
Appendix 4

Step 3: Site Size Determination

Appendix 4a)

Technical Memorandum on Single versus Multiple Sites

Project: Durham York Residual Waste Study

Subject: Rationale for Examining Single Sites for the development of the Durham/York Preferred Residuals Management System

Issue (Draft or Final): Final

Date: March 12, 2007

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Overview

During the initial phase of the Durham York EA (evaluation of the alternative systems), it was assumed that all systems would be represented as a single facility that comprises all system component functions. This was necessary for the purpose of the comparative evaluation, to ensure that the same fundamental assumptions such as 'single facility, single site' were applied to all of the systems under comparison.

At that time, based on the experience of the project team, it was the assumption that:

- A 'single facility, single site' system configuration represents the most efficient system configuration and would provide the economies of scale that are being sought in the Durham/York study;
- In general, a 'single facility, single site' configuration also represents the configuration which would be expected to have a lower potential for environmental and social impacts, as the total land area required and number of potential receptors that could be impacted by the systems increases as the number of sites required for each system increases.

This memorandum re-examines these assumptions based on the consideration of the proposed criteria for the evaluation of systems. This re-examination is required to ensure compatibility with information as inputs to the subsequent phase of the EA (identification and evaluation of alternative sites).

Review of Assumptions

The following categories/criteria (see Table F3 below) have been established for the evaluation of 'Alternative Methods' regarding the evaluation of a 'short-list' of sites resulting in the selection of the preferred site(s) upon which the preferred residuals waste management system would be developed.

This review of assumptions regarding the relative advantages of systems configured over single versus multiple sites, presupposes that it is possible to find a number of suitable locations with sufficient land and of a sufficient configuration such that all required elements of the preferred residuals management system can be accommodated.

Based on comparative evaluation, ***System 2(a) - Thermal Treatment of Mixed Solid Waste and Recovery of Energy followed by Recovery of Materials from Ash/Char,***

was selected as the preferred residuals management system, with the option that through the competitive process System 2(b) – Thermal Treatment of Solid Recovered Fuel could also be considered.

Approved Environmental Assessment Terms of Reference:

TABLE F-3: Preliminary Comparative Evaluation Criteria for the Evaluation of the “Short-List” of Alternative Sites. (Step 6)

Environmental Considerations	Preliminary Evaluation Criteria
Public Health & Safety and Natural Environment Considerations	- Potential Air Quality Impacts <i>Note: The preferred technology must be capable of meeting all applicable air quality regulations.</i> - Potential Water Quality Impacts (Surface Water and Groundwater) - Potential Environmentally Sensitive Areas and Species Impacts - Potential Aquatic and Terrestrial Ecology Impacts
Social and Cultural Considerations	- Compatibility with Existing and/or Proposed Land Uses - Potential Impact on Residential Areas - Potential Impact on Parks and Recreational Areas - Potential Impact on Institutional Facilities or Areas - Potential Impact on Archaeological and Cultural Resources - Potential Traffic Impacts
Economic / Financial Considerations	- Operation and Maintenance Costs for Facility(ies) - Capital Costs to develop Facility(ies)
Technical Considerations	- Compatibility with Existing Infrastructure - Design/operational flexibility provided by site
Legal Considerations	- Complexity of Required Approvals - Complexity of Required Agreements

Public Health & Safety and Natural Environment Considerations

When considering single versus multiple site scenarios for the development of the preferred thermal treatment system, under this category and under the proposed criteria set out in the EA Terms of Reference, the following general conclusions are reasonable:

- Even though the design capacity for each facility in a multiple site scenario is only approximately 50% that of a single larger facility, in order to accommodate two sets of supporting site infrastructure (access roads, scale house etc.), multiple site scenarios would

generally require a larger total area of land. The land required for each set of supporting infrastructure is nearly the same regardless of the capacity of the facility, and when the design capacity of thermal treatment units is scaled up, the increase in footprint does not need to be of the same magnitude (on a percentage basis).

For example, a 200,000 tonnes per year (tpy) thermal treatment facility would require approximately 11.8 hectares of land based on a facility footprint of 110 m x 180 m and assuming a 100 m buffer on all sides of the footprint, while a 400,000 tpy thermal treatment facility would require 13.7 hectares of land based on a facility footprint of 160 m x 180 m and assuming a 100 m buffer on all sides of the footprint. Thus two 200,000 tpy facilities would occupy approximately 72% more land than a single 400,000 tpy facility.

In practice, a smaller buffer than 100m could be used, or the buffer could be accomplished by means other than ownership of on-site lands, however the multiple site approach will still occupy much more land. For example, a 200,000 tpy facility would require approximately 9.2 hectares of land based on a facility footprint of 110 m x 180 m and assuming an 80 m buffer on all sides of the footprint, while a 400,000 tpy facility would require 10.9 hectares of land based on a facility footprint of 160 m x 180 m and assuming an 80 m buffer on all sides of the footprint. Thus, in this case, two 200,000 tpy facilities would occupy approximately 69% more land than a single 400,000 tpy facility. It should be noted that buffer dimensions are assumed for comparative purposes and will be subject to more definitive assessment at later stages of the project.

- As a result of the larger total area of land affected by multiple site scenarios, there is a greater potential for such systems to have an effect on environmentally sensitive areas and species, as well as potential aquatic and terrestrial ecology impacts

Overall, it is reasonable to conclude that single site scenarios would offer greater advantages in regards to public health and safety and natural environment considerations than multiple site scenarios.

Social and Cultural Considerations

When considering single versus multiple site scenarios for the development of the preferred thermal treatment system, under this category and under the proposed criteria set out in the EA Terms of Reference, the following general conclusions are reasonable:

- Each site considered for the development of a thermal treatment system will have its own unique potential set of proximate receptors and other receptors located within the primary impact zone of the facility. These receptors range from less sensitive receptors (e.g., heavy industrial facilities), to more sensitive receptors (e.g., residential areas). In addition, each site will have its own unique set of receptors located along haul route(s) used to access the site.
- In general, the total number of potentially affected receptors will increase with multiple site scenarios, notwithstanding the differences in size and scale of the facilities. The only circumstance where this would not be the case would be in a situation where two small sites capable of supporting smaller scale facilities both had extremely low receptor numbers (i.e., less than half) and/or the sensitivity of receptors was lower relative to another single larger site.

For example, using the same building footprints as indicated above the total area within 500 m of the facility footprint (considered the maximum primary zone in which potentially affected receptors could be located) of two 200,000 tpy facilities, would be approximately 262 ha. Conversely, the area within 500 m surrounding a single 400,000 tpy facility would total 137 ha.

- Increases in the total number of potentially affected receptors increases the likelihood of potential impacts to residential, parks and recreational and institutional facilities.
- In addition, the greater land area that would be required by multiple site systems would increase the potential for impacts to archaeological and cultural resources.
- Given that two or more different haul routes are necessary to access multiple sites, the potential for impacts along the haul routes increases with multiple site systems.
- Multiple site systems have the potential to affect multiple communities. Although it is difficult to quantify host community impacts or perceived host community impacts prior to identification of potential host communities, it is more likely that multiple site systems will have greater potential to impact communities in general.

Therefore, it is reasonable to conclude that single site scenarios would offer greater advantages in regards to social/cultural considerations, relative to multiple site scenarios.

Economic / Financial Considerations

When considering single versus multiple site scenarios for the development of the preferred thermal treatment system, under this category and under the proposed criteria set out in the EA Terms of Reference, the following general conclusions are reasonable:

- The duplication of required site infrastructure at multiple sites would result in increased capital costs to develop the preferred system at multiple locations.
- The duplication of operations at multiple sites would result in increased operating costs to manage the preferred system at multiple locations. The costs to operate and maintain site access, the scalehouse, the tip floor, the air pollution control system etc. would be duplicated with the need to maintain two sets of staff, and when considering other operating costs such as maintenance, security, utilities, taxes, etc. The only potential for savings would be if multiple sites could be situated such that the transfer/haul of the feedstock, i.e., the wastes from the municipalities, were reduced, i.e., through shorter haul distances.

The application of economic criteria to single versus multiple site scenarios would likely result in there being greater advantages for single sites in comparison with multiple sites.

Technical Considerations

Technical considerations, specifically compatibility with the existing infrastructure are not likely to be significantly different for single or multiple site scenarios, as with this criterion, it is the existing infrastructure surrounding the sites that will be considered as part of the review process.

With respect to design/operational flexibility, there is an advantage associated with multiple sites, as multiple sites allow for operational flexibility (e.g., should one site experience a catastrophic failure, the other site would be available for use). There would be an expectation

that single site scenarios would include the need to design for redundancy in order to provide some degree of design/operational flexibility.

Overall, for technical considerations, multiple site scenarios can offer an advantage over single site scenarios.

Legal Considerations

Each site proposed for a multiple site scenario, would require individual applications under the EPA for the required permits to operate and to emit to the atmosphere, as well as multiple applications for planning and other approvals. Therefore, multiple site scenarios generally increase the complexity of required approvals.

In addition, multiple agreements would be required to facilitate the development of multiple sites, including multiple community impact agreements, host municipality agreements, intermunicipal agreements, and agreements with potentially multiple waste management companies for the development of the facility.

Therefore, for legal considerations, multiple site scenarios can be expected to have greater disadvantages than single site scenarios.

Conclusions

Based on the review of the proposed criteria, that will be used in the evaluation of 'Alternative Methods', and in consideration of the potential impacts associated with single versus multiple site systems, it is generally concluded that multiple site scenarios would have greater disadvantages than single site scenarios.

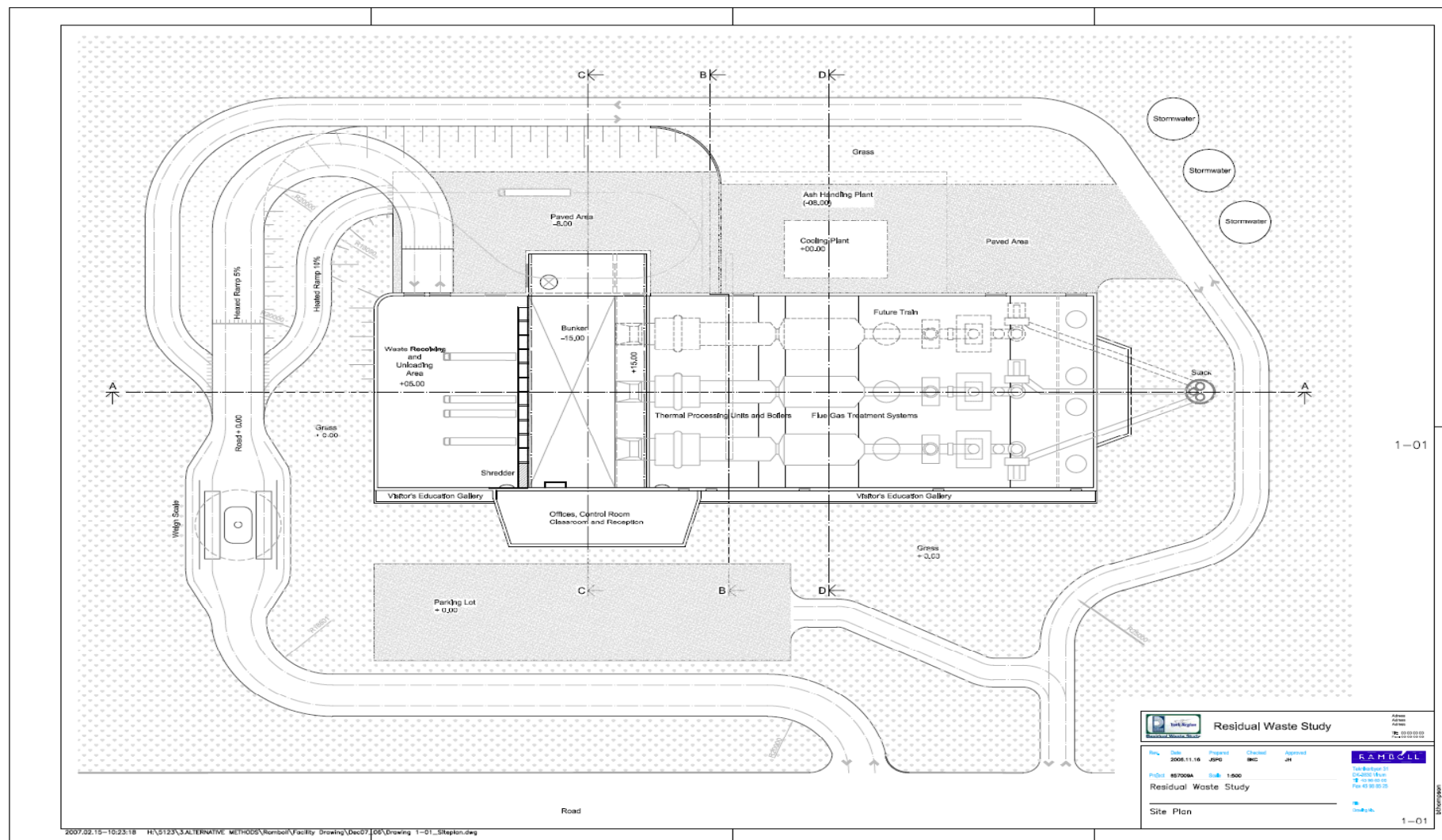
Therefore, it is not recommended that multiple site scenarios be included in the evaluation of 'Alternative Methods'. It is recommended that the evaluation of 'Alternative Methods' will focus on the development of one thermal treatment system located on a single site.

As noted earlier, this review of assumptions regarding the relative advantages of systems configured over single versus multiple sites presupposes that it is possible to find a number of suitable locations with sufficient land and of a sufficient configuration such that all required elements of the preferred residuals management system can be accommodated. In the event that this is not the case and no single sites were identified that were capable of developing the preferred thermal treatment system, the rationale supporting single versus multiple sites would hold for systems with the fewest number of sites/locations.

Appendix 4b)

Conceptual Facility Drawings

Drawing 4-1 Conceptual Facility Site Plan



Drawing 4-2 Conceptual Facility Site Plan (Section A-A)

