

MEMORANDUM

TO: C. Elizabeth Gibson, Town Manager, Town of Nantucket
Kara Buzanoski, Director of Public Works, Town of Nantucket

FROM: George Aronson, Principal, CRMC

RE: Transport of Composter Residuals to the Mainland by Barge

DATE 10 August 2016

By request of the Board of Selectmen, this memorandum addresses transport of Composter residuals to the mainland by barge as compared to either disposal in the proposed Cell 3A or transport by truck and commercial ferry service to disposal sites on the mainland. For the non-barge options, the life-cycle costs to the Town for disposal of Composter residuals over a seven-year period are as follows:

- For disposal of residual materials in Cell 3A, projected costs range from **\$74** per ton to **\$89** per ton, equivalent to the range of \$2.14 million to \$2.54 million in total cost.
- For transport by truck and the Steamship Authority (SSA) commercial freight ferry to disposal sites on the mainland, projected costs range from **\$143** per ton to **\$170** per ton, equivalent to the range of \$4.26 million to \$5.06 million in total cost. The low range of costs reflects an additional disposal option not considered in the original memorandum.

Analysis of transport of Composter residuals to the mainland by barge indicates the following:

- On a preliminary basis, it appears that the life-cycle cost for residuals management with transport by barge to the mainland would almost have a substantially higher cost than the projected costs for construction and use of Cell 3A. At a minimum, the projected cost of an option that includes barge transport would almost certainly exceed **\$120** per ton (equivalent to \$3.6 million in total cost) and would likely exceed the range of **\$140** per ton to **\$165** per ton, equivalent to the range of \$4.16 million to \$4.91 million in total cost.
- This finding is largely independent of transportation costs, because projected disposal costs on the mainland (\$75 per ton to \$100 per ton) would likely exceed projected total costs for disposal of residual materials in Cell 3A, even if transportation costs are minimal or zero.
- The projected costs of using a barge comparable to that operated by Toscana Corporation, if the service could be arranged and equipment could be made available, are elevated, because that approach would require the use of a substantial number of covered or enclosed 30-yard containers rather than 100-yard trailers.
- Development of a new barge or freight service that could accommodate loads of Composter residuals in 100-yard trailers is not projected to be cost-competitive with the use of the SSA commercial freight ferry.

- None of the mainland options for disposal of Composter residuals account for the cost impacts of not constructing Cell 3A on accelerating the closure of Cells 2A and 2B, or for the cost impacts of accelerating closure of the full landfill site, including Cells 1A, 1B and 1C.

The remainder of this memorandum describes the production of the Composter residuals, and presents non-barge and barge systems for transporting composter residuals to the mainland for disposal, with preliminary evaluation of feasibility and projected costs for use of a barge comparable to that used by Toscana and for development of a new commercial service. The memorandum also describes briefly findings from studies and analyses of barge and freight service from the island of Martha's Vineyard to New Bedford, and reviews other costs of not constructing Cell 3A.

Production of Composter residuals

The Town's contractor, Waste Options Nantucket, LLC (Waste Options), owns and operates a mixed-waste composting facility (the Composter) that accepts a mixture of MSW, sewage sludge and manure for processing. These materials are loaded together into a slowly-turning 180-foot drum, where they undergo a first stage of biological degradation. The materials discharged from the drum are then conveyed to a trommel screen. Materials that pass through the holes in the screen are moved to aerated piles inside the Aeration Building, where they undergo a second stage of biological degradation. Materials that pass through the trommel, but do not pass through the holes in the screen, become residuals and are sent to a baler.

The Composter produces approximately 4,000 tons per year of baled residuals per year, comprised mostly of film plastics contaminated with other inert and un-composted materials and carrying the odor of partially composted MSW, sewage sludge and manure. The residuals are produced in the form of tied bales with dimensions of three feet by four feet by five feet (60 cubic feet, or 2.2 cubic yards, per bale) that weigh approximately 2500 pounds each. The Composter processes sufficient material to produce approximately 500 bales per month in July and August; 260 to 360 bales per month in May, June and September; and 150 to 240 bales per month the remainder of the year. Note that the Aeration Building has the capacity to store up to 300 bales of residuals in an enclosed and ventilated building where the air exhaust is treated in a bio-filter to remove odors. Under existing conditions, the bales are stored inside the Aeration Building until moved to Cell 2B of the landfill for disposal. Cell 2B is projected to reach capacity by the end of calendar year 2016, at which time an alternative method of disposal will be required.

Non-barge options for transport and disposal of Composter residuals

A previous memo had projected life-cycle costs to the Town of Composter residuals over a seven-year period, for two options that did not include a barge system, as follows:

- For disposal of residual materials in Cell 3A, accounting for amortized construction and closure costs, projected costs ranging from **\$74** per ton to **\$89** per ton, equivalent to the range of \$2.14 million to \$2.54 million in total cost.
- If Cell 3A is not constructed, for transport by truck and SSA commercial ferry service to disposal sites on the mainland, a projected cost of **\$170** per ton, equivalent to \$5.06 million in total cost.

Subsequent investigation of disposal options for the residuals identified a Massachusetts disposal facility operator that might be willing to accept the bales if the baling ties are pre-cut before being off-loaded. The disposal facility is located within 35 miles, or approximately a 40-minute drive, of the New Bedford waterfront (the travel distance to the Hyannis waterfront is somewhat longer). An indicative tip fee was quoted in the mid-70s per ton. Modifying the prior analysis to account for this disposal option at \$75 per ton, and assuming transportation of the residuals via 100-yard trailers that use the SSA commercial freight ferry, the life-cycle cost for residuals disposal might be projected to be as low as **\$143** per ton, equivalent to \$4.26 million in total cost.

Barge options for transport and disposal of Composter residuals

Two alternatives to the use of the SSA commercial freight ferry to transport Composter residuals to the mainland might include:

- Use of the existing barge operated by Toscana Corporation (Toscana) or operation of a similar barge by others through a comparable arrangement; or
- Development of a new barge service with the SSA, with Toscana, or with a private barge operator.

Use of the Toscana barge or a comparable barge

At present, Toscana operates a freight barge to move materials between Nantucket and its dock in New Bedford as an alternative to the SSA commercial freight ferry for certain bulk and containerized materials¹. The Toscana barge service is set up to accommodate deck-loaded

¹ Island Barge, Inc., which was a competitor, no longer offers commercial freight service by barge from Nantucket. R.M. Packer Company, which operates barges to the mainland from Martha's Vineyard to a private dock in New Bedford via Tisbury Towing and Transportation, Inc., does not normally serve Nantucket.

materials (such as aggregate and soils) and 30-yard containers, and cannot accept multiple loaded 100-yard trailers due to weight and space limitations. Baled residuals could not be transported by barge on a deck-loaded basis due to the potential for fugitive odors and for unacceptable environmental impacts from run-off of moisture from the material. Rather, use of the Toscana barge, or a comparable barge, would necessarily require the bales to be loaded into 30-yard containers (which would need to be covered or lidded²). Moreover, waste materials cannot be transferred legally between 30-yard containers and larger trailers at the docks or at any location that does not have the required permits from the Mass DEP and local Board of Health (a site assignment and a solid waste facility permit). Thus, unless moved to a licensed transfer station, the baled residuals would need to stay in the 30-yard containers for the entire journey from the Composter to the disposal site. Transportation of the bales in this manner could involve the following, provided that Toscana or another barge operator could, and would be willing to, acquire and dedicate equipment to accommodate the level of demand that would be required (which has not been confirmed):

- Load the baled residuals from the Aeration Building into 30-yard containers. Assume for this analysis that a container can accept eight to twelve bales (10 to 15 tons) without exceeding volume or weight limits, and that the baling ties would be cut as the bales are either placed in or removed from the containers (the number of bales that each container could accept would need to be confirmed). In this case, removal of baled residuals would require up to 50 container loads per month in July and August, 26 to 36 container loads in May, June and September; and 15 to 24 container loads per month for the remainder of the year.
- Move the containers onto the Toscana barge at the SSA commercial freight dock, and have a tug pull the barge from Nantucket to New Bedford to the Toscana dock, to the State Pier or to another dock. Assuming that a barge can hold twenty 30-yard containers, there would need to be the equivalent of three to four full barge loads of containers in each of July and August; one to two full barge loads in May, June and September; and approximately one full barge load per month for the remainder of the year. For efficient operation, space would be needed at the dock for storage of incoming and returning containers. The availability of such space has not been confirmed.
- At the dock, off-load the containers of baled residuals from the barge in order to move the material to the disposal destination. It is presumed that the fleet of container trucks used to off-load the containers from the barge in New Bedford would be different from the fleet of container trucks used to move the containers from the Aeration Building to the SSA dock in Nantucket, that the trucks are not transported with the containers, and that the truck drivers need not ride on the tug along with the barge. Again, dock space would be needed for storage of incoming and returning containers. Availability of such space has not been confirmed.

² Alternatively, the bales might be wrapped in plastic, which would necessitate equipment and ongoing costs for the plastic wrapping operation, as well as a disposal facility willing to accept wrapped bales.

An accurate cost estimate would require significant analysis of the logistics for loading, moving and unloading the containers at each step of the process, and for barge-related costs. On a preliminary basis³, presuming that containers, trucks and other equipment can be procured efficiently as needed, and that drivers can be contracted on a commercial basis, costs can be estimated as flows:

- At least \$20 to \$30 per ton to move the containers from the Composter to the barge at the Nantucket dock and from the New Bedford dock to the disposal facility, not including additional costs for container storage at either dock and for container lidding and de-lidding.
- All-in cost for barge transportation estimated in the range of \$25 to \$35 per ton.
- Disposal costs ranging from \$75 per ton to \$100 per ton as described previously.

Based on the above, on a preliminary basis, it appears that the life-cycle cost for residuals management with transport by barge to the mainland would almost certainly have a substantially higher cost than the projected costs for construction and use of Cell 3A. At a minimum, the projected cost of an option that includes barge transport would almost certainly exceed **\$120** per ton (equivalent to \$3.6 million in total cost) and would likely exceed the range of **\$140** per ton to **\$165** per ton, equivalent to the range of \$4.16 million to \$4.91 million in total cost.

This finding is largely independent of transportation costs. Projected disposal costs on the mainland (\$75 per ton to \$100 per ton) would likely exceed projected total costs for disposal of residual materials in Cell 3A (\$74 per ton to \$89 per ton), even if transportation costs from the Composter to the mainland disposal site are minimal or zero.

Development of a new barge service

Barge transport of 110-yard trailers rather than 30-yard containers offers the potential for lower transport costs from the Composter to the SSA dock and from the New Bedford dock to the disposal site, but a full evaluation of a new barge system with capability to transport 110-yard trailers would involve substantial effort. In this context, it is worth noting that the towns on Martha's Vineyard have studied the feasibility and cost of a new barge system for transportation of solid waste and other freight to the mainland over a period of years. This analysis relies in part on findings from those analyses as the basis for a preliminary assessment.

³ The general approach presented here was discussed with representatives of Toscana, the SSA and the Martha's Vineyard Refuse Disposal & Resource Recovery District. The preliminary costs presented here were compared against cost estimates from a study performed by the SSA and a study performed by an independent engineering firm for Martha's Vineyard.

Unprocessed MSW from the island of Martha's Vineyard is shipped to the mainland from two sources: the Towns of Tisbury and Oak Bluffs (Tisbury/Oak Bluffs), which use a private transfer station to send MSW to the Crapo Hill Landfill in New Bedford, Massachusetts; and the Martha's Vineyard Refuse Disposal & Resource Recovery District (the MV District), which sends MSW to the Covanta SEMASS facility in Rochester, Massachusetts. Both Tisbury/Oak Bluffs and the MV District move MSW to the mainland via trucks that use the SSA commercial ferry. The MV District in particular moves waste materials in up to five 118-cubic-yard walking floor trailers per day during summer peak months.

A 2012 study performed for Tisbury/Oak Bluffs evaluated the feasibility of establishing a port-to-port containerized freight service from Martha's Vineyard to New Bedford for transporting MSW and C&D waste to mainland disposal facilities by either truck or rail. That study estimated the port-to-port barge-related costs of transport to be approximately \$60 per ton, based on newly-purchased barges, each loaded with 20 new top-loaded sealed containers holding 18 tons each. The study assumes use of standard pick-up and drop-off container mechanisms on a roll-on, roll-off basis. The cost of barging compares unfavorably with trucking costs for Tisbury/Oak Bluffs of \$1000 per trip, which are equivalent to \$35.71 per ton at 28 tons per load. Note that the study assumes that loads of MSW are supplemented with loads of construction and demolition debris and other compatible materials and freight in order to utilize the barge capacity on a year-round basis to the extent feasible.

A study released by SSA staff in April 2016 reviews the feasibility of providing general freight service between Martha's Vineyard and New Bedford. That study contemplates a summer seasonal freight service operating only on weekdays, with two round-trips per day on a chartered freight vessel. The study states that the SSA would need to charge a one-way fare of \$403 for a 64-foot truck, or \$806 per round-trip. The study specifically identifies a number of challenges related to handling MSW that would also apply to an arrangement for barge transport of Composter residuals from Nantucket to New Bedford, including "...handling costs associated with transferring baled solid waste, ... loading the bales onto barges, then unloading them when the barges arrive at the... New Bedford facility, and then transporting them to a landfill". The study then states that "...the staff does not believe that such a barge operation can be implemented quickly or that, even after it is implemented, it will result in a freight service that adequately addresses the concerns and needs of the interested constituent communities." The study recommends that the SSA entertain proposals for private barge and tug service for transporting freight vehicles on a roll-on, roll-off basis, but does not project related costs.⁴

⁴ "Preliminary Report on the Feasibility of Providing Freight Service Between New Bedford and Martha's Vineyard," April 12, 2016, Page 16.

Note that costs for a barge service between Nantucket and New Bedford would inevitably be higher than the costs between Martha's Vineyard and New Bedford, because of the significant additional distance and travel time. The cost of \$60 per ton from the 2012 Tisbury/Oak Bluffs study, even if the additional costs of a Nantucket embarkation point are ignored, would lead to a round-trip cost of over \$1300 for a 22-ton load of Composter residuals. Combined with the minimum tip fee of \$75 per ton for disposal and the additional costs of transport from the Composter to the Nantucket dock, and from the New Bedford dock to the disposal facility, such approach would not be cost-competitive with the use of the SSA commercial freight ferry. Similarly, a round-trip fare of \$806 per trip (more than \$36 per ton) based on the SSA study from 2016, in combination with the other costs cited previously, would not yield an option that would be cost-competitive with the use of the SSA commercial freight ferry.

Other costs of not constructing Cell 3A

The costs discussed above do not account for the impacts of not constructing Cell 3A on accelerating the closure of Cells 2A and 2B and the closure of the entire landfill site, including Cells 1A, 1B and 1C. In particular:

- Regarding acceleration of closure costs, landfill Cell 2A, although inactive, has not been closed and capped to this point, because the design of its liner system is linked to the design of the liner system proposed for the closure of Cell 3A. Similarly, landfill Cell 2B, which is current active, is not scheduled to be closed immediately after it reaches capacity, because the design of its final liner system is also linked to the design of the liner system proposed for the closure of Cell 3A. If Cell 3A is not constructed, however, there would be no justification for further deferral of the closure of the inactive Cells 2A and 2B. In such event, it is recommended that the Town prepare to proceed with closure of both cells. The Town has maintained unused borrowing authority of \$633,000 to prepare for the closure of these landfill cells, but has not evaluated what the closure might ultimately cost in the event that Cell 3A is not constructed and the closure design is changed accordingly. Additional closure costs, involving use of additional borrowing authority, would likely be required.
- Regarding acceleration of closure costs for Phases 1A, 1B and 1C, a decision not to construct Cell 3A would re-open the basis for the final closure of the entire landfill site upon the expiration of the landfill mining program, which is scheduled for not later than June 30, 2019. If Cell 3A were to be constructed and operating, the Town would have a basis for deferring certain closure costs, because of interrelations between the closure of Cell 3A and the closure of the entire site. If Cell 3A is not constructed, then there would be no such basis for deferring closure costs, and the Town would need to prepare for closure of the entire site not later than 2021. The most recent estimate of the cost of final closure of the entire landfill site are in the range of \$6.0 million to \$8.2 million. The Town has not set aside unused borrowing authority or otherwise prepared a specific plan to pay for such closure costs.