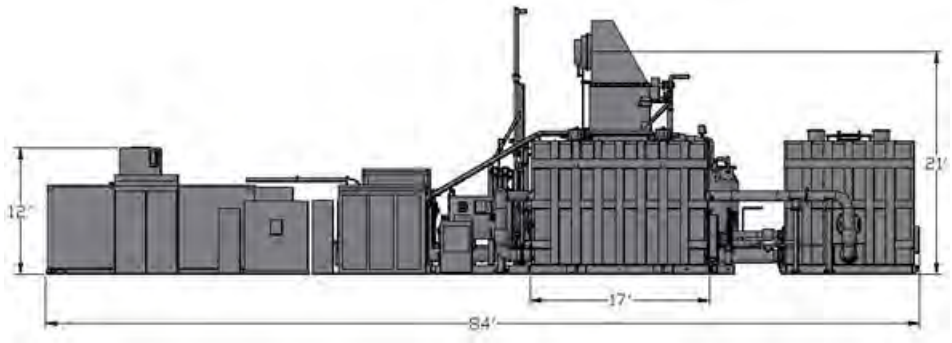
Power Output	
Power @ Plant Rating	3,700 kW
Standard Output AC Voltage	13,800 V
Standard Frequency	60 Hz
Optional Output AC Voltages	12,700, 4,160 V
Optional Output Frequency	50 Hz
Efficiency	
LHV	59% +/- 2%[1]
Available Heat	
Exhaust Temperature	430°F
Exhaust Flow	36,600 lb/h
Allowable Backpressure	5 iwc
Heat Energy Available for Recovery	
(to 250F°)	1,800,000 Btu/h
(to 120F°)	5,100,000 Btu/h
Fuel Consumption	
Natural Gas (at 930 Btu/ft^3)	383 scfm
Heat Rate, LHV	5,785 BTU/kWh

Water Consumption	
Average	10 gpm
Peak during WTS backflush	30 gpm
Average with water recovery option	< 1 gpm[2]
Water Discharge	
Average	5.0 gpm
Peak during WTS backflush	30 gpm
Average with water recovery option	0 gpm
Pollutant Emmissions	
NOx	< 0.01 lb/MWh
SOx	< 0.0001 lb/MWh
PM10	< 0.00002 lb/MWh
Greenhouse Gas Emissions	
CO_2	740 lb/MWh
CO_2 (with waste heat recovery)	520-680 lb/MWh
Noise Level	
Standard	72 dB(A) at 10 feet

[1] Projected efficiency for 1st article. Output and efficiency will decline by 10% over the life of the fuel cell modules, and increase to original values after scheduled module replacement.
[2] Amount of water recovered will vary based on site conditions.

Specifications





Weights

Water Treatment Skid:	20,000 lb
Main Process Skid:	50,000 lb
Desulfurization:	15,000 lb
Electrical Balance of Plant:	75,000 lb
Fuel Cell Module:	107,000 lb
(each of 3 modules)	

Experience & Capabilities

With more than 40 years of experience, FuelCell Energy is recognized as a world leader in the development, manufacture, and commercialization of fuel cells for stationary electric power generation. The result of years of research and the investment of more than $530 million, our patented, carbonate Direct FuelCell products have generated more than 2 billion kilowatt hours of electrical energy to date at more than 50 locations worldwide.

This brochure provides a general overview of FuelCell Energy products and services. This brochure is provided for informational purposes only. Warranties for FuelCell Energy products and services are provided only by individual sales and service contracts, and not by this brochure. This brochure is not an offer to sell any FuelCell Energy products and services. Contact FuelCell Energy for detailed product information suitable for your specific application. FuelCell Energy reserves the right to modify its products, services, and related information at any time without prior notice.

FuelCell Energy's fleet of FuelCell power plants are certified to or comply with a variety of commercial and industrial standards: ANSI/CSA America FC-1, UL 1741, CARB 2007, OSHA 29 CFR Part 1910, IEEE 1547, NFPA 70, NFPA 853, and California Rule 21.

FuelCell Energy, Inc.
3 Great Pasture Road
Danbury, CT 06813-1305
203 825-6000

www.fuelcellenergy.com

FuelCell Energy
Ultra-Clean, Efficient, Reliable Power

EXHIBIT F

Environmental Assessment

Environmental Assessment Report
Beacon Falls Energy Park

Beacon Falls, Connecticut

July 30, 2015

MILONE & MACBROOM®

Engineering | Planning | Landscape Architecture | Environmental Science

Environmental Assessment Report
Beacon Falls Energy Park

Beacon Falls, Connecticut
July 30, 2015

Prepared for:
Beacon Falls Energy Park, LLC
769 Newfield Street; Suite 8
Middletown, CT 06457

MMI #1103-87-16

Prepared by:
MILONE & MACBROOM, INC.
99 Realty Drive
Cheshire, Connecticut 06410
(203)-271-1773
www.miloneandmacbroom.com

TABLE OF CONTENTS

LIST OF FIGURES

APPENDIX

EXECUTIVE SUMMARY

Introduction

This document presents the results of the Beacon Falls Energy Park *Environmental Assessment*. This assessment was undertaken by Milone & MacBroom, Inc. on behalf of Beacon Falls Energy Park, LLC to identify potential environmental impacts as a result of the construction of a 63.3 megawatt renewable energy fuel cell park to be located in Beacon Falls, Connecticut.

This report summarizes the results of this assessment that included evaluating potential environmental impacts to the following environmental receptors:

- Land use
- Inland wetlands and watercourses
- Listed flora and fauna species
- Groundwater and surface water
- Noise
- Air quality
- Cultural resources
- Transportation infrastructure
- Utility and transmission services
- Hazardous waste
- Aesthetics and viewsheds
- Site development

The assessment report is organized as follows:

Section 1.0 describes the scope and purpose of the proposed project, summarizes existing project site conditions, identifies former and current property ownership, provides a brief history of the site, and identifies adjacent land use around the project site.

Section 2.0 identifies the site's environmental receptors, provides existing conditions descriptions of each environmental receptor, evaluates the proposed projects potential impact to each receptor, and, when applicable, identifies the proposed mitigation measures to be implemented to offset projected impacts.

Overview of the Project

The proposed energy park will be located on a 25-acre parcel that is owned by O & G Industries and is bounded to the west by State of Connecticut property, private undeveloped land, and Gruber Road; to the north by Lopus Road; and to the east and south by Metro-North railroad. The proposed project site is currently unoccupied and undeveloped land. There are no structures, roads or other improvements currently in existence at the proposed project site.

The energy park will generate electricity through the use of fuel cells. This park will consist of 21 individual fuel cell units, an electrical switchyard, and metering facility that will generate approximately 63.3 megawatts of electricity per day. The fuel cell units require natural gas for the generation of electricity and water for fuel processing. The proposed energy park will be accessed from Lopus Road. Stormwater on site is being managed through a series of stormwater quality infiltration basins. Wastewater associated with the fuel cell operations will be discharged into wastewater infiltration basins. The site will be an unmanned facility surrounded by chain-link fence.

Existing Environment and Analysis of Impact

Land Use - Development of the Beacon Falls Energy Park is consistent with the *Conservation and Development Policies Plan for Connecticut* and the *Plan of Conservation and Development for Beacon Falls*. The site is located within lands that are locally classified as Industrial Park District and it is in close proximity to primary growth areas along Route 8. The proposed Beacon Falls Energy Park is believed to be compatible with the existing industrial land uses located along Railroad Avenue Extension.

Natural Resources - Development of the energy park on this parcel is not likely to significantly impact the natural resources as efforts will be employed to control influence of nearby water resources and to reduce the overall amount of disturbance of the site during construction. Direct impacts to vegetation and wildlife are expected to be minimal given past activities and the open nature of the site. A majority of the existing scrub shrub habitats found around the periphery of the site will remain for use by the brown thrasher, a species of special concern in Connecticut. Additional shrub and tree plantings are proposed along the southern and eastern limits of the site. The project will implement several important protection plans and management measures to help protect state listed special concern species.

Water Resources - The project site is located outside of any Flood Hazard areas; therefore, the proposed energy park will have no negative impacts to Flood Hazard areas.

The project site is underlain by stratified drift deposits of sand and gravel and the underlying soils have a high permeability rate. Stormwater and water treatment wastewaters will be kept separate from each other with the stormwater being collected and directed into one or more bio-infiltration basins and the water treatment wastewater being discharged into two open infiltration basins in the south-central portion of the site. The stormwater bio-infiltration basin and the two wastewater infiltration basins will primarily treat water via natural infiltration into the underlying groundwater areas. Groundwater is assumed to move from west to east on site. An overflow spillway has been included on the stormwater basin to help control and convey large stormwater runoff producing events towards the open water pond.

The implementation of stormwater controls for managing non-point source pollution and implementation of Best Management Practices are proposed. It is anticipated that the proposed energy park will have no significant impact on the quality or availability of surface water, as no direct discharge of stormwater or wastewater to existing surface water bodies is planned. Furthermore, since no withdrawal of groundwater and only infiltration of permit compliant stormwater and wastewater is proposed, negative impacts to the quality and availability of groundwater uses is not anticipated.

Air Quality - The potential emissions of each individual fuel cell, and of all the fuel cells combined, were determined to be too small to require air permits to construct and operate, and no other applicable air quality regulations were identified. The potential emissions of the project are also much less than the fossil fuel fired power plants whose operation the project will tend to displace. The ambient air quality impacts attributable to operation of the fuel cells are expected to be minimal, both in the local area and elsewhere; therefore, no mitigation is required.

Noise - The project will implement low noise design principles within the design of the energy park. To further buffer the residential properties located along Gruber Road, a sound barrier wall will be constructed along the western and northern portions of the project site. The sound barrier wall will be constructed approximately 50 to 100 feet away from the existing road. The low noise design in combination with the sound barrier wall will minimize noise levels from this energy park and will allow the site to meet the State requirements.

Cultural Resources - Letters of inquiry were submitted to the State Historic Preservation Office (SHPO), State Archeologist, and Tribal Historic Preservation Offices, and responses from these agencies indicate that the site does not have a high likelihood of supporting any sensitive archeological and/or historic properties due to its former use as a sand and gravel pit. No additional studies and/or mitigation are required.

Transportation Infrastructure and Traffic - The overall transportation and traffic related impacts proposed by the energy park are considered to be minimal given the limited expected truck trips during construction, the existing industrial uses that border the site to the east, and the long term operation of the facility, which will be considered an unmanned facility.

Transmission and Public Utilities - Aquarion Water Company has the required volume of water to service the energy park and the facility will have no significant impact on Aquarion's water supply system for its existing and/or future customer needs. The effect of the project upon the water pressure in the main located along Railroad Avenue Extension is still being evaluated with the assistance of Aquarion Water Company.

The energy park will not require a connection to the sanitary sewer system and therefore has no significant impact to surrounding sanitary sewer systems and/or sewage treatment facilities.

The energy park does not require the connection to any state and/or local stormwater drainage systems. All stormwater from the energy park will be collected, treated, and infiltrated on site; therefore, there is no significant impact to local and/or state storm sewer systems.

The energy park is being proposed to help generate clean electrical energy and help reduce strain on the existing electrical grid. The energy park will not require a significant amount of energy to run the entry gate, security lighting, and/or cameras. This energy park will not significantly affect the electrical consumption rate of the existing grid system.

The energy park will require the consumption of natural gas, and Eversource has the necessary natural gas volumes to support this energy park without impacting existing customer and/or future customer needs.

The park will require cable and telephone feed to support the security cameras and day to day monitoring system operations for the park. The cable and telephone demand needs will be relatively minor and will not significantly impact these utilities.

Solid Waste and Hazardous Materials – Granular activated carbon (GAC) is used to remove sulfur from the incoming natural gas supply. The generation and subsequent off-site disposal and/or reclamation of the GAC carbon, although classified as hazardous waste for shipping and tracking purposes, will have a minimal impact upon the environment. The generation of spent activated carbon is commonplace in a large number of industries and the anticipated generation at the proposed project is minimal. No on-site storage of hazardous waste will occur and therefore the local impact will be negligible.

Aesthetics and Viewsheds - Existing vegetative screening located along Gruber Road will remain, and the energy park will be located approximately 46 feet below the adjacent residential properties. These proposed conditions will result in negligible aesthetic/viewshed impacts associated with the energy park. In addition, a supplemental planting is being proposed along the western, southern, and eastern portions of the property to provide additional screening from those directions.

Lighting and Security – Proposed lighting fixtures will be dark sky type fixtures that will minimize impacts to the night sky. Security measures such as gated access, chain link fencing around the project site, and 24-hour surveillance cameras are being implemented to protect the energy park infrastructure as well as the public.

1.0 INTRODUCTION

Beacon Falls Energy Park, LLC has retained Milone & MacBroom, Inc. (MMI) to prepare an environmental assessment for the planned Beacon Falls Energy Park to be located along Lopus Road in Beacon Falls, Connecticut. This assessment has been prepared in support of a proposal response to the Connecticut Department of Energy & Environmental Protection (CTDEEP) Requests for Proposals for Renewable Energy Resources. The proposed energy park will be located on a 25-acre parcel that is bounded to the west by State of Connecticut property, private undeveloped land, and Gruber Road; to the north by Lopus Road; and to the east and south by Metro-North railroad. The energy park will generate electricity through the use of fuel cells. This park will consist of 21 individual fuel cell units, an electrical switchyard, and metering facility.

Credit: FuelCell Energy, Inc.

Sixteen of the fuel cell units will be Model DFC 3000 and five of the units will be Model HEFC as manufactured by Fuel Cell Energy, Inc. with headquarters in Danbury CT. Each DFC 3000 model unit can generate approximately 2.8 megawatts of electricity and each HEFC model unit can generate approximately 3.7 megawatts of electricity. These units require natural gas and water for the generation of electricity. The energy park will be an unmanned facility and will only experience periodic service and maintenance visits from key personnel. No office space and/or restroom facilities are proposed. The site and fuel cell units will be remotely monitored.

When the system is fully operational this energy park will generate approximately 63.3 megawatts of electricity per day. The electricity will enter the power distribution network at the substation located on Cold Spring Road. This environmental assessment will describe and discuss the Energy Park's impacts and/or mitigation measures on the following environmental receptors:

- Land use
- Inland wetlands and watercourses
- Listed flora and fauna species

- Groundwater and surface water
- Noise
- Air quality
- Cultural resources
- Transportation infrastructure
- Utility and transmission services
- Hazardous waste
- Aesthetics and viewsheds
- Site development

1.1 Proposed Project Plan

The proposed energy park will be accessed from Lopus Road. The park will consist of 21 individual fuel cell units, an electrical switchyard, and metering facility (see Figure 1). Stormwater on site is being managed through a series of stormwater quality infiltration basins. Wastewater associated with the fuel cell operations will be discharged into a wastewater infiltration basin. The site will be surrounded by chain link fence and will be an unmanned facility.

1.2 Site Description and Background

The proposed project site is located in the town of Beacon Falls and to the west of the Naugatuck River. More specifically, the site is located adjacent to the western side of the Metro-North Rail line and along the southern side of Lopus Road (Figure 2). The site encompasses approximately 25 acres of land and has predominantly flat terrain, although significant slopes are present along the western and northern boundaries of the site as a result of past sand and gravel mining activities.

Historic aerial photography was reviewed to help determine the past use(s) of the property. The findings of the review are summarized as follows:

1934 photograph

The site appears to be mainly used for agricultural purposes. The area immediately surrounding the pond in the southern portion of the property appears lightly wooded, but the majority of the rest of the property appears to be either active farmland or pasture land. A large farmhouse and several outbuildings are located to the northwest of the site in the general vicinity of the present Lopus Road overpass over Route 8.

1951 photograph

The 1951 photograph shows the site as largely unchanged in land use from the 1934 photograph. An area of disturbed and possibly excavated soil is visible in the area immediately east of the present location of Gruber Road. It appears that Gruber Road has been constructed by this time, and several houses are located along it.

0' 100' 200'
0 1/2" 1"
SCALE 1" = 200'

EXISTING EVERGREEN SCREEN TO REMAIN
CHAIN LINK FENCE AROUND PERIMETER OF UTILITY PAD
PROPOSED FUEL CELLS ON CONCRETE PADS
ROUTE 8 NORTHBOUND
GRUBER ROAD
LOPUS ROAD
STORMWATER BASIN
ACCESS ROAD
PROPOSED CLEARING LIMIT
STORMWATER BASIN
WEST
EAST
WATER TREATMENT WASTEWATER INFILTRATION BASINS
RAILROAD AVENUE EXTENSION
STORMWATER BASIN

MILONE & MACBROOM®
99 Realty Drive
Cheshire, Connecticut 06410
(203) 271-1773 Fax (203) 272-9733
www.miloneandmacbroom.com

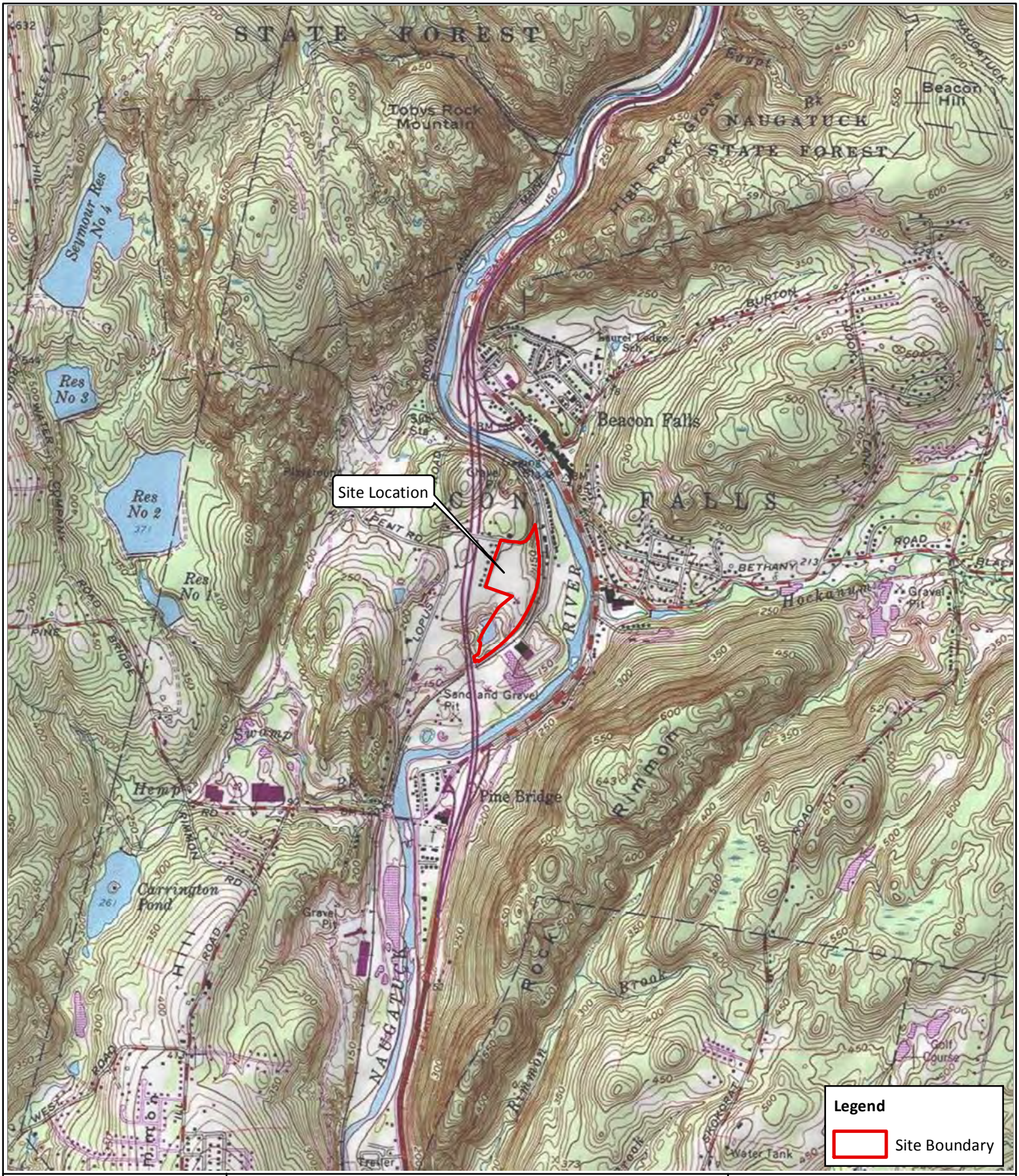
REVISIONS

SITE DEVELOPMENT PLAN
BEACON FALLS ENERGY PARK
LOPUS ROAD
BEACON FALLS

DJK	DJL	SRD
DESIGNED	DRAWN	CHECKED

SCALE: 1"=200'
DATE: JUNE 10, 2015
PROJECT NO.: 1103-87

FIG.1
SHEET NO.



SOURCE(S):
Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed

Figure 2: Location Map

LOCATION:
Beacon Falls, CT

N

Beacon Falls Energy Park

MXD: Y:\1103-87\Maps\Figure 2 (Location Map).mxd

Map By: CMP
MMI#: 1103-87
Original: 4/16/2015
Revision: 6/10/2015
Scale: 1 inch = 2,000 feet

MILONE & MACBROOM
99 Realty Drive Cheshire, CT 06410
(203) 271-1773 Fax: (203) 272-9733
www.miloneandmacbroom.com

1965 photograph

The 1965 photograph contains visual evidence that the site has been significantly excavated, based upon what is inferred to be vehicle tracks, and was still being actively quarried; although no earth moving equipment is visible in the photograph. It is also noted that a large portion of land alongside the western bank of the Naugatuck River appears to have been recently filled and it is possible that the source of the material was the subject site.

1970 photograph

No significant change is apparent as compared to the 1965 photograph. It appears that then-current sand and gravel removal operations were predominantly in the southern portion of the site.

1986 photograph

Route 8 has now been constructed to the west of Gruber Road. It appears the site is being actively mined, and several sand/gravel piles and pieces of earth moving equipment are visible. A line of small trees appears to have been planted along the crest of the slope to the east of Gruber Road.

1.3 Site Ownership

The proposed project site is owned by O & G Industries. Based upon a preliminary review of land transaction records for the town of Beacon Falls, it appears that O & G Industries obtained the site from the Leverty & Hurley Company in 1980. Leverty & Hurley was a construction and engineering firm based in Bridgeport, Connecticut. The property was acquired by Leverty & Hurley in 1964 from Alfred and Laura Gallucci, who had previously obtained ownership from Teresa Giardina in 1959.

1.4 Current Use of Property

The proposed project site is currently unoccupied and undeveloped land. There is no active use of the property by the owner; however, based upon visual and anecdotal evidence, the property is utilized by trespassers for motocross style motorcycle and all-terrain vehicle use.

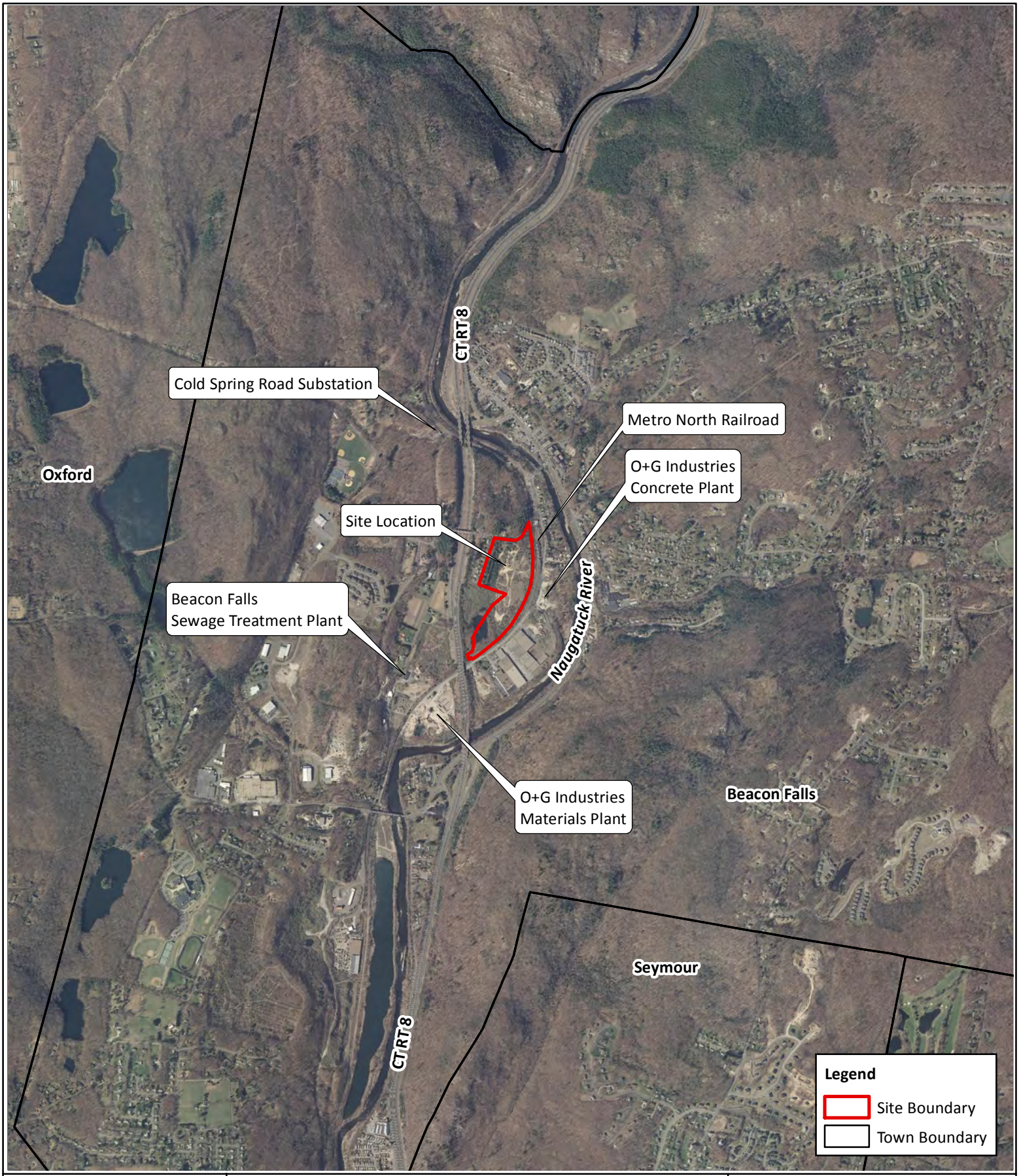
1.5 Description of Structures, Roads, and Improvements

There are no structures, roads, or other improvements currently in existence at the proposed project site, and it appears there never were any based upon the review of historic aerial photography as described above in Section 1.2.

1.6 Current Uses of Adjoining Properties

The current uses of the adjoining properties include residential (Gruber Road) to the northwest and residential and industrial (vacant) to the north across Lopus Road. The site is bordered along the east side by the Metro-North railroad and River Road Extension. Several industrial facilities are located along the eastern side of River Road Extension. Route 8 is adjacent to the site's south end.

Figures 3, 4, and 5 depict the current land uses in the vicinity of the proposed project site.



SOURCE(S):
CT ECO 2012 Orthoimagery

Figure 3: Vicinity Map

LOCATION:
Beacon Falls, CT

N

Beacon Falls Energy Park

MXD: Y:\1103-87\Maps\Figure 3 (Revised Vicinity Map).mxd

Map By: CMP
MMI#: 1103-87
Original: 4/16/2015
Revision: 6/10/2015
Scale: 1 inch = 2,000 feet

MILONE & MACBROOM
99 Realty Drive Cheshire, CT 06410
(203) 271-1773 Fax: (203) 272-9733
www.miloneandmacbroom.com

SOURCE(S):
CT ECO 2012 Orthoimagery

Figure 4: Aerial Map of Site

LOCATION:
Beacon Falls, CT

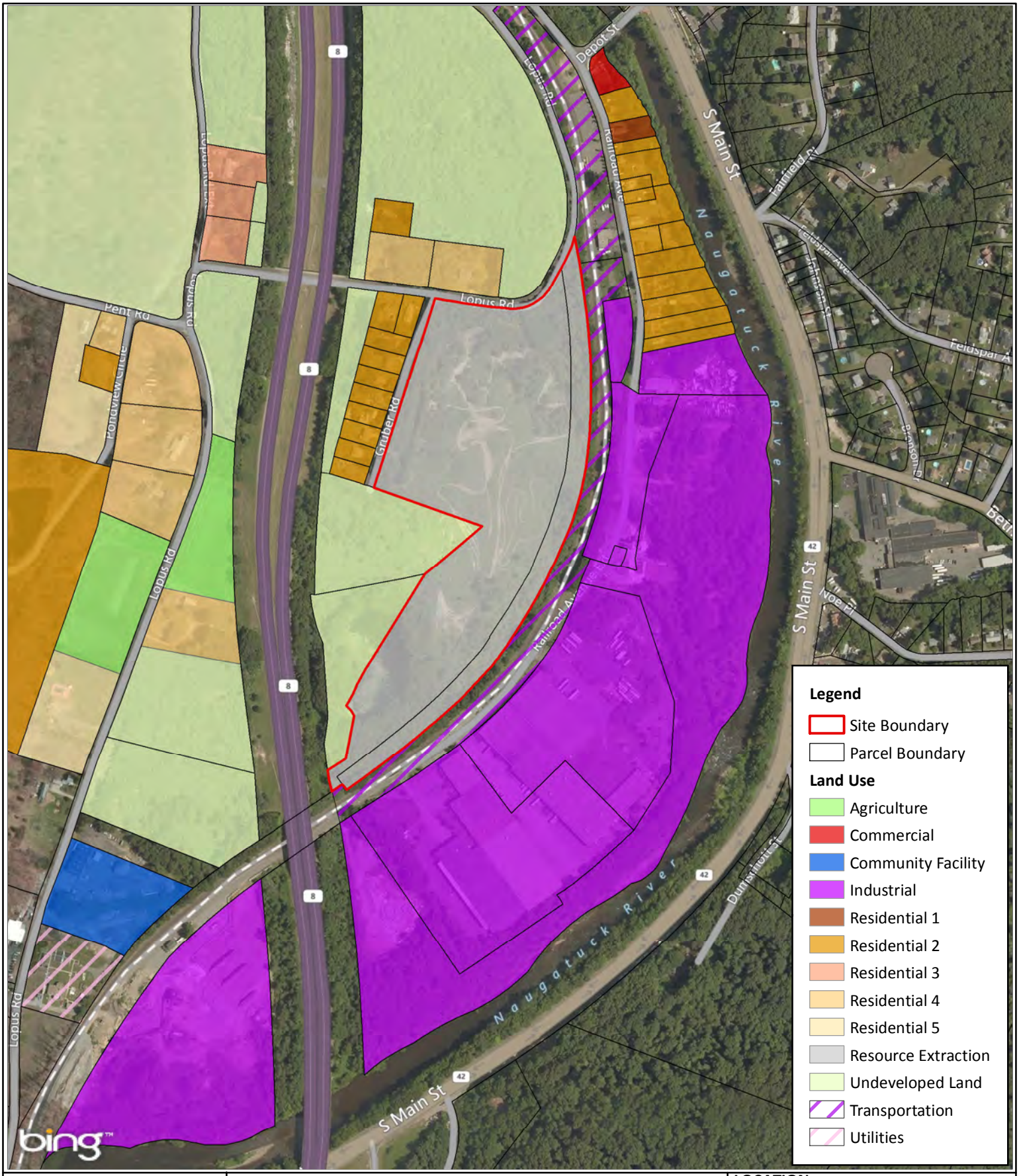
N

Beacon Falls Energy Park

MXD: Y:\1103-87\Maps\Figure 4 (Aerial Map).mxd

Map By: CMP
MMI#: 1103-87
Original: 6/10/2015
Revision: 4/16/2015
Scale: 1 inch = 250 feet

MILONE & MACBROOM
99 Realty Drive Cheshire, CT 06410
(203) 271-1773 Fax: (203) 272-9733
www.miloneandmacbroom.com



SOURCE(S):

ESRI Roads Basemap
2013 Beacon Falls Draft POCD Existing Land Use
Service Layer Credits: Image courtesy of USGS Earthstar Geographics SIO © 2015 Microsoft Corporation © 2015 HERE © AND

Figure 5: Land Use Map

LOCATION:

Beacon Falls, CT

N

Beacon Falls Energy Park

MXD: Y:\1103-87\Maps\Figure 5 (Revised Landuse Map).mxd

Map By: CMP
MMI#: 1103-87
Original: 4/16/2015
Revision: 6/10/2015
Scale: 1 inch = 500 feet

MILONE & MACBROOM
99 Realty Drive Cheshire, CT 06410
(203) 271-1773 Fax: (203) 272-9733
www.miloneandmacbroom.com

2.0 AFFECTED ENVIRONMENT AND ANALYSIS OF IMPACT

The following section of this assessment provides an overall characterization of the existing site conditions and provides a project site analysis of likely impacts to critical receptors. Data for this assessment was gathered from a variety of sources including on-site field investigations; state and local GIS database layers; federal, state, and municipal documents; and other pertinent resources.

The project area consists of a former sand and gravel mining site. The site location is depicted on a USGS quadrangle map (Figure 2). A vicinity map is depicted on Figure 3. A 2014 aerial photograph depicts recent site conditions (Figure 4).

2.1 Land Use

2.1.1 Statewide Land Use Conservation and Development

According to the Locational Guide Map contained in the Conservation and Development Policies Plan for Connecticut (the State Plan) the project site has been classified as a Growth Area. Growth Areas are lands that can support staged urban-scale expansion in areas suitable for long term economic growth that are currently less than 80% built up but have existing or planned infrastructure to support future growth in the region.

2.1.2 Local Plan of Conservation and Development

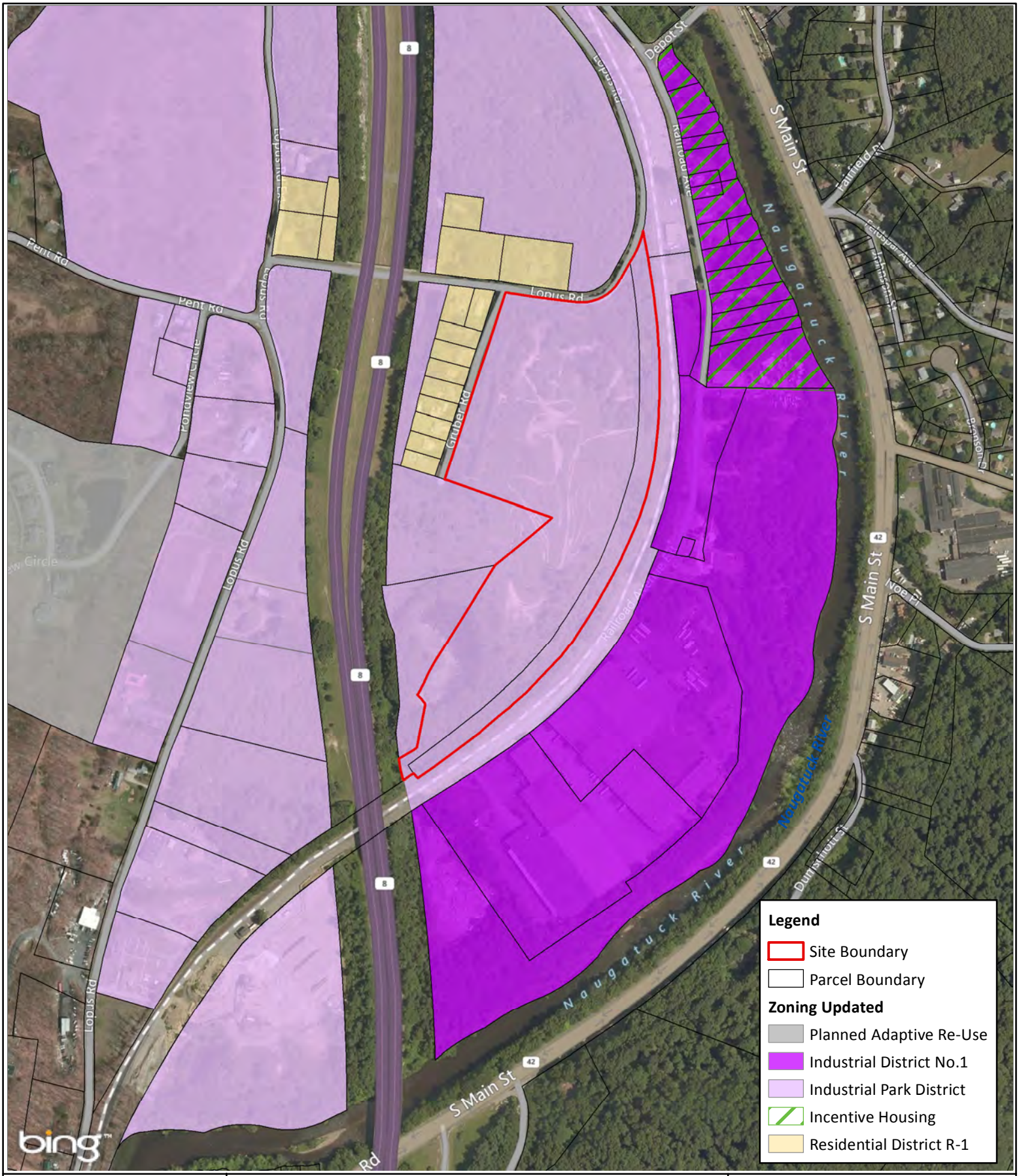
According to the 2013 Draft Beacon Falls Plan of Conservation and Development, the project area is classified as a resource extraction site (see Figure 5). There are no structures located on site and the area has become vegetated over the years with a variety of native and nonnative vegetation. The site is used by all-terrain vehicles (ATV's) as evidenced by the numerous active trails found within the parcel. An open water pond is found along the southern portion of the site.

2.1.3 Zoning

The Beacon Falls zoning maps indicate that the project parcels are located within the Industrial Park District (IPD) zone (see Figure 6). There are a wide range of permitted uses within this zone including public utility facilities which may consist of substations, water storage facilities, treatment facilities, and pump stations.

2.1.4 Potential Impacts

Development of the Beacon Falls Energy Park is consistent with the *Conservation and Development Policies Plan for Connecticut* and the *Plan of Conservation and Development for Beacon Falls*. The site is located within lands that are locally classified as Industrial Park District, and it is in close proximity to primary growth areas along Route 8. The proposed Beacon Falls Energy Park is believed to be compatible with the existing industrial land uses located along Railroad Avenue Extension.



SOURCE(S):
ESRI Roads Basemap
2003 Beacon Falls Zoning Map
Service Layer Credits: Image courtesy of USGS Earthstar Geographics SIO © 2015 Microsoft Corporation © 2015 HERE © AND

Figure 6: Zoning Map

LOCATION:
Beacon Falls, CT

N

Beacon Falls Energy Park

MXD: Y:\1103-87\Maps\Figure 6 (Revised Zoning Map).mxd

Map By: CMP
MMI#: 1103-87
Original: 4/16/2015
Revision: 6/10/2015
Scale: 1 inch = 500 feet

MILONE & MACBROOM
99 Realty Drive Cheshire, CT 06410
(203) 271-1773 Fax: (203) 272-9733
www.miloneandmacbroom.com

2.2 Natural Resources

2.2.1 Soils

The NRCS Web Soil survey was reviewed to determine the existing soil types on this parcel (see Figure 7). The resource mapping shows that the soils on site are classified as glaciofluvial deposits consisting of stratified sand and gravel. The predominant soil type consists of the Udorthent-Pits complex which is commonly defined as those soils that have been either filled and/or excavated by at least 2 feet and have no distinct natural horizons that can be taxonomically classified into a known soil series. Other soils found on site include the well-drained Agawam series, excessively drained Hinckley series, and the Udorthents-Urban complex. No wetland soils are shown on the resource mapping, with the exception of an open water pond located along the southern portion of the property.

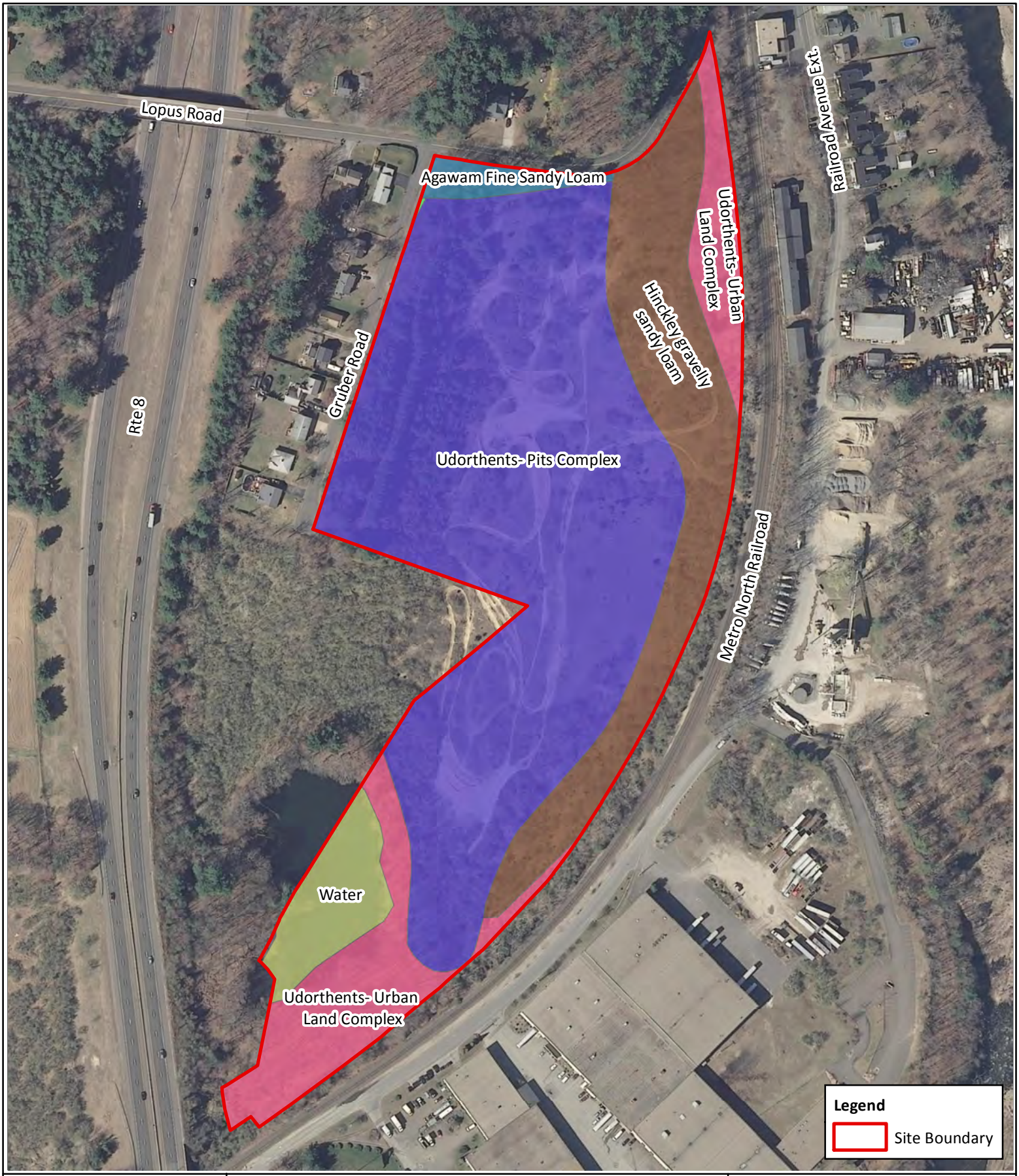
2.2.2 Inland Wetlands and Watercourses

The limits of inland wetlands and watercourses were delineated by a professional wetland scientist and certified soil scientist as part of the site assessment. The site was assessed by completing transects over the property and advancing a Dutch augur into the soils to an approximate depth of 24 inches to determine whether the soils classify as upland and/or wetland soils. No perennial and/or intermittent watercourses were observed within the parcel boundaries. No bands and/or troughs of wetland soils were found on site. An open water pond was delineated along the southern portion of the property and is depicted on the project site plans.

Open Water Pond

The open water pond is approximately 2 acres in size and appears to be manmade based on the steep sided slopes (i.e. excavated patterns) observed around the pond edge. The pond appears to have extreme fluctuations in water surface elevations based on observed wrack lines, historic aerial photograph inundation mapping, and littoral zone/shoreline vegetation indicators. During our field investigations completed in April 2015 the water levels within the pond appeared relatively low in relation to the water line indicators noted above. The pond is supported hydrologically by groundwater and surface water runoff from Route 8 highway and bordering upland areas. The pond does not appear to have a natural inlet or outlet.

Open Water Pond



SOURCE(S):
CT ECO 2012 Orthoimagery
CT DEEP Soils Layer

Figure 7: Soils Map

LOCATION:
Beacon Falls, CT

N

Beacon Falls Energy Park

MXD: Y:\1103-87\Maps\Figure 7 (Soils Map).mxd

Map By: CMP
MMI#: 1103-87
Original: 4/16/2015
Revision: 6/10/2015
Scale: 1 inch = 250 feet

MILONE & MACBROOM
99 Realty Drive Cheshire, CT 06410
(203) 271-1773 Fax: (203) 272-9733
www.miloneandmacbroom.com

The shoreline vegetation consists of a variety of native plants including red maple (*Acer rubrum*), black birch (*Betula lenta*), white oak (*Quercus alba*), American elm (*Ulmus americana*), white pine (*Pinus strobus*), common winterberry (*Ilex verticillata*), highbush blueberry (*Vaccinium corymbosum*), silky dogwood (*Cornus amomum*), steeplebush (*Spiraea tomentosa*), soft rush (*Juncus effusus*), woolgrass (*Scirpus cyperinus*), lurid sedge (*Carex lurida*), American burred (*Sparganium americanum*), and a variety of grasses.

The pond may support a warm water fishery resource; however, no fish and/or signs of fishing (ie. tangled fishing lines on vegetation) were observed around the pond. The pond may support amphibians and reptiles such as painted turtles, snapping turtles, green frogs, bull frogs, pickerel frogs, and water snakes. No wood frogs, spring peepers, and/or salamanders were observed during our field visit. Several birds were observed in and/or around the pond edge including mallards, northern cardinal, American robin, black capped chickadee, and tufted titmouse.

There is no apparent discharge of runoff from the site under existing conditions.

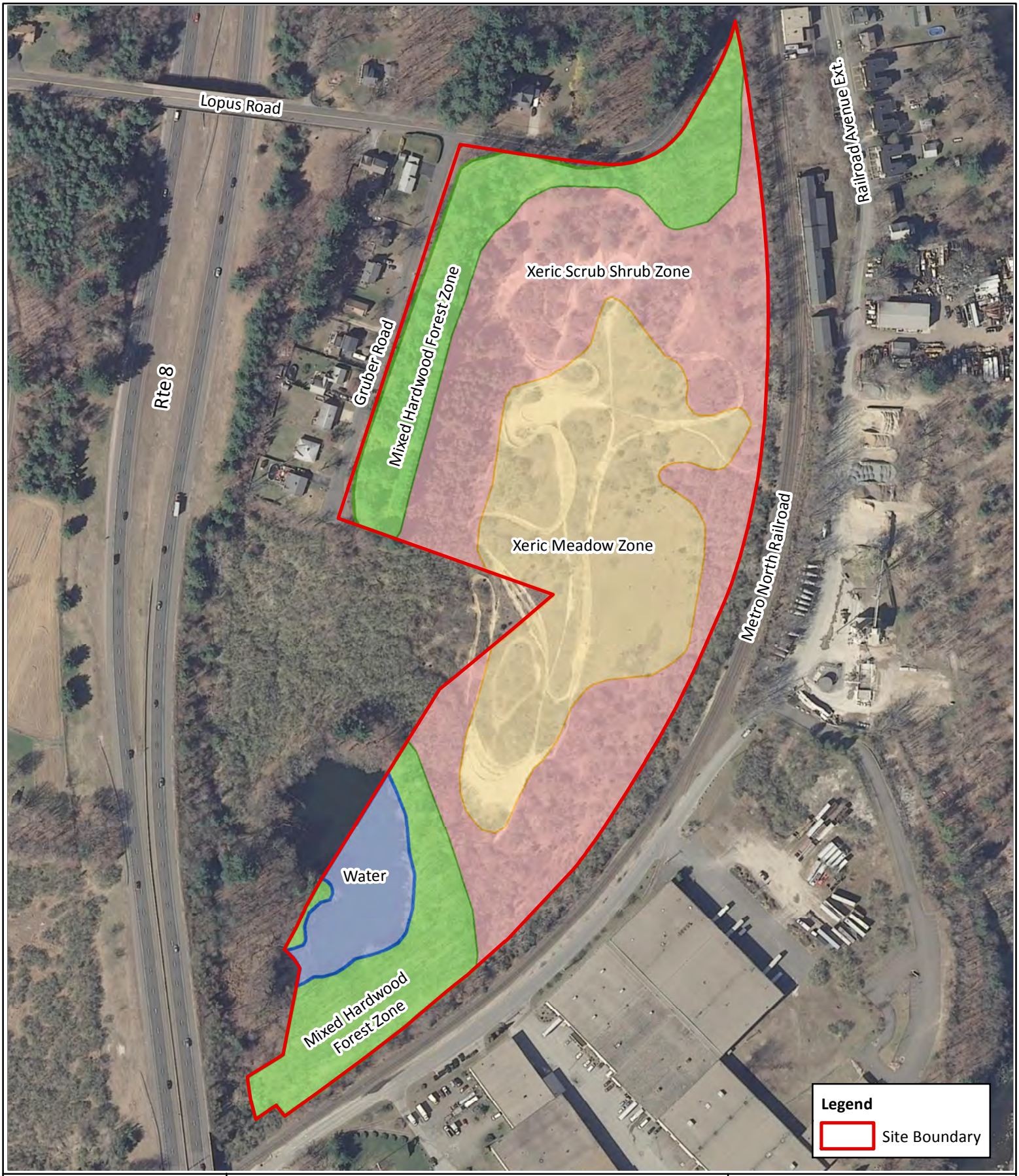
2.2.3 Upland Vegetation Areas

The site has varying vegetation community zones including mixed hardwood forest, railroad right of way vegetation zone, xeric scrub shrub zone, and xeric herbaceous zone (see Figure 8).

Mixed Hardwood Forest Zone

The hardwood forest zone consists of a mix of hardwood trees and shrubs. These forested areas appear to be at least 50 to 60 years of age based on the tree sizes observed within these areas. Typical vegetation consisted of white oak, red oak (*Quercus rubra*), black oak (*Quercus velutina*), sugar maple (*Acer saccharum*), Eastern hophornbeam (*Ostrya virginiana*), shagbark hickory (*Carya ovata*), American beech (*Fagus grandifolia*), black cherry (*Prunus serotina*), lowbush blueberry (*Vaccinium angustofolium*), witchhazel (*Hamamelis virginiana*), winged euonymus (*Euonymus alatus*), Japanese barberry (*Berberis thunbergii);* and various sedges, grasses, and mosses.

The railroad vegetation zone is located along the eastern portion of the property and consists of a narrow swath ranging between 20 to 30 feet in width. Here the plants consist of eastern red cedar, red oak, black oak, big toothed aspen, quaking aspen, autumn olive, multiflora rose, and wormwood.



SOURCE(S):
CT ECO 2012 Orthoimagery

Figure 8: Vegetation Community Map

LOCATION:
Beacon Falls, CT

N

Beacon Falls Energy Park

MXD: Y:\1103-87\Maps\Figure 8 (Vegetation).mxd

Map By: CMP
MMI#: 1103-87
Original: 4/16/2015
Revision: 6/10/2015
Scale: 1 inch = 250 feet

MILONE & MACBROOM
99 Realty Drive Cheshire, CT 06410
(203) 271-1773 Fax: (203) 272-9733
www.miloneandmacbroom.com

Railroad Right of Way Vegetation

The xeric scrub shrub zone is the largest vegetation community on site. This vegetation zone consists of shrubby vegetation that ranges in height from 6 to 12 feet. Some herbaceous vegetation is capable of surviving in areas where sunlight can penetrate to the ground. The dominant vegetation in this community included grey birch, black cherry, quaking aspen, sassafras, eastern red cedar, autumn olive, and multiflora rose.

Xeric Scrub Shrub Zone

The xeric meadow zone is found along the central portion of the site and is dominated by open barren sandy areas and densely vegetated herbaceous zones. Some shrubs are intermixed amongst the herbaceous vegetation, but are in limited density and height. Plants observed within this zone included sweetfern, little blue stem, wormwood, evening primrose, common mullen, round headed bush clover, and a variety of other grasses.

Xeric Meadow Zone

2.2.4 Fish and Wildlife

As stated earlier, the open water pond may support a warm water fishery resource. The CTDEEP fishery division does not have any fishery data on this pond.

The wildlife habitat in the project area contains significant indicators of disturbance such as gravel pits and piles, ATV trails, drainage modifications, anthropogenic debris, and introduced invasive vegetation species. The open water pond and its immediate surrounding mixed hardwood forest provide the highest quality habitat on site. The more heavily disturbed portions of the site provide habitat for a variety of scrub shrub habitat type birds, mammals, reptiles, amphibians, and insects. In addition the xeric vegetation communities have the potential to support State listed species of special concern.

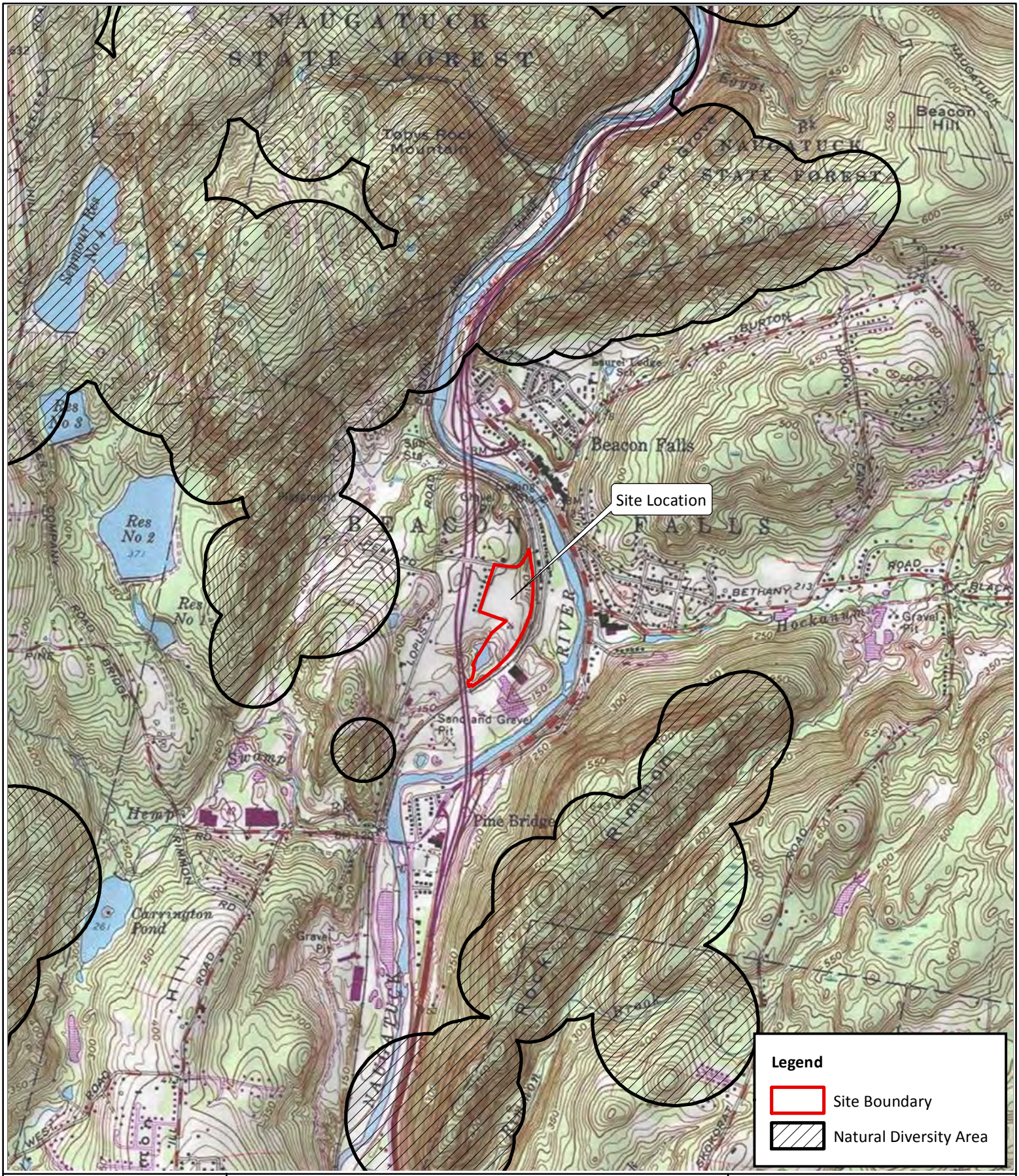
2.2.5 Species of Special Concern

The Connecticut Department of Energy and Environmental Protection (CTDEEP) Natural Diversity Database (NDDB) was accessed to determine whether any areas of special concern for endangered, threatened, and/or special concern species or significant natural communities exist within the project area. The December 2014 NDDB mapping indicates that the property does not support endangered, threatened, and/or special concern species or significant natural communities (See Figure 9). A NDDB inquiry was submitted to the CTDEEP to confirm that there are no known areas of concern on and/or within the immediate vicinity of the site. CTDEEP NDDB has indicated that although the site does not have a polygon area of concern over it, there is the potential for state listed special concern species to be present on this site (see NDDB correspondence). These species include:

- Vascular Plant – Downy wood-mint (*Blephilia ciliate*)
- Vascular Plant – Virginia waterleaf (*Hydrophyllum virginianum*)
- Vascular Plant – Hooker's orchid (*Platanthera hookeri*)
- Vertebrate Animal – Brown thrasher (*Taxostoma rufum*)
- Vertebrate Animal – Hognose snake (*Heterodon platirhrinos*)

In early July, MMI ecologists completed botanical survey of the project site to determine the presence of the three listed vascular plants. It should be noted that the *Blephilia ciliate* and *Platanthera hookeri* are considered to be extinct in Connecticut. Our botanical surveys did not find any of the listed plants within the project site.

In addition to the botanical surveys, MMI ecologists have completed both bird and reptile surveys on the project site. The brown thrasher prefers scrub shrub and early successional woodland habitats, both of which occur on this project site. In July 2015, one adult brown thrasher was observed on the property. The adult appeared to be solitary individual. The adult bird was found along the northern slope of the site that is intermixed with white pine trees and autumn olive shrubs. Protection for this bird species typically requires the maintenance of scrub shrubby habitat. This habitat occurs along the periphery of the property, most of which will remain intact following construction of the energy park. Some of the available habitat will be lost, especially along the topographically flatter portions of the site.



SOURCE(S):
ESRI USA Topo Maps
Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed

Figure 9: Natural Diversity Database Map

LOCATION:
Beacon Falls, CT

N

Beacon Falls Energy Park

MXD: Y:\1103-87\Maps\Figure 9 (NDDB).mxd

Map By: CMP
MMI#: 1103-87
Original: 4/16/2015
Revision: 6/10/2015
Scale: 1 inch = 2,000 feet

MILONE & MACBROOM
99 Realty Drive Cheshire, CT 06410
(203) 271-1773 Fax: (203) 272-9733
www.miloneandmacbroom.com

No eastern hognose snakes were found during multi-day field surveys. In fact, no snakes of any kind were observed on site. Several American toads, pickerel frogs, and grey tree frogs were observed on site. No eastern box turtles were found on site.

Although no eastern hognose snakes were found, the site does have habitat that can support the eastern hognose snake. The following management plan has been developed to help protect these species during construction of the energy park.

Silt fence will be installed as shown on the plans to form a barrier along the potential habitat. These silt fences will help limit the potential for snakes to enter the project site. However, if said species are observed within the project area, the contractor is responsible for following the snake management plan as follows:

- Conduct a sweep of the project area by a qualified wildlife biologist prior to installation of silt fence.
- Install silt fencing around the work area prior to the start of any construction.
- Conduct a second sweep of the project area by a qualified wildlife biologist prior to construction.
- The contractor will be informed of the potential presence of eastern hognose snakes within the project site and will be furnished with a description of the snake for proper identification purposes. This will be accomplished by inclusion of the necessary information in the contract documents, including notations on the plans and a Notice to Contractor and/or special provisions as appropriate.
- Carefully remove any eastern hognose snake discovered inside the project area and relocate unharmed to an area immediately outside of the silt fence and in the same direction it was slithering.
- Restrict machinery and heavy vehicles from being parked or operated in hognose snake habitat. Confine parking for construction equipment within the limits bound by silt fence.
- Work conducted during the early morning and evening hours should occur with special care not to harm basking or foraging individuals.
- Silt fence should be removed once construction is complete and soils have been stabilized to avoid restricting wildlife movement.

2.2.6 Potential Impacts

Development of the energy park on this parcel is not likely to significantly impact the natural resources as efforts will be employed to control influence of nearby water resources and to reduce the overall amount of disturbance of the site during construction. Direct impacts to vegetation and wildlife are expected to be minimal given past activities and the open nature of the site. A majority of the existing scrub shrub habitats found around the periphery of the site

will remain for use by the brown thrasher. Additional shrub and tree plantings are proposed along the southern and eastern limits of the site. The project will implement several important protection plans and management measures to help protect state listed special concern species.

2.3 Water Resources

The project site is located within the Housatonic major basin system and the Naugatuck River regional basin. The Housatonic major basin drains over 1,550 square miles, including portions of Massachusetts. The Naugatuck regional basin drains approximately 310 square miles. The Naugatuck River drainage area comprises approximately 77.3 square miles of the 310 square mile watershed of the Naugatuck regional basin. The closest perennial watercourse to the project site is the Naugatuck River.

2.3.1 Flood Hazard Potential

The project area is located outside of flood hazard areas as delineated on the Flood Insurance Rate Map (FIRM) completed for Beacon Falls pursuant to the Federal Emergency Management Agency (FEMA). According to the FEMA resource mapping the entire site is located above the published FEMA 100-year flood zone and floodway for the Naugatuck River (See Figure 10).

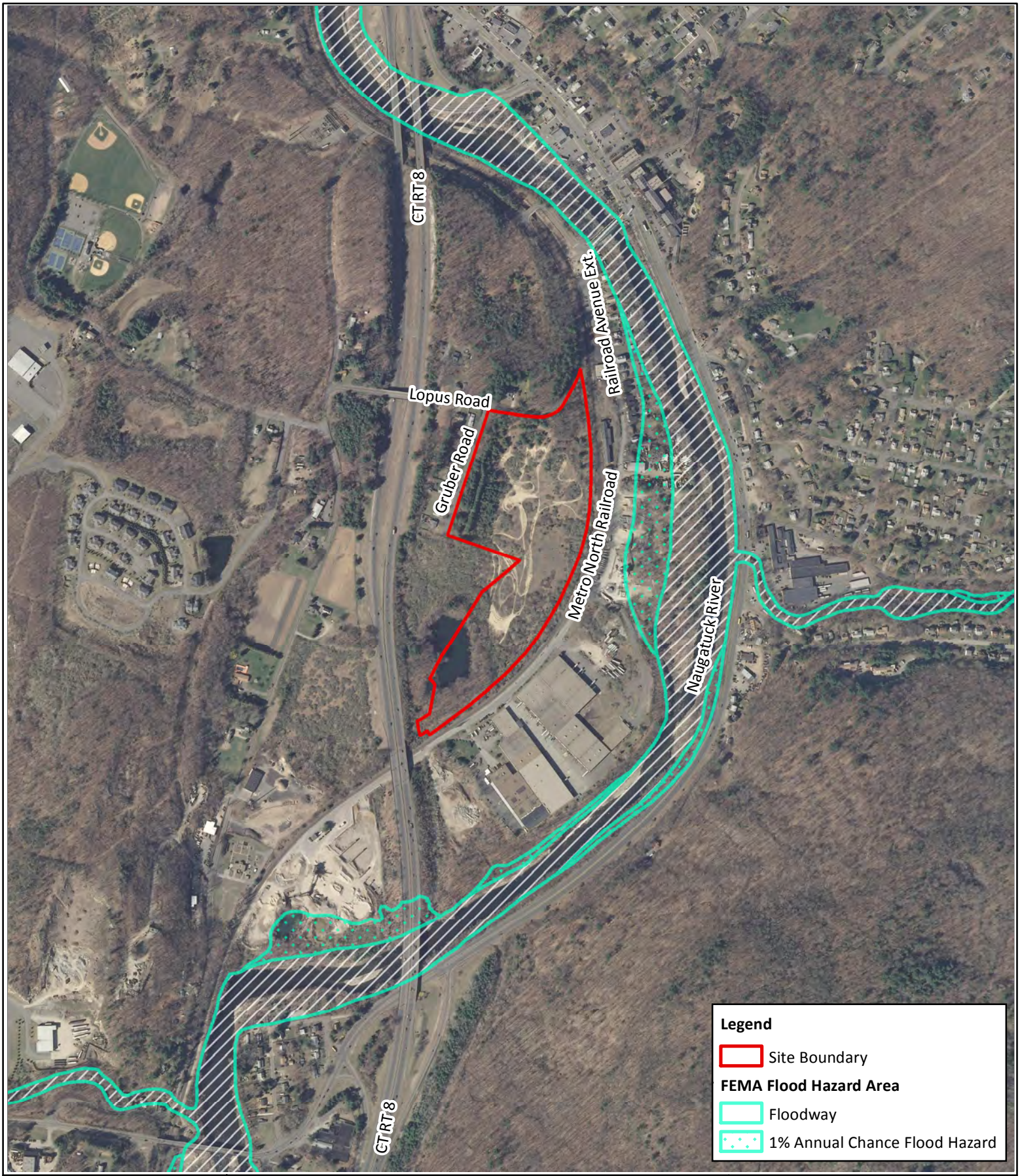
2.3.2 Surface Water Quality

Surface water quality can be influenced by both point and non-point sources of pollution. Point sources are well-defined, discrete locations, such as sewage treatment plant discharges or combined sewer overflows. Non-point sources of pollution include urban storm drainage, surface runoff, erosion, and leachate from broader areas and human activities.

The State of Connecticut has set forth a policy for the management of water quality through the Water Quality Standards and Criteria, wherein criteria and a classification system are applied to all surface water and groundwater resources in the State. These classifications establish designated uses for surface water and groundwater resources and identify the criteria necessary to support those uses. Criteria have been established with respect to desirable use, anti-degradation, allowable types of discharges, waste assimilation, and a variety of physical and chemical constituents.

The open water pond located on site is designated as a Class A waterbody (See Figure 11). Class A surface waters support the following designated uses: potential drinking water supply; fish and wildlife habitat; recreational use; agricultural and industrial supply; and other legitimate uses, including navigation. The following discharges are permittable within this zone: discharges from public or private drinking water treatment systems, dredging and dewatering, emergency and clean water discharges.

The Naugatuck River is located approximately 700 feet to the east of the project site and is classified as a C/B surface water resource. The Naugatuck River can presently support recreational use, fish and wildlife habitat, and agricultural and industrial supply, including navigation, but does support use as a drinking water supply.



SOURCE(S):
CT ECO 2012 Orthoimagery
FEMA Flood Hazard Layer

Figure 10: FEMA Flood Hazard Map

LOCATION:
Beacon Falls, CT

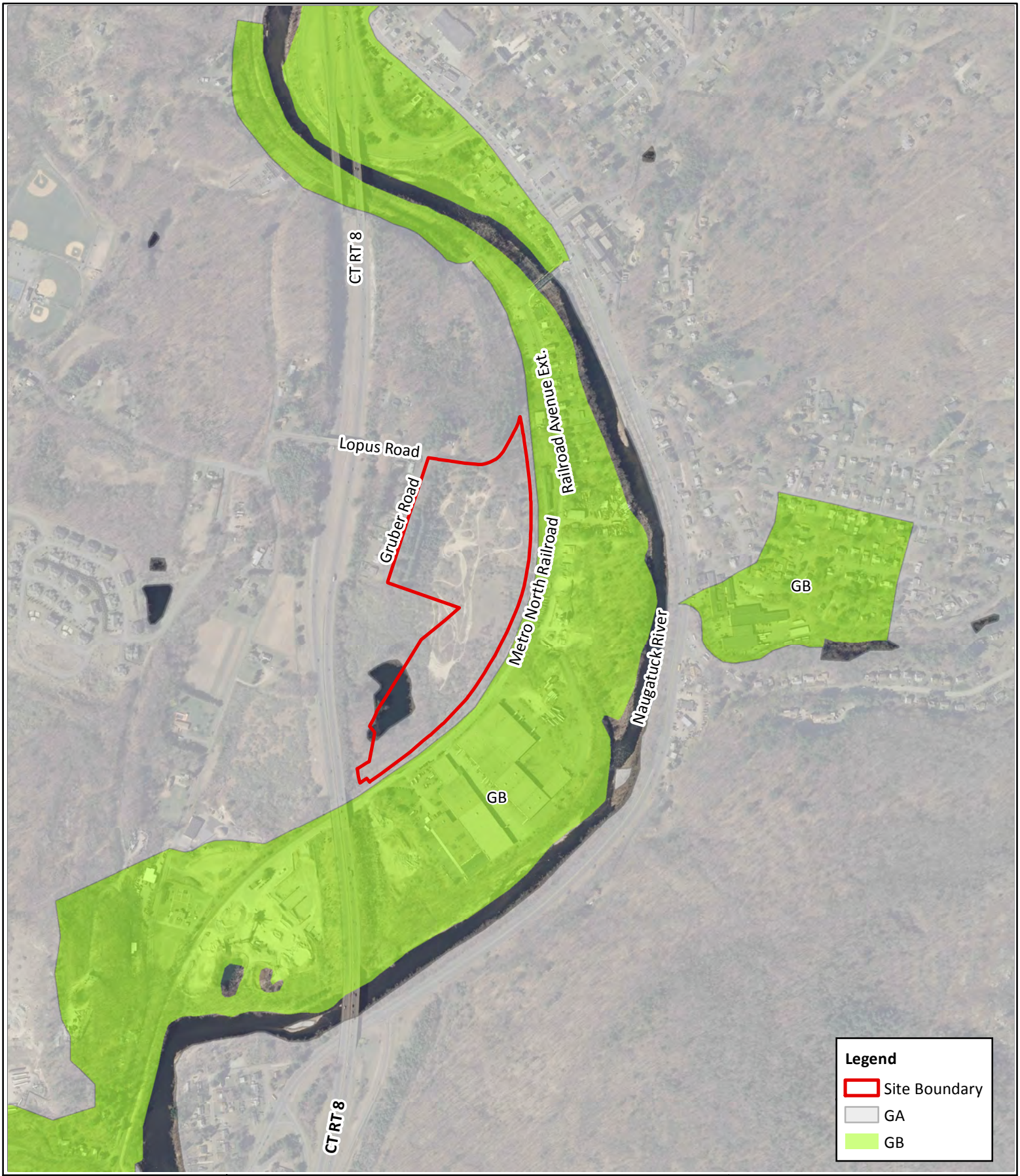
N

Beacon Falls Energy Park

MXD: Y:\1103-87\Maps\Figure 10 (FEMA).mxd

Map By: CMP
MMI#: 1103-87
Original: 4/16/2015
Revision: 6/10/2015
Scale: 1 inch = 750 feet

MILONE & MACBROOM
99 Realty Drive Cheshire, CT 06410
(203) 271-1773 Fax: (203) 272-9733
www.miloneandmacbroom.com



SOURCE(S):
CT ECO 2012 Orthoimagery
CT DEEP Groundwater Quality Layer

Figure 11: Groundwater Classification Map

LOCATION:
Beacon Falls, CT

N

Beacon Falls Energy Park

MXD: Y:\1103-87\Maps\Figure 11 (GW Class).mxd

Map By: CMP
MMI#: 1103-87
Original: 4/16/2015
Revision: 6/10/2015
Scale: 1 inch = 750 feet

MILONE & MACBROOM
99 Realty Drive Cheshire, CT 06410
(203) 271-1773 Fax: (203) 272-9733
www.miloneandmacbroom.com

2.3.3 Groundwater Quality

The project site is located within a GA groundwater area (See Figure 12). GA areas support the following designated uses: existing private and potential public or private supplies of water suitable for drinking without treatment; baseflow for hydraulically connected surface water bodies. The following discharges are permittable within a GA area: 1) discharges from septage treatment facilities subject to stringent treatment and discharge requirements, and 2) other wastes of natural origin that easily biodegrade and present no threat to groundwater.

Areas to the immediate east of the project site across Railroad Avenue are classified as GB. This area is assumed to be hydraulically downgradient of the proposed project site. GB areas are groundwater located within highly urbanized areas of intense industrial activities and where public water supply is available. The groundwater may not be suitable for direct human consumption due to waste discharges, spills, or leaks of chemicals or land use impacts.

2.3.4 Stormwater Quality

Stormwater runoff is comprised of excess precipitation that flows over the ground surface and impervious areas to storm drains and watercourses. Its quality will reflect the land uses and surfaces it contacts.

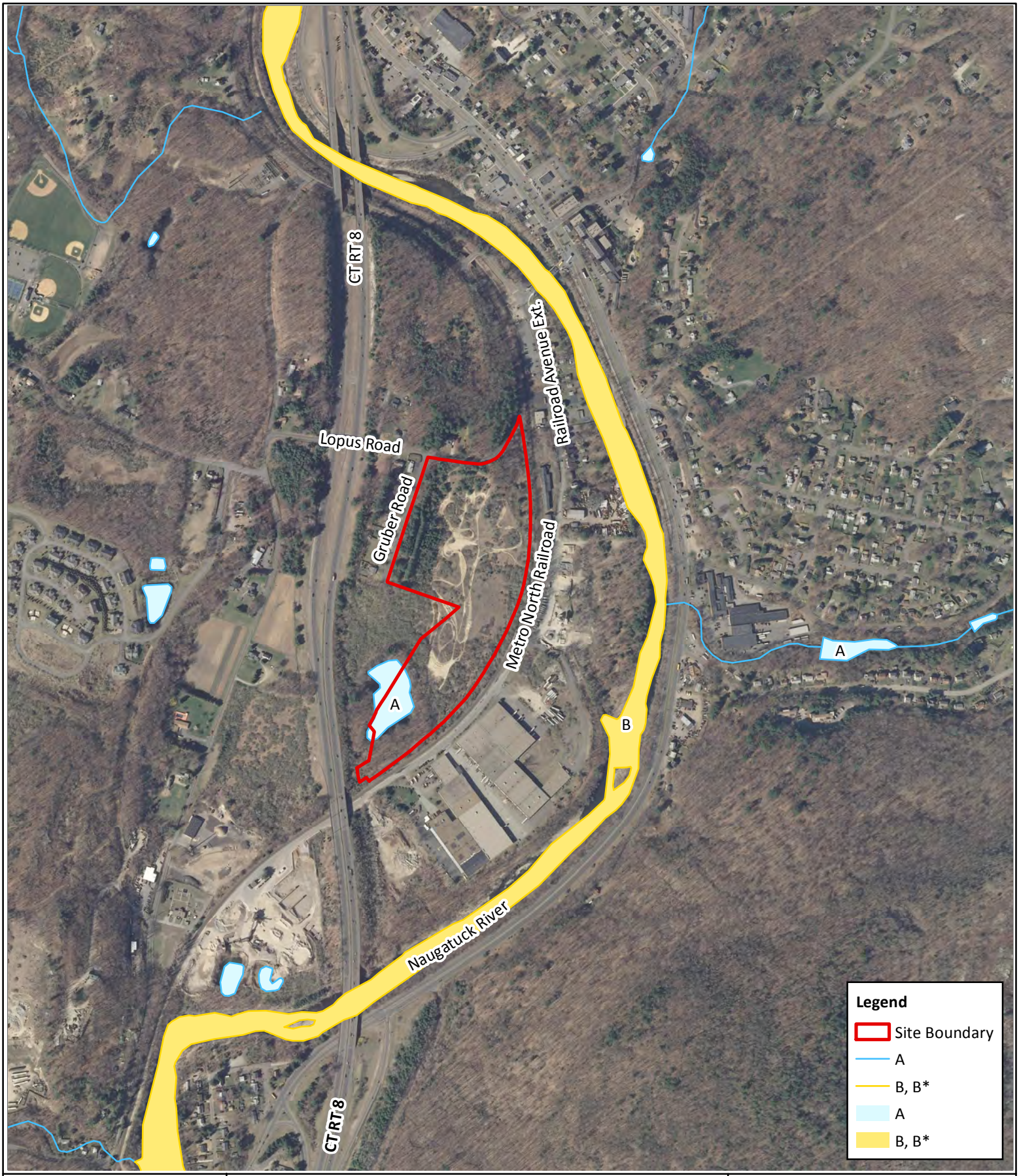
The Conservation and Development Policies Plan for the Connecticut (C&DP) and the *CTDEEP's 2004 Stormwater Quality Manual* recognize the expanding significance of non-point sources in water quality concerns. In rebuilding or expanding urban infrastructure, the C&DP Plan recommends incorporating appropriate stormwater management technologies to minimize adverse impacts of runoff on surface and ground waters. For new development, the C&DP Plan promotes a design and engineering approach to stormwater handling that minimizes the amount of impervious cover and incorporates non-structural design features and management techniques to renovate runoff.

The three fundamental storm drainage needs for this project are to 1) minimize impacts to downstream areas (i.e. open water pond and/or the Naugatuck River) and 2) treat stormwater prior to discharge. Specific concepts include controlling pollutants at their source(s), planning for both frequent and rare storm events, avoiding unnecessary impervious cover, and use of multiple treatment practices to reduce pollution loadings and concentrations.

2.3.5 Wastewater Quality

The Energy Park's operation of the 21 fuel cell units will result in the generation of several wastewater streams. Based upon information supplied by the manufacturer of the fuel cells, these include:

- Approximately 150,000 gallons per day of water treatment wastewater
- Water storage tank draining wastewater of an assumed quantity of 50,000 gallons per year.



SOURCE(S):
CT ECO 2012 Orthoimagery
CT DEEP Surface Water Quality Layer

Figure 12: Surface Water Classification Map

LOCATION:
Beacon Falls, CT

N

Beacon Falls Energy Park

MXD: Y:\1103-87\Maps\Figure 12 (SW Class).mxd

Map By: CMP
MMI#: 1103-87
Original: 4/16/2015
Revision: 6/10/2015
Scale: 1 inch = 750 feet

MILONE & MACBROOM
99 Realty Drive Cheshire, CT 06410
(203) 271-1773 Fax: (203) 272-9733
www.miloneandmacbroom.com

The wastewater proposed to be generated at the site can be classified as Water Treatment Wastewater. These are wastewaters that will result from the further purification of raw water. The raw water for the proposed project will consist of potable water as supplied by Aquarion Water Company. As potable water, the water supply is virtually free of contaminants; however, the proposed project requires a higher level of purification. The fuel cell manufacturer has provided information indicating that the pollutant loading associated with this wastewater stream is minimal based upon similar installations in Connecticut and elsewhere.

The wastewater will be handled in accordance with the General Permit for the Discharge of Water Treatment Wastewater (Permit DEP-PED-GP-002) and is proposed to be discharged to groundwater after treatment using engineered infiltration basins. The data obtained from similar sites suggests that the permit effluent limitations for discharges to groundwater can be readily met.

2.3.6 Potential Impacts

The project site is located outside of any Flood Hazard areas; therefore, the proposed energy park will have no negative impacts to Flood Hazard areas.

The project site is underlain by stratified drift deposits of sand and gravel, and the underlying soils have a high permeability rate. Stormwater and water treatment wastewaters will be kept separate from each other with the stormwater being collected and directed into one or more bio-infiltration basins and the water treatment wastewater being discharged into two open infiltration basins in the south-central portion of the site. The stormwater bio-infiltration basin and the two wastewater infiltration basins will primarily treat water via natural infiltration into the underlying groundwater areas. Groundwater is assumed to move from west to east on site. An overflow spillway has been included on the stormwater basin to help control and convey large stormwater runoff producing events towards the open water pond.

The implementation of stormwater controls for managing non-point source pollution and implementation of Best Management Practices are proposed. It is anticipated that the proposed energy park will have no significant impact on the quality or availability of surface water, as no direct discharge of stormwater or wastewater to existing surface waterbodies is planned. Furthermore, since no withdrawal of groundwater and only infiltration of permit compliant stormwater and wastewater is proposed, negative impacts to the quality and availability of groundwater uses is not anticipated.

2.4 Air Quality

TRC, an environmental/engineering consultant firm was retained to assess the site's existing environmental air quality conditions and proposed air quality conditions expected following construction of the energy park.

A fuel cell is a non-combustion, electrochemical device that combines fuel with oxygen from the ambient air to directly generate electricity and heat. The byproducts of the process are water, carbon dioxide (CO_2), and small amounts of criteria air pollutants, including particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$), particulate matter less than or equal to 10

microns in diameter (PM_{10}), sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), and volatile organic compounds (VOC). The fuel cells have inherently low emissions, and do not use add-on emission controls. The potential impacts of the fuel cell emissions are discussed in Section 2.4.1 below.

The only other ambient air quality concerns associated with the project relate to construction activities and their potential to generate fugitive dust and mobile source emissions. Such sources of dust are attributed to construction vehicle disturbance during hauling, loading, dumping, and bulldozing on any areas cleared for the proposed energy park. Meteorological conditions and the intensity of activities as well as soil moisture content also govern the extent to which particles will become airborne.

Standard controls will be implemented to reduce the impact from such fugitive dust emissions. Proper phasing of construction minimizes the length of time that soil remains exposed to wind and water. As necessary, water and wetting agents will be used on exposed soil and gravel areas. Periodic sweeping and daily rinsing of truck tires would reduce the potential for off-site tracking. Off-site tracking occurs when residual soil particles are displaced from construction sites onto higher traffic roadways and then become airborne and waterborne. These measures can also control dust from exposed soil and gravel areas to further minimize airborne particulate matter. However, wind erosion is not anticipated to be a large mobilizer of dust since the area is presently well vegetated and underlain by coarse-grained sands and gravels, and disturbance of the perimeter vegetation is not planned.

Well-maintained trucks and other construction equipment typically emit small amounts of pollutants such as NO_x, SO_2, and CO related to internal combustion or diesel engines. Proper maintenance of on-site machinery and vehicles is, thus, important to reduce the potential for higher smoke emissions.

In addition to the measures noted above, the following best management practices will be incorporated as appropriate in the construction phase of the project:

- Minimization of exposed erodible earth area
- Stabilization of exposed earth with grass, pavement, or other cover as early as possible
- Application of water and a stabilizing agent to the work areas and haul roads
- Covering, shielding, or stabilizing stockpiled material as necessary
- Use of covered haul trucks
- Rinsing construction equipment during the incidental transport of soil from unpaved to paved surfaces to minimize drag-out

2.4.1 Potential Impacts

For the purpose of evaluating the potential ambient air quality impacts of the fuel cells, calculations were first performed to determine the potential emissions of each individual fuel cell, and of all the proposed fuel cells combined, based on the assumption that they would all

operate simultaneously at their maximum capacity for all of the hours (8,760) in a year.[1] The resulting annual emission rates were then compared to the thresholds that determine the applicable regulatory requirements. Following are the potentially applicable regulatory requirements that have been reviewed:

- State Permit to Construct and Operate
- Best Available Control Technology (BACT)
- Ambient Impact Analysis
- Nonattainment New Source Review (NNSR)
- Prevention of Significant Deterioration (PSD)
- Title V Operating Permit

The potential emissions of each individual fuel cell, and of all the fuel cells combined, were determined to be too small to require air permits to construct and operate, and no other applicable air quality regulations were identified.

The potential emissions of the project are also much less than the fossil fuel-fired power plants whose operation the project will tend to displace. The U.S. Environmental Protection Agency (EPA) Emissions and Generation Resource Integrated Database (eGRID)[2] provides data on the environmental characteristics for most of the electric power generated in the United States. eGRID contains information on the average emission rates in pound per megawatt hour (lb/MW-hr) for NO_x, SO_x, and CO_2 for regions and sub-regions in the United States. The 2010 (the most recent year) emission rates for the fossil-fuel power plants in New England are summarized as follows:

- NO_x - 0.48 lb/MW-hr,
- SO_x - 2.10 lb/MW-hr, and
- CO_2 - 1,115 lb/MW-hr.

In comparison, the project's expected emissions are summarized as follows:

- NO_x - 0.011 lb/MW-hr,
- SO_x - 0.005 lb/MW-hr, and
- CO_2 - 960 lb/MW-hr.

For the reasons described above, the ambient air quality impacts attributable to operation of the fuel cells are expected to be minimal, both in the local area and elsewhere. Therefore, no mitigation is required.

2.5 Noise

TRC, an environmental/engineering consultant firm was retained to assess the site's existing and proposed noise conditions that are expected following construction of the energy park.

[1] Air Quality Regulatory Requirements Review for the Proposed Beacon Falls Energy Park Fuel Cell Project in Beacon Falls, Connecticut, TRC, June 2015

[2] http://www.epa.gov/cleanenergy/energy-resources/egrid/ accessed 05/18/15

The Town of Beacon Falls has a noise ordinance (Section 61.3 of the Town Code) that includes the following language "with the exception of time signals and noise necessarily involved in the construction or demolition of buildings and other structures, no noise shall be transmitted outside the lot where it originates when noise has a decibel level, octave band, intermittence and/or beat frequency which endangers the public health and safety or impairs safety on or the value and reasonable use of any other lot." The ordinance does not include any numerical decibel limitations on noise.

State of Connecticut

The State of Connecticut has a detailed noise standard which is applicable to the proposed Project (Section 22a-69 of the Connecticut Department of Energy & Environmental Protection). The standard limits noise from a source, as measured at certain Noise Zones when emitted from other Noise Zones. These Zones include the following:

- Class A - Generally residential, hotels, hospitals and other sensitive areas.
- Class B - Commercial areas
- Class C - Industrial uses

It should be emphasized that the noise standards are expressed as noise attributable to a specific source at a receptor and that the total noise measured at a given location (i.e., source plus background) may be greater than that which is attributable to a specific source. The proposed facility is an industrial use in an industrially zoned area (Class C). The nearest noise sensitive areas are the residences to the west on Gruber Road (Class A). As such, the applicable portion of the noise standard is a source located in a Class C area, and the measured noise level from that source at a Class A area. Summarized below are the noise limits for this scenario.

Class C source emitting to a Class A receiver

Daytime	Nighttime
61 dBA	51 dBA

Nighttime is defined in the standard as the hours between 10 p.m. to 7 a.m.

The allowable level is reduced by 5 dBA if the proposed source emits prominent discrete tones. Prominent discrete tones are defined in 22a-69 as acoustic energy which produces a one-third octave band sound pressure level greater than that of either adjacent one-third octave band and which exceeds the arithmetic average of the two adjacent one-third octave bands by the following amounts shown in Table 1.

Table 1

Prominent Discrete Tone Determination

One-Third Octave Band Center Frequency (Hz)	dB	One-Third Octave Band Center Frequency (Hz)	dB
100	16	1250	4
125	14	1600	4
160	12	2000	3
200	11	2500	3
250	9	3150	3
315	8	4000	3
400	7	5000	4
500	6	6300	4
630	6	8000	5
800	5	10000	6
1000	4		

For areas where the existing background noise levels (not including noise from the regulated source) already exceed the allowable limits, the regulated source would not be deemed to be casing excessive noise if the noise emitted by the regulated source is not greater than 5 dBA above background levels, with an absolute upper limit of 80 dBA.

Noise Modeling Study

Computer noise modeling was conducted utilizing the CadnaA noise model (DataKustik, 2006). This very powerful 3-dimensional model maps the noise contours of the overall Project in accordance with a variety of standards, primarily VDI 2714 Outdoor Sound Propagation and ISO 9613 (ISO, 1996). The software is designed to take into account spreading losses, ground and atmospheric effects, shielding from terrain, barriers and buildings, and reflections from surfaces. These model capabilities are especially important in an area such as the project site, as the effects of the local terrain can be accounted for. Site-specific GIS topographic data were obtained and incorporated into the model.

The project consists of 21 fuel cells, which includes 16 DFC fuel cells and 5 HEFC fuel cells. The HEFC fuel cells have slightly more components than the DFC fuel cells. Each fuel cell has several noise generating components that include the following:

- DFC Module
- Fresh Air Blower
- Discharge Piping
- Air Heater
- Chiller
- Transformer

In addition, the project will contain a switchyard with a main step-up transformer.

Sound level data for each fuel cell component were obtained directly from FuelCell. Noise emission data for the main step-up transformer were developed using standard NEMA sound ratings for the proposed transformer MVA rating (40/53/66 MVA).

The modeling considered hemispherical spreading and atmospheric absorption for this analysis. Standard conditions of 50° F and 70 percent relative humidity were assumed. In order to remain conservative in the analysis, no credit was taken for tree foliage.

Modeling receptors were chosen at specific residential locations near the project site. Additionally, a noise contour map was prepared that shows the calculated project sound levels in the entire area.

An initial noise model was prepared, utilizing the standard design and noise emissions data for the fuel cells. The results of this model indicated that project-related sound levels would exceed the State of Connecticut noise standard limit for nighttime hours at some residential locations.

The project therefore selected FuelCell's low noise option design. The model was revised to include the low noise data sources. In addition to selecting the low noise option, the project also opted to install a sound barrier wall along Gruber Road to further reduce sound levels in that neighborhood. The sound barrier wall would be located approximately 50 to 100 feet from the eastern edge of Gruber Road and would extend approximately 800 feet from north to south.

The noise modeling results for each residential location, that include the low noise design option and the proposed sound barrier wall, are presented in Table 2.

Table 2
Noise Modeling Results (dBA)

Location	Modeled Project Sound Level
Gruber Road	43 to 47
Lopus Road	46
Railroad Avenue	43 to 45

The data in Table 2 reveal that project sound levels will be less than 51 dBA at all residential locations. Therefore, the project is projected to be in compliance with the State of Connecticut noise standard for nighttime hours.

Ambient Noise Monitoring Program

The project will be conducting an ambient noise monitoring program at the above residential areas in order to determine existing noise levels in the area.

2.5.1 Potential Impacts

The project will implement low noise design principles within the design of the energy park. To further buffer the residential properties located along Gruber Road, the design team has proposed to construct a sound barrier wall along the western and northern portions of the project site. The sound barrier wall will be constructed approximately 50 to 100 feet away from the existing road. The existing row of white pines will be maintained and protected during the construction of the wall. The low noise design in combination with the sound barrier wall will minimize noise levels from this energy park and will allow the site to meet the state requirements.

2.6 Cultural Resources

Given the past disturbances to the site (sand and gravel extraction) and the quantity and depth of materials removed from the site, it is highly unlikely that this site can support significant historical and/or archeological resources. Letters to the State Historic Preservation Office (SHPO), State Archeologist, and Tribal Historic Preservation Offices have been filed and response from these agencies indicates that the site does not have a high likelihood of supporting any sensitive archeological and/or historic properties due to its former use as a sand and gravel pit (see Appendix B).

2.6.1 Potential Impacts

Based on correspondence received from SHPO, the project will have no adverse impacts on sensitive archeological and/or historic properties. No further correspondence and/or mitigation is required.

2.7 Transportation Infrastructure and Traffic

The site has access from two local arterial roadways, Gruber Road and Lopus Road. The eastern portion of the site is bordered by the Metro-North railroad and there is no existing at-grade crossing that services this property. Route 8 is located along the southern portion of the property and does not provide any viable access to the site. Access to the site will be provided by the construction of a new access road off of Lopus Road along the northeastern portion of the property. This is the only feasible site location for an access road given the steep slopes, railroad, and Route 8 located on other portions of the site.

Traffic impacts can occur at various stages of a project. These often include temporary construction traffic related impacts and long term facility operation traffic impacts. The construction of this project is anticipated to take approximately 3 years. Construction hours will be from 7 a.m. to 3:30 p.m. year round. During the first year of construction, the construction force will consist of approximately 100 employees and will decrease by approximately 40 employees during construction years two and three. It is estimated that during the first year of construction there will be approximately 20 trucks per day leaving and/or entering the site to deliver construction related materials. The site has been graded to balance the cut and fills so that hauling of sand and gravel off site will not be necessary.

For construction years two and three, it is estimated that only five delivery trucks will be leaving and/or entering the site per day. The heavy hauling of the fuel cell units will occur over a 2-year period, and it is estimated that there will be two heavy hauls per month during that time period.

All construction related traffic will access the site from either North Main Street and/or South Main Street. Trucks will turn onto Depot Street and proceed onto Lopus Road.

Once constructed, the energy park will largely be unmanned and the site will not receive deliveries or make outgoing shipments. The energy park will not require the use of the adjacent Metro-North railroad for any transportation related activities. The energy park does not propose any new connections to Route 8.

2.7.1 Potential Impacts

The overall transportation and traffic related impacts proposed by the energy park are considered to be minimal given the limited expected truck trips during construction, the existing industrial uses that border the site to the east and the long term operation of the facility which will be considered an unmanned facility.

2.8 Transmission and Public Utility Services

The following analysis examines the potential for impact on public utilities and services, such as the provision of water, sewer, and storm sewers as well as electricity, telephone, cable, and gas. Mitigation for increased area of impervious surface and associated stormwater is planned.

2.8.1 Water

The site will be serviced by Aquarion Water Company. Aquarion Water Company services the industrial complexes located east of the site via an existing 8-inch water main within Railroad Avenue. The energy park will be serviced by this existing line. Two new water main extensions will be installed beneath the Metro-North railroad. An 8-inch main will serve as the fire protection line and will be tied into a new fire hydrant to be installed on site. A 6-inch line will be installed to service the 21 FCE units. The installation of the two water main lines beneath the existing railroad bed will require coordination and obtainment of temporary rights of entry and license agreements with Metro-North and the Connecticut Department of Transportation. The two water lines will be installed using directional boring methods to limit the disturbance to the active Metro-North railroad. The 21 FCE units will consume approximately 300,000 gallons of water per day.

2.8.2 Sanitary Sewer

The energy park will be an unmanned facility and no formal buildings are being proposed; therefore, the project does not require a sanitary sewer connection.

2.8.3 Storm Sewer

There are no stormwater sewers located on the property or on Gruber Road. A single stormwater catch basin is located on Lopus Road which discharges stormwater onto the energy park site. Under existing conditions stormwater on this site infiltrates into the existing underlying sandy soils, with no apparent surface water discharge from the site. There are no modifications proposed for the existing stormwater catch basin and outfall on Lopus Road.

Stormwater runoff from areas within the property boundary that will not be impacted by the energy park will be collected within bioswales and conveyed along the western and northern portions of the site, where the water will then be discharged into an existing infiltration basin area. Stormwater from the developed portions of the park (i.e, fuel cell pad, etc.) will be collected in a series of stormwater catch basins and conveyed to a bio infiltration basin located between the proposed fuel cell units and the Metro-North railroad.

2.8.4 Electricity

A small electrical switchyard will be located along the northwest portion of the energy park site. This internal switchyard will be connected to the 21 FCE units and the Eversource Cold Spring Road substation, and will transmit the electricity from the energy park. Electricity from the switchyard will be required to service the entry gate, security lighting, and cameras within the facility.

2.8.5 Gas

Eversource will provide natural gas to this site. An existing gas main is located approximately 2,000 linear feet west of the site in Pondview Circle. A new 8 inch gas main will be extended down Lopus Road into a new Gas Metering Station at the site location. The 21 FCE units will consume approximately 7,707 cubic feet of natural gas per minute.

A new 10 inch gas main will be extended from the Gas Metering Station to the FCE Units.

2.8.6 Telephone and Cable

The energy park will be serviced by both telephone and cable lines owned by AT&T. An existing underground AT&T fiber cable is located along the northern portion of the site adjacent to Lopus Road. The proposed access road off of Lopus Road will cross over this fiber line. Additional fill is being placed over this line for construction of the road. No impacts are expected from the placement of fill over this cable fiber line. In addition to the underground cable fibers, Lopus Road has overhead cable and telephone lines, which will be pulled from and extended underground along the proposed access driveway to service the energy park.

2.8.7 Potential Impacts

Aquarion Water Company has the required volume of water to service the energy park and will have no significant impact on Aquarion's water supply system for its existing and/or future customer needs. The effect of the project upon the water pressure in the main located along

Railroad Avenue Extension is still being evaluated with the assistance of Aquarion Water Company.

The energy park will not require a connection to the sanitary sewer system and therefore has no significant impact to surrounding sanitary sewer systems and/or sewage treatment facilities.

The energy park does not require connection to any state and/or local stormwater drainage systems. All stormwater from the energy park will be collected, treated, and infiltrated on site; therefore, there is no significant impact to local and/or state storm sewer systems.

The energy park is being proposed to help generate clean electrical energy and help reduce strain on the existing electrical grid. The energy park will not require a significant amount of energy to run the entry gate, security lighting, and/or cameras. This energy park will not significantly affect the electrical consumption rate of the existing grid system.

The energy park will require the consumption of natural gas, and Eversource has the necessary natural gas volumes to support this energy park without impacting existing customer and/or future customer needs.

The park will require cable and telephone feed to support the security cameras and day to day monitoring system operations for the park. The cable and telephone demand needs will be relatively minor and will not significantly impact these utilities.

2.9 Solid Waste and Hazardous Materials

The energy park is not expected to generate significant amounts of solid waste. Natural gas will be used as the fuel source to power the fuel cells. Natural gas typically contains sulfur at levels that could cause corrosion within the fuel cell units and because of that, a sulfur removal system consisting predominantly of granular activated carbon must be used to treat the natural gas. Once the adsorptive capacity of the granular activated carbon is fully exhausted, it is removed to an off-site licensed facility for disposal and/or reclamation. The outgoing carbon is classified as hazardous waste for tracking and disposal purposes.

2.9.1 Potential Impacts

The generation and subsequent off-site disposal and/or reclamation of the granular activated carbon will have a minimal impact upon the environment. The generation of spent activated carbon is commonplace in a large number of industries and the anticipated generation at the proposed project is minimal. No on-site storage of hazardous waste will occur; therefore, the local impact will be negligible.

2.10 Aesthetics and Viewsheds

The energy park site is visible from Lopus Road, Railroad Avenue Extension, and Gruber Road. The northern, western, and southern portions of the property are heavily vegetated with large mature trees which provide screening from the abutting properties. A large mature grove of white pines was planted along the western property line to help screen the views for the

residential properties located on Gruber Road. In addition, the energy park will be located in the lower bowl of the site. The properties on Gruber Road are located at approximately elevation 190 feet NAVD 88 and the proposed energy park will be located at elevation 144 feet NAVD 88, a 46-foot difference in elevation.

Additional plant screening is being proposed along the eastern portion of the site which will include white pine, eastern red cedar, white spruce, and Norway spruce. These plantings will screen the energy park from the adjacent Metro-North railroad and the commercial/industrial properties located along Railroad Avenue Extension (See Figure 13).

2.10.1 Potential Impacts

The existing large white pines located at elevation 188 NAVD 88 will not be removed from the site, and given that the proposed development elevation is approximately 46 feet lower than the residential properties located on Gruber Road, there will be no negative aesthetic/viewshed impacts associated with the energy park. Under proposed conditions, a vegetated zone will be maintained between the proposed energy park and surrounding properties to provide long term screening. Supplemental plantings are being proposed along the eastern portion of the property to provide additional screening.

2.11 Lighting and Security

To protect both the energy park and the public the project proposes to implement high security measures and plans. Lighting will be installed for security purposes, and the proposed lighting will consist of dark sky type fixtures to minimize light impacts at night. Security cameras will be installed within the facility to help monitor the facility's conditions.

Access to the site will be restricted by the installation of a motorized entry gate with swipe card technology at the new access road and installation of 8-foot-high chain link fencing around the perimeter of the site.

2.11.1 Potential Impacts

The lighting fixtures will be dark sky type fixtures that will minimize impacts to the night sky. The security measures that are being implemented are necessary to protect the energy park infrastructure as well as the public.

0' 100' 200'
0 1/2" 1"
SCALE 1" = 200'

PROPOSED EVERGREEN TREES
EXISTING EVERGREEN SCREEN TO REMAIN
CHAIN LINK FENCE AROUND PERIMETER OF UTILITY PAD
PROPOSED FUEL CELLS ON CONCRETE PADS
EXISTING EVERGREEN SCREEN TO REMAIN
ROUTE 8 NORTHBOUND
GRUBER ROAD
LOPUS ROAD
EXISTING TREES TO REMAIN
PROPOSED CLEARING LIMIT
PROPOSED CLEARING LIMIT
STORMWATER BASIN
WATER TREATMENT WASTEWATER INFILTRATION BASINS
PROPOSED EVERGREEN TREES
STORMWATER BASIN
RAILROAD AVENUE EXTENSION
PROPOSED EVERGREEN TREES

MILONE & MACBROOM®
99 Realty Drive
Cheshire, Connecticut 06410
(203) 271-1773 Fax (203) 272-9733
www.miloneandmacbroom.com

REVISIONS

LANDSCAPE BUFFER PLAN
BEACON FALLS ENERGY PARK
LOPUS ROAD
BEACON FALLS

DJK	DJL	SRD
DESIGNED	DRAWN	CHECKED

SCALE: 1"=100'
DATE: JUNE 10, 2015
PROJECT NO.: 1103-87

FIG. 13
SHEET NO.

APPENDIX A

CTDEEP NDDB CORRESPONDENCE

Connecticut Department of

ENERGY &
ENVIRONMENTAL
PROTECTION

June 22, 2015

Corey Pelletier
Milone & MacBroom, Inc.
99 Realty Drive
Cheshire, CT 06410
cpelletier@mminc.com

Project: Preliminary Site Assessment for Construction of Beacon Falls Energy Park on Lopus Road in Beacon Falls, Connecticut
NDDB Preliminary Assessment No.: 201503256

Dear Corey,

I have reviewed Natural Diversity Data Base maps and files regarding the area delineated on the map provided for the preliminary site assessment for the proposed construction of Beacon Falls Energy Park located on Lopus Road in Beacon Falls, Connecticut. According to our records there are historic populations of state-listed species that occur within or very close to the boundaries of this property. I have attached the list to this letter. Please be advised that this is a preliminary review and not a final determination. A more detailed review will be necessary to move forward with any subsequent environmental permit applications submitted to DEEP for the proposed project. This letter cannot be used or submitted with your permit applications at DEEP. If you submit another NDDB review request to be used for DEEP permits please let us know how you will protect the state-listed species from being impacted by this project. This preliminary assessment is good for one year.

Natural Diversity Data Base information includes all information regarding critical biological resources available to us at the time of the request. This information is a compilation of data collected over the years by the Department of Energy and Environmental Protection's Natural History Survey and cooperating units of DEEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the Data Base should not be substitutes for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available. The result of this review does not preclude the possibility that listed species may be encountered on site and that additional action may be necessary to remain in compliance with certain state permits.

Please contact me if you have further questions at (860) 424-3592, or dawn.mckay@ct.gov . Thank you for consulting the Natural Diversity Data Base.

Sincerely,

Dawn M. McKay

Dawn M. McKay
Environmental Analyst 3

Species List for NDDB Request

Scientific Name	Common Name	State Status
Vascular Plant		
Blephilia ciliata	Downy wood-mint	SC*
Hydrophyllum virginianum	Virginia waterleaf	SC
Platanthera hookeri	Hooker's orchid	SC*
Vertebrate Animal		
Toxostoma rufum	Brown thrasher	SC
Heterdon platirhrinos	Hognose Snake	SC

E = Endangered, T = Threatened, SC = Special Concern, * Extirpated

APPENDIX B

STATE HISTORIC PRESERVATION OFFICE CORRESPONDENCE

Matt S.

Department of Economic and Community Development

Connecticut
still revolutionary

June 18, 2015

Mr. Matthew Sanford
Milone & MacBroom, Inc.
99 Realty Drive
Cheshire, CT 06410

RECEIVED
JUN 22 2015
MILONE AND MACBROOM

Subject: Beacon Falls Energy Park (MMI #1103-87-16.2)
Beacon Falls, Connecticut.

Dear Mr. Sanford:

The State Historic Preservation Office (SHPO) is in receipt of your request for our comments on the potential effects of the referenced project on historic properties received on May 12, 2015. The request for comments is in support of a proposal to the Connecticut Department of Energy and Environmental Protection (DEEP). SHPO understands that the proposed unstaffed facility will generate energy through the use of fuel cells. The energy park will occupy 23.8 acres at the southeast corner of Lopus and Gruber Roads.

There are no archeological sites or properties listed on the National Registers of Historic Places recorded within or in the immediate vicinity of the project area. The project parcel is comprised primarily of Udorthents-Pit complex soils. During the past 40 years, the site was mined for sand and gravel. Although this office considers this area to be archeologically sensitive, the proposed project facility is within existing disturbed footprints. Based on the information provided to our office, it is SHPO's opinion that no historic properties will be affected by this undertaking as described.

SHPO appreciates the opportunity to review and comment upon this project. These comments are provided in accordance with Section 106 of the National Historic Preservation Act, as amended, and the Connecticut Environmental Policy Act. For additional information, please contact Catherine Labadia, Staff Archeologist, at (860) 256-2764 or catherine.labadia@ct.gov.

Sincerely,

Mary B. Dunne

Mary B. Dunne
Deputy State Historic Preservation Officer

EXHIBIT G

Stormwater Management

Beacon Falls Energy Park
Stormwater Report

Lopus Road
Beacon Falls, Connecticut
July 24, 2015

Prepared for:
Beacon Falls Energy Park, LLC
769 Newfield Street
Suite 8
Middletown, Connecticut 06457

MMI #1103-87-6

Prepared by:
MILONE & MACBROOM, INC.
99 Realty Drive
Cheshire, Connecticut 06410
(203) 271-1773
www.miloneandmacbroom.com

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

The materials and computations included within this stormwater report were prepared in support of a proposed site plan permit application for the Beacon Falls Energy Park, a ±60-megawatt renewable energy fuel cell facility to be located on a ±25-acre site in the town of Beacon Falls, Connecticut. The energy park will consist of 22 individual fuel cell units, an electrical switchyard, and metering facility, which will be installed on a ±6-acre bituminous concrete pad. The property will be accessed by a proposed driveway from Lopus Road leading into the facility, which will have a gate and be surrounded by a perimeter fence.

The existing site is located in an Industrial Park District (IPD) zone and was formerly used as a sand and gravel mine. The topography is mainly characterized by relatively flat terrain and a large central open space. Steep hills occupy the western and northern portions of the property leading to Lopus Road and Gruber Road. The eastern and southernmost portions of the parcel are bordered by the Metro North railroad, an active rail line. Adjacent to the rail line is Railroad Avenue, a public road that provides access to a small industrial area and the O&G concrete plant. The western boundary abuts undeveloped land owned by the State of Connecticut, private land, and residential properties along Gruber Road. An open water pond is located in the southern portion of the site. This pond receives stormwater runoff from the nearby CT Route 8 and portions of the property, but it has neither direct inlet nor outlet.

The new energy park will be served by city water with extensions from the existing 8-inch water main service at Railroad Avenue. The 6-inch potable water and 8-inch fire protection services are proposed from the existing water main. The processed wastewater generated from the fuel cell operation will be disposed to two water treatment wastewater infiltration basins via a 10-inch sanitary sewage gravity line. The new sewer line will be split into two separate discharges into each basin. Two gate valves will permit the periodic shutdown of one of the lines to facilitate maintenance of the basins while the service line continues uninterrupted to the second infiltration basin. No sanitary wastewater will be generated by the facility. Two storm drainage line extensions located immediately outside the concrete pad's perimeter fence will convey the stormwater runoff from the fuel cell area to a proposed on-site stormwater infiltration basin. All the utility work proposed for the area inside the fuel cell pad was developed by PCI Skanska Engineering.

2.0 STORMWATER MANAGEMENT DESIGN

The stormwater management system for this site has been designed utilizing Best Management Practices (BMPs) to provide safe conveyance of stormwater runoff while providing no net increases in peak runoff rates and volumes from the project site for the 2-year through the 100-year storm events.

Minimum runoff is expected to leave the site due to the very high permeability of the sand and gravel mine. Therefore, the design goal of the stormwater management plan is to take advantage of the sandy soils present on site and naturally infiltrate stormwater runoff as occurs under existing conditions using three proposed detention/infiltration basins. These basins are designated as Stormwater Basins 110, 210, and 220 on the proposed site plans and on the attached proposed conditions watershed map. Stormwater Basin 110 will have a standard concrete outlet structure to control its overflow discharge while Basins 210 and 220 will be fitted with an emergency riprap spillway set at an elevation above the predicted 100-year water surface elevation within the basins.

Extensive on-site soil testing was performed to confirm the feasibility of using infiltration. Tests consisted of visual field identifications and soil sampling for laboratory test data. In addition, sieve analyses and falling head permeability tests were performed to determine the rate of stormwater infiltration and the best locations for the infiltration basins. Test pit logs and soil sampling results are included in the Appendix of this report.

The stormwater infiltration basins are proposed to be located along the eastern portion of the property, which coincides with a long linear stretch of Hydrologic Soil Group (HSG) "A" and the most favorable tested infiltration areas for the site. This HSG "A" is classified as Hinckley gravelly sandy loam, which is described as excessively drained soil and deep water tables, thus highly conducive to infiltration. The infiltration rate used in the hydrologic computations were averaged out and reduced by 50%, thus providing a safety factor of 2, which is recommended by the Connecticut Department of Energy & Environmental Protection (CTDEEP) *2004 Stormwater Quality Manual.* The Falling Head Permeability and sieve test results are included in the Appendix of this report.

A Sediment and Erosion (S&E) Control Plan has been developed to mitigate the short-term impacts of the project during construction. The S&E Control Plan includes descriptive specifications concerning land grading, topsoiling, temporary vegetative cover, permanent vegetative cover, vegetative cover selection and mulching, and erosion checks. Details have been provided for all erosion control measures with corresponding labels on the S&E control site plan. The S&E controls provided are in accordance with the *2002 Connecticut Guidelines for Soil Erosion and Sediment Control.*

The construction areas will be surrounded by a geotextile sediment filter fence that will be fortified with staked hay bales upgradient of the wetland areas. A stone construction entrance has been provided at the site entrance from Lopus Road. Erosion control blankets will be proposed on critical slopes to protect the newly created slopes until permanent vegetation can be established. During construction, inlet protection will be provided at the proposed drainage inlet structures to trap sediment. Temporary diversion berms and swales will be provided to direct the stormwater runoff from the site to the temporary sediment traps. The swales will include stone check dams to slow potential erosive velocities. The S&E controls are to be modified with the changing grades on site to ensure the protection of the surrounding areas throughout the construction process.

Storm Drainage System

Storm drainage systems are proposed to convey stormwater runoff to the proposed infiltration basins. The longest system will be located along the west side of the pad's perimeter fence with the intent to direct the runoff from the existing steep hillside away from the fuel cell pad and discharge it to proposed Basin 110. A small system consisting of a single catch basin to be located at the site's entrance on Lopus Road will discharge off-site runoff to a riprap channel, which will eventually drain to Basin 110. The riprap channel will also convey the discharge from an existing 15-inch pipe located on Lopus Road. Other drainage systems consist of the outlet pipe from Basin 110, which will discharge to an existing depression area adjacent to the railroad tracks, and the pipe extensions from the concrete pad's drainage systems, which will discharge into proposed Basin 220. Each drainage pipe outlet will include a flared end section and a riprap splash pad to dissipate the potential erosive velocity of stormwater entering the basin as well as trap sediment.

The computer program entitled *Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2014* by Autodesk, Inc., Version 10.3, was used for sizing the drainage systems. Storm drainage computations performed include pipe capacity calculations, hydraulic grade line calculations, and inlet capacity computations. The drainage area and land coverage were estimated and used to calculate the peak runoff rate using the rational method. The proposed system was designed with adequate capacity to carry the 10-year storm event. The outlet pipe from the proposed outlet control structure was designed to convey the 100-year storm discharge from Basin 110. The rainfall intensities utilized in the storm drainage computations were obtained from the CTDOT *Drainage Manual* dated October 2000.

Hydrologic Analysis

A detailed hydrologic analysis has been conducted for the predevelopment and postdevelopment runoff from the site. Three analysis points consisting of three subwatershed areas were chosen based on the fact that each area receives stormwater runoff from a portion of the proposed project site. The contributing off-site watershed areas were incorporated into the analysis. Analysis Point A represents the area draining to the east toward the railroad tracks. Analysis Point B is the existing pond to the south, and Analysis Point C consists of a small watershed area that drains toward the railroad tracks to the south.

The existing subwatersheds were used to determine the peak runoff rates and volumes for current site conditions. The existing watersheds were then modified and subdivided further to reflect the proposed changes to the site and analyze the hydrology under proposed conditions. The total combined watershed area delineated is approximately 33 acres under both existing and proposed conditions. Watershed maps for both existing and proposed conditions are included in the Appendix of this report.

The method of predicting the surface water runoff rates utilized in this analysis is a computer program entitled *Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014* by Autodesk, Inc., Version 10.3. The *Hydrographs* program is a computer model that utilizes the methodologies set forth in the Technical Release No. 55 (TR-55) manual and Technical Release No. 20 (TR-20) computer model, originally developed by the U.S. Department of Agriculture – Natural Resources Conservation Service (USDA-NRCS), formerly known as the Soil Conservation Service. The *Hydrographs* computer modeling program is primarily used for conducting hydrology studies such as this.

The *Hydrographs* computer program forecasts the rate of surface water runoff based upon several factors. The input data includes information on land use, hydrologic soil type, vegetation, contributing watershed area, time of concentration, rainfall data, storage volumes, exfiltration rates, and the hydraulic capacity of structures. The computer model predicts the amount of runoff as a function of time with the ability to include the attenuation effect due to dams, lakes, large wetlands, floodplains, and stormwater management basins. Runoff rates during specific rainstorms may vary due to different assumptions concerning soil moisture, water levels in ponds, snowmelt, and rainfall patterns. The input data for rainfalls with statistical recurrence frequencies of 2, 10, 25, 50, and 100 years were obtained from the U.S. Weather Bureau Technical Papers. The National Weather Service developed four synthetic storms to simulate rainfall patterns around the country. The type III rainfall pattern with a 24-hour duration is appropriate for analysis in Connecticut.

Land use for the site under existing and proposed conditions was determined from field survey, field investigation, and aerial photogrammetry. Land use types used in the analysis included woods, grassed or open space, ½-acre and 1-acre residential lots, and impervious (paved) cover. For this analysis, the entire watershed was determined to contain Hydrologic Soil Groups A, B, and C as classified by the USDA-NRCS.

The existing conditions were modeled with the *Hydrographs* computer program to predict the runoff rates and volume for the various storm events at each analysis point. A revised model was developed incorporating the proposed site conditions and the flow attenuation capability of the proposed stormwater basins. All *Hydrographs* input computations and model results are included in the Appendix of this report. The following peak rates of runoff were obtained from the *Hydrographs* hydrology results:

Analysis Point A: Existing Railroad Tracks - East and North

	Peak Flow Rates (cfs)*				
Storm Frequency (years)	**2**	**10**	**25**	**50**	**100**
Existing Conditions	0.0	0.0	0.0	0.0	0.0
Proposed Conditions	0.0	0.0	0.0	0.0	0.0

*cfs = cubic feet per second

	Runoff Volumes (acre-feet)				
Storm Frequency (years)	**2**	**10**	**25**	**50**	**100**
Existing Conditions	0.0	0.0	0.0	0.0	0.0
Proposed Conditions	0.0	0.0	0.0	0.0	0.0

Analysis Point B: Existing Pond - South

	Peak Flow Rates (cfs)*				
Storm Frequency (years)	**2**	**10**	**25**	**50**	**100**
Existing Conditions	0.7	1.6	2.0	2.4	2.9
Proposed Conditions	0.4	1.0	1.2	1.5	1.8

*cfs = cubic feet per second

	Runoff Volumes (acre-feet)				
Storm Frequency (years)	**2**	**10**	**25**	**50**	**100**
Existing Conditions	0.08	0.2	0.2	0.3	0.3
Proposed Conditions	0.05	0.1	0.1	0.2	0.2

Analysis Point C: Existing Railroad Tracks - South

	Peak Flow Rates (cfs)*				
Storm Frequency (years)	**2**	**10**	**25**	**50**	**100**
Existing Conditions	0.7	1.7	2.2	2.7	3.3
Proposed Conditions	0.7	1.6	2.0	2.4	2.8

*cfs = cubic feet per second

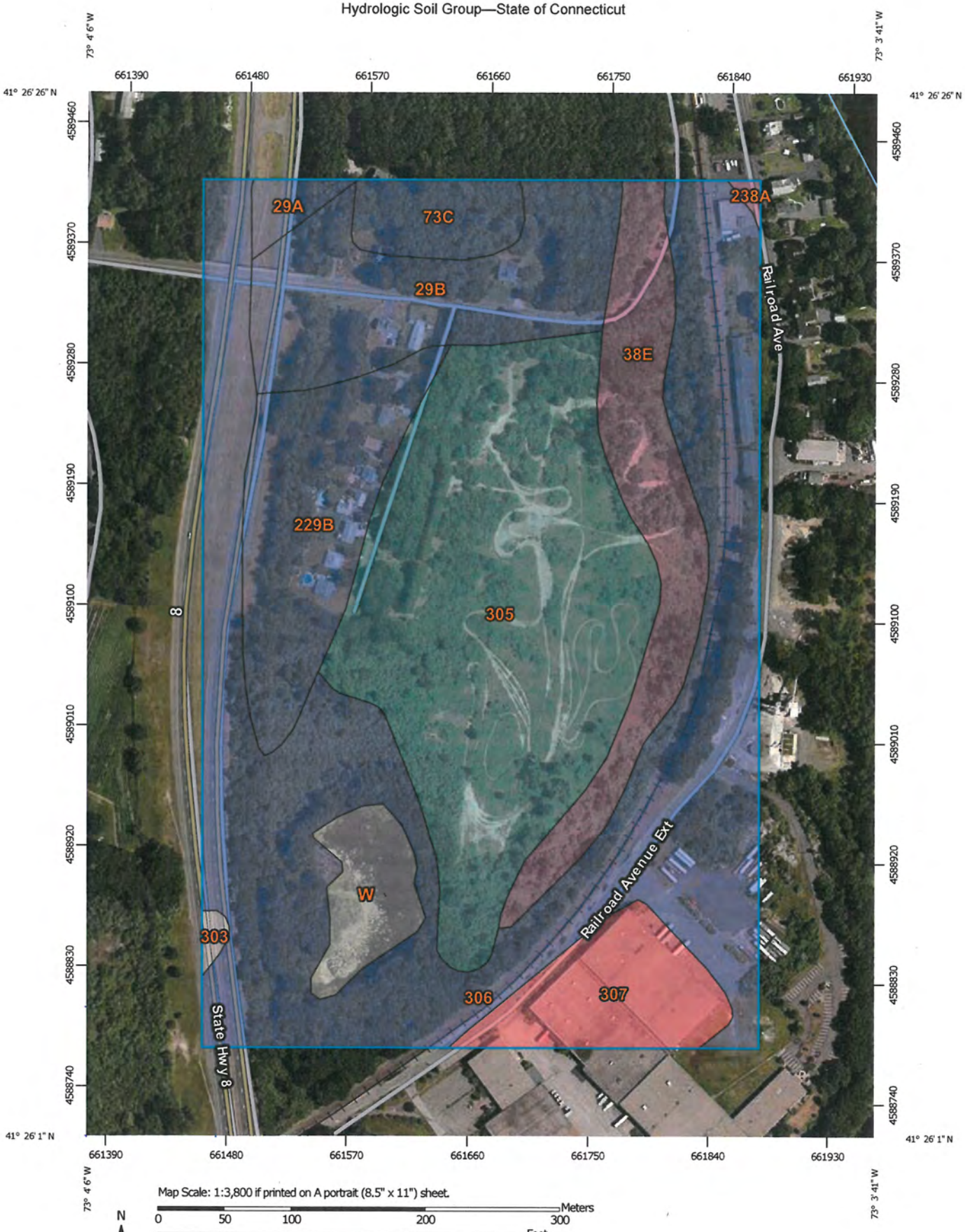
	Runoff Volumes (acre-feet)				
Storm Frequency (years)	**2**	**10**	**25**	**50**	**100**
Existing Conditions	0.08	0.2	0.2	0.3	0.3
Proposed Conditions	0.08	0.2	0.2	0.2	0.3

The summary of the results above shows that no increases in peak runoff rates and volumes are anticipated from the proposed development. Rather, matching flows or a decreasing runoff for each of the storm events modeled was achieved due to the stormwater management system and the multiple infiltration basins. The stormwater management system achieves the goal of mimicking the existing hydrologic conditions of the site by controlling the peak rates of runoff and storm volumes under proposed conditions, thus minimizing potential impacts from the proposed development to existing waterbodies and developed areas downstream of the site.

APPENDIX A

USDA-NRCS HYDROLOGIC SOIL GROUP REPORT

Hydrologic Soil Group—State of Connecticut



Map Scale: 1:3,800 if printed on A portrait (8.5" x 11") sheet.

N

0 50 100 200 300 Meters

0 150 300 600 900 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut
Survey Area Data: Version 13, Oct 28, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 28, 2011—Jul 22, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — State of Connecticut (CT600)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
29A	Agawam fine sandy loam, 0 to 3 percent slopes	B	0.6	0.9%
29B	Agawam fine sandy loam, 3 to 8 percent slopes	B	6.6	9.9%
38E	Hinckley gravelly sandy loam, 15 to 45 percent slopes	A	5.6	8.4%
73C	Charlton-Chatfield complex, 3 to 15 percent slopes, very rocky	B	1.7	2.6%
229B	Agawam-Urban land complex, 0 to 8 percent slopes	B	5.7	8.6%
238A	Hinckley-Urban land complex, 0 to 3 percent slopes	A	0.1	0.2%
303	Pits, quarries		0.2	0.3%
305	Udorthents-Pits complex, gravelly	C	17.4	25.9%
306	Udorthents-Urban land complex	B	23.8	35.5%
307	Urban land	D	3.3	5.0%
W	Water		1.9	2.8%
Totals for Area of Interest			**66.9**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

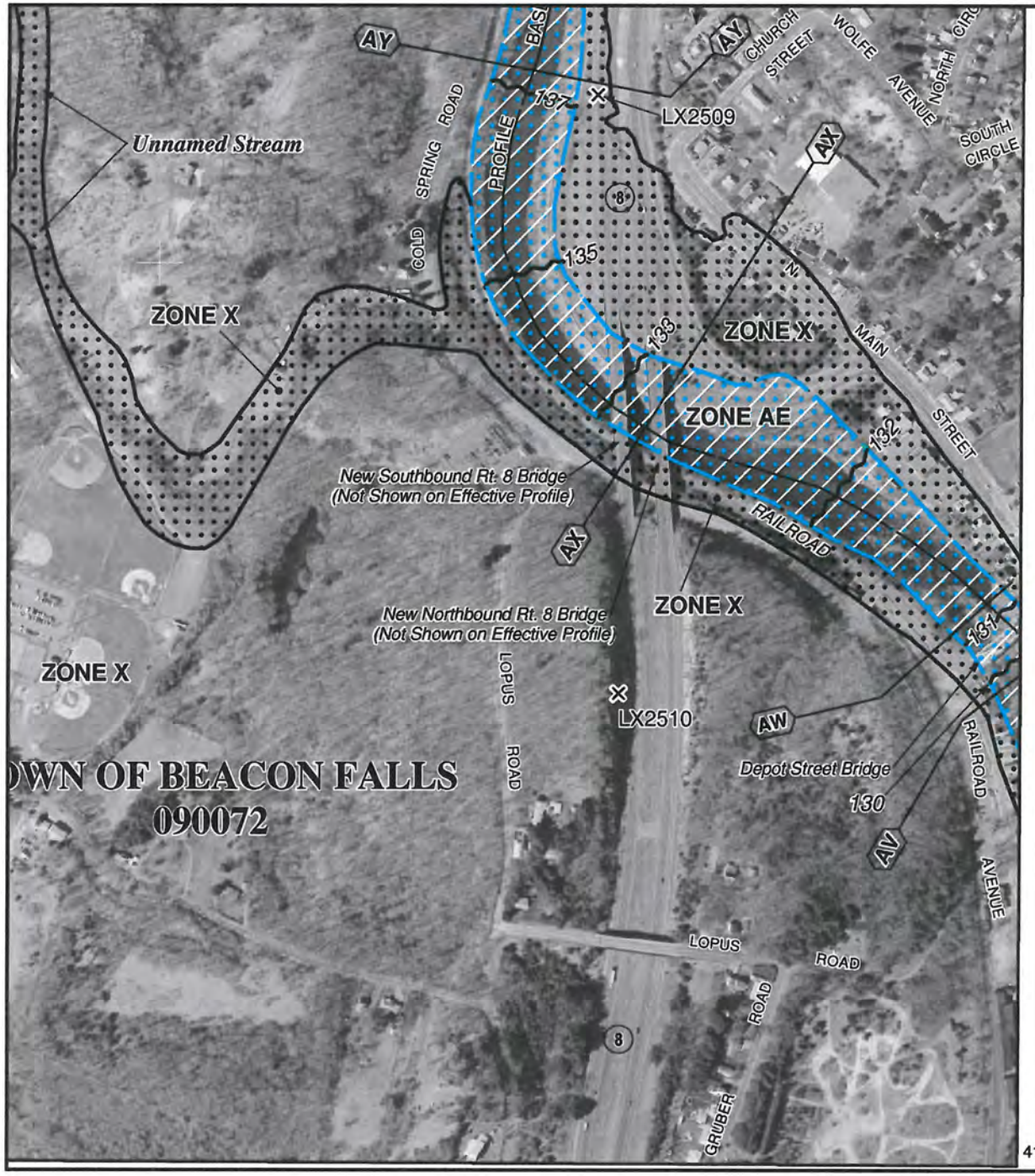
Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

APPENDIX B

FEMA FLOOD INSURANCE RATE MAP (FIRM)



ional Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0254H

FIRM

FLOOD INSURANCE RATE MAP

NEW HAVEN COUNTY, CONNECTICUT

(ALL JURISDICTIONS)

PANEL 254 OF 635

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

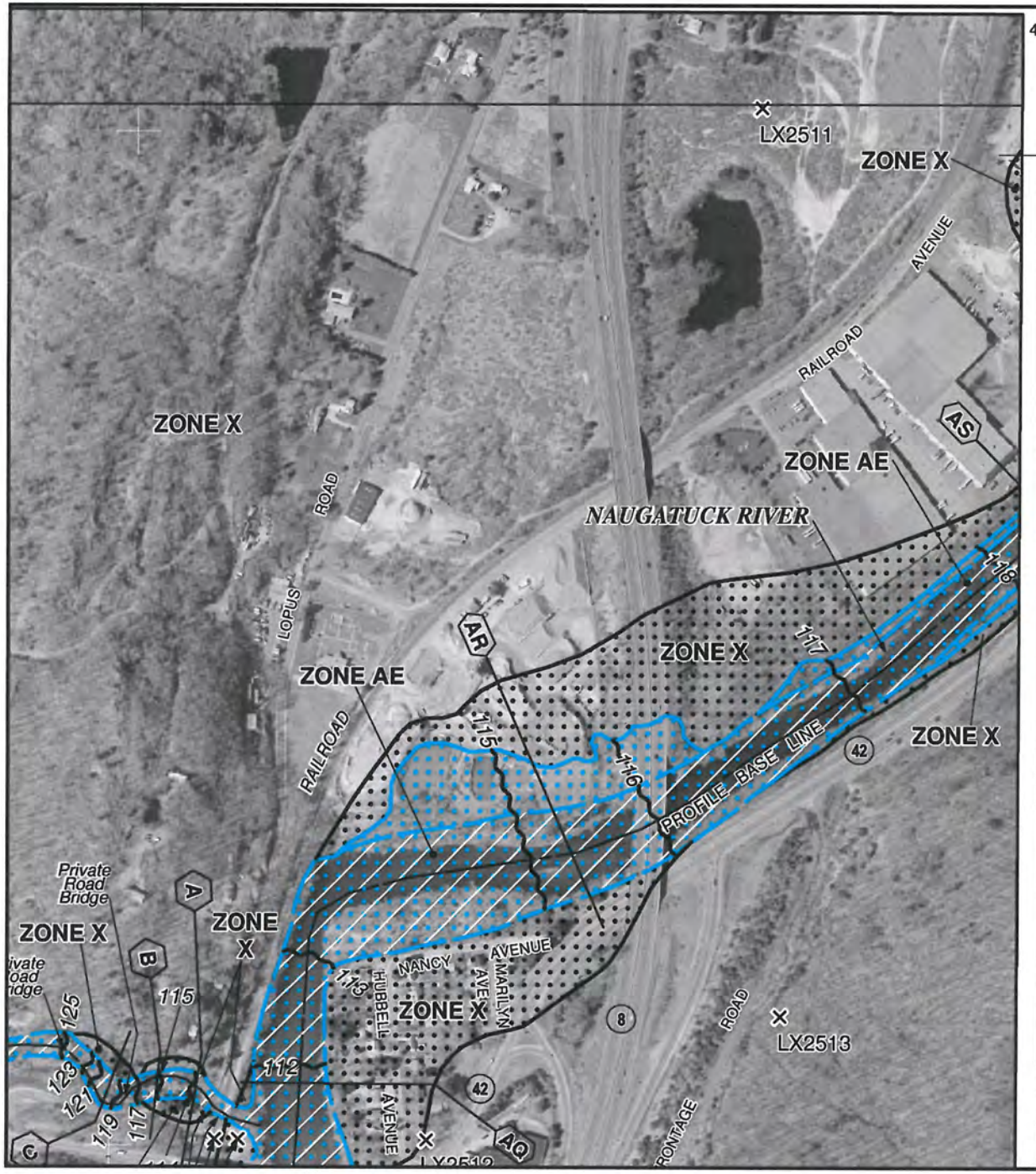
COMMUNITY	NUMBER	PANEL	SUFFIX
BEACON FALLS, TOWN OF	090072	0254	H
NAUGATUCK, BOROUGH OF	090137	0254	H
OXFORD, TOWN OF	090150	0254	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
09009C0254H

EFFECTIVE DATE
DECEMBER 17, 2010

Federal Emergency Management Agency



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0262H

FIRM

FLOOD INSURANCE RATE MAP

NEW HAVEN COUNTY, CONNECTICUT

(ALL JURISDICTIONS)

PANEL 262 OF 635

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BEACON FALLS, TOWN OF	090072	0262	H
OXFORD, TOWN OF	090150	0262	H
SEYMOUR, TOWN OF	090088	0262	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
09009C0262H

EFFECTIVE DATE
DECEMBER 17, 2010

Federal Emergency Management Agency

APPENDIX C

TEST PIT DATA AND SOIL TESTING RESULTS

FALLS

TEST PIT DATA RECORD

Project: Beacon Falls Energy Park	Job No.: 1103-87
Date: 4/15/2015	Weather: Clear
Inspector: Chris Hulk	Test Pit No.: 1
Elev. of Ground Surface:	

SOIL STRATUM ENCOUNTERED

From	To	Description of Soils
0"	132"	Light Gray Brown Fine Sand

Depth to Ledge: N/A
Water Encountered at Depth: N/A
Mottling Encountered at Depth: N/A
Installed Observation Well at Depth: N/A
Comments: Permeability Sample at 84"

TEST PIT DATA RECORD

Project: Beacon Falls Energy Park	Job No.: 1103-87
Date: 4/15/2015	Weather: Clear
Inspector: Chris Hulk	Test Pit No.: 2
Elev. of Ground Surface:	

SOIL STRATUM ENCOUNTERED

From	To	Description of Soils
0"	120"	Orange Brown Fine Sand

Depth to Ledge: N/A
Water Encountered at Depth: N/A
Mottling Encountered at Depth: N/A
Installed Observation Well at Depth: N/A
Comments: Bag Sample at 120"

TEST PIT DATA RECORD

Project: Beacon Falls Energy Park	Job No.: 1103-87
Date: 4/15/2015	Weather: Clear
Inspector: Chris Hulk	Test Pit No.: 3
Elev. of Ground Surface:	

SOIL STRATUM ENCOUNTERED

From	To	Description of Soils
0"	2"	Top Soil
2"	32"	Medium Brown Medium Fine Sand
32"	132"	Light Gray Brown Fine Sand

Depth to Ledge: N/A
Water Encountered at Depth: N/A
Mottling Encountered at Depth: N/A
Installed Observation Well at Depth: N/A
Comments: Bucket Sample at 132", Permeability Sample at 60"

TEST PIT DATA RECORD

Project: Beacon Falls Energy Park	Job No.: 1103-87
Date: 4/15/2015	Weather: Clear
Inspector: Chris Hulk	Test Pit No.: 4
Elev. of Ground Surface:	

SOIL STRATUM ENCOUNTERED

From	To	Description of Soils
0"	2"	Top Soil
2"	37"	Medium Brown Fine Sand Moderate Compaction
37"	132"	Light Gray Brown Very Fine Sand

Depth to Ledge: N/A
Water Encountered at Depth: N/A
Mottling Encountered at Depth: N/A
Installed Observation Well at Depth: N/A
Comments: Bag Sample at 120", Permeability Sample at 65"

TEST PIT DATA RECORD

Project: Beacon Falls Energy Park	Job No.: 1103-87
Date: 4/15/2015	Weather: Clear
Inspector: Chris Hulk	Test Pit No.: 5
Elev. of Ground Surface:	

SOIL STRATUM ENCOUNTERED

From	To	Description of Soils
0"	4"	Top Soil
4"	120"	Light Gray Brown Fine Sand

Depth to Ledge: N/A
Water Encountered at Depth: N/A
Mottling Encountered at Depth: N/A
Installed Observation Well at Depth: N/A
Comments: Bucket Sample at 72", Permeability Sample at 84"

TEST PIT DATA RECORD

Project: Beacon Falls Energy Park	Job No.: 1103-87
Date: 4/15/2015	Weather: Clear
Inspector: Chris Hulk	Test Pit No.: 6
Elev. of Ground Surface:	

SOIL STRATUM ENCOUNTERED

From	To	Description of Soils
0"	2"	Top Soil
2"	28"	Light Brown Fine Sand
28"	42"	Medium Brown Very Fine Sand
42"	62"	Light Gray Brown fine Sand
62"	114"	Medium Brown Very Find Sand Compact

Depth to Ledge: N/A
Water Encountered at Depth: N/A
Mottling Encountered at Depth: N/A
Installed Observation Well at Depth: N/A
Comments: Bag Sample at 108", Permeability Sample at 70"

TEST PIT DATA RECORD

Project: Beacon Falls Energy Park	Job No.: 1103-87
Date: 4/15/2015	Weather: Clear
Inspector: Chris Hulk	Test Pit No.: 7
Elev. of Ground Surface:	

SOIL STRATUM ENCOUNTERED

From	To	Description of Soils
0"	2"	Top Soil
2"	120"	Light Grey Brown Very Fine Sand

Depth to Ledge: N/A
Water Encountered at Depth: N/A
Mottling Encountered at Depth: N/A
Installed Observation Well at Depth: N/A
Comments: Bucket Sample at 84"

TEST PIT DATA RECORD

Project: Beacon Falls Energy Park	Job No.: 1103-87
Date: 4/15/2015	Weather: Clear
Inspector: Chris Hulk	Test Pit No.: 8
Elev. of Ground Surface:	

SOIL STRATUM ENCOUNTERED

From	To	Description of Soils
0"	2"	Top Soil
2"	36"	Medium Brown Fine Sand
36"	41"	Brown Very Fine Sand Compact
41"	120"	Light Grey Brown Fine Sand

Depth to Ledge: N/A
Water Encountered at Depth: N/A
Mottling Encountered at Depth: N/A
Installed Observation Well at Depth: N/A
Comments: Permeability Sample at 72"

TEST PIT DATA RECORD

Project: Beacon Falls Energy Park	Job No.: 1103-87
Date: 4/15/2015	Weather: Clear
Inspector: Chris Hulk	Test Pit No.: 9
Elev. of Ground Surface:	

SOIL STRATUM ENCOUNTERED

From	To	Description of Soils
0"	4"	Top Soil
4"	50"	Medium Brown Very Fine Sand
50"	138"	Light Gray Brown Fine Sand

Depth to Ledge: N/A
Water Encountered at Depth: N/A
Mottling Encountered at Depth: N/A
Installed Observation Well at Depth: N/A
Comments: Bag Sample at 120" ,Permeability Sample at 84"

TEST PIT DATA RECORD

Project: Beacon Falls Energy Park	Job No.: 1103-87
Date: 4/15/2015	Weather: Clear
Inspector: Chris Hulk	Test Pit No.: 10
Elev. of Ground Surface:	

SOIL STRATUM ENCOUNTERED

From	To	Description of Soils
0"	2"	Top Soil
2"	27"	Medium Brown Very Fine Sand
27"	126"	Light Brown Very Fine Sand

Depth to Ledge: N/A
Water Encountered at Depth: N/A
Mottling Encountered at Depth: N/A
Installed Observation Well at Depth: N/A
Comments: Bag Sample at 126" ,Permeability Sample at 60"

TEST PIT DATA RECORD

Project: Beacon Falls Energy Park	Job No.: 1103-87
Date: 4/15/2015	Weather: Clear
Inspector: Chris Hulk	Test Pit No.: 11
Elev. of Ground Surface:	

SOIL STRATUM ENCOUNTERED

From	To	Description of Soils
0"	16"	Medium Brown Medium Sand
16"	126"	Light Grey Brown Fine Sand

Depth to Ledge: N/A
Water Encountered at Depth: N/A
Mottling Encountered at Depth: N/A
Installed Observation Well at Depth: N/A
Comments: Bag Sample at 84"

Beacon Falles Energy Park
MMI #1103-87

Falling Head Permeability Test
Summary

5/5/2015

Sample	K (in/hr)	K (ft/day)	
TP 1 Depth 84"	24.541	49.082	
TP 3 Depth 60"	40.370	80.741	
TP 4 Depth 65"	10.948	21.895	
TP 5 Depth 84"	2.582	5.165	Note: Possibly Over Compacted
TP 6 Depth 70"	5.390	10.780	
TP 8 Depth 72"	9.138	18.275	
TP 9 Depth 84"	27.383	54.766	
TP 10 Depth 60"	4.694	9.388	

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
TP 1 Depth 84"	1	6	14	10	5.00	0.083	24.00	48.000
	2	6	10	6.8	5.00	0.083	27.43	54.857
	sample average						**25.714**	**51.429**

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
TP 1 Depth 84"	1	6	14	12.9	1.00	0.017	29.44	58.885
	2	6	12.9	12	1.00	0.017	26.02	52.048
	3	6	12	11.2	1.00	0.017	24.83	49.655
	4	6	11.2	10.4	1.00	0.017	26.67	53.333
	5	6	10.4	9.8	1.00	0.017	21.39	42.772
	6	6	9.8	9.2	1.00	0.017	22.74	45.474
	7	6	9.2	8.6	1.00	0.017	24.27	48.539
	8	6	8.6	8.1	1.00	0.017	21.56	43.114
	9	6	8.1	7.5	1.00	0.017	27.69	55.385
	10	6	7.5	7	1.00	0.017	24.83	49.655
	11	6	7	6.5	1.00	0.017	26.67	53.333
	12	6	6.5	6.1	1.00	0.017	22.86	45.714
	sample average						**24.913**	**49.826**

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
TP 1 Depth 84"	1	6	14	13	1.00	0.017	26.67	53.333
	2	6	13	12.3	1.00	0.017	19.92	39.842
	3	6	12.3	11	1.00	0.017	40.17	80.343
	4	6	11	10.4	1.00	0.017	20.19	40.374
	5	6	10.4	9.7	1.00	0.017	25.07	50.149
	6	6	9.7	9.2	1.00	0.017	19.05	38.095
	7	6	9.2	8.7	1.00	0.017	20.11	40.223
	8	6	8.7	8.2	1.00	0.017	21.30	42.604
	9	6	8.2	7.8	1.00	0.017	18.00	36.000
	10	6	7.8	7.3	1.00	0.017	23.84	47.682
	11	6	7.3	6.9	1.00	0.017	20.28	40.563
	12	6	6.9	6.5	1.00	0.017	21.49	42.985
	13	6	6.5	6.1	1.00	0.017	22.86	45.714
				sample average			**22.996**	**45.993**

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
TP 3 Depth 60"	1	6	14	12.6	1.00	0.017	37.89	75.789
	2	6	12.6	11.4	1.00	0.017	36.00	72.000
	3	6	11.4	10.2	1.00	0.017	40.00	80.000
	4	6	10.2	9.3	1.00	0.017	33.23	66.462
	5	6	9.3	8.3	1.00	0.017	40.91	81.818
	6	6	8.3	7.5	1.00	0.017	36.46	72.911
	sample average						**37.415**	**74.830**

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
TP 3 Depth 60"	1	6	14	12.5	1.00	0.017	40.75	81.509
	2	6	12.5	11.3	1.00	0.017	36.30	72.605
	3	6	11.3	10.2	1.00	0.017	36.84	73.674
	4	6	10.2	9.2	1.00	0.017	37.11	74.227
	5	6	9.2	8.3	1.00	0.017	37.03	74.057
	6	6	8.3	7.4	1.00	0.017	41.27	82.548
	7	6	7.4	6.6	1.00	0.017	41.14	82.286
	sample average						**38.636**	**77.272**

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
TP 3 Depth 60"	1	6	14	12.2	1.00	0.017	49.47	98.931
	2	6	12.2	10.8	1.00	0.017	43.83	87.652
	3	6	10.8	9.6	1.00	0.017	42.35	84.706
	4	6	9.6	8.5	1.00	0.017	43.76	87.514
	5	6	8.5	7.5	1.00	0.017	45.00	90.000
	6	6	7.5	6.6	1.00	0.017	45.96	91.915
	sample average						**45.060**	**90.120**

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
TP 4 Depth 65"	1	5.5	14	11.9	5.00	0.083	10.70	21.405
	2	5.5	11.9	10.1	5.00	0.083	10.80	21.600
	3	5.5	10.1	8.5	5.00	0.083	11.35	22.710
	4	5.5	8.5	7.3	5.00	0.083	10.03	20.051
	5	5.5	7.3	6.3	5.00	0.083	9.71	19.412
	sample average						**10.518**	**21.035**

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
TP 4 Depth 65"	1	5.5	14	11.8	5.00	0.083	11.26	22.512
	2	5.5	11.8	9.9	5.00	0.083	11.56	23.115
	3	5.5	9.9	8.4	5.00	0.083	10.82	21.639
	4	5.5	8.4	7.1	5.00	0.083	11.07	22.142
	5	5.5	7.1	5.9	5.00	0.083	12.18	24.369
	sample average						**11.378**	**22.755**

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
TP 5 Depth 84"	1	6	14	13.7	5.00	0.083	1.56	3.119
	2	6	13.7	13.2	5.00	0.083	2.68	5.353
	3	6	13.2	12.7	5.00	0.083	2.78	5.560
	4	6	12.7	12	10.00	0.167	2.04	4.081
	5	6	12	11.5	5.00	0.083	3.06	6.128
	6	6	11.5	11	5.00	0.083	3.20	6.400
	7	6	11	8.7	35.00	0.583	2.40	4.803
				sample average			**2.532**	**5.063**

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
TP 5 Depth 84"	1	6	14	13.2	5.00	0.083	4.24	8.471
	2	6	13.2	12.8	5.00	0.083	2.22	4.431
	3	6	12.8	12.3	5.00	0.083	2.87	5.737
	4	6	12.3	12	5.00	0.083	1.78	3.556
	5	6	12	11.5	5.00	0.083	3.06	6.128
	6	6	11.5	11.2	5.00	0.083	1.90	3.806
	7	6	11.2	10.5	10.00	0.167	2.32	4.645
	8	6	10.5	9.7	10.00	0.167	2.85	5.703
	9	6	9.7	6.4	60.00	1.000	2.46	4.919
				sample average			**2.633**	**5.266**

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
TP 6 Depth 70"	1	5	14	13	5.00	0.083	4.44	8.889
	2	5	13	11.9	5.00	0.083	5.30	10.602
	3	5	11.9	11	5.00	0.083	4.72	9.432
	4	5	11	9.5	10.00	0.167	4.39	8.780
	5	5	9.5	8.6	5.00	0.083	5.97	11.934
	6	5	8.6	7.8	5.00	0.083	5.85	11.707
				sample average			**5.112**	**10.224**

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
TP 6 Depth 70"	1	5	14	11.9	5.00	0.083	9.73	19.459
	2	5	11.9	11.1	5.00	0.083	4.17	8.348
	3	5	11.1	10.1	5.00	0.083	5.66	11.321
	4	5	10.1	9.5	5.00	0.083	3.67	7.347
	5	5	9.5	8.5	5.00	0.083	6.67	13.333
	6	5	8.5	7.9	5.00	0.083	4.39	8.780
	7	5	7.9	6.6	10.00	0.167	5.38	10.759
	sample average						**5.668**	**11.335**

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
TP 8 Depth 72"	1	6	14	12.8	5.00	0.083	6.45	12.896
	2	6	12.8	11.4	5.00	0.083	8.33	16.661
	3	6	11.4	10.2	5.00	0.083	8.00	16.000
	4	6	10.2	8.3	10.00	0.167	7.39	14.789
	5	6	8.3	7.2	5.00	0.083	10.22	20.439
	6	6	7.2	6.2	5.00	0.083	10.75	21.493
	sample average						**8.523**	**17.046**

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
TP 8 Depth 72"	1	6	14	11.1	5.00	0.083	16.64	33.275
	2	6	11.1	10	5.00	0.083	7.51	15.014
	3	6	10	8.8	5.00	0.083	9.19	18.383
	4	6	8.8	7.9	5.00	0.083	7.76	15.521
	5	6	7.9	6.7	5.00	0.083	11.84	23.671
	6	6	6.7	6.2	5.00	0.083	5.58	11.163
	sample average						**9.752**	**19.505**

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
TP 9 Depth 84"	1	6	14	12.9	1.00	0.017	29.44	58.885
	2	6	12.9	11.9	1.00	0.017	29.03	58.065
	3	6	11.9	11.1	1.00	0.017	25.04	50.087
	4	6	11.1	10.2	1.00	0.017	30.42	60.845
	5	6	10.2	9.5	1.00	0.017	25.58	51.168
	6	6	9.5	8.7	1.00	0.017	31.65	63.297
	7	6	8.7	8.1	1.00	0.017	25.71	51.429
	8	6	8.1	7.5	1.00	0.017	27.69	55.385
	9	6	7.5	6.9	1.00	0.017	30.00	60.000
	10	6	6.9	6.4	1.00	0.017	27.07	54.135
				sample average			**28.165**	**56.329**

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
TP 9 Depth 84"	1	6	14	12.9	1.00	0.017	29.44	58.885
	2	6	12.9	12	1.00	0.017	26.02	52.048
	3	6	12	11	1.00	0.017	31.30	62.609
	4	6	11	10.2	1.00	0.017	27.17	54.340
	5	6	10.2	9.4	1.00	0.017	29.39	58.776
	6	6	9.4	8.7	1.00	0.017	27.85	55.691
	7	6	8.7	8	1.00	0.017	30.18	60.359
	8	6	8	7.3	1.00	0.017	32.94	65.882
	9	6	7.3	6.8	1.00	0.017	25.53	51.064
	10	6	6.8	6.2	1.00	0.017	33.23	66.462
				sample average			**29.306**	**58.611**

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
TP 9 Depth 84"	1	6	14	13	1.00	0.017	26.67	53.333
	2	6	13	12.2	1.00	0.017	22.86	45.714
	3	6	12.2	11.4	1.00	0.017	24.41	48.814
	4	6	11.4	10.7	1.00	0.017	22.81	45.611
	5	6	10.7	10	1.00	0.017	24.35	48.696
	6	6	10	9.3	1.00	0.017	26.11	52.228
	7	6	9.3	8.6	1.00	0.017	28.16	56.313
	8	6	8.6	8	1.00	0.017	26.02	52.048
	9	6	8	7.4	1.00	0.017	28.05	56.104
	10	6	7.4	6.9	1.00	0.017	25.17	50.350
	sample average						**25.461**	**50.921**

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
TP 10 Depth 60"	1	5.75	14	13.1	5.00	0.083	4.58	9.166
	2	5.75	13.1	12.2	5.00	0.083	4.91	9.818
	3	5.75	12.2	11.4	5.00	0.083	4.68	9.356
	4	5.75	11.4	10.7	5.00	0.083	4.37	8.742
	5	5.75	10.7	9.9	5.00	0.083	5.36	10.718
	6	5.75	9.9	8.6	10.00	0.167	4.85	9.697
	7	5.75	8.6	7.3	10.00	0.167	5.64	11.283
	8	5.75	7.3	6.4	10.00	0.167	4.53	9.066
	sample average						**4.865**	**9.731**

Sample	Sample Round	L (inches)	H1 (inches)	H2 (inches)	t (min)	t (hours)	K (in/hr)	K (ft/day)
TP 10 Depth 60"	1	5.75	14	13.1	5.00	0.083	4.58	9.166
	2	5.75	13.1	12.3	5.00	0.083	4.35	8.693
	3	5.75	12.3	11.5	5.00	0.083	4.64	9.277
	4	5.75	11.5	10.8	5.00	0.083	4.33	8.664
	5	5.75	10.8	10.2	5.00	0.083	3.94	7.886
	6	5.75	10.2	8.9	10.00	0.167	4.70	9.393
	7	5.75	8.9	6.6	20.00	0.333	5.12	10.239
	sample average						**4.523**	**9.045**

Terracon

May 14, 2015

Milone & MacBroom, Inc.
99 Realty Drive
Cheshire, CT 06410

Attn: Tom Balskus, P.E.

Re: Milone & MacBroom
Laboratory Testing Services
Cheshire, CT
Terracon Project No. J2106330

Dear Tom Balskus, P.E.:

As requested, Terracon representatives provided laboratory testing services for the above referenced project. These services were provided as requested by you, your field representative or the contractor's representative unless otherwise noted. The attached reports provide results of services performed during the dates indicated. For your reference, a listing of the attached reports is as follows:

Service Date	Description
05/08/15	Gradation (0070)
05/08/15	Gradation (0071)

We appreciate the opportunity to be of service to you on this project. If you have any questions regarding the information presented in this report or if we can be of further assistance to you, please feel free to contact us.

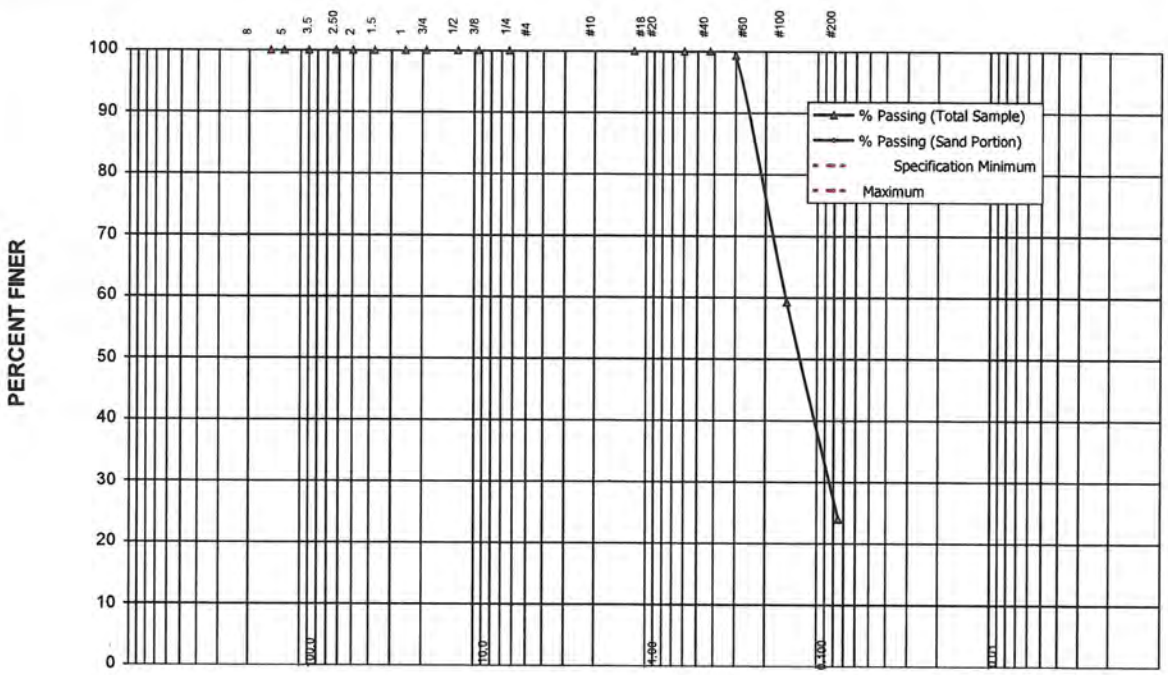
Sincerely,
Terracon Consultants, Inc.

STATE OF CONNECTICUT
ROBERT M. DOWNES
No. 13918
LICENSED PROFESSIONAL ENGINEER

Robert M. Downes, P.E.
Senior Project Engineer

cc: (1) Milone & MacBroom, Inc., (1) Milone & MacBroom, Inc., (1) Milone & MacBroom, Inc., (1) Milone & MacBroom, Inc.

GRAIN SIZE DISTRIBUTION TEST REPORT
ASTM TEST METHODS: C136, C117, D2487



% Cobbles	% Gravel	Coarse	Medium	Fine	% Fines	
		0.1	0.0	100.0	Silt (>0.002mm)	Clay (<0.002mm)
0.0	0		% Sand	76	24.0	

USCS Classification: Silty Sand (SM) Brown

Sieve Size (mm)	U.S. Sieve Size (in.)	Cumulative Wt. Retained	% Passing (Total Sample)	% Passing (Sand Portion)	Specification Minimum	Specification Maximum
150.0	6"	0.00	100			
125.0	5"	0.00	100			
90.0	3.5"	0.00	100			
62.5	2.5"	0.00	100			
50.0	2"	0.00	100			
37.5	1.5"	0.00	100			
25.0	1"	0.00	100			
19.0	3/4"	0.00	100			
12.5	1/2"	0.00	100			
9.5	3/8"	0.00	100			
6.3	1/4"	0.00	100			
1.18	#16	0.00	100			
0.600	#30	0.23	100			
0.425	#40	0.09	100			
0.300	#50	3.47	99			
0.150	#100	209.20	59			
0.075	#200	390.03	24			

Total Dry Wt. 513.27 g

Project:	**Milone & MacBroom**	Project No.:	**J2106330**	Date:	**5/8/2015**
City:	Cheshire, CT	Specification:	None cited	Report No:	J2106330.0070
Source:	Beacon Falls	Sampled from:	TP-7		

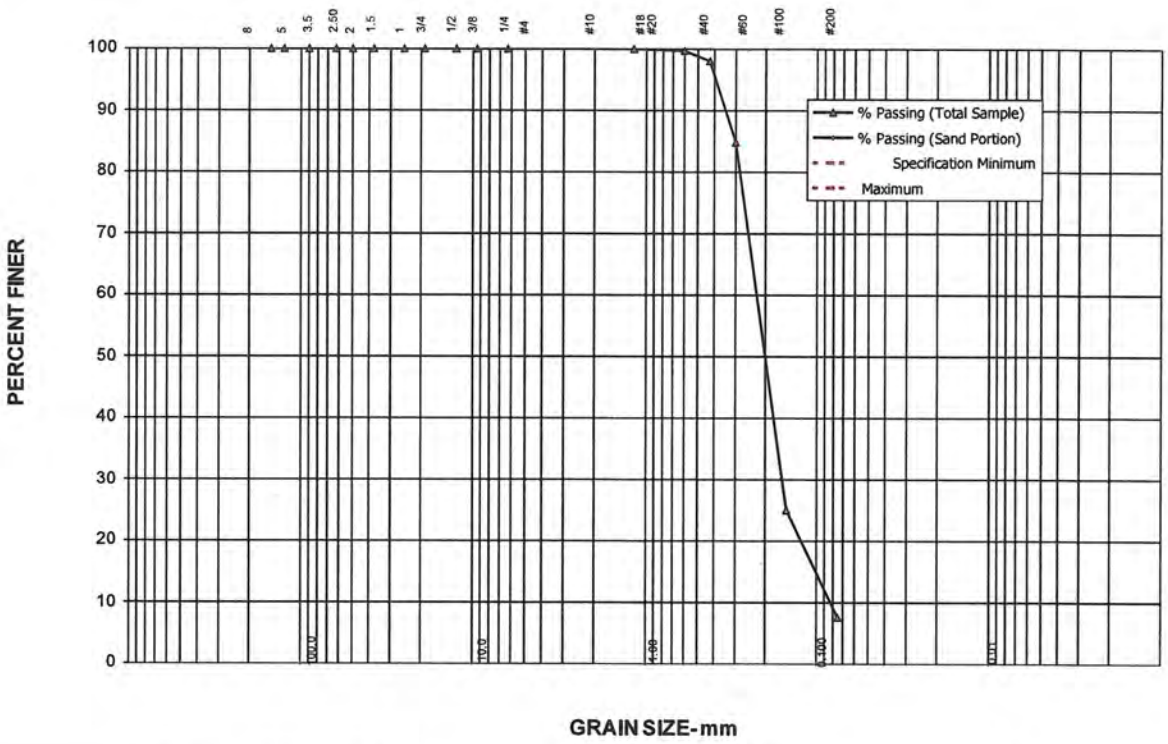
Terracon
201 Hammer Mill Road
Rocky Hill, CT 06067
860-721-1900 (p) 860-721-1939 (f)
http://www.terracon.com/

Remarks:

Tested By: C. Klopfer Date: 5/12/2015

Reviewed By: R. M. Downes III Date: 5/13/2015

GRAIN SIZE DISTRIBUTION TEST REPORT
ASTM TEST METHODS: C136, C117, D2487



GRAIN SIZE-mm

% Cobbles	% Gravel	Coarse	Medium	Fine	% Fines	
		0.3	1.8	97.9	Silt (>0.002mm)	Clay (<0.002mm)
0.0	0	% Sand		92	7.6	

USCS Classification: Poorly Graded Sand with Silt (SP-SM) Brown

Sieve Size (mm)	U.S. Sieve Size (in.)	Cumulative Wt. Retained	% Passing (Total Sample)	% Passing (Sand Portion)	Specification Minimum	Specification Maximum
150.0	6"	0.00	100			
125.0	5"	0.00	100			
90.0	3.5"	0.00	100			
62.5	2.5"	0.00	100			
50.0	2"	0.00	100			
37.5	1.5"	0.00	100			
25.0	1"	0.00	100			
19.0	3/4"	0.00	100			
12.5	1/2"	0.00	100			
9.5	3/8"	0.00	100			
6.3	1/4"	0.00	100			
1.18	#16	0.00	100			
0.600	#30	1.42	100			
0.425	#40	10.27	98			
0.300	#50	80.38	85			
0.150	#100	398.33	25			
0.075	#200	491.02	8			

Total Dry Wt. 531.37 g

Project: **Milone & MacBroom**	Project No.: **J2106330**	Date: **5/8/2015**	
City: Cheshire, CT	Specification: None cited	Report No: J2106330.0071	
Source: Beacon Falls	Sampled from: TP-5		

Terracon
201 Hammer Mill Road
Rocky Hill, CT 06067
860-721-1900 (p) 860-721-1939 (f)
http://www.terracon.com/

Remarks:

Cc= 1.5 Cu = 2.6

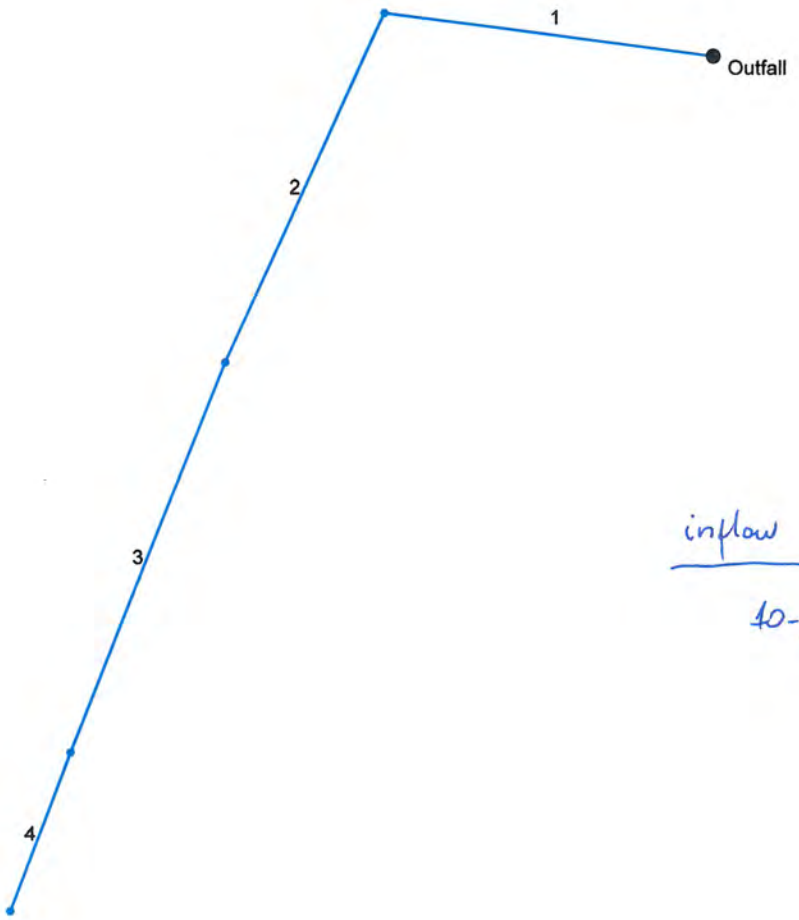
Tested By: C. Klopfer Date: 5/12/2015

Reviewed By: R. M. Downes III Date: 5/13/2015

APPENDIX D

STORM DRAINAGE COMPUTATIONS

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



inflow system to Basin 110

10-yr storm

Project File: SYSTEM 110.stm	Number of lines: 4	Date: 6/10/2015

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	172.000	-172.492	DrGrt	0.00	0.01	0.30	10.0	132.50	0.58	133.50	18	Cir	0.011	1.45	141.40	FES 201 TO YD 202
2	1	199.000	-73.138	DrGrt	0.00	2.89	0.30	10.0	133.50	0.50	134.50	18	Cir	0.011	0.50	138.60	YD 202 TO YD 203
3	2	218.000	-2.864	DrGrt	0.00	0.92	0.30	10.0	134.50	0.50	135.60	15	Cir	0.011	0.50	138.60	YD 203 TO YD 204
4	3	89.000	-1.056	DrGrt	0.00	0.35	0.30	10.0	135.60	0.56	136.10	15	Cir	0.011	1.00	139.10	YD 204 TO YD 205

Project File: SYSTEM 110.stm | Number of lines: 4 | Date: 6/10/2015

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	172.000	0.01	4.17	0.30	0.00	1.25	10.0	17.6	3.7	4.69	9.46	2.65	18	0.58	132.50	133.50	136.96	137.21	134.00	141.40	FES 201 TO YD 2
2	1	199.000	2.89	4.16	0.30	0.87	1.25	10.0	16.4	3.9	4.84	8.80	2.74	18	0.50	133.50	134.50	137.36	137.67	141.40	138.60	YD 202 TO YD 20
3	2	218.000	0.92	1.27	0.30	0.28	0.38	10.0	13.6	4.2	1.61	5.42	1.31	15	0.50	134.50	135.60	137.73	137.82	138.60	138.60	YD 203 TO YD 20
4	3	89.000	0.35	0.35	0.30	0.11	0.11	10.0	10.0	4.8	0.50	5.72	0.41	15	0.56	135.60	136.10	137.84	137.84	138.60	139.10	YD 204 TO YD 20

Project File: SYSTEM 110.stm | Number of lines: 4 | Run Date: 6/10/2015

NOTES:Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period =Yrs. 10 ; c = cir e = ellip b = box

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	YD 202	0.01	0.00	0.01	0.00	DrGrt	0.0	0.00	1.51	1.23	1.23	Sag	2.00	0.046	0.046	0.013	0.01	2.43	0.01	2.43	0.0	Off
2	YD 203	4.17	0.00	4.17	0.00	DrGrt	0.0	0.00	1.51	1.23	1.23	Sag	2.00	0.126	0.126	0.013	0.43	8.83	0.43	8.83	0.0	Off
3	YD 204	1.33	0.00	1.33	0.00	DrGrt	0.0	0.00	1.51	1.23	1.23	Sag	2.00	0.118	0.118	0.013	0.20	5.40	0.20	5.40	0.0	Off
4	YD 205	0.50	0.00	0.50	0.00	DrGrt	0.0	0.00	1.51	1.23	1.23	Sag	2.00	0.119	0.119	0.013	0.11	3.77	0.11	3.77	0.0	Off

Project File: SYSTEM 110.stm | Number of lines: 4 | Run Date: 6/10/2015

NOTES: Inlet N-Values = 0.016; Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

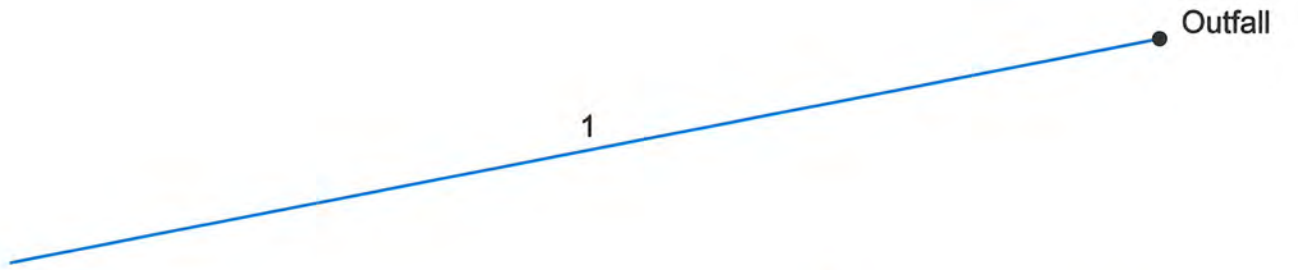
Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	18	4.69	132.50	136.96	1.50	1.77	2.65	0.11	137.07	0.143	172.000	133.50	137.21	1.50	1.77	2.65	0.11	137.31	0.143	0.143	0.245	1.45	0.16
2	18	4.84	133.50	137.36	1.50	1.77	2.74	0.12	137.48	0.152	199.000	134.50	137.67	1.50	1.77	2.74	0.12	137.78	0.152	0.152	0.303	0.50	0.06
3	15	1.61	134.50	137.73	1.25	1.23	1.31	0.03	137.75	0.045	218.000	135.60	137.82	1.25	1.23	1.31	0.03	137.85	0.045	0.045	0.097	0.50	0.01
4	15	0.50	135.60	137.84	1.25	1.23	0.41	0.00	137.84	0.004	89.000	136.10	137.84	1.25	1.23	0.41	0.00	137.84	0.004	0.004	0.004	1.00	0.00

Project File: SYSTEM 110.stm | Number of lines: 4 | Run Date: 6/10/2015

; c = cir e = ellip b = box

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



Basin 110 outlet pipe

100-yr storm

Project File: SYSTEM 110A.stm	Number of lines: 1	Date: 6/10/2015

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	99.000	168.834	None	16.60	0.00	0.00	0.0	130.00	1.01	131.00	24	Cir	0.011	1.00	140.00	FES 301 TO OCS 302

Project File: SYSTEM 110A.stm | Number of lines: 1 | Date: 6/10/2015

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	99.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	16.60	26.86	7.30	24	1.01	130.00	131.00	131.27	132.47	132.00	140.00	FES 301 TO OCS

Project File: SYSTEM 110A.stm

Number of lines: 1

Run Date: 6/10/2015

NOTES:Known Qs only ; c = cir e = ellip b = box

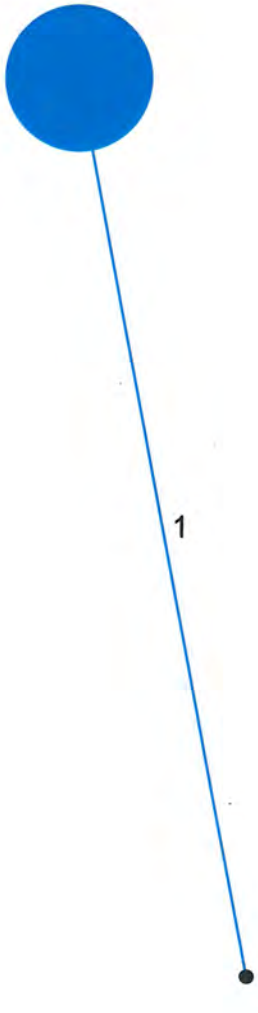
Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	24	16.60	130.00	131.27	1.27	2.10	7.89	0.70	131.97	0.000	99.000	131.00	132.47	1.47**	2.47	6.72	0.70	133.17	0.000	0.000	n/a	1.00	0.70

Project File: SYSTEM 110A.stm | Number of lines: 1 | Run Date: 6/10/2015

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



new CB on Loque Road

10-yr storm

Project File: SYSTEM 110B.stm	Number of lines: 1	Date: 6/10/2015

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	18.907	-100.605	Comb	0.00	0.16	0.90	5.0	162.00	2.64	162.50	15	Cir	0.011	1.00	167.90	FES 601 TO FES 602

Project File: SYSTEM 110B.stm | Number of lines: 1 | Date: 6/10/2015

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	18.907	0.16	0.16	0.90	0.14	0.14	5.0	5.0	6.0	0.86	12.41	4.35	15	2.64	162.00	162.50	162.22	162.86	163.25	167.90	FES 601 TO FES

Project File: SYSTEM 110B.stm | Number of lines: 1 | Run Date: 6/10/2015

NOTES:Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period =Yrs. 10 ; c = cir e = ellip b = box

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	STM CCB 602	0.86	0.00	0.86	0.00	Comb	4.0	2.73	0.00	2.31	1.35	0.141	2.53	0.050	0.043	0.013	0.11	2.18	0.11	2.18	0.0	Off

Project File: SYSTEM 110B.stm | Number of lines: 1 | Run Date: 6/10/2015

NOTES: Inlet N-Values = 0.016; Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

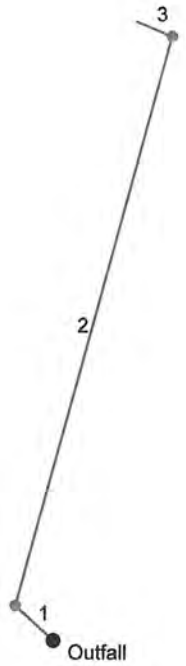
Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	15	0.86	162.00	162.22	0.22	0.15	5.80	0.13	162.35	0.000	18.907	162.50	162.86	0.36**	0.30	2.90	0.13	163.00	0.000	0.000	n/a	1.00	0.13

Project File: SYSTEM 110B.stm | Number of lines: 1 | Run Date: 6/10/2015

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



System 220A to Basin 220

10-yr storm

Project File: SYSTEM 220A.stm	Number of lines: 3	Date: 6/12/2015

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	23.000	-137.760	MH	0.00	0.00	0.00	0.0	134.30	0.87	134.50	18	Cir	0.011	0.91	140.30	FES 401 TO STM MH
2	1	265.000	62.917	MH	0.00	0.00	0.00	0.0	134.50	0.57	136.00	18	Cir	0.011	0.99	140.30	STM MH 402 TO STM
3	2	17.000	-83.173	None	5.59	0.00	0.00	0.0	136.00	0.59	136.10	18	Cir	0.011	1.00	0.00	STM MH 403 TO SKAN

Project File: SYSTEM 220A.stm | Number of lines: 3 | Date: 6/12/2015

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	23.000	0.00	0.00	0.00	0.00	0.00	0.0	0.9	0.0	5.59	11.57	4.32	18	0.87	134.30	134.50	135.51	135.41	136.01	140.30	FES 401 TO STM
2	1	265.000	0.00	0.00	0.00	0.00	0.00	0.0	0.1	0.0	5.59	9.34	4.98	18	0.57	134.50	136.00	135.41	136.91	140.30	140.30	STM MH 402 TO
3	2	17.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	5.59	9.52	4.98	18	0.59	136.00	136.10	136.91	137.01	140.30	0.00	STM MH 403 TO

Project File: SYSTEM 220A.stm

Number of lines: 3

Run Date: 6/12/2015

NOTES:Intensity = 88.24 / (Inlet time + 15.50) ^ 0.83; Return period =Yrs. 10 ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

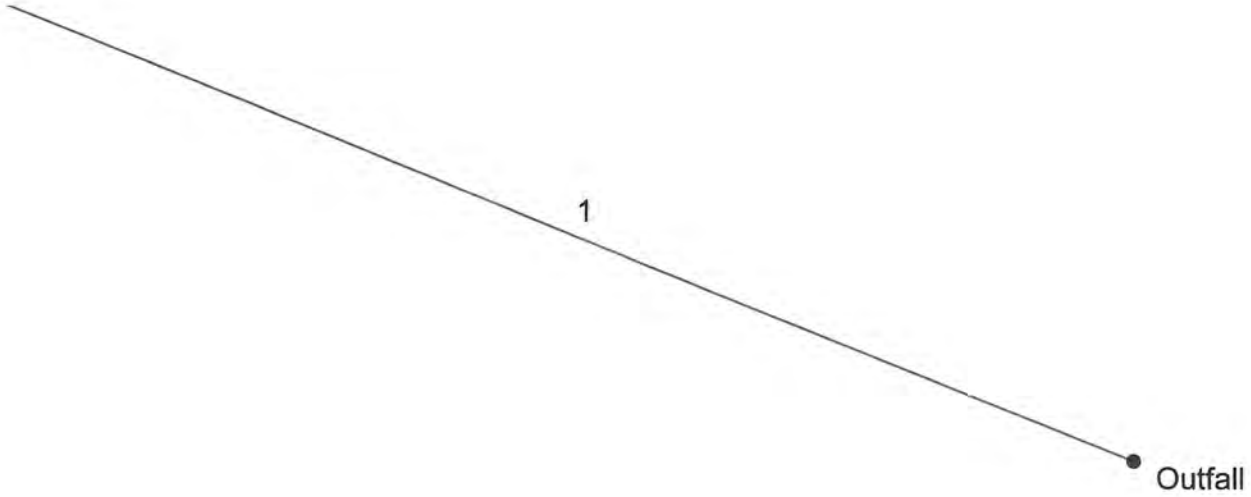
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	18	5.59	134.30	135.51	1.21	1.12	3.66	0.38	135.89	0.000	23.000	134.50	135.41	0.91**	1.12	4.98	0.38	135.80	0.000	0.000	n/a	0.91	n/a
2	18	5.59	134.50	135.41	0.91*	1.12	4.98	0.38	135.80	0.000	265.000	136.00	136.91	0.91**	1.12	4.98	0.38	137.30	0.000	0.000	n/a	0.99	n/a
3	18	5.59	136.00	136.91	0.91*	1.12	4.98	0.38	137.30	0.000	17.000	136.10	137.01	0.91**	1.12	4.98	0.38	137.40	0.000	0.000	n/a	1.00	n/a

Project File: SYSTEM 220A.stm | Number of lines: 3 | Run Date: 6/12/2015

Notes: * depth assumed.; ** Critical depth. ; c = cir e = ellip b = box

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan

System 220B to Basin 220
10-yr storm



Project File: SYSTEM 220B.stm	Number of lines: 1	Date: 6/12/2015

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	47.000	-158.096	None	7.26	0.00	0.00	0.0	135.50	0.55	135.76	18	Cir	0.011	1.00	137.59	FES 501 TO SKANSKA

Project File: SYSTEM 220B.stm | Number of lines: 1 | Date: 6/12/2015

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	47.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	7.26	9.23	5.38	18	0.55	135.50	135.76	136.60	136.80	137.26	137.59	FES 501 TO SKA

Project File: SYSTEM 220B.stm

Number of lines: 1

Run Date: 6/12/2015

NOTES:Known Qs only ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	18	7.26	135.50	136.60	1.10	1.31	5.23	0.48	137.08	0.000	47.000	135.76	136.80	1.04**	1.31	5.54	0.48	137.28	0.000	0.000	n/a	1.00	n/a

Project File: SYSTEM 220B.stm | Number of lines: 1 | Run Date: 6/12/2015

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

Outlet Protection Calculations

Project:	Beacon Falls Energy Park	By:	DJL	Date:	06/10/15
Location:	Beacon Falls, CT	Checked:	FAB	Date:	06/10/15
Outlet I.D.	**FES 201**				

*Based on Connecticut DOT Drainage Manual, Section 11.13

Description:

FES 201 Outlet to Stormwater Basin 110

Design Criteria 10-yr Storm Event):

Q=	4.69	R_p=	1.5	
D=	18	S_p=	1.5	
V=	2.65	Tw=	4.46	(Tw ≥ .5 Rp Use Type B)

Q= Flow rate at discharge point in cubic feet per second (cfs)
D= Outlet pipe diameter in inches (in)
V= Flow velocity at discharge point (ft/s)
R_p= Maximum inside pipe rise in feet (ft)
S_p= inside diametere for circular sections of maximum inside pipe span for non-circular sections in feet (ft)
T_w= Tailwater depth in feet (ft)

Based on **Table 11.13.1,** A *Riprap Apron* should be used is used *Type B*

Stone Size:

Velocity < 8 ft/sec → Use *Modified Riprap*

Preformed Scour Hole Dimensions:

F(ft)=0.5(R_p)	=	n/a
C(ft)=3.0(S_p)+6.0(F)	=	n/a
B(ft)=2.0(S_p)+6.0(F)	=	n/a

Rip Rap Splash Pad Dimensions:

L_a (ft)	=	10
W1 (ft)=3.0(S_p) min.	=	4.5
W2 (ft)=3.0(S_p)+0.4(L_a) min.	=	9
Depth of Stone	=	12" Modified Riprap

Outlet Protection Calculations

Project:	Beacon Falls Energy Park	By:	DJL	Date:	06/10/15
Location:	Beacon Falls, CT	Checked:	FAB	Date:	06/10/15
Outlet I.D.	**FES 301**				

*Based on Connecticut DOT Drainage Manual, Section 11.13

Description:

FES 301 Outlet to Existing Depression 100

Design Criteria 100-yr Storm Event):

Q=	16.6	R_p=	2	
D=	24	S_p=	2	
V=	7.3	Tw=	1.27	(Tw ≥ .5 Rp Use Type B)

Q= Flow rate at discharge point in cubic feet per second (cfs)
D= Outlet pipe diameter in inches (in)
V= Flow velocity at discharge point (ft/s)
R_p= Maximum inside pipe rise in feet (ft)
S_p= inside diametere for circular sections of maximum inside pipe span for non-circular sections in feet (ft)
T_w= Tailwater depth in feet (ft)

Based on **Table 11.13.1**, A *Riprap Apron* should be used is used *Type B*

Stone Size:

Velocity < 8 ft/sec → Use *Modified Riprap*

Preformed Scour Hole Dimensions:

$F(ft)=0.5(R_p)$	=	n/a
$C(ft)=3.0(S_p)+6.0(F)$	=	n/a
$B(ft)=2.0(S_p)+6.0(F)$	=	n/a

Riprap Splash Pad Dimensions:

L_a (ft)	=	21
W1 $(ft)=3.0(S_p)$ min.	=	6
W2 $(ft)=3.0(S_p)+0.4(L_a)$ min.	=	15
Depth of Stone	=	12" Modified Riprap

Outlet Protection Calculations

Project:	Beacon Falls Energy Park	By:	DJL	Date:	06/10/15
Location:	Beacon Falls, CT	Checked:	FAB	Date:	06/10/15
Outlet I.D.	**FES 401**				

*Based on Connecticut DOT Drainage Manual, Section 11.13

Description:

FES 401 Outlet to Stormwater Basin 220

Design Criteria 10-yr Storm Event):

Q=	5.59	R_p=	1.5	
D=	18	S_p=	1.5	
V=	4.32	Tw=	1.21	(Tw ≥ .5 Rp Use Type B)

Q= Flow rate at discharge point in cubic feet per second (cfs)
D= Outlet pipe diameter in inches (in)
V= Flow velocity at discharge point (ft/s)
R_p= Maximum inside pipe rise in feet (ft)
S_p= inside diametere for circular sections of maximum inside pipe span for non-circular sections in feet (ft)
T_w= Tailwater depth in feet (ft)

Based on **Table 11.13.1,** A *Riprap Apron* should be used is used *Type B*

Stone Size:

Velocity < 8 ft/sec → Use *Modified Riprap*

Preformed Scour Hole Dimensions:

F(ft)=0.5(R_p)	=	n/a
C(ft)=3.0(S_p)+6.0(F)	=	n/a
B(ft)=2.0(S_p)+6.0(F)	=	n/a

Rip Rap Splash Pad Dimensions:

L_a (ft)	=	12
W1 (ft)=3.0(S_p) min.	=	4.5
W2 (ft)=3.0(S_p)+0.4(L_a) min.	=	10
Depth of Stone	=	12" Modified Riprap

Outlet Protection Calculations

Project:	Beacon Falls Energy Park	By:	DJL	Date:	06/10/15
Location:	Beacon Falls, CT	Checked:	FAB	Date:	06/10/15
Outlet I.D.	**FES 501**				

*Based on Connecticut DOT Drainage Manual, Section 11.13

Description:

FES 501 Outlet to Stormwater Basin 220

Design Criteria 10-yr Storm Event):

Q=	7.26	R_p=	1.5	
D=	18	S_p=	1.5	
V=	5.38	Tw=	1.1	(Tw ≥ .5 Rp Use Type B)

Q= Flow rate at discharge point in cubic feet per second (cfs)
D= Outlet pipe diameter in inches (in)
V= Flow velocity at discharge point (ft/s)
R_p= Maximum inside pipe rise in feet (ft)
S_p= inside diametere for circular sections of maximum inside pipe span for non-circular sections in feet (ft)
T_w= Tailwater depth in feet (ft)

Based on **Table 11.13.1,** A *Riprap Apron* should be used is used *Type B*

Stone Size:

Velocity < 8 ft/sec → Use *Modified Riprap*

Preformed Scour Hole Dimensions:

F(ft)=0.5(R_p)	=	n/a
C(ft)=3.0(S_p)+6.0(F)	=	n/a
B(ft)=2.0(S_p)+6.0(F)	=	n/a

Riprap Splash Pad Dimensions:

L_a (ft)	=	15
W1 (ft)=3.0(S_p) min.	=	4.5
W2 (ft)=3.0(S_p)+0.4(L_a) min.	=	11
Depth of Stone	=	12" Modified Riprap

WASTEWATER INFILTRATION PONDS
Total Storage Volume Provided

Wastewater Infiltration Ponds (Volume within each pond)

Elevation (ft)	Surface Area (ft2)	Volume (ft3)	Volume (ac-ft)	Cumulative Volume (ft3)	Cumulative Volume (ac-ft)
132.0	900	0.0	0.000	**0**	**0.000**
133.0	1,750	1,325.0	0.030	**1,325**	**0.030**
134.0	2,575	2,162.5	0.050	**3,488**	**0.080**
135.0	3,750	3,162.5	0.073	**6,650**	**0.153**
136.0	4,925	4,337.5	0.100	**10,988**	**0.252**
137.0	6,425	5,675.0	0.130	**16,663**	**0.383**
138.0	7,925	7,175.0	0.165	**23,838**	**0.547**
139.0	9,550	8,737.5	0.201	**32,575**	**0.748**
139.5	10,525	5,018.8	0.115	**37,594**	**0.863**
140.0	11,500	5,506.3	0.126	**43,100**	**0.989**

Engineering, Planning,
Landscape Architecture
and Environmental Science

MILONE & MACBROOM®
99 Realty Drive
Cheshire, Connecticut 06410
(203) 271-1773 Fax (203) 272-9733

JOB Beacon Falls Energy Park (1103-87-9.2)
SHEET NO. 1 OF 1
CALCULATED BY FAB DATE 6/10/15
CHECKED BY DATE
SCALE Process Wastewater ponds Sizing

- 150,200 gal/day ≈ 20,000 ft³/day ≈ 0.23 cfs

- Pond was sized with a minimum storage volume to hold the processed water for 24 hrs, assuming no infiltration.

- A second pond with identical shape and storage volume will be constructed adjacent to the first pond. This will allow an unobstructed flow discharge to the ponds, as one pond can be shut down for maintenance while the second pond can remain in operation. The two ponds will be connected by an overflow spillway set at elev. 139.0. The bottom of the ponds is set at elev. 132.0.

  - Volume @ elev. 139.0 = 32,575 ft³ > 20,000 ft³ // OK //

- Draining Time:

  - Infiltration rate of soil:

    . nearby test pit locations: TP-9 and TP-10

    . TP-9 = 21.4 in/hr
      TP-10 = 4.7 in/hr
      > Average = 16.05 in/hr

    . 50% clogging factor = 8 in/hr ◄

  - D = Pt, where: D = maximum basin depth (ft) = 7 ft = 84 in
    P = infiltration rate of soil (in/hr)
    t = draining time (ft)

    84 in = 8 in/hr × t ⇒ t = 10.5 hrs //

APPENDIX E

HYDROLOGIC ANALYSIS – INPUT COMPUTATIONS

Worksheet 2: Runoff curve number and runoff

Project: Lopus Road and Gruber Road Site | By: FAB | Date: 06/10/15
Location: Beacon Falls, CT | Checked: SRD | Date: 06/10/15
Circle one: ***Present*** Developed | Watershed: WS 10 - Existing Conditions

1.) Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Value [1.] Table 2-2	Figure 2-3	Figure 2-4	Area Acres Sq. Ft. %	Product of CN x Area
A	WOODS (FAIR)	36			1.19	42.84
A	WOODS / GRASS COMB (FAIR)	43			0.49	21.06
A	OPEN SPACE / LAWN AREA (FAIR)	49			1.46	71.71
A	OPEN SPACE / LAWN AREA (POOR)	68			1.64	111.71
B	WOODS (GOOD)	55			0.34	18.64
B	WOODS (FAIR)	60			1.33	79.76
B	WOODS / GRASS COMB (FAIR)	65			0.21	13.67
B	1-ACRE RESIDENTIAL	68			2.73	185.41
B	OPEN SPACE / LAWN AREA (FAIR)	69			3.78	260.86
B	1/4-ACRE RESIDENTIAL	75			1.27	95.14
B	OPEN SPACE / LAWN AREA (POOR)	79			0.07	5.63
C	WOODS (FAIR)	73			2.48	181.30
C	WOODS / GRASS COMB (FAIR)	76			4.24	322.46
C	OPEN SPACE / LAWN AREA (FAIR)	79			2.53	200.18
C	1/4-ACRE RESIDENTIAL	83			0.49	40.69
C	OPEN SPACE / LAWN AREA (POOR)	86			6.32	543.43
N/A	EXISTING PAVED / IMPERVIOUS	98			0.17	16.49
				Totals =	30.75	2210.98
					(0.04805	sq mi)

[1.] Use only one CN value source per line.

$$\text{CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{2210.98}{30.75}$$ Use CN = **72**

Worksheet 2: Runoff curve number and runoff

Project: Lopus Road and Gruber Road Site | By: FAB | Date: 06/10/15
Location: Beacon Falls, CT | Checked: SRD | Date: 06/10/15
Circle one: ***Present*** Developed | Watershed: WS 20 - Existing Conditions

1.) Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Value [1.] Table 2-2	Figure 2-3	Figure 2-4	Area Acres Sq. Ft. %	Product of CN x Area
B	WOODS (FAIR)	60			0.21	12.34
B	OPEN SPACE / LAWN AREA (FAIR)	69			0.06	4.45
C	WOODS (FAIR)	73			0.21	15.25
C	OPEN SPACE / LAWN AREA (FAIR)	79			0.49	38.63

[1.] Use only one CN value source per line.

Totals = 0.97 | 70.67

(0.00151 sq mi)

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{70.67}{0.97}$ Use CN = **73**

Worksheet 2: Runoff curve number and runoff

Project: Lopus Road and Gruber Road Site By: FAB Date: 06/10/15
Location: Beacon Falls, CT Checked: SRD Date: 06/10/15
Circle one: ***Present*** Developed Watershed: WS 30 - Existing Conditions

1.) Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Value [1.]			Area (Acres) Sq. Ft. %	Product of CN x Area
		Table 2-2	Figure 2-3	Figure 2-4		
A	WOODS (FAIR)	36			0.05	1.63
A	OPEN SPACE / LAWN AREA (FAIR)	49			0.03	1.71
B	WOODS (FAIR)	60			0.20	11.95
B	OPEN SPACE / LAWN AREA (FAIR)	69			0.50	34.40
C	WOODS (FAIR)	73			0.14	10.17
C	OPEN SPACE / LAWN AREA (FAIR)	79			0.22	17.35
				Totals =	1.14	77.21

[1.] Use only one CN value source per line.

(0.00178 sq mi)

$$\text{CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{77.21}{1.14}$$ Use CN = **68**

Worksheet 3: Time of Concentration (T_c) or Travel Time (T_t)

Project: Beacon Falls Energy Park | By: FAB | Date: 06/10/15
Location: Beacon Falls, CT (MMI #1103-87) | Checked: SRD | Date: 06/10/15
Circle one: ***Present*** Developed | Watershed: WS 10 - Existing Conditions
Circle one: ***Tc*** T_t | Subwatershed:

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1.	Surface description (Table 3-1)		WOODS		
2.	Manning's roughness coeff. for sheet flow, n (Table 3-1)		0.350		
3.	Flow Length, L (< 300ft)	ft.	115.0		
4.	Two-year 24-hr rainfall, P_2	in.	3.30		
5.	Land slope, s	ft./ft.	0.002		
6.	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.	0.941	=	0.941

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C				
7.	Surface description		BRUSH				
8.	Manning's roughness coeff., n		0.090				
9.	Paved or unpaved		UNPVD				
10.	Depth of flow, d (default values: d=.4 unpaved, d=.2 paved)	ft.	0.40				
11.	Flow Length, L	ft.	1600.0				
12.	Watercourse slope, s	ft./ft.	0.004				
13.	Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.	0.55				
14.	$T_t = \frac{L}{3600 * V}$	hr.	0.808	+	+	+	= 0.808

Channel flow

		Segment ID					
15.	Channel Bottom width, b	ft.					
16.	Horizontal side slope component, z (z horiz:1 vert)	ft.					
17.	Depth of flow, d	ft.					
18.	Cross sectional flow area, A (assume trapazoidal)	$ft.^2$					
19.	Wetted perimeter, P_w	ft.					
20.	Hydraulic Radius, $R = \frac{A}{P_w}$	ft.					
21.	Channel slope, s	ft./ft.					
22.	Manning's roughness coeff., n						
23.	$V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.					
24.	Flow length, L	ft.					
25.	$T_t = \frac{L}{3600 * V}$	hr.		+	+	+	= 0.000
26.	Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)						hr. 1.748

Worksheet 3: Time of Concentration (T_c) or Travel Time (T_t)

Project: Beacon Falls Energy Park | By: FAB | Date: 06/10/15
Location: Beacon Falls, CT (MMI #1103-87) | Checked: SRD | Date: 06/10/15
Circle one: ***Present*** Developed | Watershed: WS 20 - Existing Conditions
Circle one: ***Tc*** T_t | Subwatershed:

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1.	Surface description (Table 3-1)		GRASS		
2.	Manning's roughness coeff. for sheet flow, n (Table 3-1)		0.300		
3.	Flow Length, L (< 300ft)	ft.	80.0		
4.	Two-year 24-hr rainfall, P_2	in.	3.30		
5.	Land slope, s	ft./ft.	0.008		
6.	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.	0.338	=	0.338

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C	C-D				
7.	Surface description		BRUSH	BRUSH				
8.	Manning's roughness coeff., n		0.090	0.090				
9.	Paved or unpaved		UNPVD	UNPVD				
10.	Depth of flow, d (default values: d=.4 unpaved, d=.2 paved)	ft.	0.40	0.40				
11.	Flow Length, L	ft.	150.0	40.0				
12.	Watercourse slope, s	ft./ft.	0.040	0.250				
13.	Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.	1.80	4.49				
14.	$T_t = \frac{L}{3600 * V}$	hr.	0.023	+ 0.002	+	+	=	0.026

Channel flow

		Segment ID						
15.	Channel Bottom width, b	ft.						
16.	Horizontal side slope component, z (z horiz:1 vert)	ft.						
17.	Depth of flow, d	ft.						
18.	Cross sectional flow area, A (assume trapazoidal)	$ft.^2$						
19.	Wetted perimeter, P_w	ft.						
20.	Hydraulic Radius, $R = \frac{A}{P_w}$	ft.						
21.	Channel slope, s	ft./ft.						
22.	Manning's roughness coeff., n							
23.	$V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.						
24.	Flow length, L	ft.						
25.	$T_t = \frac{L}{3600 * V}$	hr.	+	+	+	+	=	0.000
26.	Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)						hr.	0.364

Worksheet 3: Time of Concentration (T_c) or Travel Time (T_t)

Project: Beacon Falls Energy Park
Location: Beacon Falls, CT (MMI #1103-87)
Circle one: ***Present*** Developed
Circle one: ***Tc*** T_t

By: FAB Date: 06/10/15
Checked: SRD Date: 06/10/15
Watershed: WS 30 - Existing Conditions
Subwatershed:

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1.	Surface description (Table 3-1)		GRASS		
2.	Manning's roughness coeff. for sheet flow, n (Table 3-1)		0.150		
3.	Flow Length, L (< 300ft)	ft.	100.0		
4.	Two-year 24-hr rainfall, P_2	in.	3.30		
5.	Land slope, s	ft./ft.	0.012		
6.	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.	0.197	=	0.197

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C				
7.	Surface description		BRUSH				
8.	Manning's roughness coeff., n		0.090				
9.	Paved or unpaved		UNPVD				
10.	Depth of flow, d (default values: d=.4 unpaved, d=.2 paved)	ft.	0.40				
11.	Flow Length, L	ft.	285.0				
12.	Watercourse slope, s	ft./ft.	0.006				
13.	Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.	0.71				
14.	$T_t = \frac{L}{3600 * V}$	hr.	0.111	+	+	+	= 0.111

Channel flow

		Segment ID					
15.	Channel Bottom width, b	ft.					
16.	Horizontal side slope component, z (z horiz:1 vert)	ft.					
17.	Depth of flow, d	ft.					
18.	Cross sectional flow area, A (assume trapazoidal)	$ft.^2$					
19.	Wetted perimeter, P_w	ft.					
20.	Hydraulic Radius, $R = \frac{A}{P_w}$	ft.					
21.	Channel slope, s	ft./ft.					
22.	Manning's roughness coeff., n						
23.	$V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.					
24.	Flow length, L	ft.					
25.	$T_t = \frac{L}{3600 * V}$	hr.		+	+	+	= 0.000
26.	Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)	hr.					0.308

Worksheet 2: Runoff curve number and runoff

Project: Lopus Road and Gruber Road Site | By: FAB | Date: 06/10/15
Location: Beacon Falls, CT | Checked: SRD | Date: 06/10/15
Circle one: Present ***Developed*** | Watershed: WS 10 - Proposed Conditions

1.) Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Value [1] Table 2-2	Figure 2-3	Figure 2-4	Area Acres Sq. Ft. %	Product of CN x Area
A	WOODS (FAIR)	36			0.07	2.69
A	OPEN SPACE / LAWN AREA (GOOD)	39			0.48	18.86
A	OPEN SPACE / LAWN AREA (FAIR)	49			0.23	11.20
B	WOODS (FAIR)	60			0.26	15.82
B	OPEN SPACE / LAWN AREA (GOOD)	61			0.52	31.72
B	OPEN SPACE / LAWN AREA (FAIR)	69			1.91	131.49
Totals =					3.48	211.78
					(0.00543	sq mi)

[1] Use only one CN value source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{211.78}{3.48}$ Use CN = **61**

Worksheet 2: Runoff curve number and runoff

Project: Lopus Road and Gruber Road Site | By: FAB | Date: 06/10/15
Location: Beacon Falls, CT | Checked: SRD | Date: 06/10/15
Circle one: Present ***Developed*** | Watershed: WS 11 - Proposed Conditions

1.) Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Value [1.] Table 2-2	Figure 2-3	Figure 2-4	Area Acres Sq. Ft. %	Product of CN x Area
A	WOODS (FAIR)	36			0.31	11.21
A	OPEN SPACE / LAWN AREA (GOOD)	39			0.52	20.33
A	WOODS / GRASS COMB (FAIR)	43			0.44	18.94
B	WOODS (GOOD)	55			0.34	18.64
B	WOODS (FAIR)	60			0.26	15.41
B	WOODS / GRASS COMB (FAIR)	65			0.20	12.83
B	1-ACRE RESIDENTIAL	68			2.73	185.41
C	WOODS (FAIR)	73			0.82	59.74
C	OPEN SPACE / LAWN AREA (GOOD)	74			0.64	47.36
C	WOODS / GRASS COMB (FAIR)	76			3.63	275.76
C	1-ACRE RESIDENTIAL	83			0.05	4.46
N/A	EXISTING PAVED / IMPERVIOUS	98			0.17	16.47
N/A	PROPOSED PAVED / IMPERVIOUS	98			0.73	71.99
				Totals =	10.84	758.57
					(0.01693	sq mi)

[1.] Use only one CN value source per line.

$$\text{CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{758.57}{10.84}$$ Use CN = 70

Worksheet 2: Runoff curve number and runoff

Project: Lopus Road and Gruber Road Site By: FAB Date: 06/10/15
Location: Beacon Falls, CT Checked: SRD Date: 06/10/15
Circle one: Present ***Developed*** Watershed: WS 20 - Proposed Conditions

1.) Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Value [1.]			Area (Acres) Sq. Ft. %	Product of CN x Area
		Table 2-2	Figure 2-3	Figure 2-4		
B	WOODS (FAIR)	60			0.11	6.42
B	OPEN SPACE / LAWN AREA (GOOD)	61			0.11	6.53
B	OPEN SPACE / LAWN AREA (FAIR)	69			0.06	3.87
C	WOODS (FAIR)	73			0.07	5.04
C	OPEN SPACE / LAWN AREA (GOOD)	74			0.02	1.19
C	OPEN SPACE / LAWN AREA (FAIR)	79			0.28	21.82
				Totals =	0.63	44.88
					(0.00099	sq mi)

[1.] Use only one CN value source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{44.88}{0.63}$ Use CN = **71**

Worksheet 2: Runoff curve number and runoff

Project: Lopus Road and Gruber Road Site By: FAB Date: 06/10/15
Location: Beacon Falls, CT Checked: SRD Date: 06/10/15
Circle one: Present ***Developed*** Watershed: WS 21 - Proposed Conditions

1.) Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Value [1] Table 2-2	Figure 2-3	Figure 2-4	Area Acres Sq. Ft. %	Product of CN x Area
A	OPEN SPACE / LAWN AREA (GOOD)	39			0.73	28.40
B	WOODS (FAIR)	60			0.63	37.92
B	OPEN SPACE / LAWN AREA (GOOD)	61			0.08	5.10
B	OPEN SPACE / LAWN AREA (FAIR)	69			1.18	81.38
B	1/4-ACRE RESIDENTIAL	75			1.27	95.14
C	WOODS (FAIR)	73			1.54	112.50
C	OPEN SPACE / LAWN AREA (GOOD)	74			1.47	108.75
C	WOODS / GRASS COMB (FAIR)	76			0.29	22.37
C	OPEN SPACE / LAWN AREA (FAIR)	79			2.07	163.49
C	1/4-ACRE RESIDENTIAL	83			0.44	36.23
Totals =					9.70	691.29
					(0.01516	sq mi)

[1] Use only one CN value source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{691.29}{9.70}$ Use CN = 71

Worksheet 2: Runoff curve number and runoff

Project: Lopus Road and Gruber Road Site
Location: Beacon Falls, CT
Circle one: Present ***Developed***

By: FAB Date: 06/10/15
Checked: SRD Date: 06/10/15
Watershed: WS 22 - Proposed Conditions

1.) Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Value [1.] Table 2-2	Figure 2-3	Figure 2-4	Area Acres / Sq. Ft. / %	Product of CN x Area
A	OPEN SPACE / LAWN AREA (GOOD)	39			1.24	48.38
B	WOODS (FAIR)	60			0.01	0.48
B	OPEN SPACE / LAWN AREA (GOOD)	61			0.22	13.43
B	OPEN SPACE / LAWN AREA (FAIR)	69			0.02	1.23
C	OPEN SPACE / LAWN AREA (GOOD)	74			0.34	25.52
N/A	PROPOSED PAVED / IMPERVIOUS	98			5.58	546.69

[1.] Use only one CN value source per line.

Totals = 7.41 635.73
(0.01158 sq mi)

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{635.73}{7.41}$ Use CN = **86**

Worksheet 2: Runoff curve number and runoff

Project: Beacon Falls Energy Park
Location: Beacon Falls, CT
Circle one: Present ***Developed***

By: FAB Date: 06/10/15
Checked: SRD Date: 06/10/15
Watershed: WS 30 - Proposed Conditions

1.) Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Value [1.] Table 2-2	Figure 2-3	Figure 2-4	Area (Acres) Sq. Ft. %	Product of CN x Area
A	OPEN SPACE / LAWN AREA (GOOD)	39			0.01	0.43
A	OPEN SPACE / LAWN AREA (FAIR)	49			0.01	0.28
B	OPEN SPACE / LAWN AREA (GOOD)	61			0.03	1.54
B	OPEN SPACE / LAWN AREA (FAIR)	69			0.06	4.08
C	WOODS (FAIR)	73			0.20	14.32
C	OPEN SPACE / LAWN AREA (GOOD)	74			0.01	0.90
C	OPEN SPACE / LAWN AREA (FAIR)	79			0.49	38.51
	Totals =				0.80	60.07
					(0.00125	sq mi)

[1.] Use only one CN value source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{60.07}{0.80}$ Use CN = **75**

Worksheet 3: Time of Concentration (T_c) or Travel Time (T_t)

Project: Beacon Falls Energy Park | By: FAB | Date: 06/10/15
Location: Beacon Falls, CT (MMI #1103-87) | Checked: SRD | Date: 06/10/15
Circle one: Present ***Developed*** | Watershed: WS 10 - Proposed Conditions
Circle one: ***Tc*** T_t | Subwatershed:

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1.	Surface description (Table 3-1)		GRSS		
2.	Manning's roughness coeff. for sheet flow, n (Table 3-1)		0.150		
3.	Flow Length, L (< 300ft)	ft.	300.0		
4.	Two-year 24-hr rainfall, P_2	in.	3.30		
5.	Land slope, s	ft./ft.	0.008		
6.	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.	0.573	=	0.573

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C							
7.	Surface description		GRSS							
8.	Manning's roughness coeff., n		0.080							
9.	Paved or unpaved		UNPVD							
10.	Depth of flow, d (default values: d=.4 unpaved, d=.2 paved)	ft.	0.40							
11.	Flow Length, L	ft.	750.0							
12.	Watercourse slope, s	ft./ft.	0.008							
13.	Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.	0.88							
14.	$T_t = \frac{L}{3600 * V}$	hr.	0.238	+		+		+	=	0.238

Channel flow

		Segment ID								
15.	Channel Bottom width, b	ft.								
16.	Horizontal side slope component, z (z horiz:1 vert)	ft.								
17.	Depth of flow, d	ft.								
18.	Cross sectional flow area, A (assume trapazoidal)	$ft.^2$								
19.	Wetted perimeter, P_w	ft.								
20.	Hydraulic Radius, $R = \frac{A}{P_w}$	ft.								
21.	Channel slope, s	ft./ft.								
22.	Manning's roughness coeff., n									
23.	$V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.								
24.	Flow length, L	ft.								
25.	$T_t = \frac{L}{3600 * V}$	hr.		+		+		+	=	0.000
26.	Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)								hr.	0.811

Worksheet 3: Time of Concentration (T_c) or Travel Time (T_t)

Project: Beacon Falls Energy Park | By: FAB | Date: 06/10/15
Location: Beacon Falls, CT (MMI #1103-87) | Checked: SRD | Date: 06/10/15
Circle one: Present ***Developed*** | Watershed: WS 11 - Proposed Conditions
Circle one: ***Tc*** T_t | Subwatershed:

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1.	Surface description (Table 3-1)		GRASS		
2.	Manning's roughness coeff. for sheet flow, n (Table 3-1)		0.300		
3.	Flow Length, L (< 300ft)	ft.	150.0		
4.	Two-year 24-hr rainfall, P_2	in.	3.30		
5.	Land slope, s	ft./ft.	0.015		
6.	$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.	0.434	=	0.434

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C							
7.	Surface description		BRUSH							
8.	Manning's roughness coeff., n		0.090							
9.	Paved or unpaved		UNPVD							
10.	Depth of flow, d (default values: d=.4 unpaved, d=.2 paved)	ft.	0.40							
11.	Flow Length, L	ft.	125.0							
12.	Watercourse slope, s	ft./ft.	0.300							
13.	Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.	4.92							
14.	$T_t = \frac{L}{3600 * V}$	hr.	0.007	+		+		+	=	0.007

Channel flow

		Segment ID	C-D							
15.	Channel Bottom width, b	ft.	15" CPP							
16.	Horizontal side slope component, z (z horiz:1 vert)	ft.	---							
17.	Depth of flow, d	ft.	FULL							
18.	Cross sectional flow area, A (assume trapazoidal)	$ft.^2$	1.23							
19.	Wetted perimeter, P_w	ft.	3.93							
20.	Hydraulic Radius, $R = \frac{A}{P_w}$	ft.	0.31							
21.	Channel slope, s	ft./ft.	0.005							
22.	Manning's roughness coeff., n		0.012							
23.	$V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.	4.05							
24.	Flow length, L	ft.	545.0							
25.	$T_t = \frac{L}{3600 * V}$	hr.	0.037	+		+		+	=	0.037

26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25) hr. 0.479

Worksheet 3: Time of Concentration (T_c) or Travel Time (T_t)

Project: Beacon Falls Energy Park
Location: Beacon Falls, CT (MMI #1103-87)
Circle one: Present ***Developed***
Circle one: ***Tc*** T_t

By: FAB Date: 06/10/15
Checked: SRD Date: 06/10/15
Watershed: WS 20 - Proposed Conditions
Subwatershed:

Sheet flow (applicable to T_c only)

		Segment ID	A-B	
1.	Surface description (Table 3-1)		GRASS	
2.	Manning's roughness coeff. for sheet flow, n (Table 3-1)		0.300	
3.	Flow Length, L (< 300ft)	ft.	80.0	
4.	Two-year 24-hr rainfall, P_2	in.	3.30	
5.	Land slope, s	ft./ft.	0.008	
6.	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.	0.338	= 0.338

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C	C-D			
7.	Surface description		BRUSH	BRUSH			
8.	Manning's roughness coeff., n		0.090	0.090			
9.	Paved or unpaved		UNPVD	UNPVD			
10.	Depth of flow, d (default values: d=.4 unpaved, d=.2 paved)	ft.	0.40	0.40			
11.	Flow Length, L	ft.	150.0	40.0			
12.	Watercourse slope, s	ft./ft.	0.040	0.250			
13.	Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.	1.80	4.49			
14.	$T_t = \frac{L}{3600 * V}$	hr.	0.023	+ 0.002	+	+	= 0.026

Channel flow

		Segment ID					
15.	Channel Bottom width, b	ft.					
16.	Horizontal side slope component, z (z horiz:1 vert)	ft.					
17.	Depth of flow, d	ft.					
18.	Cross sectional flow area, A (assume trapazoidal)	$ft.^2$					
19.	Wetted perimeter, P_w	ft.					
20.	Hydraulic Radius, $R = \frac{A}{P_w}$	ft.					
21.	Channel slope, s	ft./ft.					
22.	Manning's roughness coeff., n						
23.	$V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.					
24.	Flow length, L	ft.					
25.	$T_t = \frac{L}{3600 * V}$	hr.		+	+	+	= 0.000
26.	Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)	hr.					0.364

Worksheet 3: Time of Concentration (T_c) or Travel Time (T_t)

Project: Beacon Falls Energy Park | By: FAB | Date: 06/10/15
Location: Beacon Falls, CT (MMI #1103-87) | Checked: SRD | Date: 06/10/15
Circle one: Present ***Developed*** | Watershed: WS 21 - Proposed Conditions
Circle one: ***Tc*** T_t | Subwatershed:

Sheet flow (applicable to T_c only)

		Segment ID	A-B	
1. Surface description (Table 3-1)			WOODS	
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)			0.350	
3. Flow Length, L (< 300ft)		ft.	115.0	
4. Two-year 24-hr rainfall, P_2		in.	3.30	
5. Land slope, s		ft./ft.	0.002	
6. $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$		hr.	0.941	= 0.941

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C				
7. Surface description			BRUSH				
8. Manning's roughness coeff., n			0.090				
9. Paved or unpaved			UNPVD				
10. Depth of flow, d (default values: d=.4 unpaved, d=.2 paved)	ft.		0.40				
11. Flow Length, L		ft.	600.0				
12. Watercourse slope, s		ft./ft.	0.007				
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$		fps.	0.73				
14. $T_t = \frac{L}{3600 * V}$		hr.	0.227	+	+	+	= 0.227

Channel flow

		Segment ID					
15. Channel Bottom width, b		ft.					
16. Horizontal side slope component, z (z horiz:1 vert)	ft.						
17. Depth of flow, d		ft.					
18. Cross sectional flow area, A (assume trapazoidal)	$ft.^2$						
19. Wetted perimeter, P_w		ft.					
20. Hydraulic Radius, $R = \frac{A}{P_w}$		ft.					
21. Channel slope, s		ft./ft.					
22. Manning's roughness coeff., n							
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$		fps.					
24. Flow length, L		ft.					
25. $T_t = \frac{L}{3600 * V}$		hr.		+	+	+	= 0.000
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)							1.168 hr.

Worksheet 3: Time of Concentration (T_c) or Travel Time (T_t)

Project: Beacon Falls Energy Park
Location: Beacon Falls, CT (MMI #1103-87)
Circle one: Present ***Developed***
Circle one: ***Tc*** T_t

By: FAB Date: 06/10/15
Checked: SRD Date: 06/10/15
Watershed: WS 22 - Proposed Conditions
Subwatershed:

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1.	Surface description (Table 3-1)		BIT		
2.	Manning's roughness coeff. for sheet flow, n (Table 3-1)		0.011		
3.	Flow Length, L (< 300ft)	ft.	100.0		
4.	Two-year 24-hr rainfall, P_2	in.	3.30		
5.	Land slope, s	ft./ft.	0.015		
6.	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.	0.022	=	0.022

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C				
7.	Surface description		BIT				
8.	Manning's roughness coeff., n		0.011				
9.	Paved or unpaved		PVD				
10.	Depth of flow, d (default values: d=.4 unpaved, d=.2 paved)	ft.	0.40				
11.	Flow Length, L	ft.	200.0				
12.	Watercourse slope, s	ft./ft.	0.015				
13.	Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.	9.01				
14.	$T_t = \frac{L}{3600 * V}$	hr.	0.006	+	+	+	= 0.006

Channel flow

		Segment ID	C-D				
15.	Channel Bottom width, b	ft.	15" CPP				
16.	Horizontal side slope component, z (z horiz:1 vert)	ft.	---				
17.	Depth of flow, d	ft.	FULL				
18.	Cross sectional flow area, A (assume trapazoidal)	$ft.^2$	1.23				
19.	Wetted perimeter, P_w	ft.	3.93				
20.	Hydraulic Radius, $R = \frac{A}{P_w}$	ft.	0.31				
21.	Channel slope, s	ft./ft.	0.005				
22.	Manning's roughness coeff., n		0.012				
23.	$V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.	4.05				
24.	Flow length, L	ft.	325.0				
25.	$T_t = \frac{L}{3600 * V}$	hr.	0.022	+	+	+	= 0.022

26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25) 0.051 hr.

MIN TC = 0.10 HRS.

Worksheet 3: Time of Concentration (T_c) or Travel Time (T_t)

Project: Beacon Falls Energy Park
Location: Beacon Falls, CT (MMI #1103-87)
Circle one: Present ***Developed***
Circle one: ***Tc*** T_t

By: FAB Date: 06/10/15
Checked: SRD Date: 06/10/15
Watershed: WS 30 - Proposed Conditions
Subwatershed:

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1.	Surface description (Table 3-1)		GRASS		
2.	Manning's roughness coeff. for sheet flow, n (Table 3-1)		0.150		
3.	Flow Length, L (< 300ft)	ft.	100.0		
4.	Two-year 24-hr rainfall, P_2	in.	3.30		
5.	Land slope, s	ft./ft.	0.012		
6.	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.	0.197	=	0.197

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C				
7.	Surface description		BRUSH				
8.	Manning's roughness coeff., n		0.090				
9.	Paved or unpaved		UNPVD				
10.	Depth of flow, d (default values: d=.4 unpaved, d=.2 paved)	ft.	0.40				
11.	Flow Length, L	ft.	285.0				
12.	Watercourse slope, s	ft./ft.	0.006				
13.	Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.	0.71				
14.	$T_t = \frac{L}{3600 * V}$	hr.	0.111	+	+	+ =	0.111

Channel flow

		Segment ID					
15.	Channel Bottom width, b	ft.					
16.	Horizontal side slope component, z (z horiz:1 vert)	ft.					
17.	Depth of flow, d	ft.					
18.	Cross sectional flow area, A (assume trapazoidal)	$ft.^2$					
19.	Wetted perimeter, P_w	ft.					
20.	Hydraulic Radius, $R = \frac{A}{P_w}$	ft.					
21.	Channel slope, s	ft./ft.					
22.	Manning's roughness coeff., n						
23.	$V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.					
24.	Flow length, L	ft.					
25.	$T_t = \frac{L}{3600 * V}$	hr.		+	+	+ =	0.000
26.	Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)						0.308

hr.

Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Monday, 06 / 15 / 2015

Pond No. 1 - EX DEPR 100 (Existing Conditions)

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 125.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	125.00	1,925	0.000	0.000
1.00	126.00	5,775	0.084	0.084
2.00	127.00	8,900	0.167	0.252
3.00	128.00	12,025	0.239	0.491
4.00	129.00	16,550	0.327	0.817
5.00	130.00	21,065	0.431	1.248
6.00	131.00	25,220	0.531	1.779
7.00	132.00	29,375	0.626	2.405
8.00	133.00	37,925	0.770	3.175
9.00	134.00	46,475	0.967	4.142
10.00	135.00	55,000	1.163	5.305

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 11.300 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage acft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0.000	125.00	---	---	---	---	---	---	---	---	0.000	---	0.000
1.00	0.084	126.00	---	---	---	---	---	---	---	---	1.511	---	1.511
2.00	0.252	127.00	---	---	---	---	---	---	---	---	2.328	---	2.328
3.00	0.491	128.00	---	---	---	---	---	---	---	---	3.145	---	3.145
4.00	0.817	129.00	---	---	---	---	---	---	---	---	4.329	---	4.329
5.00	1.248	130.00	---	---	---	---	---	---	---	---	5.510	---	5.510
6.00	1.779	131.00	---	---	---	---	---	---	---	---	6.597	---	6.597
7.00	2.405	132.00	---	---	---	---	---	---	---	---	7.684	---	7.684
8.00	3.175	133.00	---	---	---	---	---	---	---	---	9.920	---	9.920
9.00	4.142	134.00	---	---	---	---	---	---	---	---	12.157	---	12.16
10.00	5.305	135.00	---	---	---	---	---	---	---	---	14.386	---	14.39

Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Monday, 06 / 15 / 2015

Pond No. 1 - EX DEPR 100 (Proposed Conditions)

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 125.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	125.00	1,925	0.000	0.000
1.00	126.00	3,600	0.062	0.062
2.00	127.00	6,400	0.113	0.176
3.00	128.00	9,200	0.178	0.354
4.00	129.00	11,425	0.236	0.590
5.00	130.00	13,625	0.287	0.877
6.00	131.00	15,725	0.337	1.214
7.00	132.00	17,800	0.385	1.598
8.00	133.00	24,650	0.485	2.083
9.00	134.00	31,475	0.643	2.726

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 11.300 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage acft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0.000	125.00	---	---	---	---	---	---	---	---	0.000	---	0.000
1.00	0.062	126.00	---	---	---	---	---	---	---	---	0.942	---	0.942
2.00	0.176	127.00	---	---	---	---	---	---	---	---	1.674	---	1.674
3.00	0.354	128.00	---	---	---	---	---	---	---	---	2.406	---	2.406
4.00	0.590	129.00	---	---	---	---	---	---	---	---	2.988	---	2.988
5.00	0.877	130.00	---	---	---	---	---	---	---	---	3.564	---	3.564
6.00	1.214	131.00	---	---	---	---	---	---	---	---	4.113	---	4.113
7.00	1.598	132.00	---	---	---	---	---	---	---	---	4.656	---	4.656
8.00	2.083	133.00	---	---	---	---	---	---	---	---	6.448	---	6.448
9.00	2.726	134.00	---	---	---	---	---	---	---	---	8.233	---	8.233

Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Monday, 06 / 15 / 2015

Pond No. 2 - PR BASIN 110

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 132.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	132.00	2,975	0.000	0.000
1.00	133.00	3,625	0.076	0.076
2.00	134.00	4,250	0.090	0.166
3.00	135.00	4,975	0.106	0.272
4.00	136.00	5,700	0.122	0.394
5.00	137.00	6,500	0.140	0.534
6.00	138.00	7,300	0.158	0.692
7.00	139.00	8,200	0.178	0.870
8.00	140.00	9,075	0.198	1.068

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	8.00	0.00	0.00
Span (in)	= 24.00	8.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 131.00	132.00	0.00	0.00
Length (ft)	= 100.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 14.00	0.00	0.00	0.00
Crest El. (ft)	= 139.00	136.00	0.00	0.00
Weir Coeff.	= 3.33	0.92	3.33	3.33
Weir Type	= 1	40 degV	---	---
Multi-Stage	= Yes	Yes	No	No

Exfil.(in/hr) = 11.300 (by Contour)

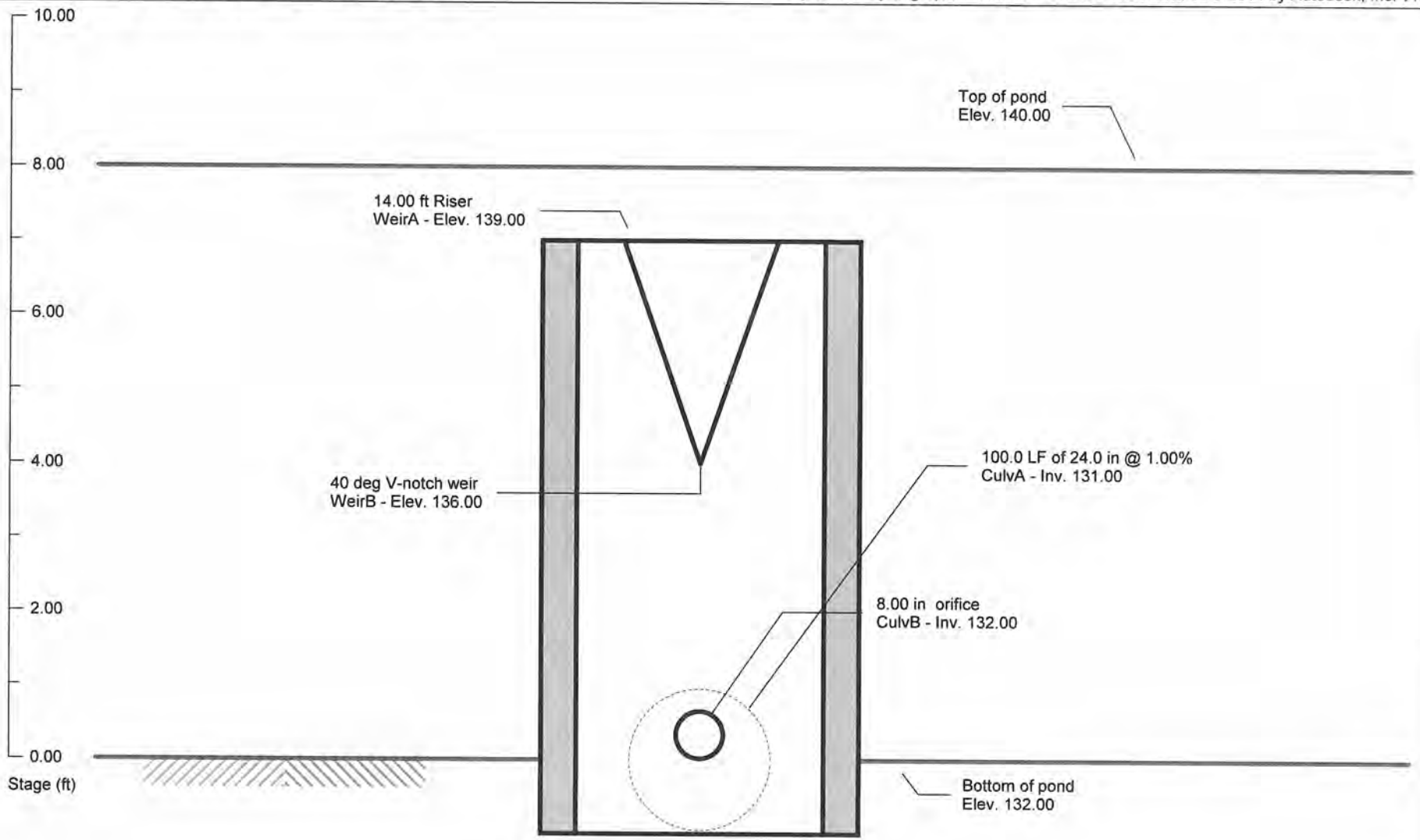
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage acft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0.000	132.00	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
1.00	0.076	133.00	5.35 ic	1.37 ic	---	---	0.00	---	---	---	0.948	---	2.320
2.00	0.166	134.00	5.35 ic	2.17 ic	---	---	0.00	---	---	---	1.112	---	3.281
3.00	0.272	135.00	5.35 ic	2.74 ic	---	---	0.00	---	---	---	1.301	---	4.046
4.00	0.394	136.00	5.35 ic	3.22 ic	---	---	0.00	---	---	---	1.491	---	4.709
5.00	0.534	137.00	5.35 ic	3.63 ic	---	---	0.00	0.92	---	---	1.700	---	6.255
6.00	0.692	138.00	9.23 ic	3.99 ic	---	---	0.00	5.23	---	---	1.909	---	11.12
7.00	0.870	139.00	18.35 ic	3.95 ic	---	---	0.00	14.40	---	---	2.145	---	20.50
8.00	1.068	140.00	42.17 ic	0.80 ic	---	---	30.01 s	11.36 s	---	---	2.374	---	44.54

Pond No. 2 - PR BASIN 110



Front View
NTS - Looking Downstream

Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Monday, 06 / 15 / 2015

Pond No. 4 - PR BASIN 210

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 132.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	132.00	3,800	0.000	0.000
1.00	133.00	5,000	0.101	0.101
2.00	134.00	6,300	0.129	0.230
3.00	135.00	10,400	0.190	0.420
4.00	136.00	13,575	0.274	0.694
5.00	137.00	17,900	0.360	1.054
5.50	137.50	20,450	0.220	1.274
6.00	138.00	22,200	0.245	1.519

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	0.00	0.00	0.00
Crest El. (ft)	= 137.80	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 8.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage acft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0.000	132.00	---	---	---	---	0.00	---	---	---	0.000	---	0.000
1.00	0.101	133.00	---	---	---	---	0.00	---	---	---	0.926	---	0.926
2.00	0.230	134.00	---	---	---	---	0.00	---	---	---	1.167	---	1.167
3.00	0.420	135.00	---	---	---	---	0.00	---	---	---	1.926	---	1.926
4.00	0.694	136.00	---	---	---	---	0.00	---	---	---	2.514	---	2.514
5.00	1.054	137.00	---	---	---	---	0.00	---	---	---	3.315	---	3.315
5.50	1.274	137.50	---	---	---	---	0.00	---	---	---	3.787	---	3.787
6.00	1.519	138.00	---	---	---	---	2.79	---	---	---	4.111	---	6.902

Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Monday, 06 / 15 / 2015

Pond No. 3 - PR BASIN 220

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 134.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	134.00	18,600	0.000	0.000
1.00	135.00	20,900	0.453	0.453
2.00	136.00	23,275	0.507	0.960
3.00	137.00	26,950	0.576	1.536
4.00	138.00	31,825	0.674	2.210
5.00	139.00	37,850	0.799	3.008
6.00	140.00	44,775	0.947	3.955
6.50	140.50	48,000	0.532	4.488

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	0.00	0.00	0.00
Crest El. (ft)	= 139.50	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 11.300 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

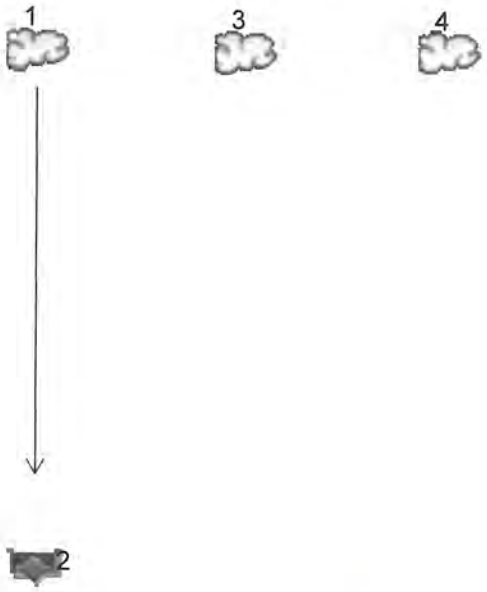
Stage / Storage / Discharge Table

Stage ft	Storage acft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0.000	134.00	---	---	---	---	0.00	---	---	---	0.000	---	0.000
1.00	0.453	135.00	---	---	---	---	0.00	---	---	---	5.467	---	5.467
2.00	0.960	136.00	---	---	---	---	0.00	---	---	---	6.088	---	6.088
3.00	1.536	137.00	---	---	---	---	0.00	---	---	---	7.049	---	7.049
4.00	2.210	138.00	---	---	---	---	0.00	---	---	---	8.325	---	8.325
5.00	3.008	139.00	---	---	---	---	0.00	---	---	---	9.901	---	9.901
6.00	3.955	140.00	---	---	---	---	11.03	---	---	---	11.712	---	22.74
6.50	4.488	140.50	---	---	---	---	31.20	---	---	---	12.555	---	43.76

APPENDIX F

HYDROLOGIC ANALYSIS – COMPUTER MODEL RESULTS

Watershed Model Schematic



Existing Conditions

Legend

Hyd.	Origin	Description
1	SCS Runoff	EX WS10
2	Reservoir	EX DEPR 100 / A
3	SCS Runoff	EX WS20 / B
4	SCS Runoff	PR WS30 / C

Hydraflow Table of Contents

Existing01.gpw

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Monday, 06 / 15 / 2015

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	9.336	-------	-------	22.19	27.19	33.22	40.31	EX WS10
2	Reservoir	1	-------	0.000	-------	-------	0.000	0.000	0.000	0.000	EX DEPR 100 / A
3	SCS Runoff	------	-------	0.710	-------	-------	1.619	1.973	2.398	2.894	EX WS20 / B
4	SCS Runoff	------	-------	0.655	-------	-------	1.734	2.160	2.686	3.312	PR WS30 / C

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph Description
1	SCS Runoff	9.336	3	795	2.543	------	------	------	EX WS10
2	Reservoir	0.000	3	807	0.000	1	128.98	0.811	EX DEPR 100 / A
3	SCS Runoff	0.710	3	738	0.083	------	------	------	EX WS20 / B
4	SCS Runoff	0.655	3	735	0.077	------	------	------	PR WS30 / C

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph Description
1	SCS Runoff	22.19	3	792	5.632	------	------	------	EX WS10
2	Reservoir	0.000	3	861	0.000	1	131.86	2.32	EX DEPR 100 / A
3	SCS Runoff	1.619	3	738	0.180	------	------	------	EX WS20 / B
4	SCS Runoff	1.734	3	735	0.184	------	------	------	PR WS30 / C

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph Description
1	SCS Runoff	27.19	3	789	6.840	------	------	------	EX WS10
2	Reservoir	0.000	3	897	0.000	1	132.67	2.92	EX DEPR 100 / A
3	SCS Runoff	1.973	3	735	0.218	------	------	------	EX WS20 / B
4	SCS Runoff	2.160	3	735	0.227	------	------	------	PR WS30 / C

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

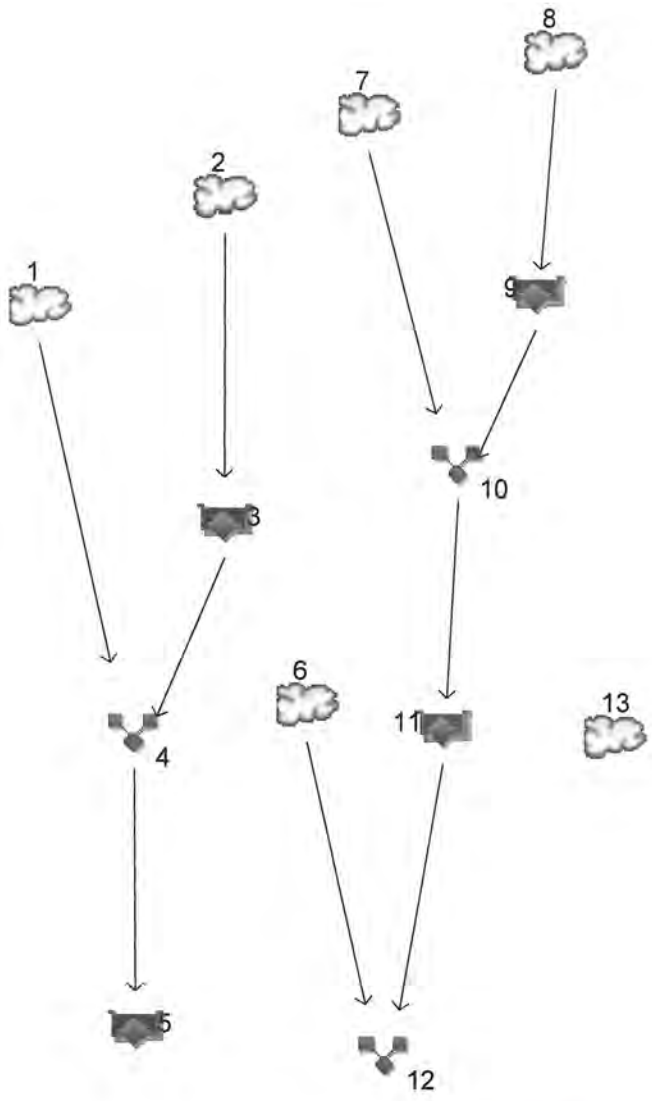
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph Description
1	SCS Runoff	33.22	3	789	8.303	------	------	------	EX WS10
2	Reservoir	0.000	3	849	0.000	1	133.49	3.64	EX DEPR 100 / A
3	SCS Runoff	2.398	3	735	0.263	------	------	------	EX WS20 / B
4	SCS Runoff	2.686	3	732	0.280	------	------	------	PR WS30 / C

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph Description
1	SCS Runoff	40.31	3	789	10.031	------	------	------	EX WS10
2	Reservoir	0.000	3	813	0.000	1	134.33	4.52	EX DEPR 100 / A
3	SCS Runoff	2.894	3	735	0.317	------	------	------	EX WS20 / B
4	SCS Runoff	3.312	3	732	0.342	------	------	------	PR WS30 / C

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	PR WS10
2	SCS Runoff	PR WS11
3	Reservoir	DET 110
4	Combine	10 + 110
5	Reservoir	EX DEPR 100 / A
6	SCS Runoff	PR WS20
7	SCS Runoff	PR WS21
8	SCS Runoff	PR WS22
9	Reservoir	PR BASIN 220
10	Combine	21 + 220
11	Reservoir	PR BASIN 210
12	Combine	POA B (POND)
13	SCS Runoff	PR WS30 / C

Proposed Conditions

Hydraflow Table of Contents

Proposed01.gpw

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Monday, 06 / 15 / 2015

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	0.640	-------	-------	2.315	3.038	3.944	5.038	PR WS10
2	SCS Runoff	------	-------	6.049	-------	-------	15.02	18.55	22.80	27.79	PR WS11
3	Reservoir	2	-------	2.141	-------	-------	4.442	7.211	11.34	16.60	DET 110
4	Combine	1, 3	-------	2.782	-------	-------	6.638	10.14	15.21	21.60	10 + 110
5	Reservoir	4	-------	0.000	-------	-------	0.000	0.000	0.000	0.000	EX DEPR 100 / A
6	SCS Runoff	------	-------	0.404	-------	-------	0.971	1.191	1.460	1.777	PR WS20
7	SCS Runoff	------	-------	3.601	-------	-------	8.754	10.77	13.19	16.06	PR WS21
8	SCS Runoff	------	-------	14.56	-------	-------	25.83	29.84	34.50	39.82	PR WS22
9	Reservoir	8	-------	0.000	-------	-------	0.000	0.000	0.000	0.000	PR BASIN 220
10	Combine	7, 9	-------	3.601	-------	-------	8.754	10.77	13.19	16.06	21 + 220
11	Reservoir	10	-------	0.000	-------	-------	0.000	0.000	0.000	0.000	PR BASIN 210
12	Combine	6, 11	-------	0.404	-------	-------	0.971	1.191	1.460	1.777	POA B (POND)
13	SCS Runoff	------	-------	0.746	-------	-------	1.630	1.969	2.372	2.841	PR WS30 / C

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph Description
1	SCS Runoff	0.640	3	765	0.143	------	------	------	PR WS10
2	SCS Runoff	6.049	3	744	0.801	------	------	------	PR WS11
3	Reservoir	2.141	3	765	0.446	2	133.96	0.162	DET 110
4	Combine	2.782	3	765	0.588	1, 3	------	------	10 + 110
5	Reservoir	0.000	3	963	0.000	4	126.78	0.151	EX DEPR 100 / A
6	SCS Runoff	0.404	3	738	0.048	------	------	------	PR WS20
7	SCS Runoff	3.601	3	771	0.752	------	------	------	PR WS21
8	SCS Runoff	14.56	3	726	1.113	------	------	------	PR WS22
9	Reservoir	0.000	3	774	0.000	8	134.81	0.365	PR BASIN 220
10	Combine	3.601	3	771	0.752	7, 9	------	------	21 + 220
11	Reservoir	0.000	3	828	0.000	10	134.13	0.255	PR BASIN 210
12	Combine	0.404	3	738	0.048	6, 11	------	------	POA B (POND)
13	SCS Runoff	0.746	3	735	0.080	------	------	------	PR WS30 / C

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph Description
1	SCS Runoff	2.315	3	759	0.402	------	------	------	PR WS10
2	SCS Runoff	15.02	3	741	1.839	------	------	------	PR WS11
3	Reservoir	4.442	3	768	1.162	2	136.96	0.528	DET 110
4	Combine	6.638	3	765	1.564	1, 3	------	------	10 + 110
5	Reservoir	0.000	3	1071	0.000	4	128.59	0.492	EX DEPR 100 / A
6	SCS Runoff	0.971	3	738	0.108	------	------	------	PR WS20
7	SCS Runoff	8.754	3	768	1.696	------	------	------	PR WS21
8	SCS Runoff	25.83	3	726	2.007	------	------	------	PR WS22
9	Reservoir	0.000	3	720	0.000	8	135.51	0.713	PR BASIN 220
10	Combine	8.754	3	768	1.696	7, 9	------	------	21 + 220
11	Reservoir	0.000	3	831	0.000	10	136.02	0.700	PR BASIN 210
12	Combine	0.971	3	738	0.108	6, 11	------	------	POA B (POND)
13	SCS Runoff	1.630	3	732	0.168	------	------	------	PR WS30 / C

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph Description
1	SCS Runoff	3.038	3	756	0.512	------	------	------	PR WS10
2	SCS Runoff	18.55	3	741	2.251	------	------	------	PR WS11
3	Reservoir	7.211	3	765	1.480	2	137.67	0.640	DET 110
4	Combine	10.14	3	765	1.991	1, 3	------	------	10 + 110
5	Reservoir	0.000	3	849	0.000	4	129.32	0.681	EX DEPR 100 / A
6	SCS Runoff	1.191	3	735	0.132	------	------	------	PR WS20
7	SCS Runoff	10.77	3	768	2.067	------	------	------	PR WS21
8	SCS Runoff	29.84	3	726	2.333	------	------	------	PR WS22
9	Reservoir	0.000	3	711	0.000	8	135.80	0.857	PR BASIN 220
10	Combine	10.77	3	768	2.067	7, 9	------	------	21 + 220
11	Reservoir	0.000	3	807	0.000	10	136.54	0.888	PR BASIN 210
12	Combine	1.191	3	735	0.132	6, 11	------	------	POA B (POND)
13	SCS Runoff	1.969	3	732	0.202	------	------	------	PR WS30 / C

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph Description
1	SCS Runoff	3.944	3	756	0.649	------	------	------	PR WS10
2	SCS Runoff	22.80	3	741	2.751	------	------	------	PR WS11
3	Reservoir	11.34	3	762	1.885	2	138.30	0.744	DET 110
4	Combine	15.21	3	762	2.534	1, 3	------	------	10 + 110
5	Reservoir	0.000	3	819	0.000	4	130.21	0.946	EX DEPR 100 / A
6	SCS Runoff	1.460	3	735	0.161	------	------	------	PR WS20
7	SCS Runoff	13.19	3	768	2.517	------	------	------	PR WS21
8	SCS Runoff	34.50	3	726	2.718	------	------	------	PR WS22
9	Reservoir	0.000	3	951	0.000	8	136.12	1.03	PR BASIN 220
10	Combine	13.19	3	768	2.517	7, 9	------	------	21 + 220
11	Reservoir	0.000	3	777	0.000	10	137.15	1.12	PR BASIN 210
12	Combine	1.460	3	735	0.161	6, 11	------	------	POA B (POND)
13	SCS Runoff	2.372	3	732	0.243	------	------	------	PR WS30 / C

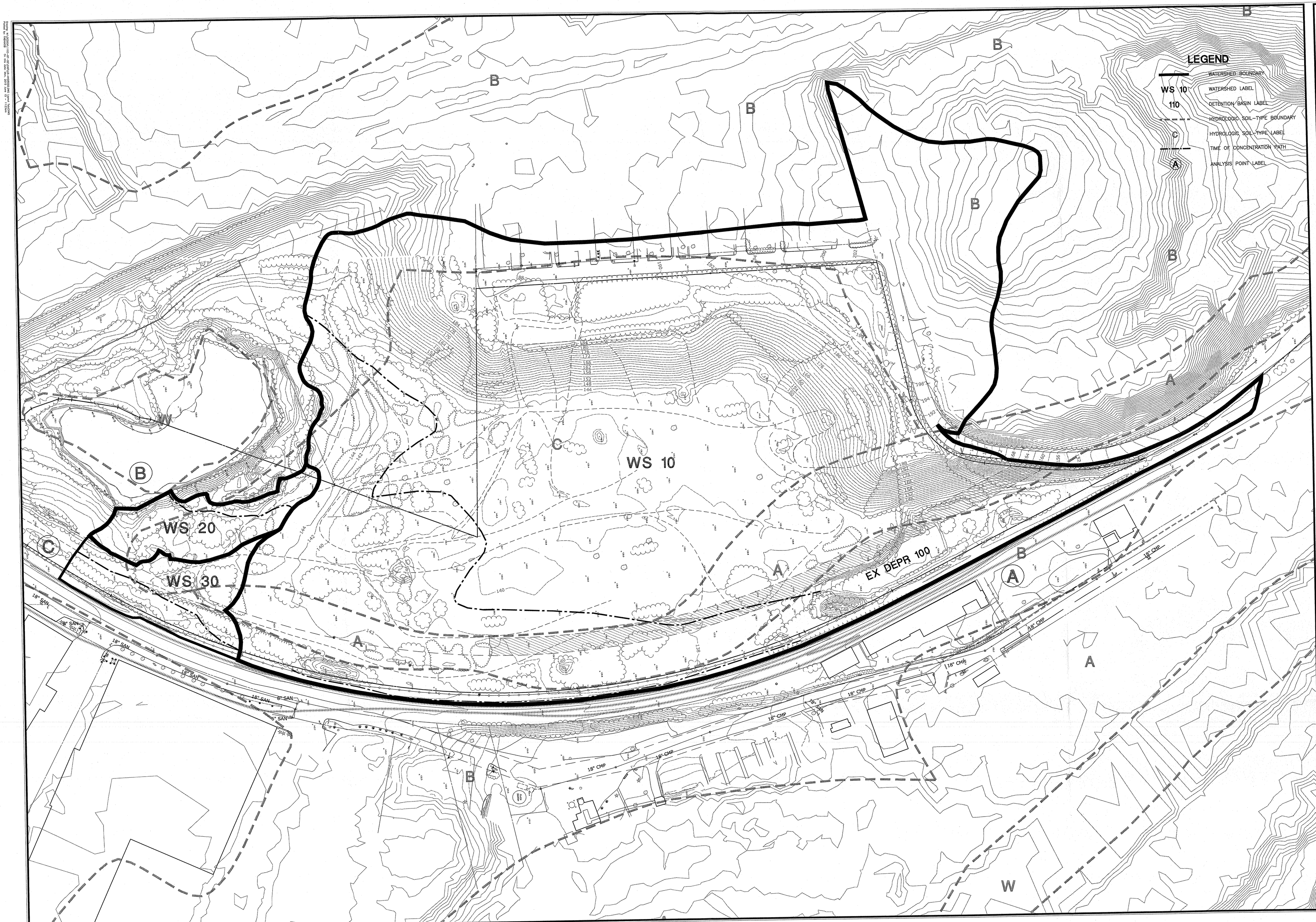
Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph Description
1	SCS Runoff	5.038	3	756	0.815	------	------	------	PR WS10
2	SCS Runoff	27.79	3	741	3.344	------	------	------	PR WS11
3	Reservoir	16.60	3	759	2.378	2	138.85	0.842	DET 110
4	Combine	21.60	3	759	3.193	1, 3	------	------	10 + 110
5	Reservoir	0.000	3	786	0.000	4	131.22	1.30	EX DEPR 100 / A
6	SCS Runoff	1.777	3	735	0.195	------	------	------	PR WS20
7	SCS Runoff	16.06	3	765	3.050	------	------	------	PR WS21
8	SCS Runoff	39.82	3	726	3.162	------	------	------	PR WS22
9	Reservoir	0.000	3	978	0.000	8	136.46	1.23	PR BASIN 220
10	Combine	16.06	3	765	3.050	7, 9	------	------	21 + 220
11	Reservoir	0.000	3	819	0.000	10	137.75	1.40	PR BASIN 210
12	Combine	1.777	3	735	0.195	6, 11	------	------	POA B (POND)
13	SCS Runoff	2.841	3	732	0.291	------	------	------	PR WS30 / C

APPENDIX G

WATERSHED MAPS



MILONE & MACBROOM®
99 Realty Drive
Cheshire, Connecticut 06410
(203) 271-1773 Fax (203) 272-9733
www.miloneandmacbroom.com

DESCRIPTION	DATE	BY

EXISTING CONDITIONS WATERSHED MAP

BEACON FALLS ENERGY PARK

LOPUS ROAD AND GRUBER ROAD
BEACON FALLS, CONNECTICUT

FAB	FAB	SRD
DESIGNED	DRAWN	CHECKED

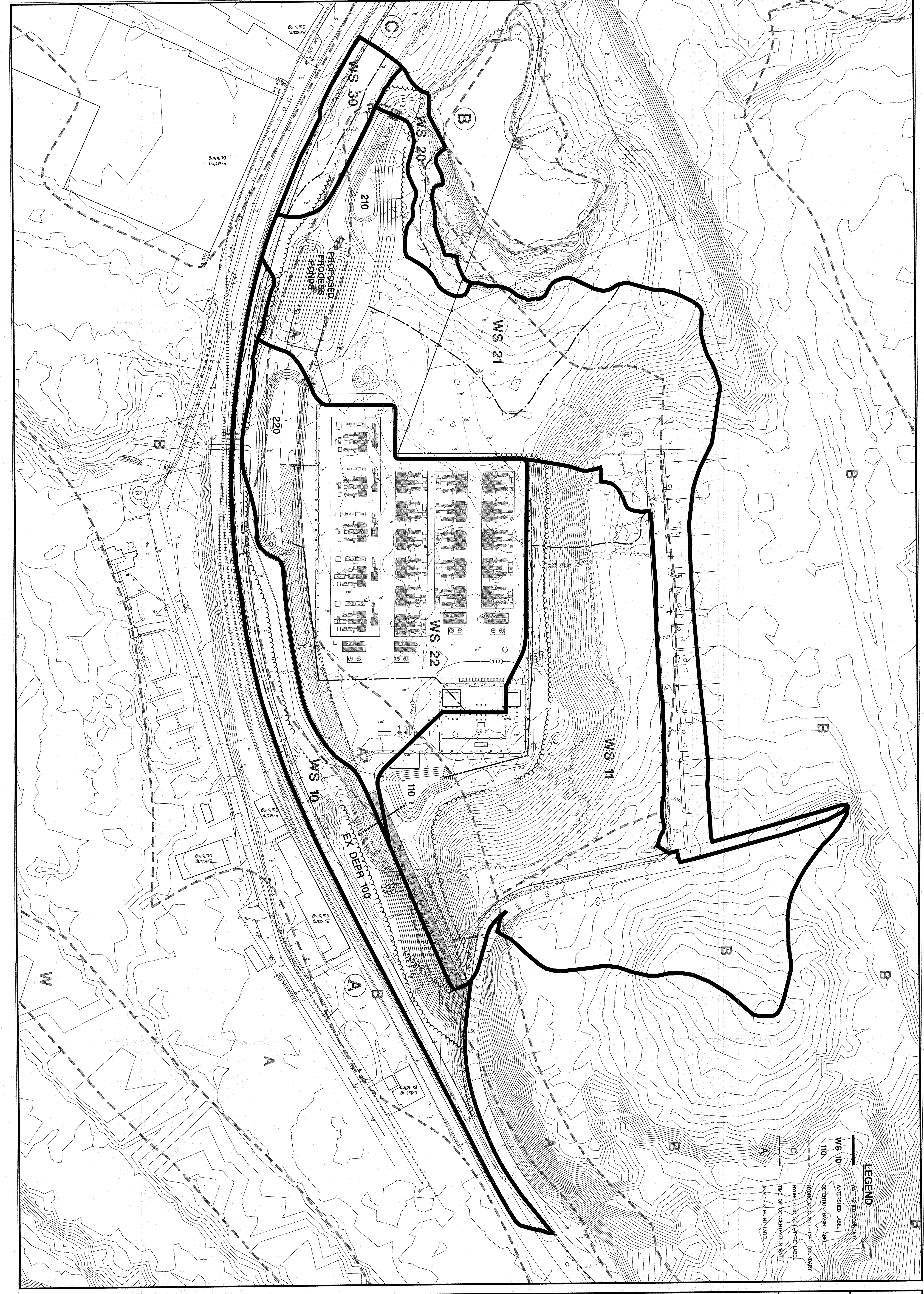
SCALE: 1"=80'

DATE: JUNE 10, 2015

PROJECT NO.: 1103-87-6

SHEET NO.: 1 OF 2

SHEET NAME



SHEET NAME	**2 OF 2**	
SHEET NO.		
PROJECT NO.	1103-87-6	
DATE	JUNE 10, 2015	
SCALE	1"=80'	
DESIGNED	FAB	
DRAWN	FAB	
CHECKED	SRD	

PROPOSED CONDITIONS WATERSHED MAP

BEACON FALLS ENERGY PARK

LOPUS ROAD AND GRUBER ROAD
BEACON FALLS, CONNECTICUT

DESCRIPTION	DATE	BY

MILONE & MACBROOM®
99 Realty Drive
Cheshire, Connecticut 06410
(203) 271-1773 Fax (203) 272-9733
www.miloneandmacbroom.com

EXHIBIT H

Wetlands Delineation Report

Engineering, Planning,
Landscape Architecture
and Environmental Science

MILONE & MACBROOM®

July 23, 2015

Mr. Richard Audette
O & G Industries
112 Main Street
Torrington, CT 06790

RE: Inland Wetland and Watercourse Impact Assessment
Beacon Falls Energy Park
Beacon Falls, Connecticut
MMI #1103-87-2

Dear Mr. Audette:

This letter has been prepared to supplement the wetland delineation report for the above-referenced project site and serves as the inland wetland and watercourse impact assessment associated with the construction of a 63.3 MW fuel cell energy park located in Beacon Falls, Connecticut. As you may recall, wetlands on this project site were delineated on April 20, 2015 by Matthew Sanford, a certified soil scientist. The only wetland and/or watercourse delineated on site was a large pond located along the southern portion of the site. Over the past few months, the project design team has developed a project plan for this site.

The existing pond has several important functions and values including supporting a warm-water fishery, providing wildlife habitat, sediment filtration, and nutrient retention.

Existing Pond - July 2015

Wetland impacts may be characterized as either direct or indirect. Direct impacts may be temporary or permanent and typically include construction-related activities such as clearing, grading, filling, and drainage installation. Indirect impacts to wetlands occur due to disturbances in adjoining areas such as shading, clearing, rerouting of surface water or groundwater, discharge of runoff, and upland erosion.

The use of sound engineering practices during design and careful attention to best management practices during construction can protect wetlands and watercourses from negative impacts.

The proposed stormwater management plan and erosion control plan both contain a series of measures designed to protect nearby wetland resources. Erosion controls will be installed in accordance with the Connecticut Council on Soil and Water Conservation *Connecticut Guidelines for Soil Erosion and Sediment Control*. Construction will take place in accordance with all applicable sections of the State of Connecticut, Department of Transportation's Standard Specifications for Roads, Bridges and Incidental Construction (Form 816), specifically Section 1.10 Environmental Compliance and "Best Management Practices."

Direct Wetland Impacts

As evidenced by the submitted plans, the energy park does not directly impact a wetland and/or watercourse.

Indirect Wetland Impacts

The greatest risk of indirect wetland impacts occurs during the preliminary construction phases when clearing and grubbing occurs. Soil erosion must be contained at all times until final grading is complete and the site has been permanently stabilized by vegetation. The erosion control plan that has been prepared for this project site meets or exceeds the standards specified in the latest version (2002) of the Connecticut *Erosion Control Guidelines*. For the most part, the site is flat, which makes the installation, monitoring, and maintenance of erosion controls easier.

Drainage is being collected, treated, and released in a manner that is designed to prevent off-site water quality impacts. Best Management Practices (BMPs) in accordance with the Connecticut Department of Environmental Protection's *Stormwater Quality Manual* (2004), including grassed swales and water quality infiltration basins to filter surface runoff, are being utilized. The existing soils (sands) on this site are highly conducive to infiltration and, therefore, offer prime opportunities to infiltrate stormwater and wastewater into the soils and groundwater. This allows stormwater and wastewater to reach natural ambient temperatures before discharging into the pond via groundwater.

Stormwater Basin 210 has the closest clearing and grading activity along the pond. Clearing and grading are proposed approximately 15 feet away from the southeast portion of the pond. The clearing and grading activities are associated with the construction of the stormwater basin's emergency spillway/swale. This area will be stabilized using New England Wildlife/Conservation seed mix. The location of the spillway was selected because there is an existing natural or man-made swale/rill located along this section of the pond. The design team elected to reuse this discharge point for the development of this site. As stated previously, proper sediment and erosion control measures will be installed upgradient from the pond edge to protect the water quality within the pond during construction.

Overall, the proposed energy park will not adversely impact inland wetlands and/or watercourses.

If you have any questions regarding this wetland and watercourse impact assessment letter, please do not hesitate to call me at (203) 271-1773.

Very truly yours,

MILONE & MACBROOM, INC.

Matthew J. Sanford, MS, PWS, Associate
Lead Environmental Scientist

1103-87-2-jl2315-ltr

Engineering, Planning,
Landscape Architecture
and Environmental Science

MILONE & MACBROOM®

May 15, 2015

Mr. Richard Audette
O & G Industries
112 Main Street
Torrington, CT 06790

RE: Inland Wetland and Watercourse Delineation
Beacon Falls Energy Park
Beacon Falls, Connecticut
MMI #1103-87-2

Dear Mr. Audette:

On April 20, 2015, Matthew Sanford, a certified soil scientist and professional wetland scientist, completed a site visit to delineate inland wetlands and watercourses on the 24-acre Beacon Falls Energy Park parcel located off Lopus Road in Beacon Falls, Connecticut. The inland wetlands and watercourses were delineated in accordance with Town of Beacon Falls inland wetland and watercourse regulations and Section 22a-36 through 22a-45 of the Connecticut General Statutes.

Prior to completing our site visit, the Natural Resources Conservation Service (NRCS) web soil survey was reviewed to determine the mapped soil types on the site. This resource mapping shows that the site predominantly consists of the well-drained Udorthents, the excessively drained Hinckley series, and an open water area that is shown along the southern portion of the site (see attached soil resource map).

The site was assessed by completing transects over the property and advancing a Dutch augur into the soils to an approximate depth of 24 inches to determine whether the soils classify as upland and/or wetland soils. No perennial and/or intermittent watercourses were observed within the parcel boundaries. No significant bands and/or troughs of wetland soils were found on site. An open water pond (wetland flags W-1 through W-18) was delineated along the southern portion of the property.

Open Water Pond

The open water pond is approximately two acres in size and appears to be man-made based on the steep-sided slopes (i.e., excavated patterns) observed around the pond edge. The pond appears to have