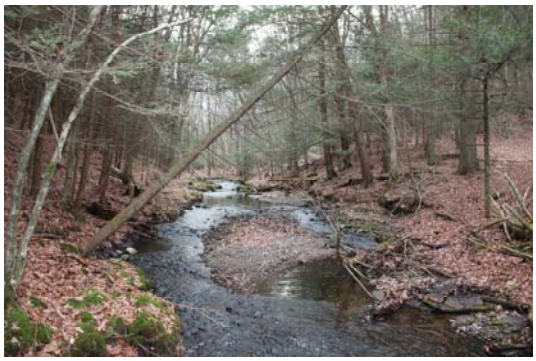
Proposed
CRRA Ash Landfill
Franklin, Connecticut

Eastern Connecticut
Environmental Review Team
Report

Eastern Connecticut Resource Conservation and Development Area, Inc.

Proposed CRRA Ash Landfill
Franklin, Connecticut



Environmental Review Team Report

Prepared by the
Eastern Connecticut Environmental Review Team

Of the

Eastern Connecticut
Resource Conservation and Development Area, Inc.

For the

First Selectman
Franklin, Connecticut

March 2009

Report #622

Acknowledgments

This report is an outgrowth of a request from the Franklin First Selectman to the Eastern Conservation District (ECD) and the Eastern Connecticut Resource Conservation and Development Area (RC&D) Council for their consideration and approval. The request was approved and the measure reviewed by the Eastern Connecticut Environmental Review Team (ERT).

The Eastern Connecticut Environmental Review Team Coordinator, Elaine Sych, would like to thank and gratefully acknowledge the following Team members whose professionalism and expertise were invaluable to the completion of this report.

The field review took place on Thursday, December 4, 2008.

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I would also like to thank First Selectman Richard Matters, Ron Ochsner, town attorney, Don Aubrey and Joseph Boucher, town engineers, Don Smith, Franklin Inland Wetland Commission, Matt Calvert, Franklin Planning and Zoning Commission, Peter Egan, Ron Gingerich and David Bodendorf, Connecticut Resources Recovery Authority (CRRA) and Carl Stopper, TRC, consultant for CRRA, for their cooperation and assistance during this environmental review.

Prior to the review day, each Team member received a summary of the proposed project with general location maps and aerial photos. During the field review Team members received additional information and maps. Some Team members made additional visits and requested additional information. Following the reviews, reports from each Team member were submitted to the ERT coordinator for compilation and editing into this final report.

This report represents the Team's findings. It is not meant to compete with private consultants by providing site plans or detailed solutions to development problems. The Team does not recommend what final action should be taken on a proposed project - all final decisions rest with the town and applicant. This report identifies the existing resource base and evaluates its significance to the proposed use, and also suggests considerations that should be of concern to the town. The results of this Team action are oriented toward the development of better environmental quality and the long term economics of land use.

The Eastern Connecticut RC&D Executive Council hopes you will find this report of value and assistance in reviewing the proposed ash landfill.

If you require additional information please contact:

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Introduction

Introduction

The Franklin First Selectman requested Environmental Review Team (ERT) assistance in reviewing a site proposed for an ash landfill.

The site proposed for the ash landfill is located in the Town of Franklin off of Route 32 behind the former Franklin Mushroom Farms property. The site investigation area for the ERT study is approximately 600 acres in size with an approximately 350 acre site necessary for CRRA to own and control for the ash landfill. This will include land in both Franklin and Windham. The construction of the ash landfill would occupy approximately 150 acres in Franklin only. The property is adjacent to the Shetucket River and is undeveloped except for a portion of the site that is currently being mined for sand and gravel.

The ash landfill would operate for about 30 years with approximately 300,000 tons of ash being delivered annually. The ash would be delivered five days a week with approximately 60 trucks per day. General information on the ash landfill may be viewed at www.ctsafeashlandfill.com.

Objectives of the ERT Study

The First Selectman has requested a review of the proposed ash landfill site to assist town officials in determining the suitability of the property for use as a long term ash landfill storage area. At the time of the ERT review the information available to Team members from CRRA was very limited. CRRA's ongoing investigations and draft reports were not provided. Participation from some CT Department of Environmental Protection (DEP) regulatory units was not possible for this review because of their role as the permitting agency. The DEP will be requiring extensive testing and detailed technical evaluations before issuing any approval of permits.

The ERT is unable to evaluate all potential short and long term impacts of an ash landfill, but a limited Team review was conducted in the areas of geology, soils, wildlife, fisheries, archaeological and historical significance, traffic analysis and planning. The report briefly describes the natural resource conditions on site and traffic and planning issues, highlights areas of concern and makes recommendations regarding necessary studies and analyses. Also presented are recommendations to lessen or mitigate potential negative impacts.

The ERT Process

Through the efforts of the Franklin First Selectman this environmental review and report was prepared for the Town of Franklin.

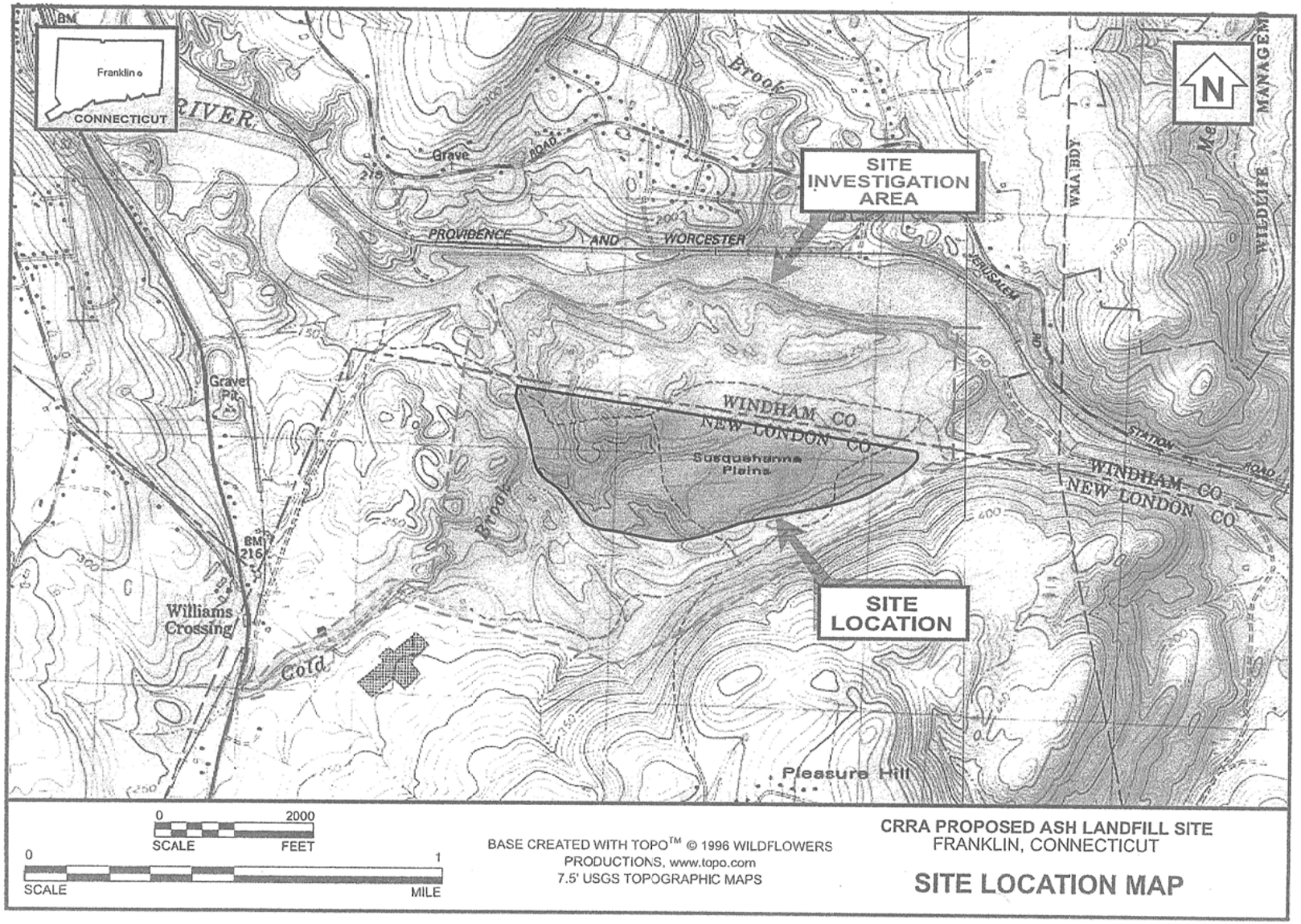
This report provides an information base and a series of recommendations and guidelines which cover some of the issues of concern to the town. Team members were able to review maps, plans and supporting documentation provided by the town and CRRA.

The review process consisted of four phases:

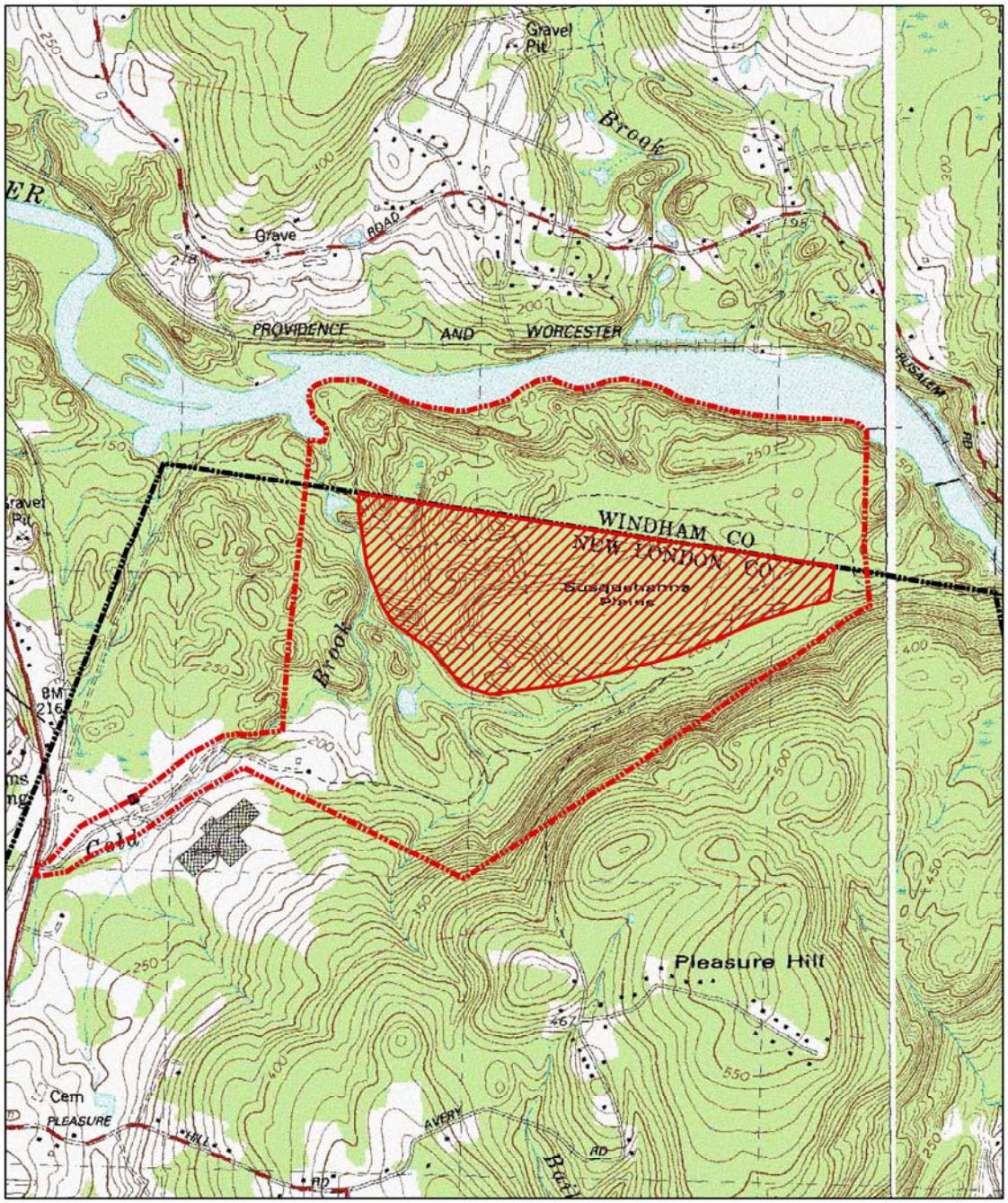
1. Inventory of the site's natural resources;
2. Assessment of these resources;
3. Identification of resource areas and review of plans; and
4. Presentation of education, management and land use guidelines.

The data collection phase involved both literature and field research. The field review was conducted Thursday, December 4, 2008. Team members also made individual or multiple field visits and requested additional information from CRRA. The emphasis of the field review was on the exchange of ideas, concerns and recommendations. Being on site allowed Team members to verify information and to identify other resources.

Once Team members had assimilated an adequate data base, they were able to analyze and interpret their findings. Individual Team members then prepared and submitted their reports to the ERT coordinator for compilation into this final ERT report.


Franklin
CONNECTICUT
SITE INVESTIGATION AREA
SITE LOCATION
N
Grave Road
PROVIDENCE AND WORCESTER
WINDHAM CO
NEW LONDON CO
Susquehanna Plains
Grave Pit
BM 216
Williams Crossing
Cold Brook
Pleasure Hill
WMA BDY
WILDLIFE MANAGEM
STATION ROAD
0 2000
SCALE FEET
0 1
SCALE MILE
BASE CREATED WITH TOPO™ © 1996 WILDFLOWERS PRODUCTIONS, www.topo.com
7.5' USGS TOPOGRAPHIC MAPS
CRRA PROPOSED ASH LANDFILL SITE
FRANKLIN, CONNECTICUT
SITE LOCATION MAP

Proposed CRRA Ash Landfill Site Map



Proposed CRRA Ash Landfill Aerial Map

The Connecticut Environmental Review Team

This map was prepared by Amanda Fargo-Johnson for the Connecticut Environmental Review Team.
This map is for educational use only.
It contains no authoritative data.
March 2009.

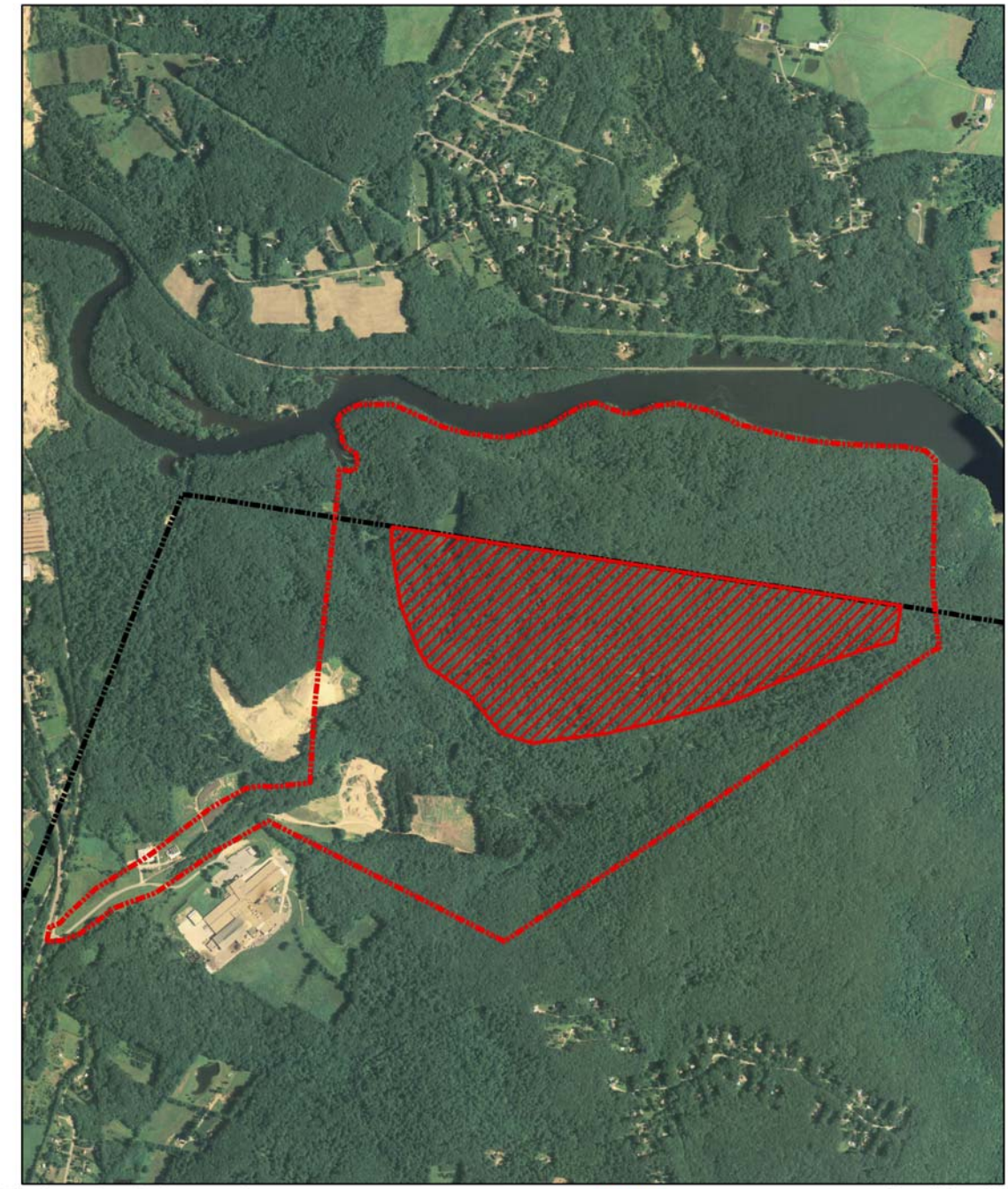
0 0.1 0.2 0.4 0.6 Miles

Site Investigation Area

Approximate Site Location

Franklin, CT

Proposed CRRA Ash Landfill Color Aerial Map



Topography and Geology

Topography at the proposed site ranges from hummocky (Figure 1) to rather plain-like (Figure 2). Linear ridges, hollows and steep sided ravines are scattered across the area. The high spot on the parcel is on a hill (locally known as Rattlesnake Hill) on the southeastern border that is about 288 feet elevation. The low area is along the Shetucket River. Stream gauges show the river elevation at 124+ feet along the northwestern part of the area and 112 feet about a mile away near the eastern portion of the area. To the south a southwest-trending bedrock ridge reaches elevations near 600 feet. A somewhat pitted plain (given the name Susquehanna Plains on the USGS topographic map) laps up against the northern side of the ridge and forms the southern part of the parcel. To the west the plain is more pitted and somewhat dissected by modern stream incision. The plain top has an elevation of about 220 feet. A ridge of sand and gravel separates the plain from the Shetucket River. The ridge is cut by terraces and contains numerous kettles. The ridge has a maximum elevation of 276 feet.

A. B.

Figure 1. Hummocky topography showing hollows (A and B) and ridges (A. on left, B. in the background).

A. B.

Figure 2. Plain-like topography of southern portion of parcel. Note rounded rocks scattered across the plain, indicating deposition by streams.

The entire parcel, except one hill along the side of the Shetucket River, is underlain by sand and gravel that was deposited in ice-dammed ponds and by meltwater streams at the end of the last Ice Age (Stone et al, 2005).

Bedrock Geology

The area is underlain by two rock formations. The Scotland Schist underlies Rattlesnake Hill and the ridge to the south of the parcel. The Hebron Formation underlies the central portion of the parcel, but does not crop out anywhere on the parcel. The bedrock surface was scoured out by glacial erosion forming a local basin during the last Ice Age. Data obtained from well borings and a geophysical survey by TRC, Inc., of Windsor, CT, show the bedrock surface has an elevation of +24 feet at its deepest near the center of the parcel. It rises up to an elevation of about 110 feet near the Shetucket River. The bedrock surface rises abruptly at Rattlesnake Hill to an elevation of 288'. To the south the bedrock rises up beneath the bedrock-ridge to elevations near 600 feet. Bedrock is exposed at Rattlesnake Hill (Figure 3A) which forms a pinnacle separated from the bedrock ridge to its south by a channel-like feature almost 160 feet deep.

A. B.

Figure 3. A. Outcrop of Scotland Schist at Rattlesnake Hill on eastern part of parcel. B. Details of Scotland schist: a silvery gray mica schist with local contorted foliation. Small garnets just visible in this view. Keys are about 2.5" long.

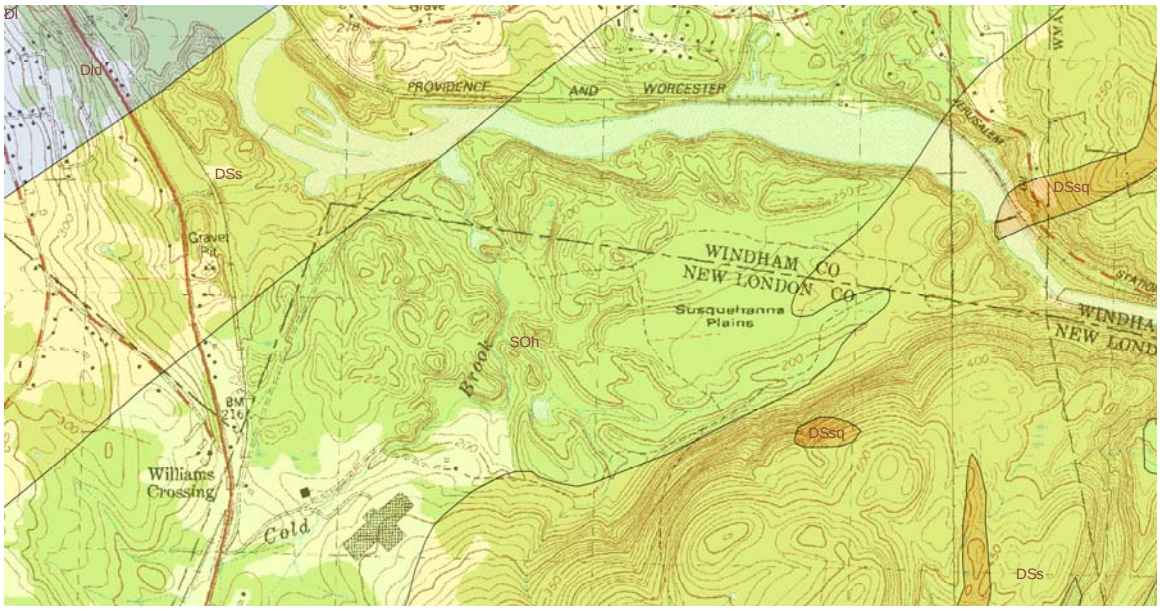


Figure 4. Geologic map of the parcel and surrounding area. The bedrock ridge just south of the parcel is underlain by Scotland Schist (DSs) that contains lenses or pods of quartzite (DSsq). Most of the parcel is underlain by Hebron Formation (SOh).

The Scotland Schist is a black somewhat silvery schistose rock (Figure 3B) composed of muscovite mica, with minor quartz and feldspar and locally containing small garnets. The geologic map of Rodgers, 1985 (Figure 4), shows layers of quartzite within the Scotland Schist in the area. The dam on the Schetucket is built where the river flows over bedrock, which may be the quartzite (the field review did not visit the dam).

Quaternary (Surficial) Geology

During the last Ice Age, glacial till was deposited beneath the glaciers and covered most of the area. A few bedrock exposures, such as Rattlesnake Hill, may have cropped out. As the Ice Age came to an end the glaciers melted: southern, warmer, areas melted first, northern areas melted later. The leading edge of the ice gradually retreated northward as melting progressed. Glacial meltwater collected in streams that moved an incredible amount of crushed up rock (in the form of mud, sand and gravel particles) that the glaciers had eroded. Those streams deposited sand and gravel downstream from the ice margin and carried mud to the ocean or to local lakes where it was deposited.

The ice margin can be mapped based on diagnostic sand and gravel deposits and topographic-morphology. Several ice-margin positions are mapped (Stone et al, 2005) in the area (Figure 5). As the ice melted a large depression was uncovered (formerly occupied by the ice prior to melting) which initially filled with glacial meltwater and later with sand, silt and gravel. The sand, silt and gravel were deposited in a small lake. Mud and fine-grained sand were deposited on the bottom of the lake. The bottom layer is overlain by coarser sand and finally gravel as the lake filled in and meltwater-streams flowed across it.

Borings taken by TRC show a tripartite stratigraphy below the parcel. Bottom-set beds consist of fine sand and silt, foreset beds consist of fine to coarse sand, and the topset (or fluvial) beds consist of sand and gravel.

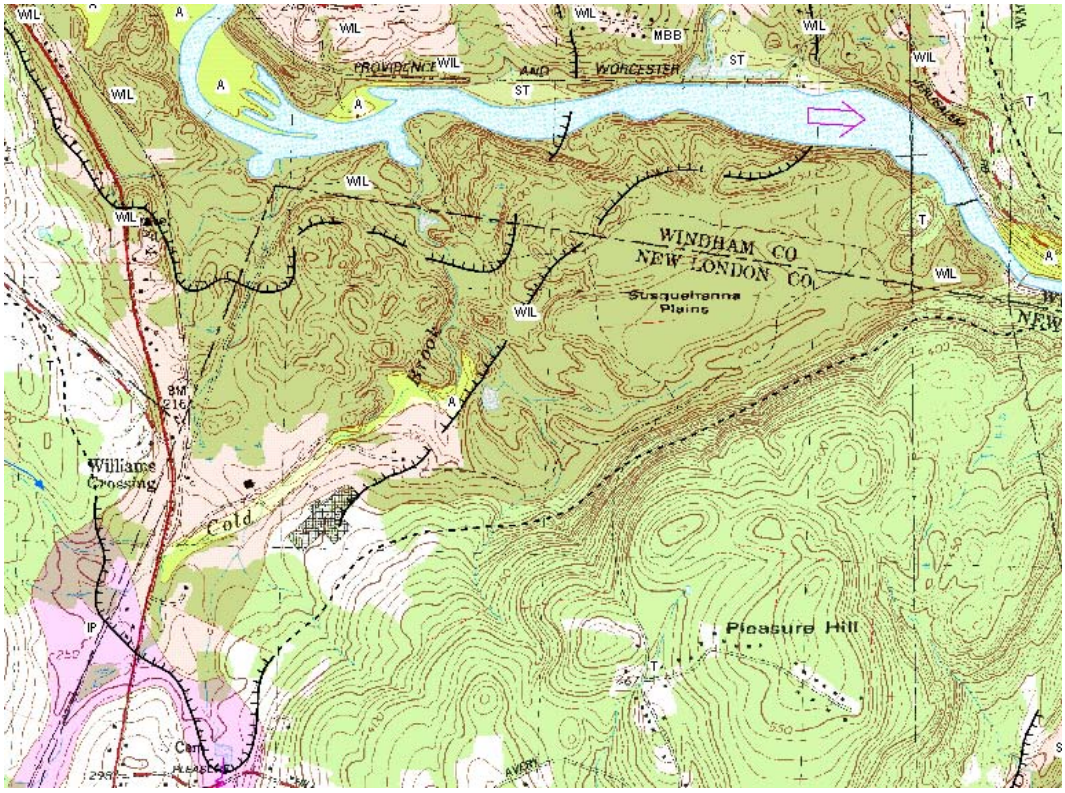


Figure 5. Quaternary map of the area surrounding the parcel. Areas colored brownish green and labeled WIL, NBB, and IP are deposits of sand and gravel. Area colored pale green and labeled T are deposits of glacial till. Areas colored yellow and labeled A are modern alluvium deposited by local rivers and streams. The hachured lines and dashed lines mark inferred ice margin positions.

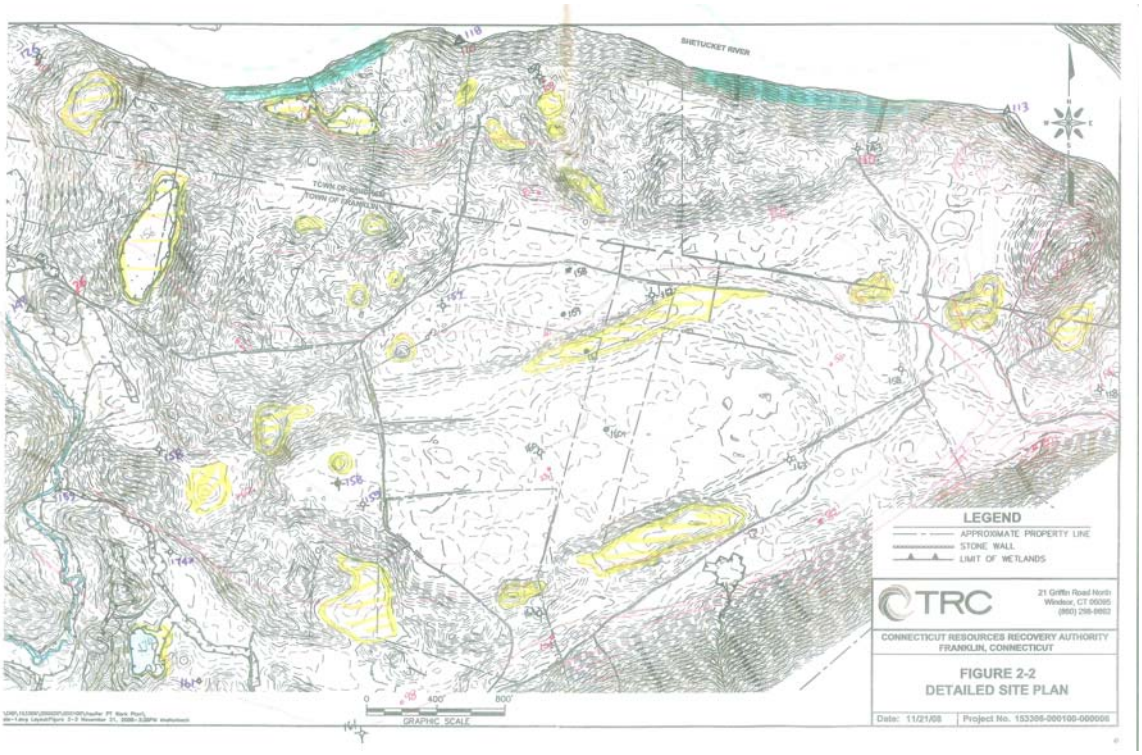


Figure 6. Topographic map showing distribution of kettles (shown in yellow). Areas of potential river bank erosion (see text) shown in blue.

In numerous places large chunks of left over ice were covered by stream-deposited sediment, mostly sand and gravel. When the ice chunk eventually melted, the sand and gravel collapsed down into the void once occupied by the ice. This created depressions (large holes or hollows) in the surface topography that are referred to as kettles. A site map generated by TRC Inc, shows more than 20 kettles in the area (Figure 6). They range in size from about an acre to almost 10 acres and are from 6-10 $feet_1$ to more than 40 feet in depth. The largest is a little less than 10 acres in area and almost 50 deep. It is breached however, and has only about 8 feet of closed topographic contours because of its open end (see Figure 7). It has a wetland on its bottom, suggesting that it intersects the groundwater table at about 155 feet elevation.

A. B.

Figure 7. A. Topset and foreset beds being mined in a gravel operation on the southwestern part of the parcel. B. Breached kettle with a swamp in its bottom (=elevation of the water table). This is one of the larger kettles on the parcel.

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1. Some of the shallow kettles may be an artifact of the photogrammetry used to construct the topographic map.

Groundwater

TRC, Inc, installed monitoring wells and piezometers to determine the shape of the water table. In addition, they plan to conduct several tests to determine the potential supply of ground water beneath the parcel. The water table is remarkably flat at an elevation of around 160'. It decreases sharply toward the Shetucket River and Cold Brook. TRC hydrologists think that perched water table conditions exit beneath locations near Cold Brook on the southwestern part of the parcel.

Generally the water table is expected to follow the topographic contour of the land, being higher below areas of higher elevation and lower beneath areas of lower elevation. In low areas the water table may actually be at or above the ground surface. Such places are ponds and swamps and rivers. Hence, the elevation of the swampy area in the breached kettle in the northwestern portion of the parcel represents the elevation of the water table at that location.

That the water table is so flat suggests that conditions within the aquifer are very porous and permeable. This, in turn, suggests that the aquifer, if developed, has potential to produce large quantities of ground water.

Gravel Removal

In order to make room for the ash a good volume of gravel will be removed. Some of the gravel may be used to cover the completed cells as the filling proceeds. What will happen to the remaining gravel?

The ash landfill will occupy 150 acres. If it is sited with its base 5 feet above the seasonal high water table (elevation ~170'), about 50' of overburden will be removed prior to laying the bottom clay-liner. Fortunately the "overburden" has value, as indicated by the on-going mining operation on or near the parcel. Quick math indicates that 150 acres = 6.5 million ft^2 area x 50 ft thickness = 327 million ft^3 = ~12 million yards of gravel on the site. If this gravel is sold to local gravel processors, at times there may be as many trucks filled with gravel leaving the site as there are trucks filled with ash entering.

River-bank Erosion

Presently the Shetucket River is backed up by a dam just east of the parcel. The dam thus slows the river's velocity and little if any bank erosion occurs at this time. If the dam becomes breached (either because of natural processes or perhaps as an effort at riparian restoration), river-bank erosion may again begin especially along the river-bends where the river swings left. There are two areas that might be susceptible (blue areas in Figure 6). Closer to the dam-site, the river flows over bedrock and will not likely erode at that area. The current plans to keep the ash landfill in the town of Franklin leaves a wide buffer to protect against the prospect of bank erosion. Possible future expansion of the ash landfill should consider this contingency and not try to fill too close to the river.

References

Rodgers, John, 1985, Bedrock Geological Map of Connecticut. State Geological and Natural History Survey of Connecticut, Nat'l. Resource Atlas Series, 1:125,000, 2 sheets.

Stone, J.R., Schafer, J.P., London, E.H., DiGiacomo-Cohen, M.L., Lewis, R.S., and Thompson, W.B., 2005, Quaternary Geologic Map of Connecticut and Long Island Sound Basin (1:125,000). U.S. Geol. Surv. Sci. Invest. Map # 2784.

Soil Resources

Introduction

This proposal is for the construction of an ash landfill in Franklin, Connecticut. The preferred site for the landfill, based on a state-wide review, is in the northwest corner of the town of Franklin. Surrounding towns within close proximity to the proposed site are Lebanon, Windham, Scotland and Sprague. An ERT was requested by the town to assist with gathering of resource information and assessing the impact of the proposal.

Documents available at the ERT meeting, included;

1. General location maps for the *Site Location and Site Investigation Area*, scale of 1"=2000'
2. Aerial Photos
3. *CRRA's Ash Landfill Progress Report*, dated September 2008, (2-pages of text)
4. A site map labeled *Site Investigation Locations* at a 1" =1,200' scale

Also available at the meeting:

1. A site map by Towne Engineering labeled *Perimeter Survey, prepared for Keith Nasin & Estate of Mark Nasin*, dated 3/8/2001, scale 1"=200'

Additional documentation was mailed to several team members and included

1. A two page report, entitled *Ecological Investigations at CRRA Franklin Ash Landfill Site*
2. Site map entitled *Preliminary Wetland and Vernal Pool Mapping*, prepared by TRC, dated 12/16/08, at a 1"=200' scale.

As listed in the *Progress Report*, CRRA has several ongoing investigations which include; ecological, traffic study, subsurface geology, subsurface hydrogeology, and cultural and archaeological reviews. The information available to Team members however, at the time of the review, is limited to what is listed above.

With a proposal of this extent, it is anticipated that a tremendous amount of additional information will be necessary before the town(s) or state can fully assess the environmental impacts. As this information has not yet been submitted, it is not possible to conduct a thorough review of potential impacts. Comments from ECCD are therefore general in nature.

Site Location and Description

Access to the proposed landfill site is off of Route 32 and would be northeast of the old Franklin Mushroom Farm. Presently, there is an active gravel pit operation located in the southwestern part of the *Site Investigation Area.* It is ECCD's understanding that the town of Franklin has recently approved additional phases to the gravel pit.

The *Site Investigation Area* is approximately 600 acres, while the *Site Location*, which essentially lies within the center of the 600 acres, is approximately 300 acres. Within the 300 acres, the 150 acre landfill would be located. The 150 acres is sized to landfill that would contain a projected 20 years worth of ash. The probability of requests for future expansion is an unknown at this time, but it appears to be a possibility.

The landfill location would at least partially occupy a geographical feature known as Susquohanna Plains. Vertically it sits about 100' feet above the nearby Shetucket River and at the north western base of another feature known as Pleasure Hill, which rises another several hundred feet above the Plains. Although the landfill site location is shown entirely within the town of Franklin, it is immediately adjacent to the town of Windham. The *Site Investigation Area* includes part of Windham that lies between the landfill S*ite Location* and the Shetucket River.

It is ECCD's understanding, based on a presentation made to the ERT team that one of the requirements in selecting a site for a landfill, is the ability to own the land where a potential contamination plume may flow. Although the landfill would be lined, permitting conditions assume that it will leak at some point and therefore the operator must have control over the land from the point of potential contamination to a point of significant dilution. In this case the point of dilution would be the Shetucket River.

The array of environmental concerns possible with a landfill such as this would be; impact on surface and groundwater quality, impact on groundwater recharge, surface water run-off, impact to future water supplies, impact to indigenous wildlife, loss of extensive forest habitat, noise, dust and/or other airborne pollutants, odor, requirements for offsite improvements that may affect sensitive areas. Additionally, there would be other planning impacts such as traffic and property values.

As other Team members will be offering reviews on wildlife, fisheries, water quality, geology, traffic, and planning, ECCD has concentrated its review on soils and associated issues.

Soil Resources

Using the NRCS Soil Web Survey, ECCD has created a map of soil resources on site, which is entitled *Soil Map-State of Connecticut (Proposed CRRA Ash Landfill Map).* Due to the size of the land are being considered (600+ acres) and the size of the map that can be printed with the ERT report, mapping units may be difficult to read. A pdf version of the maps can be obtained by contacting the ECCD office at (860) 887-4163 x401, which will allow for a larger printing.

A listing of the soil types is also included with the map. The size of the area map purposely overextends the *Site Investigation Area*, to ensure all areas are included.

Wetland Mapping

In Connecticut soils are used to delineate wetland boundaries. Soils that are poorly drained, very poorly drained, alluvial or floodplain are considered wetland soils. On the soil map created for the proposed CRRA landfill covering the *Site Investigation Area*, these include:

Map Unit Symbol	Map Unit Name
3	Ridgebury, Leicester, and Whitman soils, extremely stony
13	Walpole sandy loam
15	Scarboro Muck
18	Catden and Freetown soils
103	Rippowam fine sandy loams

Following is a short description of each wetland soil:

RIDGEBURY SERIES The Ridgebury series consists of very deep, somewhat poorly and poorly drained soils formed in till derived mainly from granite, gneiss and schist. They are commonly shallow to a densic contact. They are nearly level to gently sloping soils in low areas in uplands. Slope ranges from 0 to 15 percent. Saturated hydraulic conductivity ranges from moderately low to high in the solum and very low to moderately low in the substratum. Mean annual temperature is about 49 degrees F. and the mean annual precipitation is about 45 inches.

LEICESTER SERIES The Leicester series consists of very deep, poorly drained loamy soils formed in friable till. They are nearly level or gently sloping soils in drainageways and low-lying positions on hills. Slope ranges from 0 to 8 percent. Permeability is moderate or moderately rapid in the surface layer and subsoil and moderate to rapid in the substratum. Mean annual temperature is about 50 degrees F., and mean annual precipitation is about 47 inches.

WHITMAN SERIES The Whitman series consists of very deep, very poorly drained soils formed in glacial till derived mainly from granite, gneiss, and schist. They are shallow to a densic contact. These soils are nearly level or gently sloping soils in depressions and drainageways on uplands. Permeability is moderate or moderately rapid in the solum and slow or very slow in the substratum. Mean annual precipitation is about 45 inches and mean annual temperature is about 49 degrees.

WALPOLE SERIES The Walpole Series consists of very deep, poorly drained sandy soils formed in outwash and stratified drift. They are nearly level to gently sloping soils in low-lying positions on terraces and plains. Slope ranges from 0 to 8 percent. Permeability is moderately rapid in the surface layer and subsoil, and rapid or very rapid in the substratum. Mean annual temperature is about 48 degrees F., and mean annual precipitation is about 43 inches.

SCARBORO SERIES The Scarboro series consists of very deep, very poorly drained soils in sandy glaciofluvial deposits on outwash plains, deltas, and terraces. They are nearly level soils in depressions. Slope ranges from 0 to 3 percent. Saturated hydraulic conductivity is high or very high. Mean annual temperature is about 49 degrees F. and the mean annual precipitation is about 44 inches.

CATDEN SERIES The Catden series consists of very deep, very poorly drained soils formed in woody and herbaceous organic materials in depressions on lake plains, outwash plains, moraines, and flood plains. Saturated hydraulic conductivity ranges from moderately low to high. Slope ranges from 0 to 2 percent. The mean annual temperature is about 48 degrees F. and the mean annual precipitation is about 47 inches.

FREETOWN SERIES The Freetown series consists of very deep, very poorly drained organic soils formed in more than 51 inches of highly decomposed organic material. They are in depressions or on level areas on uplands and outwash plains. Slope ranges from 0 to 1 percent. Saturated hydraulic conductivity is moderately high or high. The mean annual temperature is about 48 degrees F. and mean annual precipitation is about 45 inches.

RIPPOWAM SERIES The Rippowam series consists of very deep, poorly drained loamy soils formed in alluvial sediments. They are nearly level soils on flood plains subject to frequent flooding. Slope ranges from 0 to 3 percent. Saturated hydraulic conductivity ranges from moderately high or high in the loamy upper part and high or very high in the underlying sandy materials. Mean annual temperature is about 50 degrees F., and mean annual precipitation is about 47 inches.

According to the NRCS SoilWeb map and the on-site mapping conducted by TRC, the majority of wetlands are associated with Cold Water Brook and its tributaries. Additional wetlands are located at the base of Pleasure Hill, another system adjacent to the Shetucket River, and additional wetlands along the access road that passes to the south along the active gravel pit. Another wetland system, designated by soil map symbol 18, is located in the northwestern part of the property. This isolated system is surrounded by steep slopes with no apparent outlet. Soils within this are deep, organic and very poorly drained, suggesting a bog habitat.

The *Preliminary Wetland and Vernal Pool Mapping* plan does not appear to be in total sync with the underlying site topography. Additionally, the hydrography (water course boundary) mapping does not appear to be well correlated to the wetland boundary mapping. Vernal pools have been indicated on the plan, however, no information on the status of the pools or what species are present, has been submitted.

If the proposed Site Location Mapping for the landfill were overlain on the *Preliminary Wetland and Vernal Pool Mapping* plan, it would be apparent that portions of the *Site Location Mapping* extend into wetland boundaries and the associated steep slopes which are part of the riparian corridors. Further, the intermittent watercourse located at the base

of Pleasure Hill and shown on the *Site Location Area*, does not appear on the *Preliminary Wetland and Vernal Pool Mapping.*

In conclusion, further wetland mapping clarification, and documentation of the wetland's specific resources, values and functions, combined with more a detailed proposal of what would be entailed for the extent of the landfill itself, will be necessary in determining the extent of environmental impact.

Upland Soils

According to the NRCS SoilWeb map, the following non-wetland soils are those shown within the proposed *Site Location Area* (there may be smaller segments of other soils as well). These include

Map Unit Symbol	Map Unit Name
29A	Agawam, fine sandy loam, 0 to 3 percent slopes
34A	Merrimac sandy loam, 0 to 3 percent slopes
34B	Merrimac sandy loam, 3 to 8 percent slopes
38C	Hinckley gravelly sandy loam, 3 to 15 percent slopes
38E	Hinckley gravelly sandy loam, 15 to 45 percent slopes

Following is a brief description of each soil. The A, B, C and E designations relate to steepness of slope. A-slopes are fairly level, up to E-slopes which are moderately steep to very steep, with other designations ranging in between.

AGAWAM SERIES The Agawam series consists of very deep, well drained soils formed in sandy, water deposited materials. They are level to steep soils on outwash plains and high stream terraces. Slope ranges from 0 to 15 percent. Saturated hydraulic conductivity is high in the upper solum and high or very high in the lower solum and substratum. Mean annual temperature is about 48 degrees F. and mean annual precipitation is about 47 inches.

MERRIMAC SERIES The Merrimac series consists of very deep, somewhat excessively drained soils formed in glacial outwash. They are nearly level to very steep soils on outwash terraces and plains and other glaciofluvial landforms. Slope ranges form 0 to 35 percent. Saturated hydraulic conductivity is high or very high. Mean annual temperature is about 48 degrees F. and mean annual precipitation is about 42 inches.

HINCKLEY SERIES The Hinckley series consists of very deep, excessively drained soils formed in water-sorted material. They are nearly level to very steep soils on terraces, outwash plains, deltas, kames, and eskers. Saturated hydraulic conductivity is high or very high. Slope ranges from 0 to 60 percent. Mean annual temperature is about 45 degrees F. and mean annual precipitation is about 45 inches.

Soil and Proposed Land-Uses

As part of ECCD's review, additional mapping as it relates to proposed uses and soil limitations was conducted for Sanitary Landfills and the K Factor (Soil and Erosion Factor). The maps are presented at the end of this section.

Sanitary Landfills

A sanitary landfill was selected as the closest category, as an ash landfill category was not available on the NRCS SoilWeb site. It should be noted that no mention of a liner is indicated with this description, which is what would be proposed with the ash landfill. Additionally, depending on depth to groundwater, the ash landfill would be excavated, not simply placed on the surface of the ground. Only the map and legend are presented with this report, since the full soil-limitation report is 15 pages long. A pdf version of the map and all listed soil limitations can be obtained by contacting the ECCD office at (860) 887-4163 x401.

The following excerpt is from the NRCS SoilWeb description.

Description

In an "area sanitary landfill," solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 2 feet thick is placed over the completed landfill. A landfill must be able to bear heavy vehicular traffic. It can result in the pollution of ground water. Ease of excavation and revegetation should be considered.

The ratings are based on the soil properties that affect trafficability and the risk of pollution. These properties include flooding, saturated hydraulic conductivity (Ksat), depth to a water table, ponding, slope, and depth to bedrock or a cemented pan. Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If Ksat is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate

maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Soil Erosion

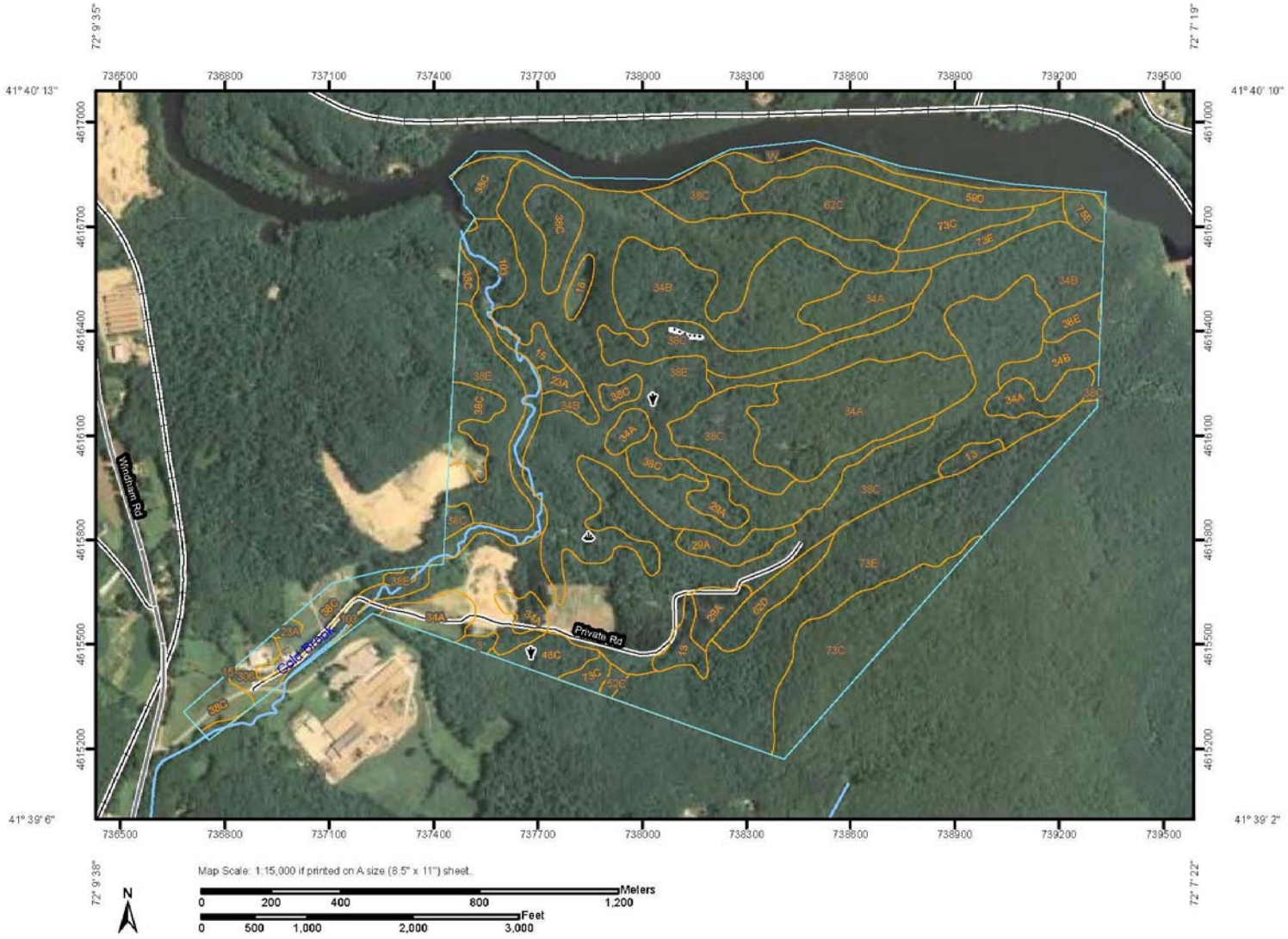
Aside from more obvious concerns with water pollution; soil erosion of open or active construction sites can be an ongoing source of sediment pollution. The map entitled *K Factor, Rock Free – State of Connecticut (Proposed CRRA Ash Landfill-Soil Erosion Factor (K Factor-Rock Free-All Layers))* is included at the end of this section of the report. Provided with the map is the legend, soil ratings and description of the category.

This mapping is a general approach to determining potential erosion impacts since any additional detail on specific site activities is not available. Other factors would include the amount of area cleared and being actively worked at one time, length and steepness of slopes, water management, temporary and permanent stabilization techniques and methods for dust control.

Soils Conclusion

Once a more detailed proposal is submitted, additional review for stormwater controls and treatment, erosion and dust control, and environmental impact as it relates to both upland and wetland soil resources can be conducted. Until that point, a discussion of the full range of impacts would be speculation.

Soil Map—State of Connecticut
(Proposed CRRA Ash Landfill Soil Map)



USDA Natural Resources Conservation Service

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National Cooperative Soil Survey

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MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:15,000 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 18N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

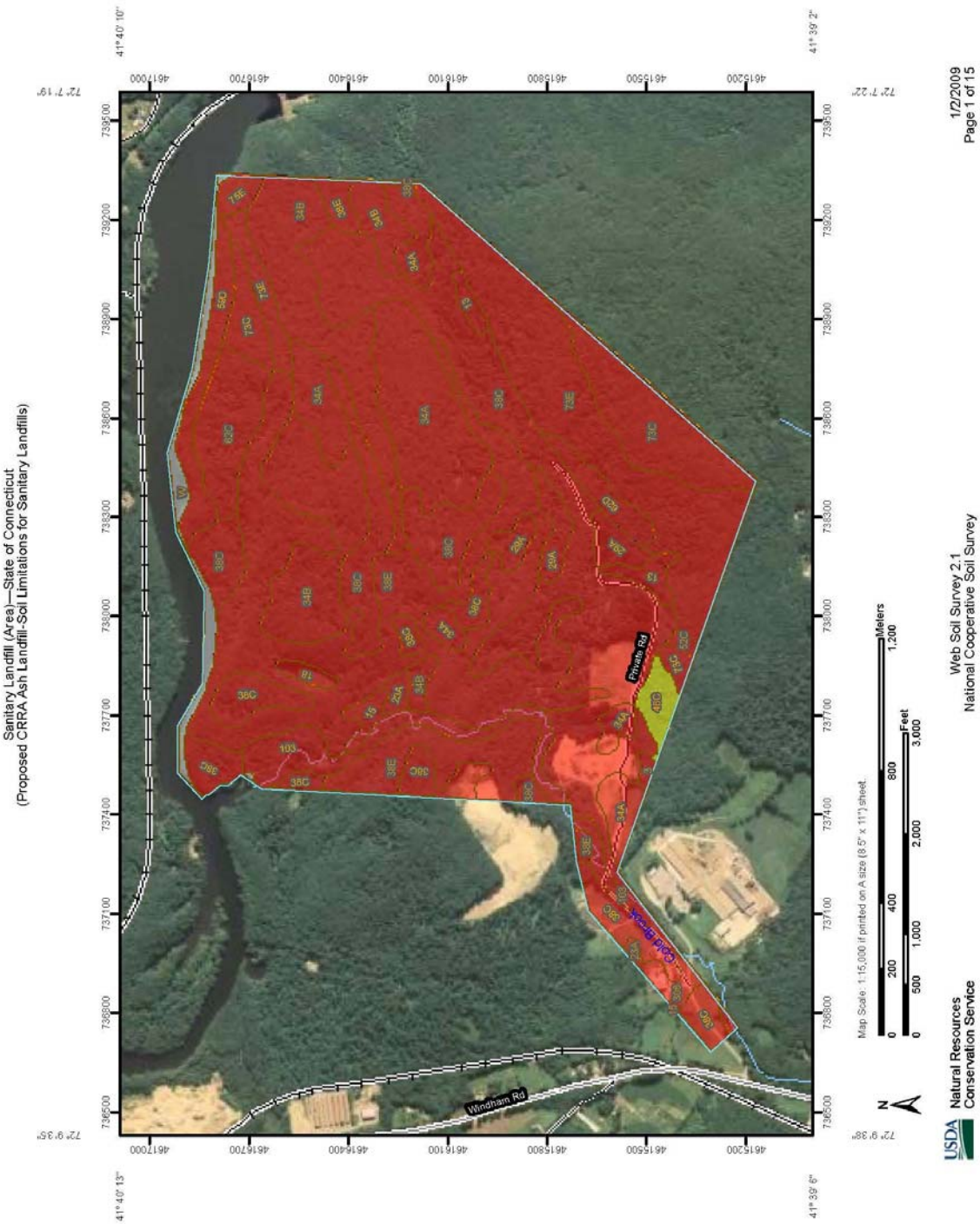
Soil Survey Area: State of Connecticut
Survey Area Data: Version 6, Mar 22, 2007

Date(s) aerial images were photographed: 7/17/2006

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.

Map Unit Legend

State of Connecticut (CT600)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
3	Ridgebury, Leicester, and Whitman soils, extremely stony	1.1	0.2%
13	Walpole sandy loam	6.1	0.9%
15	Scarboro muck	3.0	0.5%
18	Catden and Freetown soils	2.1	0.3%
23A	Sudbury sandy loam, 0 to 5 percent slopes	2.6	0.4%
29A	Agawam fine sandy loam, 0 to 3 percent slopes	13.1	2.0%
34A	Merrimac sandy loam, 0 to 3 percent slopes	60.7	9.2%
34B	Merrimac sandy loam, 3 to 8 percent slopes	75.6	11.5%
38C	Hinckley gravelly sandy loam, 3 to 15 percent slopes	170.4	25.9%
38E	Hinckley gravelly sandy loam, 15 to 45 percent slopes	133.0	20.2%
46C	Woodbridge fine sandy loam, 8 to 15 percent slopes, very stony	5.3	0.8%
52C	Sutton fine sandy loam, 2 to 15 percent slopes, extremely stony	1.0	0.2%
59D	Gloucester gravelly sandy loam, 15 to 35 percent slopes, extremely stony	13.1	2.0%
62C	Canton and Charlton soils, 3 to 15 percent slopes, extremely stony	17.7	2.7%
62D	Canton and Charlton soils, 15 to 35 percent slopes, extremely stony	6.8	1.0%
73C	Charlton-Chatfield complex, 3 to 15 percent slopes, very rocky	35.2	5.3%
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	71.0	10.8%
75E	Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes	3.2	0.5%
103	Rippowam fine sandy loam	23.4	3.6%
306	Udorthents-Urban land complex	3.6	0.5%
W	Water	10.2	1.5%
Totals for Area of Interest		**658.2**	**100.0%**


Sanitary Landfill (Area)—State of Connecticut
(Proposed CRRA Ash Landfill--Soil Limitations for Sanitary Landfills)
Windham Rd
Private Rd
Coal Brook
Map Scale: 1:15,000 if printed on A size (8.5" x 11") sheet.
Meters
Feet
Web Soil Survey 2.1
National Cooperative Soil Survey
1/2/2009
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Natural Resources
Conservation Service
USDA

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Soil Ratings
- Very limited
- Somewhat limited
- Not limited
- Not rated or not available

Political Features
- Cities

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:15,000 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 18N NAD83

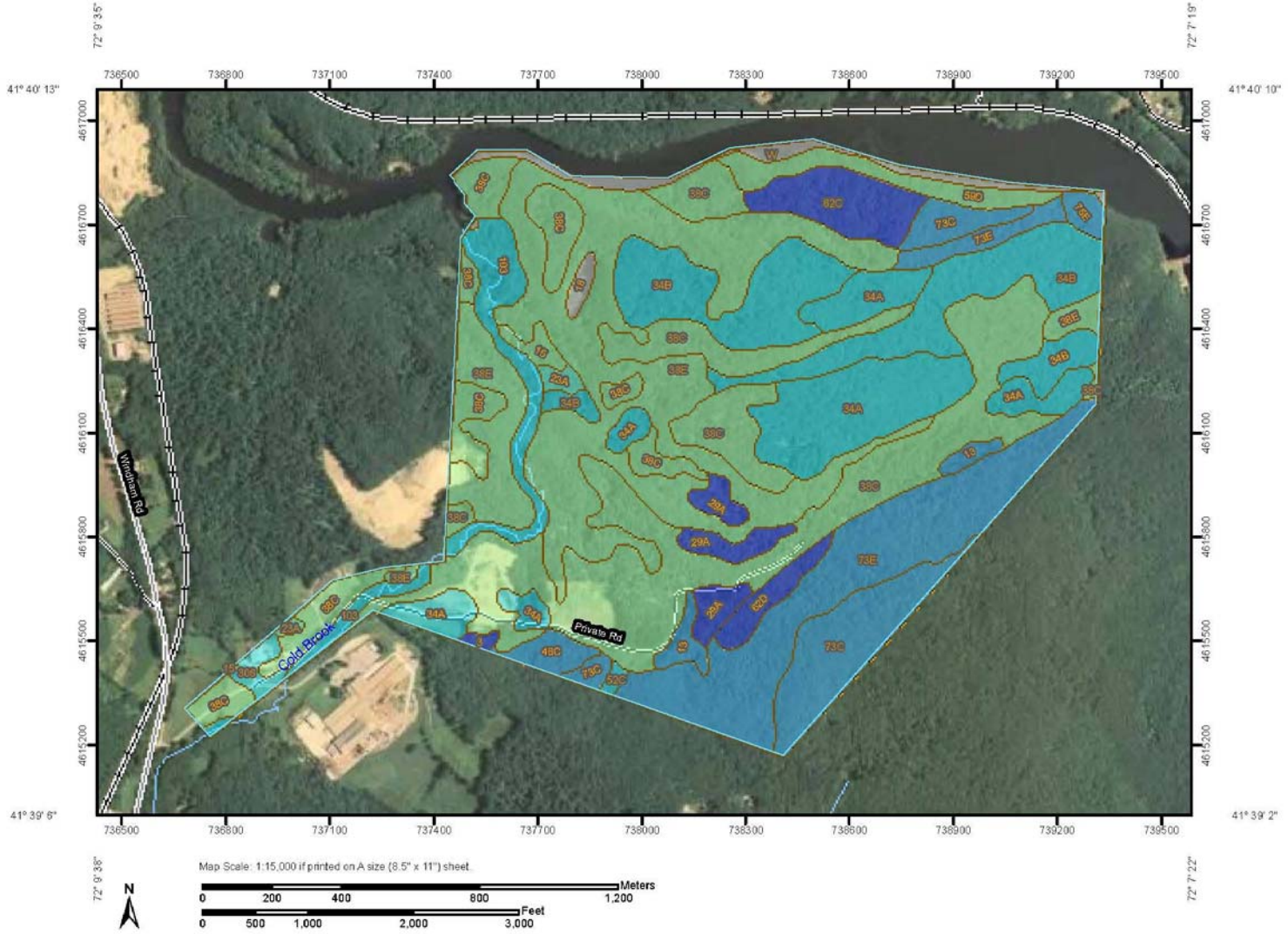
This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut
Survey Area Data: Version 6, Mar 22, 2007

Date(s) aerial images were photographed: 7/17/2006

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.

K Factor, Rock Free—State of Connecticut
(Proposed CRRA Ash Landfill-Soil Erosion Factor (K Factor-Rock Free-All Layers))



USDA Natural Resources Conservation Service

Web Soil Survey 2.1
National Cooperative Soil Survey

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K Factor, Rock Free–State of Connecticut
(Proposed CRRA Ash Landfill-Soil Erosion Factor (K Factor-Rock Free-All Layers))

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Soil Ratings
- .02
- .05
- .10
- .15
- .17
- .20
- .24
- .28
- .32
- .37
- .43
- .49
- .55
- .64
- Not rated or not available

Political Features
- Cities

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:15,000 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 18N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut
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Date(s) aerial images were photographed: 7/17/2006

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.

K Factor, Rock Free

K Factor, Rock Free— Summary by Map Unit — State of Connecticut				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
3	Ridgebury, Leicester, and Whitman soils, extremely stony	.55	1.1	0.2%
13	Walpole sandy loam	.43	6.1	0.9%
15	Scarboro muck	.28	3.0	0.5%
18	Catden and Freetown soils		2.1	0.3%
23A	Sudbury sandy loam, 0 to 5 percent slopes	.32	2.6	0.4%
29A	Agawam fine sandy loam, 0 to 3 percent slopes	.55	13.1	2.0%
34A	Merrimac sandy loam, 0 to 3 percent slopes	.37	60.7	9.2%
34B	Merrimac sandy loam, 3 to 8 percent slopes	.37	75.6	11.5%
38C	Hinckley gravelly sandy loam, 3 to 15 percent slopes	.28	170.4	25.9%
38E	Hinckley gravelly sandy loam, 15 to 45 percent slopes	.28	133.0	20.2%
46C	Woodbridge fine sandy loam, 8 to 15 percent slopes, very stony	.43	5.3	0.8%
52C	Sutton fine sandy loam, 2 to 15 percent slopes, extremely stony	.37	1.0	0.2%
59D	Gloucester gravelly sandy loam, 15 to 35 percent slopes, extremely stony	.28	13.1	2.0%
62C	Canton and Charlton soils, 3 to 15 percent slopes, extremely stony	.55	17.7	2.7%
62D	Canton and Charlton soils, 15 to 35 percent slopes, extremely stony	.55	6.8	1.0%
73C	Charlton-Chatfield complex, 3 to 15 percent slopes, very rocky	.43	35.2	5.3%
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	.43	71.0	10.8%
75E	Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes	.43	3.2	0.5%
103	Rippowam fine sandy loam	.37	23.4	3.6%
306	Udorthents-Urban land complex	.37	3.6	0.5%
W	Water		10.2	1.5%
Totals for Area of Interest			**658.2**	**100.0%**

Description

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kf (rock free)" indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

Layer Options: All Layers

Fisheries Resources

Shetucket River

The proposed CRRA Ash Landfill Site will be located adjacent to waters of the Shetucket River that have been impounded by the Scotland Dam. The Shetucket River supports a highly diverse fish community (23 species, 15 native) due to the presence of inland and diadromous fishes (Table 1). The entire Shetucket River is managed as a Trophy Trout stream with a daily creel limit of 2 trout and an open season from the 3rd Saturday in April to the last day in February. It is annually stocked by the Inland Fisheries Division (IFD) with adult brown and rainbow trout. For example in 2006, it was stocked with 3,650 brown trout (9-12 inches in length), 2,135 brown trout greater than 12 inches, 3,265 rainbow trout greater than 12 inches and 170 surplus broodstock (rainbow and brown) ranging from 1 to 10 pounds in size. In addition to a trout fishery, the Shetucket River supports an abundant smallmouth bass population. IFD electrofishing surveys of the Shetucket River have documented a diverse community of fluvial dependent/specialist fish species, which include blacknose dace, fallfish, tessellated darter and white sucker. The Shetucket River is also managed as an Atlantic salmon broodstock fishery from the Scotland Dam (Scotland) downstream to the Occum Dam (Norwich). Surplus brood stock salmon from State and Federal hatcheries are stocked annually. For 2006, a total of 752 Atlantic salmon broodstock were stocked in this area of the river. Surplus broodstock are between two to four years old and weigh between 2 and 12 pounds. Please refer to the 2009 Connecticut Angler Guide for Atlantic salmon broodstock seasons, creel limits and legal fishing methods.

Cold Brook

Cold Brook is a moderate gradient stream within this property that drops over 90 feet in elevation as it descends into the Shetucket River. In several locations, the stream abuts very steep side slopes causing slope and bank failure which contributes to instream sedimentation. Cold Brook was sampled by the DEP IFD stream survey team on August 3, 1993. Results of that survey documented that this watercourse supports a very robust native brook trout population with multiple age classes. Brook trout typically spawn in Connecticut during the month of October. Eggs incubate within gravel over the fall and winter periods with eggs hatching in late February or early March. Fry remain in the gravel until their yolk sacs are absorbed at which time the fry emerge from underneath the gravel and move into preferred stream microhabitats.

Table 1. List of fish species found in the Shetucket River upstream and downstream of the Scotland Dam.

Common Name	Scientific Name
American eel	*Anguilla rostrata*
Atlantic salmon	*Salmo salar*
Banded killifish	*Fundulus diaphanus*
Blacknose dace	*Rhinichthys atratulus*
Bluegill	*Lepomis macrochirus*
Brook trout	*Salvelinus fontinalis*
Brown bullhead	*Ameiurus nebulosus*
Brown trout	*Salmo trutta*
Common carp	*Cyprinus carpio*
Chain pickerel	*Esox niger*
Fallfish	*Semotilus corporalis*
Golden shiner	*Notemigonus crysoleucas*
Green sunfish	*Lepomis cyanellus*
Largemouth bass	*Micropterus salmoides*
Pumpkinseed	*Lepomis gibbosus*
Rainbow trout	*Oncorhynchus mykiss*
Redbreast sunfish	*Lepomis auritus*
Rock bass	*Ambloplites rupestris*
Smallmouth bass	*Micropterus dolomieui*
Spottail shiner	*Notropis hudsonius*
Tessellated darter	*Etheostoma olmstedi*
White sucker	*Catastomus commersoni*
Yellow perch	*Perca flavescens*

Realizing the importance of brook trout and their habitats, a unique partnership is now underway between state, federal, local agencies, as well as non-profit government organizations and private citizens called the Eastern Brook Trout Joint Venture (EBJTV). As part of the National Fish Habitat Initiative, this venture is a geographically focused, locally driven scientifically based effort with goals to protect, restore, and enhance aquatic habitat throughout the eastern range of brook trout. More can be learned about these efforts at http://www.easternbrooktrout.org/.

Cold Brook also supports a diversity of fluvial dependent fish species that includes: blacknose dace, longnose dace, fallfish, white sucker, tessellated darter and slimy sculpin. Slimy sculpin have a somewhat limited distribution in Connecticut, especially within eastern Connecticut where only five populations have been documented. Slimy sculpin are often considered an "indicator species" since they are only found in very cold waters with water temperatures usually less than < 15^0C (59^oF) (Otto and Rice 1977). Typically

within Connecticut, slimy sculpin are found in association with very abundant native brook trout populations and within streams that receive cold groundwater inputs especially during low flow periods. When Cold Brook was sampled on August 3, 1993, water temperature was 53.6^{o} F while air temperature was 75.2^{o} F. This is further evidence that Cold Brook receives an unusually large amount of groundwater making it a unique and valuable coldwater resource.

Unnamed Tributary to Cold Brook

This watercourse that flows into Cold Brook from the east and just south of the proposed ash landfill footprint appears to be intermittent based upon field and mapping conditions. It may seasonally support fish populations similar in composition to Cold Brook. One of the more important functions of these headwater streams is to provide clean and unpolluted waters to downstream areas of a watershed, which contain an increased diversity of aquatic organisms.

Potential Impacts

Stream Sedimentation

The development area is characterized by steep topography, which presents a major challenge to properly control soil runoff. It is proposed that ash will be disposed of within individual cells of land, cleared and excavated for ash disposal that may range from 15 to 20 acres in size. Disturbed topsoil within these cells may become exposed and susceptible to runoff events into watercourses such as Cold Brook, especially near steep slope areas. Most surface topography within the proposed ash landfill site currently drains into Cold Brook. The negative impacts of sediment laden runoff have been well documented by researchers. Sediment will reduce populations of aquatic insects and fish by eliminating physical habitat while suspended sediments will reduce dissolved oxygen levels (Cordone and Kelley 1961). Suspended sediments may prevent successful nest development of trout (Bell 1986). As reported by Meehan (1991), sediment deposition can severely impact spawning substrate abundance and quality. Reductions in egg survival are caused by smothering and insufficient oxygen supply (Bell 1986). Meehan (1991) indicated that erosion and sedimentation of instream habitat could alter channel morphology by increasing the stream width-depth ratio, incidence and severity of stream bank erosion, channel braiding, and reduce pool volume and frequency.

Stream Crossings

The proposed landfill will be accessed through the roadway utilized to enter the existing Windham Materials sand and gravel mining operation. Information was provided to the Team that the roadway will need to be upgraded to accommodate increased truck traffic associated with ash disposal at the site. At present, the triple 60” round corrugated metal culverts that convey Cold Brook at the entrance to the Windham Materials sand and gravel operation block upstream fish passage due to perched conditions (Figure 1). In effect, these culverts act as a dam. Just upstream, the twin round metal corrugated

culverts that convey Cold Brook at the Franklin Mushroom Plant driveway are passable. A survey of stream crossings above this location revealed that all were passable to fish. As such, the triple culverts fragment and isolate the Cold Brook fish community making approximately 1.4 miles of upstream stream habitats unavailable for use by the fish community that is restricted downstream of the perched culverts.

Figure 1. Culverts perched above the streambed block upstream fish passage within Cold Brook

As road crossings contribute to population fragmentation and isolation they undermine the viability of fish populations (Jackson 2003). In addition, Jackson (2003) reported that smaller and more isolated populations are vulnerable to genetic change and extinction due to natural climatic events (droughts, floods) or further human alterations.

Another stream crossing problem was located downstream within the property actively used by activities associated with the Windham Materials operation (Figure 2). There is a "direct fording" of Cold Brook; (Coordinates N41 39.567, W -72 08.699). This location is an active source of sediment as stormwaters erode the roadway soils into Cold Brook. The adverse impacts of sedimentation to aquatic resources were described above.

Figure 2. Direct fording of Cold Brook. This site is an active source of instream sedimentation.

Water Quality/Quantity

Water Quality Classifications that are based on the adopted Water Quality Standards, establish designated uses for surface and ground waters and identify the criteria necessary to support those uses (CTDEP 2002). The designated use and criteria serve to focus DEP's water quality management activities, including establishment of water quality based treatment controls and strategies required by the federal Clean Water Act.

Shetucket River surface waters are designated as Class B next to the project area. These surface waters are designated for: habitat for fish and other aquatic life and wildlife; recreation; navigation; and industrial and agricultural water supply. Cold Brook surface waters adjacent to the project area are designated as Class A: Class A surface waters are designated for: habitat for fish and other aquatic life and wildlife; potential drinking water supplies; recreation; navigation; and water supply for industry and agriculture.

Most surface topography within the proposed ash landfill site currently drains into Cold Brook. Groundwater typically flows in the direction that parallels the gradient of the surface topography and ultimately discharges to waterbodies such as streams (DEP 1989). Incinerator ash contains toxic metals such as lead and cadmium that could result in the pollution of groundwaters and surface waters if not properly managed and contained (DEP 1989). The Inland Fisheries Division is concerned about the potential relation between landfill creation and diminution and alteration of groundwater quality and quantity inflow into Cold Brook, a "Class A" stream. Specifically, will the proposed ash landfill alter groundwater temperature, infiltration path, quantity, and recharge rate to Cold Brook? The long term viability of Cold Brook's fish population, in particular native

brook trout and slimy sculpin is “highly dependent” upon the infiltration of cold groundwaters. Will leachate pumped and removed from the landfill be comprised of groundwaters that help support the health and hydrology of Cold Brook?

Recommendations/Comments

Shetucket River/Cold Brook Hydrology

Hydrogeological reports and information have not been completed and were not available for review. Ash landfill siting matrix (DEP 1989) provides guidance that recommends disposal sites be located next to major rivers that can assimilate or dilute any waste that may reach them without causing water quality impacts, hence the CRRA disposal site next to the Shetucket River. IFD staff is concerned about potential water quality impacts to the Shetucket River from ash disposal. In addition, the aquatic resource closest to the ash landfill, Cold Brook, appears most at risk from ash landfill impacts and pollution. CRRA should provide hydrologic modeling data and information to demonstrate “no impacts” to Shetucket River/Cold Brook water quality as well as water quantity inflows into Cold Brook. The protection of water quality and water quantity will serve to protect the high quality coldwater fish community within Cold Brook as well as the very diverse fish community within the Shetucket River. IFD staff will work in concert with DEP regulatory staff involved with solid waste permitting for this ash landfill to ensure that the Shetucket River and Cold Brook are not impacted by this landfill.

Stream Crossings

The existing triple 60 inch round corrugated metal culverts should be replaced to provide for upstream fish passage and to reconnect over 1.4 miles of upstream fish habitats. There are various design options that can accomplish the goal of providing upstream fish passage for the Cold Brook fish community. At this location, the most preferable option would be the installation of a bottomless arch culvert that would provide for upstream fish passage and also provide the added benefits of restoring instream and riparian habitats that have been impacted by fills associated with the existing culverts. It is advised that project developers refer to the DEP stream crossing guidelines publication for technical guidance regarding stream crossings. This publication can be obtained on the DEP website at:
http://www.ct.gov/dep/lib/dep/fishing/restoration/streamcrossingguidelines.pdf.

While not a part of the proposed CRRA ash landfill development, the Town of Franklin inland wetland enforcement agent should explore options for having Windham Materials remediate erosion and sedimentation problems associated with the “direct fording” of Cold Brook. Either this direct crossing should be abandoned with the unimproved roadway being stabilized to control stormwater runoff or a formal “fish passage friendly” crossing be designed and installed based upon the aforementioned DEP stream crossing guidelines.

Riparian Corridor Protection

It is the policy of the Inland Fisheries Division that riparian corridors be protected with an undisturbed 100 ft. wide riparian buffer zone along both sides of a perennial watercourse; 50 ft. wide riparian buffer zone along both sides of an intermittent watercourse. Given the projected footprint of the CRRA ash landfill, it is critical that an **undisturbed 100 ft. wide buffer** be maintained along both sides of Cold Brook. A riparian wetland buffer is one of the most natural mitigation measures to protect the water quality and fisheries resources of watercourses. IFD policy and supportive documentation can be viewed on the DEP website at: http://www.ct.gov/dep/lib/dep/fishing/restoration/riparianpolicy.pdf and http://www.ct.gov/dep/lib/dep/fishing/restoration/riparianpositionstatement.pdf.

Erosion and Sediment Control Plan

Proper installation and maintenance of erosion/sediment controls is critical to environmental well being. It is recommended to develop an aggressive and effective soil erosion and sediment control plan that utilizes guidance as described in the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control manual. This includes such mitigative measures as filter fabric barrier fences, staked hay bales, and temporary sediment basins. Land disturbance and clearing should be kept to a minimum. Exposed, unvegetated areas should be protected from storm events. The local wetland enforcement officer should be responsible for checking this development on a periodic basis to ensure that all soil erosion and sediment controls are being maintained. Past siltation disturbances in Connecticut have occurred when individual contractors either improperly deployed mitigation devices or failed to maintain these devices on a regular basis.

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Wildlife Resources

The following section will provide a general overview of the wildlife habitat values and potential impacts of the proposed CRRA Ash Landfill Site. Information made available to the Environmental Review Team for its evaluation was limited; therefore, it was not possible to fully assess the potential impacts to wildlife resources. A list of natural resource surveys conducted on the property by CRRA was requested by this reviewer and is provided as an attachment to this section of the ERT report (Attachment A). Wildlife Division staff will be reviewing and providing comment on the results of these investigations once the reports have been submitted to the DEP as part of the regulatory review/permitting process.

Description of Habitats

The proposed CRRA Ash Landfill Site (Landfill Site) is located within 1,000 feet the Shetucket River, just north of the Scotland Dam. The Site Investigation Area (Investigation Area) is approximately 600 acres and includes a portion of the Town of Windham located between the Landfill Site and the Shetucket River. The majority of the Investigation Area, including the area selected for the landfill (i.e., about 150 acres located in the central portion of the property that includes an area known as the Susquohanna Plains), is dominated by mature, mixed hardwood-softwood forest, consisting of primarily red oak, eastern white pine and eastern hemlock. Cold Brook flows north through the western portion of the Investigation Area into the Shetucket River. Hemlock-dominated stands occur along Cold Brook and the steep banks of the Shetucket River. Other habitats and features on the property include: rocky outcrops and ledges; potential vernal pools; a few small wetlands (one shrub-dominated and surrounded by steep slopes); an intermittent stream that flows into Cold Brook; an active gravel excavation area; a former excavation site being used for agricultural purposes; and a system of old woods roads. With exception to the eastern half of the Landfill Site that is relatively flat, the topography of the Investigation Area is moderately to steeply-sloped.

Wildlife Habitat Values

The Investigation Area provides good quality habitat for wildlife because of its large acreage, the habitats of which it is comprised, and its proximity to the Shetucket River and numerous large, contiguous parcels of protected open space (state, municipal, private) consisting of mature forest interspersed with wetlands, agricultural lands and other open habitats (e.g., grasslands, old fields). Examples include Talbot Wildlife Management Area (about 450 acres) to the northeast, Mohegan State Forest (about 960 acres) to the southeast, Franklin Swamp Wildlife Management Area (about 680 acres) to the south, and over 4,000 acres of agricultural lands protected under the Farmland Preservation Program to the south, west and north.

A diversity of wildlife species can be expected to occupy the Investigation Area, including migratory land birds that require large acreages of continuous forest for successful breeding (e.g., hermit thrush, worm-eating warbler, scarlet tanager, pileated woodpecker), and mammalian predators that have large home ranges (e.g., black bear, fisher, bobcat). Large, unfragmented parcels of mature forest containing multiple habitat types are becoming less common in Connecticut, as development creates small, isolated patches of habitat. Wildlife occupying these isolated habitats are more susceptible to human disturbance, water quality degradation and increased predation rates. As the existing forest becomes fragmented by roads and development, wildlife that require large acreages of continuous forest will be reduced in abundance and diversity, or eliminated depending on their specific needs. It has been documented that isolated patches of forest smaller than 100 acres are characterized by a low density and diversity of forest interior breeding birds. High rates of cowbird parasitism and nest predation have been reported where small forest patches are surrounded by open habitat.

Large acreages of continuous forest typically provide a greater diversity of food resources (i.e., different types of acorns, catkins, fruits, etc.), more nesting, denning and roosting sites, and areas for cover. Oak acorns are a valuable food item for a wide variety of mammals and birds such as white-tailed deer, gray squirrel, southern flying squirrel, eastern chipmunk, white-footed mouse, eastern wild turkey and blue jay. Trees, both living and dead, also serve as habitat for a variety of insects, which, in turn, are eaten by many species of birds, including woodpeckers, warblers and nuthatches. In Connecticut's hardwood-dominated landscape, preserving coniferous habitats is important to maintaining wildlife species diversity. Dense stands of hemlock, pine, spruce and cedar provide protective shelter for wildlife by reducing the effects of wind, precipitation and solar radiation, and the seeds, foliage and twigs are eaten by a variety of birds and mammals. Examples of wildlife that use mature mixed deciduous-coniferous forest include: northern redback salamander, northern spring peeper, northern black racer, sharp-shinned hawk, northern goshawk, great-horned owl, scarlet tanager, hermit thrush, wood thrush, ovenbird, great-crested flycatcher, pileated woodpecker, yellow-rumped warbler, black-throated green warbler, blackburnian warbler, pine warbler, black and white warbler, white-throated sparrow, dark-eyed junco, evening grosbeak, pine siskin, purple finch, southern red-backed vole, southern flying squirrel, red squirrel, fisher, bobcat and black bear.

The Shetucket River, Cold Brook and the riparian zones associated with these watercourses contribute significantly to the property's value to wildlife, providing a large area with multiple resources (food, water, cover) for species that may be using the river as a migratory route, foraging area or breeding habitat. Portions of the Shetucket River are considered large river habitat. Connecticut contains a few large rivers (e.g. the Connecticut, Housatonic, and Thames), most of which have had habitats altered due to dam construction, navigational dredging, and consumptive water use. Large Rivers and Streams and their Associated Riparian Zones are one of the 13 most imperiled habitats in Connecticut (Metzler and Wagner 1998). Riverside development, water diversion, and discharges are the major threats to this ecosystem.

Large rivers and associated riparian zones support a diverse assemblage of wildlife. The riparian zones include flood-scoured rocky and gravelly riverbanks, riverside seeps, and riverside outcrops. These areas are critical habitat for species such as eastern small-footed bat, long-tailed weasel and short-tailed weasel. Other examples of wildlife that use these habitats are mink, river otter, belted kingfisher, eastern kingbird, American redstart, barred owl, American black duck, eastern ribbon snake, spotted turtle, box turtle and wood turtle (one of three state-listed species found in the vicinity of the proposed Landfill Site; see Natural Diversity Database section of this ERT report). Large rivers also provide critical feeding habitat for bald eagles that winter in the state and nest in nearby forested areas.

Deep freshwater habitats provide adult holding areas, migration staging areas, and feeding and spawning areas for a variety of fish. The DEP's Inland Fisheries Division has documented 23 species of fish in the Shetucket River upstream and downstream of the Scotland Dam (see Fisheries Resources section of this ERT Report). Seven species of freshwater mussels were found in portions of the Shetucket River in Windham and Scotland, including brook floater (Endangered in Connecticut) and the eastern pearlshell (Special Concern in Connecticut) in 2008 (Nadeau 2009 and Nadeau, personal communication). Both state-listed species were found in the impoundment of the Scotland Dam. Large populations of four common species (eastern elliptio, eastern lampmussel, eastern floater, and triangle floater) were found downstream of the Scotland Hydro Dam and these species were sparse or absent in most other survey sites in the Shetucket River and Natchaug River watershed. This is the highest diversity ever documented for any river segment in the entire Thames River watershed. Thus, the conservation value of the Shetucket River in Windham and Scotland is high due to the presence of state-listed mussels and source populations of common species.

Cold Brook, a clear, gravel bottom perennial stream bordered by mature forest, is considered a valuable coldwater resource known to support native brook trout and slimy sculpin, both coldwater-dependent species. Cold Brook has the potential to support the eastern pearlshell as this mussel is found in clean, coldwater streams along with brook trout, one of its host fishes. The stream may provide suitable basking, feeding and hibernation habitat for wood turtles and may serve as a travel corridor for amphibians as they migrate between uplands and breeding pools. Other species that may use the streams and wetlands on the property include northern dusky salamander, green frog, pickerel frog, spring peeper, spotted turtle, raccoon, river otter, mink, short-tailed weasel, star-nosed mole, common yellowthroat, eastern phoebe, gray catbird, blue-gray gnatcatcher and wood thrush.

Potential Impacts & Recommendations

There will be a direct loss of a significant acreage of mature forest habitat as the land is cleared over the 30 years. The loss of habitat and increase in human activity while the landfill is in operation will render the remaining habitats functionally less valuable or unsuitable to some species of wildlife that require large acreages of undisturbed habitat.

As the site is cleared and the landfill is in operation, the potential for wetland and water quality degradation will increase.

One group of wildlife that can be greatly affected by wetland alterations and habitat fragmentation are the amphibians. Because amphibians have small home ranges, relatively limited dispersal capabilities and high site fidelity, they are highly sensitive to local environmental changes. The uplands surrounding vernal pools and other ephemeral wetlands are an integral part of the wetland systems amphibians require for survival (M.W. Klemens, Research Scientist, Land Use Planner, Author. Wildl. Conserv. Soc., personal communication, 1988). For example, studies have shown that salamanders will move up to 800 feet or more from their breeding pools into adjoining upland forests to forage. Forest canopy removal can have a detrimental effect on vernal pool ecology by altering soil and water temperature, evaporation rates and the import of organic material (e.g., leaves and branches) into the pools. Road systems can significantly impact reptile and amphibian populations through direct mortality, i.e., road kills, where roads intersect migration and dispersal routes. In addition, the presence of curbing, berms, drainage ditches and silt fences can cause amphibians and reptiles to divert from their normal migration routes. Small mammals can be similarly affected.

To optimally protect amphibian populations in a given area, an investigation would be required in the spring and fall to identify breeding sites (e.g., vernal pools) and migration and dispersal routes so that roads and development could be directed away from these critical areas. Maintaining the connections between breeding pools, the surrounding uplands and larger wetland complexes is of critical importance. Slope, soils, forest cover, distance from other pools, proximity to roads and individual species home ranges need to be considered to determine appropriate buffer locations and sizes.

Effects on amphibians and reptiles can be reduced during site development by:

1) avoiding direct impacts to wetlands and watercourses (e.g., filling and hydrologic changes);

2) maintaining water quality through a reduction of impervious surfaces, implementation of an aggressive sediment and erosion control plan (to include regular inspection and maintenance), and eliminating direct discharges of stormwater into wetlands, watercourses or potential breeding pools;

3) reducing barriers to migration by a) staggering haybales and silt fences in shorter lengths during site construction and removing them following site stabilization, b) refilling to grade any test holes and ruts created during site construction and c) eliminating the use of curbing where possible; where necessary, Cape Cod style curbs (i.e., curbs at 45 degree angle) should be used;

4) using open bottom arched culverts and similar designs at stream crossings to maintain natural stream bottom conditions; and

5) maintaining a 50-foot wide (minimum) vegetation zone around vernal pools.

Other environmental concerns associated with the construction and operation of the landfill facility include:

- noise and light pollution;
- containment of potential contaminants associated with the operation and maintenance of equipment on the site;
- the potential introduction of invasive plants;
- the effects on public health and natural resources should the leachate containment system fail; and
- the potential for future expansion of the landfill.

The primary environmental concern is the potential impact to the Cold Brook/Shetucket River ecosystem from land clearing activities and the disposal and containment of ash (containing heavy metals and salt) on the site. Cold water streams in Connecticut are typically associated with undeveloped forested areas, where shade from the forest canopy and inflow from groundwater and undisturbed wetlands maintain stable and suitable water temperatures, especially during summer. Forested riparian zones also aid in the survival of aquatic invertebrates and plants by removing excess nutrients and sediment, and serve as travel corridors for wildlife.

Attention should be given to minimizing the amount of land that is cleared and soils that are exposed to precipitation (especially storm events) as the operation progresses to reduce the potential for erosion, sedimentation and pollution. A minimum 100-foot buffer of natural vegetation should be maintained on both sides of Cold Brook and the intermittent stream that feeds it, and an aggressive erosion and sedimentation control plan (to include regular inspection of erosion control measures) and water quality monitoring program should be employed. Preserving undisturbed travel corridors for wildlife (minimum 300-foot wide areas of natural vegetation), particularly those that link the wetlands and watercourses to undeveloped uplands (and ideally to permanently protected open space) may help reduce the effects of habitat loss and fragmentation. Finally, and most importantly, the results of CRRA's hydrogeological investigations (not completed at the time of the ERT review), must demonstrate that the surface and groundwater flows that sustain Cold Brook will not be compromised. Ensuring that the quality and quantity of water entering Cold Brook is not affected by the landfill is of primary importance to protecting the health of the Shetucket River and the other natural resource values associated with the property.

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Attachment A

Ecological Investigations at CRRA Franklin Ash Landfill Site

I. Wetland/Watercourse/Vernal Pool Survey/Delineation

Surveys for wetlands, watercourses, and vernal pools were conducted by TRC in mid-April 2008. All identified wetlands, watercourses and vernal pools within the study area were subsequently delineated in the field.

The presence of wetlands and watercourses on the site were identified by a soil scientist and ecologist. TRC identified and delineated both federal and state jurisdictional wetlands located within the site boundaries. Federal wetland boundaries were identified and delineated in accordance with the U.S. Army Corps of Engineers Wetland Delineation Manual, dated January 1987 (Technical Report Y-87-1) and subsequent regulatory guidance. State wetland and watercourse boundaries were identified and delineated in accordance with the Inland Wetlands and Watercourses Act (IWWA: sections 22a-36 through 22a-45 of the General Statues of Connecticut).

TRC conducted sampling within potential vernal pools associated with the site to document presence and evidence of breeding by various amphibian species. Field sampling was conducted by TRC ecologists using waders and dipnets and included visual observations of amphibian/reptile usage, counts of amphibian egg masses and relative abundance of larvae, and other biological indicators of vernal pools (e.g., fairy shrimp, fingernail clams).

Wetland, watercourse and vernal pool boundaries were conspicuously marked with sequentially numbered pink flags. Once flags were placed, the location of each flag was recorded with the use of a Global Positioning System (GPS) unit with submeter field accuracy. Data regarding dominant vegetation and wetland hydrology were recorded in addition to taking a photograph(s) of each identified wetland, watercourse and vernal pool. A function and value assessment of each identified wetland will also be conducted by TRC based on the information collected.

II. Wood Turtle Survey

Surveys for wood turtles (*Glyptemys insculpta*) were conducted by TRC and its subcontractor, Hyla Associates from mid-June through October, 2008. The surveys focused on Cold Brook, wetlands adjacent to the Shetucket River, and potential wood turtle terrestrial habitats (i.e., breeding or egg-laying areas and hayfields) or on or adjacent to the site. Surveys were conducted by three biologists performing walk-through surveys of potential habitats three days per week during June, September and October. Surveys in July and August were conducted by three biologists for three days every other week. A CTDEP scientific collection permit was obtained for this study and all wood turtles observed during the study were measured and marked.

III. Rare Plant Survey

TRC conducted a survey for two state-listed rare plant species identified as potentially occurring on or adjacent to the site. Based on correspondence received from the Connecticut Natural Diversity Data Base (NDDB) surveys for mountain spleenwort (*Asplenium montanum*) and riverweed (*Podostemum ceratophyllum*) were conducted in appropriate habitats over a two day period in July/August 2008. Identified populations of either species were mapped, photographs taken and detailed habitat descriptions prepared to document the presence/absence of these species.

IV. Wildlife Survey

Although a formal wildlife survey was not proposed or conducted for the site, all sightings and auditory observations of amphibians, birds, mammals and reptiles were noted during the ecological investigations conducted at the site during 2008. As noted above, amphibian and reptilian use of vernal pools at the site was documented for each pool. Bird species at the site were primarily identified by song while amphibians, mammals and reptiles were typically noted by direct observation.

The Natural Diversity Data Base

The Natural Diversity Data Base maps and files regarding the project area have been reviewed. According to our information, there are records for State Special Concern *Glyptemys insculpta* (wood turtle) from the vicinity of this project site.

Wood turtles require riparian habitats bordered by floodplain, woodland or meadows. They hibernate in the banks of the river in submerged tree roots. Their summer habitat includes pastures, old fields, woodlands, powerline cuts and railroad beds bordering or adjacent to streams and rivers. This species has been negatively impacted by the loss of suitable habitat.

If Wood turtle habitat exists on the proposed site and will be impacted by the project, the Wildlife Division recommends that a herpetologist familiar with the habitat requirements of this species conduct surveys between April and September to see if they are present. A report summarizing the results of such surveys should include habitat descriptions, reptile species list and a statement/resume giving the herpetologist' qualifications. The DEP doesn't maintain a list of qualified herpetologists. A DEP Wildlife Division permit may be required by the herpetologist to conduct survey work; you should ask if your herpetologist has one. The results of this investigation can be forwarded to the Wildlife Division and, after evaluation, recommendations for additional surveys, if any, will be made.

Standard protocols for protection of wetlands should be followed and maintained during the course of the project. Additionally, all silt fencing should be removed after soils are stable so that reptile and amphibian movement between uplands and wetlands is not restricted.

Please be advised that the Wildlife Division has not made a detailed field inspection of the project nor have we seen detailed timetables for work to be done. Consultation with the Wildlife Division should not be substituted for site-specific surveys that may be required for environmental assessments. The time of year when this work will take place will affect this species if they are present on the site when the work is scheduled. Please be advised that should state permits be required or should state involvement occur in some other fashion, specific restrictions or conditions relating to the species discussed above may apply. In this situation, additional evaluation of the proposal by the DEP Wildlife Division should be requested. If you have any additional questions concerning the wood turtle, please contact Julie.Victoria@ct.gov. please reference the NDDB #16109, 16533 when you e-mail.

Furthermore, we have records of two state-listed plant species just west of the site. They are: Mountain spleenwort (*Asplenium montanum*), State Threatened and Riverweed (*Podostemum ceratophyllum*), State Special Concern (RCSA Sec. 26-306). It is recommended that a site survey by a botanist be done to determine if either of these

species are present on the site. A report summarizing the results of such survey should include habitat descriptions, vascular plant species with special notes on the presence or absence of the species in question and a statement/resume giving the botanist's qualifications. The report should be sent to Nancy Murray (DEP-Wildlife Division; 860-424-3589). The habitat for *Asplenium montanum* is acid rock ledges and cliff faces often in shaded, moist crevices. This species can be looked for any time during the year because it is an evergreen fern. The habitat for *Podostemum ceratophyllum* is fast flowing water in rivers and streams, on rocks, stones and gravel. This species is best looked for during mid-July and August. Please direct any questions regarding these plants or the site survey to Ms. Murray.

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 Environmental Protection's Geological and Natural History Survey and cooperating units of DEP, 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.

Also be advised that this is a preliminary review and not a final determination. A more detailed review may be conducted as part of any subsequent environmental permit applications submitted to DEP for the proposed site. If the proposed project has not been initiated within six months of this review, please contact our program for an updated review.

Archaeological and Historical Significance

The Office of State Archaeology (OSA) and the State Historic Preservation Office (SHPO) suggest that the ash landfill site possesses moderate-to-high sensitivity for archaeological resources including prehistoric Native American and historic Colonial sites. CRRA's *Ash Landfill Progress Report* (September 2008 acknowledges that detailed cultural and archaeological investigations are warranted and will be undertaken in coordination with the State Historic Preservation Office. In this regard, the OSA and SHPO understand that CRRA has consulted with TRC to conduct the archaeological survey of the project area.

All archaeological studies of the proposed project area must be carried out pursuant to current state-of-the-art standards and SHPO's *Environmental Review Primer for Connecticut's Archaeological Resources.* OSA and SHPO look forward to reviewing TRC's report and recommendations based on their cultural resource survey.

The OSA and SHPO offices are available to provide technical assistance in the identification and evaluation of cultural resources on the two parcels under consideration.

Traffic Issues

The Connecticut Department of Transportation (CT DOT) understands that the project is currently in the planning stage and not final.

Pertinent issues that should be considered:

General:

- A Traffic Impact Analysis/Study should be considered for the proposed site. The traffic analysis should consider traffic impacts throughout the life of the landfill. The report and site plan will need to be submitted to the State Traffic Commission (STC) along with a request for a Determination. The 85th Percentile speed data should be used in the Traffic analysis study. AM and PM peak hour and Saturday Mid day traffic volumes should also be included in the traffic study. Summer volumes may also need to be considered.

  The STC has adopted regulations which define a development needing a certificate of operation as any which provides 200 or more parking spaces or has a gross floor area of 100,000 square feet or more, and has a driveway on a state highway or which abuts or adjoins a state highway or which substantially affects state highway traffic. For those developments which do not have a driveway on, or abut or adjoin a state highway, a determination of impact (certificate determination) must be made. The Department of Intermodal Planning supports this action, since the development impacts Route 32, a State Road. This would allow the Department's Traffic Forecasting Unit and the Division of Traffic Engineering to further review the application.

- The Traffic Impact Study should supply speed limit information for the roads within close proximity to the site, including 85th Percentile speed data. This data is relevant for design, such as computing sight distance requirements and determining whether a left-turn treatment is necessary at the site driveway.

- The most current accident history data should also be included in the Traffic Impact Study. Accident data is currently available through the Department's Traffic Accident Viewing System (TAVS) program.

- According to the Department's Accident Records Section, property damage only accidents which occurred on <u>locally maintained roadways</u> (i.e. Town Roads) from 01/01/07 to present were coded for inclusion in the Department's accident files. Property damage only accidents which occurred on locally maintained roadways from 04/01/92 to 12/31/06 were <u>not</u> coded for inclusion in the accident file. The Accident Records Section estimates that accident records may increase as much as 30% when property damage only accidents are included. Therefore, accident records for nearby Town roads should be

obtained directly from the Towns of Franklin and Windham and the data should be included in the traffic study.

- It was stated by CRRA that approximately 60 trucks per day will be transporting ash to the landfill. It was uncertain, at the time of the meeting, whether the gravel pit would be in operation. The CRRA trucks and a truck count for the gravel pit should be included in the traffic study. It should be understood that the trucks leaving the gravel pit are loaded and speeds are reduced dramatically.

- It was also stated by CRRA that the trucks will use limited access state highways to get to the Route 2 interchange with State Route 32. The trucks will proceed north on Route 32. This raises some concern; the interchange between Interstate 395 and Route 2 is less than FHWA standards for acceleration and deceleration lanes for an interchange. Increasing truck traffic through this interchange will need to be studied. Also at the bottom of "Franklin Hill" there is a left turn lane to Meeting House Hill Road. The left turn lane becomes a passing lane that continues up "Franklin Hill" and discontinues beyond the crest of the hill. The tendency is to begin passing slower traffic utilizing the left turn lane and with an increase in truck traffic this tendency may increase as well, therefore a traffic study and an accident analysis of these intersections/interchanges should be included in the Project's Traffic Analysis.

- In the event of an incident, local first responders along the proposed Routes should be properly trained in the remediation of any possible spill that may occur as a result of the incident. The first responders should also have the proper equipment to perform the remediation.

- If at any time during the operation of the landfill, the proposed travel route by CRRA changes (trucks start accessing the landfill through Windham), a left-turn treatment (such as a left-turn lane or a left-turn bypass lane) may be warranted on Route 32. Assuming there will be one site driveway (all volume at one driveway) on Route 32 with a design (85^{th} Percentile) speed; a new traffic analysis should be conducted so as not to hinder thru movement traffic. Accident history, right-of way availability, available sight distance, peak hour volumes and design speed are factors that must also be taken into consideration for the analysis.

- A <u>New</u> Traffic Impact Analysis Study should also be conducted if the amount of truck traffic increases a certain percentage of the original used in the initial traffic analysis.

- The Department agrees that the Highway Design Manual (2003 Edition or later) should be used to determine sight distance requirements. However, the 85^{th} percentile speed is normally used for the design speed, not the posted

speed limit. Without the available sight distance or design speed, it cannot be determined, at this time, whether the available sight distance is truly adequate. There are noticeable crests in the road north and south of the ingress/egress point that affect sight distance and should be considered with the 85th percentile speed.

- It should also be noted that if intersection improvements are deemed necessary for the ingress/egress point, an environmental impact study should be conducted for the intersection.

- An investigation should also be conducted into moving the current ingress/egress point farther south on Route 32.

- Any recent corridor planning studies for the region and/or the Towns of Franklin and Windham should be reviewed and considered for their relevance to the proposed site plan.

Planning Considerations

At present this proposal does not have a completed site development plan. The CRRA is investigating the site area in order to obtain the information necessary to complete such a plan. While exact property boundaries and total parcel size are undetermined, in general, the proposal involves utilizing the Susquehanna Plains area to construct an ash landfill. The landfill will be constructed using various state required methods. These include the use of landfill liners and a leachate collection system. The activity will also involve the construction of several buildings for equipment storage, a truck weight scale, and some form of truck wash station. Their placement is presently undetermined. Also undetermined, at present, is whether the current sand and gravel excavation operations located in the area will continue in conjunction with the operation of the landfill. The continuation of these activities will impact the traffic generated by the site, and should be taken into consideration when designing the final access.

What is known specifically is that the landfill will utilize approximately 100 to 150 acres for the landfill itself and is intended to be located in the Susquehanna Plains. The final parcel size may be 350 acres or more and this parcel will extend to the Shetucket River in the Town of Windham. It is proposed to operate for some 30 years and will involve the disposal of approximately 300,000 tons of ash annually. This ash will be delivered to the site 5 days a week and is estimated to require 60 trucks per day to accomplish that delivery. The existing Franklin Farms access drive may be the landfill access.

Minimizing the impact from this proposal will require meeting numerous environmental standards. The techniques used will depend on site-specific natural resource characteristics. The investigation of this property will result in the identification of site constraints. It is imperative for the town to obtain the assistance of engineering services to review the investigation findings and any mitigation methods proposed for the operation of this facility. Other methods such as significant setback to surrounding uses and appropriate road design for safe vehicular travel will also assist in negating negative impacts.

State, regional and local governments have developed land use plans to guide existing and future land use. In general, these various plans classify the investigation site identified in this Team review in categories which recognizes the undeveloped nature of the area, the fact that public water and sewer service is unavailable, and that the area is a mix of forest, steams and wetlands. Specific designations are as listed below.

State Plan

The "Conservation and Development Policies Plan for Connecticut, 2005-2010" designates the site investigation area as "Conservation Area" in the Towns of Franklin and Windham with the area just east and south of it designated as "Rural Lands" in both towns. "Conservation Areas" represent a significant portion of the state and a wide range of land resources. These areas provide the state with its best opportunity to provide for

the state's future need for food, fiber, water and other resources. This designation's priority is that these areas be managed for the long-term public benefit and that changes in use be compatible with the identified conservation values. "Rural Lands" are those areas falling outside any other category. The designation priority is to discourage structural development forms and intensities that exceed on-site carrying capacity for water supply and sewage disposal.

Regional Plans

The "Regional Plan of Conservation and Development (RPOCD), 2007" Southeastern Connecticut Council of Governments (SCCOG) only recognizes the property in the Town of Franklin, as the Town of Windham is a member of the Windham Council of Governments (WINCOG). The WINCOG plan is reviewed below.

The SCCOG plan designates the site investigation area as appropriate for "Existing and Proposed Rural Uses". These areas are used, or recommended for residential uses at a density of less than 1 unit per acre. This designation is also suitable for agricultural, recreational, limited governmental or institutional uses.

To the west of this investigation area, in Franklin, along Route 32 the RPOCD designation is "Existing and Proposed Suburban Uses – Medium". These areas are used or recommended for residential and/or industrial and commercial development. These areas contain either public water or sewer system service or are recommended for such systems. These high-density suburban uses areas can accommodate residential densities ranging from 2 to 3 units per acre and similar non-residential activity densities.

The "Land Use Plan Draft Update 2008" Windham Council of Governments has the site investigation area north of the Franklin town line in the Town of Windham designated as a "High Priority Preservation Area" with the exception of a small area abutting the Town of Scotland, which is designated as "Priority Preservation Area". Preservation Areas are defined as areas that should be protected from harmful forms of development or resource use. There are two basic categories of resources, environmental resources and natural recreational resources. Environmental resources include a wide range of elements that are associated with environmental quality. Natural recreational resources include parks, trails, greenways, and other recreation areas. The stated general policy of this plan for Preservation Areas is that they should be permanently protected from any immediate and negative impacts to the resource, whether that resource is a specific natural element or an existing or potential recreation source.

Local Plans

Plan of Development, Franklin, Connecticut, 2000. The Franklin Plan of Development designates the site investigation area as low-density residential development with regard to future land use. This area is zoned for residential development with a minimum lot size of 120,000 square feet. The area is also depicted as containing areas of stratified drift, which the plan states are highly desirable to be protected from development, as they

are important for water supply purposes. The 2000 Plan of Development stated that Route 32 has the capacity to handle heavy a traffic load but that a continued rate of traffic increase may require improvements, which in large part will be dependant on the type of development that occurs along the corridor. The Recreation component of the plan promotes the Giddings Park area on Route 207 for present and future use recreational use.

Plan of Conservation and Development, Windham, Connecticut, 2007. The site investigation area in Windham north of the Franklin town line to the Shetucket River is designated such that the best use is undetermined. It is suggested that the area along the Shetucket River may be best as conservation land depending upon future use of the contiguous land in Franklin. The area north of the Shetucket River is designated for rural residential use while the land area along the east side of Route 32 is designated for manufacturing and industrial use.

Local Zoning

Franklin: As stated above the present zoning designation for this investigation area in Franklin is Residential R-120, which requires a minimum lot size of 120,000 square feet. While various uses, in addition to single-family dwelling units, are permitted, a landfill is not. Accordingly, in order to obtain a permit for this type of activity from the Planning & Zoning Commission, the zoning regulations would have to be amended.

Windham: The site investigation area north of the Franklin town line and adjacent to the Shetucket River in Windham is zoned Industrial M-2. The stated purpose of this District is to encourage and permit rural manufacturing. Listed permitted uses include office buildings, warehousing, and manufacturing. The minimum lot size is 80,000 square feet. There are no proposed activities in Windham accordingly zoning permits are not required.

Traffic

Review of State of Connecticut Department of Transportation traffic logs for the years 2003, 2005, and 2007 indicate that traffic volumes on the length of Route 32 from the Norwich town line to the Plains Road area in the Town of Windham have generally experienced a slight decline during the past several years. The vicinity of Route 2 and Route 87 is an exception to that decline but the increase there has also been slight. The 2007 Average Daily Traffic volumes range from 19,900, along the length of Route 32 between Route 2 to Route 87, 13,500 between Murphy Road and Baltic Road, 9,900 in the vicinity of Franklin Farms, and 10,900 between South Windham and Plains Roads. These volumes indicate that Route 32 has the capacity to safely handle the additional 60 trucks per day stated by CRRA. There is some concern regarding sight line at the access drive to the facility especially looking north on Route 32. Attention should be given to this situation during the design of the site development plan.

Review Process

The CRRA has stated that they intent to apply to the Franklin Planning & Zoning Commission for a zoning permit to operate this facility. Again, in order to accomplish this an amendment to the zoning regulations will be required.

Recreation Potential

Due to the large size of the proposed site, its undeveloped nature as well as access to the Shetucket River there has been mention of utilizing a portion of the site for recreational use in conjunction with the landfill operation. While this may have some potential, especially with regard to the area adjacent to the Shetucket River, the access to such an area may be problematic. This is primarily due to the long length of access road to get into the site from Route 32 and the potential problems of mixing private vehicles with larger vehicles accessing a landfill. The design of any access for such a dual purpose should be configured to minimize the mix of public vehicles from other heavy equipment and truck traffic.

Visual Impact

It is estimated by CRRA that a 100-acre landfill site would have a final elevation 130 feet above grade. The Susquehanna Plains is at an elevation of approximately 220 feet. While this area may be excavated somewhat for the first fill level, the final elevation of a completed 100-acre ash landfill will bring the Susquehanna Plains to an elevation of approximately 350 feet. As a comparison, the approximate elevations at various points surrounding the Susquehanna Plains are as follows: Route 32 at 220 feet, Shetucket River at 120 feet, Jerusalem Road in Windham, directly north of the proposed site, ranges from 200 to 270 feet, Pleasure Hill in Franklin at 580 feet. While the final completed landfill elevation should compliment the topography of the surrounding area, during construction the site may be viewable from many of the surrounding higher elevations shortly after the completion of the first or second levels. In general, with distances of over one-half mile to Jerusalem Road and Pleasure Hill, and over one mile to Route 32 the visual impact should be minimal.

About The Team

The Eastern Connecticut Environmental Review Team (ERT) is a group of professionals in environmental fields drawn together from a variety of federal, state and regional agencies. Specialists on the Team include geologists, biologists, foresters, soil specialists, engineers and planners. The ERT operates with state funding under the supervision of the Eastern Connecticut Resource Conservation and Development (RC&D) Area — an 86 town region.

The services of the Team are available as a public service at no cost to Connecticut towns.

Purpose of the Team

The Environmental Review Team is available to help towns and developers in the review of sites proposed for major land use activities. To date, the ERT has been involved in reviewing a wide range of projects including subdivisions, landfills, commercial and industrial developments, sand and gravel excavations, active adult, recreation/open space projects, watershed studies and resource inventories.

Reviews are conducted in the interest of providing information and analysis that will assist towns and developers in environmentally sound decision-making. This is done through identifying the natural resource base of the project site and highlighting opportunities and limitations for the proposed land use.

Requesting a Review

Environmental reviews may be requested by the chief elected official of a municipality and/or the chairman of town commissions such as planning and zoning, conservation, inland wetlands, parks and recreation or economic development. Requests should be directed to the chairman of your local Conservation District and the ERT Coordinator. A request form should be completely filled out and should include the required materials. When this request is reviewed by the local Conservation District and approved by the ERT Subcommittee, the Team will undertake the review on a priority basis.

For additional information and request forms regarding the Environmental Review Team please contact the ERT Coordinator: 860-345-3977, Eastern Connecticut RC&D Area, P.O. Box 70, Haddam, Connecticut 06438, e-mail: connecticutert@aol.com.