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CMA ENGINEERS

April 17, 2024

Mr. Matt Scruton, Town Administrator
Town of Rye
Central Road
Rye, New Hampshire 03870

Re: Feasibility Evaluation of Post-Closure Landfill Site Uses – Breakfast Hill Landfill, Rye, NH

Dear Mr. Scruton:

The purpose of this letter is to report on our evaluation of the potential feasibility of post-closure uses of the closed Rye Breakfast Hill Municipal Landfill at the intersection of US Route 1 and Breakfast Hill Road in Rye. Specifically, you asked if the site could be utilized for a cellphone tower or for a fueling station for town vehicles.

The Breakfast Hill landfill was operated by the Town of Rye for the disposal of municipal solid waste, demolition debris, and waste to energy ash from approximately1976 through 1985. The 6+ acre site was closed in 1987 through the construction of a clay capping system and has been monitored by the Town of Rye under the provisions of a groundwater permit from the NH Department of Environmental Services (NHDES) since . Town post closure activities have consisted of groundwater quality monitoring, gas vent monitoring, maintenance and annual mowing.

The site is currently privately owned and was operated by the Town of Rye under the provisions of an agreement with the current property owner. Discussions have been held regarding the installation of a solar power facility by placing solar panels above the cap, which has been accomplished at several other closed landfill sites in New Hampshire. In the course of those discussions, the Town has asked whether other post-closure uses including a cellphone tower or a fueling station might be feasible at the site.

In response to your request, we have completed the following:

1. Conducted a site walk to view the site from the perspective of these potential post-closure site uses.
2. Requested from NHDES' archives copies of the December 1985 landfill closure plans which have not been available in the Town's files previously ("Rye Landfill Closure". Dubois and King, Inc., December 1985, 3 sheets).
3. Reviewed newly proposed rules regarding the post-closure use of solid waste landfills dated March 2024.
4. Reviewed the likely technical constraints of the requested post closure uses internally within CMA Engineers with environmental and geotechnical engineers.
5. Prepared this brief feasibility evaluation letter.

Breakfast Hill Landfill Closure- 1986

The landfill closure drawings on file with NHDES are design drawings and are clearly not "as-built" drawings that would have reflected any changes to the design made during construction. We assume that the closure construction was consistent with the closure design drawings.

The landfill cap consisted of a layer of 12 inches of operating intermediate cover soil over the top layer of waste materials, 12 inches of clay, six inches of a sand/gravel drainage layer, and six inches of topsoil. The surface slopes in the northeasterly section of the landfill, draining toward the intersection of Route 1 and Breakfast Hill Road, were at a 5-7% slope, while the southwesterly section of the landfill, nearest the adjacent Rye Water District storage tank, were at a minimal 2% slope.

The design drawings clarified the extent of the landfill cap on the site. Interview summaries with Rye officials had indicated that there might be some part of the site in the southwest corner that might not have been landfilled, perhaps about 30 feet shy of the tree line. The closure design confirmed that the clay cap was extended to the tree line on three sides, and to the drainage swale on the east side of the site. The existing clay cap thus extends throughout the site.

Our recent site walk revealed that there has been recent differential settlement which has resulted in ponded areas on the cap in wet weather periods, in both of the areas regardless of slope. This differential settlement has been mentioned in recent inspection reports and correspondence. Further differential settlement in the future will require maintenance regardless of post closure uses.

Post-Closure Regulatory Requirements

Until now, there have been few relevant requirements for post-closure landfill uses in New Hampshire and, other than several landfills where solar facilities have been sited in recent years, there are few examples of which we are aware of post-closure uses in the state. However, NHDES is in the process of updating its Solid Waste Rules anticipating a mid-2024 readoption and has recently released drafts of proposed landfill post closure rules for public consideration at public hearings. The current draft, widely available for public review in the last several weeks, is presented in Appendix A.

The proposed rules preclude the construction of buildings on top of closed landfills, prohibit any activity that could damage any component of the closure system, require the permittee to be able to access, observe, monitor and repair any damage to components of the closure system, and prescribe a permitting and approval process applicable to any post closure uses. This would require an application to modify the facility closure permit to allow the post closure use which would need to be submitted by the permittee, which is the Town of Rye. From an engineering standpoint, the proposed rules appear reasonable in our opinion. We would note that these post closure rules would apply to the two post closure uses outlined herein, as well as to the installation of solar panels at the site.

Post-Closure Use – Cellphone Tower

While we are not experienced in the design of cellphone tower structures and foundations, it is our understanding that most cellphone towers are constructed with one large column extending down and into bedrock, or four smaller diameter feet that are cored into and secured in bedrock. The borings at this site indicate bedrock at relatively shallow depths beneath the waste material.

Either foundation configuration could be constructed in the southwesterly corner of the landfill site adjacent to the RWD water tank location. This would require drilling, removal and proper disposal of the cap and waste materials at a diameter somewhat wider than the dimension of each structural member. This would be a relatively small volume of material which in all likelihood would not affect economic feasibility. Vehicular access to the tower location would need to be from the adjacent RWD site. Particular care would need to be taken to preclude construction vehicle point loads on the soil above the clay cap to preclude damage to the saturated clay located only 12 inches below the surface. Following the construction of the foundation and base structural members, the landfill cap layer at the interface with the structure would be patched using geomembrane materials to ensure that rainfall in the vicinity of the tower would not penetrate the cap. From an engineering standpoint, this should be relatively straightforward.

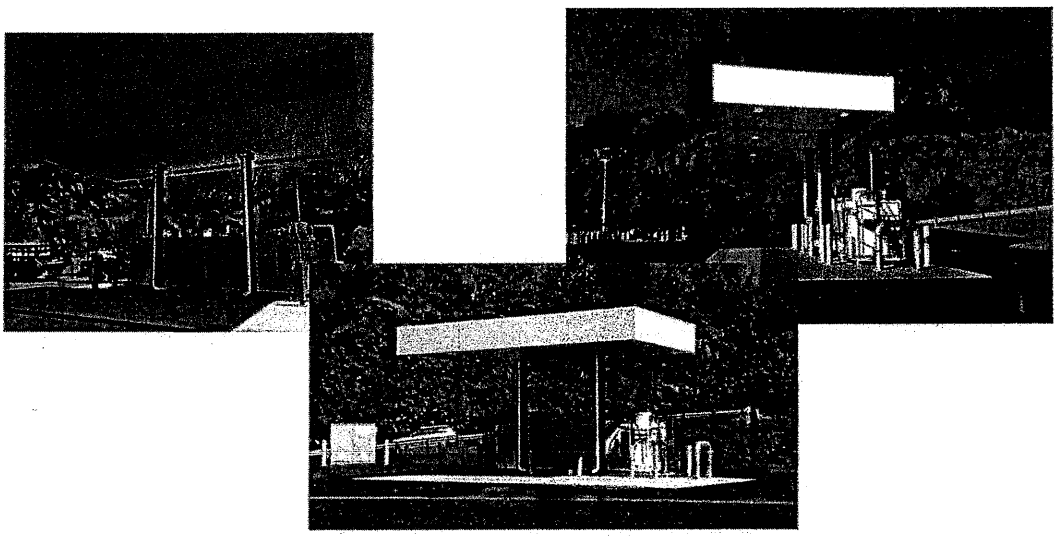
We have evaluated this concept from the perspective of constructing it within the footprint of a capped landfill. We do not have expertise to know whether this is a sufficient signal coverage location to attract the interest of the cellphone tower industry and have not assessed the location with respect to neighboring land uses regarding setback issues or community acceptability.

From permitting, design, construction, environmental and operational perspectives, constructing a cellphone tower within the landfill footprint as described above should be technically and administratively feasible. The permitting, design and construction would be somewhat more costly than would be the case for a site without a landfill. The cellphone tower company would need to be sufficiently interested in locating a tower in this location for them to go through the process.

Post-Closure Use – Fueling Station

The other post closure use we were asked to evaluate was the location of a fueling station to provide fuel for town-owned vehicles, we assume those operated by Public Works, Police, and Fire. The facility the Town had envisioned was illustrated by the photo sent to us to initiate this evaluation, reproduced below.

Example fuel islands similar to Rye's proposed fuel island



This use raises a number of additional challenges to address with respect to the landfill closure system.

The foundation to support the canopy system and the fueling equipment would need to be excavated to remove the cap and the waste beneath the cap. The expanse of paved, impervious area required for vehicle turning movements and for spill prevention, if installed at the existing surface elevation, would provide little protection with respect to freeze and thaw beneath the pavement. A foot of permeable soil, above a foot of permanently saturated clay, is a very poor base for asphalt pavement. If additional soil was imported over the clay to create a better base beneath the pavement, the differential load over the clay where the cover returned to one foot of soil (at the periphery of the paved area) would be problematic with respect to settlement of the clay cap. The presence of methane gas beneath and vented through the cap, which can occur in excess of the lower explosive limit, would merit careful consideration and design accommodation, if feasible. In addition, the presence of the pavement would preclude access to the cap beneath it for maintenance and repair as required by the proposed Solid Waste Rules section 807.06(c) (see Appendix A). We believe that this use over the capped landfill would likely not be approvable by NHDES.

We believe that the use of the site for a fueling station would necessitate the excavation of the cap and the waste from beneath the entire paved area in the southwestern corner of the landfill to be technically and administratively feasible. We do not have information on the depth of waste materials beneath the cap, so we are hesitant to provide a cost estimate for the excavation of the landfilled materials. The cost of excavation and disposal of the waste and replacement with suitable soil would be very substantial. It is our opinion that the cost of reclaiming the landfill footprint would far exceed the cost of building a fueling station and that this post closure use would be economically unfeasible as a result. If the waste materials beneath the paved area were removed and replaced, design provisions would be required to assure proper management of methane gas generated by the remaining landfill areas adjacent to the fueling facility. If the Town wishes to pursue this concept, further borings and a detailed scope of investigation would be necessary to allow formulation of an opinion of cost,. We do not recommend such an effort in that it is our opinion that the fueling station use is likely unfeasible.

In summary, we believe that the post-closure use of the Breakfast Hill landfill site as a cellphone tower should be technically and administratively feasible, if the site is attractive as a cellphone tower location and if a cellphone tower developer is sufficiently motivated to permit, design and construct the tower while properly protecting the landfill cap. We believe that the use of the site for a town fueling station is technically and administratively unfeasible if constructed over the existing landfill cap, and that excavation and disposal of the waste materials in a sufficient area of the site to support the fueling station, while technically feasible, would be economically unfeasible.

If you have questions concerning the above, please don't hesitate to contact me.

Very truly yours,
CMA ENGINEERS, INC.

Craig N. Musselman, P.E.
Principal Engineer

Appendix A

Text of NHDES Proposed Post Closure Use requirements for municipal solid waste landfills, subject to public hearings in May, 2024 and scheduled for adoption as early as July 1, 2024.

"Env-Sw 807.06 Post-Closure Use

(a) The permittee shall obtain department approval, via the permit modification procedures in Env-Sw 315, for any post-closure use or activity at the site not specifically approved in the facility's permit.

(b) A post-closure use shall not increase the potential hazards to public health, safety and the environment from the closed landfill.

(c) A post-closure use shall not preclude access to components of the landfill closure system for purposes of inspection, maintenance, monitoring, and repair.

(d) A post-closure use shall not cause damage to any component of the landfill closure system as specified in Env-Sw 1004.04.

(e) If damage occurs to any component of the landfill closure system during post-closure use, the damage shall be repaired in a timely manner and the incident reported to the department in accordance with Env-Sw 1005.09.

(f) Residential and commercial buildings, except buildings used for landfill operation, maintenance, and post-closure care, shall be prohibited on top of or within 100 feet of the landfill footprint or property line, whichever is less.

(g) The following information shall be included with the application for permit modification for postclosure use: (1) A description of the proposed post-closure use; (2) The intended start date of the proposed post-closure use or activity, and the proposed duration; (3) A site plan showing the proposed location(s) of post-closure use and existing components of the landfill closure systems, including monitoring points; (4) Post-closure use design plan(s); (5) As-built Record drawings of landfill closure systems located within 100 feet of the postclosure use or activity; (6) An updated post-closure care plan as specified in Env-Sw 807.05(e); (7) An evaluation of the available environmental monitoring data and other information pertaining to the facility conditions and the proposed post-closure use including a statement by a qualified professional engineer identifying whether the proposed post-closure use will meet the requirements of (b) above; (8) A plan for the repair of any disturbance or damage to the landfill and associated infrastructure, including the capping system; (9) A plan for the protection of all existing landfill components including liners, leachate collection piping, gas recovery systems, stormwater systems and other landfill infrastructure present; (10) Updated financial assurance plan in accordance with Env-Sw 1400; and (11) Certification, signed by the applicant, that the proposed activity shall not adversely affect the post-closure care of the landfill.

(h) Post-closure use requiring construction shall follow the applicable requirements of Env-Sw 1104.

(i) Following termination of a post-closure use or activity, the facility shall be restored to conditions that existed prior to commencing the post-closure use."