



Fuss & O'Neill Inc. Consulting Engineers

146 Hartford Road, Manchester, CT 06040-5992  
TEL 860 646-2459 FAX 860 643-6313  
INTERNET: www.fussandoneill.com

Other Offices:  
West Springfield, Massachusetts  
Providence, Rhode Island  
Tumbull, Connecticut  
Columbia, South Carolina  
Greenville, North Carolina

April 16, 2003

Ms. Shirley Rasmussen  
Town Planner  
Town of Branford  
1019 Main Street  
P.O. Box 150  
Branford, CT 06045

RE: Proposed Residential Development  
North of the Branford Landfill  
Tabor Drive - Branford, Connecticut

Dear Ms. Rasmussen:

In early March 2003, Fuss & O'Neill, Inc. was first notified of a proposal to change the zoning designation of the 77-acre parcel to the north of the landfill from industrial to residential. Given our knowledge of the landfill's history, we were asked to explain the potential implications of constructing residential dwellings in close proximity to the landfill. The purpose of this correspondence is to briefly summarize what was relayed to Town staff and its legal representatives.

For simplicity, this summary is broken down by topic as indicated by the subheadings in bold below.

#### **Past Disposal Operations**

The Branford Landfill, which is owned by the Town of Branford, occupies approximately 19.4 acres. There are two separate historic disposal areas. The 8.9-acre portion to the west was used for the disposal of municipal solid waste (i.e. garbage) and bulky waste (e.g., demolition and land clearing debris). The eastern portion, which covers 10.5 acres and abuts a wetland, was used only for bulky wastes. State-approved special wastes, including sewage sludge and contaminated soil, were also placed in the landfill. Currently, the only active operations are the disposal of bulky waste and contaminated soil in the northern portion of the landfill.



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#### Neighboring Properties

A ridge occupied by Waverly Park Road and residential housing extends south from the landfill with tidal wetlands on either side. A closed private solid waste landfill (approximately 10.3 acres) is located immediately west of the active Town of Branford landfill, on land owned (now or formerly) by Henry Zuwallick. There is residential property northwest of the facility. Property to the north and east is undeveloped.

#### Leachate

Over the years, a portion of the rainwater which falls on the landfill soaks into the cover soil and enters the waste below. As the wet waste decomposes over time, inorganic and organic constituents dissolve and form a liquid known as *leachate*. The leachate drains from the waste in the landfill until it encounters the groundwater table. When leachate mixes with the groundwater it causes a plume of impacted water that spreads in the direction of the flowing groundwater.

As discussed in the 1985 document entitled "Branford Landfill Study" and subsequent annual reports, the groundwater flow patterns of the site are controlled largely by bedrock topography. There appears to be radial groundwater flow away from a high area of bedrock located beneath the landfill. The depth of groundwater, as measured quarterly, displays site-wide variations of several feet depending on season and precipitation. A portion of the groundwater that flows from the landfill travels some distance to the north before it turns to the south and follows the regional flow pattern. The extent that it reaches to the north has not been defined. Groundwater quality beneath the landfill and property to the north is classified by the CTDEP as GB. This designation indicates that the State recognizes such groundwater may not be suitable for human consumption without treatment due to historic land use impacts.

There are three common concerns associated with leachate-impacted groundwater. First, groundwater wells may become impacted making the water unsuitable for drinking, vehicle washing or irrigation. Second, man-made ponds and drainage features could bring impacted groundwater to the surface where human contact would be possible.

The third concern associated with leachate-impacted groundwater is the potential movement of volatile organic compounds (VOCs) from the groundwater to overlying soil. In vapor form, the VOCs could then enter structures, such as basements, in



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much the same way as radon gas. The Connecticut Remediation Standard Regulations (CT RSRs) establish limits for the concentration of VOCs in groundwater known as the volatilization criteria. One set of limits is for industrial/commercial land use and a more stringent set for residential land use. The current groundwater monitoring program at the landfill includes the analysis of leachate indicator parameters and VOCs for all groundwater samples.

For approximately the past 16 years, the Town of Branford has conducted a groundwater monitoring program as required Solid Waste Permit No. 014-26 issued by the Connecticut Department of Environmental Protection (CTDEP) in February 1987. Monitoring well MW-1 is located to the north of the landfill, closest to the proposed development. Elevated concentrations of leachate indicator parameters (e.g., suspended/dissolved solids, alkalinity, hardness, ammonia, etc.) at this location suggest that groundwater north of the landfill has been impacted by a leachate plume. Although VOCs, primarily petroleum-based, have been detected in this monitoring well, they have been below CT RSR Volatilization Criteria.

#### Decomposition Gas

Decomposition gas is generated from the breakdown of municipal solid waste in a landfill. It consists of a mix of approximately 50 percent methane and 50 percent carbon dioxide. Trace amounts of other gasses, such as oxygen and hydrogen sulfide, may also be present.

There are two common concerns associated with the generation of decomposition gas. The first concern is that the trace gasses, often hydrogen sulfide, in decomposition gas can cause unpleasant odors. Currently, there are no reported offensive odors emanating from the landfill. Furthermore, the landfill no longer accepts municipal solid waste which is the material that generally has a greater potential for generating odors.

The second issue is with the methane component of decomposition gas. At high enough concentrations, the gas, which can accumulate in low lying areas such as basements and utility trenches, can lead to explosive conditions. The Connecticut Solid Waste regulations state that concentrations of methane cannot exceed the lower explosive limit (approximately 5% methane) at the property boundary. Methane monitoring is conducted on a quarterly basis at on-site gas ports and along the floors and corners of the on-site office/equipment storage building. In addition, in August 2001, a methane sampling probe survey was conducted along the northern and western boundaries of the landfill where the landfill is closest to residential



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properties. Along the northern boundary, methane was detected at seven locations at concentrations less than 4%. As indicated above, these concentrations are below the lower explosive limit for methane.

As the waste ages, its ability to generate methane will diminish. However, capping the top of the landfill with clay (planned within the next two years) and closing the active bulky waste area will reduce the ability of the landfill to vent upwards and could allow the gas to move further away from the landfill laterally. Because of these two competing actions, the extent of decomposition gas migration is difficult to predict for the future.

#### Potential Issues with Re-Zoning the Parcel Residential

Changing the zone of the 77-acre parcel to the north of the landfill could potentially place future residents closer to the landfill than anyone has lived in the past.

The following potential concerns become more significant to the Town of Branford if the property in question is re-zoned for residential use:

1. *Methane Gas:* The Town is currently monitoring for methane gas on a quarterly basis. Based on recent data collected at the property line, measured gas concentrations are within acceptable limits. However, methane migration will become a greater concern if residential homes are constructed nearby on the property to the north.
2. *Groundwater Limitations:* It is possible that groundwater under some portion of the 77-acre parcel is or in the future could be impacted by landfill leachate. As a result, groundwater uses on the 77-acre parcel should be a concern until an evaluation of on site groundwater is performed. Such uses that might be a concern include irrigation and the creation of ponds that potentially could become impacted by groundwater recharge.
3. *Groundwater Volatilization:* Volatile organics could potentially off-gas from impacted groundwater and work their way into the new buildings. This possibility should be evaluated in the development plan. Also, the volatile organics would need to be evaluated against the more stringent residential standards.
4. *Noise and Odors:* Although the landfill existed before the proposed development, it has been our experience that people who move next to a



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landfill will demand that it close as soon as possible. The primary concerns cited generally include odors from decomposition gasses and noise from truck traffic.

#### Conclusions

On a quarterly basis, the Town of Braunford has been monitoring groundwater, surface water and methane. The information obtained during these monitoring events is summarized in report form and submitted to the CTDEP for their review. Currently, the CTDEP does not have any enforcement actions against the Town of Braunford relating to the monitoring program. This was confirmed through a telephone conversation made to David McKeegan of the CTDEP Waste Engineering and Enforcement Division on April 7, 2003.

However, the proposed zone change could result in residential development adjacent to a municipal landfill. Potential concerns regarding this have been discussed. If residential use of the 77-acre site is allowed, residents could be located closer to the landfill site than any existing homes. For these reasons, additional precautions may be necessary to protect future residents' safety and limit nuisances.

If you have any questions regarding the above information, please call either of the undersigned at 860-646-2469.

Sincerely,

Craig M. Lapinski, P.E.  
Senior Environmental Engineer

David F. Hurley, LEP, RPG  
Vice President