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October 28, 2013

New Brunswick Department of Environment
Project Assessment Branch (EIA)
Sciences and Planning Division
P.O. Box 6000
Fredericton, NB
E3B 5H1

Attention: Director, Project Assessment Branch

RE: EIA REGISTRATION – ACADIE AVENUE/AMIRAULT STREET RE-CONSTRUCTION PROJECT, DIEPPE, NEW BRUNSWICK

A copy of an Environmental Impact Assessment (EIA) Registration document prepared for the above referenced work by **exp** Services Inc. (**exp**) on our behalf is attached. The project will involve the raising and re-construction of a portion of Acadie Avenue/ Amirault Street which is one of the more important transportation arteries within the City of Dieppe. The portion of roadway slated for re-construction, which is located between Alain-Gillette Street and the Chartersville Road along an approximately 1.1 km section of the Chartersville Marsh, has been subject to several historical flooding events including the most recent event which occurred in the spring of 2011. Therefore, the primary purpose of the project is to mitigate the potential for future flooding and to preserve the integrity of the road.

We trust that this information is sufficient for your department's review of this matter. If there are any questions, please contact the undersigned or Mr. Robert Gallagher of **exp** at 857-8889.

Yours very truly,

Angèle Spencer

Angèle Spencer, P.Eng.
Project Engineer

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ENVIRONMENTAL IMPACT ASSESSMENT REGISTRATION (Regulation 87-83)

1.0 PROPONENT

(i) Name of Proponent

City of Dieppe

(ii) Address of Proponent

333 Acadie Avenue
Dieppe, NB
E1A 1G9

(iii) Chief Executive Officer

Yvon Lapierre, Mayor

(iv) Principal Contact Person for purposes of Environmental Impact Assessment

Angèle Spencer, Project Engineer
City of Dieppe
Tel: 506-877-7900 (office); email: Angele.Spencer@dieppe.ca

(v) Property Ownership

The project involves the re-construction of an approximately 1.1 km section of Acadie/Amirault Street between rue Alain-Gillette and Chartersville Road. No changes to the horizontal roadway alignment will occur and nearly all construction activity will take place within the existing right-of-way which is a Provincially designated highway. Depending upon the selected final design option, additional right-of-way may be required.

2.0 THE UNDERTAKING

(i) Name of the Undertaking: Acadie Avenue/Amirault Street Re-construction Project

(ii) Project Overview

Acadie Avenue/Amirault Street, with an estimated traffic volume of 23,000 vehicles per day, is a four lane roadway which serves as one the more important transportation arteries within the City of Dieppe. A section of this roadway which is approximately 1.1 km in length traverses the Chartersville Marsh which is a Provincially Significant Wetland (PSW). In the spring of 2011, an above average snow melt and icing of the existing Virginia Street culvert caused flooding of the marshland above the road surface and inside the nearby New Brunswick Department of Agriculture dyke. The roadway was subsequently closed due to safety concerns. Over the years, this section of roadway has been subject to other flooding events of varying severity, including another severe flooding event which occurred in 1993 in response to a rapid snowmelt and siltation of the existing aboiteau structure in the dyke at Babineau Creek. Effects of climate change are expected to increase the severity of flooding along this portion of the roadway in the future.

In response to flooding related public safety concerns and in consideration of the importance of the level of service of this urban arterial roadway to the citizens of southeastern New Brunswick, the City of Dieppe and the New Brunswick Department of Transportation and Infrastructure (NBDTI) commissioned a pre-design study in 2012 to examine potential roadway upgrading options to mitigate the potential for future flooding. The study recommended that the roadway be raised to a minimum elevation of 8.3 m in order to reduce the risk of flooding to accommodate the historic 100 year return period rainfall event plus an allowance of 20% to account for the effects of climate change (R. V. Anderson and Associates, 2012). This would involve raising the existing roadway grade a maximum of approximately 1.0 m and thereby introducing surcharge loading on the existing roadway embankment. However, since the roadway is underlain by highly compressible organic silts and clays, it is the design intent that there be limited to no increase in the net load on these soils to minimize potential roadway settlements and damage to the underground utilities located in the existing embankment. Therefore, the pre-design report recommends over-excavating the organic soils to a suitable depth and replacing them with lightweight fill followed by the new pavement structure.

Project design work completed to date has focused on the collection of the data required to assess potential candidate materials for lightweight fill and the development of related preliminary design options. The preliminary design options currently under consideration may be broadly classified as three design approaches or options. A brief description of each of these preliminary design options is provided below.

Option #1 was developed on the basis of the assumption of "no net increase in effective stress" on the compressible foundation soils resulting from the surcharge loading created

by raising the elevation of the existing roadway embankment. Although this design approach essentially allows differential settlement concerns related to the road surface and sub-surface infrastructure to be dismissed as a key consideration, it necessitates the use of a relatively large quantity of expensive lightweight fill. Furthermore, since pipework is located at relatively shallow depth at several locations in the existing roadway embankment, the piping in these areas represents a physical constraint on the depth of over-excavation and replacement of poor foundation soils with lightweight fill.

As a result of the above noted issues, several alternate design options are also under consideration. One alternate option (i.e. Option #2) is to allow the differential settlement of underground piping within tolerable limits. The implementation of this option would likely entail the construction of a "zoned embankment", wherein varying thicknesses of lightweight fill would be utilized to maintain the differential settlements within tolerable ranges. Any underground infrastructure which could not tolerate the predicted settlement would need to be relocated outside the zone of influence of the surcharge loading of the existing embankment. It is quite likely that some portions of the embankment underlain by poor quality foundation soils such as those underlain by thin zones of clay/silt or lightly over-consolidated clay/silt would not need any lightweight fill. Therefore, the "limited net loading" option would be expected to result in appreciable construction cost savings compared with the "zero net loading" scenario as a result of the significantly reduced lightweight fill quantity associated with the former option. However, notwithstanding these potential construction cost savings, it must be appreciated that the "limited net loading" design approach would result in localized but appreciable post-construction differential settlement of the road surface. This would necessarily result in some increased maintenance costs for several years post-construction until the majority of the settlements are realized. "Hardscaping" items (e.g. base and seal asphalt, etc.) for portions of the roadway which would be expected to experience the greatest settlements could be deferred until the majority of the settlements have been realized several years after the execution of the main re-construction contract. Post-construction settlement monitoring could be employed to more accurately predict the time required for the underling soft silts/clays to consolidate to the degree which would permit the construction of the final road surface. An extreme variation to this design approach would be to forego the use of any lightweight fill and allow the roadway to settle as a result of the compression of the fine-grained foundation soils. However, this variation would necessitate the relocation of underground services outside the zone of influence of the embankment surcharge loading.

Finally, Geopier® foundation technology could potentially be used as an alternative to mass over-excvation of soft soils and replacement with lightweight fill. An evaluation of the technical feasibility of this approach (i.e. Option #3) is currently being conducted. Under this approach, it is anticipated that multiple Geopier® rammed aggregate piers (RAP) would be constructed to form high stiffness engineered elements to support to raised roadway and significantly mitigate potential settlements. The RAP elements are constructed by initially driving a patented mandrel and tamper foot into the ground to the design depth using a combination of static loading and dynamic impact energy. A sacrificial cap prevents soil from entering the mandrel during driving, which results in the

lateral displacement of soils and the resultant densification and reinforcement of exiting soils. Following placement, the hollow mandrel serves as a conduit for aggregate placement and compaction in one foot lifts. During aggregate placement, the mandrel is slowly raised/removed from the ground. Compaction is achieved through static down force and dynamic vertical ramming from an impact hammer. The process subjects the aggregate to vertical compaction and forces the material laterally into cavity sidewalls which promotes coupling with the surrounding soil. The end result is a stiff foundation element.

Several lightweight fill candidate materials for project design Option #1 and Option #2 were evaluated by **exp** during the design process. Key factors which were considered during the lightweight fill options assessment included cost; local availability and past performance; and the geotechnical properties of the material (e.g. unit weight, angle of friction, etc.). Economics was a key practical consideration and this favored fill sources readily available in the Dieppe region to minimize transportation costs. On the basis of the above criteria, geo-foam and tire derived aggregate (TDA) were short listed for the lightweight fill material options assessment. Costs associated with the geo-foam option were determined to be significantly higher than those for the TDA option. Furthermore, technical analysis also indicated the potential for buoyancy effects associated with the geo-foam given the high groundwater table in the Chartersville Marsh. Therefore, it was recommended that the design proceed on the basis of using TDA as lightweight fill as it was determined to be the best option in terms of both cost and technical benefits.

Other key project elements include the replacement of the existing 1.8 m diameter culvert at the Babineau Creek crossing with dual 1.8 m diameter primary drainage culverts in addition to the installation of secondary drainage culverts at appropriate locations along the roadway. Although a single barrel 1.8 m culvert would provide adequate discharge capacity, a second barrel was recommended to account for blockages from siltation and ice and to provide additional discharge capacity (R. V. Anderson and Associates, 2012). The dual culverts will serve to minimize the risk of differential water level elevations between the upper and lower sections of the Chartersville Marsh and the resulting potential flooding/damaging of the Acadie Avenue road structure. Finally, it is anticipated that some municipal infrastructure piping (e.g. primarily storm and sanitary lines and possibly some watermain) will be replaced in conjunction with the street re-construction project.

(iii) Purpose/Rationale/Need for the Undertaking:

Market Potential: Not applicable.

Benefit to Society: The undertaking will result in improved public safety since the roadway elevation will be raised in order to significantly reduce the potential for future flooding. Since the subject roadway is an important regional transportation artery, there are also indirect economic benefits associated with the reduction in the frequency of road closures due to flooding. Direct economic benefits are expected to include a reduction in municipal operation and maintenance expenses related to the decreased potential for

flooding and the associated damage to the roadway and pavement structures. The project also has the potential to divert a large quantity of tires from landfills if design Option #1 or Option #2 is selected. The current high-end estimate of the quantity of TDA required under Option #1 is approximately 34,000 tonnes which equates to roughly 3.4 million tires.

Economic Benefits: See above.

Job Creation Benefits: Job creation will include short term construction related jobs.

Consumer and/or Industrial Demand: See above.

Discussion of Alternatives: The "do nothing" alternative is not considered to be acceptable due to flooding related public safety concerns and the economic importance of minimizing the potential for road closures and/or roadway damage caused by flooding along this important regional transportation artery. The construction of a new roadway was not considered practical due to the associated very high cost and destruction of a significant area of marsh habitat.

(iv) Project Location

Location/PID: The limits of construction include a section of the existing Acadie Avenue/Amirault Streets situated between rue Alain-Gillette and Chartersville Road and measuring approximately 1.1 km in length. Since the work will be completed on roadway right-of-way, there are no Service New Brunswick (SNB) parcel identification numbers (PID) associated with this project. However, it is noted that the section of roadway targeted for re-construction traverses or adjoins thirty-six (36) separate land parcels. Depending upon the selected final design option, the City may need to obtain additional right-of-way from selected adjoining land owners along the alignment. The proposed work area is situated within the municipal boundaries of the City of Dieppe which is located in the Parish of Moncton, Westmorland County.

Address: The proposed work area consists of an approximately 1.1 km long section of existing roadway right-of-way for which for is no associated PID number or civic address.

Location Map: The project location relative to communities, roads, environmental features, etc, is indicated on Figure 2.

(v) Siting Considerations

As previously mentioned, the undertaking will involve the re-construction of approximately 1.1 km of existing roadway and the horizontal alignment of the roadway will not change. Alternative alignments were not examined as this would not be practical from an economic perspective. Furthermore, it was recognized that maintaining the

existing roadway alignment will essentially limit construction work within the marsh to a previously disturbed area.

Since the subject roadway traverses a PSW with an area in excess of 2 ha, it is recognized that wetlands are a key valued environmental component (VEC) in the project area. Consequently, **exp** prepared a project briefing document including preliminary design details for submission to the New Brunswick Department of the Environment (NBDENV) for departmental review and consideration with respect to potential environmental related project requirements. A copy of the submission document dated August 16, 2013 is provided in Attachment A. Under the preliminary design scenario outlined in the briefing document, the total area of marsh encroachment resulting from the undertaking was determined to be 1,475 m^2 as shown on the accompanying Drawing 2-1. The width of the isolated encroachment areas along the marsh portion of the alignment varied from 0 m to 4 m and nearly all of the encroachment was located on the west side of the roadway.

A response to the above noted briefing document was by provided by NBDENV on August 22, 2013. NBDENV indicated that the project must be registered for an EIA review since it will potentially impact a wetland greater than 2 ha in extent. However, NBDENV noted that the wetland field data that has been collected during previous assessments will be sufficient for EIA review.

Depending upon the selected final design option, the City may need to obtain additional right-of-way from selected adjoining land owners along the alignment.

Certain land use activities within 30 m of a watercourse or wetland may not be permissible without a permit under the Watercourse and Wetland Alteration (WAWA) Regulation under the *Clean Water Act*. As previously mentioned, the project will include the replacement of the existing 1.8 m diameter culvert at the Babineau Creek crossing with dual 1.8 m diameter primary drainage culverts. A WAWA permit will therefore be required for this work in addition to the required marsh encroachment. It is noted that secondary drainage culverts will also be placed along the re-constructed alignment at two locations for the sole purpose of providing drainage across the roadway embankment during a significant rainfall or flooding event. Therefore, WAWA permits will not be required for the secondary culverts since they will not be located in or within 30 m of any natural watercourses and will only be used to periodically convey flood water.

(vi) Physical Components and Dimensions of the Project

A property plan and aerial photograph indicating the limits of the roadway re-construction work and surrounding relevant features is provided as Figure 2. A complete set of project drawings based upon recent preliminary design work is provided in Attachment B. The use of TDA lightweight fill and "no net increase in stress" (i.e. Option #1 as previously discussed in **Section 2.ii**) was assumed in developing the preliminary design concepts outlined in Attachment B. It is noted that the project is currently in the preliminary design phase, and that the final footprint area of the

reconstructed roadway and hence the final marsh encroachment area are not definitively known at this time and will not be determined until the detailed design phase. ***However, it is important to note that the final design footprint is not expected to vary significantly from the preliminary design***.

As previously mentioned, the overall length of the project is about 1.1 km. Through the marsh from Station 1 + 240 m to Station 2 + 040 m, an overall roadway width of 20 m is currently envisioned as illustrated on Detail 1 of Drawing 4-6 (Attachment B). As shown on the cross section, the roadway will be comprised of four lanes of traffic; a 4 m asphalt shoulder/trail on the west side of the road; and a 2 m asphalt shoulder on the east side of the road. The overall toe to toe width of the re-constructed roadway through the marsh including the 3:1 embankment slopes would be approximately 26.6 m. A typical cross section of the re-constructed roadway outside the marsh is shown as Detail 5 on Drawing 4-6. As indicated, roadway drainage outside the marsh will be controlled by concrete curb and gutter and the road will be comprised of four lanes of traffic; a 4 m asphalt trail on the west side of the road; and a 2 m concrete sidewalk on the east side of the road.

The estimated marsh encroachment based upon the roadway cross section currently under consideration during preliminary design is 2,600 m^2 compared with the encroachment estimate of 1,475 m^2 provided in the August 16, 2013 project briefing document submitted to NBDENV. The majority of the encroachment would be on the west side of the roadway as shown on the project drawings. The width of the isolated encroachment areas along the marsh portion of the alignment typically varies from about 0 m to 5 m.

The existing 900 mm stormwater outfall on the east side of the road in the vicinity of Station 1+ 300 m will need to be upgraded. A second 900 mm storm outfall will be required on the east side of the road near Station 1 + 855 m. Although this is an on-going design item, the current plan is to construct small rip-rap sediment/energy dissipation ponds at each of these outfall locations on the east side of the road. It is estimated that the footprint area of each pond will be about 4 m x 7 m and much of this footprint area will encroach on the marsh. This encroachment has been included in the current total encroachment area estimate outlined above. The construction of the sediment/energy dissipation ponds is expected to result in a net environmental benefit since under the current situation, the outfalls in question are highly silted and outfall directly to the marsh and Babineau Creek, respectively. The ponds will decrease the stormwater velocity and allow some silt and debris to settle out, reducing the potential for any sediment to back up into the piping. The ponds will be maintained by the proponent as required.

The embankment of the re-constructed roadway will need to be sloped at 3:1. Although steeper slopes would result in somewhat less marsh encroachment, they are not feasible for this project since a maximum slope of 3:1 is required in order to maintain a suitable factor of safety against slope failure of the zoned embankment which will contain TDA, granular fill and roadway granular aggregate. The use of 3:1 slopes will also result in improved safety for any vehicles which may leave the roadway due to a traffic accident.

Given that the poor quality sub-grade soil beneath the existing roadway will need to be over-excavated to an appreciable depth to accommodate the placement of lightweight fill under design Option #1 and Option #2, it is anticipated that the Contractor may need to construct a temporary access road along the majority of the west side of the existing roadway including the portion of the road which traverses the marsh to permit the re-construction of the roadway. The road would need to accommodate two lanes of traffic and it is expected that it would be approximately 8 m in width. A temporary culvert crossing would likely be employed by the Contractor at Babineau Creek. The roadway would be removed following the completion of construction work and it would be constructed to mitigate potential impacts to the marsh to the greatest extent practical. For example, to minimize potential impacts and facilitate post-construction removal, the granular fill comprising the temporary roadway would be placed on a geotextile cushion layer placed directly on the surface of the undisturbed marsh. Since the access road will be a temporary structure, it has not been included in our permanent marsh encroachment estimate outlined previously herein.

As previously mentioned, the City may need to obtain additional right-of-way from selected adjoining land owners depending upon the selected final design option. For the various design options currently under consideration, the cumulative total area of additional right-of-way required varies from approximately 0 m^2 to 700 m^2. The City will initiate negotiations with land owners once the additional right-of-way requirements (if any) have been confirmed. Regardless of the selected design option, the majority of the proposed work will be confined to the existing right-of-way.

The key physical components of the project will include the reconstructed roadway and the associated fill materials, roadway structure and pavement structure; two new 1.8 m diameter culverts which will replace the existing 1.8 m culvert at Babineau Creek; two 900 mm flow equalization culverts; and new underground municipal infrastructure piping. Roadway lighting is currently and will continue to be provided by standard roadway fixtures mounted on utility poles.

There will be no net increase in existing vehicular traffic associated with the undertaking. In addition, it is noted that no new off-site facilities or processes will be required by the project.

(vii) Construction Details

Approximate Duration: The project timelines are tight and an outline of the current project schedule which has been established by the proponent is provided below:

Issue project tender package – February, 2014
Tender closing – March, 2014
Tender award – April, 2014
Construction start date – May, 2014

It is estimated that approximately twenty (20) weeks will be required for construction (i.e. May, 2013 to October, 2013).

Estimated Hours: The estimated working hours during the construction period are as follows: 7:00 hr to 19:00 hr, 5 days per week, Monday to Friday.

Anticipated Equipment: Excavators, front end loaders, flat bed trucks, dump trucks, concrete trucks and compaction equipment. Ancillary equipment to include concrete tools and municipal infrastructure piping installation equipment.

Date of First Physical Construction-Related Activity: Construction is currently scheduled to commence on May 1, 2014. Construction timelines are tight as it is anticipated that the duration of the work will encompass the majority of the 2014 construction season.

Potential Sources of Pollutants: Fugitive dust emissions, noise, suspended solids runoff, spillage of fluids used in equipment such as hydraulic fluid and fuels.

Fate of Wastes: Wastes associated with the project are expected to include construction debris primarily related to equipment and supplies packaging. Where not recycled, this material will be removed, handled and disposed of in accordance with the Province of New Brunswick construction and demolition debris management procedures and regulations. Portable toilets will be provided on-site for construction workers and these units will be serviced as required by a qualified sub-contractor.

Access and Traffic Management: A traffic control plan for the construction phase of the project will be developed by **exp** in consultation with the City of Dieppe. Maintaining access to adjacent properties will be included in the plan, in addition to maintaining a minimum of two lanes of travel on Acadie Avenue/Amirault Street at all times. As previously mentioned, it is anticipated that a temporary access road may be required on the west side of the existing roadway during construction. Options will be reviewed for managing traffic flows under various construction staging and closure scenarios. The traffic control plan will conform to the requirements of the latest version of the City of Dieppe Standard Municipal Specifications. NBDTI's Work Area Traffic Control Manual will be referenced for any situations not covered by the above noted standard specifications.

Clearing and Grubbing: No clearing activity and no significant grubbing activity will be required for the undertaking since the work involves the re-construction of an existing roadway in a developed urban area and the work will essentially be confined to the right-of-way of the existing roadway.

Fill Material: Clean common fill and standard aggregate (sub-base and base) for roadway construction will be required. Specialized lightweight fill comprised of tire derived aggregate (TDA) may also be required to raise the elevation of the roadway as previously discussed. It is noted that the product can be manufactured locally on a custom order basis by Tire Recycling Atlantic Canada Corporation (TRACC) located in

Minto, NB. The quantity of TDA required will vary considerably depending upon the selected final design option. However, the current high-end estimate of the quantity of TDA required under Option #1 (refer to **Section 2.ii**) is approximately 34,000 tonnes which equates to roughly 3.4 million tires.

Work Near Wetlands/Watercourses: The project will involve minimal encroachment and work within a provincially significant wetland (Chartersville Marsh) in excess of 2 ha in extent in addition to a watercourse alteration related to the culvert replacement work at the Babineau Creek crossing. All necessary permits and approvals will be obtained prior to initiating the work as previously discussed herein. No other work within 30 m of a watercourse or wetland will be completed.

(viii) Operation and Maintenance Details

General – The City of Dieppe will be responsible for operating and maintaining the re-constructed section of roadway. Key operational requirements include snow clearing and de-icing. Maintenance will include standard municipal roadway maintenance work (e.g. periodic repairs to the pavement and road structure; underground infrastructure renewal work; reinstatement of pavement markings; etc.).

Water Supply – Not applicable.

Lifespan of Project – The functional design life of a given pavement and roadway structure will vary in accordance with the magnitude and nature of the traffic loading and several other site specific considerations, where functional design life is defined as the time required for the first major rehabilitation. For the current project, an estimate of the functional design life of the re-constructed road and pavement structure will be completed during the detailed design phase of the project. It is noted that design life estimates are prepared under the assumption that routine maintenance including patching and repair are completed as and when required.

Power Requirements – Not applicable.

Labour Requirements – Operation and maintenance of the reconstructed roadway will be completed by the proponent's existing municipal public works staff.

Fate of Wastes, Emissions and Effluents – Solid waste will not be generated during the operation of the roadway. For the portion of the roadway alignment which traverses the marsh, the roadway will be suitably crowned along the centre-line to convey storm water to the marsh. Outside the marsh, storm water will be controlled and conveyed by concrete curb and gutter and the associated municipal storm water drainage piping. Air emissions would include automobile emissions associated with the vehicular traffic. However, it is important to note that the reconstruction project is not expected to result in any *net increase* in greenhouse gas and related automotive emissions since there will be no *net increase* in traffic over the operational life of the roadway.

(ix) Future Modifications, Extensions, or Abandonment

No future modifications, extensions or abandonment are envisioned at this time.

(x) Project Related Documents

The following project related documents are available:

i. Acadia Consultants and Inspectors Limited (an **exp** predecessor company) & D. J. Hood Associates Ltd., 2010[a]. Standard Wetland Delineation – Chartersville Marsh Wetland Delineation Project, Dieppe, Westmorland County, New Brunswick. Report to the City of Dieppe dated October 31, 2010. ACI File No. (80) 1653-076.2.
ii. Acadia Consultants and Inspectors Limited (an **exp** predecessor company) & D. J. Hood Associates Ltd., 2010[b]. Standard Wetland Delineation – Chartersville Marsh-West, Dieppe, Westmorland County, New Brunswick. Report to the City of Dieppe dated November 30, 2010. ACI File No. (80) 1653-084.1.
iii. **exp** Services Inc., 2013. Preliminary Pre-Design Report – Acadie Avenue/Amirault Street Reconstruction. Report to the City of Dieppe dated August 23, 2013. **exp** File No. MON-00213818-A0.
iv. R. V. Anderson Associates Limited and Conquest Engineering Ltd., 2013. Preliminary Design Report – Acadie Avenue Upgrading. Revised final report submitted to the City of Dieppe dated May 24, 2013. RVA file no. 122577.

Copies of the above noted supporting documentation have been included with the electronic version of the EIA registration submission.

3.0 DESCRIPTION OF THE EXISTING ENVIRONMENT

Note: Detailed information concerning the Chartersville Marsh wetland is provided in selected supporting documentation associated with the EIA registration submission (i.e. wetland delineation reports). Therefore, summary information pertaining to the wetland is provided below and reader is referred to the supporting documentation for more complete details.

(i) Physical and Natural Features

Topography and Surface Water Drainage – The ground surface elevation is relatively flat in the study area. The elevation of the existing roadway typically ranges from 7.2 m to 8.4 m and the centerline of the re-constructed road will be raised to a minimum elevation of 8.3 m. The study area is drained by Babineau Creek which crosses Acadie/Amirault Street in the proposed work area via an existing 1.8 m diameter culvert. From the roadway, Babineau Creek flows west towards an aboiteau in the nearby New Brunswick Department of Agriculture dyke which generally follows the north bank of the

Petitcodiac River. It is noted that the elevation of the top of the dyke is 9.0 m. Since the above noted aboiteau structure is severely silted and represents a significant restriction to the creek flow, the majority of the surface water drainage flows to the northwest and parallel to the dyke until it reaches the Virginia Street culvert near the Virginia Street sewage pumping station. At this point, the surface water drains through the culvert and discharges to the Petitcodiac River (refer to Attachment A, Figure 1).

Geology and Hydrogeology – Existing geological mapping indicates that the subject roadway is located near a transition zone between two types of surficial material (Rampton et al., 1984). Along the Petitcodiac River, the overburden material is comprised of intertidal plains and salt marshes typically comprised of clay, silt, some fine sand, minor peat and organic sediment generally more than 2 m thick. East of this zone, the overburden consists of a 0.5 m to 3 m thick blanket of loamy lodgement till, minor ablation till, silt, sand, gravel and rubble. Overlying the latter material is a discontinuous veneer of sand, some gravel and silt and rare clay. Where present, this material is generally less than 0.5 m thick.

Regional bedrock geology mapping indicates that the study area is underlain by red to grey sandstone, conglomerate and siltstone (Potter et al., 1968).

A total of ten (10) boreholes were advanced to depths ranging from 4 m to 10 m along the existing roadway alignment in the proposed work area in July, 2013 as part of the project geotechnical investigation also completed by **exp**. The results of the borehole investigation confirmed the presence of varying thicknesses of poor quality foundation soils (e.g. very soft to soft silt with organics, etc.) over the majority of the roadway alignment. Native till was encountered beneath the soft soils at each borehole location.

Regarding hydrogeology, it is noted that the Petitcodiac River would be expected to serve as a regional groundwater flow divide and discharge zone and, therefore, the direction of regional groundwater flow would be expected to be west towards the Petitcodiac River. Superimposed on this regional flow system would be intermediate and shallow groundwater flow systems whose character would be a function of topography, soil/bedrock type and geologic structure. Based upon existing topographic conditions, it is expected that shallow groundwater along the roadway alignment immediately north and south of Babineau Creek would be expected to respectively flow to the south and to the north towards Babineau Creek. It is noted that the study area is serviced by the City of Dieppe municipal water system and that there are no known private wells, municipal wells, municipal wellfields or protected watersheds located within 500 m of the proposed work area.

Potential Adverse Environmental Conditions – As previously mentioned, the existing roadway is subject to periodic flooding and the primary purpose of the undertaking is to reduce the future flooding potential of the roadway.

Watercourses and Wetlands – Babineau Creek traverses the subject roadway at Station 1 + 835 m and the existing 1.8 m diameter culvert will be replaced by dual 1.8 m diameter

culverts. A permit will be required for this work under the provincial Watercourse and Wetlands Alteration Regulation. The Petitcodiac River is located approximately 500 m west of the proposed work area. As previously noted, the subject roadway traverses the Chartersville Marsh which is a Provincially Significant Wetland (PSW) greater than 2 ha in extent. Multiple scientific studies have been completed on the Chartersville Marsh in recent years, most notably including wetland delineation work conducted in 2009/10 along both sides of the existing Acadie/Amirault roadway. A summary of existing conditions in the marsh based upon a desktop review of selected existing studies and including a discussion of wetland function in the context of the proposed undertaking was prepared by D. Peck Botanical of Island View, NB. A copy of the summary report is provided in Attachment C.

Significant Fish/Wildlife Populations or Habitat – The Atlantic Canada Conservation Data Centre (ACCDC) was requested to search their databases for a 5 km buffer around the 1.1 km portion of the roadway alignment which has been slated for reconstruction to complete a screening level assessment of the nature and extent of potential ecological receptors in the study area. The results of the ACCDC data request are provided in Attachment D. It is important to note that this data only provides information on the potential presence of rare flora or fauna in the vicinity of the proposed areas of development.

The 5 km buffer area contained eight (8) records of five (5) vascular and zero (0) non-vascular flora. Similarly, eighty-one (81) records of twenty-eight (28) vertebrate fauna and fifteen (15) records of three (3) invertebrate fauna were identified and wood turtles were noted to be present in the study area. The above noted flora and fauna observations within the study area were assigned proximity estimates ranging from 1 km +/- 5 km to 33 km. Finally, the records review identified zero (0) managed areas (MAs) and one (1) environmentally significant area (ESA). Managed areas typically have some degree of protected status and ESAs may or may not have legal status. The identified ESA is the Outhouse Point migratory waterfowl staging area. This ESA is well removed from the proposed work area as it is situated about 1.5 km southwest and across the Petitcodiac River from Acadie/Amirault Street.

With the exception of the Eastern Cougar for which one observation was noted, no species at risk (SAR) under the provincial *Endangered Species Act* were identified in the ACCDC data. Based upon our past discussions with the New Brunswick Department of Natural Resources (NBDNR), it is understood that the department has no concerns related to Eastern Cougar and, although the species is listed in regulation as endangered at this time, there is no evidence to confirm that there has ever been a breeding population in the province. In addition, it is noted that no rare or endangered vascular plants were found in the Chartersville Marsh during multiple recent field studies as noted in the wetland summary report prepared for this project and appended to this registration document in Attachment C.

Environmentally Sensitive Areas - The results of the ACCDC records review within 5 km of the subject property did not reveal the presence of any environmentally sensitive areas in close proximity to the subject roadway (see above).

(ii) Cultural Features

A biking/walking trail through the Chartersville Marsh is located along the top of the existing New Brunswick Department of Agriculture dyke which is situated about 200 m to 500 m west of the subject roadway. There are no other known cultural features at or in the immediate vicinity of the proposed work area.

(iii) Existing and Historic Land Use

Existing and Previous Uses of the Subject Property and Adjoining Lands: As previously discussed, the subject roadway currently serves as an important urban arterial roadway within the City of Dieppe. Existing land use along the roadway is predominately commercial, and some commercial development has encroached on the northern and southern extremes of the Chartersville Marsh. Adjacent lands within the Chartersville Marsh north of Babineau Creek are essentially undeveloped.

Aerial photographs of the study area taken in 1945, 1953, 1963, 1976, 1982 and 2001 were obtained from the New Brunswick Department of Natural Resources (NBDNR) to assist in assessing historical land use in the study area. The subject roadway and Chartersville Road are shown in each of the above noted photos. The existing New Brunswick Department of Agriculture dyke which roughly follows the Petitcodiac River is first depicted in the 1953 air photo. Prior to 1976, the land adjoining the subject roadway is interpreted to be predominately undeveloped with some limited agricultural and/or residential usage. Some additional development consistent with residential land use is shown on the north side of the study area in the 1976 photo in addition to a residential trailer park and some limited commercial development on the south side of the marsh. The overall level of development in the study area is shown to gradually increase from the mid-1970s to 2001. Land usage on adjoining properties in the 2001 photo appears similar to existing conditions.

General Description of the Existing Condition and Use of the Site: See above.

Ownership of Lands Abutting Property: A site plan identifying the thirty-six (36) individual abutting land parcels along the approximately 1.1 km section of roadway alignment slated for re-construction is shown on Figure 3. The Service New Brunswick (SNB) property identification number (PID) for each of these land parcels is provided below in Table 1. Lands ownership information for the abutting properties is not provided in this table in consideration of Provincial privacy related regulations, guidelines and policies.

Table 1 – PID Numbers for Abutting Property

Dwg #	PID
1	70354097
2	00668566
3	70455720
4	70309240
5	70539135
6	01009976
7	00671990
8	70150305
9	00796060
10	00671685
11	01009950
12	01009927
13	01009919
14	01009901
15	00671677
16	01009935
17	01009943
18	01009893
19	70334123
20	70334131
21	00668301
22	70396395
23	70400270
24	70200860
25	00795922
26	70400288
27	70337837
28	70546460
29	70535083
30	70337894
31	00796110
32	01015023
33	70139258
34	70131693
35	01033711
36	70554118

Type and Extent of Any Known or Suspected Contamination Resulting from Previous Uses of the Subject Property or Adjacent Property: There are no known contamination (i.e. spills and contaminated soils) incidents in the study area that are expected to impact the proposed undertaking. It is noted that there is an automobile service station located on the northeast corner of the intersection of Amirault Street and Chartersville Road at

the southern project limit. The service station is located on two land parcels identified by property identification numbers PID 70131693 and PID 70139258. It is noted that there is a New Brunswick Department of the Environment (NBDENV) remediation file associated with the former PID which is referenced under the Land Gazette feature for this PID on the Service New Brunswick (SNB) real property information website. Although the current status of this file (i.e. closed or open file, etc.) is not known, it is noted that any contaminated soil encountered during construction will be managed in accordance with the NBDENV Guidelines for the Management of Contaminated Sites.

4.0 SUMMARY OF ENVIRONMENTAL IMPACTS

General: In general terms, potential environmental impact considerations associated with road re-construction projects including socio-economic factors are sediment and erosion control; avoidance of heritage resources; avoidance of species at risk and environmentally significant areas; minimization of noise and air quality impacts during construction; and traffic management and mitigation of construction related impacts to adjoining properties and businesses. Project specific considerations for the proposed undertaking include encroachment on a Provincially Significant Wetland; avoidance of watercourse impacts related to the Babineau Creek culvert replacement; the resulting requirement for a WAWA Permit under the Provincial Watercourse and Wetland Alteration Regulations; and the use of TDA lightweight fill (assuming design Option #1 or Option #2 as outlined in **Section 2.ii**).

It is noted that other than wetland encroachment, the same potential project-environment interactions would typically be expected for future operation and maintenance activities on the re-constructed roadway. Concerning accidents and malfunctions, it is noted that traffic accidents and related fires and fuel spillage are a possibility during all phases of the project. However, the likelihood of the occurrence of these events for the current project would be similar to that expected for typical municipal street re-construction, operation and maintenance. It is noted that the subject roadway is subject to flooding as previously indicated. Since flood mitigation represents the major impetus for the undertaking, the completion of the proposed work will result in a net positive impact with respect to this environmental component. Additional discussion concerning flood mitigation and the potential effects of the environment on the project is provided below.

A summary of the interpreted project related environmental interaction with key valued environmental components (VECs) for the construction and operation phases of the project in addition to potential accidents, malfunctions and unplanned events is provided in Table 2. A qualitative rating system was employed as outlined below to assist with the assessment which was based upon the professional judgment and experience of the project team in addition to our current understanding of the project:

0 = No interaction with this VEC is anticipated;

1 = Interaction occurs, but it would not be expected to result in a significant environmental effect even without mitigation; or the interaction would not be

expected to result in a significant environmental effect upon the implementation of suitable mitigation measures (e.g. typical environmental "best practices", project specific mitigation, etc.); and,

2 = Interaction occurs and may result in an environmental effect of concern even with mitigation (this would typically require compensation for habitat loss, etc.).

Mitigation measures will be required for some potential impact categories (e.g. sedimentation and erosion control) and general comments pertaining to existing mitigating factors or proposed mitigation measures for each VEC are provided in Table 3. It is noted that compensation for habitat loss will be required for the limited encroachment on the adjoining wetland.

There are no known species at risk or designated environmentally significant areas located in the general vicinity of the project. The New Brunswick Department of Natural Resources (NBDNR) have indicated that based upon the available information for the study area, no additional species at risk surveys would be required for the undertaking at this time. However, since the project will involve work within 30 m of a wetland, impact a wetland greater than 2 ha in extent and include a culvert replacement at Babineau Creek, a WAWA permit will be required under the Provincial Watercourse and Wetland Alteration Regulations. Finally, as the work will result in encroachment on a Provincially Significant Wetland, a wetland habitat loss compensation plan will be required.

Most of the above noted environmental issues were tabled at a pre-registration consultation meeting to discuss the proposed undertaking which was held between NBDENV, the City of Dieppe and **exp** at the NBDENV head office in Fredericton on September 9, 2013. NBDENV staff included specialists in the fields of EIA; biology; and watercourses and wetlands. The primary purpose of the meeting was to identify project specific environmental issues and to discuss the general requirements for project registration under the EIA process and potential approaches to mitigation. Additional discussion pertaining to the potential use of TDA as lightweight fill and the potential effects of the environment on the project is provided below.

Potential Effects of the Use of TDA Fill – An appreciable quantity of tire derived aggregate (TDA) will be required for the re-construction project if design Option #1 or Option #2 is selected. TDA has been used throughout North America for lightweight fill in roadway embankments and/or a multitude of other civil engineering applications for some time. As such, the American Society for Testing and Materials (ASTM) has developed a standard practice for the use of scrap tires in lightweight fill and other civil engineering applications (ASTM, 2008). In New Brunswick, the Department of Transportation and infrastructure (NBDTI) completed a TDA fill project along a portion of NB Route 1 in St. Stephen. An appreciable amount of academic research and field studies have been conducted on the potential environmental and ecological effects of the use of recycled tires in civil engineering applications including the use of TDA as roadway fill both above and, to a lesser extent, below the groundwater table. Research

findings on the placement of TDA below the water table are of particular interest since depending upon the selected final design option, the majority of the TDA placed for the proposed undertaking may be below the water table (refer to **Section 2.ii**).

A literature review of the potential water quality effects of TDA and rubber modified asphalt pavement was recently completed by researchers at the University of Maine (Humphrey and Swet, 2006). Studies involving TDA placed above and below the water table were included in the review and the review generally found that "*TDA has a limited effect on drinking water quality and fresh water aquatic toxicity for a range of applications including lightweight backfill...and drainage aggregate for drain fields for on-site wastewater treatment systems. TDA is unlikely to increase the concentration of substances with primary drinking water standards above those naturally occurring in the groundwater. It is likely that TDA will increase the concentration of iron and manganese, but the data indicate that these elements have limited ability to migrate away from the TDA installation* (Humphrey and Swet, 2006)".

Concerning iron and manganese, it is noted that naturally elevated concentrations of these parameters are often observed in New Brunswick groundwater, and that their respective Health Canada potable water criteria have been established on the basis of aesthetic considerations such as the control of encrustation and staining. Regarding organic parameters, a few volatile and semi-volatile organic compounds were detected in groundwater samples collected directly from TDA filled trenches in one field study (Humphrey and Swet, 2006). However, the concentrations of these parameters were generally observed to attenuate rapidly (i.e. within as little as 0.6 m to 3 m) in groundwater samples taken downgradient of the trenches to below detection limits or below potable water criteria (where applicable). It is also noted that potable water in the study area is supplied by the City of Dieppe municipal water system and that there are no known potable water wells situated downgradient of or in the general vicinity of the subject roadway.

Results of laboratory leachate testing on scrap tire debris have generally indicated that higher concentrations of metals tend to appear at lower pH conditions and more elevated concentrations of organic compounds are found at higher pH levels compared with near neutral pH conditions which generally produce relatively few extractables (Liu et al., 1998). However, it is important to note that the metallic and organic constituents observed in the leachate were well below levels which would result in a "hazardous waste" classification under leachate testing by the toxicity characteristic leaching procedure (TCLP) method in the above noted study (Liu et al., 1998). Additionally, the aforementioned ASTM standard practice pertaining to the use of scrap tires in engineering applications notes that TDA is not classified as hazardous waste based upon TCLP testing and cites additional supporting references (ASTM, 2008).

Groundwater samples were collected from two monitoring wells installed along the roadway alignment as part of the project geotechnical investigation and subjected to general chemistry and trace metal inorganic parameter scans. The analytical results are provided in Attachment E. The pH of the groundwater was in the near neutral range of

6.6 to 7.0. Elevated sodium, chloride and conductivity values were observed confirming the presence of brackish water, as expected given the location of the roadway in a former salt water marsh and in close proximity to the Petitcodiac River which is subject to tidal influence.

A long term study was conducted on tires immersed in sea water. The study concluded that after 42 years tires constructed of polyisoprene and immersed at a depth of 24 m showed very little degradation (California Integrated Waste Management Board, 1996). It is also noted that TDA fill has been used on several marine projects. Some studies have demonstrated a decrease in the toxicity of TDA leachates with increasing salinity (Hartwell et al., 2000).

Although research has been conducted on the potential toxicological effects of TDA leachate on certain aquatic species (e.g. fathead minnow, rainbow trout, *Ceriodaphnia dubia*, etc.), it appears that the literature related to this aspect is generally more limited than that for potential adverse human-health effects. A few aquatic toxicity studies were included in the above noted literature review report by Humphrey and Swet. This review generally found that "*TDA placed above the water table has negligible toxic effects for fresh water aquatic organisms. Undiluted leachate from TDA placed below the water table would have some toxic effects, but with only a small amount of dilution the effects are reduced to negligible levels* (Humphrey and Swet, 2006)".

It is noted that any use of TDA in the proposed undertaking will follow the recommendations and guidelines outlined in the aforementioned ASTM standard document on the use of scrap tires in civil engineering applications (ASTM, 2008). The standard includes engineering design recommendations and a discussion related to the potential environmental effects of scrap tire leachate. The leachate discussion in the ASTM standard supports the key research findings summarized herein for project EIA registration purposes. Concerning the potential use of TDA below the water table, it is noted that "*In summary, TDA placed below the water table would be expected to have a negligible off-site effect on water quality* (ASTM, 2008)".

Climate Change and the Effects of Climate on the Project: As mentioned above, the subject roadway is subject to periodic flooding and flood mitigation is the primary impetus for the proposed undertaking. The proposed minimum centerline elevation for the re-constructed roadway is 8.3 m which is based on a design flood elevation of 8.2 m which was derived from the historic 1:100 year return period rainfall event plus 20%. The City of Dieppe Stormwater Design Guidelines stipulate that municipal stormwater infrastructure be designed to accommodate the historical 100 year return period rainfall event plus 20% to account for the effects of climate change. As previously mentioned, the technical basis for this recommendation is provided in the 2012 pre-design study (R. V. Anderson Associates, 2012). The later study took into consideration the recent consultant report (AMEC, 2011) outlining potential climate change adaptation measures for the Greater Moncton area which was prepared for the Atlantic Climate Adaptation Solutions Association. A brief summary of the technical approach and rational for the determination of the design flood elevation of 8.2 m for the proposed undertaking is

provided below. A detailed discussion concerning the selection of the design flood elevation is provided in R. V. Anderson Associates, 2012.

R. V. Anderson developed a hydraulic computer model using PCSWMM stormwater software to evaluate the complex hydrology of the Babineau Creek watershed; the complex flooding dynamics of the Chartersville Marsh; and the complex hydraulics of drainage from the marsh into the Petiticodiac River. The effects of tidal water level fluctuations on the ability of the marsh to drain were considered as part of the modeling work. The hydrotechnical analysis included an assessment of the expected water level elevations associated with storm events with a range of return periods under both open water and winter (i.e. worst case) conditions; the hydraulic capacities of various culverts, outfalls and channels; and the flood risk of Acadie Avenue for a range of road surface elevations. The following potential flood mitigation options were evaluated as part of the hydrotechnical assessment:

- Raise the elevation of the Acadie/Amirault roadway embankment;
- Increase the hydraulic capacity of Virginia Street stormwater outfall;
- Increase the hydraulic capacity of the channel connecting Babineau Creek and the Virginia Street outfall;
- Increase the hydraulic capacity of the Babineau Creek culvert under Acadie Avenue;
- Provide stormwater pumping capacity to allow discharge of stormwater during high tides and storm surges; and,
- Construct additional stormwater storage outside of the existing Petitcodiac River dyke.

Based on the results of the hydrotechnical assessment and modeling, it was recommended that the City proceed with the first option (raise roadway elevation) combined with the fourth option (increase hydraulic capacity of Babineau Creek culvert). Although the latter option was determined to result in a relatively minor reduction in flood risk, it was selected as an "add-on" to the first option due to the high cost/benefit associated with this option. The other options were primarily rejected since they were deemed to have an insignificant effect on roadway flood risk reduction (R. V. Anderson Associates, 2012). The Petitcodiac River water level elevations which are subject to significant tidal effects represent an important consideration in the hydrotechnical dynamics of the study area. Babineau Creek drainage is currently controlled by flapgates on the existing NB Department of Agriculture (NBDA) dyke (currently severely restricted to flow due to siltation) and the stormwater outfall at Virginia Street. When the elevation of the river is above the elevation of the Babineau Creek water level, the above noted flapgates are closed and no water can be drained from the creek through the dyke. Although many of the rejected improvement options were found to allow quicker drainage of stormwater

stored in the marsh between high tides, the corresponding reduction in water level was determined to be insignificant. The latter finding relates to the Chartersville Marsh stormwater runoff storage volume, the magnitude of which is such that tidal water level fluctuations on the Petiticodiac River do not significantly affect the flood risk of Acadie Avenue. The results of the hydrotechnical analysis suggested that there could be an appreciable and moderate reduction in flood risk for the stormwater pumping and stormwater storage pond options, respectively. However, the former option was rejected due to the very high construction and operation and maintenance costs and the potential for low reliability due to the high potential for electric power outages or damage during storm events. The latter option would involve the construction of a new dyke to an elevation above 9.0 m; the modification of existing NBDA dyke; the construction of a new aboiteau at the location of the new outlet of Babineau Creek; and the stabilization of the existing Greater Moncton Sewerage Commission (GMSC) collector sewer in the area. However, this option was also rejected due to the high cost; moderate potential for flood risk reduction; and the environmental implications of the significant wetland habit loss which would be associated with constructing a new dyke in the marsh.

The Petitcodiac River flood elevation outlined in the above noted Greater Moncton climate change adaptation study was estimated at 9.67 m for a 100 year event occurring in 2055 taking into effect climate change considerations (AMEC, 2011). The top of the existing NBDA dyke is currently at elevation 9.0 m. However, the results of the above noted hydrotechnical analysis indicate that if the dyke was raised to above elevation 9.67 m, the storage elevation inside the dyke in the Chartersville Marsh would not be affected significantly by the Petitcodiac River tides (R. V. Anderson Associates Ltd., 2012). Water level and storage effects were modeled by R. V. Anderson for a tide cycle with a high water elevation of 8.2 m which represents the highest higher-high water for a large tide that generally occurs every year. As noted above, the modeling results indicated that "...the peak water levels are not influenced by the magnitude of the high tide, but rather the duration during which the runoff is allowed to release between (tidal) cycles" (R. V. Anderson Associates Ltd., 2012). The R. V. Anderson report notes that storm surges such as those associated with the historic Saxby Gale extreme event that would raise the Petitcodiac water levels for extended periods would prevent the release of runoff through the dyke and have a more pronounced effect on peak flood levels. However, these conditions would be dependent upon surge height and duration and were not included in the pre-design hydrotechnical analysis (R. V. Anderson and Associates Ltd., 2012).

5.0 SUMMARY OF PROPOSED MITIGATION

A summary of the proposed mitigation efforts associated with the undertaking are outlined herein. A tiered approach was utilized in developing the project mitigation measures as suggested in the technical guide to EIA in New Brunswick. Under this approach, environmental impact avoidance opportunities are implemented wherever possible. If it is not possible or practical to avoid some degree of environmental impact, impact reduction measures are stipulated. Finally, in occasional instances where more extensive impacts are unavoidable and justifiable (e.g. public good, etc.), compensation measures are proposed.

The main aspects of the work that may require mitigation include erosion control (re: suspended solids runoff); potential spills (e.g. fuel or oil leak from equipment); possible heritage resource encounters; control of noise; fugitive dust emissions and air quality; traffic management and potential impacts on adjoining property; replacement of a culvert in a watercourse; and encroachment upon wetlands. These will be mitigated as follows.

Suspended Solids – mitigative measures will include standard erosion control measures (e.g. silt fences, check dams) which will be employed as required during the construction phase of the project.

Spills – spills (if any) will be addressed by applicable regulatory requirements (e.g. notification and response). On-site construction equipment will be required to be in good condition and free of any known fluid leaks.

Heritage Resource Encounters – in the event that any item of cultural or archaeological significance is encountered during construction, work in the affected area will immediately be halted and the Provincial Archaeological office will be notified.

Noise – the construction work is not expected to result in a significant increase in noise levels above ambient background levels. However, as practical, construction equipment will be turned off when not in use.

Fugitive Dust Emissions and Air Quality – for aspects of the work that may lead to an increase in fugitive dust emissions above ambient conditions, standard dust suppression techniques such as water application to work area/ roadways will be used, and/or dust emission generation activities will be ceased until weather conditions warrant. Regarding air quality, it is noted that an anti-idling policy will be implemented for construction equipment as practical. **Note:** the project will not result in any long term increase in greenhouse gas emissions since the roadway reconstruction will not result in any *net increase* in future traffic loading.

Traffic Management and Potential Impacts on Adjoining Property – a traffic control plan for the construction phase of the project will be developed by **exp** in consultation with the proponent. Maintaining access to adjacent properties will be included in the plan, in addition to maintaining a minimum of two lanes of travel on Amirault/Acadie at all times. **Note:** when complete, the project will reduce the potential for future flooding and result in an increased level of service for the roadway.

Wetlands and Watercourses – the project involves working within a Provincially Significant Wetland and a culvert replacement at Babineau Creek. A permit will therefore be required under the provincial *Watercourse and Wetland Alteration Regulation* and the conditional terms of the permit will be respected. Since the

project will involve some encroachment on the wetland, a wetland habitat loss compensation plan will be prepared and submitted to NBDENV for approval.

The above discussion of proposed mitigation measures for the key environmental aspects of the project are intended to provide a general overview. More detailed mitigation measures will be outlined in an Environmental Protection Plan (EPP) which will be developed for the project and included with the project tender documents.

Concerning the possible use of TDA, the current scientific literature suggests TDA leachate would not be expected to have a significant impact on potable groundwater quality. Furthermore, it is noted that there are no known potable groundwater wells in the general vicinity of the proposed undertaking and that the existing shallow groundwater is naturally brackish and non-potable due to tidal influence from the Petitcodiac River. It is also noted that this brackish shallow groundwater is situated in low permeability overburden soil which is not considered to be an aquifer. Concerning potential effects on aquatic habitat, less information appears to be available in the scientific literature. Although several studies on undiluted tire leachate have demonstrated varying toxic effects on selected aquatic species when tested under laboratory conditions including lethal effects on rainbow trout during 96-hr acute lethality testing, the results of research reviewed during the preparation of this submission suggest toxic effects (if any) would be reduced to negligible levels with a relatively small amount of dilution. It is noted that Babineau Creek is severely silted in the vicinity of the existing Amirault culvert and roadway crossing and may not have a significant fish presence. An additional potential mitigating factor associated with the production and mobility of leachate if TDA is employed as lightweight fill in the re-constructed roadway is that most of the TDA below the water table would be placed in over-excavated poor foundations soils which are comprised of low permeability clays and silts.

6.0 PUBLIC INVOLVEMENT

Public Involvement: The minimum public consultation requirements outlined in Appendix C of the provincial EIA registration guide will be followed. Stakeholders include the owners of the properties adjoining the portion of the roadway slated for re-construction. It is noted that there are no First Nation communities located in the study area. A public notice containing the information specified in the registration guide will be delivered to stakeholders subsequent to registering the undertaking.

In addition to the minimum public consultation requirements, a public open house on the project will be held to allow the public to become familiar with the project, pose questions related to the project and to raise any environmental concerns. Details concerning the timing and location of the open house and the locations to obtain project related information will be advertised in one local and one provincial newspaper in accordance with the requirements outlined in the EIA registration guide.

The report on the public consultation is typically provided to NBDENV within 60 days of project registration in accordance with the EIA process requirements. However, it is noted that the proponent may choose to delay the public consultation process until the final design option is selected or the number options currently under consideration are reduced.

7.0 APPROVAL OF THE UNDERTAKING

The following permits and approvals will be required for the proposed development:

- Authorization/conditional approval of the undertaking under the Provincial EIA requirements outlined in *NB Regulation 87-83*.
- Provincial Watercourse and Wetland Alteration permit from NBDENV under the Watercourse and Wetland Alteration Regulations.

8.0 FUNDING

Funding for this project will be provided by the City of Dieppe, the Province of New Brunswick and the Government of Canada.

9.0 SIGNATURE

This EIA registration document was prepared by a team of **exp** Services Inc. professionals on behalf of the City of Dieppe. The summary of existing background information on the Chartersville Marsh was prepared by D. Peck Botanical.

Angèle Spencer

Date : October 28, 2013 Angèle Spencer, City of Dieppe

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Table 2: Project-Environment Interaction Matrix

Component	Air Quality	Sound Quality	Groundwater	Surface Water	Fish and Fish Habitat	Wildlife/Habitat	Species at Risk	Wetlands	Heritage/ Archaeology	Land Use	Land Use by First Nations	Human Health	Transportation and Navigation
Construction Activities													
Mobilization and Demobilization	1	1	0	0	0	0	0	1	0	0	0	0	0
Traffic Management	0	0	0	0	0	0	0	1	0	1	0	0	1
Road Re-construction	1	1	0	1	0	1	0	2	1	1	0	0	1
Culvert Replacement at Babineau Creek	1	1	0	1	1	1	0	1	0	1	0	0	0
Underground Services Installation	1	1	1	1	0	0	0	1	1	1	0	0	1
Operation and Maintenance													
Roadway Operation and Maintenance	1	1	1	1	1	1	0	1	0	0	0	0	1
Use of TDA fill	0	0	1	1	1	0	0	1	0	0	0	0	0
Potential Accidents/Malfunctions													
Hazardous Material Spills	0	0	1	1	1	0	0	1	0	1	0	1	1
Erosion and Sediment Control Failure	0	0	0	1	1	0	0	1	0	0	0	0	0
Fires	1	0	0	0	0	0	0	1	0	1	0	1	1
Flooding	0	0	1	1	1	1	0	1	0	1	0	1	1
Fish or Wildlife Encounter	0	0	0	0	1	1	0	0	0	0	0	0	1
Disturbance of Archaeological Resources	0	0	0	0	0	0	0	0	1	0	0	0	0

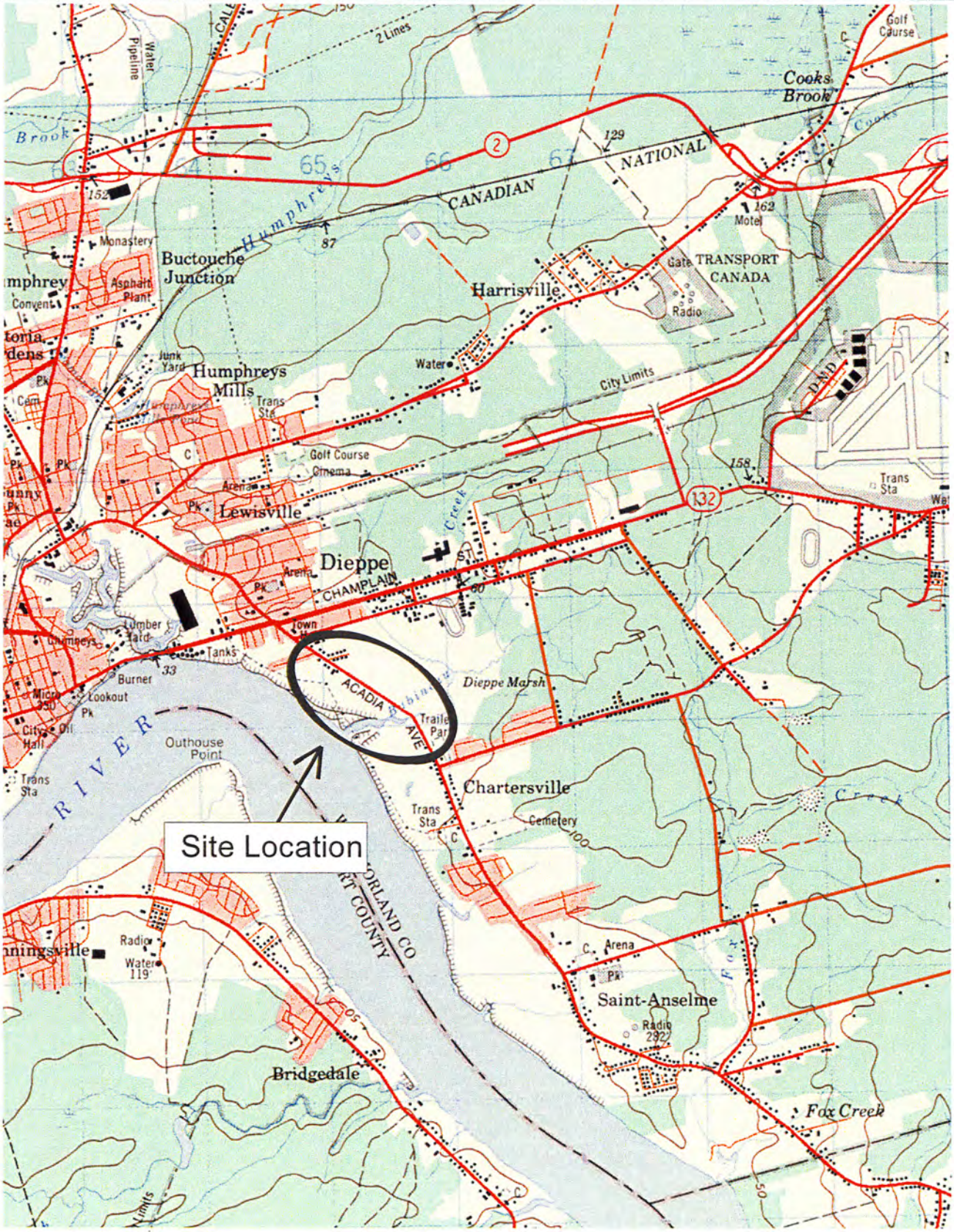
Table 3 Environmental Effects Checklist

Environmental Component	Potential Project Effects						Comments/Mitigation Measures
	Potential Adverse Effect?			Mitigation Required?			
	Yes	*No*	*Uncertain*	*Yes*	*No*	*Uncertain*	*Uncertain*
1) Topography		x					- No significant change in topography will occur.
2) Species/Habitat of Special Status		x					- The project footprint is essentially confined to the existing Acadie/Amirault Right of Way with limited marsh encroachment.
3) Vegetation	x			x			- A minimal amount of adjoining land acquisition may be required primarily on the southern end of the project. This land has been cleared and subjected to urban development. A temporary access road will likely be required during construction on the west side of the existing roadway.
4) Wildlife / Habitat		x					
5) Fish and Fish Habitat	x			x			- Work will be subject to and completed in accordance to NBENV Watercourse and Wetlands Alteration Regulation permits and requirements. - Sedimentation and erosion control measures will be in place. - Literature reviewed for EIA suggests that TDA leachate toxic effects (if any) on aquatic habitat would be reduced to negligible levels with a relatively small amount of dilution. - Based on information collected for EIA registration, Babineau Creek may not contain fish and/or provide fish habitat.
6) Marine Resources		x					- There are no marine areas or resources in the project vicinity.
7) Soils		x					- No impacts to area soils are anticipated.
8) DrinkingWater		x					- The study area is serviced by the City of Dieppe municipal water supply infrastructure and is outside any wellfield protection areas. - Based upon the above and no known wells in the area, no impacts to area drinking water would be expected. - Literature review suggests that any TDA leachate impacts to groundwater would be localized/limited in extent.
9) Groundwater	x						
10) Surface Water / Hydrology	x			x			- Refer to response to Item 5) outlined above.
11) Wetlands	x			x			- Work will be subject to and completed in accordance to NBENV Watercourse and Wetlands Alteration Regulation permits and requirements. - Sedimentation and erosion control measures will be in place. - Project will result in some unavoidable encroachment on a provincially significant wetland and related habitat destruction. A wetland habitat loss compensation plan will therefore be developed and submitted to NBDENV for approval.
12) Sediments		x					- Sedimentation and erosion control measures will be in place.
13) Climate and Air Quality	x			x			- There will be project related greenhouse gas emissions related to construction equipment operation. These are expected to have no significant impact on climate, and will be temporary. An anti-idling policy will be implemented for construction equipment, as practical. There will be not net increase in long term greenhouse

							gas emissions during the project operation and maintenance phase since the reconstruction work will not result in any net increase in future traffic loading. - There will be potential for temporary, local scale impact on air quality related to construction activities. Impacts are anticipated to be associated with vehicle and fugitive dust emissions related to use of construction equipment. Mitigation measures will be outlined in the project specific EPP developed to govern the construction phase of the project. Typical measures will include dust suppression techniques (e.g. water application on problem areas), and limiting/ ceasing activities in potential problem areas on windy days.
14) Noise	x			x			- There will be potential for temporary increase in noise related to use of construction equipment. Mitigation measures will be outlined in the project specific EPP developed to govern the construction phase of the project. Measures will include turning off construction equipment when not in use.
15) Vibration	x			x			- There will be potential for temporary, localized impacts related to vibration associated with construction equipment use during the construction phase. However, it is expected that all excavation work can be completed using standard construction techniques and equipment (e.g. back hoes) and that there will be no requirement for blasting. Mitigation measures will be outlined in the project specific EPP developed to govern the construction phase of the project. Measures will include turning off construction equipment when not in use.
16) Transportation and Navigation	x			x			- A traffic control plan for the construction phase of the project will be developed by **exp** in consultation with the City of Dieppe. Maintaining access to adjacent properties will be included in the plan, in addition to maintaining a minimum of two lanes of travel on Acadie/Amirault at all times. A temporary access road will likely be required during construction on the west side of the existing roadway. Options will be reviewed for managing traffic flows under various construction staging and closure scenarios. The traffic control plan will conform to the requirements of the latest version of the City of Dieppe Standard Municipal Specifications. NBDTI's Work Area Traffic Control Manual will be referenced for any situations not covered by the above noted standard specifications.
17) Land Use	x			x			- Refer to responses to Item 2), Item 3) and Item 4) outlined above.
18) Human Health		x					- Human health protection objectives will be enhanced as the project will result in a reduced potential for future roadway flooding.
19) Socio-economic Conditions[1]		x					- Socio-economic conditions will be improved as the project will result in a reduced potential for roadway flooding and an associated increased level of service for the subject roadway which is a major ground transportation artery in the City of Dieppe.

20) Physical/Cultural Heritage	x			x			- No impacts anticipated. However, there is potential that an archaeological artifact could be encountered during construction excavation activities. Mitigation measures will be outlined in the project specific EPP developed to govern the construction phase of the project, and include cessation of all work and notification of the Provincial Archaeological office in the event an object or area of potential archaeological significance is encountered during excavation work.
21) Aboriginal Use of Traditional Lands/Resources		x					- No impact.
22) Structures/Sites of Significance		x					- There are no structures/ sites of significance within the project footprint; also, refer to item 20), above.
23) Other		x					- None

Accidents and Malfunctions	x			x			- There is potential for accidents and malfunctions during the construction and operation phases of the project. Representative incidents include vehicle accidents, and spillage of fuels. Mitigation measures to address potential incidents will be outlined in the project specific EPP that will address environmental aspects related to construction and operations activities. Representative mitigation measures include the requirement to maintain construction equipment to prevent spills, obey traffic regulations and use designated fuelling areas outside a minimum 30 m buffer from watercourses.
Effects of Environment on the Project	x			x			- Refer to response to Item 18) outlined above.



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Project Title: EIA REGISTRATION ACADIE/AMIRAULT STREET RECONSTRUCTION	
Dwg. Title: **SITE LOCATION PLAN**	
Drawn By: AMP	Project No. MON-00213818-A0
Dwg. Standards Ckd. By:	Dwg. No. **FIGURE 1**
Designed By:	Dwg. Design Ckd. By: / Rev. No.

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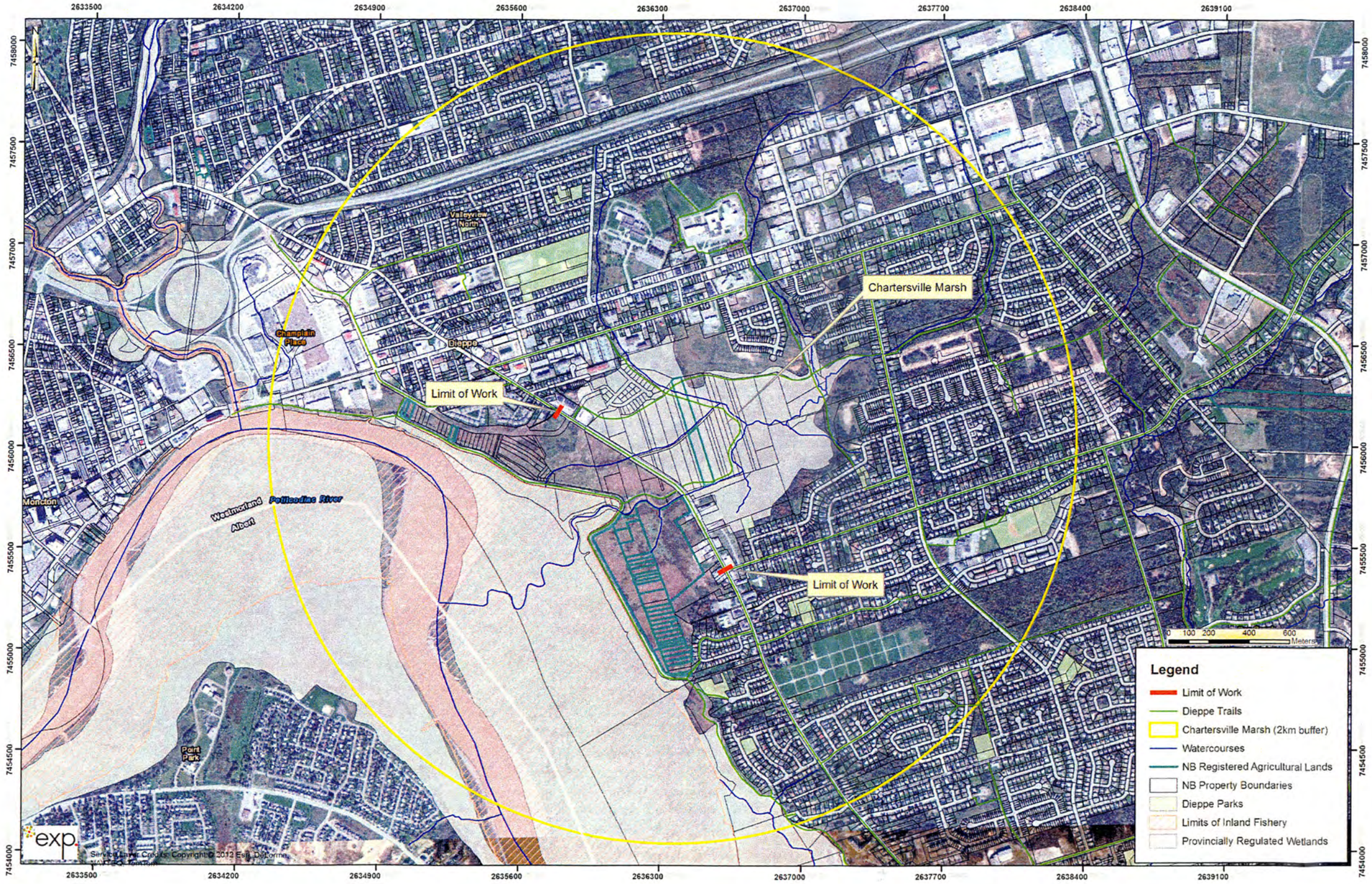

No	Revision	Chkd By	Date

Const. North

Drawn By: WJ /ba

Dwg. Standards Chkd. By:

Designed By:

Date Printed:

Dwg. Design Chkd. By: RSG

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Project Title:

EIA REGISTRATION
ACADIE / AMIRAULT STREET
RECONSTRUCTION

Dwg. Title:

AERIAL SITE PLAN

Project No: MON-00213818-A0

Dwg. No: FIGURE 2 | Rev. No:

Scale:

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SCALE

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Project Title	EIA REGISTRATION ACADIE/AMIRAULT STREET RECONSTRUCTION
Dwg. Title	**PROPERTY OWNERSHIP**

Drawn By: BLA	Project No. MON-00213818-A0	
Dwg. Standards Ckd. By:	Dwg. No. FIGURE 3	
Designed By:	Dwg. Design Ckd. By:	Rev. No.

ATTACHMENT A

Copy of NBDENV Project Briefing Document
(August 16, 2013)

August 16, 2013 MON-00213818-A0

New Brunswick Department of Environment
Marysville Place
PO Box 6000
Fredericton, NB E3B 5H1

Attention: David Maguire

Re: Project Briefing - Acadie Avenue/Amirault Street Re-construction, Dieppe, NB

Exp Services Inc. (**exp**) has recently been retained by the City of Dieppe to provide engineering services related to the above noted street re-construction project. On behalf of the City, we are submitting the following Project Briefing document for your review and consideration with respect to potential environmental related project requirements.

PROJECT OVERVIEW AND RATIONAL

Acadie Avenue/Amirault Street, with an estimated traffic volume of 23,000 vehicles per day, is a four lane roadway which serves as one the more important transportation arteries within the City of Dieppe. A section of this roadway which is approximately 1.1 km in length traverses the Chartersville Marsh which is a Provincially Significant Wetland (PSW). In the spring of 2011, an above average snow melt and icing of the existing Virginia Street culvert caused flooding of the marshland above the road surface and inside the nearby New Brunswick Department of Agriculture dyke. The roadway was subsequently closed due to safety concerns. Over the years, this section of roadway has been subject to other flooding events of varying severity, including another severe flooding event which occurred in 1993 in response to a rapid snowmelt and siltation of the existing aboiteau structure in the dyke at Babineau Creek. Effects of climate change are expected to increase the severity of flooding along this portion of the roadway in the future.

In response to flooding related public safety concerns and in consideration of the importance of the level of service of this urban arterial roadway to the citizens of southeastern New Brunswick, the City of Dieppe and the New Brunswick Department of Transportation and Infrastructure (NBDTI) commissioned a pre-design study in 2012 to examine potential roadway upgrading options to mitigate the potential for future flooding. The study recommended that the roadway be raised to a minimum elevation of 8.3 m in order to reduce the risk of flooding to within the historic 100 year return period level plus an allowance of 20% to account for the effects of climate change (R. V. Anderson and Associates, 2012). This would involve raising the existing roadway grade a maximum of approximately 1.0 m. However, since the roadway is underlain by highly compressible organic silts and clays, it is the intent that there be no increase in the net load on these soils to minimize potential roadway settlements and damage to the underground utilities located in the existing embankment. Therefore, the pre-design report recommends over-excavating the organic soils to a suitable depth and replacing them with lightweight fill followed by the new pavement structure.

The pre-design study suggested geo-foam as a potential candidate for lightweight fill. However, this material may not be ideal for the current project given the high groundwater table in the marsh and the

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potential for adverse buoyancy effects. Therefore, the use of geo-foam and other potential lightweight fill options will be assessed and the optimal material will be selected during the detailed design phase. Factors to be considered during the options assessment include but are not necessarily limited to cost; local availability and past performance; and the geotechnical properties of the material (e.g. unit weight, angle of friction, etc.). Economics is a key practical consideration and this will favor fill sources readily available in the Dieppe region to minimize transportation costs; the identification of potential local fill sources will be completed during the project pre-design phase. Another possible local source of lightweight fill includes but is not necessarily limited to tire derived aggregate (TDA).

Other key project elements include the replacement of the existing 1.8 m diameter culvert at the Babineau Creek crossing with dual 1.8 m diameter primary drainage culverts in addition to the installation of secondary drainage culverts at appropriate locations along the roadway. Although a single barrel 1.8 m culvert would provide adequate discharge capacity, a second barrel was recommended to account for blockages from siltation and ice and to provide additional discharge capacity (R. V. Anderson and Associates, 2012). The dual culverts will serve to minimize the risk of differential water level elevations between the upper and lower sections of the Chartersville Marsh and the resulting potential flooding/damaging of the Acadie Avenue road structure. Finally, it is anticipated that some stormwater piping will be replaced in conjunction with the street re-construction project.

A site plan depicting the overall project limits and key features is provided as Figure 1.

PROJECT TIMELINE

The project timelines are tight. In accordance with the City's schedule for this project, final design (97% pre-tender submission) is to be completed by November 29, 2013 with the project being tendered in February, 2014 and construction occurring during the 2014 construction season.

In order to maintain the above noted schedule, it is noted that any field work which may be required in the marsh in support of the requirement (if any) for additional environmental screening beyond the current delineation work completed in the past (see below), habitat compensation, etc. would have to be scheduled as soon as possible since wetland assessment will not be possible subsequent to the initial frost which may occur as soon as early-September to mid-September. Fortunately, the Chartersville marsh has been well characterized as a result of the past completion of several biological studies as noted below

EXISTING ENVIRONMENT

As previously mentioned, the portion of Acadie/Amirault to be re-constructed traverses the Chartersville Marsh which is a PSW. As such, the Chartersville Marsh is considered to be the key Valued Ecological Component (VEC) associated with this project. **Exp** developed an NBDENV approved Wetland Compensation Plan for the City of Dieppe in 2008 which involved the delineation of the Chartersville Marsh boundary on the east side of Acadie/Amirault in the project area. The dual purpose of the plan was to mitigate urban encroachment on the wetland and facilitate sustainable development around the perimeter of the wetland. The wetland delineation work on the east side of the road was completed in 2009/10 (ACI, 2010[a]). The City also retained **exp** to delineate the portion of the marsh boundary within the right-of-way of the west side of the roadway in 2010 (ACI, 2010[b]). The resulting wetland boundary is shown on Figure 2.

PROJECT ENVIRONMENTAL CONSIDERATIONS – PROPOSED APPROACH

Since the roadway elevation is to be raised, an increase in the footprint area of the existing roadway is unavoidable. It is noted that the project is currently in the preliminary design phase, and that the final footprint area of the reconstructed roadway is not definitively known at this time and will not be determined until the detailed design phase. ***However, it is important to note that the final design footprint is not expected to vary significantly from the preliminary design.***

A site plan depicting preliminary project design details is provided on Drawing 2-1 which has been included in Attachment A. This drawing shows the proposed roadway alignment which follows the existing alignment; the footprint of the new roadway (i.e. width of road measured from the toe of each embankment slope); and the wetland boundary. The overall toe to toe width of the roadway is demarcated on the drawing by the two dotted lines along the alignment and the encroachment on the marsh is shown as the green shaded area. The total area of encroachment under this preliminary design scenario has been determined to be 1,475 m^2. The width of the isolated encroachment areas along the marsh portion of the alignment varies from 0 m to 4 m. As shown, nearly all of the encroachment area is located on the west side of the roadway.

A typical roadway section through the marsh area at Station 1+650 based upon preliminary design work is also shown at the bottom of Drawing 2-1. The overall width of 20 m is comprised of four lanes of traffic at 14 m and two 3 m wide combination shoulder areas/walking trails. The walking trails are required to provide pedestrian access to the area since there are no sidewalks along this portion of the road. The overall toe to toe width at this section is approximately 26 m assuming 2:1 embankment slopes.

It is noted that every effort will be made to keep potential marsh encroachment to a minimum during the project design phase. Concerning construction, it is noted that nearly all of the project will be constructed outside the marsh as indicated on Drawing 2-1 and that the City is committed to implementing mitigation measures to the greatest extent practical to limit any construction related impacts on the marsh.

CLOSING

We thank-you for your evaluation of the potential environmental requirements for this project. Given the tight project timeline, a prompt review of this information at your earliest convenience would be greatly appreciated.

We trust that this information satisfies your current requirements. If you have any questions, please contact the undersigned or Mr. Robert Gallagher, M.Sc.Eng., P. Eng. at your convenience.

Yours very truly,

John Sims, M.Sc., P.Eng., P. Geo
Project Engineer

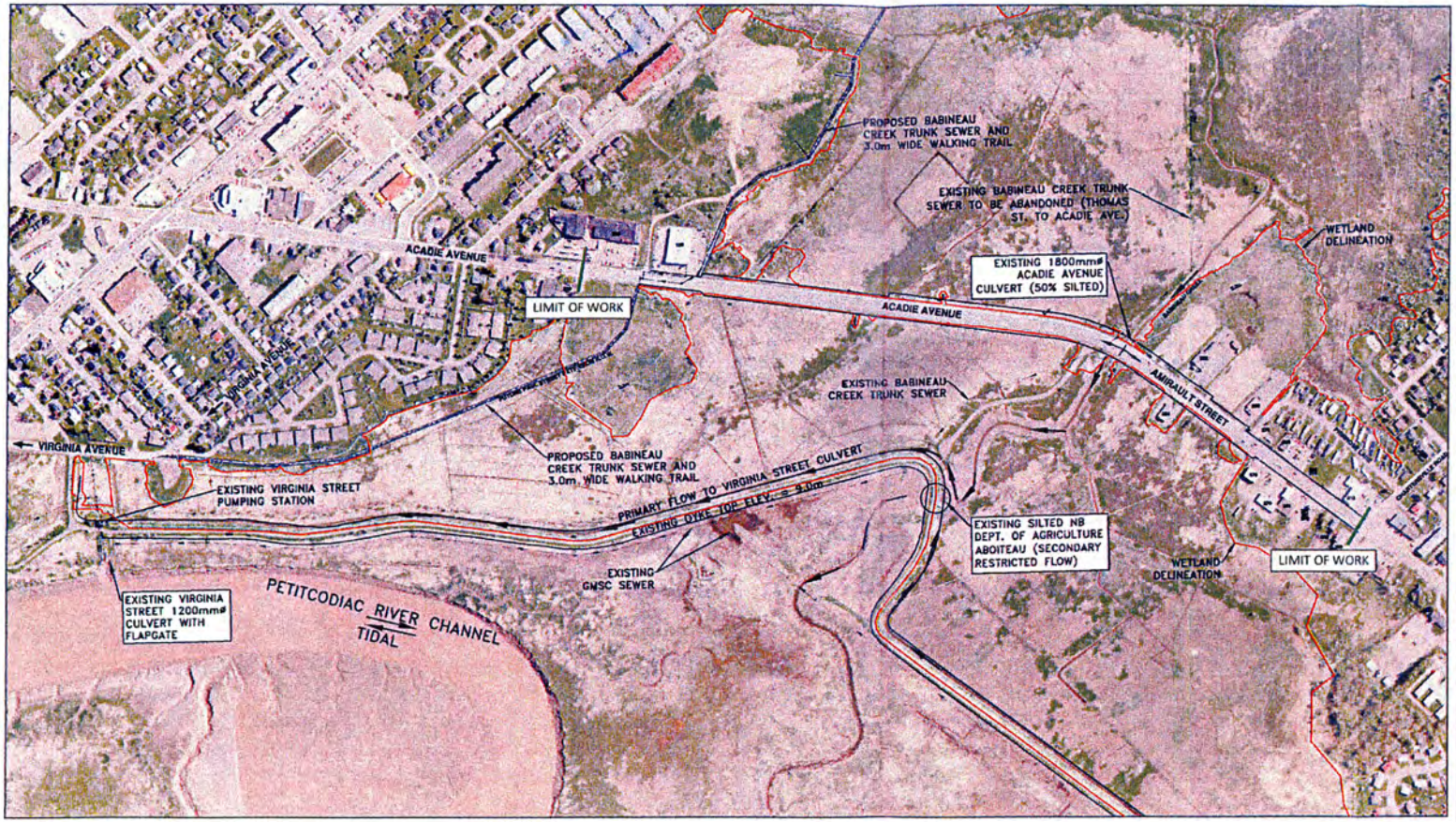
cc. Angèle Spencer, P. Eng. – City of Dieppe

REFERENCES

Acadia Consultants and Inspectors Limited (an **exp** predecessor company) & D. J. Hood and Associates Ltd., 2010[a]. Standard Wetland Delineation – Chartersville Marsh Wetland Delineation Project, Dieppe, Westmorland County, New Brunswick. Report to the City of Dieppe dated October 31, 2010.

Acadia Consultants and Inspectors Limited (an **exp** predecessor company) & D. J. Hood and Associates Ltd., 2010[b]. Standard Wetland Delineation – Chartersville Marsh-West, Dieppe, Westmorland County, New Brunswick. Report to the City of Dieppe dated October 31, 2010

R. V. Anderson Associates Limited, 2012. Preliminary Design Report – Acadie Avenue Upgrading Final Report (Revised). Report to the City of Dieppe dated May 24, 2013. RVA File No. 122577.



DRAWING NOT TO SCALE

SOURCE: R.V. ANDERSON ASSOCIATES LIMITED, 2012

No	Revision	Dsn By	Date

exp Services Inc.

ACADIE / AMIRAULT STREET RECONSTRUCTION – PROJECT BRIEFING

OVERALL PROJECT LIMITS AND KEY FEATURES

MON-00213818-A0

FIGURE 1

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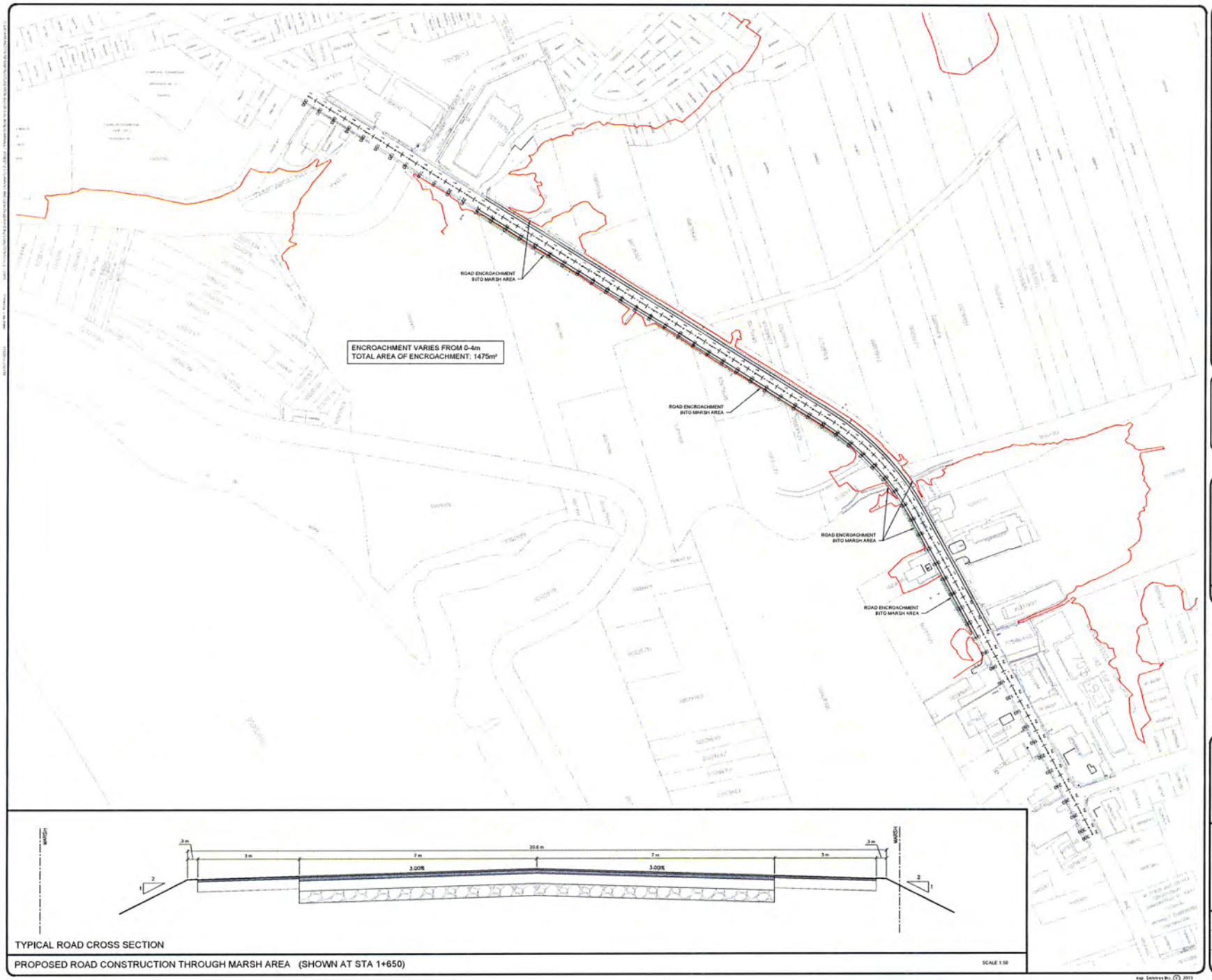
Project Title: ACADIE / AMIRAULT STREET RECONSTRUCTION – PROJECT BRIEFING	Dwg. Title: CHARTERSVILLE MARSH WETLAND BOUNDARY

Drawn By: BLA	Project No: MON-00213818-A0	
Dwg. Standards Ckd. By:	Dwg. No. FIGURE 2	
Designed By:	Dwg. Design Ckd. By:	Rev. No.

ATTACHMENT A

Preliminary Design Details
(**exp** Drawing 2-1)



TYPICAL ROAD CROSS SECTION

PROPOSED ROAD CONSTRUCTION THROUGH MARSH AREA (SHOWN AT STA 1+650)

SCALE 1:50

No.	Issue	Date

LEGEND

MARSH DELINEATION

AREA OF ENCROACHMENT

No.	Revision	Ckd. By	Date

PRELIMINARY

Orient. North

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Dwg. Standards Ckd. By:

Designed By: MEHT

Date Printed

Dwg. Design Ckd. By:

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Project Title

ACADIE AVENUE & AMIRAULT STREET RECONSTRUCTION
CITY OF DIEPPE, NB

Dwg. Title

AREA OF WORK

Project No. MON-00213818-A0

Dwg. No. **2-1**

Rev. No. 0

Scale 1:2000
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ATTACHMENT B

Preliminary Project Design Drawings

ATTACHMENT C

Description of Physical and Natural Features of the Chartersville Marsh
(Report by D. Peck Botanical dated September, 2013)

Acadie Avenue/Amirault Street Reconstruction
City of Dieppe, New Brunswick

Description of Physical and Natural Features in the Work Area (Chartersville Marsh)

Presented to

exp Services Inc.
Moncton, NB

by

D. Peck Botanical
Island View, NB
September, 2013

INTRODUCTION

The City of Dieppe, in association with the New Brunswick Department of Transportation and Infrastructure (NBDTI) is proposing to reconstruct a 1.1 km section of the City's Acadie Avenue/Amirault Street where it passes through the Chartersville Marsh. A generalized location map of the City of Dieppe is presented in Figure 1. A map outlining the overall project limits and the key features of the area within the municipality where the road reconstruction is to take place is presented in Figure 2.

Exp Service Inc., hereafter referred to as exp, was recently retained by the City of Dieppe to provide engineering services related to this street reconstruction project. These services include the collection and collation of the data and materials required for an Environmental Impact Assessment (EIA) registration. In support of that requirement, Debby Peck, of D. Peck Botanical, was asked by exp to prepare a description of the existing environment within the project area, using a "desktop" approach. As such, no dedicated site visits were completed by D. Peck Botanical for this specific project.

This report describes the processes and results of the review and synthesis of existing information about the physical and natural features of the Chartersville Marsh with a focus on the portion of the wetland that borders where Acadie Avenue/Amirault Street will be reconstructed.

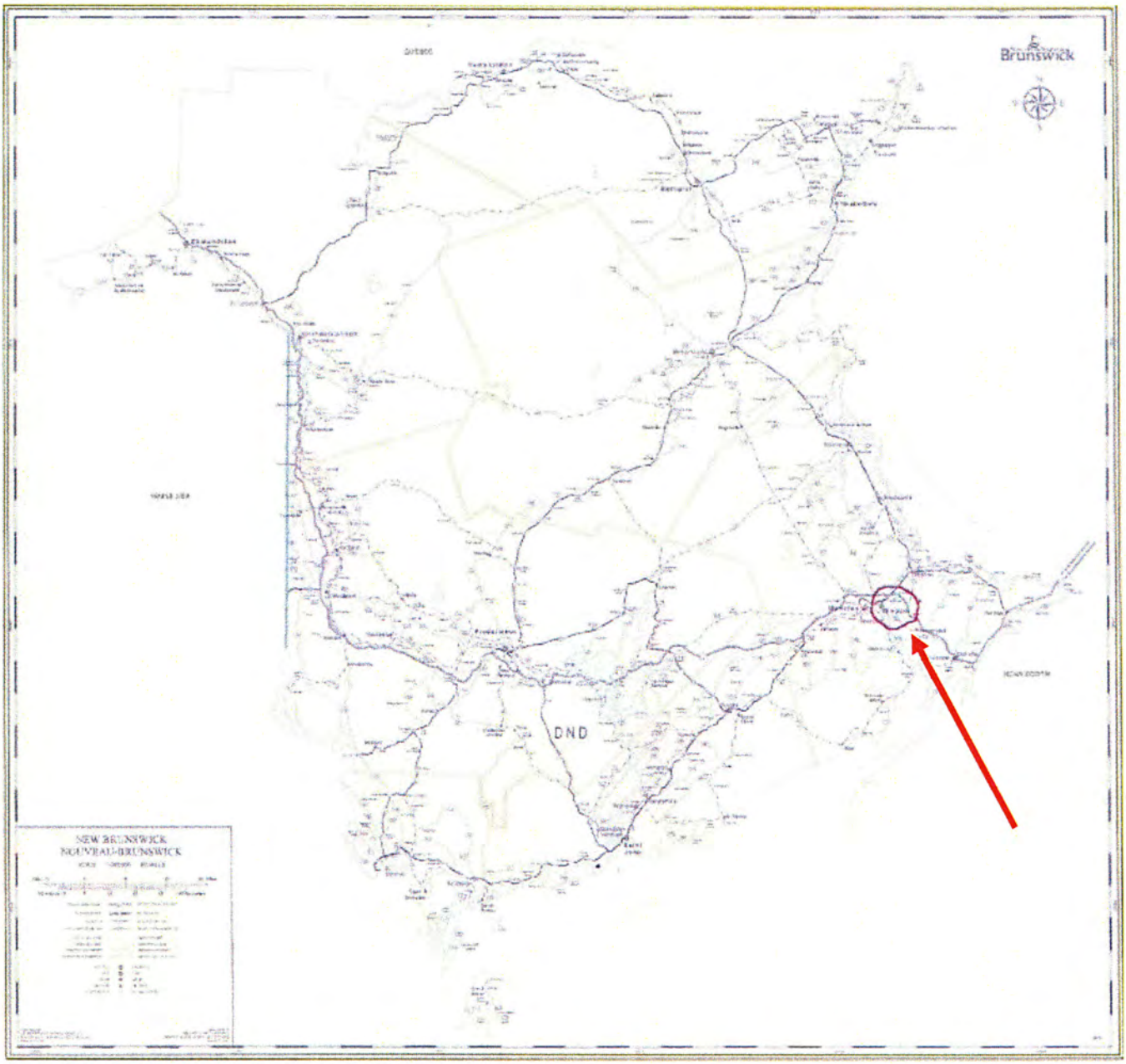


Figure 1 – Location of the City of Dieppe in New Brunswick.

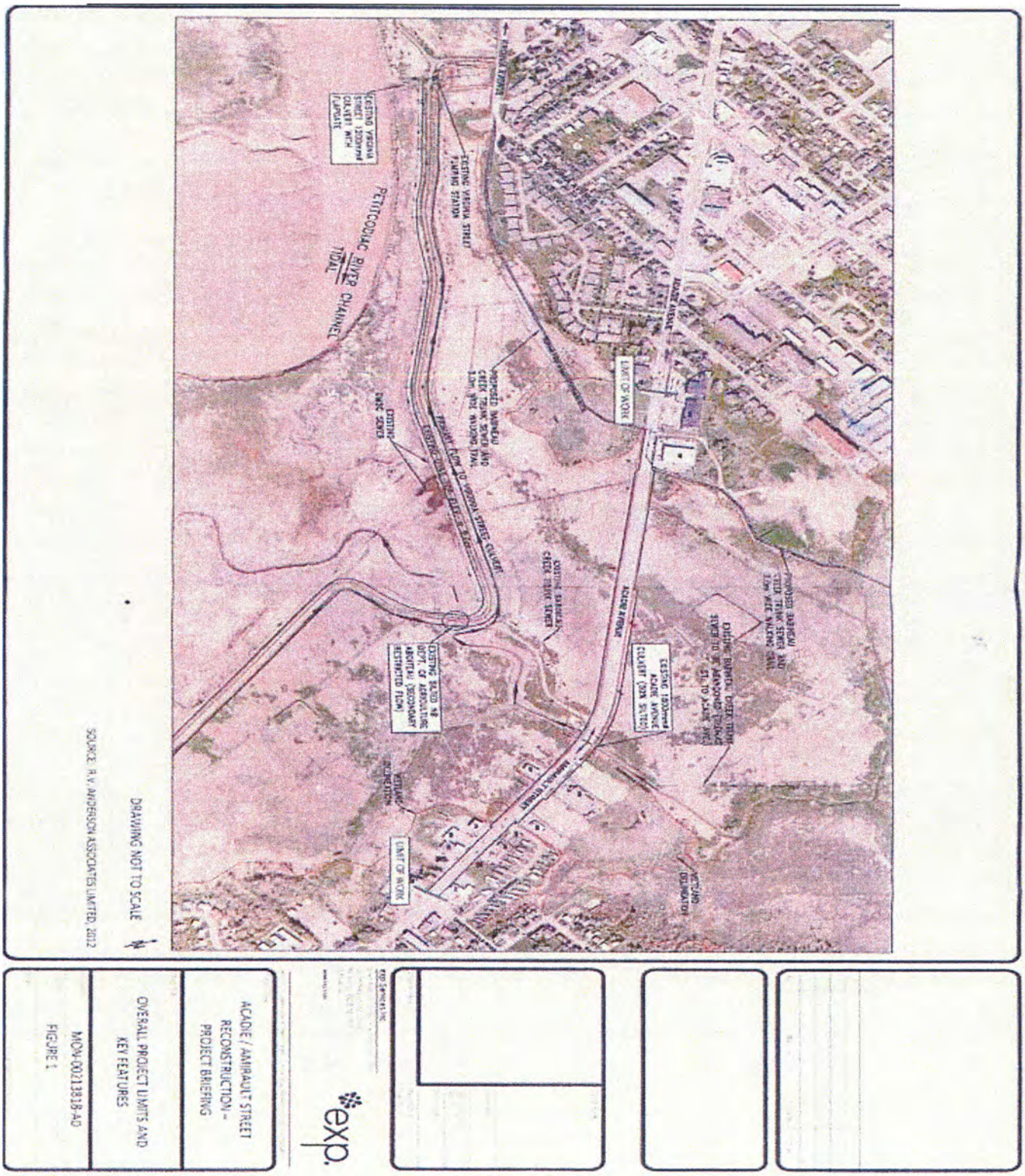


Figure 2 – Project limits and key features of the work area (figure provided by exp Services Ltd.)

METHODOLOGY

Background Preparation:

Before this desktop exercise was begun, the terms of reference for the Acadie Avenue/Amirault Street reconstruction project and the proposed scope of work required for the preparation of the project's EIA registration document were discussed with Mr. Robert Gallagher (P.Eng.) of exp, via e-mail and telephone conversations. Through these communications Mr. Gallagher provided pertinent background information in the form of maps, reports and construction drawings. He also shared summaries and/or minutes of project related meetings that have been held involving exp and both provincial and municipal government representatives. Mr. Gallagher clarified that the New Brunswick Department of Environment (NBDELG) would allow a desktop approach to be used (as opposed to there being a requirement for additional field work to be done) for completing the section of the project's EIA registration document in which data must be presented and interpreted to describe the existing environment in the Chartersville Marsh work area.

Document Review:

The following materials were acquired from exp for review by D. Peck Botanical because it was perceived that they contained information related to the physical and natural environment in the Chartersville Marsh and/or to regulatory requirements for the proposed reconstruction of Acadie Avenue/Amirault Street:

- *Standard Wetland Delineation – Chartersville Marsh Wetland Delineation Project, Dieppe, Westmorland County, NB.* D.J. Hood & Associates, 2010 (1)

- *Standard Wetland Delineation – Chartersville Marsh West, Trunk Sewer/Acadie Avenue Projects, Dieppe, Westmorland County, NB.* D. J. Hood & Associates, 2010 (2)

- *Data Report 5086: Acadie Avenue/Amirault St., Dieppe, NB (Prepared September 5, 2013)* Atlantic Canada Conservation Data Centre (ACCDC), Sackville, NB (3)

- *Exp Drawing # 2-1, Area of Work, Acadie Avenue & Amirault Street Reconstruction*

- *Exp Minutes of EIA Pre-consultation Meeting, NBDELG Main Office, Fredericton, NB, September 9, 2013*

- *Exp Project Briefing Letter to NBDELG, August 16, 2013*

- *Exp Site Photographs (taken in September, 2013)*

Additionally, because they were considered to contain information pertinent to the wetland environment in the Chartersville Marsh, the following materials were consulted by D. Peck Botanical:

- *GeoNB Map Viewer*) – to identify location of regulated wetland boundaries (4)

- *Wetland Delineation Letter Report (PID 00674929 – Thomas Street, Dieppe, NB* D. Peck Botanical, 2005.

- *Wetland Delineation Letter Report (PID 01004134) – Pascal Street, Dieppe, NB* D. Peck Botanical, 2005

- *Rare Vascular Plant Survey, Sewer Line Project, Chartersville Marsh, Dieppe, NB* D. Peck Botanical, 2011 (5)

Regulatory Changes in Wetland Boundary Mapping:

The Chatersville Marsh was delineated in 2009/2010 so, at that time, its wetland/upland boundary was defined "on the ground" through an examination of the site's soil, hydrology and vegetation. Because that delineated wetland/upland boundary location coincides directly with what is presented by Service New Brunswick (SNB) as the currently accepted (for regulatory purposes) wetland limits (see Appendix I), it is deemed appropriate by D. Peck Botanical to use data gathered in the wetland delineation process to describe the existing (i.e. in 2013) environment in the work area in the Acadie Avenue/Amirault Street reconstruction project. That said, it should be noted that depth to water table (dwt) mapping, obtained from the New

Brunswick Department of Natural Resources (NBDNR), was used to inform the 2009/2010 wetland delineation process. Said mapping indicated that wetland could be expected to be found well beyond where the 2009/2010 delineation process set the final wetland boundary in the Chartersville Marsh. The discrepancy at that time as well as at the present time can be explained by the infilling and other forms of impacts around the fringes of the Chartersville Marsh that have resulted in what was once wetland no longer having functional wetland features. So, for the purposes of this report, infilled areas at the wetland boundary will be described as part of the physical features of the Chartersville Marsh.

RESULTS

Physical Features of the Chartersville Marsh and the Project Work Area:

The Chartersville Marsh is approximately 62 ha in size. The terrain in the immediate vicinity is flat and has an average elevation of 6-7 m. Ground elevation changes correspond directly with development impacts from the construction of municipal infrastructure (streets, access roads, sewer lines etc.), the placement of recreational facilities and the building of residential, commercial and industrial structures, particularly at the Marsh perimeter.

Acadie Avenue/Amirault Street (also referred to as NB Route 106) passes through the Marsh for a linear distance of 1.1 km in an east to west direction. It is a four lane roadway that has experienced flooding events of varying severity over the years.

A dyke (top elevation = 9m) was constructed by Acadian farmers in the early 1700s between the Marsh and the Petticodiac River. It prevents tidal and salt water from influencing the Marsh environment. The top of the dyke has been used as a recreational trail in recent years. An access road runs through the Marsh to connect the dyke trail with Acadie Avenue/Amirault Street.

Babineau Creek and its tributaries flow through the Marsh. The main channel of the Creek currently passes through a 1.8 m culvert under Acadie Avenue/Amirault Street and then through an aboiteau structure in the dyke before draining into the Petticodiac River. Photos 1 and 2 illustrate the physical terrain features adjacent to Babineau Creek upstream and downstream of the culvert under Acadie Avenue/Amirault Street.

Various drainage channels exist in the surface of the Marsh, most of which are steep-sided. Some of these channels are relatively shallow due to having become partially filled in by sediment and vegetation. Others reach depths of 2 m and are usually water-filled.

Stormwater drainage discharges to the Marsh at several locations. A municipal sewer outlet exists on the right bank of Babineau Creek but it is to be decommissioned/abandoned when a new trunk sewer is built in the vicinity of the western Marsh boundary.

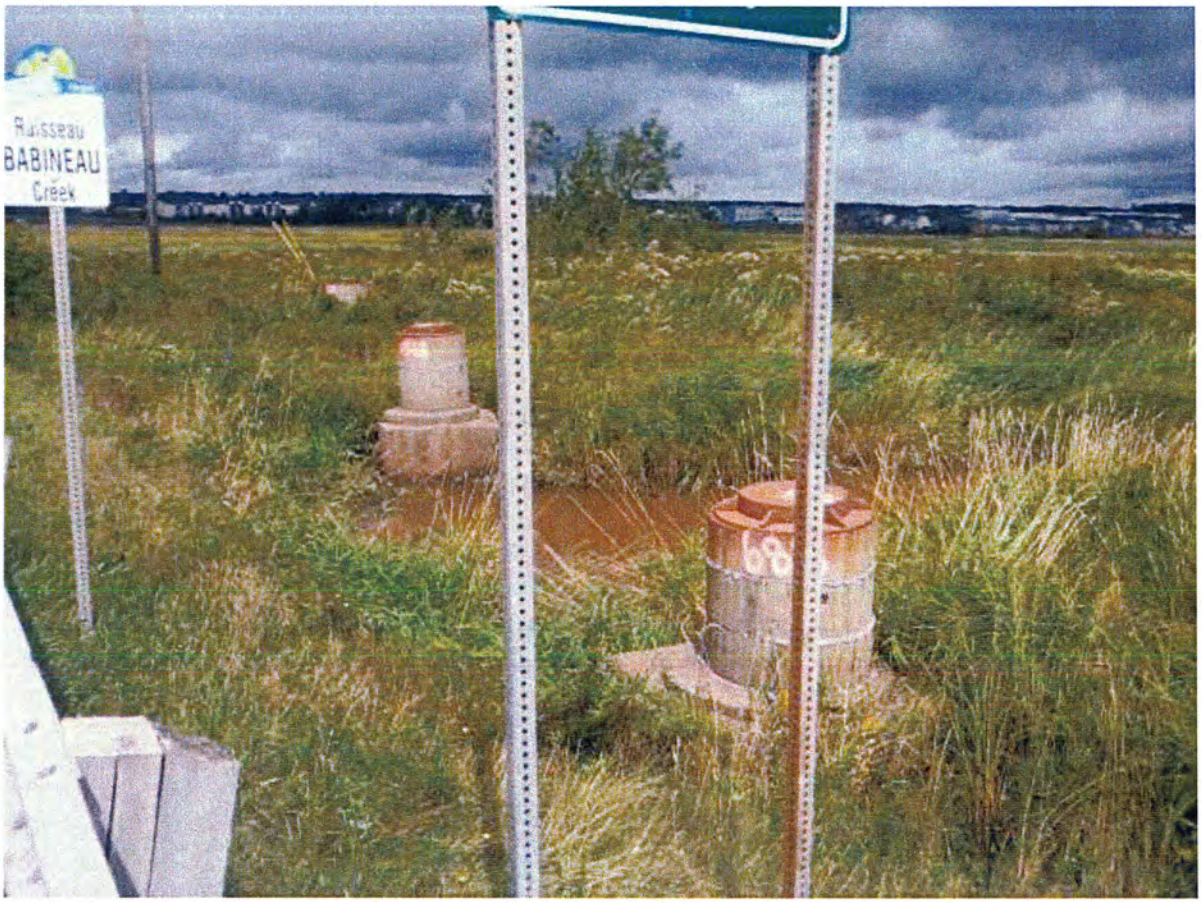


Photo 1 – Babineau Creek upstream of Acadie Avenue/Amirault Street, facing north (image provided by exp).

Photo 2 – Babineau Creek downstream of Acadie Avenue/Amirault Street, facing west (image provided by exp).

Natural Features of the Chartersville Marsh and the Project Work Area:

Vegetation

The vascular plant species found during the 2009/2010 delineation of the Chartersville Marsh associated with the section of the Marsh on the west side of Acadie Avenue/Amirault Street and on the east side of that roadway are listed in Appendix II. The vegetation in the Marsh study area is predominately hydrophytic (i.e. adapted to a wet environment) but there are also upland species growing where soil excavation, berm creation, infilling or other disturbances has presented advantageous conditions for the establishment of weedy species of herbaceous upland vascular plants or for upland species of shrubs and trees.

Forested areas, some wetland and some upland, exist at the outer edges of the Marsh, particularly along the northern and eastern sides of the wetland.

Rare Vascular Flora

There were no rare or endangered vascular plants found in the Marsh during field studies conducted in 2009, 2010 (1, 2) or 2011 (5). The ACCDC project specific database report (3) is summarized in Table 1. It notes that five species of rare vascular plants have been found at some point in the past close to the Marsh. However, none of these species has been identified within 1 km distance. Also, the preferred habitat for these species is not present in the Chartersville Marsh so it is not surprising that they were not observed there during field studies of the wetland.

Vegetative Assemblage

Generally speaking, the vegetative assemblage in the Chartersville Marsh is unremarkable. It is typical of the freshwater marsh/shrub/swamp wetland complexes in this part

of New Brunswick. As noted above, the species complement of the Marsh vegetation has been influenced greatly by historical and ongoing impacts of human or climactic origin.

Table 1 – Rare Vascular Plants Reported Within 5km of the Work Area for the Acadie Avenue/Amirault Street Reconstruction Project by the ACCDC

Species Botanic Name	Species Common Name	S Rank (3)	NB Rank (6)	Preferred Habitat (7)
Juncus vaseyi	Vasey's Rush	S2	Sensitive	Rock crevices along wet sandy shores and in dune hollows
Eragrostic pectinacea	Tufted Love Grass	S2/3	Secure	Sandy shores
Carex tenera	Tender Sedge	S3	Secure	Moist open ground and woodlands
Rumex maritimus	Seaside Dock	S3	Secure	Salt marshes and coastal shores
Suaeda calceoliformis	Horned Sea-blite	S3	Secure	Salt marshes

Soil

The soils within the study area are part of the province's Acadia series which is characterized as having low permeability, poor to very poor drainage, deep, reddish brown to brown color, medium acid to neutral pH and a coarse to fine-silty texture. They are considered to be low in natural fertility (1).

Hydrology Indicators

The primary hydrological indicators in the Marsh include water channels, water stained leaves, oxidized rhizospheres on living plant roots, the presence of reduced iron in the soil, wet depressions, surface water, saturated soil and sediment deposits (1, 5).

Wetland Function

The Chartersville Marsh is a Provincially Significant Wetland. It is a complex of wetland types including freshwater grass-sedge marsh, shrub wetland and forested swamp. The Marsh's vegetation community and its hydrology has been severely altered by culverts, dams, ditching, diversion of surface flow, runoff changes and infilling over many decades. Additionally, toxic substance, nutrients and sediment are continually added to the wetland due to the surrounding land use. However, there is no evidence of excessive nutrient or toxin loading to the wetland which is proof of its functional efficiency at bioremediation and attenuation of surface runoff pollutants despite the ever diminishing extent of the Marsh (5).

The Marsh receives overland flow of storm water, however due to the significant vegetative density the related water energy is dissipated and suspended solids settle within the wetland complex to various degrees at various locations, particularly on the east side of Acadie Avenue/Amirault Street. In this way, the Marsh provides a buffer zone for flooding especially during years of rapid spring thaw or during periods of intense rain. Indeed, during high rain and flood events the wetland, which is often dry, can be full of water. Babineau Creek and its tributaries distribute storm water flow from the Marsh to the Petticodiac River in a naturally controlled way to the extent allowed by the size of the culvert under Acadie Avenue/Amirault Street and to the functioning of the aboiteau under the dyke. This gives a degree of erosion protection to the River's shoreline (5).

In addition, the Marsh provides habitat to many water fowl and mammals. Various bird species have been observed and deer and moose are known to frequent the area. Since the

wetland is located in an urban setting, the habitat it provides is considered scarce to the region and is important for wildlife. The Marsh is contiguous with a waterbody that provides spawning/ nursery habitat for fish. The ratio of open water to vegetative cover in the areas assessed was < 1% (5).

Finally, the Chartersville Marsh is an important aesthetic feature of the area as it is visible from surrounding roads, houses and businesses. The walking trail along the dyke is heavily used by local residents (5).

SUMMARY

A desktop review of available information about the Chartersville Marsh can be summarized through the following points:

- The Chartersville Marsh is a Provincially Significant Wetland located within the municipal limits of the City of Dieppe, New Brunswick. It is complex of wetland types (freshwater grass-sedge marsh, shrub wetland and forested swamp) totalling approximately 62 hectares.
- Babineau Creek and its tributaries drain the Marsh into the Petticodiac River.
- Through time, the Marsh has been impacted by dyke construction and many other land use practices.
- The Marsh vegetation is typical of similar wetland complexes in the Petticodiac River watershed.
- The Marsh soils are part of the Acadia soil series which are characterized by poor drainage and low fertility.
- The Marsh maintains a significant functionality with respect to sediment and erosion control, nutrient retention, storm water protection, habitat provision and aesthetic value.

REFERENCE LIST

1. Standard Wetland Delineation – Chartersville Marsh Wetland Delineation Project, Dieppe, Westmorland County, NB. D.J. Hood & Associates, 2010 (available from exp)

2. Standard Wetland Delineation – Chartersville Marsh West, Trunk Sewer/Acadie Avenue Projects, Dieppe, Westmorland County, NB. D. J. Hood & Associates, 2010 (available from exp)

3. Data Report 5086: Acadie Avenue/Amirault St., Dieppe, NB (Prepared September 5, 2013) Atlantic Canada Conservation Data Centre (ACCDC), Sackville, NB

4. Service New Brunswick Wetland Mapping (available at http://geonb.snb.ca)

5. Rare Vascular Plant Survey, Sewer Line Project, Chartersville Marsh, Dieppe, NB, D. Peck Botanical, 2011 (prepared for the City of Dieppe in association with GEMTEC Ltd.)

6. New Brunswick Department of Natural Resources General Status of Wildlife in New Brunswick: Provisional Report: Vascular Plants, April 15, 2008

7. Hinds, H. 2000. Flora of New Brunswick, 2nd Ed. University of New Brunswick (Department of Biology).

Appendix I

SNB Wetland Mapping for the Chartersville Marsh (4)

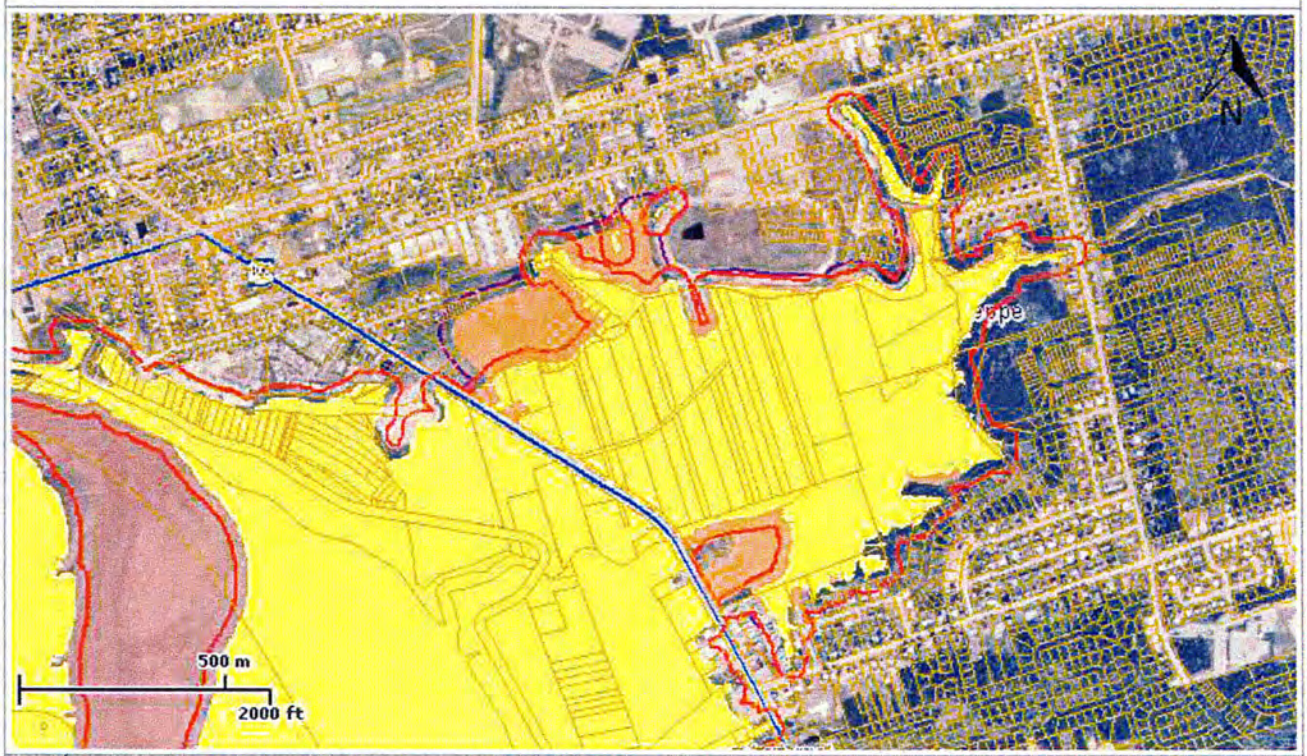
Yellow Highlighted Area = Provincially Significant Wetland

Brown Highlighted Area = Regulated Wetland

http://www.snb.ca/geonb

Chartersville Marsh

Description:Acadia Avenue/Arrirault Street Reconstruction



Scale/Échelle:1:8000 Date:09/19/13 Printed by/Imprimé par:Debby Peck

Appendix II

Vascular Plants Found in the Chartersville Marsh (1, 2)

Species of Vascular Plants Observed During Delineation of Chartersville Marsh-West Wetland

Botanical Name		Common Name	Wetland Indicator
Abies balsamea		Balsam Fir	FAC
Acer negundo		Manitoba Maple	FAC+
Acer rubrum		Red Maple	FAC
Achillea millefolium		Yarrow	FACU
Agrostis capillaris		Fine Bent-grass	UPL
Alnus incana	ssp. *rugosa*	Speckled Alder	FACW+
Ambrosia artemisiifolia	var. *elatior*	Common Ragweed	FACU
Amelanchier sp.		Serviceberry	FAC?
Aster acuminatus		Whorled Wood Aster	UPL
Aster lateriflorus		Calico Aster	FACW-
Aster novi-belgii	var. *novi-belgii*	New York Aster	FACW+
Aster umbellatus		Flat-topped White Aster	FACW
Betula papyrifera		White Birch	FACU
Betula populifolia		Grey Birch	FAC
Calamagrostis canadensis		Blue-stem	FACW+
Calystegia sepium	ssp. *americana*	Hedge Bindweed	FAC-
Cirsium arvense		Canada Thistle	FACU
Clematis virginiana		Virgin's Bower	FAC
Equisetum arvense		Common Field Horsetail	FAC
Eupatorium maculatum		Joe-pye-weed	FACW
Euthamia graminifolia		Grass-leaved Goldenrod	FAC
Festuca trachyphylla		Hard Fescue	UPL
Fragaria virginiana		Wild Strawberry	FACU
Frangula alnus		Glossy Buckthorn	FAC
Glyceria striata	var. *striata*	Fowl Manna-grass	OBL
Hieracium sp.		Hawkweed	UPL
Hordeum jubatum		Squirrel-Tail Grass	FAC
Juncus effusus		Soft Rush	FACW+
Larix laricina		Tamarack	FACW
Linaria vulgaris		Butter-and-eggs	UPL
Lythrum salicaria		Purple Loosestrife	FACW+
Malus sp.		Apple	-
Melilotus officinalis		White & Yellow Sweet Clover	FACU-
Oenothera parviflora		Northern Evening-Primrose	FACU-
Onoclea sensibilis		Sensitive Fern	FACW
Persicaria sagittata		Arrow-leaved Tearthumb	OBL
Phalaris arundinacea		Reed Canary-grass	FACW+
Phleum pratense		Common Timothy	FACU
Photinia floribunda		Purple Chokeberry	FACW
Picea rubens		Red Spruce	FACU
Pinus strobus		White Pine	FACU
Plantago major		Common Plantain	FACU
Poa pratensis		Kentucky Bluegrass	FACU

Botanical Name		Common Name	Wetland Indicator
Populus tremuloides		Trembling Aspen	UPL
Potentilla simplex		Common Cinquefoil	FACU-
Prunus pensylvanica		Pin Cherry	FACU-
Prunus virginiana		Choke-cherry	FACU
Ranunculus acris		Common Buttercup	FAC+
Rosa sp.		Rose	-
Rubus alleghaniensis		Blackberry	FACU-
Rubus idaeus	var. *strigosus*	Red Raspberry	FAC-
Salix discolor		Pussy Willow	FACW
Salix eriocephala		Red-tipped Willow	FACW
Scirpus cyperinus		Common Wool-Grass	FACW+
Solidago canadensis	var. *canadensis*	Canada Goldenrod	FACU
Solidago rugosa		Rough-stemmed Goldenrod	FAC
Solidago sempervirens		Seaside Goldenrod	FACW
Sonchus arvensis		Field Sow-Thistle	UPL
Spartina pectinata		Fresh-Water Cord Grass	OBL
Spiraea alba	var. *latifolia*	Meadowsweet	FACW+
Tanacetum vulgare		Common Tansy	UPL
Taraxacum officinale		Common Dandelion	FACU-
Thalictrum pubescens		Tall Meadow-rue	FACW+
Trifolium arvense		Rabbit-foot Clover	UPL
Trifolium pratense		Red Clover	FACU-
Trifolium repens		White Clover	FACU-
Typha latifola		Common Cattail	OBL
Vicia cracca		Cow Vetch	UPL

Species of Vascular Plants Observed During Delineation of Chartersville Marsh Wetlanc

Botanical Name		Common Name	Wetland Indicator
Acer negundo		Manitoba Maple	FAC+
Acer rubrum		Red Maple	FAC
Achillea ptarmica		Sneezeweed	NI
Agrostis capillaris		Fine Bent-grass	NI
Agrostis gigantea		Redtop	NI
Alisma triviale		Water Plantain	OBL
Alnus incana	ssp. *rugosa*	Speckled Alder	FACW+
Alopecurus pratensis		Meadow Foxtail	FACW
Ambrosia artemisiifolia	var. *elatior*	Common Ragweed	FACU
Amelanchier x neglecta		Serviceberry	NI
Apocynum androsaemifolium	var. *incanum*	Spreading Dogbane	NI
Arisaema triphyllum	ssp. *stewardsonii*	Jack-in-the-pulpit	FACW-
Aster acuminatus		Whorled Wood Aster	NI
Aster lanceolatus		Simple Aster	FACW
Aster lateriflorus		Calico Aster	FACW-
Aster macrophyllus		Large-Leaved Aster	NI
Aster novi-belgii	var. *novi-belgii*	New York Aster	FACW+
Aster puniceus		Purple-stemmed Aster	OBL
Aster radula	var. *strictus*	Rough-leaved Aster	OBL
Aster umbellatus		Flat-topped White Aster	FACW
Betula papyrifera		White Birch	FACU
Betula populifolia		Grey Birch	FAC
Bromus inermis		Smooth Brome-grass	NI
Calamagrostis canadensis		Blue-stem	FACW+
Calystegia sepium	ssp. *americana*	Hedge Bindweed	FAC-
Carex arctata		Compressed Sedge	NI
Carex echinata		Bur Sedge	OBL
Carex gracillima		Filiform Sedge	FACU
Carex gynandra		Gynandrous Sedge	NI
Carex intumescens		Bladder Sedge	FACW+
Carex lacustris		Lake Sedge	OBL
Carex pallescens	var. *neogaea*	Pale Sedge	NI
Carex scoparia		Broom Sedge	FACW
Carex stricta		Tussock Sedge	OBL
Carex viridula	subsp *viridula*	Greenish Sedge	OBL
Carex vulpinoidea		Fox Sedge	OBL
Cirsium arvense		Canada Thistle	FACU
Clematis virginiana		Virgin's Bower	FAC
Comptonia peregrina		Sweet Fern	NI
Cornus rugosa		Round-leaved Dogwood	NI
Crataegus sp.		Hawthorns	-
Dactylis glomerata		Orchard-grass	FACU
Dryopteris carthusiana		Spinulose Wood Fern	FAC+
Dryopteris cristata		Crested Wood Fern	FACW+
Dryopteris intermedia		Glandular Wood Fern	FACU
Dryopteris x boottii		Boott's Wood Fern	FACW

Botanical Name		Common Name	Wetland Indicator
Eleocharis palustris		Small's Spike-rush	OBL
Elytrigia repens		Couch-grass	FACU-
Epilobium ciliatum	subsp. *ciliatum*	Glandular Willow-herb	FAC-
Epilobium leptophyllum		Narrow-leaved Willow-herb	OBL
Equisetum arvense		Common Field Horsetail	FAC
Equisetum sylvaticum		Wood Horsetail	FACW
Erysimum cheiranthoides		Wormseed Mustard	FAC
Eupatorium maculatum		Joe-pye-weed	FACW
Euthamia graminifolia		Grass-leaved Goldenrod	FAC
Fallopia japonica		Japanese Knotweed	FACU-
Festuca trachyphylla		Hard Fescue	NI
Fragaria virginiana		Wild Strawberry	FACU
Frangula alnus		Glossy Buckthorn	FAC
Galium mollugo		Wild Madder	NI
Galium trifidum	ssp. *trifidum*	Dyer's Cleavers	FACW+
Geum laciniatum		Avens	FAC+
Glyceria grandis		Reed Meadow Grass	NI
Glyceria striata	var. *striata*	Fowl Manna-grass	OBL
Hieracium pilosella		Mouse-ear Hawkweed	NI
Hierochloe odorata		Sweet Grass	FACW
Hordeum jubatum		Squirrel-Tail Grass	FAC
Ilex verticillata		Winterberry Holly	FACW+
Impatiens capensis		Spotted Touch-me-not	FACW
Iris versicolor		Blue Flag	OBL
Juncus arcticus	var. *balticus*	Baltic Rush	FACW+
Juncus brevicaudatus		Short-caudate Rush	OBL
Juncus effusus		Soft Rush	FACW+
Kalmia angustifolia		Sheep-Laurel	FAC
Larix laricina		Tamarack	FACW
Lemna minor		Duckweed	OBL
Linaria vulgaris		Butter-and-eggs	NI
Lonicera tatarica		Tartarian Honeysuckle	FACU
Lysimachia terrestris		Swamp candles	OBL
Lythrum salicaria		Purple Loosestrife	FACW+
Melilotus officinalis		White & Yellow Sweet Clover	FACU-
Oenothera parviflora		Northern Evening-Primrose	FACU-
Osmunda cinnamomea		Cinnamon Fern	FACW
Osmunda claytoniana		Interrupted Fern	FAC
Parthenocissus vitacea		Virginia Creeper	FACU
Persicaria sagittata		Arrow-leaved Tearthumb	OBL
Phalaris arundinacea		Reed Canary-grass	FACW+
Phleum pratense		Common Timothy	FACU
Photinia floribunda		Purple Chokeberry	FACW
Picea rubens		Red Spruce	FACU
Plantago major		Common Plantain	FACU
Poa palustris		Fowl Meadow-grass	FACW
Poa pratensis		Kentucky Bluegrass	FACU
Populus tremuloides		Trembling Aspen	NI

Botanical Name		Common Name	Wetland Indicator
Potamogeton spirillus		Dimorpous Pondweed	OBL
Potentilla simplex		Common Cinquefoil	FACU-
Prenanthes trifoliolata		Gall-of-the-Earth	NI
Prunus pensylvanica		Pin Cherry	FACU-
Prunus virginiana		Choke-cherry	FACU
Pteridium aquilinum		Bracken Fern	FACU
Quercus rubra		Red Oak	FACU-
Ranunculus acris		Common Buttercup	FAC+
Ribes lacustre		Bristly Black Currant	FACW
Ribes triste		Wild Red Currant	OBL
Rosa carolina		Rose	UPL
Rosa rugosa		Rose	FACU-
Rosa sp.		Rose	-
Rubus alleghaniensis		Blackberry	FACU-
Rubus hispidus		Hispid Blackberry	FACW
Rubus idaeus	var. *strigosus*	Red Raspberry	FAC-
Rubus pubescens		Dwarf Raspberry	FACW
Rubus vermontanus		Bristly Blackberry	FACW+
Sagittaria sp.			OBL
Salix discolor		Pussy Willow	FACW
Salix eriocephala		Red-tipped Willow	FACW
Salix humilis		Prairie Willow	FACU
Salix petiolaris		Slender Willow	OBL
Salix sericea		Silky Willow	OBL
Sambucus canadensis		Common Elderberry	FACW-
Schoenoplectus acutus		Great Bulrush	OBL
Scirpus cyperinus		Common Wool-Grass	FACW+
Scirpus microcarpus		Red-sheathed Bulrush	OBL
Solanum dulcamara		Deadly Nightshade	FAC-
Solidago canadensis	var. *canadensis*	Canada Goldenrod	FACU
Solidago rugosa		Rough-stemmed Goldenrod	FAC
Sonchus arvensis		Field Sow-Thistle	UPL
Sonchus sp.		Sow Thisle	-
Spartina pectinata		Fresh-Water Cord Grass	OBL
Spiraea alba	var. *latifolia*	Meadowsweet	FACW+
Tanacetum vulgare		Common Tansy	NI
Thalictrum pubescens		Tall Meadow-rue	FACW+
Thelypteris palustris	var. *pubescens*	Marsh Fern	NI
Trientalis borealis		Starflower	FAC
Trifolium arvense		Rabbit-foot Clover	NI
Trifolium pratense		Red Clover	FACU-
Trifolium repens		White Clover	FACU-
Typha latifola		Common Cattail	OBL
Ulmus americana		American Elm	FACW-
Vaccinium angustifolium		Lowbush Blueberry	FACU-
Viburnum nudum	var. *cassinoides*	Wild Raisin	FACW
Viburnum opulus	var. *americanum*	Highbush Cranberry	NI
Vicia cracca		Cow Vetch	NI

ATTACHMENT D

Results of ACCDC Database Search

Atlantic Canada Conservation Data Centre
Centre de données sur la conservation du Canada Atlantique

DATA REPORT 5086: Acadia Avenue/Amirault St, Dieppe, NB

Prepared 5 September, 2013
by M. Elliott, Data Manager

CONTENTS OF REPORT

1.0 PREFACE

The Atlantic Canada Conservation Data Centre (ACCDC) is part of a network of NatureServe data centres and heritage programs serving 50 states in the U.S.A, 10 provinces and 1 territory in Canada, plus several Central and South American countries. The NatureServe network is more than 30 years old and shares a common conservation data methodology. The ACCDC was founded in 1997, and maintains data for the jurisdictions of New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador. Although a non-governmental agency, the ACCDC is supported by 6 federal agencies, 4 provincial governments, as well as through outside grants and data processing fees. URL: www.ACCDC.com.

Upon request and for a fee, the ACCDC queries its database and produces customized reports of the rare and endangered flora and fauna known to occur in or near a specified study area. As a supplement to that data, the ACCDC includes locations of managed areas with some level of protection, and known sites of ecological interest or sensitivity.

1.1 DATA LISTS

Included datasets:

Filename	Contents
Filename_ob.dbf	Rare and Endangered Flora and Fauna in your study area
Filename_bb.dbf	Breeding Birds in your study area
Filename_sa.dbf	Biologically-Significant zones in your study area
Filename_ma.dbf	Managed Natural areas in your study area
Filename_xp.dbf	Expert Maps (predictive distribution) in your study area

1.2 RESTRICTIONS

The ACCDC makes a strong effort to verify the accuracy of all the data that it manages, but it shall not be held responsible for any inaccuracies in data that it provides. By accepting ACCDC data, recipients assent to the following limits of use:

a.) Data is restricted to use by trained personnel who are sensitive to landowner interests and to potential threats to rare and/or endangered flora and fauna posed by the information provided.
b.) Data is restricted to use by the specified Data User; any third party requiring data must make its own data request.
c.) The ACCDC requires Data Users to cease using and delete data 12 months after receipt, and to make a new request for updated data if necessary at that time.
d.) ACCDC data responses are restricted to the data in our Data System at the time of the data request.
e.) Locations given for rare species records may be deliberately imprecise. Each record has an estimate of locational uncertainty, which must be referenced in order to understand the record's relevance to a particular location. Please see attached Data Dictionary for details.
f.) ACCDC data responses are not to be construed as exhaustive inventories of taxa in an area.
g.) The absence of a taxon cannot be inferred by its absence in an ACCDC data response.

1.3 CONTACT INFORMATION

Please direct questions about ACCDC data to the following individuals:

Plants, Lichens, Ranking Methods
Sean Blaney
Tel: (506) 364-2658
sblaney@mta.ca

Animals (Fauna)
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All other Inquiries
R.A. Lautenschlager
Tel: (506) 364-2665
rlautenschlager@mta.ca

Questions on Federal Species at Risk can be directed to ACCDC: (506) 364-2657, and technical data queries to: Samara Eaton, Canadian Wildlife Service (NB and PE): (506) 364-5060 or Julie McKnight, Canadian Wildlife Service (NS): (902) 426-4196.

For provincial information about rare taxa and protected areas, or information about game animals, deer yards, old growth forests, archeological sites, fish habitat etc., in New Brunswick, please contact Stewart Lusk, Natural Resources: (506) 453-7110.

2.0 RARE AND ENDANGERED TAXA

A 5km buffer around the study area contains 104 records of 36 taxa from 13 sources, a relatively high density of records (quintile 5): 1.32 rec/km2.

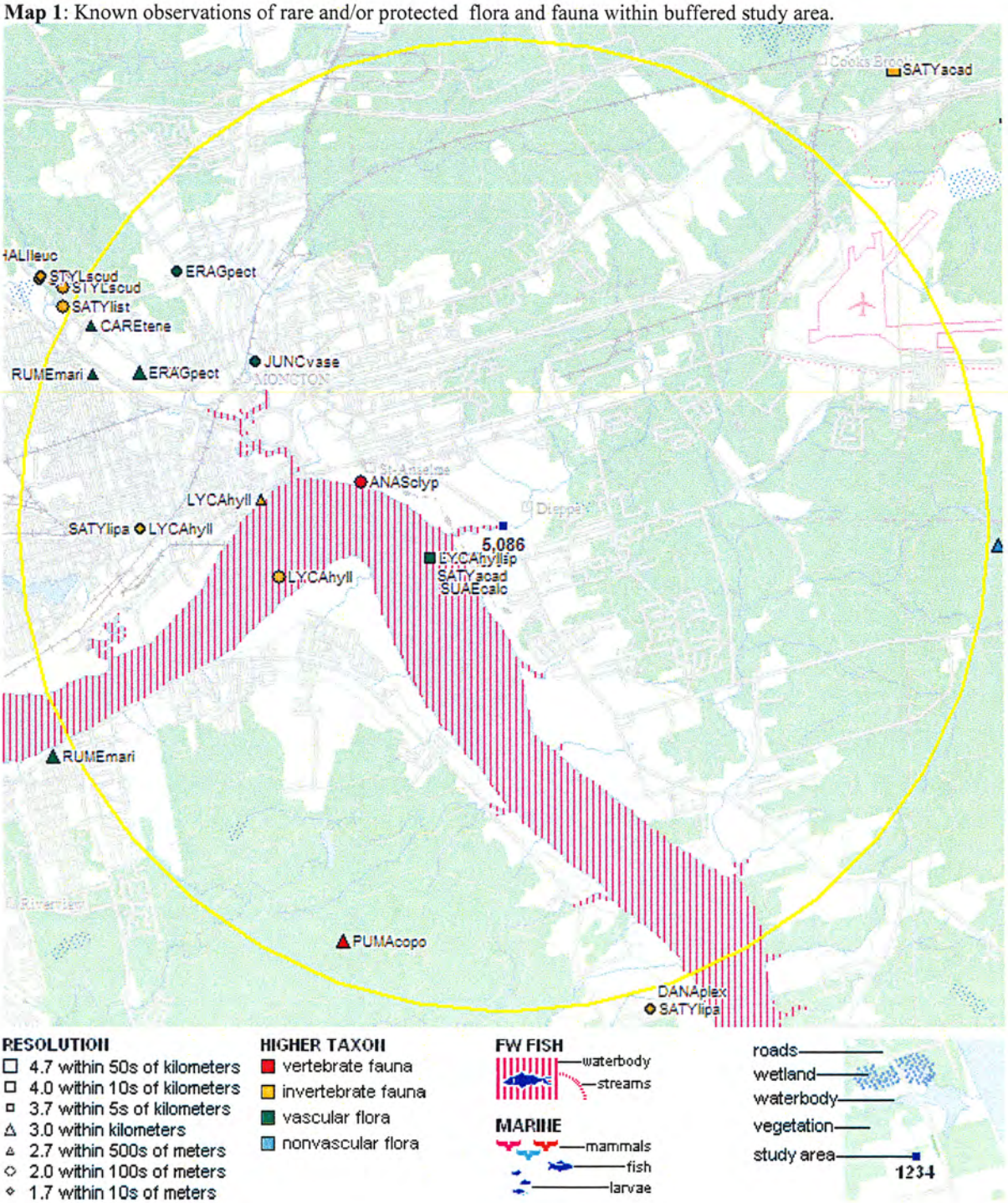
2.1 FLORA

A 5km buffer around the study area contains 8 records of 5 vascular, 0 records of nonvascular flora (see attached *ob.dbf).

2.2 FAUNA

A 5km buffer around the study area contains 81 records of 28 vertebrate, 15 records of 3 invertebrate fauna (cf attached *ob.dbf). Sensitive data: Wood Turtles are PRESENT in the study area (cf attached WOTU.rtf). Peregrine Falcons are POTENTIALLY present in the study area (cf attached PEFA.rtf).

Map 1: Known observations of rare and/or protected flora and fauna within buffered study area.

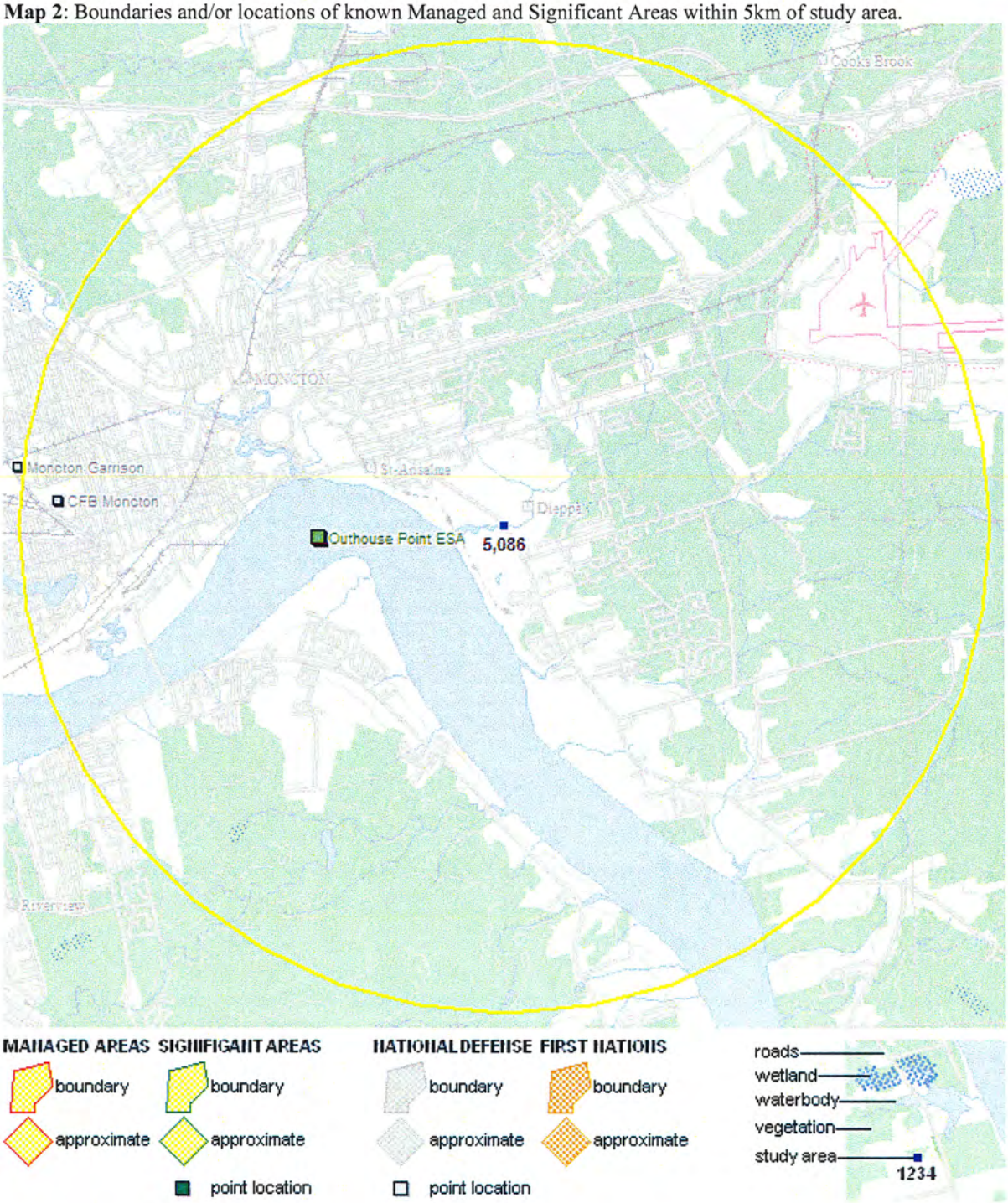


3.0 SPECIAL AREAS

3.1 MANAGED AREAS
No Managed Areas identified.

3.2 SIGNIFICANT AREAS
The GIS scan identified 1 biologically significant site in the vicinity of the study area; such sites are known for exceptional biotic richness but may or may not have legal status (see attached *sa.dbf).

Map 2: Boundaries and/or locations of known Managed and Significant Areas within 5km of study area.



4.0 TAXON LISTS

Rare and/or endangered taxa within the buffered area listed in order of concern, beginning with legally listed taxa, with the number of observations per taxon and the distance in kilometers from study area centroid to the closest observation. [p] = vascular plant, [n] = nonvascular plant, [a] = vertebrate animal, [i] = invertebrate animal, [c] = community.

4.1 FLORA

	scientific name	common name	prov. rarity	prov. status	COSEWIC	obs	dist.km
p	Juncus vaseyi	Vasey Rush	S2			1	3 ±0
p	Eragrostis pectinacea	Tufted Love Grass	S2?			3	4 ±1
p	Carex tenera	Tender Sedge	S3			1	5 ±0.5
p	Rumex maritimus	Sea-Side Dock	S3			1	5 ±0.5
p	Suaeda calceoliformis	Horned Sea-blite	S3S4			2	1 ±5

4.2 FAUNA

	scientific name	common name	prov. rarity	prov. status	COSEWIC	obs	dist.km
a	Salmo salar pop. 1	Atlantic Salmon - Inner Bay of Fundy pop.	S2		E	1	33 ±0
a	Caprimulgus vociferus	Whip-Poor-Will	S2B		T	2	1 ±5
a	Hirundo rustica	Barn Swallow	S3B		T	1	1 ±5
a	Chordeiles minor	Common Nighthawk	S3B		T	4	1 ±5
a	Dolichonyx oryzivorus	Bobolink	S3S4B		T	2	1 ±5
a	Wilsonia canadensis	Canada Warbler	S3S4B		T	2	1 ±5
a	Contopus virens	Eastern Wood-Pewee	S4B		SC	5	1 ±5
a	Puma concolor pop. 1	Cougar - Eastern pop.	SU,SH	Endangered	DD	1	5 ±1
a	Troglodytes aedon	House Wren	S1B			1	1 ±5
a	Progne subis	Purple Martin	S1S2B			4	1 ±5
a	Empidonax traillii	Willow Flycatcher	S1S2B			2	1 ±5
a	Eptesicus fuscus	Big Brown Bat	S2?			1	4 ±1
a	Pooecetes gramineus	Vesper Sparrow	S2B			3	1 ±5
a	Eremophila alpestris	Horned Lark	S2B			2	1 ±5
a	Anas strepera	Gadwall	S2B			2	1 ±5
a	Anas clypeata	Northern Shoveler	S2B			7	1 ±5
a	Asio otus	Long-eared Owl	S2S3			1	1 ±5
a	Pinicola enucleator	Pine Grosbeak	S2S3B,S4S5N			1	1 ±5
a	Loxia curvirostra	Red Crossbill	S3			2	1 ±5
i	Satyrium acadica	Acadian Hairstreak	S3			1	1 ±5
i	Lycaena hyllus	Bronze Copper	S3			13	1 ±5
a	Molothrus ater	Brown-headed Cowbird	S3B			1	1 ±5
a	Mimus polyglottos	Northern Mockingbird	S3B			11	1 ±5
a	Myiarchus crinitus	Great Crested Flycatcher	S3B			2	1 ±5
a	Charadrius vociferus	Killdeer	S3B			10	1 ±5
a	Anas americana	American Wigeon	S3B			4	1 ±5
a	Anas acuta	Northern Pintail	S3B			2	1 ±5
i	Satyrium liparops	Striped Hairstreak	S3S4			1	4 ±0
a	Petrochelidon pyrrhonota	Cliff Swallow	S3S4B			5	1 ±5
a	Tyrannus tyrannus	Eastern Kingbird	S3S4B			1	1 ±5
a	Coccothraustes vespertinus	Evening Grosbeak	S3S4B,S4S5N			2	1 ±5

4.3 RANGE MAPS

The legally protected taxa listed below are linked to the study area by predictive range maps based upon expert estimates of distribution. Taxa listed here but not in the observation data above, are unknown within the study area but perhaps present. A potential for occurrence value of 1 indicates possible occurrence, with 2 and 3 increasly less probable.

	scientific name	common name	prov. rarity	prov. status	COSEWIC	Potential
a	Glyptemys insculpta	Wood Turtle	S3	Vulnerable	T	1
p	Listera australis	Southern Twayblade	S2			1
p	Isoetes prototypus	Prototype Quillwort	S2	Vulnerable	SC	1
i	Danaus plexippus	Monarch	S2B		SC	1
a	Glaucomys volans	Southern Flying Squirrel	S2S3		NAR	1
a	Bucephala islandica	Barrow's Goldeneye (Eastern pop.)	S1N		SC	2
p	Juncus caesariensis	New Jersey Rush	S2	Vulnerable	SC	2
p	Lachnanthes caroliana	Redroot	S2	Threatened	SC	2
n	Erioderma pedicellatum	Boreal Felt Lichen (Atlantic pop.)	S1S2	Endangered	E	1
a	Charadrius melodus melodus	Piping Plover melodus ssp	S1B	Endangered	E	1
p	Hydrocotyle umbellata	Water-pennywort	S1	Endangered	T	2
p	Scirpus longii	Long's Bulrush	S2S3	Vulnerable	SC	2
p	Lilaeopsis chinensis	Eastern Lilaeopsis	S2	Vulnerable	SC	1
p	Eriocaulon parkeri	Parker's Pipewort			NAR	2
a	Sterna dougallii	Roseate Tern	S1B	Endangered	E	1

5.0 SOURCE BIBLIOGRAPHY

The recipient of this data shall acknowledge the ACCDC and the data sources listed below in any documents, reports, publications or presentations, in which this dataset makes a significant contribution.

recs	source
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ATTACHMENT E

Results of Water Quality Testing on Chartersville Marsh
Groundwater Samples