

**QUALITY ASSURANCE PLAN**  
Closure - Lined Ash Area  
Hartford Landfill

*Prepared for*

**Connecticut Resources Recovery Authority**  
Hartford, Connecticut

*Prepared by*

**TRC**  
Windsor, Connecticut

May 2007

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**TRC**  
Windsor, Connecticut

TRC Project No. 106811-0170-00000  
May 2007

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1 Site Location Map

## **1.0 INTRODUCTION**

The Hartford Landfill is located as indicated on the Site Location Map (Figure 1). The approximate 124-acre parcel is located in the North Meadows section of Hartford, Connecticut. The landfill consists of two distinct disposal areas: a Non-Processible Waste Disposal Area, also referred to as the Municipal Solid Waste (MSW) Area, and a Lined Ash Area (LAA). The MSW area occupies approximately 80 acres while the LAA occupies approximately 16 acres in the northern part of the site. The remaining area is occupied by site facilities located in the southern portion of the parcel and undisturbed land to the north of the LAA. This plan addresses the closure of the LAA. A plan indicating the location of the proposed construction activities relative to the remainder of the site is presented in the design drawings.

Access into the landfill area is via Leibert Road, which intersects Jennings Road south of the site (adjacent to Exit 33 of Interstate 91). The landfill parcel is bounded on the south by the City of Hartford Department of Public Works facility; on the west by Interstate 91; on the north by an undeveloped area, Weston Street and the Army Corps of Engineers (USACE) Flood Control Dike (herein referred to as the "USACE dike"); and on the east by the USACE dike. The Connecticut River is located to the east of the USACE dike.

Buildings and structures located on the site include the scale house, vehicle maintenance facility, leachate pre-treatment facility, vehicle wheel wash facility, ground water pumping system control building, leachate storage tank and landfill gas blower/flare station.

The Connecticut Resources Recovery Authority (CRRA) is performing landfill closure activities for the Phase I Lined Ash Area (LAA) of the Hartford Landfill. This document serves as a Quality Assurance Plan (QAP) specifically developed for the proposed closure construction activities at the LAA. In general, closure construction activities will consist of constructing an impermeable barrier and soil cover over approximately 16 acres of the LAA with associated storm water control features. The closure will be performed in two phases. The east side of the landfill will continue to receive waste to reach final elevations, while the west side, which is currently at final elevations, will be closed.

This QAP is intended to provide guidance for control of construction quality aspects of the proposed LAA closure activities. This document outlines specific duties of the Quality Assurance Consultant (QAC) and Construction Contractor, and procedures for documenting and reporting that the closure activities have been conducted in general conformance with the CTDEP-approved plans,

specifications, and applicable regulations. Specific details of proposed construction quality assurance/quality control activities will be presented in the Standard General Conditions of the Construction Contract, supplementary conditions, technical specifications and final design drawings that will be made part of the project's contract documents. These documents should be consulted should questions arise or omissions be discovered in this QAP. Table 1 summarizes the reporting and testing requirements for the major tasks and materials for this project.

## **2.0 RESPONSIBILITY AND AUTHORITY**

### **2.1 General**

Quality assurance consists of implementing a planned system of activities to assure closure construction occurs as specified in the contract documents. The implementation of quality assurance activities for this project involves applying standards and procedures outlined in the contract documents to ensure the closure construction meets or exceeds the performance criteria. The following paragraphs outline the organization of the project participants and their responsibilities, meetings, and testing/submittal requirements.

### **2.2 Project Organization and Responsibilities**

The construction phase of the project involves coordination between six participants:

- Connecticut Department of Environmental Protection (CTDEP)
- CRRA
- Engineer
- Quality Assurance Consultant
- Construction Contractor
- Land Surveyor

Each participant has a responsible role in implementing the proposed closure activities. The general lines of communication between the parties as described below:

#### **2.2.1 Connecticut Department of Environmental Protection**

The role of the CTDEP in this project is to review and approve, as appropriate, documents submitted in connection with the closure contract, and assess whether or not the closure is being constructed in conformance with the Connecticut General Statutes (CGS) Section 22a-208 and the Regulations of Connecticut State Agencies (RCSA) Section 22a-209.

The closure of the landfill is to be completed in accordance with the terms and conditions of CTDEP Modification to Permit No. 064-4(L), dated May 28, 2002. Closure activities are required to be in conformance with RSCA sections 22a-209-1 through 22a-209-14 and the provisions of the permit.

### 2.2.2 CRRA

CRRA is the permit holder. Therefore, CRRA is responsible for completing closure activities in accordance with the terms and conditions of the permit. CRRA will solicit bids and ultimately hire a qualified Construction Contractor who will complete the construction work. Alternatively, CRRA may act as the Construction Contractor for all or part of the closure activities. CRRA will also retain the services of a Quality Assurance Consultant who will oversee the implementation of the Quality Assurance Plan.

### 2.2.3 Engineer

The Engineer for the project will be an experienced civil engineer, licensed by the State of Connecticut. The responsibilities of the Engineer during construction will be detailed in the contract documents. Generally, the Engineer will make visits to the site at intervals appropriate to the various stages of construction in order to observe the progress and quality of the work completed by the Contractor. The Engineer will provide clarifications and interpretations of the contract documents, have the responsibility to authorize minor variations in the work that are compatible with the CTDEP-approved closure plans, and have the authority to reject defective work. The Engineer may, at his discretion, test materials at random or observe quality control testing as it is being performed.

CRRA retained TRC as Engineer to prepare the technical specifications, engineering drawings, and the QAP. TRC will function as the Engineer and report to CRRA during the bidding and construction phase of the closure.

### 2.2.4 Quality Assurance Consultant

The Quality Assurance Consultant (QAC) for the project will be an experienced civil engineer, licensed by the State of Connecticut. The individual or firm serving as the QAC will have a track record of successful landfill closures within the state. The QAC is responsible for coordinating the activities as presented in this QAP and will report to CRRA. The responsibilities of the QAC include:

- Providing written certification to the CTDEP that sedimentation and erosion controls have been installed (provided prior to initiating construction);
- Reviewing and approving submittals made by the construction contractor;



- Documenting construction and QAC activities;
- Coordinating independent testing services where applicable; and
- Preparing a final closure certification report upon completion of the landfill closure activities.

The roles of QAC and Engineer may be filled by the same entity.

#### 2.2.5 Construction Contractor

The Construction Contractor is the individual or entity who will complete the proposed closure construction work. Pursuant to the contract documents, the Construction Contractor is also referred to as the “Contractor” who will enter into an agreement with CRRA to successfully complete the work.

The Contractor is responsible for supervising and directing the work and solely responsible for the means, methods, techniques, sequences and procedures of construction in accordance with the contract documents. The Contractor is responsible for maintaining and supervising all safety precautions and programs and compliance with all applicable laws. The Contractor also maintains the record documentation, including those annotations made to the construction documents that reflect minor changes to the proposed work.

The Contractor is responsible for providing material submittals to the QAC in a timely manner for review prior to installation. The Contractor is also responsible for performing soil and geomembrane testing on capping materials as required to determine compliance with the project specifications. A soil testing laboratory and a geomembrane testing laboratory approved by the QAC will be retained by the Contractor to provide the Contractor testing and reporting services. These documents will be submitted to the QAC to review for conformance with the requirements of the Contract Documents.

#### 2.2.6 Land Surveyor

The Land Surveyor retained by the Contractor will be a professional land surveyor who is legally qualified to practice in the State of Connecticut and who is experienced in providing land-surveying services of the kind required. The selected Land Surveyor will have a minimum of two years experience in construction surveying layout and preparation of as-built surveys in accordance with the specified horizontal and vertical control requirements.

## 2.3 Project Meetings

Project meetings are proposed throughout the course of the project. Meetings may or may not involve all the parties listed in the QAP. The intent of the meetings will be to establish lines of communication to report, control, and resolve problems that could affect the quality of the work. The following meetings are proposed as part of this project.

### 2.3.1 Pre-Construction Meeting

Prior to any work being undertaken at the site, a meeting with CRRA, Contractor, Engineer, QAC, and CTDEP will be held to establish a working understanding among the parties and to discuss the schedules listed in the contract documents (e.g., progress schedule and schedule of shop drawings). Other topics that will be discussed include the procedures for handling shop drawings, processing of applications for payment, and maintaining project record documents.

### 2.3.2 Project Progress Meetings

Progress meetings will be held bi-weekly (or more frequently as needed) at the site with CRRA, Contractor, Engineer, QAC and CTDEP, as necessary, for the purposes of understanding the project's construction and administration progress. The Land Surveyor may also participate, as necessary. Meeting notes will be prepared and distributed to the attendees within five days.

### 2.3.3 Daily Meetings

The Contractor will conduct daily "tailgate meetings" with the crew leaders, subcontractors, QAC, and CRRA, as required, for the purpose of reviewing daily construction schedule and resolving outstanding construction issues.

### 2.3.4 Corrective Action Meetings

Significant conditions adverse to quality may be identified during the course of the construction work by one or more of the parties involved with the project. The condition reported to be adverse will be analyzed by the reporting party to determine if it represents a significant condition adverse to quality. If determined to be significant, CRRA or, at CRRA's direction, the Engineer will then perform an analysis to determine if corrective action is required, and if necessary, hold a meeting with the QAC, Contractor and others, as appropriate, to discuss the proper course of action.

### **3.0 OBSERVATION AND TESTING**

#### **3.1 General**

Quality control includes testing and final observation of materials and workmanship before and during construction to assess compliance of the materials and workmanship with the final engineering design plans and specifications.

Detailed descriptions of the character and quality of material submittals, workmanship, and observation of the work will be presented in the contract documents. Technical specifications presented in the contract documents detail submittals, specific testing requirements and laboratory testing protocols in accordance with the American Society of Testing Materials (ASTM), the Connecticut Department of Transportation (ConnDOT) Standard Specifications for Roads, Bridges and Incidental Construction (Form 816), and other recognized standards. The Contractor's, QAC's, Engineer's and CRRA's responsibilities concerning tests and observations, as well as correction, removal or acceptance of defective work will be presented in the Standard General Conditions of the Construction Contract presented in the contract documents.

##### **3.1.1 Project Submittals**

The Contractor will provide the QAC with project submittals for review and approval in accordance with the contract documents. Before providing the project submittals, the Contractor will have determined and verified that the items contained in the submittal are acceptable for their intended use. The QAC will perform a timely review of the material submittal. Submittals determined to be deficient will be returned to the Contractor for corrections. Approved submittals will be returned to the Contractor for his use in maintaining the project record documents. Project record documents, which include a compilation of approved submittals and marked-up (i.e. red-lined) copies of the construction drawings and specifications, will be furnished to the QAC and CRRA in connection with final payment at the time of contract closeout.

##### **3.1.2 Testing and Reporting Requirements**

Testing and reporting requirements have been established to verify the chemical and physical characteristics of materials and statements supporting the quality control of workmanship. Refer to the technical specifications for more detailed descriptions of the work to be performed and the testing/submittals required.

### 3.2 Disruption and Grading of Ash Landfill Materials

This work will consist of the excavation, deposition, and regrading, as per the specifications and drawings, of existing on-site materials within the limits of the LAA as necessary to prepare a suitable subgrade for constructing the cap. There are no specific quality assurance submittals/testing associated with this task.

### 3.3 Subbase Material

The following submittals, required for subbase material imported by the Contractor, will be made as part of the quality control program prior to placing the subbase material layer:

- A materials certificate stating that the subbase material meets the technical specification prior to delivery of soil to the site. If the material is obtained from more than one source, then a materials certificate will be submitted from each source.
- A grain size analysis, permeability test report, interface friction angle test report (for subbase/liner interface), internal friction angle, and any other soil qualification testing listed in the technical specifications.

The following testing, required of the Contractor, will be made part of the quality control program during placement of the subbase material layer:

- Compaction test reports immediately following field testing of material. Field testing will be measured with a Nuclear Density Gauge at a frequency of one per 10,000 square feet.
- Measurements of the subbase material thickness taken following compaction at a frequency of every 50 feet on center.
- Environmental tests, grain size analysis, modified proctor, interface and internal friction angle testing at least once per 3,000 cubic yards of material delivered.

### 3.4 Soil Cover Material

The following submittals, required for soil cover material imported by the Contractor, will be made part of the quality control program prior to placing the soil cover material layer (the uppermost topsoil layer is addressed separately in Section 3.8). The soil cover material may include solely, or in part, a drainage sand layer. In the instances where the soil cover material is comprised of more than one soil type, the following submittals are required for each soil material:

- A materials certificate stating that the soil cover material meets the technical specification prior to delivery of soil to the site. If the material is obtained from more than one source, then a materials certificate will be submitted for each source.
- A grain size analysis, permeability test report, interface friction angle test report (for soil cover/liner interface), internal friction angle, and any other soil qualification testing listed in the technical specifications.

The following testing, required of the Contractor, will be made part of the quality control program during placement of the soil cover material layer:

- Compaction test reports immediately following field testing of material. Field testing will be measured with a Nuclear Density Gauge at a frequency of one per 10,000 square feet.
- Measurements of the soil cover material thickness taken following compaction at a frequency of every 50 feet on center.
- Environmental tests, hydraulic conductivity, grain size analysis, modified proctor, interface and internal friction angle testing at least once per 5,000 cubic yards of material delivered.

### 3.5 Geomembrane

The following submittals, required for geomembrane supplied by the Contractor, will be made as part of the quality control program prior to delivery of the geomembrane:

- Brand information and manufacturer literature, including manufacturer's quality control test results for the batch and lot numbers of material supplied to the project.
- Interface friction angle test results.
- Warranties for geomembrane material and installation workmanship.
- Installation contractor's name, qualifications, references, and project descriptions.
- Installation contractor master seamers' and superintendent's names and qualifications.
- Proposed panel layout drawing.
- QA/QC Plan.

The following submittals shall be provided on a daily basis during the course of geomembrane installation:

- Manufacturer's QA/QC results
- Trial seam testing results
- Non-destructive seam testing results.
- Destructive seam testing results.

The following submittal shall be provided at the completion of the project:

- As-built panel layout drawing indicating panel locations, numbers and repair locations.

### 3.6 Tri-Planar Geocomposite

The following submittals, required for tri-planar geocomposite supplied by the Contractor, will be made as part of the quality control program at least 10 days prior to delivery of materials to the site:

- A sample of the proposed tri-planar geocomposite.
- Installer's certifications per technical specifications.
- Certification that the material meets the required specifications.
- Interface friction angle test reports (for geocomposite/liner interfaces).

### 3.7 Geotextiles

The Contractor shall submit to the Engineer samples of the proposed geotextiles, and certification that each material to be used meets the required specifications, at least 10 days prior to delivery of the material to the site.

### 3.8 Topsoil Material

The following submittals, required of the Contractor, will be made as part of the quality control program prior to and during placement of the vegetative support soil (topsoil):

- For each source, prior to delivery of the material to the site, certified test reports for environmental sampling in compliance with the technical specifications for topsoil material.
- Written statement indicating borrow source.
- Environmental tests, grain size, pH, and internal friction angle testing per technical specifications once per 3,000 CY
- Measurements of the vegetative support material thickness taken following final grading at a frequency of every 50 feet on center.

### 3.9 Turf Establishment

The following submittals, required of the Contractor, will be made as part of the quality control program prior to commencement of turf establishment activities:

- A materials certification and copies of catalog cut sheets for review and acceptance for fertilizer, lime, seed, erosion control blanket and matting products documenting that they comply with the specifications.
- A hydroseed procedure and application rates for approval that includes the number of pounds of mulch product to be used per acre.
- Full and complete written maintenance instructions for proper care and development of seeded areas.
- Planting schedule for each area of the site

### 3.10 Riprap

Prior to delivery of the riprap to the site, material certification of conformance with the specifications and one riprap sample per source meeting the requirements in the specification will be submitted.

### 3.11 Grout

At least 10 days prior to delivery of materials to the site, the Contractor shall submit to the Engineer a product data sheet and certification that the material meets the required specifications..

### 3.12 Gravel

A material certification of conformance with the specifications and a grain size analysis, at a frequency of one per source, will be submitted prior to delivery of the material to the site.

### 3.13 Corregated Metal Pipe (CMP)

A material certification of conformance with the specifications and manufacturer's installation instructions will be submitted prior to delivery of the material to the site.

## **4.0 REPORTING AND DOCUMENTATION**

### **4.1 General**

Quality assurance documentation consists of the design drawings, approved submittals, addenda, change orders, written clarifications, and all other data required by the contract documents. In addition, documentation prepared by the QAC will include daily field reports, independent laboratory test results (where applicable), and photographs of pertinent phases of the construction.

### **4.2 Project Record Documents**

As specified in the contract documents, record documents will be maintained by the Contractor in a safe place at the site and will be annotated to show changes made during construction. The documents will be made available to CRRA and the QAC for reference during construction. Upon final completion of the work, the project record documents will be delivered to the QAC for CRRA in connection with final payment.

### **4.3 Final Certification Report**

The QAC will prepare a report that documents the closure was conducted in general conformance with the approved plans and specifications. The report will include copies of daily field reports, testing results and as-built plans. The report will be submitted to the CTDEP upon completion of the landfill closure activities.

### **4.4 As-Built Drawings**

In accordance with RCSA 22a-209-13(f), the CRRA will submit to the CTDEP as-built site drawings certified by a Professional Engineer licensed in the State of Connecticut that grading and closure have been completed as specified in the approved closure plan. The as-built drawings will be submitted to the CTDEP within ninety (90) days of completing the landfill closure. The drawings and a detailed description of the landfill will be recorded in the land records of the City of Hartford and a certified copy of the recording will be forwarded to the CTDEP.



This QAP Prepared By: Matthew A. Panciera, P.E.

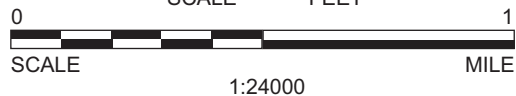
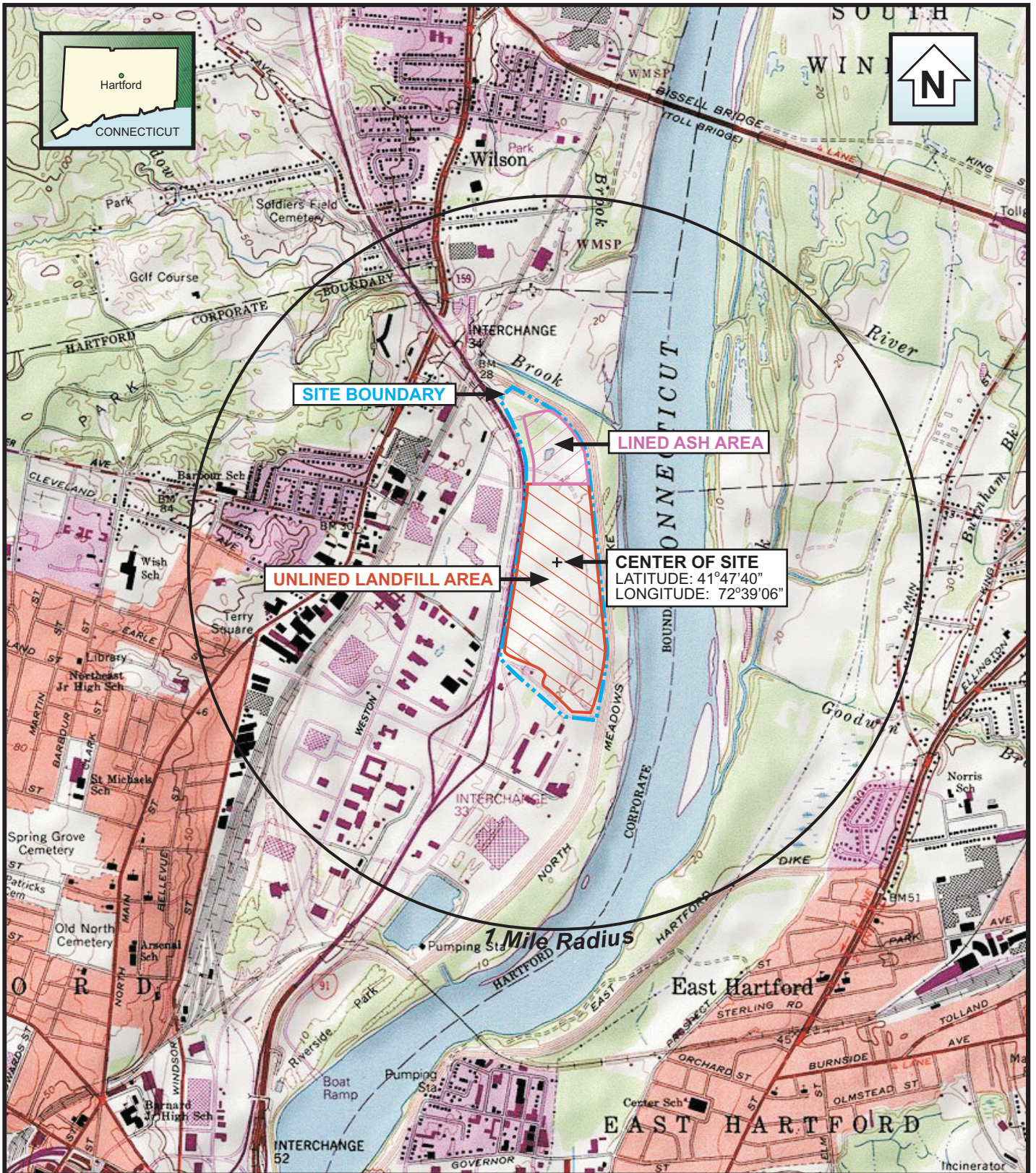
This QAP Reviewed By: Carl N. Stopper, P.E., Project Manager

## **TABLES**

**TABLE 1  
TESTING/REPORTING SUMMARY**

<b>Construction Task/Product</b>	<b>Test/Submittal</b>	<b>Frequency</b>
Landfill Regrading	N/A	N/A
Subbase Material	Materials certification w/qualification testing	One per source: prior to delivery
	Environmental testing, grain size analysis, modified proctor, interface and internal friction angle	One per 3,000 CY delivered
	Field density tests	One per 10,000 sq. ft.
	Subbase material thickness	50 ft. on center
Soil Cover Material	Materials certification w/qualification testing	One per source: prior to delivery
	Environmental testing, hydraulic conductivity, grain size analysis, modified proctor, interface and internal friction angle	One per 5,000 CY delivered
	Field density tests	One per 10,000 sq. ft.
	Cover soil material thickness	50 ft. on center
Geomembrane	Materials certification with all shop drawing requirements in Section 06643 Sec. 1.4 Paragraph A including interface friction angle tests	Prior to delivery
	Manufacturer's factory QA/QC results	Per delivery, prior to installation
	Trial seam test results	Daily before commencing field seaming (3 foot test weld)
	Trial seam test results	Every 500 feet of field seam (1 inch test weld)
	Vacuum box testing	Each field seam
	Air pressure testing	Each double fusion seam
	Destructive seam testing	One per 500 feet of seam
	As-built panel layout drawing indicating panel locations, numbers and repair locations.	Upon completion
Tri-Planar Geocomposite	Material certification and sample with friction angle test results	Prior to delivery
	Installer's certifications	Prior to delivery
Geotextiles	Material certification and sample	One per geotextile specified; Prior to installation
Vegetative Support Material (Topsoil)	Material certification	One per source: prior to delivery
	Environmental testing, grain size (gradation), pH, and internal friction angle	One per 3,000 CY
	Topsoil material thickness	50 ft. on center
Turf Establishment and Erosion Control Products	Material certification and catalog cuts for fertilizer, lime, seed, erosion control products	Prior to delivery
	Hydroseed procedure, application rates	Prior to application
	Planting schedule	Prior to application
	Maintenance instructions	Prior to application
Riprap	Material certification and sample	Prior to installation
Grout	Material certification and sample	Prior to installation
Gravel	Material certification and sample	One per source: prior to delivery
Corrugated Metal Pipe (CMP)	Materials certification	Prior to delivery
	Manufacturer's installation instructions	Provide prior to installation

**FIGURE**



21 Griffin Road North  
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**CRRA HARTFORD LANDFILL**  
HARTFORD, CONNECTICUT

**FIGURE 1**  
**SITE LOCATION MAP**

Date: 05/07

Project No. 106811.0170.0000

BASE CREATED WITH TOPO™ © 1996 WILDFLOWERS PRODUCTIONS, www.topo.com  
7.5' USGS TOPOGRAPHIC MAP OF HARTFORD NORTH QUADRANGLE