Part 3.

Aggregate Resource Exploration and Development, A Strategic Planning Approach

Proximity to a Limited Access Highway

The proximity of the study area to an expanding Metro suburb which will require increasing amounts of aggregate in the future provides a compelling argument for resource development. Its 'remote' location should also avoid the common concerns of quarries near communities. However, being near a 100 series highway may be an even more important benefit. If access from a quarry to Route 103 could be accomplished, it would result in the avoidance of most of the complaints related to trucking.

Route 103 is a primary highway designed and constructed with high volume traffic in mind. Because it is a limited access highway, it bypasses communities except for strategically located connectors to the secondary routes. For reasons of safety and efficiency, residential dwellings with direct access to Route 103 (between Halifax and Bridgewater) are not permitted. These features and restrictions are positive for quarry development in two respects: (1) these highways are capable of handling the high volume of trucks needed to move the aggregate to market, and (2) the trucks bypass communities except for local deliveries. This helps eliminate most noise and safety issues, which are always concerns at the time of permitting and commonly major obstacles to quarry development.

Access restriction to the 100 series highway is also an obstacle to this type of development. The only traffic access to Route 103, other than the connectors to secondary roads, are the Bowater Mersey/Nova Scotia Power intersection north of French Village at Mill Lake and the Bowater Mersey intersection to the west of Ingram River (Fig. 6, in pocket). Given these circumstances, is a high volume trucking operation in proximity to Route 103 realistic? The simple answer is probably 'no'. Permitting a new haulage road to intersect the highway would most likely be considered unsafe. The entering and exiting of traffic by potentially hundreds of slow moving trucks daily in peak construction season would also impede traffic flow. Furthermore, twinning the highway to the west of Upper Tantallon will probably take place in the near future. A standard intersection accessing a quarry road would never be permitted under these circumstances.

An alternative choice, which solves many of these problems, would be a dedicated access to Route 103 by means of an overpass connector, similar to one accessing the Otter Lake Sanitary Land Fill (Fig. 8). This structure at Exit 3 on Route 103 was selected for comparison because it serves the following two purposes: a connection to the land fill, and access to the communities along Route 3. A similar structure in the study area could not only serve an aggregate quarry, but may also have the potential of being used by other interests. For example, in the event that Route 103 was twinned and traditional access points were no longer possible, private land owners and Nova Scotia Power could use this interchange to gain access to their properties. Other government agencies may see potential cost savings if a privately funded connector was in place for these companies at the time of the twinning.

If the necessary permits could be obtained to build a connector, the main drawback would be the cost of its construction. (Note: The authors have not approached NSTPW regarding this matter.) The recently constructed Otter Lake structure, including ramps and overpass, cost approximately $3 M. This is certainly an expensive capital cost, not normally incurred in the development of a new quarry. However, if it allowed access to a supply of aggregate for several decades, it could be a worthwhile investment for a company.

Figure 8. Exit 3 on Route 103 is a connector to the Otter Lake Sanitary Landfill. Perhaps a similar structure could be constructed in the study area to provide dedicated access to a new quarry site.

Cost/Benefit Analysis of Resource Development in this Area

The case for aggregate development in the study area has been presented based on the expectancy that: (1) access to the local resources will ultimately disappear, (2) there will continue to be a need for these important structural materials well into the future, and (3) alternative sources of materials will be more expensive than maintaining a quarry presence near Metro. Taking measures now to ensure the survival of this valuable resource should be a priority in the long term planning strategy for the community. However, in spite of the importance of the resource development described in this report, it also has to be acknowledged that quarrying is heavy industry which cannot avoid affecting communities and the environment. Issues can include social, historical, cultural, environmental and economic impacts. Based on the location of this resource potential and a knowledge of problems which typically surface during the permitting process, this quarry proposal will be examined from multiple perspectives on different sides of the debate. The discussion below is not intended to be an exhaustive examination of the subject, but rather is designed to illustrate the potential complexity of developing aggregate resources in this area. The discussion is divided into the benefits of the proposed sites and the potential concerns and negative impacts of the proposed sites.

Potential Benefits of Proposed Sites

- Preliminary results suggest that the area offers good aggregate resource potential capable of

producing high quality stone for the construction industry for many years.
- A quarry near the Upper Tantallon area would offer the opportunity to extend diminishing aggregate reserves in a region that is seeing major population growth and residential development.
- These granites are extremely benign rock types, typically having low to negligible concentrations of metals that might affect the environment or minerals that can react in aggregate products such as Portland cement concrete or asphalt mixes.
- The proximity of a quarry to potential markets will help keep costs of construction materials manageable. Because of the major role which aggregate plays in public infrastructure this has important implications for the cost to public works agencies and the taxpayer.
- The comparatively 'remote' location of the proposed sites should minimize impacts (e.g. health, safety and nuisance factors) on nearby communities.
- By minimizing the haulage distances for these bulk materials, it should help reduce environmental impacts in the future. This would include fossil fuel consumption, air emissions, highway deterioration and equipment wear per tonne of stone delivered to the construction site.
- Improved infrastructure could provide the land owner and Nova Scotia Power with cost effective, efficient access to Route 103 in the inevitable event that highway twinning between Exits 5 and 6 will curtail existing access north of French Village near the hydroelectric plant at Mill Lake, 3.5 km west of Exit 5 (Figs. 5 and 6, in back pocket).

Potential Concerns and Negative Impacts of Proposed Sites

- A new operation would increase competition for existing aggregate producers in the Metro area, hurting market share and possibly depressing Metro commodity prices in the process. Although this is a potential downside of this research, it should be more than offset by increasing resource development opportunities and aggregate reserves in the area for the industry.
- A new quarry could provide competition for aggregate producers outside of the Metro area. Where markets overlapped there would probably be a net loss of market share for existing producers. The primary impact in this respect would occur to the west of the proposed sites.
- The building of a connector to Route 103 could impede traffic during the time of its construction.
- There would be additional slow moving truck traffic where the ramps at Exit 5 on Route 103 connect with the Hammonds Plains Road. This could potentially cause additional noise, air emissions, traffic congestion and safety hazards in this area.
- The proposed development sites in the Island Lake and Bates Lake areas may be perceived as being too close to a popular hiking trail on Bowater Mersey property (Old Annapolis Road Hiking Trail). Although a quarry could be sited kilometres away from the Trail, this type of development may be seen as a major concern by many nature enthusiasts.
- This is a wilderness area which would undoubtedly be altered by a quarry operation. Potential impacts include changes to existing habitats and ecosystems.

Proposed Exploration Strategy for New Quarry Development

The conclusions outlined in this report are based on field observations and the analytical results of a few surface samples. Although the area looks promising for aggregate development, it is emphasized that there are inherent risks in drawing conclusions based on such limited data (refer to Appendix 1). The research conducted here should be viewed as a preliminary examination of the area which has yielded promising results. Any serious attempt to develop a quarry should begin with permission from the landowner to do a more comprehensive assessment of one of the sites. Further exploration work to identify a specific area where the rock has the technical suitability for aggregate might include trenching to determine overburden depth, and collect additional samples. To look at the rock at a depth typical of quarrying, samples could be collected by drilling and blasting test holes using an air track drill. Although more costly, the best results can be achieved by diamond

drilling over the area. A series of shallow holes located in a grid fashion can quickly provide an abundance of information on overburden depth, rock quality and potential geological problems at the site.

As with all aggregate developments, the rock should also be tested for deleterious metals and other minerals that could have an impact on human health or the environment. Although rarely a problem in these granites, the rocks should be examined and tested for concentrations of potentially harmful minerals. When sulphide minerals are exposed to the atmosphere and water, they can produce an acidic runoff which can degrade water quality for aquatic life and may impact drinking water quality in very rare occasions. Similarly, metals such as arsenic or uranium can be leached from mineralized rock and enter water courses and the food chain. In extremely rare cases these can be concentrated enough to be harmful to human health. The inexpensive tests required to identify the minerals associated with these risks should be seen as a preventive measure against potential problems associated with site development and production of the quarry products. Continuous testing in an operating quarry, as the working faces advance, is advised as a key measure of due diligence.

Another potential concern in the rock is the presence of alteration minerals that could negatively impact on aggregate quality. Many of the alteration minerals are soft or lack durability. This may create mechanical weakness in the rock or make it vulnerable to weathering over time. Hematite is a common alteration product in the granitic rocks. When hematite is present in feldspars it is fine grained and very soft, and often is found with other soft alteration minerals including chlorite, sericite, saussurite and kaolinite. Areas that are strongly altered should be approached with caution. Rock with a dark reddish-brown colouring (due to hematite) may indicate that alteration minerals will detract from the aggregate's quality.

This resource development opportunity needs to be approached with the environment and community as priorities. The abundant water courses in the area should be a focus in the early stages of exploration efforts. View planes are also a concern. The proponent of a proposed quarry should make every effort to minimize the visual impact of the project. There is a high probability that a quarry could be sited so that it is completely hidden from view. Attention to details could mean the difference between success and failure in the permitting of an operation and perhaps set a precedent for future quarry activities. Finally, individuals interested in looking for a quarry are strongly encouraged to employ the services of a qualified geoscience professional with expertise in granitic rocks. The cost incurred for this service should be seen as an investment in identifying the best possible site during the exploration phase.

Final Thoughts

The current stability of the aggregate resource in the Halifax Regional Municipality has led some to assume that there is an unlimited supply of stone for the future. The reality is that access to the resource is shrinking while demand for the stone continues to expand. Ironically, the urban development which drives the consumption of aggregate and permits the industry to thrive is threatening the future of the local resources. As aggregate deposits become depleted and regional stone reserves decline, the community will experience significant cost increases for these widely used construction materials. If this trend persists, it will result in the demise of the local resource and create serious economic and environmental challenges for the region in the future.

The strategic approach outlined in this paper is seen as a possible, partial solution to reversing this trend. Hopefully, it will be viewed by the stakeholders as an acceptable compromise that permits the community's resource needs to be met while minimizing the impact on its residents. If this approach is successful, this study could become a template for the identification of similar strategic resource zones elsewhere in HRM. The implications to this resource initiative may be far reaching for the community in the future.

Finally it must be emphasized that, although the land owner agreed to allow the authors access to the property for this research, there has been no discussion of aggregate extraction in the area. The suggestions and conclusions presented in this report are solely those of the authors.