Greater Upper Valley Solid Waste Management District

Serving Bridgewater, Hartland, Norwich, Pomfret, Sharon, Strafford, Thetford, Vershire, West Fairlee, Woodstock

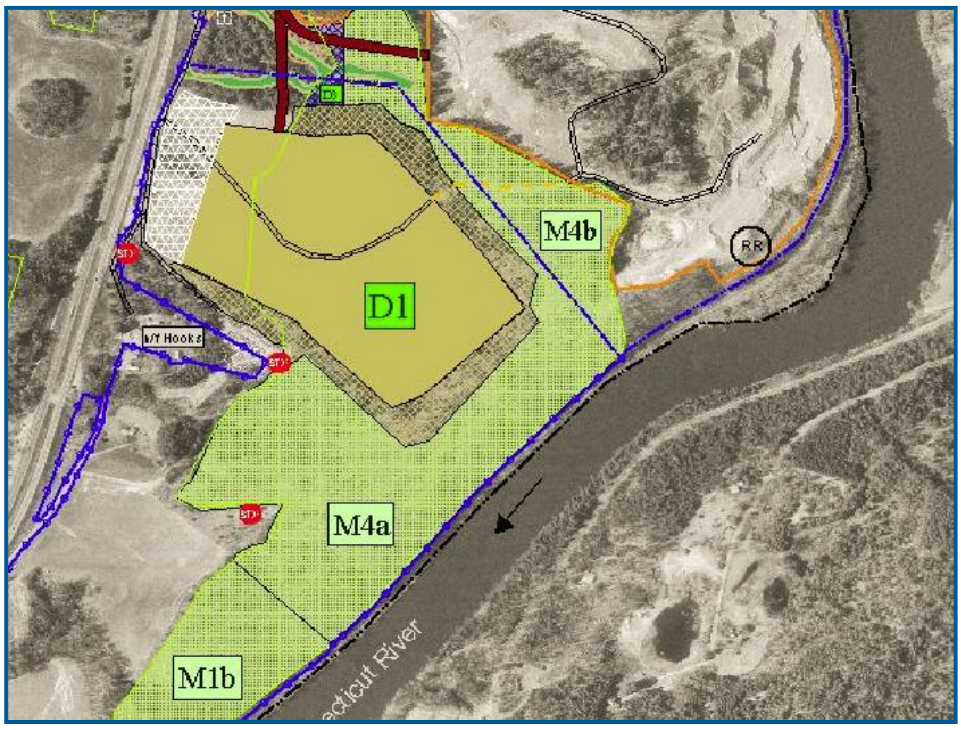
96 Mill St., P.O. Box 58, No. Hartland, VT 05052-0058 • Phone (802) 296-3688 • Fax 281-7088 • E-mail GUVSWD@valley.net

Proposal for Engineering Services

Preliminary Landfill Design, Economic Analysis, and Waste Evaluation Study

August 9, 2013

CMA Engineers, Inc.
35 Bow Street
Portsmouth, NH 03801
www.cmaengineers.com



Presented to the

Greater Upper Valley Solid Waste Management District

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CMA ENGINEERS, INC.
CIVIL/ENVIRONMENTAL ENGINEERS

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August 8, 2013

Mr. Thomas Kennedy
Greater Upper Valley Solid Waste Management District
96 Mill Street
North Hartland, Vermont 05052

Re: Proposal for Engineering Services
Preliminary Landfill Design, Economic Analysis, and Waste Evaluation Study
CMA # P-2545

Dear Mr. Kennedy,

In response to the RFP from the Greater Upper Valley Solid Waste Management District (District), CMA Engineers is pleased to submit our proposal for engineering services for Preliminary Landfill Design, Economic Analysis, and Waste Evaluation Study for the District's landfill project in North Hartland.

CMA Engineers is a civil and environmental consulting engineering firm with offices in Portsmouth and Manchester New Hampshire, and in Kennebunk, Maine. Engineering for municipal solid waste management projects, and lined landfill projects in particular, is a major area of service for the firm. We have worked with numerous solid waste districts and municipalities, in the successful planning, implementation and operations of secure solid waste landfills. In each of these projects, we have provided essential input and evaluations for the unique planning and management issues of each landfill, as well as detailed engineering associated with preliminary and final design, permitting, construction, and operations of the facilities.

We are pleased to include DSM Environmental Services of Windsor VT on our team, to assist in the evaluation and characterization of the solid waste market evaluation in Vermont and the region. DSM brings unique capabilities to the project team, with significant experience in the State and the region. CMA Engineers and DSM have a long history of collaboration.

CMA Engineers' solid waste landfill projects are more completely summarized in Section 1 of this proposal, Highlighted Project Experience. This section includes successful landfill projects for the following public sector landfills:

- ***Mt. Carberry Solid Waste Landfill,***
Androscoggin Valley Regional Refuse Disposal District, Berlin NH
AVRRDD is a 10 member municipal district that owns and operates the Mt. Carberry Solid Waste Landfill. CMA Engineers provides engineering services for all issues associated with the ongoing operation and expansion of the landfill.

- ***Franklin Secure Residue Landfill***
Concord Regional Solid Waste/Resource Recovery Cooperative, Concord NH
Engineering for all aspects of the Franklin Secure Residue Landfill that has served this 24 community-Cooperative in ash/residue disposal and management since 1988. Services have included comprehensive solid waste planning and management for the Cooperative since its formation.

- ***Lower Mt. Washington Valley Secure Landfill, Conway NH***
Since 1988, CMA Engineers has provided ongoing engineering for the permitting and phased development of this landfill serving three communities including Conway. Currently (summer 2013) the third phase of the originally permitted five-phase landfill is being constructed.

- ***Lebanon Regional Landfill, Lebanon, NH***
CMA Engineers provided comprehensive engineering services to the City of Lebanon for the expansion of the City's lined landfill, the closure of old unlined landfills as well as implementation of recycling and office/garage facilities, from 1995 to 2011.

- ***Nashua Four Hills Landfill, Nashua NH***
CMA Engineers provided engineering for the planning, permitting, design and phased construction services for the closure of 60 acres of unlined landfills, and the first two phases of a three-phase 40 acre long term secure expansion at the Nashua Four Hills site (between 1992 and 2010).

- ***Lewiston Landfill, Lewiston, ME***
CMA Engineers designed and administered construction of the expansion of the Lewiston Landfill in accordance with a phasing plan, and investigated the major expansion of the landfill for broader regional use.

CMA Engineers also provides comprehensive engineering for private landfills, including the ***North Country Environmental Services Landfill in Bethlehem, NH***, and the ***Verso Paper special waste landfill in Jay, ME***.

Additionally, our general solid waste management services also includes implementation of recycling and transfer facilities, and the preparation and evaluation of responses to RFPs for municipalities and districts for waste disposal services at remote landfill and resource recovery facilities.

For most of these projects, CMA Engineers' role has been comprehensive conventional engineering, and also significant assistance in the management and business planning for the communities, including helping to develop strategies based on the financing, economics, market risks, and environmental permitting of the overall projects.

CMA Engineers' solid waste management projects in northern New England have received national and state engineering awards, including two in 2013. In April, the firm received the Grand Prize award of the American Academy of Environmental Engineer and Scientists for the first ever in the US application of geothermal energy recovery technologies to recover heat from the bottom liner system at the North Country Environmental Services landfill in Bethlehem, NH. This innovative technology can readily and inexpensively be applied to the Hartland landfill. In May, CMA Engineers received the Outstanding Civil Engineering Award from the NH Section of the American Society of Civil Engineers for an innovative landfill leachate siphon project constructed at the Androscoggin District's lined landfill in Berlin, NH. These are the latest in a long series of national and state awards for engineering innovation.

The Greater Upper Valley Solid Waste Management District has developed a very unique and important asset in the Hartland Landfill site. The landfill site is technically and environmentally superb, and the surrounding land use is unusually favorable for project development. While site access had been a major stumbling block, the recent construction of the bridge over I-91 and associated access road removes that barrier.

As outlined in our project approach, we present ideas for design modifications to solve the significant "soil balance" problem, and to lower capital construction costs while maintaining and enhancing long term capacity. We also propose to update design and operating concepts to align with technological developments over the last 20 years, and to further lower costs.

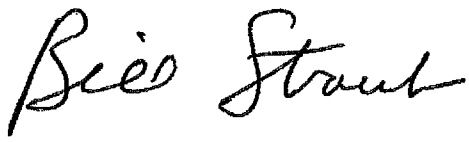
This will result in a rather straight-forward redefinition of net landfill economics. The key determinant of landfill economics will be annual solid waste tonnage. It is clear from the outset that at permitted rates (up to 50,000 tons per year), a new landfill facility (even with capital cost savings) will not have competitively favorable net costs in comparison with other facilities at

current and likely market rates. At higher disposal tonnages, similar total annual costs would be distributed over more tons, and favorable economics can be met at a greater level of disposal.

The major result of this evaluation will be to re-estimate those landfill costs with reasonable confidence, and to identify some threshold utilization rates that may result in favorable comparative economics. The essential companion task is developing a realistic assessment of tonnage that may be attracted to a facility at this location, at those projected net costs. Finally, a preliminary assessment of the possible project structures to accomplish objectives is necessary. Consideration of such issues as structures for ownership, financing, risk assumption, and sequencing will be essential.

CMA Engineers' focus includes municipal and publicly developed solid waste projects, and on working closely and collaboratively with project representatives to solve problems and establish sound programs for successful project implementation. In accomplishing this objective, we have established a history of outstanding communication and responsiveness. We would look forward to the opportunity to serve the District the same way.

Very truly yours,
CMA ENGINEERS, INC.



William A. Straub, P.E.
Principal

Enc.

SECTION 1
Highlighted Project Experience

Solid waste management projects, including lined landfill expansions, are a particular strength of CMA Engineers. The firm has provided comprehensive engineering for numerous publicly owned and operated lined landfills including landfills owned and operated by individual communities, and by inter-municipal solid waste districts and cooperatives. In addition, we provide comprehensive engineering for a major private landfill in New Hampshire, and a private special waste landfill in Maine.

CMA Engineers has been providing comprehensive services for the development and operation of lined solid waste landfills since the late 1980s. The experience of key principals and staff extends to the early 1980s in other affiliations. We remain current in our understanding and knowledge of design and construction practices, and the evolution of State and Federal regulatory requirements.

CMA Engineers' range of experience in the engineering for lined landfills includes:

Siting Studies

- Screening of potential sites for suitability for landfill development with existing mapping and photography, soils and ownership information.
- Comparative evaluations of alternative sites, including size, development costs, environmental issues, comparative permitting risks, and availability of ownership.
- Completing initial on-site characterization to investigate key site issues and potential "fatal flaws".

Feasibility Evaluations and Economic Evaluations

- Preparation of estimates of capital and operating costs of landfill developments, and net cost scenarios based on net utilization of facilities at differing disposal rates and uses.
- Sensitivity analyses of changes in key assumptions and possible variations in these costs and utilization rates.
- Evaluation of changes in potential operations at existing sites, including changes in waste streams and utilization rates and revenues.
- Evaluation of changes in operating requirements, including leachate management options, LFG control, and responses to changes in regulatory requirements.

Preliminary Design and Permitting

Comprehensive preliminary design of all long term facility components to support State and Federal permitting, which typically includes:

- Comprehensive hydrogeologic evaluations to support conformance with siting criteria and monitoring plans. Site work including roadways, stormwater management, and utilities including power, instrumentation, leachate piping and tankage.
- Landfill layout including planned phasing, liner and leachate collection details internal piping, and landfill gas management facilities.
- Documentation of engineering design criteria with applicable regulatory standards and criteria including geotechnical, hydraulic, material conformance.
- Preliminary closure plan design, including phased closure and use of final cover materials.
- Preparation of facility operating plans addressing all aspects of facility operations to define intended operations as guides to operators and to comply with applicable regulatory requirements.
- Preparation of associated permits (non-solid waste) that may be required.

Final Design and Permitting

CMA Engineers has completed numerous final designs and permitting documents. Phased construction of successive portions of the entire landfill are typically developed sequentially as

disposal capacity is required. For each phase of the landfill, comprehensive final designs and construction documents are prepared. These include:

- Complete and detailed design for all elements of construction.
- Complete specification of all materials and products to be incorporated in construction.
- Development of detailed quality control and quality assurance programs to document that critical elements of the landfill, including liners, other geosynthetics, and critical soils are constructed and installed to meet project requirements.
- Development of contract and bidding documents that in combination with the design and technical specifications define the requirements of construction.
- Preparation of permitting documentation to support and allow the construction of the distinct phase of the landfill.

Bidding and Construction

CMA Engineers has completed bidding and construction services for each of our landfill clients. These projects have included all services necessary to complete the bidding to establish a qualified contractor, and then to administer that contract and observe and document in the field the construction. Landfill construction, due to the environmental sensitivity of facility and regulatory compliance often requires a relatively high level of documentation of construction.

Operations Assistance

CMA Engineers provides ongoing engineering to support active operations of several landfill facilities. Operation of lined landfills is characterized by constantly changing physical configurations due to filling of waste towards closure grades and progression through phases and stages of landfill construction. As changes in open areas and active areas operations progress, the operations requirements change due to variations in potential leachate generation, landfill gas production, and requirements for cover

materials. Services have included engineering support for operations throughout landfill operations, including:

General operations **-** Formulation of phased filling plans and sequencing, assistance with management of cover materials and interim capping.

Leachate Management **-** Establishment of wastewater discharge arrangements, design of leachate pre-treatment systems, maintenance of piping and pumping systems, estimation of leachate flows and evaluation of use of on-site management systems.

Permit Compliance **-** Assistance in assembling and evaluation of data required for compliance with permits, including solid waste, groundwater, and air permits; reporting to agencies, and meetings/negotiations as may be required.

Landfill Gas Management and Odor Control **-** For large landfills, development of LFG collection systems including combustion or landfill gas utilization for energy for large and small landfills; evaluations of the causes and control of nuisance odors associated with LFG.

Bird control **-** Landfills within specified distances of airports require preparation and execution of bird control plans. We have developed successful bird control plans.

Example CMA Engineers' Landfill Projects are presented on the following pages, and include:

- *Mt. Carberry Solid Waste Landfill, Androscoggin Valley Regional Refuse Disposal District, Berlin NH*
- *Franklin Secure Residue Landfill, Concord Regional Solid Waste/Resource Recovery Cooperative, Concord NH*
- *Lower Mt. Washington Valley Secure Landfill, Conway NH*
- *Lebanon Regional Landfill, Lebanon, NH*
- *Nashua Four Hills Landfill, Nashua NH*
- *Lewiston Landfill, Lewiston, ME*
- *North Country Environmental Services Landfill in Bethlehem, NH*, and
- *Verso Paper Special waste landfill in Jay, ME.*

Project:

Androscoggin Valley Regional Refuse Disposal District (Berlin) - Mt. Carberry Landfill, Success, NH

CMA Engineers provides comprehensive engineering services to the Androscoggin Valley Regional Refuse Disposal District in Berlin, NH for the District's Mt. Carberry Landfill. The district includes 10 communities, and the landfill serves these communities as well as numerous other municipal and commercial sources of solid waste. Recent services include permitting of additional landfill cells, base grade preparation of future landfill cells, the design and construction administration of leachate piping systems for landfill leachate delivery to the City of Berlin wastewater treatment facility, the design/build procurement of a landfill gas pipeline to deliver MSW landfill gas to a local industry, the construction of landfill gas collection system extensions and improvements, and on-going landfill monitoring and regulatory compliance activities.

Services include operational assistance in the monitoring of groundwater, landfill gas, leachate, and other aspects. The leachate piping system was a unique design and was recogniozed as the Outstanding Civil Engineering Award by the NH Section of ASCE in 2012.

Owner:

Androscoggin Valley Regional Refuse Disposal District

***Engineering Services*:**

- **Operations & Operational Assistance; Sampling/Testing**
- **Master Planning**
- **Permitting; Design**
- **Construction Administration**
- **Resident Services**

Period of Service:

- **2009-Present**

Key Personnel:

- **Craig Musselman, P.E.** *Principal*
- **Paul Schmidt, P.E.** *Project Manager*
- **Bradley Sullivan, P.E.** *Proj. Engineer*

Project Construction Cost:

- **$300,000 (2011)**
- **$4.5 Million (2012)**

Project Contact:

Sharon Gauthier, Executive Director
(603) 752-3342

CMA ENGINEERS

Project:

Concord Cooperative Secure Ash Landfill
Franklin, NH

Since 1988, CMA Engineers has played a lead technical and management role for the Concord Regional Solid Waste/Resource Recovery Cooperative in siting, permitting, design and construction of a secure ash residue landfill in Franklin, New Hampshire. The Cooperative serves 24 member towns and cities in central and southern New Hampshire. The landfill accepts ash from the Wheelabrator waste to energy facility in Penacook, New Hampshire. CMA Engineers planned, permitted, designed, and oversaw coinstruction of five separate phases of landfill development from 1988-2009. Recent projects have included design of a leachate pretreatment system. Final closure of a portion of the facility was designed in 2013, and will be constructed in 2013-14. Operations of the facility are unique in comparison to a conventional MSW landfill, as the ash/reside does not involve the ongoing stabilization, settlement and gas production as in an MSW landfill. CMA Engineers has provided operations assistance throughout the life of the landfill, including general assistance, design of sequenced filling plans, assessment of monitoring information and regulatory reporting.

Owner:

Concord Regional Solid Waste/Resource Recovery Cooperative

***Engineering Services*:**

- **Operations & Operational Assistance; Sampling/Testing**
- **Master Planning**
- **Permitting; Design**
- **Construction Administration**
- **Resident Services**

Period of Service:

- **1988-Present**

Key Personnel:

- **Craig Musselman, P.E.** *Principal*
- **Paul Schmidt, P.E.** *Project Manager*
- **William Straub, P.E.** *Senior Engineer*
- **Bradley Sullivan, P.E.** *Proj. Engineer*

Project Construction Cost:

- **Phased over time (5 phases)**
- **$10 Million (since 1988)**

Project Contact:

James Presher, Project Director
(603) 753-9265

CMA ENGINEERS

Project:

Lower Mt. Washington Valley Solid Waste Landfill
Conway, NH

After comprehensive evaluation, selection, and permitting, CMA Engineers completed the design, administered construction, and provided resident engineering services for the development of this secure landfill project. The project incorporated the highest levels of design and was an innovative small capacity solid waste landfill. The first phase of the facility initiated operations in January 1992.

In 1997, CMA Engineers completed the permitting and design of Phase II of the landfill and administered the construction of the phase in 1998. The project included an innovative leachate recirculation component as part of the operating plan.

In 2012 CMA Engineers designed Phase III of the facility, which is under construction in 2013.

CMA Engineers provides regular engineering support to operations of the facility and coordination with regulatory agencies.

Owner:

Town of Conway, NH

***Engineering Services*:**

- **Planning**
- **Permitting; Design**
- **Construction Administration**
- **Resident Services**
- **Operational Assistance**

Period of Service:

- **1990-Present**

Key Personnel:

- **William Straub, P.E.,** *Principal/Project Manager*
- **Craig Musselman, P.E.,** *Senior Engineer*
- **Robert Grillo, P.E.,** *Geotechnical Engineer*
- ***Adam Sandahl, P.E.,*** *Project Engineer*

Project Construction Cost:

- **Phased since 1991**
- **$8 Million**

Project Contact:

Paul DegliAngeli, P.E., *Dir. of Public Works*
(603) 447-3855

CMA ENGINEERS

Project:

Lebanon Solid Waste Landfill
Lebanon, NH

CMA Engineers provided comprehensive solid waste engineering services to the City of Lebanon for the planning, permitting, design, construction administration and operational assistance for the Phase II landfill expansion of the Lebanon Secure Solid Waste Landfill. Permitting efforts included comprehensive site hydrogeologic investigations, development of a bird hazard mitigation plan to address proximity of the landfill to the Lebanon Municipal Airport and resolution of floodplain issues related to the Connecticut River.

Construction of Phase II-A was completed in 1999 and construction of Phase II-B was completed in 2003. The landfill design included evaluations to maximize use of on-site soils which resulted in significant cost savings during construction. Construction inspection included full time resident inspection plus geomembrane and soils quality assurance testing and inspection. CMA Engineers also provided landfill operational assistance to the City including water quality reporting, assistance with the leachate industrial discharge permit, and regular reporting and data management.

Owner:

City of Lebanon, NH

***Engineering Services*:**

- **Planning**
- **Permitting; Design**
- **Construction Administration**
- **Resident Services**
- **Operational Assistance**

Period of Service:

- **1995-2011**

Key Personnel:

- **Craig Musselman, P.E.,** *Principal*
- **Paul D. Schmidt, P.E.,** *Project Manager*
- **Robert Grillo, P.E.,** *Geotechnical Engineer*

Project Construction Cost:

- **Phased since 1999**
- **$5 Million**

Project Contact:

George Murray, *Solid Waste Manager*
(603) 298-6486

CMA ENGINEERS

Project:

Nashua Four Hills Landfill
Nashua, NH

CMA Engineers represented the City of Nashua in the planning, permitting, design, and construction of a secure expansion to the unlined Four Hills landfill. Expansion was fully coordinated with closure of the 75 acres of unlined landfills. Initial services included full site characterization and hydrogeologic evaluations, and preliminary assessments of engineering feasibility. CMA Engineers then identified available footprint area and capacity, and prepared comprehensive permit application documents for long-term development of a phased 40-acre landfill expansion.

A number of design innovations were developed for the project, including use of native materials in liner systems, leachate management, landfill gas management, and resolution of setbacks to adjacent residential development. CMA Engineers provided engineering planning, design, and construction services in the concurrent landfill expansion and closures. Construction was phased to include separate site work and lined landfill construction. Operations commenced in 2003. CMA Engineers continued with the final design and construction documents for the 13-acre Phase II landfill expansion in 2008. CMA Engineers provided engineering for comprehensive operational assistance from 1992-2010.

Owner:

City of Nashua, NH

***Engineering Services*:**

- **Planning**
- **Permitting; Design**
- **Construction Administration**
- **Resident Services**
- **Operational Assistance**

Period of Service:

- **1992-2010**

Key Personnel:

- **William Straub, P.E.,** *Project Manager*
- **Craig Musselman, P.E.,** *Principal and senior engineer*
- **Robert Grillo, P.E.,** *Geotechnical Engineer*

Project Construction Cost:

- **Phased since 1996**
- **$24 Million**

Project Contacts:

Kerry Converse
Four Hills Environmental Engineer
(603) 589-3410

Steve Dookran, P.E.
Nashua City Engineer
(603) 589-3120

CMA ENGINEERS

Project:

Lewiston Secure Landfill
Lewiston, ME

Since 2000 CMA Engineers has provided solid waste consulting services to the City of Lewiston for their Secure Landfill. The Secure Landfill has been operated as an ash monofill since 1997, accepting ash from the Mid-Maine Waste Action Corporation incinerator in Auburn. Most recently, in 2009 CMA Engineers designed, permitted and provided engineering during construction of two landfill cells comprising the Phase III expansion. CMA Engineers provided resident engineering and soil and geosynthetic CQA services. The landfill has been permitted, designed, constructed and is operating successfully with gravity pipe penetrations for transmission of the leachate out of the landfill cells.

Owner:

City of Lewiston, Maine

***Engineering Services*:**

- **Permitting; Design**
- **Construction Administration**
- **Resident Services**

Period of Service:

- **2000-Present**

Key Personnel:

- **Robert J. Grillo, P.E.** *Principal/Project Manager*
- **William Straub, P.E.** *Senior Engineer*

Project Construction Cost:

- **$5 Million**

Project Contact:

Rob Stalford, Solid Waste Superintendant
(207) 782-4200

CMA ENGINEERS

Project:

North Country Environmental Services Landfill Bethlehem, NH

CMA Engineers has provided North Country Environmental Services with comprehensive engineering services for the ongoing operations and expansion of this regional commercial landfill. Services have included engineering to resolve the permitting issues of so-called Stage IV, and the final design and phased construction of that Stage. Permitting and design of a long planned expansion in Stage V is also ongoing. Site constraints have required the design of perimeter berms around existing limits of the landfill and extension of the liner systems to obtain the desired capacity. CMA Engineers has also provided design, permitting, and construction administration services for improvements to the facilities' landfill gas collection and leachate management systems. In 2011, CMA Engineers designed an innovative geothermal heat recovery system on the landfill liners which was constructed in 2012 as the only system of its kind. The system has been recognized nationally for its innovation.

Owner:

North Country Environmental Services

***Engineering Services*:**

- **Planning**
- **Permitting; Design**
- **Construction Administration**
- **Resident Services**
- **Operational Assistance**

Period of Service:

- **2006-Present**

Key Personnel:

- **Robert Grillo, P.E.,** *Project Manager*
- **William Straub, P.E.,** *Principal and Senior Review*
- **Bradley Sullivan, P.E.,** *Project Engineer*

Project Construction Cost:

- **Phased since 2010**
- **$5 Million**

Project Contact:

Kevin Roy, *NCES Manager*
(603) 869-3366

CMA ENGINEERS

Project:

Verso Paper Landfill
Androscoggin Mill, Jay ME

CMA Engineers assisted Verso Paper with the design and permitting of the 25 acre expansion of the special waste landfill. The landfill includes a composite lining system for the horizontal expansion and piggy-back expansion over the existing landfill. The design incorporated measures to manage the existing leachate collection systems of the unlined landfill, collect landfill gas beneath the liner system, and accommodate settlement of the existing waste material. The design also included management of landfill leachate by gravity flow with liner pipe penetrations, and management of high flow rates of leachate from stormwater run-off from the low permeable sludge materials during significant rain events. Construction of the 7.5 acre Phase I expansion of the landfill commenced in 2008 and was completed in 2010.

CMA Engineers has also provided design and construction administration services for two stormwater improvement projects completed at the facility, including reconstruction of existing drainage ways and culvert upgrades, and construction of two stormwater detention ponds.

Owner:

Verso Paper Landfill

***Engineering Services*:**

- **Planning**
- **Permitting; Design**
- **Construction Administration**
- **Resident Services**

Period of Service:

- **2006 -Present**

Key Personnel:

- **Robert Grillo, P.E.,** *Project Manager*
- **William Straub, P.E.,** *Principal and Senior Review*
- **Bradley Sullivan, P.E.,** *Project Engineer*

Project Construction Cost:

- **Phased since 2008**
- **$5 Million**

Project Contact:

Charles Kraske, *Site Manager*
(207) 897-1336

CMA ENGINEERS

CMA Engineers Inc. Core Capabilities

Civil and Site Engineering
ROADWAY and TRANSPORTATION ENGINEERING

Portsmouth, NH Lower Court Street Reconstruction

- Roadway Intersection Design
- Bicycle and Pedestrian Facilities
- Drainage Analysis & Design
- Urban Reconstruction
- Streetscape Design
- Rural Roadway Design
- Utility Design & Relocation
- DOT Coordination & Planning
- Pavement Engineering & Management
- Construction Administration & Resident Engineering

Civil and Site Engineering
SITE DESIGN AND PROJECT MANAGEMENT

Nashua, NH Transit Garage

- Site Layout & Design
- Site Access and Traffic
- Utility Planning & Design
- Development Feasibility & Impact Studies
- NHDOT Drive Permits
- Drainage Planning & Design
- Coordination of Disciplines for Building Design
- Road & Parking Area Planning & Design
- Planning and Zoning Board Approvals
- State & Local Permitting

Civil and Site Engineering
PARKS AND ATHLETIC FACILITIES

Nashua, NH Roussel Park

- Feasibility Studies
- Site Evaluation and Planning
- Permitting
- Environmental Assessments & Site Re-Use
- Design and Construction Services

Civil and Site Engineering
MUNICIPAL SERVICES

New Castle, NH

- Construction Administration & Resident Engineering
- Planning Board & Zoning Reviews
- Engineering Review of Plans/Proposals
- Grant & Loan Assistance
- EPA/Phase II/MS4 Stormwater Permitting
- Utility Design

GEOTECHNICAL ENGINEERING

Claremont, NH Sugar River Drive

- Subsurface Exploration & Analysis
- Geotechnical Evaluations – Foundations & Retaining Walls
- Earthwork / Embankment Design
- Slope Stability
- Containment Structures

DESIGN/BUILD MANAGEMENT

Nashua, NH Holman Stadium Reconstruction

- Project Scoping
- Conceptual Design
- Preparation of Design/Build Contract Documents
- Engineering Review
- Design/Build Contract Administration

CONSTRUCTION SERVICES

Merrimack, NH Transfer Station

- Contract Documents and Specifications
- Bidding Assistance
- Contract Administration
- Owner Representation
- Resident Engineering
- Inspections
- Quality Assurance Programs
- Coordination of Materials Testing

Environmental Engineering
WATER SUPPLY AND WASTEWATER ENGINEERING

Lebanon, NH Wastewater Treatment Plant

- Comprehensive Master Planning
- Groundwater/Surface Water Source Development
- Distribution System Analysis & Design
- Storage Facility Design & Wastewater Quality Studies
- Sanitary Sewer Systems & Pumping Stations
- Combined Sewer Overflow (CSO) Studies
- Municipal Treatment Facility Evaluation & Design
- Industrial Pretreatment Plans & Designs
- Sludge Management & Discharge Permitting
- Septic Tank/Leachfield Systems
- Impact Fee Analysis

Environmental Engineering

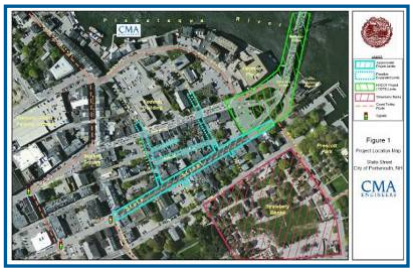
SOLID WASTE MANAGEMENT

(Landfills, Transfer Stations, Recycling Facilities, Management & Procurement, Waste-to-Energy Facilities, and Composting Facilities)

Franklin, NH Ash Residue Landfill

- Site Evaluation/ Development
- Permitting & Design
- Gas Management & Utilization
- Leachate Collection & Treatment
- Landfill Closures/Remedial Action
- Special Waste Characterization
- Regulatory Compliance Assessments
- Community Relations
- Construction Services

GEOGRAPHIC INFORMATION SYSTEM (GIS)



Portsmouth, NH
State Street/GIS Applications

- GIS Map Review & Interpretation
- Field Survey / Verification (Norway Plains)
- GIS to CADD File Conversions
- GIS to Adobe "pdf" File Conversions
- Drainage Mapping & Plotting
- Sewer System / Stormwater System Mapping & Plotting
- Utility Work Sheet Development & Printing

Environmental Engineering

STORMWATER MANAGEMENT

Stormwater Evaluation and Verification Facility, University of New Hampshire, Durham, NH

- Hydrologic Analysis
- Design of Culverts/Bridges
- Low Impact Design & BMPs
- Detention/Retention Pond Design
- State, Local and Federal Permitting
- Assistance in Preparation of FEMA Grants

Civil and Structural Engineering

BRIDGE AND CULVERT ENGINEERING

New Durham, NH
Davis Crossing Road over Ela River

- Feasibility Studies and Planning
- Project Estimating
- Funding Assistance (NHDOT, NHOEM, and FEMA)
- Geotechnical Evaluation Program
- Hydrologic / Hydraulic Evaluations
- Permitting, including wetlands and NEPA documentation
- Detailed Design, including Highway, Civil, Utilities, structural, hydraulics
- Project Specifications
- Bidding
- Contract Administration
- Resident Engineering Services

DSM ENVIRONMENTAL SERVICES, INC.

Resource Economists
Environmental Scientists

DSM was incorporated in 1988 to meet the growing needs of state and local government as they began to address new federal and state solid waste management regulations and expand recycling and materials recovery programs.

DSM has analyzed solid waste and recycling collection and transfer systems throughout the United States, developing solid waste and recycling management plans and programs for municipalities, solid waste districts, authorities and state governments from Iowa and Ohio, to North Carolina and Delaware and throughout the Northeast. This has provided DSM with a large database associated with the costs of collecting and processing refuse and recyclables and the breadth of experience to apply our experience to the unique issues of DSM's home state of Vermont.

The partners at DSM are resource economists, specializing in economic analysis of solid waste management systems. Clients as diverse as the Natural Resources Defense Council and US AID have contracted with DSM to conduct detailed economic assessments of complex solid waste management systems. In addition, DSM has worked with both public and private clients to assess regional markets for solid waste disposal services in the Northeast.

Most importantly, as a Vermont company located in the Upper Valley, DSM has an intimate knowledge of the solid waste market of both Vermont and New Hampshire, as well as the regional New England market due to on-going work in Massachusetts, Rhode Island and Connecticut.

SECTION 2
Project Team

CMA Engineers has significant experience in the planning, implementation, and operation of secure solid waste landfills on behalf of municipalities and inter-municipal districts. As outlined below, our proposed project team draws upon the experience of these individuals to complete the evaluations necessary to serve the Greater Upper Valley Solid Waste Management District. Our team includes primarily the principals and staff of the firm, and also DSM Environmental Services of Windsor, VT for assessment of the solid waste market in Vermont. CMA Engineers and DSM have a long history of collaboration.

PROJECT MANAGER

William A. Straub, P.E., P.G. is Vice President of CMA Engineers and has over 30 years of experience in a wide range of municipal civil and environmental engineering projects. Mr. Straub has been project manager for the firm's work on landfill projects in Nashua and Conway, and has been either principal or senior engineer the firm's landfill projects in Franklin, Lewiston, Bethlehem, and Lebanon. In the 1990s he was manager for VT solid waste management district siting studies, including Addison County, St. Johnsbury, and the Rutland area. Earlier in his career he was project manager for planning and implementation of municipal secure landfill projects in Somersworth and Newport, NH. He will have overall responsibility for the day-to-day completion of the project, and to ensure that project requirements are being met and that the required resources of the firm are provided. He will interact directly with District staff, and represent the team at public meetings. He has been an active leader in the engineering profession, and was named the NH Engineer of the Year in 2006. Mr. Straub has a Bachelor's Degree in Civil Engineering from the University of New Hampshire and a Master's Degree in Engineering from the Thayer School of Engineering at Dartmouth College in Hanover, NH, and is licensed in Vermont, New Hampshire, Maine and Massachusetts.

SENIOR PROJECT ENGINEER – SOLID WASTE MARKETS AND BUSINESS PLANNING

Craig N. Musselman, P.E., BCEE – is president of CMA Engineers, and has 38 years' experience in civil and environmental engineering, and founded CMA Engineers in 1988. Mr. Musselman is a Board Certified Environmental Engineer of the American Academy of Environmental Engineers and Scientists. He is one of five engineers in the US who are board certified by AAEE in both solid waste management and water and wastewater engineering. Mr. Musselman has been project manager and senior project engineer since 1988 at the Franklin, NH Ashfill for the Concord Cooperative. In addition to managing multiple landfill expansions, he was centrally involved in both technical and management roles in forming the 27 community Cooperative, and with the negotiation of contracts and other project arrangements. He has served in similar roles with the Androscoggin Valley Regional Refuse Disposal District and the

City of Lebanon's secure landfill project. He has also provided key senior input for all of CMA Engineers' other landfill permitting, design, and construction administration projects in New England. Mr. Musselman has authored numerous technical papers and made presentations at national and international engineering conference in the area of ash utilization, the generation of hydrogen gas from chemical reactions in landfilled ash residues, and on the vaporization of mercury at waste disposal sites. He received his Bachelor's and Masters' Degrees in civil and environmental engineering from UMASS Amherst, and is a licensed professional engineer in three states.

SR. LANDFILL ENGINEERS

Robert J. Grillo, P.E. is a vice president of CMA Engineers, and has over 30 years experience in civil and geotechnical engineering. He will contribute to the recommended re-design concepts for the Hartland Landfill to reduce construction costs while maintaining and enhancing capacity. Mr. Grillo served as project manager at the Lewiston Secure Landfill during design, permitting and construction-related services for a Phase II expansion. Since 2000 he has provided design and construction administration services for the Phase III ash landfill expansion in 2009. Mr. Grillo has served as principal-in-charge and project manager at four other lined landfills in New England, including permitting, design and construction services for the NCES private landfill in Bethlehem, NH, and the permitting, design and construction administration of a lined piggy back expansion of the Verso Paper Mill Landfill in Jay, ME. Through his geotechnical engineering background, he has gained extensive experience in use of both natural and geosynthetic materials in landfill construction to provide efficiencies and minimize costs. Mr. Grillo received a BS in civil engineering from Worcester Polytechnic Institute, and an MS in geotechnical engineering from Northeastern University. He is a licensed professional engineer in three states.

Paul D. Schmidt, P.E. is a senior project manager with CMA Engineers with over 17 years' experience. Solid waste and landfill projects are a major focus of Mr. Schmidt's practice. Mr. Schmidt has served as project manager on multiple transfer station and recycling projects. He is project manager for the firm's comprehensive engineering for the Mt. Carberry Landfill owned and operated by the Androscoggin Valley Regional Refuse Disposal District. He was the project manager for CMA Engineers' work on the City of Lebanon solid waste facilities including projects for both the lined landfill and the City's recycling and transfer station; and he served in a similar role on aspects of the Franklin secure ashfill facility. Mr. Schmidt holds a BS in civil engineering from Clarkson University and an MS in environmental engineering from the University of Massachusetts, Amherst. He is a licensed professional engineer in two states.

PROJECT ENGINEERS

Bradley W. Sullivan, P.E. is a project engineer at CMA Engineers with a particular focus on environmental engineering for solid waste landfills. He has seven years' experience, and has been a key project engineer in the detailed design of numerous landfill projects, including in Berlin (AVRRDD), the Franklin NH Ashfill, the NCES landfill in Bethlehem NH, as well as numerous landfill closures and other environmental projects. He will assist in the preliminary

designs and cost estimates for the project. Mr. Sullivan received both BS and MS degrees in civil engineering from the University of New Hampshire. He is a licensed professional engineer.

Adam J. Sandahl, P.E. is a project engineer with over 10 years' experience and a similar focus on solid waste and landfill projects. In addition to engineering for permitting, design, and construction, Mr. Sandahl has completed numerous complex economic and financial evaluations for solid waste projects, including landfills, recycling facilities, and transfer and hauling systems. His landfill experience includes detailed permitting and design of the Lower Mt. Washington Valley Secure Landfill, phase III, and aspects of the Franklin Ashfill, as well as numerous landfill closures. Mr. Sandahl received a BS in civil engineering from the University of New Hampshire, and an MS in environmental science from the University of Idaho. He is a licensed professional engineer.

SUBCONSULTANTS

DSM Environmental Services

Ted Siegler is the president of DSM Environmental Services in Windsor, VT. Ted has 38 years of experience applying economic and resource management analysis to solid waste and recycling issues throughout the United States and in 12 countries around the world. Ted has worked for state governments (Maryland, Nevada and Vermont), local governments (NH/VT Solid Waste Project), and for the past 25 years as President of DSM. Ted's specialty is the application of economics to solid waste management issues. Ted works extensively throughout New England on a broad range of solid waste management issues. As such he is very familiar with both public and private sector solid waste disposal facilities and markets. Ted holds an MS in resource economics from the University of Nevada, and a BS in environmental conservation from the University of New Hampshire.

Natalie Starr is vice president of DSM Environmental Services. She has over 25 years' experience in the fields of solid waste and resource recovery, focusing on the economics of solid waste management programs. Ms. Starr's focus has been local, regional, and national. Natalie has worked to assess infrastructure, waste generation and disposal rates and materials recovery efforts in urban and rural regions across varying demographics working to increase recycling and improve the efficiency of collection and processing systems. In Vermont she has completed statewide surveys of solid waste practices and waste generation/hauling, among many other projects. Natalie's education includes a M.S. in Resource Management and a B.S. in Environmental Studies with a focus on resource economics and energy resources.

Resumes of the named individuals are on the following pages.

Team Resumes

William A. Straub, P.E., P.G.
Principal/Project Manager

EXPERTISE
- Solid Waste Management
- Civil/Roadway/Drainage
- Wastewater Management
- Environmental Assessments
- Planning Board Reviews

EDUCATION
- BS Civil Engineering (1978) - University of New Hampshire (UNH) – Summa Cum Laude

- MS Civil Engineering (1980) – Dartmouth College, Thayer School of Engineering

PROFESSIONAL REGISTRATIONS
Professional Engineer:
- New Hampshire
- Maine
- Vermont
- Massachusetts

Professional Geologist:
- New Hampshire

EXPERIENCE
Consulting: 33 years

PROFESSIONAL AFFILIATIONS
- ASCE-NH Section
- ACEC-NH (Past President)
- NHSPE (Past President)
- NH QBS Coalition (Co-Chair)
- Solid Waste Association of North America

AWARDS
NH Engineer of the Year (2006)

CIVIC ACTIVITIES:
- South Berwick Planning Board
- UNH Dean's Advisory Committee College of Engineering and Physical Sciences

PROFESSIONAL PROFILE
Mr. Straub is a civil and environmental engineer with over 30 years experience in consulting engineering. Project experience includes solid waste management projects; roadway, drainage, municipal streetscape, water supply and distribution, wastewater management, and. Mr. Straub has been involved in all aspects of project development, including planning studies and feasibility assessments, regulatory permitting, design and construction.

As principal and project manager Mr. Straub is responsible for projects involving individual communities as well as intermunicipal and regional projects. He has significant experience in the public participation process during the planning and implementation of projects. In this role, he has worked closely with Boards of Selectmen, City Councils, Districts, and other groups commonly involved in the development of public projects. He has played central roles in many public meetings and hearings. Mr. Straub has also presented numerous papers at regional and national public works and technical conferences. In addition to engineering project management roles, Mr. Straub coordinates the technical staff of CMA Engineers, and is responsible for project development.

REPRESENTATIVE PROJECTS

Nashua Four Hills Landfill, Nashua, NH
Principal and project manager for a multi-year, phased landfill expansion and closure at the 300 acre Four Hills site in Nashua, NH. Two large unlined landfills were closed in conjunction with a 40 acre lined expansion. Services started with overall site characterization and hydrologic evaluations for a lined expansion. Several major site issues were resolved with innovative use of native glacial till, and methods for establishing a required residential setback/buffer. Landfill development required a total site wide stormwater management program be established, as well as the rehabilitation of a sewage pumping station for leachate management. Construction was phased over a 6 year period while final operations in the unlined landfill were completed. The project included establishment of a landfill gas collection and energy recovery system.

Lower Mt. Washington Valley Secure Landfill, Conway, NH
Project engineer and manager for the final planning, permitting and implementation of a regional solid waste landfill for three communities in the Mt. Washington Valley. The first phase of the landfill was constructed in 1992. Two subsequent phases were constructed in accordance with the original permitted concepts; Phase II in 1998, and Phase II in 2013. The project included innovative leachate recirculation programs, and arrangements for local disposal of leachate in exchange for disposal of wastewater sludge. The landfill is located in a remote section of Conway, and is successfully operated at a relatively small scale.

North Country Environmental Services Landfill, Bethlehem, NH
Senior project review and principal for the firm's engineering for the North Country Environmental Services commercial regional landfill in Bethlehem, NH. Project has included development of innovative methods to increase capacity in previously permitted landfill sections, and resolving long term expansion permitting issues. Construction has been phased. Additional capacity is being designed and permits updated.

Franklin Ashfill, Franklin, NH
Project engineer, project manager, and senior review for various phases of the long term development of this secure ash/residue landfill that serves the Concord Regional Solid Waste/Resource Recovery Cooperative. Work has included management of contract administration, resident engineering, and quality control programs and regulatory certifications of construction.

Solid Waste Planning and Landfill Siting
Project manager for numerous solid waste planning evaluations for individual communities, and districts. Projects include evaluation of alternatives for disposal, transfer, recycling of all waste materials. Capital and operating costs are compared for various options and periods of service. Also included comprehensive siting evaluations for regional landfills. Example planning projects include evaluations for Nashua, the communities in the Keene area, communities in the Manchester area, the Lamprey Regional Solid Waste Cooperative, and the Towns of Bedford, Merrimack. Example siting projects include the communities in the Keene area; the Addison County, Lamoille County, Rutland County, and Southern Windsor County Solid Waste Management Districts and the Town of Merrimack.

Landfill Closures
Project manager and principal for numerous municipal landfill closures. Projects have included large facilities with complex hydrogeological and groundwater impoact issues, to smaller facilities with minor environmental impacts. Capping systems have ranged from secure geomembrane systems to low permeability soil and short fiber paper sludge. Closure projects include landfills in Newmarket, Nashua, Bedford, Merrimack, Deerfield, Barrington, Madison, Concord, Ossipee, Milton, and Farmington. Post closure monitoring and maintenance programs are also managed at most landfills.

Solid Waste Transfer Stations and Recycling Facilities
Principal and project manager for numerous community and regional transfer and recycling facilities. Facilities include large multi-community and smaller individual community transfer/recycling facilities. Example projects include the City of Keene, Towns of Merrimack, Deerfield, Farmington, and Weare.

SELECTED PUBLICATIONS

1. Straub, William,; Kissida, John,; Spieler, Richard,; Reine, Richard; *"Redeveloping Existing City Parks over Former Landfills – The Nashua, New Hampshire (USA) Experience"* in Proceedings of the Ninth International Waste Management and Landfill Symposium, Sardinia 2003, Cagliari, Italy, October 2003; also in Proceedings of SWANA 8th Annual Landfill Symposium (Solid Waste Association of North America), June 2003.

2. Straub, William A.; Reine, RK; *"Sound Principals in Conducting Facilities Planning and Development of Design Criteria for Beneficial Reuses of Landfills"* in Reclaiming Our Landfills into Beneficial Reuses; published by the American Public Works Associations, 2003.

3. Straub, William A.; Sills, MA; Reine, RK; *"Interim Capping to Maximize Landfill Gas Collection and Odor Control"* in Proceedings of Wastecon 2000; Solid Waste Association of North America; October 2000; Cincinnati, OH.

Craig N. Musselman, P.E.
Principal/Project Manager

EXPERTISE
- Civil and Municipal
- Solid Waste Management
- Water and Wastewater

EDUCATION
- University of Massachusetts, Bachelor of Science in Civil Engineering, 1973
- University of Massachusetts, Master of Science in Civil Engineering, 1974

PROFESSIONAL REGISTRATIONS
- New Hampshire
- Maine
- Massachusetts

EXPERIENCE
Consulting: 38 years

CERTIFICATIONS
Board Certified Environmental Engineer (BCEE), certified in both water/wastewater and solid waste, American Academy of Environmental Engineers and Scientists

PROFESSIONAL AFFILIATIONS
- NSPE, State and National
- ASCE
- WEF, and AWWA
- SWANA
- ABET Executive Committee
- APWA

AWARDS
ASCE Distinguished Member
ASCE President's Medal
Fellow, NSPE and ACEC
NSPE President's Award

CIVIC ACTIVITIES:
- Town of Rye Selectman – 2005 through present.

PROFESSIONAL PROFILE
Mr. Musselman is the President of CMA Engineers, Inc. and is a civil and environmental engineer with over thirty-eight years' experience in the planning, design, and construction administration of civil and environmental engineering projects. Mr. Musselman formed CMA Engineers, Inc. in 1988. Prior to that, he held positions as Vice President of Environmental Engineering for Kimball Chase Company in Portsmouth NH from 1982 through 1987. Prior to 1982 he was project manager for Wright Pierce Engineers of Portsmouth and project engineer for O'Brien & Gere Engineers in North Carolina. He has extensive experience in the planning, design, and construction administration of a diverse range of projects including lined landfills; waste-to-energy plants; recycling facilities; roadways; wastewater collection and treatment facilities; water distribution and treatment facilities; public works facilities; sports stadiums; and industrial, residential, and commercial developments. Mr. Musselman also is responsible for the management of CMA Engineers.

Mr. Musselman is a leader in the engineering profession, with substantial ongoing involvement in national organizations regarding qualifications for engineering practice and licensure, as well as several State roles including leadership of NHSPE and service as chairman of the NH Board of Licensure for Professional Engineers.

He has spent most of his career based in Portsmouth, NH and has been active in numerous civic activities in the area, and is recognized as a civic and business leader.

In addition to his design capabilities and experience evidenced by his 38 year engineering career, Mr. Musselman's specialties in practice include the planning and evaluation of institutional, ownership and operation options for projects; the economic analysis of complex engineering projects; risk analysis; and the interpretation of construction contract documents.

REPRESENTATIVE PROJECTS

Concord Regional Solid Waste Resource Recovery Cooperative, Concord, NH
Project Manager for the Concord Regional Solid Waste/Resource Recovery Cooperative continuously since 1982. For this overall project, Mr. Musselman served as the Cooperative's negotiator, leading a team of lawyers, financial advisors, and engineers in the negotiation of contracts and other project arrangements. He has been centrally involved in both technical and management roles in the formation of a 27 community cooperative; project planning and siting of a 500 ton per day waste-to-energy facility; procurement, contract negotiations, and financing of the facility; construction monitoring; and engineering and management services through the first ten years of facility operations. For the Cooperative, he has also been in responsible charge of the siting, permitting, design, and construction administration of the project's secure residue landfill in Franklin, New Hampshire. The Franklin landfill project involved five phases of lined landfill construction projects since 1988.

Solid Waste Landfills

Mr. Musselman has served as the project engineer, project manager and principal in charge of the planning, design, construction administration and operation of five operating lined landfills in New England. These facilities have been both publicly and privately owned and have provided disposal both for municipal solid waste and for ash residue. For each of these major projects, he has been responsible for coordinating the efforts of a multi-disciplined team of engineers and hydrogeologists to permit, design, and construct the facilities. These include some of the first lined landfills constructed in the region, and then throughout the past twenty five years. These include landfill projects in Lebanon, Berlin (Success), Conway, Franklin, and Nashua.

Transfer Stations and Recycling Facilities

Mr. Musselman has served as the principal-in-charge and project manager for the design of solid waste transfer stations and recycling faciolities, each tailored to the specific needs of individual communities. He has been in responsible charge of the transfer stations in Salem, Windham, Franklin, Meredith, Conway, and Northumberland, New Hampshire. In the field of recycling, Mr. Musselman has served as the project engineer for the planning, design, and construction administration of recycling facilities ranging in size from drop-off facilities in rural communities to larger facilities with picking lines for sorting of commingled recyclables.

SELECTED PUBLICATIONS

1. Musselman, Craig N.; Nelson, Jon D. and Phillips, Monte, L., "A Primer on Engineering Licensure in the United States" in proceedings of the American Society for Engineering Education Annual Conference, 2011, Vancouver, BC, Canada.
2. Musselman, Craig N., "Requiring a Master's Degree or its Equivalent as a Model Law Prerequisite for Licensure after 2020" in proceedings of the American Society for Engineering Education Annual Conference, 2009, Austin, TX.
3. Saffarzadeh, A.; Shimaoka T.; Wei Y.; Gardner KH and Musselman, CN, "Impacts of Natural Weathering on the Transformation/Neoformation Processes in Landfilled MSWI Bottom Ash, A Geoenvironmental Perspective", 2011, in Waste Management, New York, NY.
4. Musselman, Craig N., "A Professional Engineer Serving in Local Elected Political Office, Personal Observations", 2008, American Society of Civil Engineers Journal of Leadership and Management in Engineering, Reston, VA.
5. Musselman, Craig *N; Eighmy, TT; Gress, DL; Killeen, MP; and Presher, JR; "Utilizing Waste to Energy Bottom Ash as an Aggregate Substitute in Asphalt Paving" in Proceedings of* the Eighth International Conference on Municipal Solid Waste Combustor Ash Utilization, 1995, Arlington, VA.
6. Musselman, Craig N; Bidwell, JN; Carpenter, JE; Straub, WA; Presher, JR; *"Landfill Gas Generation at a Municipal Waste Combustor Ash Monofill - Franklin, NH"* in:
   - Proceedings of Waste Tech '97, National Solid Wastes Management Association, 1997, Tempe, AZ.
   - Proceedings of the North American Waste to Energy Conference, 1997, Research Triangle Park, NC.
   - Proceedings of the Air and Waste Management Association's 90th Annual Meeting, 1997, Toronto, Canada.
   - Proceedings of "Sustainable Construction, Use of Incinerator Ash", March 2000, University of Dundee, Scotland.
7. Straub, William A; Musselman, CN; Allen, DM; and Sills, MA; *"Overcoming Siting Constraints for a Municipal Landfill Expansion in an Urban Setting"* in Proceedings of Wastecon 96, Solid Waste Association of North America; 1996, Portland, OR.
8. Musselman, Craig N; Shimaoka, T; Yanase, R; and Sills, MA; "Assessing the Behavior and Fate of Mercury in a Municipal Waste Combustor Ash Landfill" in Proceedings of the Eighth International Waste Conference, Sardinia 2001, Cagliari, Italy, October 2001.
9. Musselman, Craig N; Ryder, KH; and Slate, D; "Can Landfills, Birds and Airports Coexist?" in Waste Age Magazine; May 1998.

Robert J. Grillo, P.E., P.G.
Principal/Project Manager

EXPERTISE
- Solid Waste Management
- Geotechnical Engineering
- Hydrogeology
- Environmental Engineering

EDUCATION
- BS Civil Engineering (1977) Worcester Polytechnic Institute
- MS Geotechnical Engineering (1979) Northeastern University

PROFESSIONAL REGISTRATIONS/CERTS.

Professional Engineer:
- New Hampshire
- Maine
- Illinois

Professional Geologist
- New Hampshire

EXPERIENCE
Consulting: 34 years

PROFESSIONAL AFFILIATIONS
- ASCE-ME Section
- North American/International Geosynthetic Society

PROFESSIONAL PROFILE

Mr. Grillo is a geotechnical and civil engineer with over 30 years experience in consulting engineering. Project experience includes landfill and other solid waste management, hydrogeology, and civil, geotechnical and environmental engineering. . Mr. Grillo has been involved in all aspects of project development including site characterization, regulatory permitting, design and construction. He has been responsible for numerous lined landfill expansions, and closure projects

Mr. Grillo joined CMA Engineers in 1998. For eleven prior years he was a project manager and vice president with GZA GeoEnvironmental in Manchester, New Hampshire and Portland, Maine, where he was office manager. Prior to 1986, he served as project engineer and project manager at Atec Associates, the Chicago Department of Public Works – Engineering Division, and Sargent and Lundy Engineers in Chicago, Illinois.

In the area of solid waste management, Mr. Grillo has served as project manager on the planning, design, construction administration, and operations assistance for lined landfills and landfill closures. Beginning in 1987, projects have included double-lined landfills for municipal solid waste, industrial waste, and ash residue from waste-to-energy facilities. Many of these projects have included multiple expansions, liaison with regulatory agencies, and presentations to the public. Landfill closure projects have ranged from small rural municipal landfills with soil cover systems, to larger municipal and industrial facilities incorporating geosynthetic barrier and drainage systems as well as groundwater and soil remediation technologies.

Mr. Grillo has also directed groundwater contamination and remediation studies for landfills and industrial facilities, and hydrogeologic studies to support landfill expansion. He has characterized site conditions to support real estate transfers, and evaluates water quality through groundwater monitoring programs at landfill and industrial facilities.

In the geotechnical engineering field, Mr. Grillo has conducted geotechnical investigations for wastewater treatment plants, power stations, and commercial and industrial projects. Many of these projects were founded on soft clay that required evaluation of settlement and stability, and in some cases ground improvement. He has also been lead geotechnical engineer on landfill projects. In this role, Mr. Grillo has evaluated settlement and incorporated its effects into the design of the lining and leachate collection systems, and analyzed stability of foundations soils, lining system interfaces, and waste under static and seismic loading conditions.

Mr. Grillo has provided litigation support services, including testimony at trial. He has served as an expert witness on cases involving landfill closure, landfill clay liner construction, and roadway construction.

PUBLICATIONS

Grillo, R.J., Murray, J.S., Petersen, J. and Roy, K. "Landfill Based Geothermal Heating System," in proceedings of Global Waste Management Symposium 2012, Phoenix, Arizona.

Grillo, R.J., Murray, J.S. and Leber, B. "Design of a Lining System for a Piggyback Landfill," in proceedings of Geosynthetics 2001 Conference; Portland, Oregon.

Grillo, R.J. and Burns, P.F. "Evaluation of an Existing Landfill Cover Over Steep Sideslopes," in proceedings of Geosynthetics '99 Conference; 1999, Boston, Massachusetts.

Grillo, R.J. and Burns, P.F. "A Case Study: Landfill Closure Design Increases Capacity," in proceedings of Waste Tech '99: Landfill Technology, National Solid Waste Management Association; 1999; New Orleans, Louisiana.

Schonewald, I.V. and Grillo, R.J. "Performance of a Stone Column and Wick Drain Installation to Stabilize a 25-foot High Rockfill Overlying Soft, Sensitive Clay," in proceedings of Innovation in Civil and Environmental Engineering, 1996 Technical Seminar, American Society of Civil Engineers, Maine Section; Portland, Maine.

Grillo, R.J. and Burns, P.F. "A Laboratory and Test Fill Program for Constructing Compacted Clay Barrier Layers," in proceedings of Practical Application of Soil Barrier Technology, 1994 Technical Seminar, American Society of Civil Engineers, Maine Section; Augusta, Maine.

Paul D. Schmidt, P.E.
Principal/Project Manager

EXPERTISE

- Municipal solid waste planning and facilities development
- General municipal engineering services and construction
- Economic evaluations
- Environmental site investigations, closures and remediation
- Wastewater facilities design and construction

EDUCATION

- Clarkson University, BS Civil Engineering 1992
- University of Massachusetts, MS in Environmental Engineering 1994

PROFESSIONAL REGISTRATIONS

Professional Engineer:

- NH
- ME

EXPERIENCE

Consulting: 19 years

PROFESSIONAL AFFILIATIONS

- New Hampshire Society of Professional Engineers, Past President
- National Society of Professional Engineers
- American Society of Civil Engineers
- Water Environment Federation
- American Water Works Association

AWARDS

- NH Young Engineer of the Year, 2006
- 40 under 40 leaders in NH, Union Leader, 2005

PROFESSIONAL PROFILE

Mr. Schmidt is a Project Manager and Principal at CMA Engineers with 18 years of experience in a variety of civil and environmental projects. Mr. Schmidt has experience in all aspects of project development, including planning, economic evaluations, design, permitting, and construction administration. Mr. Schmidt has expertise in a wide range of civil and environmental project for municipal clients, including solid waste management projects. Representative project include the following:

REPRESENTATIVE PROJECTS

Androscoggin Valley Regional Refuse Disposal District, Berlin, NH

Mr. Schmidt is responsible for comprehensive solid waste services for the Androscoggin Regional Refuse Disposal District, including planning, permitting, design, construction administration and operational assistance. Representative projects have included permitting of expansion of the Mt. Carberry Secure Solid Waste Landfill, expansion of landfill gas collection systems, landfill gas operations assistance, and general landfill operations assistance. Construction projects have included landfill gas expansion construction, complete rehabilitation of the leachate storage pond and extension of the leachate sewer for connection to the City of Berlin Wastewater Treatment Plant through a unique inverted siphon and force main. Mr. Schmidt has also assisted with planning, permitting and owner's representation of a design-build contract for construction of a landfill gas to industrial energy pipeline to the Gorham Paper Mill.

Concord Regional Solid Waste/Resource Recovery Cooperative, Concord, NH

Mr. Schmidt has served in many roles in comprehensive services to the Concord Regional Solid Waste/Resource Recovery Cooperative. Mr. Schmidt was part of a team responsible for negotiations of a $100+ million extension of a solid waste contract for continued disposal at the Wheelabrator Concord Waste-to-Energy Facility, which included completion of complex financial models. Mr. Schmidt is also responsible for the construction administration and resident inspection of the $1.4 million Phase IV expansion of the Cooperative's Secure Ash Residue Landfill constructed in 2005/2006 and the Phase V expansion completed in 2008/2009.

Mr. Schmidt was the project manager for the planning, permitting and design of a planned regional single stream recycling facility for the Concord Solid Waste Cooperative. Services provided included all aspects of project development including site design, permitting, assistance for procurement of recycling equipment, assistance for procurement of operations contract services, and evaluation of recycling operations for participating communities.

Lebanon Solid Waste Landfill and Management Facilities, Lebanon, NH
Mr. Schmidt served as project engineer and project manager for multiple projects for the City of Lebanon associated with its solid waste management program. These included full design and permitting of two successive phases of the landfill, in 1999 and 2003. The work was coordinated with the final closure/capping of the 20-acre unlined landfill immediately adjacent to the lined facility. He managed the design and construction of other facilities at the site, including a solid waste equipment garage and office, a recycling facility, and scale facility. Additionally, he oversaw the planning of future capacity, including preparing comprehensive economic evaluations of alternative programs, and the hydrogeological investigations for a future 20-acre expansion of the landfill. He managed interfacing with regulatory agencies for leachate management, LFG management, environmental reporting and groundwater evaluations due to multiple activities at the site.

Multiple Landfill Closure and Post Closure Monitoring Programs
Mr. Schmidt has been responsible for planning, permitting, design, and construction of numerous landfill closures, including both large and small solid waste and special waste landfills. These include unlined landfills in Salem, Lebanon, Newmarket, Deerfield, Windham, Grantham, and Weare. For closed landfills, he also manages the environmental monitoring and State reporting for water quality and LFG migration, and the inspection, maintenance and repair of the closures.

Solid Waste Transfer and Recycling Facilities
For several communities, Mr. Schmidt has managed the implementation of solid waste transfer and recycling facilities. Some have been for larger communities and others for smaller communities. Often, these have been associated with the closure of unlined landfills. For recycling facilities, source separated options, dual stream facilities for processing of transfer to remote MRFs, and combinations of these methods have been involved. Representative projects include in Salem, Deerfield, Lebanon, Concord, Grantham, and Wakefield.

SELECTED PUBLICATIONS

1. Schmidt, P.D., Tobiason, J.E., Edzwald, J.K. and Dunn, H., “DAF Treatment of a Reservoir Water Supply: Comparison with In-Line Direct Filtration and Control of Organic Matter”, Water Science & Technology, Vol. 31, No. 3-4, pp.103-111, 1995.
2. Schmidt, P.D., Tobiason, J.E. and Edzwald, J.K., “DAF Treatment of a Reservoir Water Supply: Comparison with In-Line Direct Filtration and Control of Organic Matter”, IAWQ-IWSA-AWWA Joint Specialised Conference on Flotation Processes in Water and Sludge Treatment, Orlando, Florida, USA, April 1994.
3. Schmidt, P.D., Tobiason, J.E., Edzwald, J.K. and Dunn H., “Dissolved Air Flotation for Drinking Water Treatment: Pilot Scale Investigation of Process Variables”, American Water Works Association Annual Meeting, New York, New York, June 1994.

Bradley W. Sullivan, P.E.
Project Engineer

EXPERTISE
- Solid waste planning and facilities design
- Water, wastewater, and utilities design and construction
- Drainage and site design
- Economic evaluations
- Environmental site permitting and compliance

EDUCATION
- University of New Hampshire, BS Civil Engineering, 2007
- University of New Hampshire, MS Civil Engineering, 2010

PROFESSIONAL REGISTRATIONS
Professional Engineer:
- New Hampshire

PROFESSIONAL AFFILIATIONS
- American Society of Civil Engineers

PROFESSIONAL PROFILE
Mr. Sullivan is a civil and environmental engineer with over six years experience. He joined CMA Engineers, Inc. in 2006 as an Intern Engineer and continued with CMA Engineers as a Project Engineer following the completion of his Bachelor's and Master's degrees. He has gained experience with permitting and design, preparation of construction drawings, construction inspection, economic planning and evaluations, and technical engineering reports.

REPRESENTATIVE PROJECTS

Androscoggin Valley Regional Refuse Disposal District, Berlin, NH: Mr. Sullivan has been involved with several projects associated with the Mt. Carberry Secure Landfill located in Success, NH, owned by the Androscoggin Valley Regional Refuse Disposal District of Berlin, NH. He has been part of the permitting and design team for the Stage 10 & 11 vertical expansion, the Phase III-North horizontal expansion, the 2011 LFG improvements, landfill leachate sewer and inverted siphon, and landfill leachate storage pond. As part of the permitting and design team, Mr. Sullivan prepared evaluations of the existing facilities, designed and prepared engineering drawings, and provided construction administration assistance. He also aided in procuring state and federal funding and the construction contract for a design/build natural & landfill gas to energy project.

AVRRDD Leachate/Wastewater Evaluation, Berlin, NH: Mr. Sullivan evaluated several possible corrective measures to address an EPA Administrative Order (AO) regarding wastewater treatment plant disposal of landfill leachate for the Androscoggin Valley Regional Refuse Disposal District (AVRRDD). The evaluation included the sampling and analysis of current leachate quality and flows and projecting future leachate quality and flows using existing data and modeling software under multiple scenarios.

North Country Environmental Services Landfill, Bethlehem, NH: Mr. Sullivan has provided a wide range of engineering support for the permitting, design, and construction of the NCES Landfill in Bethlehem. He as assisted the project team on design, compliance, and landfill management issues for the operations and expansion of the landfill.

Franklin Ashfill, Franklin, NH: Mr. Sullivan has assisted the engineering project team on numerous issues at the Franklin Ashfill. These include planning for closure, evaluation of leachate production, instrumentation updates, and operational evaluations.

Adam J. Sandahl, P.E.
Project Engineer

EXPERTISE
- Solid waste planning and facilities design
- General municipal engineering services and construction
- Drainage and site design
- Economic evaluations
- Environmental site investigations, closures and remediation
- Environmental site permitting and compliance

EDUCATION
- University of New Hampshire, BS Civil Engineering, 2002
- University of Idaho, MS Environmental Science, 2005

PROFESSIONAL REGISTRATIONS
Professional Engineer:
- NH

PROFESSIONAL AFFILIATIONS
- American Society of Civil Engineers

PROFESSIONAL PROFILE
Mr. Sandahl is a civil engineer with over ten years experience in civil and environmental engineering projects. Mr. Sandahl has experience in all aspects of project development, including planning, economic evaluations, design, permitting, and construction administration.

REPRESENTATIVE PROJECTS

Concord Cooperative Franklin Secure Residue Landfill Evaluations: Mr. Sandahl has assisted the Concord Cooperative in several evaluations at the landfill including investigations of elevated secondary leachate flow and elevated primary flow during significant storm events. He was also the Resident Engineer for the construction of the facility's leachate pretreatment system.

Concord Cooperative Single Stream Facility: Mr. Sandahl completed detailed economic evaluations for a proposed single stream recycling facility to be constructed in Concord, New Hampshire that included evaluations of projected single stream material quantities, costs and revenue. Mr. Sandahl prepared economic analyses for individual Cooperative municipalities and several municipalities outside of the Cooperative that are interested in converting to single stream recycling. Mr. Sandahl was also Project Engineer on a CMA Engineers design team responsible for the site design and permitting of a proposed 47,000 square foot single stream recycling facility in Concord, New Hampshire. He was also involved in the design of the associated 1,500 foot extension of Whitney Road, in Concord to access the proposed facility.

Concord Cooperative General Services: Mr. Sandahl has assisted the Concord Cooperative with their annual financial reconciliation with the Wheelabrator Concord Company for the past five years. Mr. Sandahl has also completed several other economic evaluations for the Cooperative including siting of alternate landfill facilities, tipping fee projections and long-term economic projections.

Farmington Solid Waste: Mr. Sandahl was the Project Engineer for the Farmington Transfer Station and 13 acre landfill closure in Farmington, New Hampshire. Mr. Sandahl was involved in all aspects of the project including design and permitting, bidding, construction administration and was the project resident engineer. New Hampshire Department of Environmental Services (NHDES) permit applications prepared for the project included Solid Waste Facility Type II Permit Modification, Alteration of Terrain Permit, Shoreland Permit and Wetland Permit Applications.

Newmarket Landfill Groundwater Management Zone: Mr. Sandahl assisted the Town of Newmarket, New Hampshire with modifying the landfill's Groundwater Management Zone (GMZ) after concentrations of 1,4-dioxane exceeded applicable groundwater quality levels at the landfill property line. As a result of the investigations, that included a detailed hydrological report and, homeowner sampling, the GMZ was expanded to properties to the north and south of the landfill.

Midcoast Solid Waste Corporation Transfer Station Improvement Evaluation: Mr. Sandahl completed detailed economic and operations evaluation of Midcoast's solid waste transfer station in Rockport, Maine. Evaluations included operational changes at the facility's Construction and Demolition Debris landfill and alternatives to improve operations and residential/commercial traffic efficiency at the transfer station. Additional evaluations were performed to convert to curbside collection of MSW and recyclables and to expand the capacity of the transfer station. Mr. Sandahl also completed a carbon footprint analysis of the alternatives analyzed.

Rockland Landfill Odor Abatement Project: Mr. Sandahl assisted in developing plans to mitigate odors at the Rockland Landfill in Rockland, Maine. The project involved analyzing concentrations of landfill contaminants in ambient air, developing a Facility Operating Plan, and a Facility Closure Plan in full compliance with Maine Department of Environmental Protection requirements.

Contaminated Leather Waste Removal Project: Mr. Sandahl was the Project Engineer for the Applebee Road Tannery Waste Removal Project in Milton, New Hampshire. The project involved preparing a Soil Cleanup Plan, Site Safety Plan and a Sampling and Analysis Plan. Mr. Sandahl was involved in performing the site walkthrough to further characterize waste, quantity estimations, sampling, sampling result interpretation, correspondence with the United States Department of Environmental Protection Agency, preparing applicable site plans and bidding documents. Mr. Sandahl was also the Resident Engineer during construction.

Wakefield Transfer Station Upgrades: Mr. Sandahl has provided assistance with transfer station upgrade alternatives for the Town of Wakefield, New Hampshire. Economic analyses and proposed facility layouts were prepared for a source separated recycling facility with full baling operations and a separate layout to accommodate a dual stream recycling facility.

Wakefield Septage Facility Permitting: Mr. Sandahl was the Project Engineer for the design of a septage land application project at the Town of Wakefield, New Hampshire Wastewater Treatment Facility. The project involved preparing a wetlands permit application, a septage facility permit application, design of landfill closure grades, preparation of a Facility Management Plan, a Facility Closure Plan and agronomic rate calculations.

Post-Landfill Closure Monitoring and Reporting: Mr. Sandahl is involved with preparing annual landfill reports as required by the New Hampshire Department of Environmental Services. The reports include summaries of groundwater quality, landfill gas, a site inspection summary and other observations as applicable to each landfill. Mr. Sandahl has prepared landfill reports for several New Hampshire municipalities.

TED SIEGLER
President DSM Environmental Services

Ted has 38 years of experience applying economic and resource management analysis to solid waste and recycling issues throughout the United States and in 12 countries around the world. Ted has worked for state government (Maryland, Nevada and Vermont), local government (NH/VT Solid Waste Project), and for the past 25 years as President of DSM Environmental Services Inc., Windsor, Vermont.

Ted works extensively throughout New England on a broad range of solid waste management issues. As such he is very familiar with both public and private sector solid waste disposal facilities and current prices. DSM's current contract with the Vermont Agency of Natural Resources to analyze the potential impacts of Act 148 provides DSM with the most up-to-date data on quantities of waste, recyclable materials and organics generated and managed in Vermont, as well as a detailed understanding of how these quantities are likely to be managed over the next 10 years.

In addition to the Act 148 contract, other relevant work in New England includes:

- Analysis for a private client of the potential market for development of a transfer station and/or organics management facility in the Boston metropolitan area
- Project Manager for state-wide waste characterization studies in Vermont (2012) and Connecticut (2010)
- Detailed analysis of the Hartford, Vermont transfer station, recycling system and curbside collection system
- Subcontractor to Concord Realty Associates of the economic value of the Essex County landfill in up-state New York
- Consultant to the Oxford County (Maine) Regional Recycling organization to determine the potential to consolidate recycling and solid waste management operations as well as the potential for regional negotiation of new disposal contracts
- Consultant to the Maine Resource Recycling Organization to provide model guidelines for improving efficiency at transfer station management in Maine
- Consultant, Connecticut Governor's Modernizing Recycling Working Group – work included an assessment of waste generation and disposal capacity in Connecticut
- Consultant, Delaware Solid Waste Authority to determine the potential causes of continued declines in waste disposal quantities in Delaware and the market clearing price for disposal at DSWA landfills
- Consultant to the Delaware Solid Waste Authority from 2005 through present completing multiple projects, including annual recycling rate calculations for the State of Delaware, completion of a state-wide, moving toward zero waste management plan, analysis of the composition of single stream recyclables, and a state-wide waste characterization study.
- Consultant to the Chittenden Solid Waste Management District with respect to the impact of organizing the private subscription waste collection system in Chittenden County, Vermont

- Consultant to the City of Concord, NH, both for preparation of Concord's solid waste management plan, and then during implementation of unit based pricing, including predictions of quantities of waste and recyclables that would be set out after PAYT pricing
- Consultant to the Natural Resources Defense Council on full cost allocation of the New York City's, Department of Sanitation's, $1.3 billion solid waste and recycling budget; with predictions of the potential future cost of transferring 10,000 tons of waste per day out of NYC, compared to the cost of collecting and processing recyclables

Ted holds a MS in Resource Economics from the University of Nevada, and a BS in Environmental Conservation from the University of New Hampshire. Ted specialty is the application of economics to solid waste management issues.

Natalie Starr,
Vice President DSM Environmental Services, Inc.

Natalie has spent over twenty-five years in the solid waste, resource recovery and energy field. Natalie's work has focused on improving the economics of solid waste management and recycling programs throughout the U.S. as well as abroad. Natalie specializes in benchmarking and economic analysis of solid waste management and recycling systems, including completing the recent analysis of the impact of Act 148 on Vermont's total solid waste system costs and diversion.

Natalie has been involved in assessing infrastructure, waste generation and disposal rates and materials recovery efforts in urban and rural regions across varying demographics working to increase recycling and improve the efficiency of collection and processing systems. Relevant project experience includes:

- Consultant, Delaware Solid Waste Authority to determine and model the causes of declines in waste disposal quantities at three landfills and three transfer stations throughout Delaware and to estimate future disposal volumes and potential tip fees for budget planning;
- Consultant, Connecticut Governor's Modernizing Recycling Working Group including technical assistance on recycling and organics diversion potential, review of future disposal costs and options for CT, and to the CT Economic Resource Center on the report "*The Economic Impact on Connecticut from Recycling Activity*";
- Project Manager/Consultant, Northeast Recycling Council, to assess the economic impact of recycling industries in five northeastern states (Pennsylvania, Delaware, New York, Massachusetts, and Maine);
- Project Manager/Consultant, Illinois Recycling Association and the Illinois Department of Commerce and Economic Opportunity to assess the economic impact of recycling industries for the State of Illinois;
- Consultant, City of Boston to analyze the annual solid waste management and recycling budget, the impact of diverting bulky waste, recyclables and yard waste from the waste stream and the impact of different user fees on disposal quantities and budgeting;
- Consultant, Solid Waste Authority of Central Ohio, to analysis the costs and environmental impacts associated with increasing residential and commercial recycling in Franklin County (Columbus) Ohio;
- Project Manager, Vermont Agency of Natural Resources, on two statewide surveys of solid waste haulers and commercial generators to determine average residential and commercial prices for solid waste collection/disposal services in Vermont in 2005 and 1997; and,
- Consultant, Natural Resources Defense Council, analysis of the cost allocation model for New York City's Department of Sanitation $1.3 billion annual budget and the costs of recycling vs. refuse as transfer and export costs increased after the closing of Fresh Kills landfill.

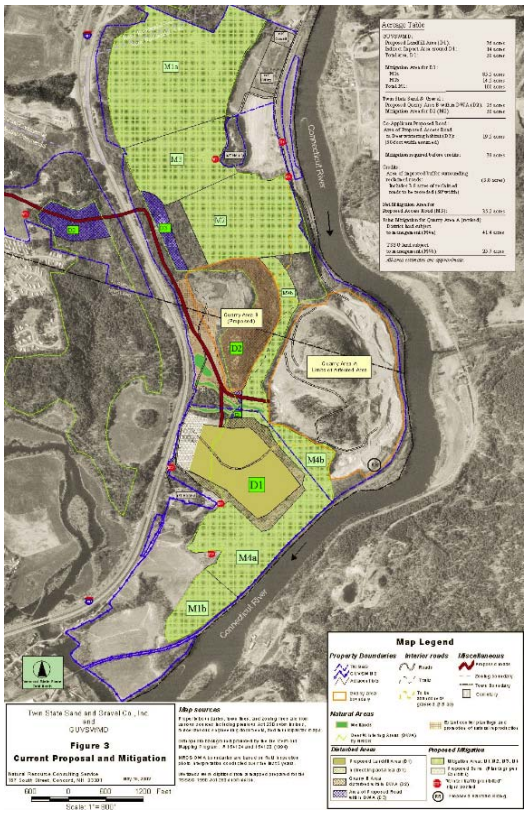
Natalie's education includes a M.S. in Resource Management and a B.S. in Environmental Studies with a focus on resource economics and energy resources. In 2007 Natalie completed an eighteen month fellowship as a Donnella Meadows Leadership Fellow with the Sustainability Institute concentrating on the climate change impacts of recycling and solid waste management.

SECTION 3
Project Understanding and Approach

As noted in our transmittal letter, the Greater Upper Valley Solid Waste Management District has a unique and important asset in the Hartland Landfill site. The landfill site is technically and environmentally superb, and the surrounding land use is unusually favorable for project development. While site access had been a major stumbling block, the recent construction of the bridge over I-91 and associated access road removes that barrier. The communities in the District are relatively small, and collectively have only a small fraction of the solid waste disposal demand that is necessary to develop a viable landfill operation at the site. With this proposed study, the parameters will be explored of how a landfill project could be developed in a way that benefits the communities for solid waste disposal and also as a potential revenue-producing facility generating funds for general municipal needs or tax rate reduction.

In this section we focus on two major aspects of the project:

1. ***Developing a more efficient landfill design approach***. We have formulated a general design concept that addresses the balance of cuts and fills for the landfill, while maintaining or enhancing capacity. The existing design includes an extraordinary amount of excess excavation beyond the landfill construction requirements. The material has limited or no market value in the construction industry, particularly at these high quantities. We believe the previous cost estimates costs did not properly deal with the costs of managing this tremendous amount of material.



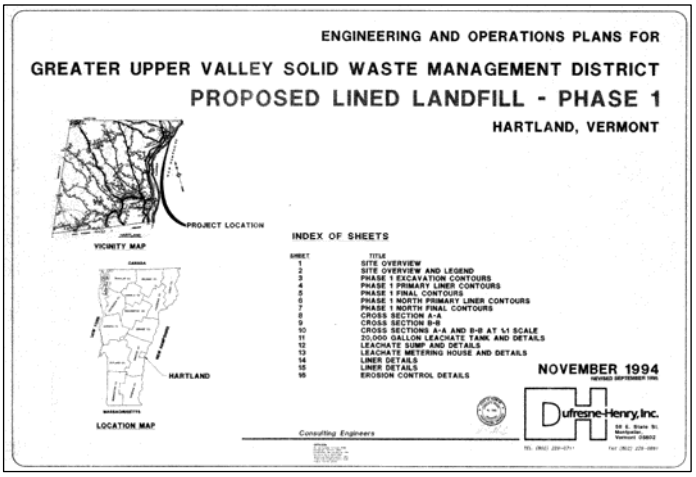
2. ***Waste Supply.*** It is clear from preliminary evaluations and our experience with landfill economics and market conditions that for a Hartland Landfill to be operated at net costs that can compete with regional disposal alternatives, waste disposal rates of somewhere between 75,000 and 125,000 tons per year will be necessary. We characterize some of the elements of the waste supply issues, and provide initial ideas on what will be important in completing this essential part of the project.

Completing the evaluations in this study will update the design concepts and cost estimates for a landfill facility, and take a hard, focused look at the regional solid waste markets for short and long term options. With an understanding of these issues CMA Engineers proposes to work closely with the District to formulate strategies and approaches for decision-making on next steps for the project.

Landfill Design Issues

The Hartland Landfill was permitted and designed almost 20 years ago. The state of the practice and regulatory rules/policies has evolved since that time and new cost effective and performance enhancing synthetic materials are now available for incorporation.

The original design was not prepared in a manner that optimizes cut/fill volumes, re-uses on-site materials, or maximizes airspace of the permitted footprint. We believe there are large costs associated with the design approach with the substantial excess excavation. There are also design alternatives that can address this fundamental issue.


ENGINEERING AND OPERATIONS PLANS FOR
GREATER UPPER VALLEY SOLID WASTE MANAGEMENT DISTRICT
PROPOSED LINED LANDFILL - PHASE 1
HARTLAND, VERMONT
PROJECT LOCATION
VICINITY MAP
INDEX OF SHEETS
SHEET TITLE
1 SITE OVERVIEW
2 SITE OVERVIEW AND LEGEND
3 PHASE 1 EXCAVATION CONTOURS
4 PHASE 1 PRIMARY LINER CONTOURS
5 PHASE 1 FINAL CONTOURS
6 PHASE 1 NORTH PRIMARY LINER CONTOURS
7 PHASE 1 NORTH FINAL CONTOURS
8 CROSS SECTION A-A
9 CROSS SECTION B-B
10 CROSS SECTIONS A-A AND B-B AT 1:1 SCALE
11 20,000 GALLON LEACHATE TANK AND DETAILS
12 LEACHATE SUMP AND DETAILS
13 LEACHATE METERING HOUSE AND DETAILS
14 LINER DETAILS
15 LINER DETAILS
16 EROSION CONTROL DETAILS
HARTLAND
LOCATION MAP
NOVEMBER 1994
Consulting Engineers
Dufresne-Henry, Inc.

The permit level design depicts the first 20-acre phase of the 39-acre landfill footprint. The first stage of Phase I (Phase I North), encompassing 9.1 acres, has been permitted for construction. For the purposes of the following discussion, our comments and quantity estimates refer to the 20-acre Phase I design.

Existing Designed Base Grades and Geometry

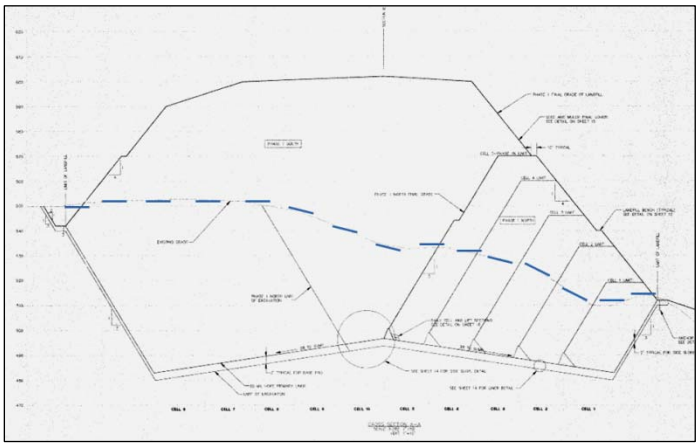
The Phase I landfill is centered on a ridge line bisecting the long axis of Phase I, and is divided into stages or cells, Phase I North and South. The maximum topographic relief of the existing ground surface within the landfill is over 80 feet, ranging from elevation 554 in Phase I South to elevation 470 along the southeastern limits of Phase I. The current design locates the two sumps, the low points in each landfill cell, directly beneath the topographically high ridgeline. Locating the landfill low points at these two locations maximizes the amount of soil cut (up to 72 feet) needed to achieve design base grades, without providing a corresponding need for fill or increases in capacity.

We calculate the preliminary design yields **1.58 million cubic yards of disposal capacity**, and requires excavating 886,000 cubic yards of soil and placing 153,000 cubic yards of fill, **generating 773,000 excess cubic yards of soil**. Most of the soil consists of silt, sandy silt or

silty clay that has little to no value in conventional construction. The remainder consists of silty sand or fine sand that may have some small commercial value. The site has limited area available for long-term stockpiling of excess soil due to conservation easements established in most areas not planned for development.

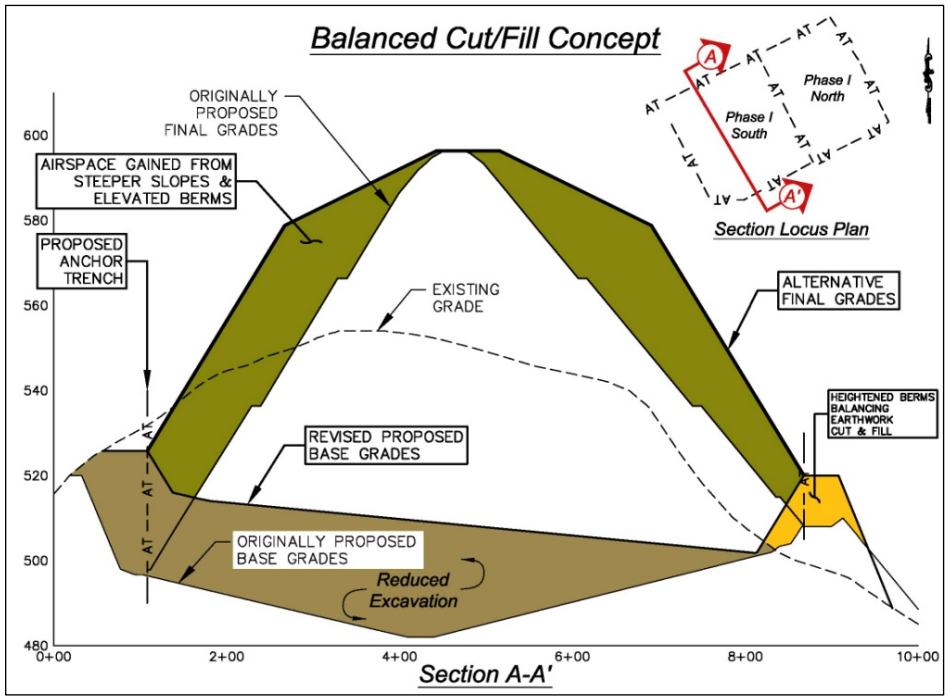
A single sump located at the intersection of Phase I north and south along the southeastern limits of the landfill could be designed to handle all of the leachate flow and leak detection requirements for both cells. Locating the sump at this location where topography is naturally low would reduce soil cut quantities without reducing capacity.

Solution to Soil Balance Problem



We have developed the concept for a solution to this problem. It is depicted on the figure below. It provides the same disposal capacity as the original design while limiting and **balancing cuts and fills to roughly 300,000 cubic yards each**. The balance is accomplished by:

- Limiting cuts to achieve sump elevations to only 20 feet,
- Building larger perimeter berms, steepening landfill side slopes, and raising the landfill floor, all within the proposed landfill limits.
- Additional feasible solutions could incorporate a cut/fill balance with even larger berms and a deeper base, thereby providing more capacity than the preliminary design with less earthwork and its associated cost.
- The design could be further refined to provide more cut volume and capacity, thereby generating some excess fill materials to be re-used in landfill construction as discussed below, or for construction of a screening berm, or daily cover as needed.
- Lastly, the smaller portion of the excavated soil that is coarser in consistency can be segregated, stockpiled and sold. Consolidating the two sumps into one will save significant construction cost (roughly $200,000), reduce the need for force mains and power line extensions, and simplify landfill operations and record keeping.



- Waste capacity of original and alternative configuration is equal.
- Alternative cell configuration balances earthwork cut and fill.

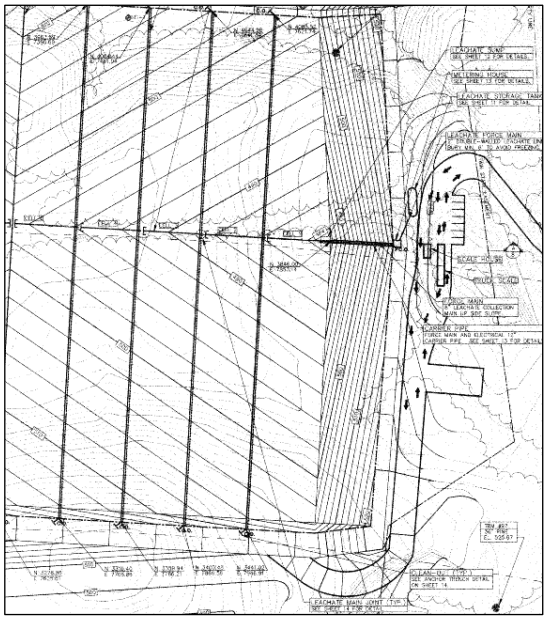
Final Grades

The existing design incorporates 3.5 horizontal to 1.0 vertical (3.5H:1V) final slopes with benches placed at vertical intervals. We have designed and constructed many final side slopes for landfills at 3H:1V without benches, incorporating side slope swales into the above-liner portion of the cap. It has been our experience that designing final grades at 3H:1V can increase disposal capacity up to 15 percent or more in comparison to the approach used in the original design, without increasing overall landfill height. Steepening the slopes in this manner also allows, from a geometry standpoint, landfill height increases without reducing the size of the top flat area. All of these increases in landfill capacity are achieved essentially without any additional capital cost.

Lining System

The existing lining design includes drainage layers that consist of 12 inches of highly permeable sand within a network of closely spaced piping. This was a common approach years ago. Sand meeting the design requirements for this system is not available on site and would be costly and difficult to source.

Alternatively, drainage geocomposite used as the primary drainage medium would provide substantially more drainage capacity and much faster response time than the specified sand layer, while allowing a wider spacing of leachate collection header pipes. We would recommend keeping the 12 inch sand layers over each liner for mechanical protection against puncture or damage; however, on-site deposits of sand from base grade excavations should be satisfactory for this purpose in conjunction with modern geosynthetic drainage media.



The lining system also includes a 24-inch layer of clay beneath the secondary liner to form a composite liner. The clay layer thickness is increased to six feet in sump areas. The clay is specified to have a hydraulic conductivity of 10^{-7} centimeters per second. We recommend evaluating and using the natural silt/clay subgrade where present, or a 24-inch layer of re-compacted silt/clay where subgrades consist of sandier materials, in lieu of a clay liner. The silt/clay soils on site have a hydraulic conductivity in the range of 10^{-5} centimeters per second. Head on the liner in the secondary collection system is quite low, and a composite liner incorporating the on-site soils instead of clay will perform essentially the same as a clay composite liner with respect to providing a barrier to leakage.

Importing, conditioning and placing clay liners at the site will cost about $30 to $40 per cubic yard if sourced locally, and suitable clay may not be available within a reasonable haul distance. Over 60,000 cubic yards of clay are required for the Phase I liner as currently designed. It has been our experience that suitable clay deposits in Vermont have naturally high water contents. Prior to being placed to specified densities, the clay requires conditioning (drying) that involves significant mechanical effort and time to accomplish. This conditioning can only be done effectively in summer months when sunlight is strong. If clay liners are specified, construction schedules need to be lengthened and planned around these seasonal limitations, adding time, cost and complexity to any landfill project. Further, the thickness of the clay liner either adds to soil excavation quantities or reduces available disposal capacity by a like amount. The clay component of the lining system is unnecessary and expensive, costing in the range of $2 million dollars or more.

Re-use of On-site Soils

The fine sand deposits that constitute a smaller portion of the soils to be excavated to achieve base grades could be used over the primary and secondary liners for mechanical protection,

provided drainage geocomposite is used as the drainage medium. For the Phase I area, approximately 60,000 cubic yards of sand is required for this purpose.

The silt/clay soil can be used as a 24-inch composite liner layer where natural liner subgrade soils consist of sand. Assuming this condition exists over 15 percent of the Phase I base area, about 12,000 cubic yards of silt/clay soil is required for this purpose. We typically include a 6-inch layer of moisture retention soil below topsoil in our cap designs to reduce infiltration flows into the cap drainage system and to promote vigorous cap vegetation by retaining soil moisture available in the root zone. The on-site silt/clay meets the specifications for moisture retention soil. An additional 16,000 cubic yards of silt/clay is required for this purpose.

Leachate Storage

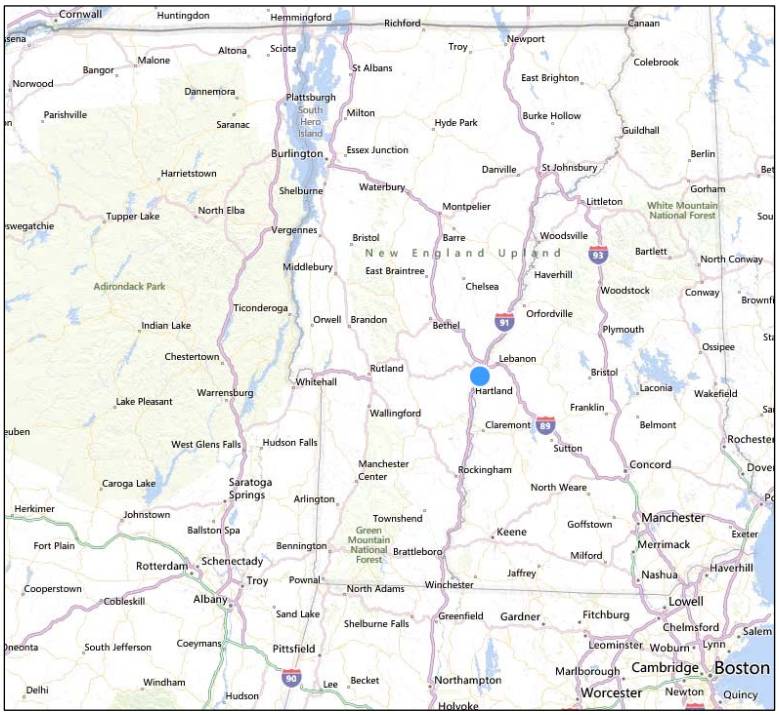
Leachate collected at the landfill will be trucked off site for treatment at an approved municipal waste water treatment plant, as there are no municipal wastewater treatment plants in the immediate vicinity that could connect to the landfill by pipeline and pump station. Design plans show one 20,000 gallon underground storage tank for each of the two Phase 1 cells. Leachate pumped into the tanks will be in turn pumped into tanker trucks for transportation to the treatment facilities. It has been our experience that operating a 20-acre landfill will require significantly more storage than 40,000 gallons. During extended periods of snow melt or precipitation, leachate removal via trucking can be a 7 day per week operation, and large storage capacity is vital in keeping head off of the liner and the landfill well drained. A 150,000 to 200,000 gallon above ground storage tank is common for landfills of this size.

Waste Evaluation Study

The waste evaluation study, indicated as Task 7 in the scope of services, is in essence the crux of the matter with respect to the future development and operation of the Hartland landfill site. As described above, CMA Engineers will be creative with suggested significant design modifications to increase capacity and lower capital costs for the landfill. Based on an initial review and our experience with other lined landfills, we are certain, however, that even with these lowered costs, the preliminary design and economic analysis will conclude that at a rate of up to 50,000 tons per year, the Hartland landfill could not operate competitively in the current regional waste disposal market.

At somewhere in the range of 75,000 to 125,000 tons per year, however, economies of scale associated with relatively fixed capital and operating costs will result in per ton costs below what the current disposal market will bear, making the landfill potentially cost competitive, or very cost competitive. The question therefore is, whether that much waste can be attracted to a lined landfill in Hartland, initially and in the future.

The question is significant. If the facility is constructed with public debt, and if the requisite tonnages are not attracted at an appropriate tipping fee level, the GUVSWMD member municipalities, which have a total population of about 18,500, could be faced with the choice of operating the facility at a loss, or shutting the facility down and continuing to pay off the bonds until market conditions improve. Reasonable assurance of base tonnage and revenue levels is needed in order for GUVSWMD to assume the significant financial risk inherent in developing the landfill. Developing a good understanding of both the general waste disposal market conditions and the interests of competing disposal facilities is imperative for the District to make good business decisions.



General Market Conditions

The waste disposal market in northern New England has changed in recent years. Waste quantities have declined steadily and significantly in all regions and sectors for the last six years due to the economic downturn, increased recycling, and more efficient packaging practices. This is not just the case in New England but is the case in much of the United States. This decreasing trend may continue in part due to the future implementation of Act 148, precluding the disposal of heavy organics in Vermont landfills.

The result has been the stabilization, and in some cases decline, of regional tipping fees, as waste to energy facilities have procured waste to keep the plants operating at maximum capacity year-round, and commercial landfills have lowered tipping fees to attract additional waste in an effort to maintain revenue levels. The disposal facilities together are competing for a decreasing amount of waste available for disposal.

This increased competition and price stabilization has changed the desires and expectations of public entities seeking disposal arrangements. Twenty years ago, when the Hartland site was acquired, many municipalities in New England were interested in securing long term arrangements for waste disposal at locked in prices, fearing that continued rapid increases in waste quantities and constraints in developing new capacity would result in soaring future

tipping fees. The opposite occurred. At this point in time, many, or most, municipalities are more interested in the lowest near term net hauling/disposal cost among all available alternatives, and fewer municipalities than in the past are willing to assume any amount of risk in order to secure future capacity. Municipalities can commit base load tonnages under municipal control for long periods of time, twenty years or more, but few municipalities are interested in doing that with current market conditions. It seems currently that many municipalities would just as soon ride out a medium term agreement and see if they might be able to do better after the end of the term.

Private waste disposal firms can enter into agreements with waste disposal facilities, and their motivations are different from those of municipalities. Small hauling firms may have interest in entering into longer term agreements in order to limit the possibility of being "leveraged" in the future by larger hauling competitors that also have disposal capacity. This appears to be the situation at the Moretown Landfill where smaller haulers not affiliated with Casella Waste Systems ("Casella" herein) had locked in favorable disposal rates allowing them to compete with Casella, and Casella's inherent advantage in owning large regional landfills. Delivery of waste from such haulers will be subject in the future to the vagaries of the very competitive private hauling business. Haulers can have their waste quantities decline due to competition, or they can be successful in attracting more customers in which case they may be a target for acquisition by a larger hauler.

The larger haulers that have their own disposal capacity, predominantly Casella in this region, have distinctly different interests, but are an important part of the mix in securing waste supplies of the magnitude envisioned by the District. Casella may have interest in facility operations as they have public-private arrangements at other publicly owned landfill sites, and will have interest in the availability of low cost disposal capacity, at a cost less than their combined hauling and internal disposal cost at their own disposal facilities.

Competing Disposal Facilities

The District needs to understand the general waste disposal market as described above, and also the interests of its disposal competitors. Our understanding of the competing disposal facilities is as follows.

Moretown Landfill

We do not currently have a good understanding of the likelihood of the re-opening of the currently closed Moretown landfill. It would appear, based on the Agency of Natural Resources decision to close the Moretown landfill that it will be difficult to reopen the site given both the long term odor issues and the monitoring status and significant site restrictions inherent in that site. The District needs to develop a better understanding of that in order to assess its waste supply prospects, to be provided by the CMA Engineers team. Even if the Moretown landfill is

closed, price will remain the primary factor in whether GUVSWMD could attract the waste that was going to Moretown.

City of Lebanon Landfill

The City of Lebanon's municipal landfill is located about a mile from the Hartland site, "as the crow flies", and is a significant factor to consider. The facility disposes of waste from many of the municipalities and businesses in the Upper Valley, about 38,000 tons per year annually at current tonnage rates. While the facility is municipally owned and operated, it functions as a commercial landfill, and as a business, returning significant funds to the City's general fund each year to offset local taxes. The majority of waste delivered to the facility is from private haulers, both from businesses and subscription hauling services. The tipping fees in the upper sixties per ton have successfully "held" the waste disposed at Lebanon, about two thirds of which is delivered to the facility by Casella, attracted solely by the level of the gate price. The Lebanon landfill has about 10 years of remaining capacity permitted and under construction, and the site has additional potential capacity which has been studied but not permitted.

The Greater Upper Valley District will need to carefully consider its relationship to the Lebanon facility, among perhaps three distinct options:

1) GUVSWMD could attempt to operate another commercial operation "cooperatively" with the Lebanon landfill;
2) GUVSWMD could directly compete with the Lebanon landfill, offering lower tipping fees, and likely forcing the City of Lebanon to close the facility in time rather than to operate at a net loss; or
3) GUVSWMD could forge a relationship with the other municipalities in the region so that the Hartland site would serve as a successor disposal facility to the Lebanon landfill, serving the long term public and private disposal needs of the region, and the Hartland site would be developed at a later date when Lebanon capacity is depleted.

It is difficult to conceive of an operation of the Hartland landfill at tonnage rates of 75,000 to 125,000 tons per year in the cooperative 1) mode above, without getting into the competitive 2) mode. The relationship is further complicated by the fact that much of the waste generated by

the GUVSWMD member municipalities themselves appears to be committed to the Lebanon site for the next ten years.

Claremont WTE Closure/Wheelabrator Concord

The recently announced closure of the waste to energy facility in Claremont owned and operated by subsidiaries of Wheelabrator Technologies (itself a subsidiary of Waste Management, Inc., "WMI") presents both an opportunity and a threat to the potential acquisition of tonnage from the region for disposal at the Hartland site. Wheelabrator is closing the Claremont facility in part because it is a less costly option with respect to keeping the Wheelabrator Concord facility running at full capacity year-round. While the waste delivered to the Claremont facility is now available, WMI will likely become more active in the region marketing waste for delivery to the Concord facility, not necessarily less active, after the closure of the Claremont facility.

Casella Waste Systems Disposal Facilities

Casella operates commercial landfills within reasonable hauling distance of the greater upper valley in Coventry, VT; Bethlehem, NH; and in Massachusetts and New York State. The firm also has a significant presence in the waste hauling business throughout Vermont. Given the economies of scale that exist at Casella landfills, it is likely that any decision to compete with Casella will result in lower disposal prices, not higher disposal prices as Casella actively seeks to source waste that might go to a new, competitive landfill. If waste quantities continue to decrease, acquiring additional waste from more remote locations may become a higher priority for existing commercial landfills in order to maintain revenue levels.

Other Disposal Facilities

Disposal facilities in Massachusetts and New York also play a role in Vermont. Hauling to remote disposal facilities is an increasing practice in New England. Large capacity transfer stations are beginning to utilize larger, lighter trailers with additional axles, capable of achieving 30 ton payloads while meeting legal road load limits (previous payload limits were closer to 20 tons). This trend will lower the cost of remote disposal in time. Remote disposal sites in New England, upstate New York, and even Ohio are regularly offering tipping fees to private haulers in the low 30's per ton in an effort to procure waste from remote sources. The current disposal market is very competitive.

Returning to the Big Picture

The project's institutional structure, business strategy and management scheme are decisions that need to be made by the District. CMA Engineers' role in this critically important task is to provide the information that the District needs in order to make those decisions on a sound basis. The CMA Engineers' team understands the context of those decisions, and can provide focused input based on long experience and a unique depth of understanding of waste disposal in the region.

SECTION 4
Scope of Services and Schedule

CMA Engineers has reviewed the Scope of Work included in the District's RFP, and propose no modifications to the scope as presented. It describes a logical progression of work to update the estimates of costs and economic forecasts to achieve the District's objectives.

As discussed in our Project Approach section, Task 4 (Preliminary Design Update) will include some major reconfiguration of the landfill components within the existing footprint to more closely balance excavation and filling, while enhancing landfill capacity. The drawings will be a conceptual presentation of the landfill design.

The cost estimates and economic forecasting (Tasks 5 and 6) will be straightforward and as outlined in the RFP.

Also as highlighted in our Project Approach, the waste evaluation study (Task 7) will be a primary focus, as it is the largest variable and has the most important effect on the conclusions of this work. The emphasis will be on the 3rd, 4th, and 5th bullet points in that task.

The suggested schedule extending through late January, 2014 is a framework wherein a logical sequence of work can be readily completed to achieve the District's objectives.

SECTION 5
Engineering Fees

For the scope of services included in the RFP, total costs are estimated to be $53,500. The approximate distribution of costs is as follows (note this is not intended as fee limits for each task, but rather the basis of the total budget):

Task 1- Project Kick-off Mtg and Documentation Review (note much of this has been done in preparation of this proposal)	$ 2,000
Task 2- Regulatory Review	1,000
Task 3- Geologic and Hydrogeologic Review	1,000
Task 4- Preliminary Design Update	16,000
Task 5- Cost Estimates	4,500
Task 6- Economic Forecasting Analysis	9,000
Task 7- Waste Evaluation Study	11,000
Task 8- ADDITIONAL- Report and meetings	9,000
	$ 53,500

Engineering fees will be assessed on the basis of CMA Engineers' standard rates subject to established fee limits. Engineering staff are invoiced at the rate of salary cost (wage rate plus 35% to cover statutory and customary fringe benefits) times a factor of 2.45. Principal time is invoiced at the lesser rate of $140 for William Straub, P.E. and Robert Grillo, P.E, and $150 for Craig Musselman, P.E. Subconsultants will be invoiced at cost times 1.15. Expenses are invoiced at cost plus 10%. Mileage will be billed at the prevailing IRS rate. CADD computer time is invoiced at $9/hour.

Current resulting hourly rates for named staff are:

Bill Straub, P.E.	$140
Craig Musselman, P.E.	150
Robert Grillo, P.E.	140
Paul Schmidt, P.E.	135
Adam Sandahl, P.E.	93
Brad Sullivan, P.E.	95

An estimated hour breakdown estimated for the tasks to complete the project is provided as follows:

Date: August 8, 2013

Greater Upper Valley Solid Waste Management District
Preliminary Landfill Design, Economic Analysis, and Waste Evaluation Study

CMA ENGINEERS PROJECT BUDGET

LABOR CLASSIFICATION	1 Project Kick-off Mtg	2 Regulatory Review	3 Geologic Hydro review	4 Prelim Design Update	5 Landfill Cost Est	6 Economic Forecast Analysis	7 Waste Eval Study	8 Report & Meeting	BY CLASS
PROJECT MANAGER (Straub)	6	2	1	6	2	12	8	20	57
PRINC/SR. REVIEW (Musselman)	0	0	0	1	0	6	16	8	31
LANDFILL ENGINEER (Grillo)	0	4	4	24	8	0	0	4	44
PROJECT ENGINEER (Schmidt)	0	0	0	4	0	6	6	6	22
STAFF ENGINEER (Sullivan/Sandahl)	8	0	0	100	32	40	32	24	236
CADD/TECH	0	0	0	16	0	0	0	0	16
CLERICAL	1	1	0	4	2	2	4	6	20
TOTAL HOURS(CMA)	15	7	5	155	44	66	66	68	426
DSM Environmental Services	2					20	35	10	67
									493

SECTION 6
Project References

The following references are familiar with CMA Engineers' past projects, performance and experience with solid waste management projects, and particularly lined landfill projects We urge District representatives to consult with these references regarding our record of responsiveness and effectiveness.

Name	***Title***	***Representing***	***Phone***	***Email***
Sharon Gauthier	Director	Androscoggin Valley Regional Refuse Disposal District	(603) 752-3342	sgauthier@avrrdd.org
Jim Presher	Director	Concord Regional Solid Waste/Resource Recovery Cooperative	(603) 753-9265	crswrrc@aol.com
Paul DegliAngeli, P.E.	Director of Public Works	Town of Conway (Lower Mt. Washington Valley)	(603) 447-3855	pauld@conwaynh.org
Kevin Roy	Site Manager	NCES Solid Waste Landfill (Casella, Bethlehem, NH)	(603) 869-3366	kevin.roy@casella.com
George Murray	Solid Waste Manager	City of Lebanon	(603) 298-6486	George.Murray@lebcity.com
Kerry Converse	Environmental Engineer	City of Nashua (Four Hills Landfill)	(603) 589-3410	ConverseK@nashuanh.gov