NIAGARA PENINSULA CONSERVATION AUTHORITY
FULL AUTHORITY

WELLAND **AGENDA** **JULY 18, 2012 – 7:00 P.M.**

ROLL CALL

DECLARATION OF CONFLICT OF INTEREST

BUSINESS:

(1) MINUTES FULL AUTHORITY MEETING – JUNE 20, 2012

Attached are the Minutes of the Full Authority Meeting held June 20, 2012.

(2) BUSINESS ARISING FROM MINUTES

(3) DELEGATIONS

Mr. Maurice Edwards who owns property in the Town of Pelham wishes to make a presentation to the Board with respect to drainage issues on his property.

(4) CHAIRMAN'S REMARKS

(5) CAO'S REMARKS

(6) BUDGET STATUS REPORT NO. 37-12

Attached is Report No. 37-12 regarding the budget status to June 30, 2012.

(7) JORDAN TRAIL STAIRWAY - TENDER – REPORT NO. 38-12

Attached is Report No. 38-12, regarding a recent tender for replacement of the stairway to the Jordan Trail.

(8) AWARD OF WORK – DIGITAL TERRAIN MODEL UPDATE – REPORT NO. 39-12

Attached is Report No. 39-12 regarding this matter.

(9) POS – BINBROOK RESERVOIR – REPORT NO. 40-12

Attached is update Report No. 40-12 regarding PFOS at the Binbrook Conservation Area.

(10) PROJECT STATUS REPORT – REPORT NO. 41-12

Attached is Report No. 41-12 regarding the Project Status Report.

(11) OTHER BUSINESS

(12) IN-CAMERA

(a) Tree By-law
(b) Violation Status
(c) Woodend Lease/Letter of Intent/Development Agreement – DSBN
(d) Land Sale – Cave Springs - Len Pennachetti

ADJOURNMENT

NIAGARA PENINSULA CONSERVATION AUTHORITY

TO: **The Chairman and Members of the Authority**

DATE: **July 12, 2012**

SUBJECT: **Budget Status Report - Report No. 37 -12**

Attached is the budget status report for the period ending June 30, 2012.

Expenditures and revenues in the operating budget are generally in line with the approved budget with the following notes.

Operating Budget:

Unanticipated costs for continuation of the Strategic Plan will be incurred in 2012 and will be identified in the budget year end projection report (September Board Meeting).

Land Management Programming Costs will be realized as we continue to move into the parks operating year.

Project (Capital) expenditures will be realized once projects are completed.

There are no significant variances to report at this time.

RECOMMENDATION:

That the Budget Status Report for the period ending June 30, 2012 be received.

Respectfully Submitted By: _____

Tony D'Amario, P. Eng. CAO/ Secretary-Treasurer

NIAGARA PENINSULA CONSERVATION AUTHORITY

TO: **The Chairman and Members of the Authority**

DATE: **July 11, 2012**

SUBJECT: **Jordan Staircase – Twenty Valley Trail – Report No. 38-12**

The 2012 Capital Budget includes a $25,000 project for the repair of a staircase linking the Twenty Valley Trail with the Village of Jordan. The existing staircase was constructed in 1998 as part of the Twenty Valley Tourism Project.

The staircase was built using rough-sawn, western red cedar. This material was selected because of its qualities as a durable outdoor construction material. Unfortunately the staircase is located in a damp, shaded area on the northern slope of the Twenty Valley. After several years the structure began to show signs of deterioration. The cedar was not lasting as expected and repairs were becoming more frequent. Conservation Authority staff replaced several railing components and decking with other woods such as white cedar and hemlock in an attempt to find a product that would last longer under these conditions.

Last year it became evident that major structural components were going to need replacement. Rot in these elements made repairs difficult, so a capital project was set-up for the partial reconstruction of the staircase.

In early 2012, staff inspected the structure and determined that rot had extended far beyond original estimates. The entire structure was in need of replacement. Weekly inspections were initiated and repairs were undertaken as necessary to ensure the structure was safe for public use.

Several park agencies along the Niagara Escarpment were consulted to find out how they were able to maintain access structures in damp, shaded locations. Most park agencies have moved to the use of galvanized steel for the construction of staircases and walkways. One of the earliest examples is in the Niagara Glen, where a steel staircase has been in use for close to 20 years, with little signs of wear. The City of Hamilton is using steel for their staircases, and the Town of Lincoln recently completed a large staircase at Optimist Park.

Using a detailed survey of the existing Jordan Staircase, Conservation Authority staff designed a staircase that follows the same route. The design allows many of the existing concrete supports to be used for the new staircase. The new structure was designed using standard, galvanized steel components, requiring low maintenance.

On June 11th, a public tender was advertised on the NPCA website, and through the Niagara Construction Association. Submissions were due on July 10th. From the onset, staff expected the cost to be far beyond the $25,000 budget estimate from July 2011. Conservative estimates of the project ranged between $120,000 and $150,000. Given the significance and popularity of the staircase, staff had planned to recommend to the Board that other projects be deferred to help fund the new structure.

On July 10th, the Authority received the following three submissions:

Stevensville Lawn Service	$278,997.00
Stucor	$356,420.08
Global Technologies and Manufacturing	$391,149.50

The prices far exceed staff estimates for the project. In follow-up discussions with the bidders, extra costs were added because of the difficult access to the site for materials and equipment.

Staff will reconsider the project and examine other options for the staircase. In the meantime, the existing staircase will be demolished. It is no longer feasible to repair components and public safety cannot be guaranteed.

Over the next two months, staff will consult with the local community and trail users to examine options and return with a report to the September Full Authority Meeting.

RECOMMENDATION:

That Report No. 38 -12 regarding the Jordan Staircase be received; and,

That staff be directed to investigate alternatives to provide access from Jordan Village to the Twenty Valley Trail.

Prepared by: Darcy B. Baker, Director-Land Management

Respectfully Submitted by: _____

Tony D'Amario, CAO/Secretary-Treasurer

NIAGARA PENINSULA CONSERVATION AUTHORITY

250 Thorold Road West, 3rd Floor, Welland, Ontario L3C 3W2
Telephone 905.788.3135 | Facsimile 905.788.1121 | www.npca.ca

TO: **The Chairman and Members of the Authority**

DATE: **July 18, 2012**

SUBJECT: **Award of Work – Digital Terrain Model Update - Report No. 39-12**

The purpose of this report is to seek Board approval to award the contract for work on the subject project.

In the spring of 2012 the NPCA applied to the Region of Niagara's WaterSmart Program for funding for a number of initiatives. Based on our application, the subject project received funding in the amount of $100,000. Briefly put, the project involves updating the 2002 digital terrain model (DTM) with updated orthimagery captured for the watershed wide in 2010. The mapping update will integrate changes that have occurred to the DTM as a result of significant changes in the landscape (i.e. new subdivisions, highway widening, etc.) that have occurred since 2002. A number of other line work and metadata refinements will be done at this time.

In June of 2012, NPCA issued Requests for Proposals from five firms with known expertise in photogrammetric mapping. Of the five firms solicited, only two firms submitted formal proposals. Of the two proposals received, only one work plan addressed the NPCA's core specifications.

The proposal that did address NPCA specifications contained an upset limit which is moderately higher than the staff original estimate for the work. Nonetheless, the original work plan also contemplated an additional external QA/QC check, which staffs believe is not needed given the work plan methodology laid out in the preferred proposal. As this is no longer needed, the project can be completed within the funding allocation approved by the Region.

NPCA staff has been advised by the staff from RMON's Integrated Community Services Department that they have a high need for the deliverables of this project which will be used as base data relating to a pending Ontario Municipal Board matter. As such, the project has an aggressive timeline and requires the Consultant complete the workplan by December 21, 2012. Staff believes this demanding schedule is a significant factor in the limited response to the call for proposals.

Attachments:

1. Request for Proposals

RECOMMENDATION:

That the proposal to complete the subject project submitted by First Base Solutions Limited be accepted with an upset limit of $ 100,000 (including taxes).

Prepared by: John Kukalis; Director, Water Management

Respectfully Submitted By: _____

Tony D'Amario, P. Eng.
Chief Administrative Officer/Secretary-Treasurer

NIAGARA PENINSULA CONSERVATION AUTHORITY

Request for Proposal (RFP)

2010 Update to 1 Meter Contour Supporting Digital Terrain Model for Niagara Watershed

CLOSING DATE: July 6th, 2012
CLOSING TIME: 2:00 p.m. (Local time)

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1.0 INTRODUCTION

The Niagara Peninsula Conservation Authority (NPCA) is issuing this Request for Proposal (RFP) to update the existing 1 meter contour supporting Digital Terrain Model (DTM) for the Niagara Watershed (Watershed) that corresponds to its jurisdiction. The update is intended to bring the existing DTM into currency with the NPCA's 2010 orthoimagery using the associated stereo models and geo-positioning information available for this source aerial photography. This document outlines the assignment, as well as the method for submitting a proposal, and the terms and conditions that will govern the assignment.

1.1 Background

The Niagara Peninsula Conservation Authority originally partnered in the 2002 Greater Toronto and Area Orthophotography and Digital Elevation Model (DEM) Project to acquire digital aerial imagery and elevation information capable of being '***used for pre-engineering survey and design, the production of municipal planimetric mapping and detailed topographic mapping at a minimum scale of 1:2000 with a contour interval of no less than one meter (1.0 m).***'

The elevation data delivered to meet these guidelines resulted in a DTM with minimum 0.5 meter horizontal and vertical accuracy It was photgrammetrically derived to meet the accuracy requirements of the former Flood Damage Reduction Program (FDRP) specifications for 1m contours. As a 1 meter contour supporting DTM, it means that 90% of all derivative 1 meter contours and elevations of points interpolated from its derivative surface and 1 meter contours are accurate to within one half the contour interval. This product has served the NPCA extremely well by enabling its capital floodplain mapping program, shoreline flood and erosion hazard mapping updates, riverine erosion hazard feature and associated valley land identification, development of a water budgeting spatial framework, and the compilation of a large scale surface water inventory (hydrologic mapping). Despite functioning as a critical information asset, this DTM information has been only partially maintained opportunistically through subsequent orthoimagery acquisition cycles occurring in the NPCA watershed.

The Region of Niagara (the Region) facilitated an update to the 2002 1 meter contour supporting DTM (limited to its municipal extent) in 2006 through a local Aerial Photography and Digital Orthoimagery Project. This effort focused on 'areas of significant change or where necessary to maintain the positional accuracy stipulated' by the same 0.5m accuracy specifications used in the original 2002 compilation, however not necessarily the 1 meter contour supporting requirement as the intent was simply to update the 2002 product for the 2006 orthorectification purposes. The Region used this update as an opportunity to capture and include the additional vector mapping of several supplementary features such as planimetric building footprints, utility lines, and storm sewer catch basins.

The City of Hamilton has also been maintaining the original 2002 DTM compilation through local orthoimagery acquisitions in 2007, and most recently in 2010. Each of these subsequent updates specifically ensured that the DTM vintages developed remain capable of its intended support requirements inherent in the original 2002 capture specifications. The City has also highlighted in scoping these efforts that the elevation products 'created from the terrain data, and the derivative planimetric mapping will be used to support floodplain mapping programs and related applications'. Hamilton even required that the delivered data products for these previous updates be officially stamped by a certified Photogrammetrist.

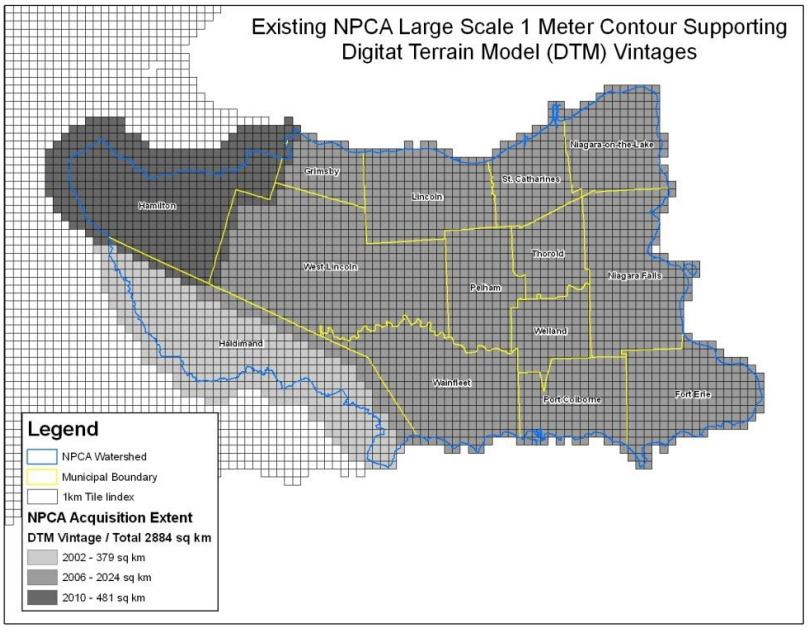

Figure 1: DTM vintages across the Niagara Watershed

The current status as a result of these subsequent updates to the original 2002 1 meter contour supporting DTM compilation for the Niagara Watershed are depicted in Figure 1. These efforts have resulted in a variety of temporal resolutions achieved through conceptually similar, yet separate change detection processes. While these maintenance efforts have generally kept the initial support requirements behind the original 2002 DTM as the most significant accuracy consideration behind their individual endeavors, technology has evolved and resulted in the use of different of capture methods (digital vs. film based photography), ground control datasets, and imagery resolutions (ground sample distance or GSD) undergirding the photography in the derivative stereo models used to facilitate the terrain updates.

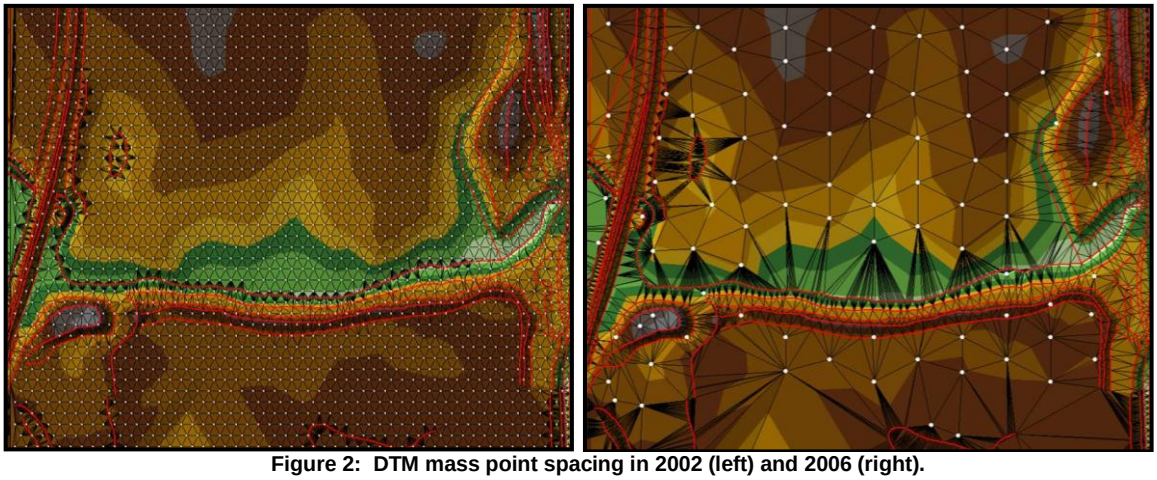

Figure 2: DTM mass point spacing in 2002 (left) and 2006 (right).

Review of the existing and most current DTM vintages reveals that while updates have been conducted, limited inconsistencies still persist throughout the aggregated product across the watershed. In some cases, areas of the original 2002 compilation have been updated when not necessary, and in other cases, areas of this compilation were missed or inappropriately

overlooked as requiring an update. There are also poorly collected localized areas in both the original and updated products. Breakline densities appear to change on a tile basis without correlation to terrain, and their feature typing deviates throughout the following updates. Mass point spacing also fluctuates on a project basis from the raw and irregularly spaced operator interpreted spots heights to denser, evenly distributed post spacing (Figure 2.) that add a smoothing effect to the intended surface. While all these observed issues haven't been a broader concern or an apparent limitation with respect to the DTM's overall ability to support 1 meter contours or meet its accuracy specifications, they remain localized inconsistencies that do qualify the product in the greater context.

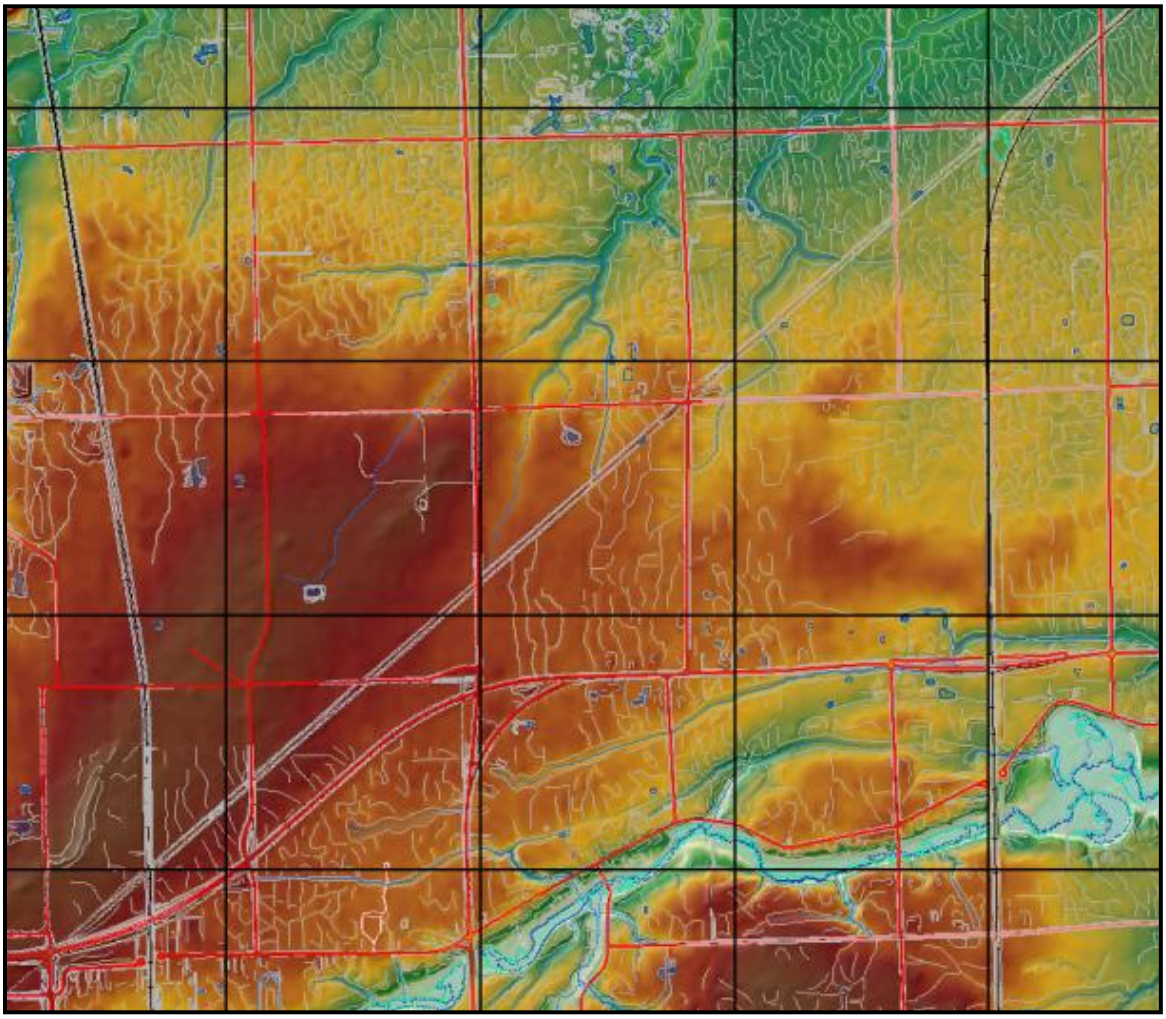

Figure 3: Example of abrupt changes in breakline density.

The scope of previous change detection efforts to the DTM have generally addressed typical temporal updates to the modeled bare ground surface related to ongoing development activities within the watershed. Edge features for roads are added and the elevation grades are adjusted in newly urbanized areas to reflect development in the model; however it is clear that there has been much less change detection focus in rural areas across the full spectrum of breakline types. As a result of this, hydrology features have been largely overlooked, and the breaks that define surface waters and their associated morphology are seldom updated even if they have come to exceed the minimum accuracies of typical large scale mapping specifications which are directly related to the source imagery and elevation acquisition guidelines for these types of

projects. This is a major concern when relying on the subsequent DTMs for water resource management applications, such as the development of derivatives like spatially accurate large scale surface water inventories, or the geometry characterizing channels and floodplains for hydraulic modeling support.

Figure 4: Hydrology breakline feature captured in 2002 (left) not updated to reflect positioning in 2006 photos (right).

In 2010, the NPCA partnered again with a broad list of public agencies to participate in the **SWOOP 2010** Orthophotography acquisition project. 'The specifications that were used for this project demanded 20 cm pixel resolution with an accuracy of 50 cm (horizontal and vertical) in order to obtain highly accurate information that could be used for a variety of purposes.' It used the 'UltraCam X' digital sensor and included as deliverables for the entire Watershed;

- flight indices and reports,
- the raw images,
- aerial triangulation (AT) data,
- block stereo models,
- digital orthophotos (20 cm GSD) and associated mosaics.

The intent behind acquiring the additional photogrammetric products through this acquisition project was so that participants could use this data in their own softcopy and stereo environments or provide them on to vendors for additional works such as planimetric feature collection, detailed DTM compilation, or pixel correlated Digital Surface Model (DSM) extraction.

It is this SWOOP 2010 based information (stereo models) that the NPCA proposes to use to update the existing 1m contour supporting DTMs for the Watershed using the traditional photogrammetric compilation method of stereo digitizing. As already stated these products have recently been used by the City of Hamilton to provide similar digital terrain data updates that support detailed topographic mapping at a minimum scale of 1:2,000 with a contour interval of no less than 1 meter.

2.0 OBJECTIVES AND OUTLINE OF THIS ASSIGNMENT

2.1 Purpose of this Assignment

The purpose of this assignment is to use the SWOOP 2010 project stereo models to update the existing 2002 originating 1 meter contour supporting DTM vintages through traditional stereo-

digitizing techniques and re-standardize it across the Niagara Watershed including a tile based buffer correlating to previous acquisition extents (2884 km^2 in total, Figure 1). The 1 meter contour supporting DTM delivered will provide that 90% of all derivative 1 meter contours and elevations of points interpolated from its derivative surface and 1 meter contours will be accurate to within one half the contour interval (0.5m accuracy). This update will also address the observed issues already noted with regards to the existing DTM's quality, and the scope of past change detection efforts as it relates to Authority business and hydrology features, while fully quantifying its achievements with respect to accuracy and the essential 1m contour support requirement.

It is the NPCA's intention, through this RFP to obtain an updated 1 meter contour supporting DTM of photogrammetric operator interpreted and stereo digitized mass points and breaklines of sufficient density and possessing an accuracy of 0.5 meters that will function as the most current topographic base for the Niagara Watershed. More details on project deliverables are included in Section 6.1.

2.2 DTM Update Task Summary

1. Niagara-on-the-Lake Pilot Area – proposals must detail how the required accuracy can be, or will be achieved with the SWOOP 2010 deliverables. Upon award, proof of concept must then be demonstrated by means of an initial test area (Niagara-on-the-Lake) using the SWOOP 2010 stereo products (16 cm GSD scans, accuracy of AT) to quantify the accuracies achievable and certify that the DTM deliverable can be confidently created from this source data. NPCA will secure an independent third party quality assurance consultant to verify the findings.

The advent of digital sensors in application to photogrammetry is changing the traditional film based relationships between flight altitude, GSD and intended map scale. A better understanding of what can be achieved by industry practitioners, should be clarified in the proposal in context of the SWOOP 2010 stereo products proposed for use by this project. See references in Section 3.4.3 and 3.4.4 of this document.

At the conclusion of the pilot stage, the consultant *must* guarantee that the DTM deliverable proposed can support 1 meter contours before further work is completed. If it is determined through the pilot that the required accuracies cannot be achieved, NPCA reserves the right to terminate the project.

2. DTM Compilation – edits to existing, and capture of both new breakline features and spot heights as required to represent the ground surface properly in order to update the vintage 1m contour supporting DTMs available accordingly to specifications.

Change detection efforts will address typical temporal changes to the modeled bare ground surface but with additional focus on surface water features and their associated morphology.

Previously stated issues perceived with the source digital terrain models existing for the watershed will be examined and corrected where necessary through an appropriate quality assurance process.

GenerateTriangulated Irregular Network (TIN)/Terrain dataset and associated 1 meter contour direct derivatives using primary mass point and breakline DTM deliverable.

3. Planimetric Feature Capture – capture of supplementary 2D features defined in section 3.6, such as current building footprints for the portion of the Watershed in the County of Haldimand, as well as some Watershed wide hydrographic feature considerations (i.e. shoreline protection works).

4. Documentation – provide a report outlining how the desired accuracy and specifications have been met using the source materials. Full quantification and documentation of associated methodology behind quality control measures. Includes general metadata that can be used as technical citation for final product deliverables as detailed in Section 6.1.

3.0 DETAILED DESCRIPTION OF WORK PROGRAM

This section provides a more detailed description of the 1 meter contour supporting DTM update work program proposed for this project.

3.1 Workflow

The work will be completed and delivered throughout the project timeline in subsections by the NPCA's member municipalities (the low tier municipalities in the case for the Regional Municipality of Niagara).

The first municipality (Niagara-on-the-Lake) to be delivered in the schedule will be used as the Pilot Area to test and determine the accuracy achievement capable with the source materials.

3.2 Input Data

NPCA will provide the necessary SWOOP 2010 photogrammetric products:

- flight indices (planned and flown) and reports,
- the raw images (16 cm GSD),
- aerial triangulation (AT) data (airborne GPS IMU, and ground control adjusted),
- block stereo models (*Intergraph ZI* format) for Niagara, Haldimand and Hamilton
- digital orthophotos (20 cm GSD) mosaics

In addition to the SWOOP 2010 inputs the Horizontal Control Network for the Region Niagara, incorporating provincial control information is available if necessary:

http://maps.niagararegion.ca/metadata/md/Explorer/1036.aspx

3.3 Existing DTM Models

NPCA will provide the most current vintage of existing 1 meter contour supporting DTMs that exist across the watershed:

1. *2002 GTA* (Watershed wide) in AutoCAD drawing (.dwg) format derived from film based colour photography with final ortho GSD of 20cm. Regular 10 meter mass point post spacing, feature coded breaklines. NAD 1983-ORIG UTM Zone 18N, CGVD28. This is the original 1 meter contour supporting DTM for the Niagara Watershed.

2. *Niagara Region 2006* in ASCII format (.pts, tab delimited file structure (Point ID, Easting, Northing, Elevation, Feature Code, Breakline Start and End Flags)) updated from 2002 product for rectification needs using digitally captured photography with final ortho GSD of 10cm. Original select point spacing mass points (approximately 30m), feature coded breaklines. NAD 1983-ORIG UTM Zone 18N, CGVD28.

3. *City of Hamilton 2007* in Bentley MicroStation design (.dgn) format updating previous vintage of 2002 originating DTM product using digitally captured photography with final ortho GSD of 15cm. Regular, alternating, 15m mass point post spacing, feature coded breaklines. NAD 1983-ORIG UTM Zone 18N, CGVD28.

4. *City of Hamilton 2010* in Bentley MicroStation design (.dgn) format updating previous vintage of 2002 originating product (2007) using SWOOP 2010 stereo models (16 cm GSD). Regular, alternating, 15m mass point spacing, feature coded breaklines. NAD 1983-ORIG UTM Zone 18N, CGVD28.

In addition to the existing digital terrain models, the derivative 1 meter contours from the original 2002 vintage for entire watershed are available.

Small geographic samples of these data can be provided in advance to help with proposal development.

3.4 Recommended References

In addition to NPCA providing the bulk data requirements, a number of references are available and recommended.

3.4.1 'MNR Large Scale Data Capture Specifications for Hydrographic Features'

Support requirements of the elevation data for the development of large scale hydrology mapping and associated GIS data can be gleaned from the provincial 'Large Scale Data Capture Specifications for Hydrographic Features'. The hydrologic breaklines and other hydrographic aspects of the DTM do not have to adhere to these features specs, but they are essential in understanding the accuracy requirements, the hydrologic features generally expected to be captured and how the data will be used as the source material for these kinds of derivative base mapping products. The additional planimetric feature capture considerations must meet these specs at minimum. These specifications can be found online at:

http://www.conservation-ontario.on.ca/projects/pdf/Data_Capture_Specifications_for_Hydrographic_Features_-_Large_Scale_-_v1.3.pdf

3.4.2 'NPCA Updating Existing Integrated Large Scale Hydrology Data'

Support requirements of the elevation data for the development of large scale hydrology mapping and associated GIS data can also be gleaned from the NPCAs 'Updating Existing Integrated Large Scale Hydrologoy Data' Methodology. This document is essential in understanding how the DTM data will be used as the source material to maintain this kind of integrated hydrology data product. NPCA will provide a digital copy of this report to the successful consultant.

3.4.3 'The Semantic Information of Images Acquired by Aerial Digital Sensors in Cartographic and Environmental Applications'

Research paper evaluating semantic information and related map entities from a qualitative and quantitative point of view, and the image quality and information content of several digital sensors, which are commonly employed in map production at different scales. This paper can be found online at:

http://www.isprs.org/proceedings/XXXVII/congress/4_pdf/232.pdf

3.4.3 'Mapping Matters' (August to October 2010), '*Photogrammetric Engineering and Remote Sensing*'

A three article series discussing map accuracy standards and related industry challenges, in the context of traditional film based photography and migration to the new digital sensors.

http://www.asprs.org/a/mapping_matters/august2010.pdf
http://www.asprs.org/a/mapping_matters/september2010.pdf
http://www.asprs.org/a/mapping_matters/october2010.pdf

3.5 Specifications

The specifications detailed in this section define the standards which are to apply to the photogrammetric compilation and preparation of the elevation data. Any data that fails to meet spec will be rejected and will require resubmission.

3.5.1 General Guidelines/ Scope of Work

It is intended that the derived DTM ***support***:

a) pre-engineering survey and design;
b) the production of municipal planimetric mapping and detailed topographic mapping at a scale of 1:2,000 with a contour interval of no less that 1.0 meter; and
c) the development of large scale hydrology mapping and associated GIS data.

The DEMs created from the terrain data and the derivative planimetric mapping will be used to support ongoing surface water inventory and floodplain mapping efforts, and related water resources management applications. Therefore the supplied terrain data must be of sufficient quality and accuracy and be structured (density) to support these needs**. As such, the final data products *must* be accompanied by signed professional stamp of an Ontario Land Surveryor (OLS) and/or a certified Photogrammetrist (ASPRS).**

The portion of the watershed in the City of Hamilton has already been updated to the 2010 photography with the same 1 meter contour support requirements. Scope of the work in this geography will be to perform an additional change detection pass to ensure the uniformity of the DTM across the entire Watershed.

3.5.2 Horizontal Reference System (Datum), Map Projection and Vertical Datum

The datum for the existing input DTMs is NAD83-ORIG, rather than NAD83-CSRS. The specification required NAD83-CSRS so transformation is required to be precise.

1. The horizontal projection and datum for all the data deliverables will be 6-degree Universal Transverse Mercator Projection grid coordinates on NAD83 - CSRS (Canadian Spatial Reference System). In accordance with GO-ITS 45.1 – North American Datum 1983 (NAD83), all information will be related to NAD83-CSRS realization that is officially approved in Ontario.
2. The vertical datum to be used for data deliverables shall be mean sea level as established by the Geodetic Survey of Canada (Canadian Geodetic Vertical Datum CGVD28 - 1978 Version).
3. The Geoid model to be used will be the Canadian Gravimetric Geoid 2000 (CGG2000) along with the height transfer software HTv2.0 which relates GPS derived (ellipsoidal heights) to orthometric heights (heights above mean sea level).
4. All data deliverables will be expressed in UTM Easting and UTM Northing and Elevation in untruncated metres.
5. Benchmarks shall be obtained from the provincial geodetic control database known as COSINE for the required horizontal and vertical control related to NAD83 or CGVD 28 to meet the requirements of this project (for any additional ground control, quality control and quality assurance purposes).

3.5.3 Data Accuracy

1. All mapping product data deliverables must adhere to the following accuracy guidelines. These guidelines use the CMAS and LMAS accuracy standards which are based on a 90% confidence level as the minimum acceptable level. CMAS and LMAS guidelines are detailed in the table below:

Mapping Accuracy Calculation Methods and Requirements	
Horizontal	**Vertical**
Circular Map Accuracy Standard = CMAS = 2.1460 * sigma	***Linear Map Accuracy Standard = LMAS = 1.6449 * sigma***
Standard Circular Error = sigma = .7071 * square root(stdev(X)^2 + stdev(Y)^2) = 39.35% Percentage Probability	stdev(Z) = sigma = 68.27% Percentage Probability
CMAS Statistical Confidence level = 90%	*LMAS Statistical Confidence level = 90%*

Table 1: CMAS and LMAS Guidelines

2. The project data deliverables shall be mapped to an accuracy of ± 0.5 meter CMAS and LMAS.
3. An absolute horizontal positional accuracy of 0.5 meter (minimum) is required for the project area.
4. An absolute vertical positional accuracy of 0.5 meter (minimum) is required for the project area.
5. All map data will be tested against data of a known higher accuracy in order to verify compliance with the CMAS and LMAS requirements. A minimum of ten ground control points per calculation shall be used for CMAS or LMAS accuracy test calculations. More information on quality control and assurance processes are included in section 4.0.
6. Any data set, found to be outside the required accuracy will be rejected and will result in further more extensive testing being required for other data sets except for those areas of obscured view. How obscured areas will be handled is further clarified in Sections 3.5.5.4 and 4.1.2 of this document.

3.5.4 Additional Ground Control

1. Any data used as an additional control source that is derived from previous mapping data (stereo imagery, orthos, shapefiles, etc) must have an accuracy that is at least as good as the required accuracy for the final products.
2. Any new or existing ground control points that are used and produced by field survey must have an accuracy that is at least three times better than the required mapping accuracy for the area(s) it is to be used for controlling.
3. All points used as additional ground control must be supplied in ESRI shapefile format with attributes identifying the:
    a. The source of Geodetic control and any ancillary methods used to verify accuracy
    b. The date the control points were placed (date of survey for surveyed points, date of image acquisition for points derived from existing imagery)
    c. Accuracy specification achieved for the control points

3.5.5 Vector Elevation Data Capture

1. Elevation data will include mass point datasets for both the operator interpreted spot heights that have been stereo-digitized, and a linearly interpolated post spacing derivative no greater than ten times the specified accuracy.
2. Upon award of contract the NPCA will work with the successful consultant to determine the layering specifications (breakline coding) based upon review of the existing DTM datasets.
3. Elevation data will include breakline data for any hydrologically significant features to support the development of a hydrologic terrain surface that meets the CMAS/LMAS project specifications. A hydrologic terrain surface is defined here as a 3D elevation surface created from elevation points and line and/or polygon breaklines which accounts for any barriers to hydrologic flow. Breakline features must be captured for the following features:
    a. Water body Features
        i. Shorelines of water bodies and islands with constant elevation (lakes, reservoirs, etc.) be delivered as closed polygons with an elevation reflecting the water elevation at time-of-capture.
        ii. Surface water features (such as wide rivers) having a width of greater than 5x the desired accuracy level for the project shall be considered a polygonal water feature.
        iii. Includes *Lake, Canal, Reservoir, River, Liquid Waste, Pond, Beaver Pond*, and *Side Channel* **'Waterbody**' feature types as defined by the 'MNR Large Scale Data Capture Specifications for Hydrographic Features' referenced in Section 3.4.1 of this document where applicable to defining the terrain at the intended mapping scale and accuracy.
        iv. Includes *Island* '**In-Stream Obstacles or Irregularities**' feature type as defined by the 'MNR Large Scale Data Capture Specifications for Hydrographic Features' referenced in Section 3.4.1 of this document where applicable to defining the terrain at the intended mapping scale and accuracy.
    b. Linear Hydrographic Features
        i. Linear hydrographic breakline features (streams, shorelines, canals, etc.) with varying elevations.
        ii. Linear water features can be considered as less than 5x the desired accuracy level for the project (from shoreline to shoreline – not top of bank) and should be represented as line for use in identifying hydrological breaklines.
        iii. Includes *Stream, Conduit, Culvert, Ditch,* and *Constructed Drain* '**Watercourse**' feature types as defined by the 'MNR Large Scale Data

Capture Specifications for Hydrographic Features' referenced in Section 3.4.1 of this document where applicable to defining the terrain at the intended mapping scale and accuracy.

iv. Includes *Bridge/Overpass, Pipe/Inlet/Outlet/Outfall Ford*, and *Culvert* '**Crossing Structures**' feature types as defined by the 'MNR Large Scale Data Capture Specifications for Hydrographic Features' referenced in Section 3.4.1 of this document where applicable to defining the terrain at the intended mapping scale and accuracy.

v. Includes *Waterfall, Rapids, Spring, Fish Ladder,* and *Sink/Karst Feature* '**In-Stream Obstacles or Irregularities**' feature types as defined by the 'MNR Large Scale Data Capture Specifications for Hydrographic Features' referenced in Section 3.4.1 of this document where applicable to defining the terrain at the intended mapping scale and accuracy.

vi. Includes *Lock Gate/Water Gate, Dam, Beaver Dam, Weir/Sluice Gate, Sea Lamprey Barrier, Other Fish Ladder, Embankement, Berm/Retaining Wall*, and *Pumping Station* '**Flow Barrier**' feature types as defined by the 'MNR Large Scale Data Capture Specifications for Hydrographic Features' referenced in Section 3.4.1 of this document where applicable to defining the terrain at the intended mapping scale and accuracy.

vii. Includes *Reef, Warf/Pier/Dock, Dry Dock, Boat Ramp/Slip, Artificial Headland/Jetty/Groyne, Curved, Stepped or Rip-Rap Seawall/Headwall,* and *Offshore Breakwater/Breakwall* '**Shoreline Feature**' feature types as defined by the 'MNR Large Scale Data Capture Specifications for Hydrographic Features' referenced in Section 3.4.1 of this document where applicable to defining the terrain at the intended mapping scale and accuracy.

c. Road Features
    i. Road features, not including bridges and overpasses, will be captured as edge of pavement breaklines as required to create a hydrologically correct digital terrain model.
d. Overpasses and Bridges
    i. The surface of overpass and bridge features will be captured as breaklines.
e. Ditches and other constructed features
    i. Linear surface water features and associated conduits that impact hydrologic flow.

4. Obscured Areas
    a. These are defined as vegetated (or in some rare cases densely shadowed) areas that are considered obscured to the extent that adequate vertical data cannot be clearly determined in order to accurately define the DTM.
    b. These are the only features that may be captured as either a 2D or 3D closed polygon.
    c. These features are for reference information indicating areas where the vertical data may not meet the data accuracy requirements due to heavy vegetation.
5. General Breakline Features
    a. In areas where the mass point elevation data and the above breakline features are not sufficient to create a hydrologically correct DTM, general topographic features such as ridges, valleys, top-of-banks, etc. that help provide better surface representation will be captured as general breaklines of varying elevations.
6. Contours
    a. Contours shall be developed by using a combination of elevation mass points, polygons, and breaklines to generate a TIN

b. Contours at the desired interval will be extracted from the TIN without the application of any smoothing, splining, or other modifications to the contour
c. If the contours show an area to be in error or suspect, the input mass points and breaklines must be reviewed and edited as appropriate prior to rebuilding the TIN and regenerating the contours.
d. The contours must be a true reflection of the TIN.
e. Contours should only be generated at an interval that is two or more times greater than the accuracy standard of the least accurate of features used to build the TIN
f. The contours shall have an attribute to indicate if it is an index or intermediate contour, a depression contour, or if it is in an obscured area.

7. The combination of the above elevation features (mass points, breaklines, and obscured areas), shall be referred to herein as the Digital Terrain Model. This model shall only consist of ground based features with the possible exception of the obscured areas polygons.

3.6 Planimetric Feature Capture

If pricing allows, NPCA intends to use this update opportunity to capture additional 2D features, not critical to the definition of the bare ground elevation surface. There is interest in collection of the following features listed by priority.

1. Building Footprints – only in the portion of the Watershed in the County of Haldimand and using specifications provided in Section 3.6.1.
2. Shoreline Protection Features – include artificial headland/jetty/groyne, curved stepped or rip-rap seawall/headwall, offshore breakwater/breakwall using the *MNR Large Scale Data Capture Specifications for Hydrographic Features* recommended in Section 3.9.
3. Other Hydrographic Features – non watercourse or waterbody hydrographic mapping such as crossing structures, in-stream obstacles or irregularities, flow barriers, and other shoreline features as defined by the *MNR Large Scale Data Capture Specification for Hydrographic Features* recommended in Section 3.4.

Planimetric Feature Capture costs are lumped as an individual task in the Cost Breakdown Table in Attachment A. If the consultant believes the Planimetric Feature Capture will upset the limit available for this work program they may further breakdown this task into separate costs and provide options as proposed alternatives to refining the scope of this aspect of the project.

3.6.1 Specifications for Building Footprint Feature Extractions

1. Digitize all building/structures (e.g. buildings, sheds, outbuildings, garages, silos, etc.) using stereo phototgraphy methodology from digital aerial photography acquired as part of the SWOOP 2010 project.
2. Permanent buildings and structures great than 25 square meters must be captured. Buildings may be ‘squared’; however, the general shape of the building must be maintained. See Figure 6:

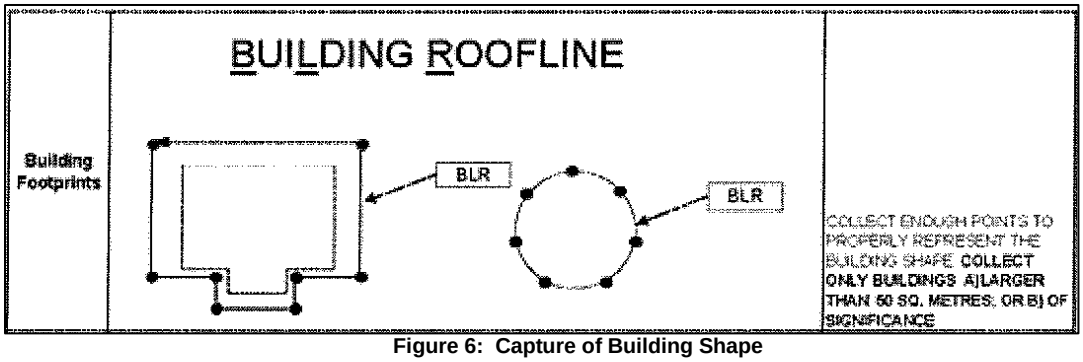

Figure 6: Capture of Building Shape

3. Digitize the building roofline and provide the average elevation as an attribute. A feature code of BLR and date of collection must be attached as attributes.

3.7 Copyright, Ownership, Licensing and End User Rights

It is expected that the updated DTM for the Watershed may eventually be made available to the public via local 'Open Data' initiatives.

1. All deliverables that are required for the project will be, at a minimum, provided to the NPCA, the Regional Municipality of Niagara, and the City of Hamilton, with perpetual, world-wide, non-exclusive, irrevocable, transferable, royalty free, fully paid up right and licence under all associated Intellectual Property rights to use the Deliverables identified in Section 6.1 without restriction, including without limitation:
    a. to use, modify, make derivative works, reproduce, publish, sell and distribute, in any form, the Deliverables, in whole or in part; and
    b. to authorize other Persons, including without limitation and grant sub-sublicenses under any or all of the former to any third parties with respect to the Deliverables.
2. Joint Copyright, Ownership, and Intellectual Property Rights of the Deliverables will be considered the property of:
    a. Niagara Peninsula Conservation Authority
    b. The Regional Municipality of Niagara (for deliverables within its jurisdiction).
    c. The City of Hamilton (for deliverables within its jurisdiction).

3.8 Reporting

The successful consultant will provide separate technical reports as an accuracy assessment for each member municipality of the NPCA highlighting the change detection trends (i.e. urban development, natural stream processes), and detailing the quality control findings. These individual reports will be compiled into a single final accuracy report and should allow for faster project completion as reporting can be provided as each member municipality is completed and allow for addressing "global" type comments early on. Draft reports are not to be submitted without the successful consultant's senior staff review and signature. NPCA and their peer reviewers will provide comments with 10 business days of receiving each draft technical report received after the initial test pilot phase is completed.

The draft and final memo and report texts will be provided in Microsoft Word™ and tables in Microsoft Excel™. Figures are recommended provided in Adobe Acrobat™ format. Figures must follow accepted industry cartographic standards, i.e. north arrow, scale bar, legend, etc. Each final technical memo will also be provided in Adobe Acrobat format.

3.9 Metadata

1. Overall project metadata shall be produced in XML format
2. The XML files will be compliant with the rules of the North American Profile (NAP) of ISO 19115 or GOITS 72 (v2) rules (for provincial government agencies) and include the following minimum elements:

Minimum Required Elements	One of the following:
Metadata Standard Name	
Title	
Date	
Date Type	*creation* , *publication* , *revision* , *notAvailable* , *inForce* , *adopted* , *deprecated* , *superseded*
Individual Name and/or Organization Name and/or Position Name	
Role	*resourceProvider* , *custodian* , *owner* , *user* , *distributor* , *originator* , *pointOfContact* , *principalInvestigator* , *processor* , *publisher* , *author* , *collaborator* , *editor* , *mediator* , *rightsHolder*
Abstract	
Status	*completed* , *historicalArchive* , *obsolete* , *onGoing* , *planned* , *required* , *underDevelopment* , *proposed*
Language	default ENG
Topic Category	*farming* , *biota* , *boundaries* , *climatologyMeterologyAtmosphere* , *economy* , *elevation* , *environment* , *geoscientificInformation* , *health* , *imageryBaseMapsEarthCover* , *intelligenceMilitary* , *inlandWater* , *location* , *oceans* , *planningCadastre* , *society* , *structure* , *transportation* , *utilitiesCommunication*
Spatial Extent	Polygon and/or North Bound, South Bound, East Bound and West Bound Coordinates (decimal degrees lat/long)
Reference System Information	applicable code of reference system used

3. The GOITS 72 (v2) rules can be accessed at: http://www.mgs.gov.on.ca/stdprodconsume/groups/content/@mgs/@goits/documents/resourcelist/226920.pdf
4. Metadata will be accompanied by a shapefile of the footprint of the area the XML file refers to (note that this is to be an outline of the area(s) covered not a minimum bounding rectangle)
5. There shall be an XML file for each data type, i.e. Planimetric data, Topographic data, etc.
6. All North American Profile of ISO 19115 or GOITS 72 (v2) mandatory fields must be populated
7. The dates components shall be represented by a date range including year, month, and day for the start and end dates of the source data layer (acquisition of the imagery, LiDAR, etc).
8. The accuracy statements are to be fully populated with the results of the accuracy tests as performed by the data provider listing the calculated CMAS and LMAS values for the various data sets
9. The production procedures sections are to be populated with information on
   a. Organizations used to acquire, compile and produce each deliverable
   b. Sensor hardware used for each data set
   c. Software used in the data production
   d. Procedures followed to complete the production and QC
   e. Any outstanding issues with regard to non-compliance with the guidelines of the final data sets

10. There shall be an attribute defined in the XML file for each Feature Type produced in the project
11. Contours shall have metadata that identifies all the source data inputs to the creation of the TIN the contours were derived from. The accuracy attribute of the contours shall not be better than two times the least accurate component of the TIN.

4.0 QUALITY CONTROL OF ASSIGNMENT

The successful consultant will be fully responsible for the quality control of all products they produce for the assignment, and shall submit a project specific Quality Control (QC) Plan as part of the proposal. The QC Plan should include protocols and/or procedures pertaining to achievement of the accuracy required by the guidelines and specifications throughout Section 3.0. NPCA will secure an independent third party quality assurance consultant to verify the findings.

The QC monitoring of the successful consultant's work for this assignment shall be performed by a qualified member of their senior staff. This senior staff member shall be assigned the responsibility of overseeing the process of QC checking of work, resolving problems that may arise, and confirming that QC meets the required professional standards, such as those outlined by the Association of Ontario Land Surveyor (AOLS) and the American Society of Photogrammetry and Remote Sensing (ASPRS).

Upon request, NPCA shall be given access at any time to all records produced in the performance of this assignment, including stereo models and associated control, captured features, results of preliminary elevation data compilations, and other data sets as may be deemed required by NPCA to monitor adherence of the consultant to QC standards.

4.1 Quality Control Plan

1. The data producer is required to create a Quality Control (QC) plan based on the requirements specified throughout Section 3.0. It will detail in a PDF file:
    a. The agencies and/or companies involved in all phases of the data acquisition and production, along with a shape file identifying the areas where each agency/company was involved and what processes those organizations were involved in (i.e production, quality control etc.)
    b. The hardware used to produce the data sources (manufacture, make and model of softcopy peripherals etc.)
    c. The software products used at the various production stages including manufacturers product names and version numbers
    d. The source of all ground control points, their geographic and UTM coordinates, their type of control (local, municipal, provincial or federal) and their accuracy classification for NAD83-CSRS control (Class A, B,C or D) and for NAD83-ORIG control (first, second or third order) and for associated orthometric elevations (first, second or third order, as appropriate).
    e. The QC steps carried out
    f. The sample rate used in the QC
    g. The findings of these QC steps
    h. The steps undertaken to mitigate any problems found during the QC to ensure compliance with the guidelines
    i. Recommendations for future projects based on the results of the current project

2. The data producer shall provide a letter stating that all the data meets the guidelines and specifications. In the case that aspects of the product could not meet the guidelines and specifications then these shall be itemized including a description of the layers affected, the accuracy's achieved, and an explanation provided as to why the data could not meet the guidelines (i.e. obscured areas). Any non-compliant data must first be agreed to in writing by the NPCA, prior to acceptance and final payment.
3. Regardless of 2. above the data may be rejected in part or in its entirety if it does not meet the guidelines and specifications in full unless previously agreed to by the NPCA's designated representative.

4.2 Quality Assurance

1. Quality Assurance (QA) is used here to denote an independent verification of the resulting products accuracy, completeness, and adherence to standards. The NPCA will carry out a thorough QA of all data products in line with the project objectives.
2. The QA of the project will be completed under a standalone contract by a different firm or agency.
3. This will involve an independent check of the positional accuracy of all data layers and products.
4. Check points (targets and other photo identifiable points) will be used to verify the horizontal and vertical accuracy of the digital elevation models and all other deliverables.
5. Shapefiles will be tested to ensure that all data (100%):
   a. Have attributes populated with valid data
   b. Are topologically clean
   c. Match geometrically to other layers as appropriate
6. Metadata requirements will be tested for compliance with the guidelines in this document.
7. If the QA process finds data that does not meet the guidelines and specification then that data may be rejected and be required to be corrected and redelivered. The Warranty period for reporting of errors will be for a period of one year after final delivery of all products.
8. An elevation accuracy assessment report will be created by the third party QA firm detailing the results of a statistical analysis of the complete data set as compared to the check points including a statement that the data meets the required specification and is fit for the planned purpose. This report will clearly document all test points used, the error found at each point, a summary by each ground cover type as well as a consolidated summary of all check points.

5.0 PROJECT MEETINGS AND COMMUNICATION

The consultant shall budget a reasonable amount to cover the general costs for required meetings and correspondence. To assist in this regard, what follows is a minimum level of effort that will be expected from the consultant for this project:

- Meet with NPCA staff (at Welland Offices) at key milestone events, or as situations warrant, throughout the course of the study. For the purpose of budgeting, assume two (2) meetings. Prepare and distribute "minutes of meeting".
- Provide weekly e-mail project updates to the NPCA project manager including progress of work, "bottle necks" etc. More e-mail based communication may be required early on during the test pilot phase and should be budgeted for accordingly.
- Bi-weekly conference calls with NPCA staff throughout the course of the study. For the purposes of budgeting, assume ten (10) such calls.

6.0 DELIVERABLES

The following deliverables will be required from the successful consultant for completion of the assignment. **It should be noted that NPCA has an aggressive timeline for project completion (end of 2012). Allowances for project timelines being extended will not be given to the Successful Consultant due to funding timelines.** The draft reporting schedule has been generally developed based upon a two week turnaround time per member municipality or combination. Comments from NPCA regarding an individual draft report are required to be reflected in the next individual draft member municipality report.

6.1 Deliverable Schedule

	Deliverable	**Due Date**
1	Initial conference call/meeting for start-up of the work	July 20, 2012
2	Niagara-on-the-Lake TEST PILOT Draft Memo**	August 3, 2012
3	Niagara Falls Draft Report*	August 17, 2012
4	Fort Erie WSPA Draft Report*	August. 31, 2012
5	Port Colborne and Wainfleet Draft Report*	Sept. 14, 2012
6	Welland and Pelham Draft Report*	Sept 28, 2012
7	St. Catharines and Thorold Draft Report*	October 12, 2012
8	Lincoln and Grimsby Draft Report*	October 26, 2012
9	West Lincoln Draft Report*	Nov. 9, 2012
10	Haldimand Draft Report*	Nov 23, 2012
11	Hamilton Draft Report*	Dec 7, 2012
12	**Final Watershed Wide Report, DTM, 1m Contours, and 2D Planimetric Features**	**Dec 21, 2012**

Notes:

1. Draft Report* deliverable infers full written documentation of the elevation accuracy test procedures and the results of the elevation accuracy, and digital files of elevation data components listed below.
   a. For mass points, both the original stereo-digitized spot heights and the derivative post spacing at 10 times the accuracy spacing (which may be interpolated from the TIN created by the spot heights and breaklines) as separate ESRI PointZ Shapefile
   b. The contours will be delivered as an ESRI LineZ Shapefile. Each contour line will have an attribute to indicate if it is an index or intermediate contour and whether it is a depression contour and if it is in an obscured or low reliability area.
   c. The edited topologically correct breakline and other planimetric features as ESRI LineZ or PolygonZ shapefiles as is appropriate.
   d. AutoCAD 2010 DWG or Bentley Microstation V8 DGN in a 1 km^2 tiled format containing all the 3D vector data (both mass points types, breaklines and contours) will be required in addition to the shapefile listed above.
   e. All control, test survey, and other data used in the quality control process as ESRI PointZ, LineZ, or PolygonZ shapefiles as is appropriate.
2. With the exception of Niagara-on-the-Lake as the pilot test area, the order and combination of member municipality completion is listed only as a recommended guide, consultants are free to suggest alternative approaches to breaking down the work.

7.0 PROJECT SCHEDULE

The final consultant selection by NPCA is expected to be made by July 18th, 2012 and it is anticipated that the work will begin later that month. The assignment, including final reporting, is to be completed by December 21, 2012. Although every attempt will be made to meet all dates, NPCA reserves the right to modify any or all dates at its sole discretion.

The respondent shall submit a detailed schedule showing expected durations and completion dates of the tasks as well as milestone deliverables completion dates. These completed attachments will form part of the agreement between NPCA and the successful consultant selected to complete the assignment.

The respondent shall also submit a list of all sub-consultants that will be used on the project, and provide a description of the tasks to be performed by each of the sub-consultants (Attachment C). The use of sub-consultants is however generally discouraged unless they serve a minor role to compliment the successful consultant's primary responsibility to complete the core technical exercise. Sub-consultants may not be substituted without written consent from NPCA, including substitution with lead consultant staff.

8.0 PROJECT COSTS

Based on the proposed work plan, the respondent shall complete the Cost Breakdown Table in 'Attachment A' by providing costs for each task outlined as well as a total cost. The work performed for this assignment shall be charged on a lump sum basis as indicated on the Cost Breakdown Table. The respondent must identify all costs associated with sub-consultants. The project upset limit for this work program is $80,000 including taxes.

If the consultant does not consider $80,000 sufficient funds to complete this work program, the consultant shall recommend a work program for the upset limit that proposes cost savings tasks completed by NPCA staff. This alternative work program will need to meet the purposes for this project.

9.0 BASIS OF PAYMENT

Consultant invoices during the course of the project can be billed with the satisfactory completion and submission of the milestone deliverables as indicated in Section 6.0. The final digital deliverables will constitute 10% of the project budget. The final reports must incorporate key draft report comments and include delivery of the digital deliverables.

Invoicing will correspond with project completion to date and detail:

- Work completed since the last update;
- Summary of the total work performed to-date;
- Outline and description of any variances of the actual assignment schedule to the schedule submitted by the successful consultant, and proposed methods to resolve these variances;
- Update of project costs incurred to-date;
- Anticipated date of completion and submission of milestone deliverables;
- Problems or issues that require resolution; and
- Changes in scope that have been authorized in writing by NPCA.

All pricing shall be expressed in Canadian currency.

9.1 Fee Schedule

The respondent shall complete and submit Attachment B Fee Schedule indicating staff that will be involved in the assignment and providing their name, function in the assignment, and charge out rate. The Fee Schedule may be used as a basis for negotiating additional services.

A revision to staff working on the project will not be allowed without written consent of NPCA.

10.0 FORMAT OF PROPOSAL

The proposal shall be limited to ten (10) single-sided pages of text, with minimum 10pt font (excluding covering letters and appendices. The proposal should also contain at a minimum, the following information:

- A methodology that describes key elements of the approach that will be employed by the Consultant in undertaking this project as outlined in this RFP. The methodology need not be very detailed, but must contain enough information to indicate a sound understanding of the needs of the project and provide the evaluators with step by step procedures and a schedule of activities which indicated how it proposes to meet those needs including identification of specific roles and expectations of NPCA staff.
- Attachment A: Cost breakdowns
- Attachment B: Fee schedule for consultant staff who will be working on the project.
- Attachment C: Listing of all sub-consultants and description of their deliverables
- Detailed Project Schedule
- Quality Control Plan
- Resumes of all key staff who will be working on the project
- Conflict of Interest Statement
- Proof of Insurance
- Company profile showing (years in existence, company size, liability insurance, etc)
- Summaries and references concerning at least three similar past projects.

11.0 SUBMISSION OF PROPOSAL

Three (3) bound copies of your proposal are to be submitted in a sealed envelope on or before July 6th, 2012 at 2:00 p.m. to the address below:

Niagara Peninsula Conservation Authority
c/o Geoffrey Verkade, Supervisor, GIS Services
250 Thorold Road West, 3rd Floor, Welland, Ontario, L3C 3W2

12.0 PROPOSAL EVALUATION AND NOTIFICATION

The proposal submissions will be evaluated based on the following:
10 points - Submission
30 points - Qualifications and Experience
40 points - Technical Approach and Methodology

20 points – Project Management

Submission
- Responsiveness to the RFP in terms of completeness/comprehensiveness of submission
- Demonstrated full understanding of the project objectives and the services to be provided
- Demonstrated willingness to comply with terms and conditions of the RFP
- Potential conflicts of interest identified

Qualifications and Experience
- Experience and credentials/qualifications of the firm/team and personnel
- References (i.e. past projects) indicating the competence of the consultant

Technical Approach and Methodology
- Suitability of approach/methods to provide deliverables and meet the project objectives
- Ability to conduct research, analyses and communicate findings efficiently and effectively
- Suitability of level of effort assigned
- Value added services within the scope of services provided

Project Management
- Experience and track record of personnel assigned to the management of the project
- Schedule and staff to provide all services in a timely manner
- Suitable approach to Quality Assurance and Quality Control

Proposals which exceed the upset limit of $80,000 or do not meet the final deliverable date of December 21, 2012 are not expected to be considered for evaluation. Exact numerical scoring will not be disclosed.

Consultants may be requested to compete through an interview process for the outlined assignment if in the opinion of NPCA, this is advisable to make the final selection. Dates for such interviews will be arranged by NPCA after submission and initial evaluation of the proposals submitted. Costs for this interview will be the sole responsibility of the respondent, however teleconferencing will be permitted.

It is anticipated that the final selection will be made on or before July 18th, 2012. Written communications to the Successful Consultant of notification of award shall result in a binding contract without further action by either party whether or not there are negotiations.

13.0 OTHER PROPOSAL SUBMISSION INFORMATION

13.1 Clarification

It is the responsibility of the consultant to seek clarification of any matter that they consider unclear before submitting a proposal. NPCA is not responsible for any misunderstanding of the RFP on the part of the consultant.

Queries regarding the proposal should be directed to:
Geoffrey Verkade, Supervisor, GIS Services
Telephone: 905-788-3135 ext.244
Cell: 905-933-4589

Fax: 905-788-1121
E-mail: gverkade@npca.ca

Verbal clarification will not be interpreted to change the terms of the RFP.

Any information or changes to the requirements of this proposal will be sent to each consultant in the form of an addendum by facsimile and/or e-mail and issued by NPCA.

13.2 Right to Accept or Reject: Contract to be Executed

NPCA reserves the right in its sole discretion and for any reason to:

- Accept or reject any quotations in whole or in part
- Reject all quotations
- Not to proceed with any part of the assignment

13.3 Irregularity or Omission

NPCA reserves the right to reject any or all submissions, regardless of whether the submissions were completed correctly and all the required information was included.

13.4 Irrevocable Response

The submission is irrevocable by the respondent following the deadline for submissions and will remain in effect and open for acceptance by NPCA for 60 days from the submission deadline date.

13.5 Contact Person

The respondent will identify one contact person to whom additional information concerning the RFP may be provided.

13.6 Conflict of Interest

The respondent must include a written statement confirming that the respondent does not and will not have any conflict of interest in the performance of the assignment, if selected by NPCA to complete the work.

13.7 Costs Incurred by Consultants

All expenses involved with the preparation and submission of proposals shall be borne by the consultant.

13.8 Changes to RFP

Each respondent shall be responsible for reviewing all available information concerning the RFP, including any addenda issued, prior to the submission deadline. In the event this RFP is amended via addendum, all terms and conditions, which are not modified, shall remain unchanged.

13.9 Negotiations

NPCA reserves the right to enter into discussions/negotiations with the Selected Consultant. If NPCA and the Selected Consultant cannot negotiate a successful contract, NPCA may terminate negotiations and begin negotiations with the next Selected Consultant. This process may continue until a contract has been executed or all Consultants have been rejected.

13.10 Confidentiality

Consultants shallow not at any time before, during or after completion of the project, divulge any confidential information communicated to or acquired by the Consultant or disclosed by NPCA in the course of carrying out this project.

13.11 Contact Termination

In the event that the Successful Consultant, in the opinion of NPCA, fails to satisfactorily perform the services as stated herein, NPCA reserves the right to terminate the contract without showing cause, prior to its conclusion, upon giving at least thirty (30) days written notice to the Successful Consultant.

NPCA shall pay all reasonable costs incurred by the Successful Consultant up to the date of termination, less any excess costs incurred by NPCA in re-procuring and completing the work where the termination is for just cause. However, in no event shall the Successful Consultant be paid for any amount that exceeds the price of the agreed fee for the work performed.

13.12 Insurance Coverage by Consultant

The respondent shall provide proof of the following insurance coverage:

- General liability – minimum coverage of $ 1,000,000.
- Valid Workplace Safety and Insurance Board (WSIB) Clearance Certificate

Attachment A: Project Cost Break Down

	Task		Lump Sum
1	**Niagara-on-the-Lake TEST PILOT**		
	Traditional 1m Contour Supporting DTM Update	SUM	
	Additional focus on hydrologic features and morphology	SUM	
	Planimetric Feature Capture	SUM	
	Draft Accuracy Assessment Report	SUM	
		SUB-TOTAL	$
2	**Niagara Falls**		
	DTM Update, Hydrology Focus, Feature Capture, Draft Report	SUB-TOTAL	$
3	**Fort Erie**		
	DTM Update, Hydrology Focus, Feature Capture, Draft Report	SUB-TOTAL	$
4	**Port Colborne and Wainfleet**		
	DTM Update, Hydrology Focus, Feature Capture, Draft Report	SUB-TOTAL	$
5	**Welland and Pelham**		
	DTM Update, Hydrology Focus, Feature Capture, Draft Report	SUB-TOTAL	$
6	**St. Catharines and Thorold**		
	DTM Update, Hydrology Focus, Feature Capture, Draft Report	SUB-TOTAL	$
7	**Lincoln and Grimsby**		
	DTM Update, Hydrology Focus, Feature Capture, Draft Report	SUB-TOTAL	$
8	**West Lincoln**		
	DTM Update, Hydrology Focus, Feature Capture, Draft Report	SUB-TOTAL	$
9	**Haldimand**		
	DTM Update, Hydrology Focus, Feature Capture, Draft Report	SUB-TOTAL	$
10	**Hamilton**		
	Hydrology Focus, Feature Capture, Draft Report	SUB-TOTAL	$
15	**Communications**		
	Two (2) meetings, ten (10) conference calls, weekly email updates	SUB-TOTAL	$
16	**Final Aggregated Digital Technical Report**		
	10% of Project Total	SUB-TOTAL	$
		TOTAL COST	$
17	**Contingency – Additional Meetings**		
	Cost per one hour meeting at NPCA offices in Welland	Optional tem	$

Note: Reimburseables are to be included in the lump sum amounts and mark-ups of subconsultants are not permitted. Individual member municipality task costs only requested for Task 1 to show costing allocation but can be included for each if varying due to geography. Feature capture costs can be further broken down by municipality and/or types in an additionally submitted table by consultants not provided in this document.

Attachment B: Fee Schedule of Consultant's Staff for this Project

	Position	Name	Chargeout Rate ($/day)	Project Days
1	Project Manager			
2	Principal-in-charge Senior Technical Reviewer			
3	Softcopy Operator/Analyst			
4	GIS Specialist			
5				
6				
7				
8				

Note: It is recognized that the same staff member may fulfill more than one role on the project, in which case please amend their position title.

Attachment C: Sub-consultants to be Used on the Assignment by the Respondent

	Sub-consultant: Contact Info	Task(s) performed by Sub-consultant
1		
2		

Attachment D: Glossary

1 meter contour supporting DTM
A DTM providing that 90% of all derivative 1 meter contours and elevations of points interpolated from its derivative TIN surface and derivative 1 meter contours will be accurate to within one half the contour interval.

Aerial Triangulation
Also known as block triangulation, it is the process of defining the mathematical relationship between the images contained within a block, the camera or sensor model, and the ground

American Society of Photogrammetry and Remote Sensing (ASPRS)
The Imaging and Geospatial Information Society that governs photogrammetry certification. Promotes the ethical application of active and passive sensors, the disciplines of photogrammetry, remote sensing, geographic information systems, and other supporting geospatial technologies.

Block file
The collection of all the information associated with photogrammetric mapping project, including: projection and datum information, imagery, camera or sensor information, GCPs, and geometric relationship between the imagery and the ground.

Breakline
A linear feature that represents a distinct interruption in the slope of a surface, such as a ridge, road, or stream. They define and control the surface behaviour of a TIN in terms of smoothness and continuity.

Cell Resolution
Related to pixel size. It refers to the area on the ground that a pixel represents. With digital imagery it may also be defined as the ground sample distance (GSD).

DEM
The digital representation of the elevation of the bare earth at regularly spaced intervals in x and y directions, using elevation values referenced to a common vertical datum.

DTM
Similar to DEM but with the incorporation of mass points and breaklines that are irregularly spaced to better characterize the true shape of the bare earth terrain.

DSM
Similar to DEM or DTM except that they depict the elevation of the surface features such as buildings, vegetation and other features elevated above bare ground.

Exterior Orientation
The position and angular orientation of the camera during image capture. The positional elements include datum and ground space coordinate system in relation to the image perspective center, while the rotational elements describe the relationship between the ground space coordinate system and the image space coordinate system, mainly the pitch, roll, and yaw of the plane.

Feature Class
Homogeneous collection of common features, each having the same spatial representation, such as point, lines, or polygons, and a common set of attribute columns.

GCP
A Ground Control Point (GCP) is an identifiable feature located on the Earth's surface whose ground coordinates, X, Y, and Z, are known. GCPs are instrumental for establishing accurate relationship between images, camera/sensor, and ground surface.

GSD
In remote sensing, ground sample distance (GSD) in a digital photo (such as an orthophoto) of the ground from air or space is the distance between pixel centers measured on the ground. For example, in an image with a one-meter GSD, adjacent pixels image locations that are 1 meter apart on the ground. GSD is a measure of one limitation to image resolution, that is, the limitation due to sampling.

Interior Orientation
The internal geometry of a camera or sensor as it was defined during the image capture, includes the principal point, focal length, fiducial marks, and lens distortion.

Interpolation
In this case spatial interpolation is the process of estimating or predicting the values at un-sampled locations based on the values of sampled locations.

Mass points
Irregularly distributed sample points, each with an x,y location and a z value, which are used as the basic elements to build a tin. Each mass point has important, yet equal, significance in terms defining the tin surface.

Natural Neighbours
A method of spatial interpolation that is based on the Voronoi tessellation for assigning interpolation weights to adjacent neighbours.

NoData
Cell values in a raster dataset that represents the absence of data.

Parallax
The displacement of a ground point in a stereo-pair image in relation to the position of the sensor/camera at the time the image was captured.

Photogrammetry
The art, science and technology of obtaining reliable information about physical objects and the environment through the process of recording, measuring, and interpreting photographic images and patterns of electromagnetic radiant imagery and other phenomena.

Pixel
The smallest point or cell that can be identified in a raster image.

Pixel Auto-Correlation

An automatic digital image matching technique that identifies and measures corresponding image points that are located on the overlapping areas of multiple images.

Point capture

The process of obtaining a point cloud, discrete points normally through stereo-digitizing or ground survey.

Point cloud

In Geographic Information and Survey Systems, point cloud data refers to the collection of range, location measurements and sensor information obtained from the millions of laser shots in LiDAR, or obtained from the pixel-matching in Pixel Auto-Correlation.

Post spacing

The constant sampling interval in x- and y-directions of a DEM lattice or grid. This is also called the horizontal resolution of a gridded DEM or the DEM grid spacing. It can also refer to the final regular spacing of mass points in a terrain model derived through linear interpolation between photogrammetrically operator collected select points and breaklines.

Root Mean Square Error (RMSE)

An aggregate measure of accuracy and predictive power of a model, that pertains to the differences between the predicted values of the model and the actual observed values.

Softcopy Photogrammetry

A digital workflow of photogrammetry involving the coupled use of digital imagery, high-end technology, and automatic techniques as opposed to analogue photogrammetric measuring devices and systems.

Stereo image-pair

Two overlapping images that allows 3D viewing, and terrain extraction within the overlap region.

SWOOP

The Southwestern Ontario Orthophotography Project is a dataset of high resolution ortho-photos for approximately 42,000 square kilometres of land in South-western Ontario.

Terrain dataset

A multi-resolution, TIN-based surface built from measurements stored as features in a geodatabase, typically made from LiDAR, sonar, and photogrammetric sources.

Tile base buffer

Existing 1 meter contour DTM vintages that the NPCA currently uses are managed on a 1 square kilometer tile basis and the NPCA possesses coverage of its watershed plus a suitable buffer based on these tile extents.

TIN

Triangular Irregular Network (TIN) are a digital mean to represent surface morphology. They are vector-based digital geographic data and are constructed by triangulating a set of vertices (points). The vertices are connected with a series of edges to form a network of triangles.

NIAGARA PENINSULA CONSERVATION AUTHORITY

TO: **The Chairman and Members of the Authority**

DATE: **July 9, 2012**

SUBJECT: **PFOS Compounds at the Binbrook Reservoir (update) – Report No. 40-12**

In May, Conservation Authority staff took samples from the drinking water well and the swimming beach at Binbrook Conservation Area to be analysed for water quality and levels of PFOS. The results show no detectable amounts in the well water. The level at the swimming beach was 0.12 ng/l. This is below the interim guidelines for drinking water, and considered well within the safe guidelines for swimming. The information has been forwarded to the City of Hamilton Public Health.

The City of Hamilton held a public open house on June 20th, to discuss the PFOS contamination of the Hamilton International Airport and the Binbrook Conservation Area. Approximately 25 people attended to hear presentations from the City of Hamilton Health Unit, the Hamilton Planning and Economic Development Department, The Ministry of the Environment, the NPCA and the airport operator (Tradeport).

Most of the questions focused on the airport clean-up and impacts on lands adjacent to the airport. A draft remediation plan was submitted to the MOE for review, however some of the treatment methods recommended have never been used with this compound. Results of soil tests are expected by mid-July. This information will help refine the proposed plan for site remediation.

There were very few questions about the Conservation Area and fish consumption. Overall, the meeting was well received by the attendees. The City is planning to host another meeting in the fall.

So far visitation at Binbrook is up over last year during June and early-July. There are very few questions or concerns about the PFOS compounds.

RECOMMENDATION:

That Report No. 40-12 regarding PFOS Compounds at the Binbrook Reservoir be received.

Prepared by: Darcy B. Baker, Director-Land Management

Respectfully Submitted by: _____

Tony D'Amario, CAO/Secretary-Treasurer

TO: **Chairman and Members of the Authority**

DATE: **July 13, 2012**

RE: **PROJECT / PROGRAM STATUS REPORT - REPORT NO. 41-12**

WATER MANAGEMENT

I. Watershed Development Services Division

1) Municipal and Development Plan Input and Review

i) To the end of May, staff have reviewed and processed 120 planning applications (of various types/complexity) and 172 building permits. In addition staff responds to many general enquires both from local municipalities and the public. Inquiries from landowners, real estate agents, etc. regarding floodplain mapping for the Welland River in Wainfleet, West Lincoln, Pelham and Welland appears to have peaked, although interest still remains high relative to other systems..

2) NPCA 'Regulation of Development, Interference with Wetlands, and Alteration to Shorelines and Watercourses'

i) Permits
To date, 60 permits have been issued.

ii) Violations
A separate Confidential Violation Status Report has been prepared for July.

iii) NPCA-DFO Partnership Agreement
As part of the NPCA-DFO Partnership Agreement, NPCA staff work as a liaison between DFO Assessors and proponents to recommend appropriate fish habitat compensation projects. To date, NPCA's Biologist has been consulted on approximately 35 matters.

II. Watershed Technical Services Division

1) Source Water Protection Plan

- The public consultation period for the Proposed Source Protection Plan (SPP) ended in mid-June. Comments that were received during this consultation period are presented in report SPA-03-12. The comments must be forwarded to the Ministry of the Environment (MOE) along with the proposed Source Protection Plan by August 2012. See report SPA-04-12 concerning submission of the proposed SPP to the MOE. .

2) Water Quality Monitoring Program

Surface water quality monitoring continues at 72 stations in the NPCA watershed. Water samples are collected monthly from April to October. These samples are analysed for bacteria, metals, nutrients and general chemistry.

- Staff is continuing to monitor water levels at all Provincial Groundwater Monitoring Network wells. As part of the regular maintenance of this data, a water level correction review is currently under way by NPCA staff.

- Two water well decommissioning projects were approved in June and will be completed in the near future. To-date 7 water well decommissioning projects have been approved or completed for 2012.

- Staff assisted the NPCA Ecologist with the annual Mud Lake Conservation Area benthic community monitoring.

- Staff completed the groundwater monitoring component of the Balls Falls Centre for Conservation Sewage Treatment System Certificate of Approval .

- Staff continue to assist the MOE with two projects: 1) the nutrient track down in Beaver Creek and Big Forks Creek watersheds; 2) and the Balls Falls Climate Change station.

3) Geographic Information Systems

a) Source Water Protection Support Activities

- Archiving of project workspaces and organization of valuable data elements not captured in the MOE prescribed information deliverables continues.

b) Watershed Development Services Support Activities

- Staff continues with tasks for implementing the Property Info application.
- Integrating the toe of slope information delivered by consultant earlier this year into hazards data model as part of the riverine erosion and valley land features is near completion.
- The delayed GIS data package to accompany the Nature for Niagara's Future project report continues to be compiled with the focus on metadata development.
- Staff are conducting a pilot project on a single subwatershed migrating available fisheries information, drainage area, and stream ordering onto our large scale 1:2000 base to develop a decision support framework and identify with more certainty where fisheries issues apply to watercourses.

c) Corporate GIS and Information Management Support Activities

- Proposals to supply an update to the Niagara Watershed's topographic base (1 meter contour supporting Digital Terrain Model) via funding from the Niagara Water Strategy have been received. This is a critical information asset that addresses many Authority and municipal business needs and will specifically enable the continued compilation and maintenance of the NPCA's large scale hydrology base data.
- The new Niagara Navigator (public web mapping tool) application is testing in beta at the moment on the development server and should launch before the end of the month

rebranded as the 'NPCA Watershed Explorer' to eliminate confusion with other Niagara Navigator instances (Region of Niagara and County of Haldimand).

4) Flood Control

a) Monitoring & Major Maintenance

i) Staff continues to monitor the water levels at the Binbrook reservoir on a regular basis. With this summer's extended hot and dry weather, the reservoir's water level is currently six inches below holding level. A minimal amount of water is being discharged in an effort to maintain the water level as close to the holding level as possible.

ii) Staff continues to routinely monitor the water levels at our 14 stream gauge stations, climatic data at our 15 climate stations, and undertake routine maintenance, calibration, and inspections at all 25 installations, as part of the NPCA's routine flood forecasting and warning duties. The public may access this real-time water level and rainfall information through the NPCA's website.

5) Other

a) Staff continues to assist the Ministry of Natural Resources with the Groundwater Indicator Program for the Low Water Response Program and Provincial Groundwater Monitoring Network;

b). Technical Services staff continues to provide on-going technical engineering support to the Development Services, Restoration, and Lands Divisions as requested.

V. Watershed Stewardship Division

The Watershed Stewardship Division is responsible for improving water quality, water quantity and biodiversity within the NPCA Watershed. The Stewardship Program advances these areas through the implementation of a comprehensive cost-sharing program that offers local landowners financial incentives to implement water quality and habitat improvement projects on their properties. This program is voluntary, working primarily with private landowners who have a keen interest conserving the public interest.

Niagara-on-the-Lake Stewardship

The following are the program accomplishments to date for the 2012 implementation year:

- A 250 m in-stream and bank enhancement project at the corner of Line 1 and 4 Mile Creek Road. Sedimentation has been reduced at this site by redirecting erosive flows around 3 sharp bends in 4 Mile Creek. The site was also planted with a variety of native trees, shrubs and wildflowers.
- The Harrison #1 Drain/2 Mile Creek Natural Channel Design Demonstration Project. This project was collaboratively developed with the Town of NOTL with monitoring support from Trout Unlimited Canada. The in-stream and bank enhancements stretch from Line 9 Road north for 280 metres. This project will demonstrate how a channel designed using natural form and structure (alternating riffles and pools) can be more efficient in transporting sediment through the watercourse and therefore cost less to maintain. This

will also result in improved local water quality and aquatic habitat, which is a benefit to the whole community.

- A 250 m buffer enhancement project between the rose fields of Palatine Fruit and Roses and 4 Mile Creek. 10 acres will also be converted to trickle irrigation (water conservation).
- A 40 m riparian restoration project along 4 Mile Creek where an old and no longer utilized creek level crossing was improved to allow for the proper crossing of farm equipment over the creek.
- 6 acres of Provincially Significant Wetland along 4 Mile Creek was enhanced by the removal of an invasive species (Phragmities) which was threating to displace a Provincially Vulnerable vegetative Species of Concern.
- A collaborative project with Niagara College and 3 landowners along 3 Mile Creek saw nearly 1 acre of land and 150m of watercourse improved by removing invasive species, over 100 cinder blocks and 7 bags of garbage from the creek. Native plantings and stream stabilization work was also undertaken at the site.
- A 30 metre buffer enhancement project along 4 Mile Creek was completed using native shrub and wildflower plantings.
- The One Mile Creek - Lansdowne Pond Biodiversity Enhancement Project. This is a partnership project with the Niagara Restoration Council. This project saw the removal of the invasive yellow flag iris from 14 properties in the 1 Mile Creek watershed and 1000's of native trees; shrubs and wildflowers were planted to replace them. The project also included the creation of a small intermittent wetland, and creek buffer enhancement on a property close to Landsdowne Pond which will aid in improved water quality and quantity downstream.
- A 40 m buffer enhancement project in partnership with the Friends of One Mile Creek.
- A 5 acre woodland enhancement project was completed within the 4 Mile Creek watershed with the support and help of employees from Henry Schein Medical.
- 2 windbreaks/woodlands were enhanced through the planting of native species within the 4 Mile Creek watershed.

Welland River/Niagara River Stewardship

The following are the program accomplishments to date for the 2012 implementation year:

- Eleven (11) wetland restoration projects are currently underway, restoring/creating over 14 acres of habitat within multiple Niagara sub-watersheds. Seven of these projects have been implemented through a partnership with Ducks Unlimited Canada. One project is in partnership with Ontario Soil and Crop Association through the Canada-Ontario Farm Stewardship Program.
- A Species at Risk habitat improvement project involving the construction of four Snapping Turtle nesting plots adjacent to South Forks Drain. The project is in partnership with a private landowner in the Big Forks Creek watershed and the Ontario Soil and Crop Association through the Canada-Ontario Farm Stewardship Program. This project will deter the turtles from nesting on the sides of raods which is a major contributor to their populations being peril.
- A retrofit project in partnership with a large greenhouse operation in the Chick Hartner Drain watershed to control irrigation run off to improve efficiency and reduce fertilizer use and nutrient runoff to the local watercourse.

- A Wetland Biofliter improvement project in partnership with a large greenhouse producer. The biofilter will allow for the re-circulation and reuse of irrigation water, thereby reducing the amount of nutrients released into the Michener Drain.
- Two Best Management Practices projects involving the construction of improved manure management facilities to reduce non-point source pollution in Mill Race Creek and Bayers Creek.
- One riparian fencing project in the Upper Welland River to aid in reducing erosion and negative water quality impacts due to livestock access.
- Reforestation efforts throughout the watershed included the planting and enhancement of 40 acres of woodland. More than 36,000 native trees and shrubs were planted on 9 sites.

Ontario Power Generation Welland River Partnership

- Two riparian buffer projects to aid in reducing erosion impacts from the flow reversal and fluctuation in the major zone of impact while improving runoff and associated water quality.
- Staff continues to work on multiple shoreline erosion/riparian habitat projects within the flow reversal and fluctuation zone involving the installation of BioD-Blocks - a unique bio-engineering product designed to mitigate shoreline erosion issues while improving habitat and water quality through the establishment of vegetation.
- One large-scale floodplain wetland restoration project in the Wellandport area. This project will be similar in scope to the E.C. Brown Wetland project, minus the trail infrastructure as it is on private land. In addition, livestock fencing will be installed to eliminate horses form the river and riparian edge.
- The Canadian Pacific (CP) Railway Bridge in Attercliff (crossing the Welland River) will be subject to a debris clean-up in August. This work will be done by CP under the direction of Transport Canada. An erosion / stabilization project will be undertaken with the adjacent landowner to assist in minimizing the impact on his property from the flow reversal and fluctuation in the area. In addition, the NPCA's Water Well Decommissioning Program will assist with an old, abandoned dug well.

12 Mile Creek Stewardship

The following are the program accomplishments to date for the 2012 implementation year:

- A riparian buffer project in critical Brook Trout habitat on 500 meters of stream consisting of the installation of more than 400 native trees and shrubs.
- Repair to a stream crossing involved the placement of nearly 20 tonne of rock to aid in the efficient crossing of farm equipment (as opposed to driving through the creek).
- A wetland project in the Upper Twelve Mile Creek of approximately 7 acres in size, to aid in flood mitigation and provide habitat and water quality improvement.
- A wetland in south Niagara Falls, half acre in size to provide biodiversity.
- An erosion control project scheduled for later this summer (currently in the design phase) will involve the installation of fish habitat structures and other bioengineering techniques.

- Reforestation efforts throughout the watershed included the planting and enhancement of 32 acres of woodland. More than 26,000 native trees and shrubs were planted on 8 sites.

15-16-18 Mile Creeks Stewardship

The following are the program accomplishments to date for the 2012 implementation year:

- The establishment of 6 acres of floodplain woodland and seasonal wetland habitat in 16 Mile Creek.
- A wetland creation project 0.25 ac in the 15 Mile Creek
- 200m riparian planting of native tree and shrubs was completed along 16 Mile Creek in St. Anns.
- A 0.5 acre wetland restoration is currently in the design phase for 16 Mile Creek.
- A stream crossing for farm equipment is being planned to reduce siltation and erosion issues in 18 Mile Creek
- An erosion/bank stabilization construction project in 16 mile creek. The project was completed at Big Valley Campground and will be highly visible to visitors of the park.
- A construction project including the remediation of a perched culvert and erosion/bank stabilization is currently in the design stages.
- Infill planting was completed for 5 projects from 2011 where necessary
- Continued enhancement of two wetland projects from 2011, including seeding and plantings were completed
- Planning and design for 3 snake hibernacula in 16 Mile Creek.

Twenty Mile Creek Stewardship

The following are the program accomplishments to date for the 2012 implementation year:

- 200m wetland riparian planting
- A 2.5 acre wetland and a 0.25 acre wetland are in the planning phases in West Lincoln
- Invasive species removal (phragmites) from a wetland at a retirement condominium community property in Hamilton.
- 2 stream crossings and an erosion control project in West Lincoln.
- 1 eavestrough–cleanwater diversion project in Lincoln.
- 1 manure storage/nutrient management project in West Lincoln
- Reforestation efforts throughout the watershed included the planting and enhancement of 18 acres of woodland. More than 16,000 native trees and shrubs were planted on 4 sites.

Fort Erie Creeks Stewardship

The following are the program accomplishments to date for the 2012 implementation year:

- The construction of a half -acre wetland restoration project within the Miller Creek watershed to improve habitat and water quality.
- The installation of one riparian fencing project with in the Black Creek watershed to reduce erosion and negative water quality impacts due to livestock access.

- The establishment of an improved riparian buffer at a golf course in the Frenchman's Creek watershed.
- A shoreline stabilization project in Lake Erie North Shores, approximately 6 acres involved the planting of 5000 native trees and shrubs and 2100 plugs of grasses and wildflowers to secure the sand dunes and prevent further habitat loss of this unique shoreline feature.

General Restoration (Non Watershed Plan Areas)
The following are the program accomplishments to date for the 2012 implementation year:

- 1 nutrient management project at a greenhouse operation within the 40 Mile Creek watershed. This project allowed water to be collected and re-used after watering thereby reducing the amount of nutrients being added each time and preventing the runoff from entering the nearby creek. (Always Fresh Greenhouses)
- 3 additional previous projects were given plant material to enhance the windbreaks/woodlands within the Vineland Drain watershed in Beamsville.
- Planting of 2 acres of trees and shrubs for slough forest habitat restoration in 40 Mile Creek.
- A 0.25 acre wetland is planned for 40 Mile Creek
- A 500m grassed waterway in Beaver Dams Drain, Port Colborne to reduce sedimentation from agricultural activities to the watercourse.
- Native trees and shrubs were provided to 4 landowners on a cost-share basis, for them to plant on their properties
- A naturalization project at the Jericho House in Wainfleet saw native trees, shrubs, wildflowers and grasses planted and sown. Approximately one acre has been naturalized.

Outreach and Education
The following are the program accomplishments to date for the 2012 implementation year:

- Canopies for Kids program planting took place in May. 10 schools from across the watershed were selected and each school planted 10 large (~5-6m) trees and 15 smaller (~3-4m) trees. Approx. 2900 students participated in planting and aftercare. Monitoring of these ten schools, plus participants from 2011 is currently being conducted. **The event was featured on Cogeco's The Source and was covered by multiple local newspapers including the Welland Tribune, Niagara This Week, , and the St. Cathabries Standard.**
- The 2012 Niagara Envirothon was a great success with 65 students competing from 9 different schools across the watershed. New schools for this year included Beamsville District Secondary School and Ridgeway-Crystal Beach High School. The winning team from the 2012 Niagara Envirothon, St. Michael Catholic School from Niagara Falls, placed 7th overall at the Ontario Envirothon competition this year. The Niagara Envirothon received funding support from Ontario Power Generation, WaterSmart Niagara, Land Care Niagara and Ontario Forestry Association. **The event was featured on Cogeco's The Source and was covered by local newspapers including the Welland Tribune, Niagara This Week, In Port News.**

- Earth Day at Ball's Falls Conservation Area was a great success with over 200 visitors. Visitors to the Centre participated in making a toad home, constructing and painting a blue bird box and nature hikes. **The event was featured on Cogeco's The Source and was covered by local newspapers including the St. Catharines Standard and the Voice of Pelham.**
- Yellow Fish Road Program saw the painting of 44 storm drains and the distribution of 225 fish door hangers to Niagara residents.
- Staff presented at the Port Colborne and District Conservation Club to highlight the Community Fisheries Involvement Program, including the Angler Diary Program and the Angler Catch and Release Program.
- Over 45 students from Alexander Kuska school in Welland visited the E.C. Brown Conservation Area to participate in an ecological educational tour in May.
- NPCA assisted with the planning and planting of large native trees at A.N.Meyer Secondary School in Niagara Falls
- Staff assisted the Friends of One Mile Creek with their Earth Day Creek clean-up. **The event was covered by the Niagara Town Crier.**
- Staff assisted a newly formed Drapers Creek Community Group with a creek clean-up on Earth Day.
- Staff coordinated a weekend volunteer planting with a Scouts group from Welland in partnership with the City of Welland at Cooks Mills Park. The Scouts planted 250 trees at the site and applied mulch and water to the plantings.
- Staff are assisting with the construction of a "willow dome" at an elementary school in Welland. The willows grow to create a shaded space for outdoor education and learning. Although popular in Europe, this is the first project of this kind at a school in Niagara.
- Staff assisted with a wildflower garden at a school in Chippawa to create an outdoor education opportunity. Over 30 students participated in the planting and will be responsible for caring for the garden.
- The NPCA received confirmation of funding from the Ontario Community Environment Fund for the printing of the Stewardship Guide. The Stewardship Guide is in the final review phases and is anticipated to be completed in September.

Niagara River Remedial Action Plan (RAP)

a) Lyons Creek East – Contaminated Sediment

- The Administrative Controls Protocol for Monitored Natural Recovery of contaminated sediment in Lyons Creek East is in place, and the NPCA is the lead coordinating agency. The local community has been advised through distribution of an update newsletter.

- Details and reports are available at: *www.npca.ca/planning-permits/lyons-creek-east/*

b) Monitoring & Assessment

- The Welland River Eutrophication Study is complete. Next steps will involve developing a strategy with partners to address the problems and identify remaining RAP actions.
- An interim assessment of fish & wildlife habitat has been completed.
- An assessment of fish & wildlife populations is underway.

LAND MANAGEMENT DEPARTMENT

Ball's Falls Conservation Area

Historical buildings are open for tours. Mill siding on the west side is now complete. The stabilization of the Mill is an engineering task that will begin in August.

The Crystals to Gems exhibit continues to be featured at the CFC. A Lapidary demonstration was held on June 30. Staff are preparing for the next exhibit, Iroquois Beadwork, a travelling exhibit from the ROM. Staff are following up on changing situations with the Province's Museum Assistance Program (MAP) in order to secure funding for Crystals to Gems Exhibit.

Followed up on projects: Outdoor Maps & Interpretive Panels, New Mill Exhibit Shelving for Gift Shop people place concept slated to be done by Aug 1 to coincide with the exhibit opening. All shelving units have been purchased, refurbished and installed.

Face book, Twitter and ballsfalls.ca are being updated on a regular basis. We are receiving positive feedback and building our social media connections.

Proposal to add a special video window to Web page showing the strength of the flow of the falls has been received. This addition may reduce the amount of complaints received in the warm months when the falls are dry. It is also an animated feature of the web page and it could liven up the presentation.

Staff attended several outreach events including the Attractions Showcase in Niagara Falls, Stoney Creek Battle Weekend, Ancaster Heritage Days, and Kids Art in the Park (Welland Rose Festival).

Spring Awakening, Your World Rocks, From Crystals to Gems school programme, Stray Squirrel programmes were launched. Gardening and Blacksmith workshops continue to go well.

Arrangements for the Thanksgiving Festival are on track. Vendors are placed and the entertainment schedule has been finalized. Staff will be focusing on the new vendor layout, heritage displays and selection of food vendors. This year the Centre for Conservation (CFC) will be marketed as a "Centre for Celebration", showcasing some of the special event operators that use the site.

A TD Friends of the Environment Grant provided assistance for the installation of a Bee observation box outside the CFC. The artist responsible for the box is making a donation as well. Plans are being examined to produce a bee wall habitat from quarried stone in the arboretum. An Agri-Spirit grant application has been submitted to pay for the wall.

There have been a number of inquiries for filming at Ball's Falls. In September the reality show "4 Brides" may be filming a wedding at the CFC.

The Community Museum Operating Grant (CMOG) Report - part two, was submitted at June's end. Ball's Falls has registered with the Provincial government's new computerization of grants and services programme. Ball's Falls has also submitted its CMOG application for the next year, examination of 2011 for 2012-13.

Binbrook Conservation Area

It was a very busy July Long-Weekend… Unofficially it was the busiest and highest revenue in the park's history. The warm weather and sunny days have helped the conservation area recover from the loss of ice fishing revenues in the winter. Picnic pavilions are booked throughout the rest of the summer, including many of the open air pavilions.

The splashpad is functioning well. The facility has passed all of the final inspections by the City of Hamilton.

Capital works ongoing include final landscape restoration around the splashpad and play structure. A phone line was installed, providing better communications with the store and boat rental facility. The kids fishing pier is being expanded with platforms on either end. This will add approximately 30 feet more dock for recreational use and improve the shoreline in this area. Plans are also underway by staff to add a floating dock in this area to replace the handicapped fishing platform that was removed by pavilion number one earlier this year.

Riprap has been distributed along sections of the shoreline where we had some significant erosion from the high water levels earlier in the spring.

Beach was posted for high bacteria levels on July 5th. The posting was removed on July 11th.

Binbrook has been registered as a "Family Fishing" destination with the OFAH. This will provide additional promotions and marketing through OFAH publications and website traffic.

Approx. 360 Seasons Passes sold to date, a head of last year…lots of them are new as opposed to renewals. Many of the renewals will be due in July and August

The Binbrook Triathlon, held in June, was a major success. This event is building in popularity and many of the participants return to the site throughout the year, for training purposes.

An outdoor movie night under the stars is scheduled for Saturday July 14th, 2012. This event is in partnership with the Glanbrook Home Support Programme. The park will be open later for the event. Admission is free, with donations supporting the Glanbrook Home Support Program. The Hamilton International Airport is helping to fund the event. Staff expect the balance of funding will come from sales at the park store during the movie. Hamilton Councilor Brenda Johnson has been a great supporter of the event.

Long Beach and Chippawa Creek Conservation Areas

Park operations are at full strength. The Canada Day Long Weekend was very busy, with few problems. Park systems were able to meet the high demands, and campers enjoyed their stay.

Beach water quality has been on again / off again. Conditions are changing daily. Water temperatures in all bodies have peaked to summer max far earlier than usual. At Long Beach, this has resulted in Total Dissolved Solids (TDS) contaminants from rotted algae shutting down our water treatment 1 to 1.5 months earlier than ever. Our standard operating procedure in these cases is to truck in water as the cost of running treatment will go to $200 - $300 per day vs. $100 - $200 to truck it in.

On the plus side, high water temps on Dils Lake are suspected of causing a die-off of milfoil, coontail and similar lake vegetation. Staff estimate a savings of 5 days in time and materials for weed harvesting operations. The situation helped make the 25th Annual Chippawa Creek Bass Derby a success. Fisher-folk registered for the weekend (camping and fishing) during the July 7th weekend. This is a very popular event for families, with prizes awarded for heaviest fish in adult and children's categories.

The Russian Festival at Chippawa Creek on Jun 22-24 was a success that brought in $5,400 in revenue. Many seasonal campers took chairs down to join in. This is a new event, gaining in popularity. Many campers are now looking forward to it. Staff received many comments from non-festival visitors who said the event is "good for the park" on a number of levels.

Staff at Long Beach are preparing for Bolerama. The event, run July 20-22, is a gathering of people who own Boler Trailers. Last year our facilities impressed the group so much that they decided to make it an annual event.

Wainfleet Access Beach

Work to upgrade the trail to the beach was completed as planned. The trail over the dune was re-worked across the dune slope to reduce the trail grade and mitigate wind erosion. The new trail held up well to the busy long weekend at the beach, our staff will continue to monitor the trail and site over the summer months during routine maintenance operations. As usual, it has been a very popular spot for those looking to escape the summer heat.

Beamer Memorial Conservation Area

Staff continue to monitor the Buckthorn removal area, treating for new growth, and several missed trees. This activity will continue for the next 4 years, until the seed bank is depleted.

Stevensville Conservation Area

A prairie site was planted in partnership with the Fort Erie Conservation Club and Pheasants Forever. The area was seeded with native prairie grasses and flowers, and augmented with plantings of some native grasses, sedges and wild grape. This area will provide a feeding and nesting area for wild turkey and pheasants, with the surrounding site providing cover, escape and linkages to other habitats for these birds.

Site management will include some weeding in the first few years with partial plot mowing in subsequent years to mimic the effects of fire. The site will be monitored by volunteers and staff while the plants come into effect.

Mud Lake Conservation Area

Staff are monitoring the effects of site water management, with the annual benthic invertebrate sampling. This helps the NPCA track diversity and abundance of benthic throughout the years to show changes in relation to open water-plant ratios. As benthics provide a valuable food source for waterfowl, and other species, the benthics levels are expected to be high early in the water management cycle and low late in the cycle. At these times water levels will be lowered, plant diversity increased, open water-to plant ratios adjusted. Monitoring shows positive results with the benthics increasing in abundance and diversity as higher water levels return.

St. Johns Conservation Area

A population of bass and large goldfish species have been identified in the site pond. To minimize potential effects on species in the upper headwaters of the 12 Mile Creek, these species will be removed. The Ministry of Natural Resources will be assisting with equipment and resources in July.

Jordan Harbour

Two new floating docks were installed this past month at the boat ramp area, providing over 50 feet of wood docking for recreational use in addition to the docking offered by the rowing school.

20 Valley – Jordan Stairs

The stair replacement project went out for tender in June with bids received July 10th. For this public tender bid documents were made available online via our website and at the website for the Niagara Construction Association. Positive feedback was received from bidders for the convenience in accessing and viewing bid documents online. See the separate report on the bids enclosed herein.

Wainfleet Bog Conservation Area

Site information/welcome signs are in final production, delayed with changes to some of the text. The three signs will be installed in late-July.

Hunting Permits

Staff issued an additional 5 hunting permits for a total of 177 hunting permits issued for the NPCA Conservation Areas in 2012. Of this total, hunting permits are issued to 37 individuals residing outside of our administrative area.

Waterfowl Hunting Program

The controlled waterfowl hunting at Binbrook and Mud Lake Conservation Area will continue in 2012. A lottery system is used to select hunters for the CA blinds during the first two weeks of the federal duck hunting season. These applications will be available shortly after the federal announcement of the duck hunting season, expected in late July. NPCA lottery application deadline is August 31, where hunting blinds will be selected and all successful applicants informed in early September.

Ontario Family Fishing Week (OFFW)

Ontario Family Fishing Week is July 7 – 15 where Canadian residents are able to fish licence free. Highlighting fishing events and destinations for this week, both the Chippawa Creek Bass Derby and the Binbrook Conservation Area 'Fish Binbrook' events have been listed in the provincial website/event list.

As part of the Ontario Family Fishing Week, both Conservation Areas will also be handing out 'OFFW' materials including: colouring contest sheet, kids fishing licence, 'How to Fish Booklets'

and fishing lures, on a first come-first served basis. Materials were generously provided by the OFFW.

Gord Harry Trail

NPCA staff are in consultation with staff at Haldimand County, Trans Canada Trail, City of Port Colborne, and the Township of Wainfleet to discuss trail connections and linkages to the Gord Harry Conservation Trail in Wainfleet. The focus of these discussions is to look at ways and means of expanding trail connections into Haldimand County and the City of Port Colborne.

COMMUNITY RELATIONS

Niagara Children's Water Festival

2012 marks the 10th anniversary of this exceptionally successful and popular program. This year 5,001 students are registered and along with parent volunteers, teachers, students volunteers and presenter over 6,000 will be on hand to mark the occasion. A total of 97 schools are participating as follows:

Tuesday	1,249 (23 schools)
Wednesday	1,256 (23 schools)
Thursday	1,264 (24 schools)
Friday	1,232 (27 schools)

Currently there are six schools on the waiting list.

The public day is scheduled for Sunday, September 16 from 12:00 to 4:00. This is always a popular event and provides an opportunity for families to come out to learn about the environment and our water resources in an interesting and interactive way. Plans are also underway to host a special luncheon and an invitation has been extended to the Minister of Environment requesting his attendance along with others from our municipal and project partners. This will give an opportunity for guest to witness first-hand the tremendous success of this program. The new website has been a great resource for teachers and students to continue learning about water resources throughout the year.

Community Outreach

Staff continues to participate in numerous community initiatives to promote the work of the Conservation Authority and our various conservation areas. An updated Conservation Areas booklet has been completed and will be distributed to tourism centers, libraries, municipal offices and hotels. Staff will also be hosting several delegations from Asia over the next few months. These groups have indicated a keen desire to learn about the way Conservation Authorities balance our mandate of managing natural resources with human needs and development.

The July 9th edition of The Toronto Star published an article on a new book entitled ***Hikes & Outings of South-Central Ontario***, compiled by N. Glenn Perrett. Staff had the pleasure of working with Mr. Perrett in the course of his work and the NPCA is featured quite prominently in the publication where Ball's Falls, Beamer Memorial and Woodend Conservations Areas are highlighted.

Source Water Protection

The Committee met on June 26th to finalize the Source Protection Plan and will be submitting it to the Minister of Environment after approval by the Source Protection Authority.

Queen's Jubilee Medal Award

It is with great pleasure that we are able to share the news that Doug Elliott, one of the NPCA's founding members and past Chairman has been selected to receive the Queen's Jubilee Medal. The medal is being awarded through the office of M.P.P. Cindy Forster. Born in Welland, Ontario on April 5, 1925 where he continues to reside, Doug Elliott transformed an early love for the outdoors into the pioneering role he has played as a conservationist in this region of Ontario and Canada – a role he has selflessly embraced, and one that has borne results that will continue to enrich the lives of everyone who cherishes the rich diversity and beauty of this region's natural heritage for generations to come.

2012 Latornell Symposium

The A.D. Latornell Conservation Symposium continues to be one of Ontario's *premier* annual environmental events. It provides a forum for practitioners, policy makers, nongovernment organizations, academics and businesses to network and discuss the challenges and opportunities in Ontario's conservation field. The symposium will take place November 14-16, 2012 at the Nottawasaga Inn and Conference Centre, Alliston, ON. This year's theme ***Prescription for a Healthy Environment*** brings attention to the important connections between healthy people and clean, sustainable water, and a rich mix of plants, animals and ecosystems. Ontario's Conservation community strives to implement programs that encourage healthy and resilient watersheds, and in turn, a healthy population. Delegates are challenged to bring solutions and innovations to this year's event.

Fundraising Update

Staff will be requesting donations from the various artisans selected to the Thanksgiving Festival for the annual raffle. The Thanksgiving Festival will be held from October 5-8th 10:00 a.m to 5:00 p.m.

Notices for the annual Bursary program have been sent out to high schools in the eligible catchment area and to date one application has been received. The program was set up and continues to be funded through an endowment set up by the Fort Erie Conservation Club Women's Auxiliary. Scholarships of up to $1,000 each are awarded to eligible students in the Fort Erie area who will continue their post-secondary education in the field of conservation.

Recommendation:

Report No. 41-12 outlining the status of Authority projects/programs be received for information.

Respectfully Submitted by:_____

Tony D'Amario, P.Eng.
Chief Administrative Officer/Secretary-Treasurer