APPENDIX K

Phase I Archaeological Impact Study

Phase 1 Archaeological Impact Assessment of the Alton Natural Gas Storage Facility

By

In Situ

Executive Summary

In Situ was contracted by Jacques Whitford to conduct a Phase 1 archaeological impact assessment of the proposed Alton Natural Gas Storage Facility in Colchester County. The assessment included historical background research to identify areas with high potential for containing archaeological resources and a pedestrian survey to examine those areas. The background research found the only high potential areas to be located within the bounds of Fort Ellis, specifically along the high ground above the Shubenacadie and Stewiacke rivers. It was recommended that a shovel-testing program be developed to test the locations where the pipeline and the high potential areas intersect. The entire line outside of the Fort Ellis area was considered to be low potential and did not require further archaeological work.

Introduction

Underground salt formations are natural geological formations. The layered salt formation near Alton is approximately 420 m thick below the surface and varies in thickness from under 100 m to over 300 m. In these domes, salt caverns are formed when fresh water solutions are used to dissolve the salt (*i.e.*, solution mining). Salt caverns can be used for storage of natural gas or other bulk hydrocarbons, because of their size and stable, well-sealed structure. Salt acts as a natural sealant. It is comparable to concrete in its strength and is virtually impermeable to liquid and gaseous hydrocarbons. An important property of salt cavern storage is the ease of injection and withdrawal of the stored product, resulting in a much-desired high rate of deliverability.

Components of the proposed Alton Gas Storage Project will include: an underground natural gas storage facility in engineered salt caverns near Alton, Nova Scotia, and buried pipelines from Alton to the confluence of the Shubenacadie and Stewiacke Rivers where water will be drawn to the facility near Alton with brined water returned to the Shubenacadie River during the cavern development process. There will also be a lateral gas pipeline linking the Alton facility with the Maritimes and Northeast Pipeline natural gas transmission system; but this gas lateral is not currently included as part of the project for environmental investigation.

Background Research

First Nations

The background research for First Nations archaeological resources consisted of going through the files of the Nova Scotia Museum's archaeological sites database, which records all of the archaeological sites reported within the province. There are a number of recorded First Nations sites/isolated finds along both the Shubenacadie and the Stewiacke rivers and, while none fall within the study area, they are essential for determining First Nations archaeological potential within certain sections of the study area. The reported sites will be listed below and their significance will be discussed in the Archaeological Potential section of the report.

BgCu-1: This is a ground stone adze that was found on the surface of a plowed field approximately three km southwest of the proposed Brackish Water Intake System (BWIS) shown on Fieldsheet 4.

BgCu-2: This is another field, approximately 1.4 km northwest of the BWIS, where "arrowheads and other prehistoric artifacts" were reported on the surface when it was plowed. The site was tested by the Nova Scotia Museum in 1970 but they found no evidence of First Nations occupation and presumed the site had been destroyed by cultivation.

BgCu-3: This site is a field located approximately 2.4 km northeast of the BWIS that had apparently been yielding First Nations artifacts after plowing. It was examined by the Nova Scotia Museum in 1970 but it was presumed that the site had been destroyed by cultivation.

BgCt-1: This site is a field located approximately 4 km south of Alton on the north bank of the Stewiacke River and, again, First Nations artifacts showed up in the plowed field. It was examined by the Nova Scotia Museum in 1970 and was presumed to have been destroyed.

BgCt-2 to 5: These are various sites located roughly 3.5 km south of Alton, on the north and south banks of the Stewiacke, all of which the Nova Scotia Museum felt were destroyed.

BhCt-2: This site is the result of First Nations artifacts reported on the Densmore Farm, approximately 3 km northeast of Alton.

It is obvious that there was a strong Mi'kmaq presence in and around the study area as people were attracted by its location near two major transportation routes, one leading to the coasts and one to the interior, as well as the floral and faunal abundance that would be found in such an ecosystem. The sandbars created by the confluence of the Shubenacadie and Stewiacke also formed a natural ford that allowed easy pedestrian access from one side of the Stewiacke to the other.

First Nations Archaeological Potential

While there are no recorded First Nations archaeological sites within the study area, this appears to be more a product of lack of professional research rather than a lack of potential. It is unfortunate that there has been no intensive professional archaeological survey of the Shubenacadie and Stewiacke rivers but the reported sites clearly show a settlement pattern along the high ground of the riverbanks, usually within 400 meters or so of the river. There is every reason to believe that the same criteria would apply to the study area, despite no previous reports of Mi'kmaq material being found. With this in mind, the only First Nations high potential areas identified were along the ridges where they are intersected by the BWIS and the proposed Brine Discharge System, to the southeast and northwest respectively. These areas are shown on Fieldsheet 4.

Historic

As mentioned above, the confluence of the Shubenacadie and Stewiacke rivers produced a combination of resources that attracted Mi'kmaq settlement for thousands of years before the arrival of Europeans. It should be no surprise, then, that the same area was the focus of European settlement not long after their arrival. There are no recorded historic archaeological sites within the study area but there is abundant documentary evidence that Europeans were settling the area perhaps as early as the late seventeenth century.

The south side of Fort Ellis, along the north bank of the Stewiacke River, is a broad salt marsh that proved to be an irresistible draw to the Acadians and, in the early eighteenth century we know that Pierre Hebert founded a small village and created arable land from the salt march using an extensive dyke system. In 1754, Captain William Floyers visited the village as part of his survey of survey of the Shubenacadie:

> "…we forded the Chibbenacadie where the Steeuiacke or Torbay River falls into it to a village of three houses called Pierre Hebere… This is a fine settlement and has a vast quantity of best marsh land beloging to it. 'Tis situated on a point at the concourse of the two rivers, and is the most convenient and advantageous spot for a fort; the land is clear, and a gunshot from the wood, is not commanded by any rising ground, and has absolute command of the two rivers. We came so suddenly upon the inhabitants they had not time to escape from us, though they were wonderfully dismayed; we soon removed their fears. We purchased some refreshments from them, which was a happy relief as it was short commons with most of us. We spent the night there."[1]

While Floyers says there were three houses in V. Hebere, his map actually shows six buildings2 and Fulton says there were at least eight families there. In 1755 the village was cleared during the Deportation but the British military had taken note of Floyer's visit and in 1761 they built a small fort they named after the Honourable Henry Ellis, the Governor-in-Chief of Nova Scotia3. The military importance of Fort Ellis was short-lived, however, and it was abandoned in 1767.

Fortunately, the location of Village Hebere and Fort Ellis are shown on several early maps. As mentioned above, Floyers created a map in 1754 that clearly shows six buildings on the ridge that parallels the north bank of the Shubenacadie, just north of the mouth of the Stewiacke. A second map done in 1755 by Morris shows three buildings running along the small ridge that parallels the north bank of the Stewiacke, which is a continuation of the ridge along the Shubenacadie4. This map also shows the "Indian

[1] Fulton, n.d.
[2] http://www.northeastarch.com/sainte_anne.html
[3] http://www.gov.ns.ca/nsarm/cap/places/
[4] http://www.northeastarch.com/sainte_anne.html

Mass House" a few kilometers to the south of Fort Ellis. This was a French mission established in the 1720s in a failed attempt to have the Mi'kmaq give up their seasonal travels and settle permanently in the area. It too was cleared in 1755.This spot is mentioned to emphasize the fact that there was still a strong Mi'kmaq presence on the area well into the historic period.

A third undated, anonymous map that pre-dates 1755 shows what is likely a small complex of buildings along the ridge of the Shubenacadie that is labeled "V. Hebere". The location of the fort, with a distinctive star shape, shows up on Miller's 1801 map, despite having been abandoned for 46 years. The use of the star shape may or may not indicate what was visible on the surface at the time but it is used again on Haliburton's map in his 1829 History of Nova Scotia and George Baldwin's map of 1836.

There was a renewed interest in Fort Ellis during the planning and construction of the Shubenacadie Canal between 1827 and 1862. The sandbars created by the turbulent waters at the confluence of the two rivers proved to be a severe problem in designing the canal and the chief engineer Francis Hall actually designed a plan for a lock and dam at Fort Ellis that would have been 600 feet long and 15 feet high. It was determined, however, that the plan was too risky to be attempted and it was never built.

The 1903 Geological Survey of Canada map provides a very accurate view of how the study area would have appeared in the late nineteenth century and was extremely useful for determining archaeological potential for the area outside of Fort Ellis. In the Fort Ellis area the 1903 map shows the present farm complex and several other houses that are still standing. There are also two buildings shown along the marsh road, south of the farm, which are no longer standing. All of these buildings would not be affected by the proposed project. There is a school shown 80 m northeast of the farm, and a couple of hundred meters north of the pipeline leading to the Brine Discharge System. This area should not be affected by the construction of the pipeline. Nothing else is encountered until halfway along the pipeline, approximately 1100 m east of Highway 102, when two buildings are shown. These buildings are still standing and belong to the Veres family but the pipeline will pass to the north of them. Finally, the pipeline travels along the south side of Stevens Road and the 1903 map shows several building clusters on the north side.

Although the road appears to have been straightened this was only a minor alteration and did not affect the location of the buildings, many of which are still operating farms today. None of these will be affected by the project.

Historic Archaeological Potential

The only areas determined to have a high potential for containing historic archaeological resources are located within the Fort Ellis area and are identical to those identified for First Nations resources – the pipeline route through the high ground to the east of the existing farm complex, from north of the PBWIS and the Brine Discharge System. While this is not where Village Hebere and Fort Ellis are shown, there may be unmapped peripheral settlement related to the main settlements. It does not appear that the pipeline will impact the existing dyke system that, although modern, should be considered as having elevated potential because it could contain original Acadian elements.

Field Survey

A field survey was conducted by the author along the pipeline route on July 10, 11, 13, 14 and 15, 2006, in order to examine high potential areas identified through the background research and to determine if other areas should also be considered high potential, particularly watercourses. For the sake of convenience the fieldwork will be described in the context of the Fieldsheet maps used during the survey.

Fieldsheet 1

This sheet begins in the area of the drill/plant, which is now clear-cut, and, although it is elevated, it is also damp. There is a small stream to the south but it is insignificant to the point of being very difficult to see. The pipeline moves west then south, crossing the stream and Stevens Road, which it roughly parallels until it crosses Alton Road. This area is in general low and relatively damp. Fieldsheet 1 ends as the pipeline crosses an open field and veers to the west across the railway.

There were no areas of high or even moderate potential identified within this fieldsheet.

Fieldsheet 2

After crossing the railroad the pipeline moves through low, wet pasture and across Highway 2. It then veers slightly southwest through a heavily clear-cut area then slightly northwest across Highway 103. Fieldsheet 1 ends at the Veres farm that is shown on the 1903 GSC map. The pipeline crosses watercourses at five points on this map but none of these are significant, the widest measuring around two meters. Again, once the pipeline leaves the cultivated fields, the vegetation is scrubby and the ground damp, not ideal for past settlement.

There were no areas of high or moderate potential identified within this fieldsheet.

Fieldsheet 3

This sheet begins at the Veres farm where the pipeline veers to the southwest through some heavily clear-cut land and into a large open field northeast of Fort Ellis. The pipeline parallels the western edge of the field, running south then veering southeast again where the map ends. The pipeline does not cross any significant watercourses in this area. The field it passes through could be considered to have moderate potential as it is within 1400 m of the Shubenacadie River, but it is a new field and was being expanded by an excavator at the time of the survey, which would certainly have destroyed any archaeological resources present. The last leg of the pipeline on this map is a small hill that may be considered as having moderate potential given its elevation and relative proximity to the river.

There were no high potential areas identified within this fieldsheet.

Fieldsheet 4

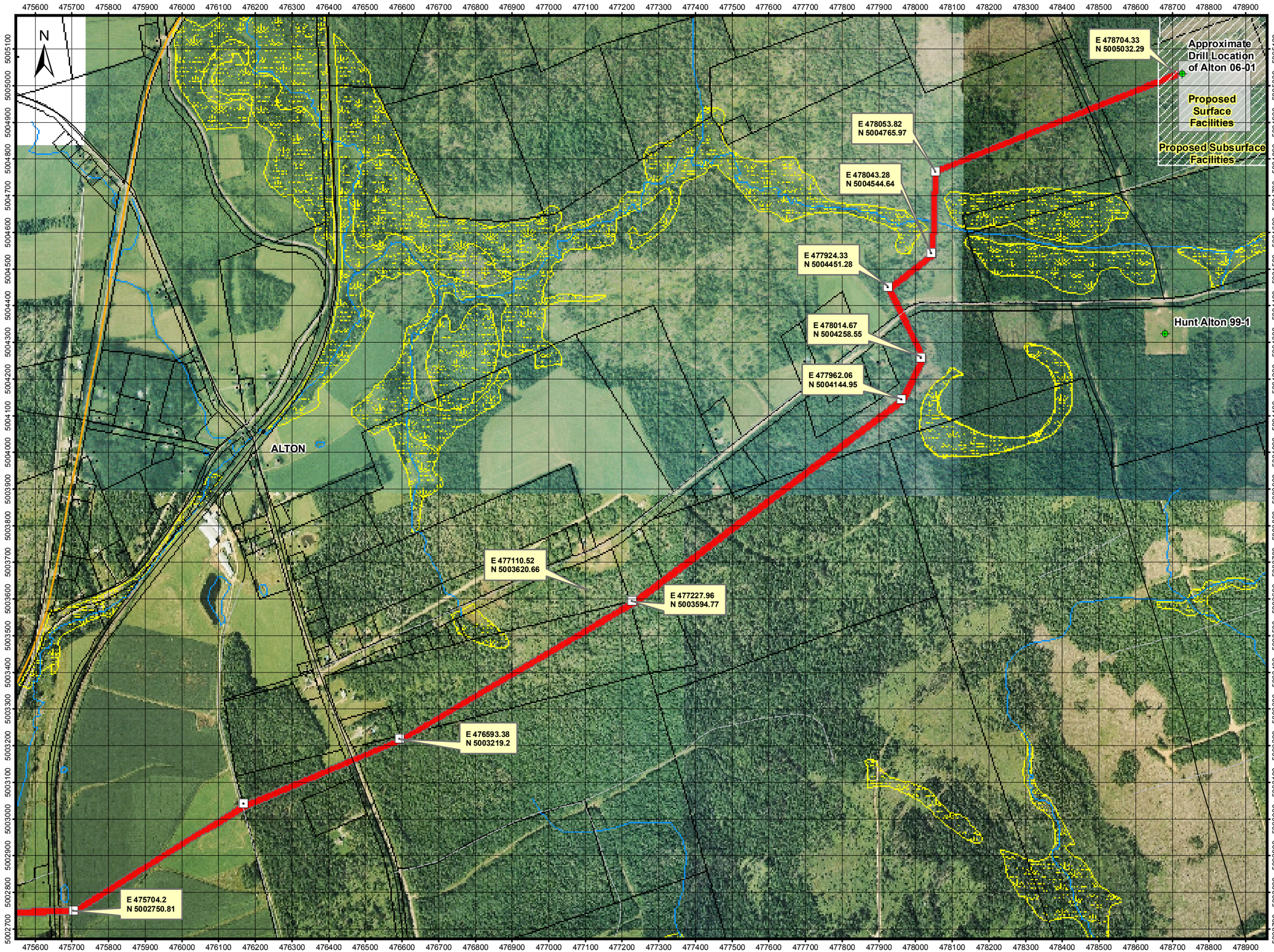
From the previous sheet the pipeline moves southwest and crosses Riverside Road and heads directly south to the Stewiacke. The pipeline splits 100 m south of Riverside Road with one branch heading northwest to the Proposed Brine Discharge System on the Shubenacadie and the other continuing south to the Proposed Brackish Water Intake System on the Stewiacke. Both of these branches are considered to have high potential for containing both First Nations and historic archaeological resources. The high potential

areas would run from the small ridge to the northeast of Riverside Road and include both pipeline branches as they run down to the rivers. The high potential areas would end when the pipelines move into the low areas west and south of the ridges. Obviously the whole ridge running along the east side of the Shubenacadie and north of the Stewiacke and containing Village Hebere and Fort Ellis would also be considered high potential but it will not be affected by the proposed project.

Conclusion and Recommendations

The only areas of high potential identified during the background research and field survey were at Fort Ellis where the pipeline splits and moves along the high ground to the Shubenacadie and Stewiacke rivers. The First Nations high potential determination is based on the presence of numerous First Nations sites along the Stewiacke whose location and topography is similar to that of Fort Ellis. The historic high potential determination is based on background research that showed the existence of Village Hebere, an early eighteenth century Acadian village, and Fort Ellis, a minor, mid-eighteenth century British fort/blockhouse. The proposed pipeline will not affect the area where these identified resources are located, but there is concern that there may have been peripheral settlement associated with them, perhaps soldiers living with their families or even historic Mi'kmaq.

It is recommended that a program of shovel testing be employed to determine the presence of archaeological resources within the high potential areas. The shovel tests would begin at the centerline of the pipe and move ten meters on either side, a total of five tests per line. It is also recommended that a professional archaeologist monitor any work that would impact the dykes in case any original dyke work is encountered.



FIELDSHEET 1

Alton Gas Storage Project

Map Features

- waypoints
- Building (1997, NSTS, 10k)
- Approximate Drill Location
- Gate
- Silo
- Bridge
- Major Highway
- Collector Highway
- Paved Road
- Unpaved Road
- Rail
- Utility Line
- Watercourse
- Proposed Surface Facilities
- Proposed Subsurface Facilities
- Proposed Pipeline Route (20m Row)
- Property Boundary
- NSDNR Fresh Water Wetlands
- NSDNR Saltwater Wetland
- Waterbody

Air Photos: Nova Scotia Aerial Photography, 2004

Map Parameters
Projection: UTM, NAD83, Zone 20
Scale 1 : 10,000
Date: June 05th, 2007
Project No.: 1012229

0 75 150 300 450
Meters

Jacques Whitford

FIELDSHEET 2

Alton Gas Storage Project

Map Features

- Approximate Drill Location
- Gate
- Silo
- Building (1997, NSTS, 10k)
- Bridge
- Major Highway
- Collector Highway
- Paved Road
- Unpaved Road
- Rail
- Utility Line
- Watercourse
- Waterbody
- Property Boundary

NSDNR Delineated Wetland

- NSDNR Freshwater Wetland
- NSDNR Saltwater Wetland
- Proposed Pipeline Route (20m Row)

Air Photos: Nova Scotia Aerial Photography, 2004

Map Parameters
Projection: UTM, NAD83, Zone 20
Scale 1 : 10,000
Date: June 05th, 2007
Project No.: 1012229

0 75 150 300 450
Meters

Jacques Whitford

FIELDSHEET 3

Alton Gas Storage Project

E 472336.23
N 5002701.07

E 471577.02
N 5002174.92

E 470965.11
N 5001715.57

E 470838.37
N 5001522.54

E 471022.77
N 5000657.77

E 470966.8
N 5000489.27

Proposed Water Intake
& Brine Discharge System

E 469720.33
N 5000509.22

Map Features

- Waypoints
- Approximate Drill Location
- Gate
- Silo
- Water Intake
- Brine Discharge
- Building (1997, NSTS, 10k)
- Bridge
- Major Highway
- Collector Highway
- Paved Road
- Unpaved Road
- Rail
- Utility Line
- Watercourse
- Waterbody
- Property Boundary
- Holding Ponds

NSDNR Delineated Wetland

- NSDNR Freshwater Wetland
- NSDNR Saltwater Wetland
- Proposed Pipeline Route (20m Row)

Air Photos: Nova Scotia Aerial Photography, 2004

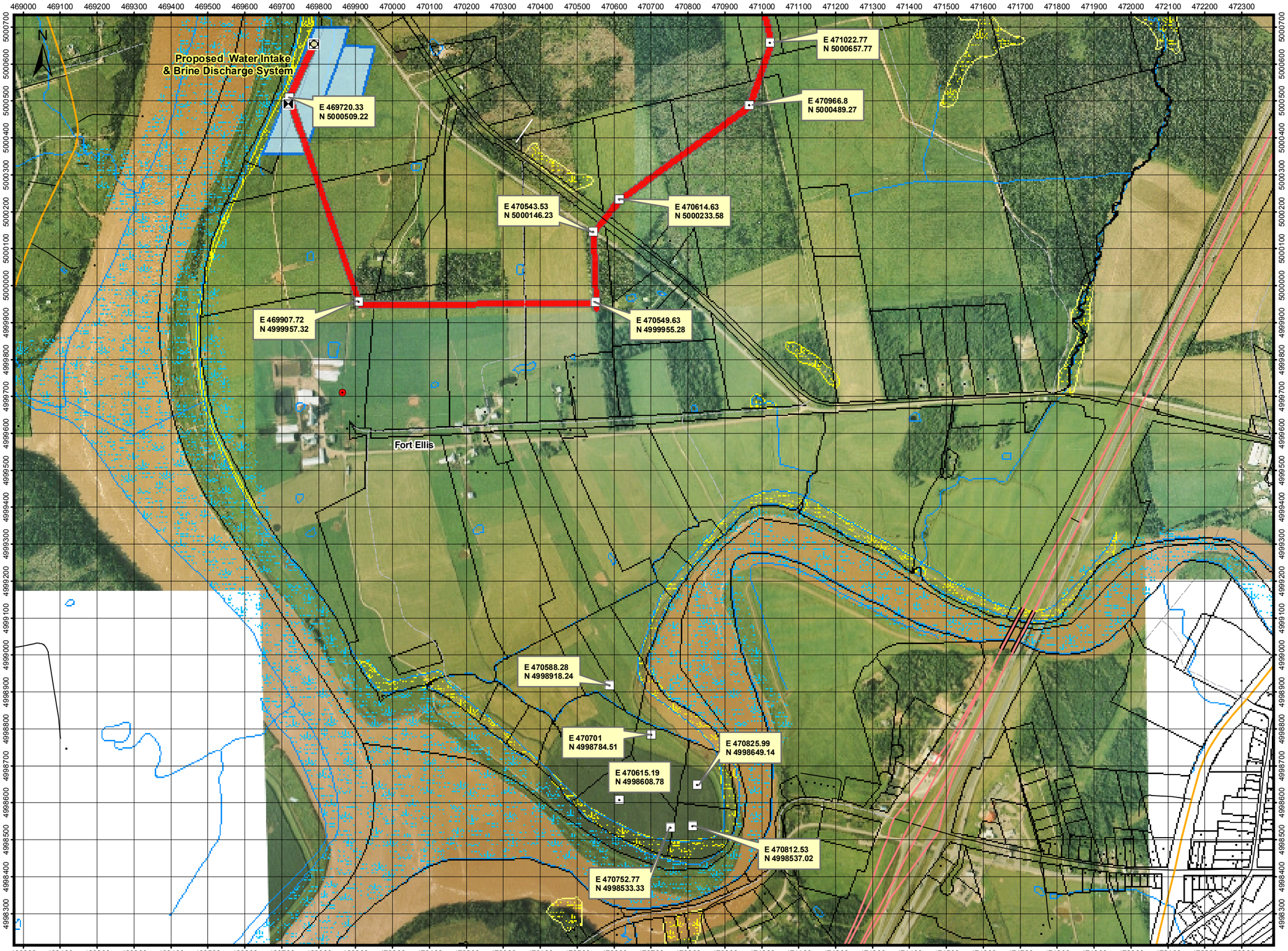
Map Parameters
Projection: UTM, NAD83, Zone 20
Scale 1 : 10,000
Date: June 05th, 2007
Project No.: 1012229

0 75 150 300 450
Meters

Jacques Whitford

FIELDSHEET 4

Alton Gas Storage Project



Map Features

- waypoints
- Approximate Drill Location
- Gate
- Silo
- Water Intake
- Brine Discharge
- Building (1997, NSTS, 10k)
- Bridge
- Major Highway
- Collector Highway
- Paved Road
- Unpaved Road
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