

# Project Plan for the Proposed Britannia Village Flood Control Project

Prepared by the Rideau Valley Conservation Authority

in accordance with Conservation Ontario's  
Class Environmental Assessment for Remedial  
Flood and Erosion Control Project

May 4, 2014





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# 1. Introduction

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## Explanation of Project Plan and relationship of the undertaking to the *Environmental Assessment Act*

This Project Plan has been prepared to summarize the planning and design process that has been followed by the Rideau Valley Conservation Authority (RVCA) for the proposed Britannia Village Flood Control Project, to describe the environmental setting within which the project will be undertaken, and to describe potential environmental impacts from the project and how they will be avoided or mitigated during construction and operation of the proposed works.

Under Conservation Ontario's Class Environmental Assessment for Remedial Flood and Erosion Control Projects ("the Class EA"), a Project Plan (instead of an Environmental Study Report, or an Individual Environmental Assessment) is the appropriate form of documentation for remedial works for which it has been demonstrated that there are no negative impacts or outstanding concerns held by the Conservation Authority or reviewers.

This Project Plan has been prepared generally in a format that is prescribed in the Class EA,<sup>1</sup> and will be filed and made available at the RVCA and other locations for a 30-day public review period. The RVCA and its agents will work to satisfactorily address and resolve any concerns that are raised during this review. In the event that an issue cannot be resolved through follow-up consultation or negotiation, the RVCA, in consultation with the City of Ottawa, will consider preparing an Environmental Study Report, or alternatively any party may make a request to the Ministry of the Environment for a so-called "Part II Order," requiring the RVCA to comply with part II of the *Environmental Assessment Act* before proceeding with the proposed undertaking.

If no concerns are raised during the Project Plan's 30 day review period, the project is considered approved under the Environmental Assessment Act and can proceed to implementation once all other necessary approvals have been obtained. Notification that the project is approved will be sent to all parties who expressed an interest in the remedial work.

## Purpose of the undertaking

The purpose of the undertaking is to provide an improved system of flood control barriers to serve a flood vulnerable area of the Britannia Village Community. The proposed works will raise the level of protection afforded to the community by preventing the overland passage of flood waters into the community during 1:100 year flood conditions on the Ottawa River — for a water level of 60.8 metres above sea level (m.a.s.l.) as measured at Britannia Bay, Water Survey

of Canada Recording Station 02KF005. The design includes a 0.30 metre freeboard allowance above the design flood level as an additional margin of safety. The existing assortment of seawalls, earthworks and removable bulkheads could be expected to prevent the entry of flood water into the community for water levels up to about 60.4 m.a.s.l. (the water level associated with a 30 year return period), but they have not been managed or operated as a unified system by any single public or private entity. As part of the proposed undertaking, responsibility for the ongoing maintenance and operation of the improved flood control system will be placed with the RVCA, working in cooperation with the City of Ottawa, thereby improving the reliability of the community's flood defenses as well as the level of protection provided by them.

## The Study Area

The study area for this Project Plan includes areas that could be *directly* or *indirectly* affected by the undertaking.

*Directly affected* areas include properties that will be occupied by the constructed works: City-owned open space land in Britannia Park, riverfront residential properties between Salina Street and Rowatt Street; filled Crown Land (formerly the bed of the Ottawa River) located between the present day water's edge and upland private properties.

*Indirectly affected* lands in the study area are those for which the undertaking could have an environmental impact of some sort, as a result of its design and operation, or due to construction procedures.

The Study Area, for the purposes of examining the potential for environmental impacts caused by the proposed undertaking, is generally described as including the lands and waters that are located within an area bounded on the north by the Ontario-Quebec interprovincial boundary, on the south by the NCC's Ottawa River recreational trail (formerly an old railway bed), extending to the east as far as the easterly limits of the Britannia Conservation Area, and to the west as far as the westerly limits of the Lakeside Gardens/Britannia Beach parklands. **Figure 1** depicts the extent of the Study Area.

Within the study area there is a smaller area that will benefit from the undertaking, which includes the lands within the Britannia Village Community which are identified as being prone to flooding under 1:100 year flood conditions on the Ottawa River, as shown in RVCA flood plain mapping. **Figure 2** shows the flood vulnerable area as determined in a 1984 Flood Plain Mapping study.<sup>2</sup>

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<sup>1</sup> Conservation Ontario's approved Class Environmental Assessment for Remedial Flood and Erosion Control has been amended on two occasions (in 2009 and again in 2013) since the initiation of the planning and design process for this project in 2008. Project planning and design was initiated under the 2002 version of the Class EA.

<sup>2</sup> Ottawa River Flood Plain Mapping; MacLaren Plansearch Inc. for MVCA, RVCA and RMO, December 1984

### General description of the undertaking

The undertaking under consideration involves the construction, maintenance and operation of a flood control system consisting of an assortment of low level earthen (clay) dykes, modified and/or reconstructed seawalls and removable flood control bulkheads, complete with drainage works (sumps pits, shallow perforated drain systems and more conventional storm sewers with connections to the municipal storm sewer system and/or temporary pumping facilities), as shown schematically in **Figure 3**. The final design<sup>3</sup> of the proposed works is depicted in a set of four drawings dated May 2, 2014 contained here in Appendix A.

### Rationale for the undertaking

As noted above, the proposed remedial flood control works will provide a higher level of protection against flooding than exists presently, and will be much more reliable than the existing, ad hoc assortment of flood control measures that have been implemented by individual property owners in the past. The benefits to be gained by implementing the project will be in the form of reduced property damages, reduced risks to public safety and less community disruption during future flood events on the Ottawa River. The City of Ottawa, as the sole benefitting member municipality of the RVCA for this undertaking has secured the funding to enable its initial construction and future operation and maintenance.



<sup>3</sup> as of the date of this version of the Project Plan (May 2, 2014), the final design continues to evolve while negotiations for permanent easement rights on directly affected land are in progress, so the drawings referred to here are subject to further refinement and revision, but not likely to the extent that the content of the Project Plan will require substantive amendment.

## 2. Background

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Significant, widespread flooding of several days' duration last occurred in the Britannia Village community in May, 1979 when the Ottawa River water level peaked at 60.26 m.a.s.l., at a discharge of 5,110 cubic metres per second (cms).<sup>4</sup> Property damages and losses sustained during that event were not well documented, but according to newspaper accounts, residents were displaced from their homes for several days and there was significant disruption in the community. A higher water level had been recorded on only one other occasion in the 97 year long period of record for the Britannia Bay monitoring station — on May 15, 1928 at 60.35 m.a.s.l. In the aftermath of the May 1979 event, the City of Ottawa and local landowners implemented flood protection measures (many of which are still in place today in the form of seawalls, grade modifications and removable flood control bulkheads) with a view to protecting the community against future flood events of similar magnitude to what was experienced in 1979. Those measures were undertaken on a voluntary basis by the City and landowners on the waterfront, to no particular engineering or construction standards (at least none that were documented) and with no strategy in place to ensure their continued existence or maintenance. Their effectiveness, even to the level of protection for which they were intended, has always been questionable.

Since 1979, water has flowed overland into the community on several occasions as a result of wind driven waves overtopping the waterfront installations when combined with moderate spring-time water levels on Britannia Bay. During these events, the rate of flow into the lower lying areas due to wave overtopping has been more than the local drainage system's inlet capacity, causing localized flooding in the lowest lying portions of the community.

In 1984, the RVCA, jointly with the Mississippi Valley Conservation Authority and the Regional Municipality of Ottawa-Carleton commissioned the first ever flood plain mapping study of the Ottawa River, in which it was determined that the 1:100 year food level for Britannia Bay is 60.77 m.a.s.l. This is the water level associated with a flow of 6,370 cms which has a one percent probability of being reached or exceeded each year and is the "regulatory flood" for this area. The 1979 event was determined to have had a return period of slightly less than 20 years (a probability of occurring each year of slightly more than five percent).

In 1992, the RVCA commissioned the *Lac Deschenes Flood Damage Reduction Study*<sup>5</sup> (often referred to as "the 1992 Novatech study"). This study made an estimate of the average annual flood damages that could be expected in flood vulnerable communities along the Lac Deschenes reach of the Ottawa River (including Britannia Village), based on flood depth vs. flood frequency information from the 1984 study, surveys of the buildings in the communities, and empirical relationships between expected flood

damages and flood depth for typical residential building classes (by type and construction quality). The study included a preliminary analysis of the technical and economic feasibility of implementing remedial flood control measures to reduce average annual flood damages, and its findings suggested that doing so could be cost-effective for the Britannia Village community. In the mid-1990s, community leaders facilitated discussions within the community as to whether or not a project of remedial flood control measures, as suggested in the 1992 Novatech study, should be pursued. No decision to initiate a project was made as a result of these discussions in the mid 1990s.

Meanwhile, the 1984 flood plain mapping was adopted for use by the City of Ottawa and RVCA in the land use planning and development approvals process to prevent the creation of new building lots or land use intensification within the identified hazard lands, and to require that any new construction or reconstruction on existing lots of record within the flood prone part of Britannia Village would be adequately flood-proofed, thus preventing any increase in average annual flood damages. These policies had the effect of reducing potential damages in the long term, because they required that flood-proofing measures be incorporated into any new additions or building replacements that were determined to be permitted uses within the zoning that lay beneath the "flood plain overlay" that had been established in zoning schedules.

In 2006, the flood vulnerable portion of Britannia Village was included in the area which is subject to the RVCA's "Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses" (Ontario Regulation 174/06 made under Section 28 of the Conservation Authorities Act). Around the same time, provisions in the City of Ottawa's comprehensive zoning bylaw which control development in flood prone areas were amended. In accordance with the Provincial Policies for the management of natural hazards, development and redevelopment of properties in the flood prone area (the floodway) came under tighter control such that, since 2006, approved development has been limited to only very minor additions, unless it is demonstrated that means of "safe access and egress" during the regulatory flood event would be available to the occupants of the property. With these policy changes, a number of lots that remained "under-developed" relative to the previous zoning provisions (e.g., vacant lots or lots occupied by older buildings with relatively small living space) have in effect been frozen in their present condition. The changes triggered a new round of discussion within the community on the merits of investing in flood protection measures for the community (based on a preliminary design concept that had been developed pursuant to the 1992 Novatech Study) to prevent future flood

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<sup>4</sup>As measured at Water Survey of Canada hydrometric station 02KF005

<sup>5</sup>undertaken by Novatech Engineering Consultants Ltd.

damages and risks, but also as a possible means of relaxing the development control polices to enable the resumption of flood-proofed development and re-development on existing lots of record, but only to the extent (in terms of the number of households and building sizes) that had been permissible up until the 2006 regulatory and policy changes. This would be accomplished by formally designating the area that will have been protected by an engineered flood protection system as “flood fringe” wherein limited, conditional development may be permitted according to and consistent with the Provincial Policies.

By Autumn, 2007 Ottawa City Council adopted a resolution approving *“the implementation of the proposed Ottawa River 100-year flood protection measures in Britannia Village .... based on the revised petition of interest having received support from at least 50 percent plus one of the owners of non-City properties within the flood plain limits defined by the Rideau Valley Conservation Authority.”*<sup>6</sup> After Council’s decision to support the capital project, the RVCA initiated the remedial flood control project and undertook the necessary administrative steps to define the RVCA-Ottawa relationship (for the purposes of this project) in a Memorandum of Agreement, and to enlist the

services of a qualified engineering consultant (Delcan Corporation Ltd.) to provide the required design and construction management services for the project.

By December 2008, a “Notice of Intent” was published in the local weekly newspaper and distributed to potentially interested agencies and stakeholders to notify them that the planning and design process was beginning and to invite interested parties to provide input. Since then the detailed design of the proposed flood control measures has evolved through numerous discussions with the owners of properties that would be directly affected by, or are adjacent to the proposed flood control measures. As the design has evolved, the estimated cost of the proposed works has been updated and on two occasions the need for additional funding approvals was identified. By early 2013, a commitment of Provincial funding to the project was secured by the City of Ottawa, from the Ontario Ministry of Infrastructure, leading to a renewed effort in the summer and fall of 2013 to finalize the design. Given the time that has elapsed since the 2007 decision by RVCA and City of Ottawa to initiate the project, a second Notice of Intent was published in Ottawa area daily newspapers, and distributed to the RVCA’s external contacts lists in early February, 2014.



<sup>6</sup> Excerpt from City Council minutes of September 26, 2007

### 3. Baseline Inventory

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An overview of the environment that stands to be affected by the proposed flood control works has been prepared using the “Baseline Environmental Inventory Checklist” contained in the Class EA for Remedial Flood and Erosion Control Projects, and is summarized in tabular form in Appendix B.

The environmental inventory has been completed using information obtained from:

- A *Natural Resource Scoping and Preliminary Impact Assessment* undertaken by Ecotec Environmental Consultants Inc. (July 2008), included here in Appendix C
- the Rideau Valley Conservation Authority’s watershed information system and the accumulated knowledge acquired through RVCA’s ongoing watershed monitoring programs, past studies and involvement in local land use planning and development approval processes throughout its area of jurisdiction
- the Provincial Natural Resources and Values Information System (NRVIS)
- comments received in response to the published Notice of Intent for the proposed project
- dialogue and discussion with local landowners and stakeholders during the planning and design process



## 4. Examination of Alternatives

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The planning and design process which is outlined in the Class EA calls for “alternatives” of two kinds to be examined:

- a) Alternative Conservation Authority Program Options, and
- b) Alternative methods of carrying out the remedial project.

### **Alternative Conservation Authority Program Options**

The primary objective of the undertaking is to reduce flood damages and risks to public safety resulting from inundation of the Britannia Village Community by flood waters of the Ottawa River.

The *Program Option* that is being pursued through the undertaking is essentially *to construct remedial works to prevent overland entry of flood waters into the Britannia Village Community*. Through this undertaking, existing flood control works will be improved (to provide a higher level of protection) and brought under a formal operation and maintenance regime (to improve their reliability and ensure their effectiveness in the long term). The planning and design of the undertaking was initiated and has evolved without a deliberate and methodical examination of alternative Program options having been completed.

The RVCA, in cooperation with the City, could have considered pursuing other Program Options to achieve the stated objective, as follows:

#### **Alternative Program Option A: Do Nothing**

- Reduction of average annual flood damages would be dependent on landowners’ voluntary investment in flood proofing measures on a property-by-property basis
- Public safety risks and inconvenience due to flooding on local streets would not be decreased by flood-proofing of individual residences
- Average annual flood damages and risks would increase over time as the existing informal flood defenses continue to age and deteriorate (there is no formal operation and maintenance strategy in place for them at present; landowners are not obliged to maintain the existing flood defenses for the benefit of the larger flood prone community)
- “Doing Nothing” will not achieve the objective

#### **Alternative Program Option B: River Engineering Solutions to reduce expected Ottawa River flood levels**

- in theory, modification of the river channel at the Deschenes Rapids could be done to increase the river’s capacity to pass flood discharges with lower water levels on Britannia Bay, but doing so would have major environmental and socio-economic consequences
- this program option is not feasible

#### **Alternative Program Option C: Artificial storage solutions to reduce flood discharges**

- In smaller river and stream systems flood control reservoirs can sometimes be used to attenuate runoff and reduce downstream discharges
- Dams in the Ottawa River watershed have been built primarily for hydro-electric power generation and their management is coordinated through the Ottawa River Regulation Planning Board to optimize the system’s operation and minimize its impact on flooding to the extent that’s possible given the physical characteristic of the dams and reservoirs, and other constraints. The storage available in the existing system of dams and reservoirs is very small in relation to the volume of runoff from the very large Ottawa River watershed, and cannot be expected to provide flood abatement benefits during extreme rain/snowmelt events
- Building additional artificial storages for flood control purposes is not feasible

#### **Alternative Program Option D: Land Acquisition and removal of flood prone residences**

- Land acquisition costs would be very high, relative to the cost of remedial flood control measures and would not complement any other established strategies related to creation of parkland, open space whether for public recreation or natural environment purposes
- Would likely be opposed by local residents
- Land acquisition on a willing vendor/willing buyer basis is probably not possible, would require expropriation

### **Alternative methods of carrying out the remedial project**

As noted above, the proposed works to be constructed through this undertaking are essentially betterments or improvements to previously constructed flood control measures within a developed community, to provide a more effective and reliable flood control barrier consisting of earthen berms, grading adjustments, seawalls and removable bulkheads. As such, the alternative methods that are available to be used in its implementation are limited both in terms of the types of structures to be used and their location and alignment.

During community consultations, a few alternative approaches were raised and considered, but deemed either unworkable or less preferred than the conceptual design that had formed the basis of City Council’s original decision to provide financial support to the project.

#### **Alternative alignments for elements of the flood control barrier**

- Instead of improving previously constructed works, a new barrier system could be installed on the bed of the Ottawa River so as to avoid encroaching on private land or filled Crown Land:
  - Further encroachment onto the bed of the river would give rise to adverse impacts on the quality of the riparian and

littoral zone of the river and would be contrary to shoreline stewardship practices advocated by the RVCA, and the principles espoused in the Class EA for remedial flood and erosion control projects

- The flood control barrier could be constructed on the municipal rights of way to avoid the need to encroach on private property:
  - The barrier would have to be higher above existing grade to achieve the desired level of protection, making it more costly
  - The flood control barrier would conflict with other services and functions in the right-of-way

***Temporary/Emergency measures versus Permanent measures***

- Instead of building permanent flood control defenses, the City/RVCA could develop and implement a flood emergency plan that includes the installation of temporary, removable flood barriers, prior to the onset of flooding:
  - Less reliable, more risky than permanent measures
  - Labour intensive and high cost in annual operation/maintenance/clean-up

- Would have to be deployed annually in late fall, given uncertainties as to site conditions prior to, and severity of, the next spring's flooding conditions
- Unlikely that RVCA or Ottawa would accept responsibility/liability for such a program

Over the course of the planning and design process there have been numerous discussions and consultations with directly affected landowners — in large open house settings, in meetings of the Community Liaison Group, and in one-on-one meetings with individual landowners. These consultations intensified in the past 12 months and more recently with the negotiation of necessary temporary and permanent easement rights over directly affected properties, (which continue as of this writing). These consultations have led to successive refinements and adjustments to the final design, and as a result numerous iterations of the design have been generated to eventually yield the preferred design, depicted in Appendix A, that is considered optimal in terms of its addressing individual preferences, tastes and opinions as regards aesthetics and compatibility with the landowners' use of the affected lands.



## 5. Environmental Screening

This section of the Project Plan contains a discussion of the potential for direct or indirect adverse environmental impacts that could result from implementing the preferred alternative for carrying out the proposed undertaking (the design depicted in the drawings contained in Appendix A), based on the local environmental characteristics and features (as summarized in the

baseline environmental inventory in Appendix B).

The potential adverse environmental impacts from the proposed undertaking and the strategies that will be used to prevent or adequately mitigate adverse impacts, are summarized on the following pages:

Environmental Feature or Characteristic	Potential Adverse Effect	Prevention/Mitigation Strategy
<b>Physical Environment</b>		
Groundwater flow	<p>Interference with subsurface flow of water from Lac Deschenes to the Mud Lake wetland, with potential disruption of the wetland's natural hydroperiod and attendant implications for wetland habitat values;</p> <p>Possibility of diversion of subsurface flow away from Mud Lake via local storm sewer system</p>	<p>The proposed flood control barrier is designed to prevent overland flow into the community; structures will be on the surface or, in the case of concrete walls, founded no deeper than frost-free depth; a continuous barrier/impediment to subsurface flow from Lac Deschenes (Britannia Bay) to Mud Lake will not be created</p> <p>drainage facilities associated with the flood control works will be provided in three sections, and are designed to minimize interception and diversion of subsurface flow while providing needed drainage of water from the surface and the near surface immediately beneath the flood control structures:</p> <p>a 250 mm diameter shallow depth perforated pipe system extending from just north of the Jamieson Street apartment block along the east side of the flood control berm with an outlet to the Rowatt Street storm sewer will collect local runoff and seepage (under high river level conditions); depth approximately 1 metre below existing grade and invert elevations (as low as 58.8 metres) that will be above the water level of Lac Deschenes except during the spring freshet season</p> <p>a 250 mm shallow depth perforated drain will be installed behind the flood wall at 156 to 170 Kehoe Street, outletting to a sump pit at low river levels the sump will drain by gravity through a backflow valve to the river side of the wall, and at high river level a submersible pump will be used. A 250 mm diameter storm sewer will be installed between the earthen flood control berm/terrace and existing residences from 176 to 206 Kehoe Street; with invert elevations as low as 58.2 metres, will be constructed of "pressure pipe" to minimize infiltration of groundwater into the pipe system when river level is higher than the pipe invert</p>
Littoral Drift and Coastal Processes	<p>Sediment transport patterns could be affected at two locations where the flood control works will encroach marginally onto the riverbed (i.e. below the normal high water mark):</p> <p>a) at the south end of the Kehoe Street townhomes, adjacent to Salina Street, and</p> <p>b) adjacent to low rise apartment block south of the Jamieson Street road allowance.</p>	<p>Effects will be minimized by providing smooth transitions to adjacent shorelines, to avoid the creation of eddies and sheltered zones where bottom materials could accumulate; all installations will be constructed with natural erosion resistant materials to avoid adding to the bed-load carried by near shore currents, and to ensure the integrity of the installations under high water/wind conditions;</p> <p>Approximately 70 metres of rip-rap bank protection will be placed on the shoreline to protect the flood control berm against potential erosions effects in the section of the project between Jamieson and Rowatt Streets, and is a beneficial effect of the project from a coastal processes/ and riparian zone restoration point of view.</p>
Surface Water Quality	<p>Discharge of runoff-borne sediments or other pollutants into the waters of the Ottawa River (directly or via the local municipal storm water collection system), during the construction period.</p>	<p>Conduct all works as much as possible in the dry under favourable weather and Ottawa River water level conditions, dewatering only when/if necessary; Diligent application of best practices in construction site erosion and sediment control; Minimize time period between initial removal and final restoration of vegetative ground covers; use of synthetic erosion control blankets as/if required; restrictions in contracts to prohibit onsite re-fueling of construction equipment or vehicles</p>

Environmental Feature or Characteristic	Potential Adverse Effect	Prevention/Mitigation Strategy
<b>Biological Environment</b>		
Waterfowl and Shorebirds	Potential temporary disruption of habitat for migrating shorebirds and waterfowl	Window for construction on site is early June (depending rate at which Ottawa River levels recedes after spring freshet) to late November. Immediate vicinity of the site is not used for nesting due to previously altered state of shorelines and proximity to residential uses
Fish Habitat	Potential for harmful alteration or disruption of fish habitat	No in water work to be done on this project; unavoidable minor encroachments on river bed at two locations will be installed after river levels recede to below the normal high water mark ; riverbed at these locations is not nesting/rearing habitat
Riparian Zone	Potential reduction in ecological value of riparian zone	Riparian zone is already highly altered and impacted due to previous modifications and ongoing maintenance practices of riverfront and adjacent landowners; RVCA advocates a shoreline naturalization approach to shoreline stewardship and will cooperate with and support landowners and community members to achieve riparian zone rehabilitation objectives; the construction contract will require the installation and maintenance of effective soil erosion and sediment control measures throughout the construction period and to remain in place until ground covers have re-established on all disturbed surfaces; the construction zone will be clearly identified and fenced off to prevent unintended disturbance of the riparian zone
<b>Environmental Feature or Characteristic</b>		
<b>Cultural Environment</b>		
Traditional land uses	Potential for disruption of or interference with traditional uses by aboriginal community of Crown Lands on the bed and banks of the Ottawa River	No traditional uses of land in the vicinity of the proposed undertaking have been identified to date; to be confirmed by circulation of the project plan
Riparian land uses — access to public lands and waters	Potential for easier access by general public to filled Crown Land and resulting conflicts with upland property owners	Installation of fencing and/or signage to clearly identify limits of public vs. private lands; upland property owners have opportunity to acquire filled Crown Lands
	Potential to interfere with riparian landowners' access to the water	Design includes "low water access" openings in concrete retaining wall elements, complete with removable bulkheads to be installed prior to onset of flooding.
<b>Environmental Feature or Characteristic</b>		
<b>Socio-Economic Environment</b>		
Noise and vibration	occupants of nearby residential buildings will be sensitive to excessive noise and vibration during construction; temporary reduction in quality of life for directly affected property owners	<p>Expect noise and vibration at levels that are typically associated with earthworks, installation of underground services and road construction and maintenance activity in residential area ; hours of work to be restricted to normal working day (no weekend work); construction schedule to be arranged such that the period of disruption for any given section of the work shall be minimized; clear and effective communication with adjoining residents to provide minimum one week (7 days) advanced notice of scheduled construction activities.</p> <p>Standard precautions during construction will be followed to minimize risk of damage to adjacent property or structures and general liability insurance policies will be in place.</p> <p>Construction routes to and from via municipal streets will be designated so as to minimize disruption.</p> <p>Geotechnical investigations have been undertaken to determine depth to bedrock along proposed drain system alignments; based on the geotechnical findings, and given the proposed profile of the drainage works (perforated pipe and storm sewers) there is a high level of confidence that rock excavation methods will not be required.</p>

Landscape aesthetics	Potential damage to landscape elements (gardens, specimen trees, watering systems, etc.)	<p>Some landscape elements on private properties will be interfered with or removed. Prior to construction, a complete inventory of landscape features (specimen trees, flower beds, gardens, patios, decks, etc.) will be prepared, and those elements that will need to be removed in order to implement the project will be identified. Individual landowners will be offered cash allowances based on an estimate of replacement cost prepared by a qualified landscape architect, to be used by the landowner as they wish, on completion of the flood control measures; the negotiated allowances for landscape restoration will be specified in individual landowner agreements to be finalized prior to the commencement of construction.</p> <p>Proposed grading and alignment changes have been made within the construction plans, to accommodate the individual preferences and needs of directly affected and adjacent landowners as much as possible.</p> <p>With respect to the portion of the works to be undertaken on filled Crown Land, a tree planting plan will be prepared in consultation with the Ministry of Natural Resources with a view to replacing any specimen trees that are removed to accommodate the flood control project by trees of native species.</p>
Scenic Views	Potential obstruction of /intrusion into scenic views	Profile and alignment of the structures are such that their visual impact on views of the water and horizon have been minimized to the extent that is possible without compromising on the level of protection provided by the flood control barrier
Property maintenance	Grades and alignment of earth berm components could alter the appearance of the local landscape and make for changes in maintenance practices.	During the final design of the proposed works there have been numerous and extensive discussions with the directly affected landowners and the proposed alignment and grading of the earth berm elements of the flood control barrier has been adjusted as much as reasonably possible to satisfy individual landowner preferences as to the berm's position relative to their buildings or other to features on the lot.
Environmental Feature or Characteristic		
Engineering/Technical Environment	Potential Adverse Effect	Prevention/Mitigation Strategy
Adjacent Structures and Utilities	Potential for damage to adjacent structures or utilities during construction of seawall, and shoreline revetment components	Pre-construction identification of all buried utilities including public services and privately owned irrigation systems; pre-construction photographic documentation of all structures located in close proximity to the temporary and permanent easement areas; standard requirements in contract documents regarding the protection of existing structures and services, and the maintenance of adequate general liability and property damage insurance policies



## 6. Summary

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Based on the environmental screening that is summarized above in Section 5, it is concluded that no long term adverse environmental impacts are expected to result from implementation of the Britannia Village Flood Control Project, as presently configured.

There is a risk of short term impacts during the construction period. Aspects of the local environment that are most at risk during the construction period are:

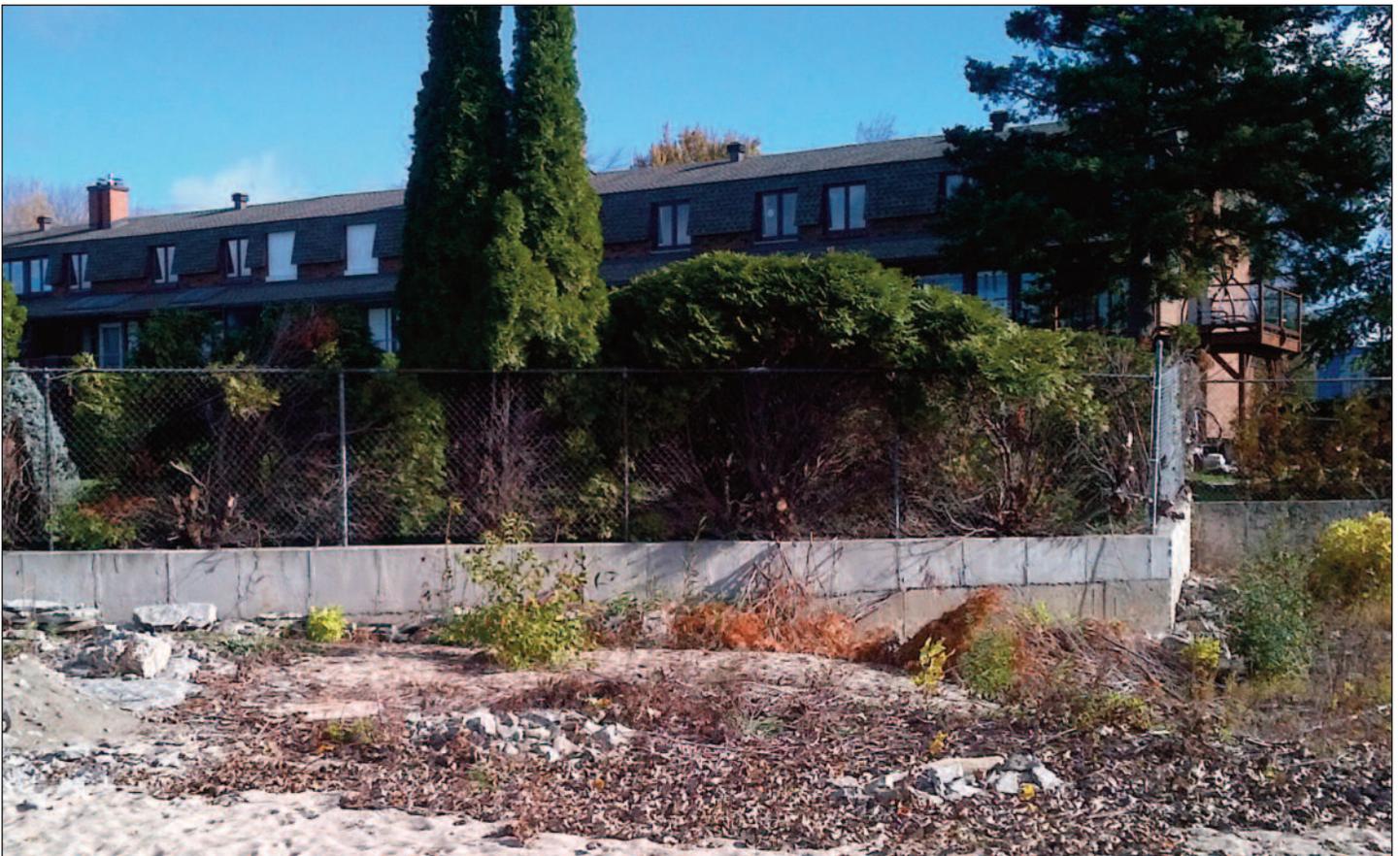
- the riparian and littoral zones of the Ottawa River shoreline
- Ottawa River water quality
- the structures, utilities and landscape features on adjacent properties
- quality of life of nearby residents

Impacts will be minimized and/or avoided by requiring the application of best practices and procedures in construction and long term operation and maintenance. Ensuring that planned mitigation measures are implemented requires ongoing monitoring and supervision of the work on site. Designated personnel of the RVCA and its engineering consultants will be assigned responsibility for daily inspection of the construction site to ensure that the environmental protection and mitigation

measures incorporated into contract documents are properly adhered to by all Contractors, Subcontractors and workers on site. These monitoring and inspection personnel will serve as a primary point of contact, for the project for community representatives, adjacent landowners, interested government agencies and departments, and any other individuals with concerns or questions regarding the environmental implications of the work on site.

Monitoring of site conditions will continue during the initial year after construction is completed, as follows:

- Frequent site inspections to monitor the condition of new vegetative ground covers and the condition of soil erosion and sediment control measures (contract requirements will bind the Contractor(s) to a one year maintenance period for all site work, including re-vegetated surfaces)
- Inspection of trees planted on Crown Land to confirm survival
- A detailed Operating and Maintenance Plan for the flood control measures (currently in preparation) will prescribe the frequency of and procedures to be followed during periodic inspections of the flood control facilities (to ensure integrity and effectiveness)









Britannia Village  
Flood Control Works

Figure 3

Schematic

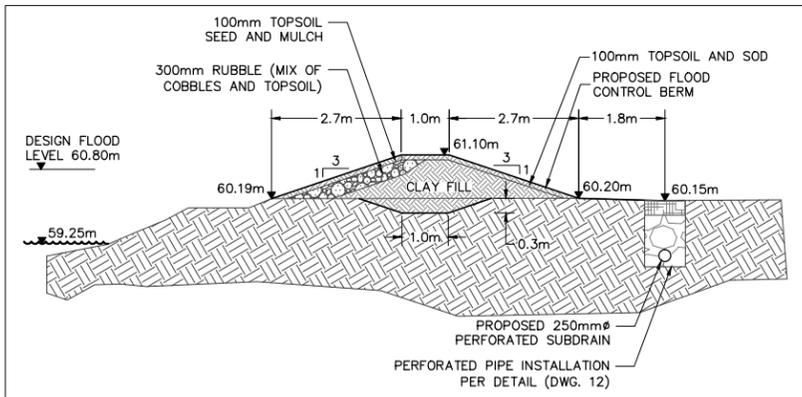


# Appendix A — Grading Plans and Typical Sections for the Britannia Village Flood Control Project

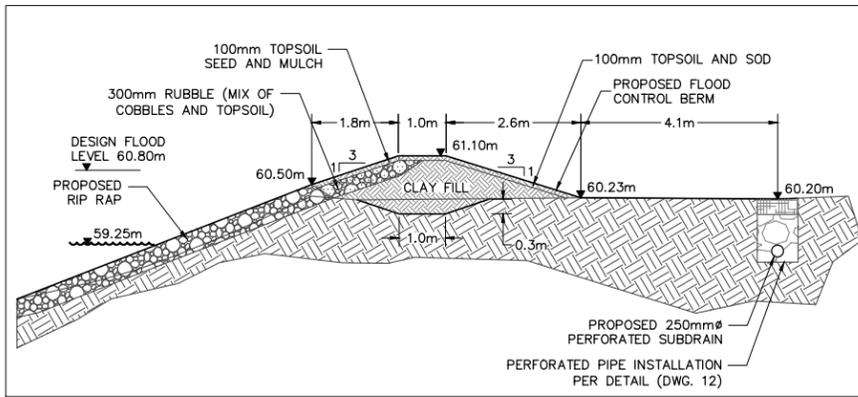
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Drawings 5, 6, 7 and 8 prepared by Delcan Corp

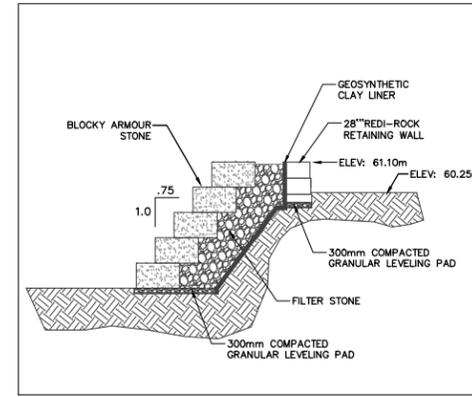




1 SECTION: FLOOD CONTROL BERM  
1:75



2 SECTION: FLOOD CONTROL BERM  
1:75



3 DETAIL: ARMOUR STONE REVETMENT  
1:100

NOTES

- NOTE: THE POSITION OF ALL POLE LINES, CONDUITS, WATERMANS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.
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  - LANDSCAPE DRAIN No. 4 AS PER CITY OF OTTAWA STANDARD DRAWING S31.
  - LANDSCAPE DRAIN No. 1, 2&3 AS PER CITY OF OTTAWA STANDARD DRAWING S30.
  - PERFORATED PIPE AS PER CITY OF OTTAWA STANDARD DRAWING S29.

**BRITANNIA VILLAGE FLOOD CONTROL WORKS**

GRADING PLAN - 1

Contract No. \_\_\_\_\_ Dwg. No. 5

Asset No. \_\_\_\_\_

Asset Group \_\_\_\_\_

Des. D.R.Y. Chk'd \_\_\_\_\_

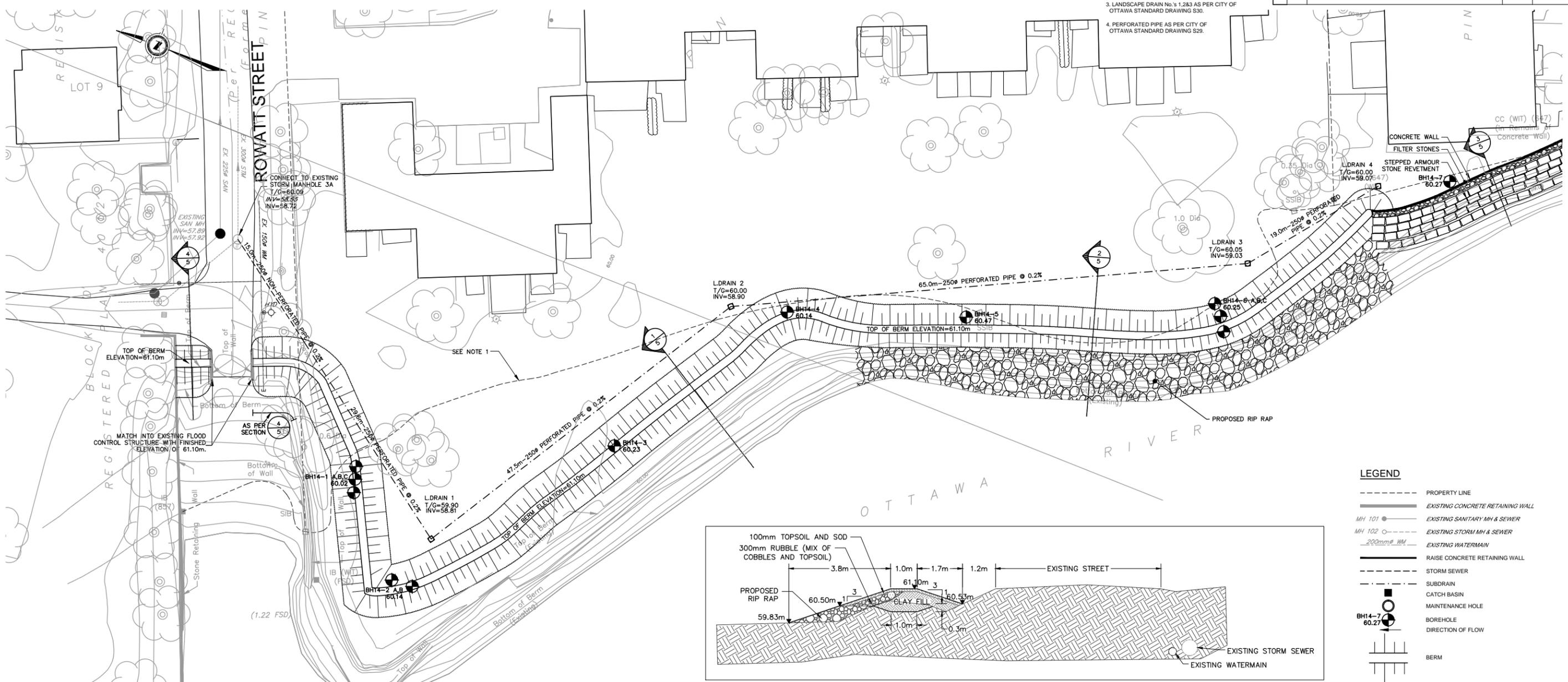
Dwn. D.M./S.S. Chk'd \_\_\_\_\_

Utility Circ. No. \_\_\_\_\_ Index No. \_\_\_\_\_

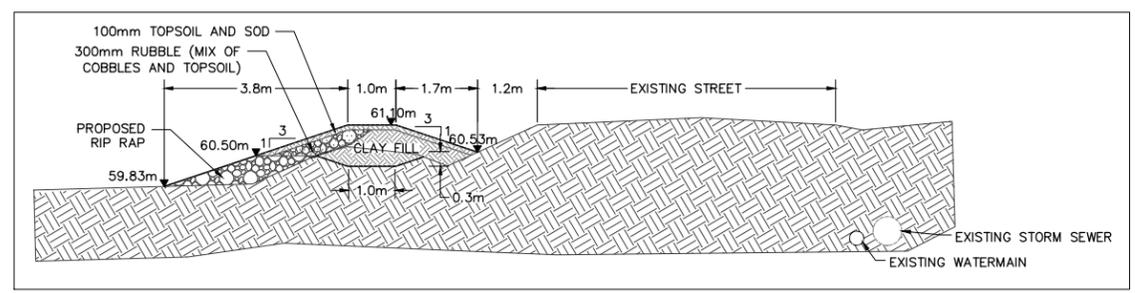
Const. Inspector: \_\_\_\_\_

SCALE 1:250

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NOT FOR CONSTRUCTION  
May 2, 2014



4 SECTION: EXISTING BERM  
1:75



NOTE: The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

No.	Description	By	Date (dd/mm/yy)

**LEGEND**

- PROPERTY LINE
- EXISTING CONCRETE RETAINING WALL
- MH 101 --- EXISTING SANITARY MH & SEWER
- MH 102 --- EXISTING STORM MH & SEWER
- 200mm# WM --- EXISTING WATERMAIN
- RAISE CONCRETE RETAINING WALL
- STORM SEWER
- SUBDRAIN
- CATCH BASIN
- MAINTENANCE HOLE
- BOREHOLE
- DIRECTION OF FLOW
- BERM



BRITANNIA VILLAGE  
FLOOD CONTROL WORKS

GRADING PLAN - 2



Contract No. \_\_\_\_\_ Dwg. No. **6**

Asset No. \_\_\_\_\_

Asset Group \_\_\_\_\_

Des. **D.R.Y.** Chk'd. \_\_\_\_\_

Dwn. **D.M./S.S.** Chk'd. \_\_\_\_\_

Utility Circ. No. \_\_\_\_\_ Index No. \_\_\_\_\_

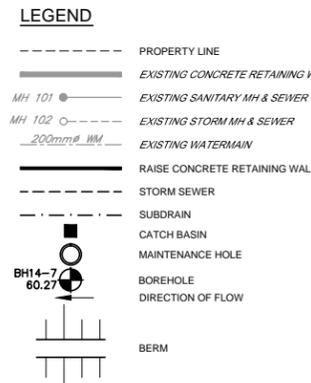
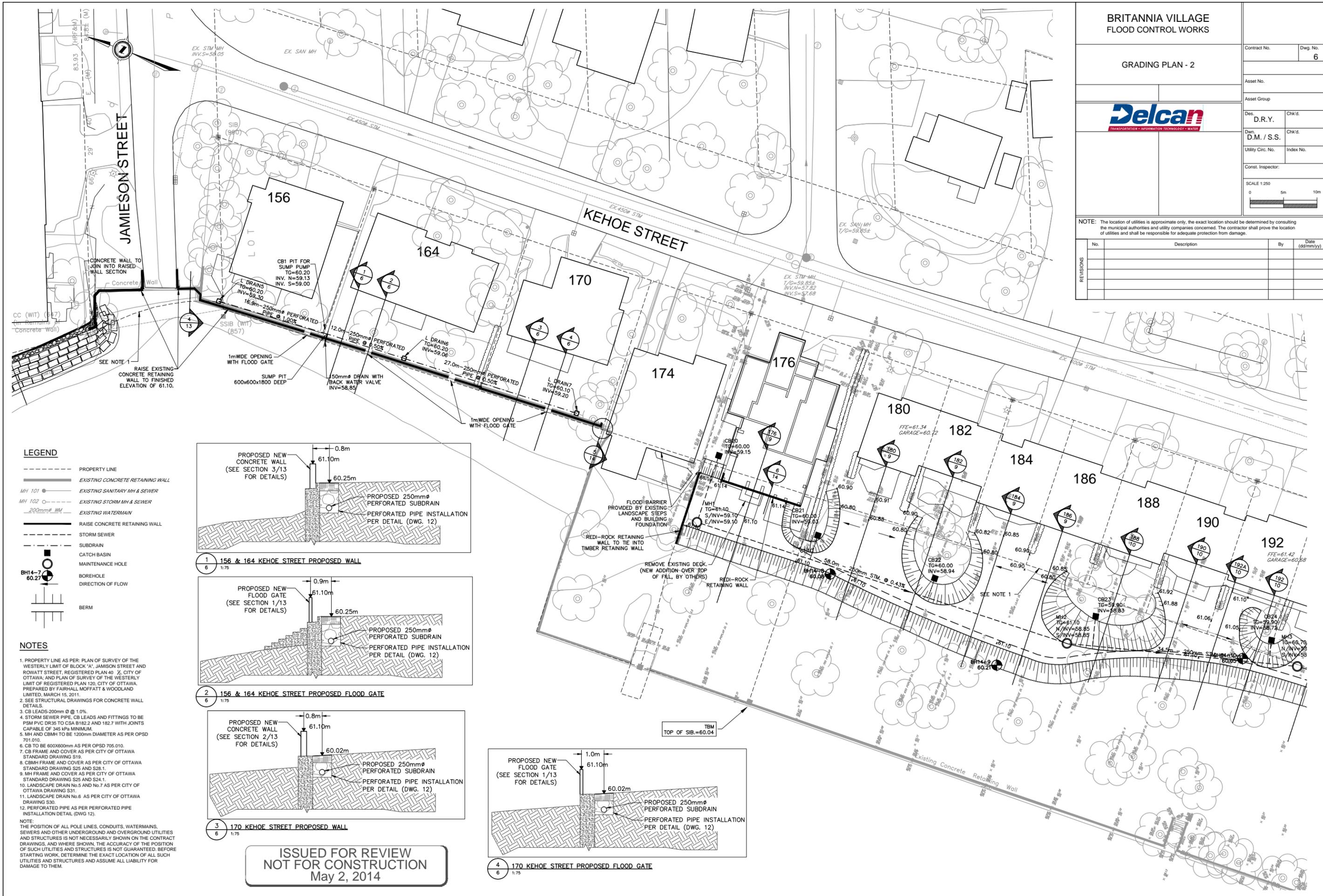
Const. Inspector: \_\_\_\_\_

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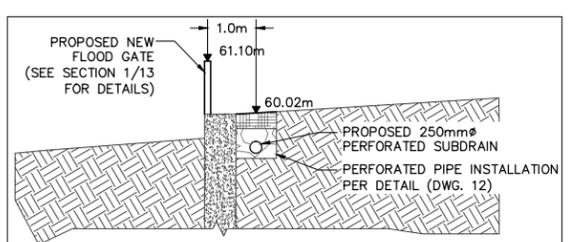
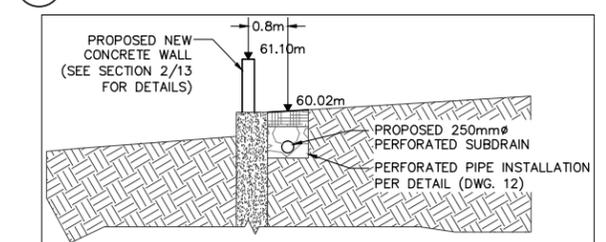
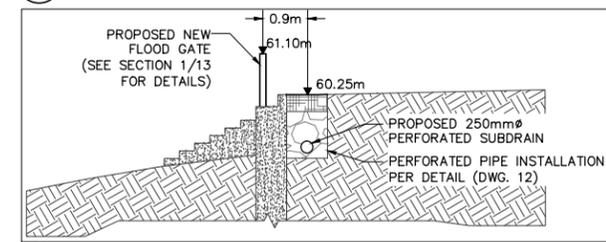
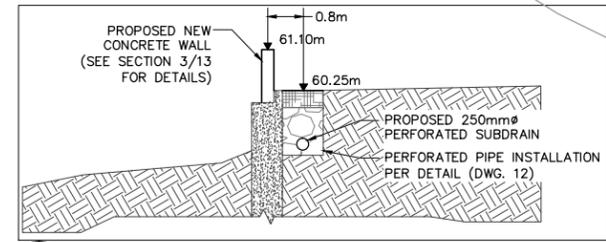
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  - SEE STRUCTURAL DRAWINGS FOR CONCRETE WALL DETAILS.
  - CB LEADS-200mm Ø @ 1.0%.
  - STORM SEWER PIPE, CB LEADS AND FITTINGS TO BE PSM PVC DR35 TO CSA B182.2 AND 182.7 WITH JOINTS CAPABLE OF 345 kPa MINIMUM.
  - MH AND CBMH TO BE 1200mm DIAMETER AS PER OPSD 701.010.
  - CB TO BE 600x600mm AS PER OPSD 705.010.
  - CB FRAME AND COVER AS PER CITY OF OTTAWA STANDARD DRAWING S19.
  - CBMH FRAME AND COVER AS PER CITY OF OTTAWA STANDARD DRAWING S25 AND S28.1.
  - MH FRAME AND COVER AS PER CITY OF OTTAWA STANDARD DRAWING S25 AND S24.1.
  - LANDSCAPE DRAIN No.5 AND No.7 AS PER CITY OF OTTAWA DRAWING S31.
  - LANDSCAPE DRAIN No.6 AS PER CITY OF OTTAWA DRAWING S30.
  - PERFORATED PIPE AS PER PERFORATED PIPE INSTALLATION DETAIL (DWG 12).
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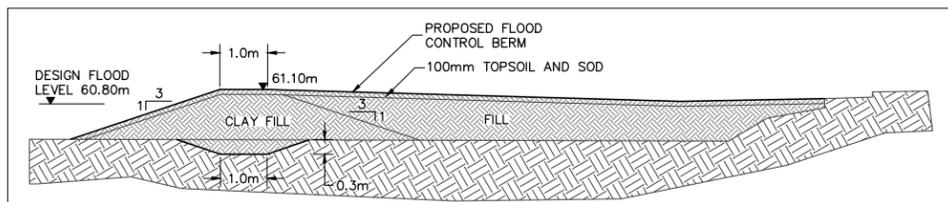


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May 2, 2014

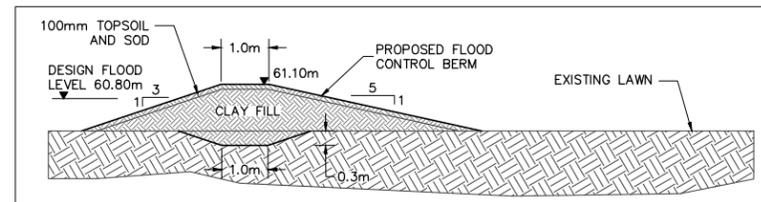


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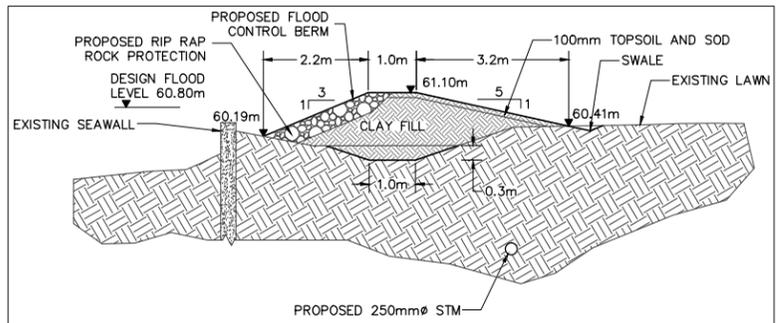
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- STORM SEWER
- SUBDRAIN
- CATCH BASIN
- MAINTENANCE HOLE
- BOREHOLE
- DIRECTION OF FLOW
- BERM



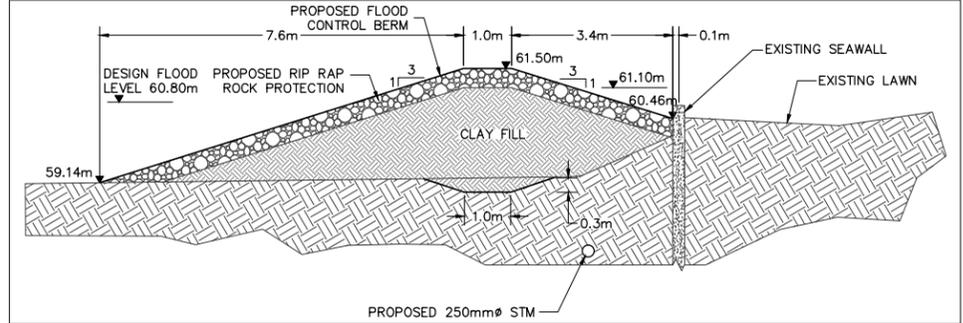
1 TYPICAL BERM WITH PLATEAU FOR 176-208 KEHOE STREET



2 TYPICAL BERM FOR 176-208 KEHOE STREET



3 SECTION: FLOOD CONTROL BERM



4 SECTION: FLOOD CONTROL BERM

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NOT FOR CONSTRUCTION  
May 2, 2014

**BRITANNIA VILLAGE  
FLOOD CONTROL WORKS**

GRADING PLAN - 3

Contract No. \_\_\_\_\_ Dwg. No. **7**

Asset No. \_\_\_\_\_

Asset Group \_\_\_\_\_

Des. **D.R.Y.** Chk'd. \_\_\_\_\_

Dwn. **D.M. / S.S.** Chk'd. \_\_\_\_\_

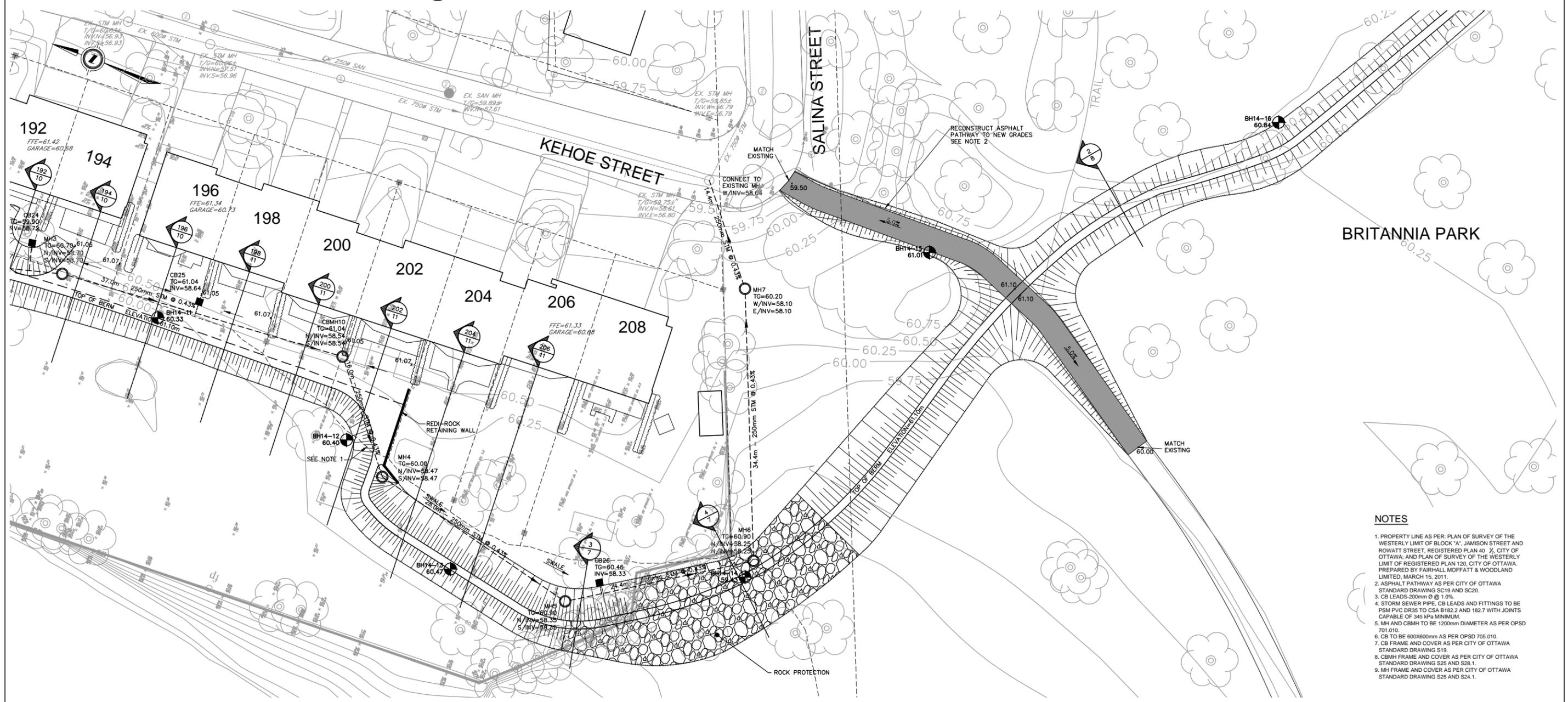
Utility Circ. No. \_\_\_\_\_ Index No. \_\_\_\_\_

Const. Inspector: \_\_\_\_\_

SCALE 1:250

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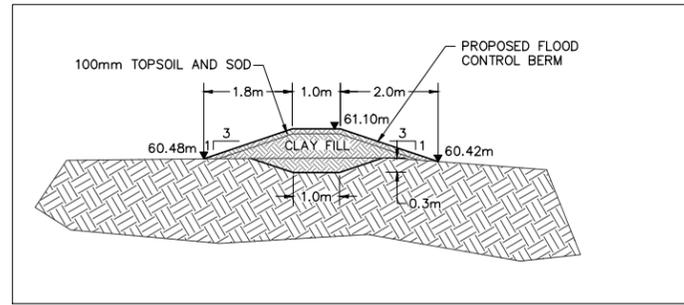
**LEGEND**

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- BOREHOLE
- DIRECTION OF FLOW
- ===== BERM

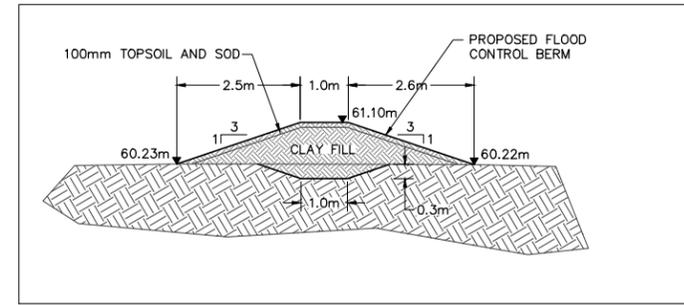
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1 SECTION: FLOOD CONTROL BERM  
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2 SECTION: FLOOD CONTROL BERM  
1:75

**BRITANNIA VILLAGE  
FLOOD CONTROL WORKS**

**GRADING PLAN - 4**

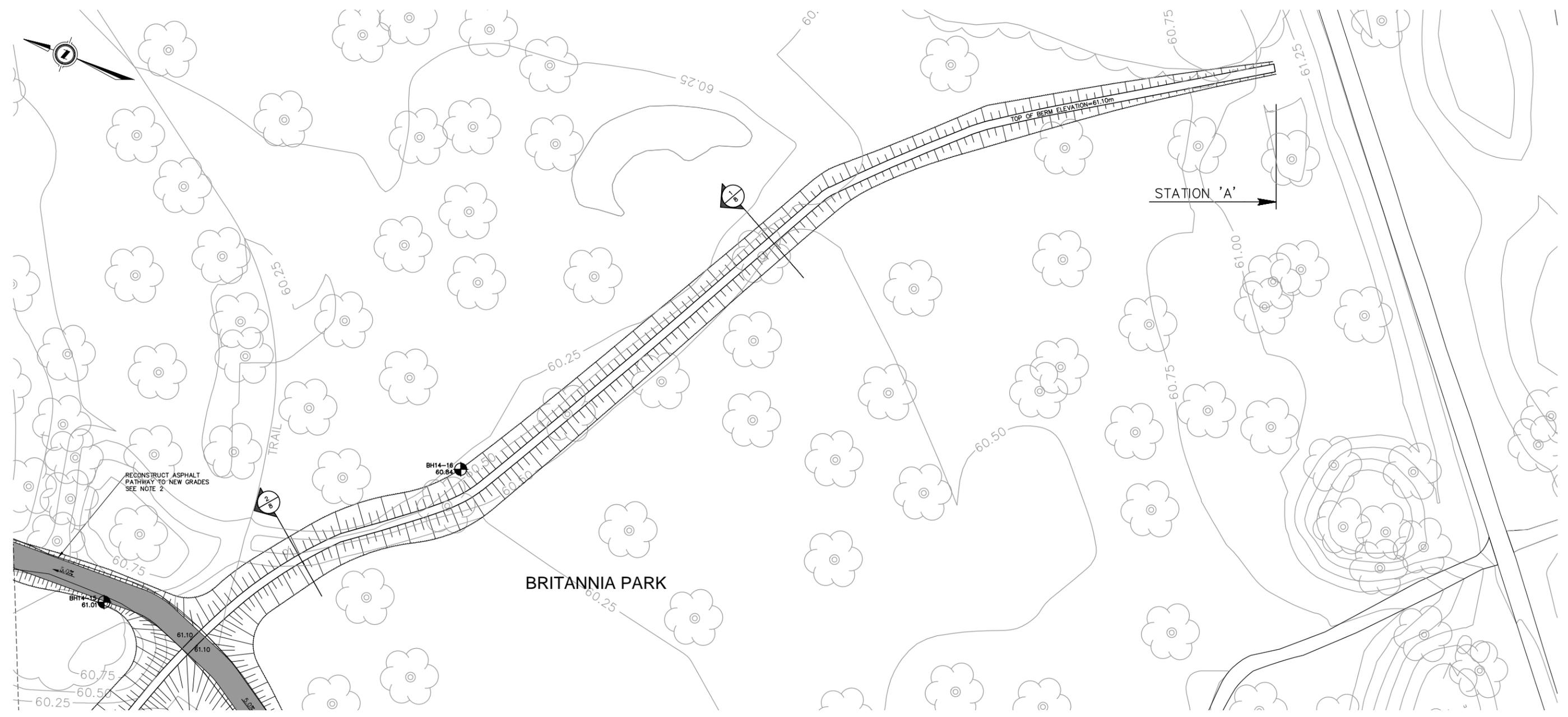


Contract No.	Dwg. No.
	8
Asset No.	
Asset Group	
Des.	Chk'd.
D.R.Y.	
Dwn.	Chk'd.
D.M. / S.S.	
Utility Circ. No.	Index No.
Const. Inspector:	
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0 5m 10m	

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No.	Description	By	Date (dd/mm/yy)

**ISSUED FOR REVIEW  
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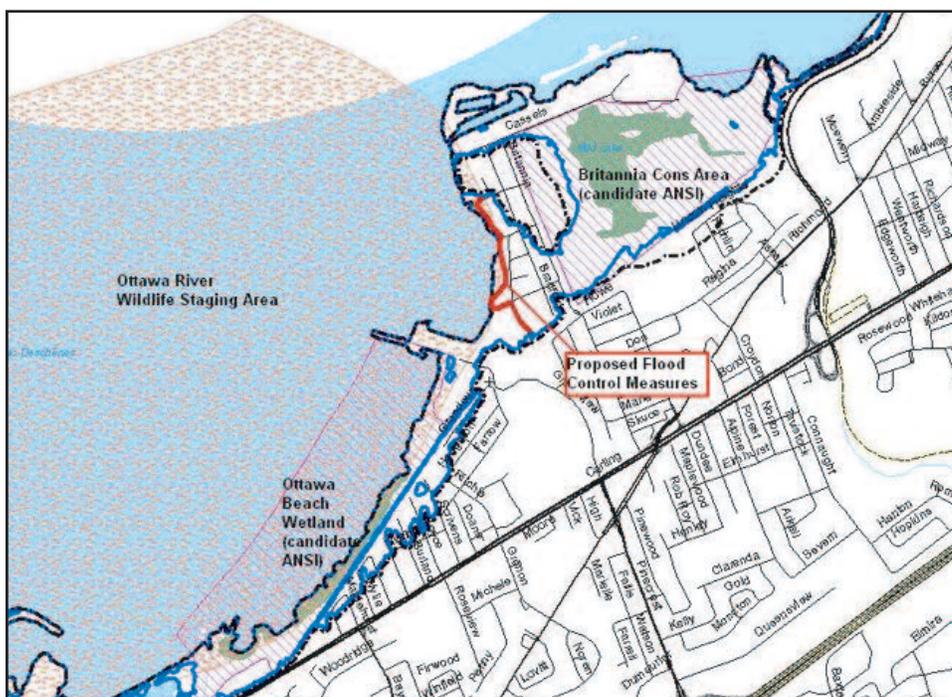


## Appendix B — Baseline Environmental Inventory Checklist

The Physical Environment		
Feature or Characteristic	Present?	Extent
unique landform	No	
existing mineral or aggregate resources extraction industries	No	
Earth Science — Areas of Natural and Scientific Interest (ANSIs)	No	
specialty crop areas	No	
agricultural lands or production	No	
Niagara Escarpment	No	
Oak Ridges Moraine	No	
environmentally sensitive/significant areas — physical	No	
air quality	No	
agricultural tile or surface drains	No	
noise levels & vibration	No	Ambient noise and vibration levels are typical of cottage-like waterfront communities, more typical of a rural village setting than urban or suburban neighborhoods, due to location by the water and distance from major arterial roads
high/storm water flow regime	Yes	The affected area is vulnerable to flooding during high springtime water events on the Ottawa River; implementing the project will reduce the potential flood damages, public safety risks and community disruption during future flood events, by preventing overland entry of water into the community, without affecting flows or water levels elsewhere; Water Survey of Canada hydrometric monitoring station number 02KF005 has been in operation in this vicinity since 1916 (water level recording) and 1961 (flow recording).
low/base water flow regime	Yes	Summer low flows on the Ottawa River are more dramatically influenced by hydro-electric power plant operations in the Ottawa River basin; will not be affected by the project
existing surface drainage and groundwater seepage	Yes	Water is known to flow in the subsurface beneath the Britannia Village Community from the topographically higher Lac Deschenes (Britannia Bay) to the topographically lower Mud Lake wetland, an aquatic wildlife habitat area within the Britannia Conservation Area, owned and managed by the National Capital Commission; this groundwater seepage is a small component of the hydrologic cycle which supports the Mud Lake wetland ecosystem. Local residents have indicated that some basements in existing residents are prone to chronic wetness or flooding whenever ground water levels rise seasonally in response to rain/snowmelt and elevated river levels.
groundwater recharge/discharge zones	No	
littoral drift	Yes	Some fine sand and gravel deposition is known to occur in some locations along the littoral zone adjacent to the Britannia Village Community, typically in the lee of man-made features (seawalls or breakwaters); some of the sand /gravel deposits likely originate from the nearby and up-current Britannia Beach, which is periodically augmented with imported beach sand, and some of it originates from annual sandbagging operations at the flood prevention bulkheads installed by the City of Ottawa at the Rowatt and Jamieson Street road allowances
other coastal processes	No	
water quality	Yes	Background Ottawa River water quality is monitored on an ongoing basis by the City of Ottawa; the project involves construction activities near the water, to be carried out in the dry; river water quality could be affected by runoff borne sediment or pollutants unless standard mitigation measures are implemented during construction
soil/fill quality	Yes	Much of the construction work will take place on land that was created many years ago by the placing of fill on what was originally the natural bed of the Ottawa River, some of it now under private ownership and much of it still under the control and management of MNR on behalf of the Crown. There are no records or reports on the quality of the fill materials
contaminated soils/sediments/seeps	Unknown	Contaminated soils are not expected to be present on the directly affected site of the project; testing performed during geotechnical investigations confirmed that "clean fill" materials appear to have been used where the former riverbed has been filled
existing transportation routes	Yes	Access to the project site for construction purposes will be via local residential streets serving the Britannia Community (Britannia Road, Salina St., Kehoe St., Jamieson St., Bradford St, and Rowatt St.)
constructed crossings (e.g. bridges, culverts)	No	
Geomorphology	Yes	The shoreline of the Ottawa River at the site of the project is exposed to a very long fetch of the river and wave energy resulting from winds coming in from the northwest; riverfront properties have been armoured using concrete seawalls in differing configurations and shoreline revetments (dumped stone linings), and with varying degrees of success; rip-rap protection placed on the shoreline between Rowatt Street and Jamieson Street has largely failed since its installation several years ago

## The Biological Environment

Feature or Characteristic	Present?	Extent
wildlife habitat	Yes	The Ottawa River to the west of the site is an important wildlife staging area, primarily for migratory birds.
habitat linkages or corridors	No	Habitat corridor function (linking Britannia Bay to the Mud Lake wetland) was severed many years ago with the development of the original Britannia Village settlement
significant vegetation communities	No	None in the immediate, directly affected vicinity of the proposed works; however, significant vegetation communities are present in the nearby Britannia Conservation Area (a candidate Life Science ANSI)
environmentally sensitive/significant areas — biological	No	None in the immediate, directly affected vicinity of the proposed works; however, within the nearby Britannia Conservation Area (a candidate Life Science ANSI) is the Mud Lake Wetland, a Provincially Significant Wetland
fish habitat such as, spawning or feeding areas, restriction of movement, environmental conditions (e.g. flow, temperature, oxygen levels)	No	No nesting, spawning or nursery areas are identified on the Ottawa River shoreline adjacent to the proposed works
species of concern (e.g. Species at Risk, Vulnerable/Threatened/Endangered Species, conservation priorities — either flora or fauna)	No	None have been identified in the vicinity of the project.
exotic/alien and invasive species	Yes	The directly affected lands are under urban residential land use; as such, non-native plants typical of urban landscapes are present in the areas that have been under regular maintenance by landowners; un-maintained vegetated buffers on the shoreline are generally non-existent, as landscape maintenance practices have been carried out to the edge of the armoured river bank; there is an opportunity to restore some natural wildlife habitat function in the riparian zone through re-naturalization of the riparian area
wildlife/bird migration patterns	Yes	The entire Ottawa River is an important staging area for migratory birds (waterfowl and shorebirds); however, the area of the proposed works is generally not utilized by the bird populations owing to its having been developed as a residential community
wildlife populations	No	Permanent populations of wildlife are not present in the immediate vicinity of the proposed works; the nearest wildlife populations are present in the Britannia Conservation Area
wetlands	Yes	The Mud Lake Wetland, to the east of the Britannia Village community is Provincially Significant
microclimate, (e.g. wind screening, snow accumulation, shading)	Yes	A grove of mature shade trees is present on the proposed alignment of the earthen berm as it passes behind (to the west of) the townhome properties on Kehoe Street
Life Science ANSIs	Yes	Two Candidate ANSI's are present within 500 metres of the proposed works (as indicated in the figure below): <ul style="list-style-type: none"> <li>• the Britannia Conservation Area (including the Provincially significant Mud Lake Wetland)</li> <li>• the Ottawa Beach Wetland (unevaluated)</li> </ul>
unique habitats	No	



## The Cultural Environment

Feature or Characteristic	Present?	Extent
traditional land uses (e.g. harvesting)	No	
aboriginal reserve or community	No	
outstanding native land claim	Yes	The lands affected are within the area that is subject to the Algonquin Land Claim which encompasses lands within the Ottawa River watershed in the Province of Ontario. While the area affected by this project includes some Crown Land (filled areas that were originally the bed of the Ottawa River), it is our understanding that these Crown Lands are not included amongst the Crown Lands to be transferred to Algonquin ownership, under the terms of a settlement agreement being negotiated between the Algonquins of Ontario, the Government of Canada and the Government of Ontario.
transboundary water management issues	Yes	The Ottawa River is an inter-provincial waterway; its management is coordinated in part by the Ottawa River Regulation Planning Board; the proposed project will not affect river flows in any significant way, and will not add to or exacerbate any existing transboundary water management issues; the project will provide a higher degree of protection against flooding to existing properties within the Britannia Village Community, and in that sense should be seen as being complementary to the primary purpose of the ORRPB ("to provide protection against flooding along the Ottawa River and its tributaries, particularly in the Montreal Region, and at the same time maintain the interests of the various users particularly in hydro-electric energy production")
riparian uses (e.g. water access, navigation, boating, fishing, cottages)	Yes	Land uses on the directly affected riverfront properties are residential and public park; public access to riparian land and the water is available through the City owned parkland which is associated with Britannia Beach or via the municipal road allowances at Jamieson Street and Rowatt Street; some filled Crown Lands are present between the private properties and the present position of the river's edge; these filled Crown Lands have been maintained and utilized by the adjacent upland property owners as though they are extensions of their properties; no legal restrictions prevent members of the public from accessing these public lands, but existing shoreline structures (seawall and fences) are effective barriers to public access to the filled Crown Land between Salina St and Jamieson Street. An effective physical barrier is not present at the Rowatt Street road allowance; the general public has, and will continue to have, a right of passage over the bed of the river whenever it is exposed under low water conditions, or by boat. The current policy of the Ministry of Natural Resources, is such that the Crown is prepared to convey title over the filled Crown Lands to owners of the adjacent upland private property parcels on a willing vendor/willing purchaser basis.
recreational or tourist use of water body and/or adjacent lands (e.g. canoeing, trails)	Yes	Water uses on Ottawa River (sailing, kayaking, canoeing) will not be affected by the proposed project; an existing earthen berm in the public parkland south of Salina Street will be modified (raised and widened) to provide a more effective barrier to prevent entry of flood waters into the community; the area of the park that will be affected is under passive open space use; a pedestrian path crosses the earth berm alignment and grades will be adjusted to ensure that accessibility on the pathway for persons with mobility limitations is not jeopardized
recreational or tourist use of existing shoreline access locations	Yes	See above under riparian uses
aesthetic or scenic landscapes or views	Yes	The shoreline properties in the vicinity of this project enjoy a wonderful view towards the northwest, of the Lac Deschenes reach of the Ottawa River; the proposed works have the potential to be visually intrusive, but with a maximum height of about 1 metres above existing grades, the impact is very limited. Views of the water and the horizon by persons seated or standing on the main floor level of the existing waterfront buildings will generally not be impeded.
archaeological resources, built heritage resources and cultural heritage landscapes	No	
historic canals	No	
federal property	No	
heritage river systems	No	

## The Socioeconomic Environment

Feature or Characteristic	Present?	Extent
surrounding neighbourhood or community	Yes	The purpose of the project is to increase the level of protection afforded by, and improve the reliability of, flood defenses that are in place to protect existing residential properties in the Britannia Village community against flood damages, and their occupants against public safety risks and inconvenience during future flood events
surrounding land uses or growth pressure	No	Official Plan land use designations or zoning amendments to accommodate growth or intensification are not contemplated for the area that will be protected by the proposed flood control structures; however it has been an expressed objective of proponents of the flood control project to request that the City of Ottawa implement the two zone concept in flood plain management after construction of the flood control works (i.e. designate the area protected by the works as flood fringe) to allow limited development and re-development on existing lots of record provided that such development meets flood-proofing standards.
existing infrastructure, support services, facilities (education, water supply, sewage)	Yes	Residences in the affected area are served by municipal water, wastewater and storm water management services, and the usual support services and facilities that are available in an urban centre. It is noteworthy that the only vehicular access route to the Britannia Water Treatment plant passes through the flood vulnerable area and is flood prone to a depth of approximately 30 centimetres during a 1:100 year flood event; implementation of the proposed undertaking will ensure that access to the treatment plant is safe and dry for all flood events up to and including the 1:100 year Ottawa River flood
Pedestrian/vehicular traffic routes	Yes	Portions of the municipal streets in the affected area are prone to flood depths under 1:100 year flood conditions that would make them "unsafe", and compromise the provision of emergency services during flood events
property values or ownership	Yes	Property values in the vicinity are potentially affected in either of two ways: a) where the flood control works will occupy private land, negotiated easement rights in favour of the RVCA and/or City will restrict the property owner's use of the land to some extent (in the same way that utility easements are an encumbrance on property), and in that sense could have a minor negative effect on land value b) the enhanced flood prevention/control benefits afforded by the proposed works might have the effect of increasing property values, if it results in a larger pool of potential purchasers and/or if policies for development/redevelopment in the protected area are modified to enable existing lots of record to be developed (with flood-proofing) to an extent permitted by the current zoning provision under the flood plain overlay (in effect designating the protected area as flood fringe in accordance with the Provincial Policy Statement).
Local Municipal Water Supplies – vulnerable areas as per the Clean Water Act, 2006	Yes	The site of the project is located within Intake Protection Zone 2 (IPZ-2) associated with the City of Ottawa's municipal drinking water system, with a vulnerability score of 8.1, meaning that runoff from the site of the flood control project could reach the intake of the Britannia Water Treatment Plant within 2 hours. Implementation of the flood control project will not involve any activities that would be restricted or regulated by policies in the proposed Source Protection Plan; however, the proximity of the site to the water intake calls for a higher level of care in the management of construction site runoff-borne sediment and the handling of fuel for construction vehicles and equipment
existing tourism operations	No	
property/farm accessibility	No	

# Appendix C — Letter from Ecotec to Delcan Corporation



July 22, 2008

Delcan Corporation  
1223 Michael Street, Suite 100  
Ottawa, Ontario  
K1J 7T2

**ATTENTION: Dave Yaeger, P.Eng.,  
Senior Project Manager**

**RE: Brittanica Village Flood Control Project  
City of Ottawa**

### **Natural Resource Scoping and Preliminary Impact Assessment**

Delcan Corporation retained the services of EcoTec Environmental Consultants Inc. in order to identify existing fisheries and aquatic habitat features associated with the Ottawa River at the Brittanica Village shoreline, as well as to provide a preliminary impact assessment for a proposed flood control project at this location.

The following letter provides a synopsis of the Brittanica Village Flood Control Project, an outline of the natural resource scoping methodology, as well as a summary of information regarding the existing fisheries, aquatic ecosystem, and riparian habitat characteristics associated with the Ottawa River shoreline at Brittanica Village. This letter report also highlights the significant issues and potential impacts associated with the proposed flood control project and future work requirements.

Fisheries and aquatic habitat information used for the production of this report has been assembled from previous reports as well as from current field data specifically collected for this project. The intent of summarizing background and field data is to set baseline conditions of existing fisheries and aquatic habitat sensitivities, as well as "projected environmental conditions", which shall be deemed as future conditions without this project being in place.

#### **PROJECT SUMMARY**

Flooding of the Britannia Village community during spring runoff on the Ottawa River has been an on-going concern for many years. In 1992, a preliminary engineering study was undertaken to define return period flood elevations on the Ottawa River, to determine the extent of the flood prone area, and to provide recommendations to address the flooding concerns. In 2005, a conceptual design for remedial flood control works to protect the flood-prone portion of Britannia Village community during a 1:100 year flood on the Ottawa River was prepared generally based on the conclusions and recommendations from the 1992 study (Figure 1).



**Figure 1:  
Aquatic and Terrestrial  
Communities within the  
Britannia Bay Flood Control  
Study Area**

- Community 1: RipRap/Sand Shoreline
- Community 2: Concrete Retaining Wall
- Community 3: Parkland/Manicured Lawn
- Community 4: Public Beach





In response to a petition of interest from the land owners within the flood plain limits, the Rideau Valley Conservation Authority (RVCA), in cooperation with the City of Ottawa, would like to proceed with the detail design and construction of the proposed flood control works for Britannia Village. Implementation of the flood control works would be partially funded by “special service charges” applied to property taxes in the area designated as benefiting from the project.

Delcan Corporation was retained by the Rideau Valley Conservation Authority in order to provide professional engineering services for the Britannia Village Flood Control Project. The project is to be undertaken in two phases. The first phase involves providing a review of the work that has been done to date as well as other existing information, identifying the remaining scope of work, and preparing an updated implementation cost estimate. This information would be used to obtain the confirmation/agreement of the City before proceeding with Phase 2. Phase 2 involves the detail design and implementation of the flood control works.

The proposed flood control works consists of an earthen berm (dyke) where space permits, together with the improvement and raising of existing seawalls in selected locations where limited space precludes the construction of an earthen berm. The road allowances at Jamieson Street and Rowatt Street are accommodated by breaks in the seawall/berm, and temporary bulkheads would continue to be installed annually by City forces to provide a continuous flood control barrier. The proposed flood control works provide a universal level of protection throughout the flood susceptible area and maintains access and egress to the area during flood events.

## **NATURAL RESOURCE ASSESSMENT METHODOLOGY**

A field survey of aquatic habitat and fish communities was carried out on May 13, 2008 by M. Doornekamp and M. Lay of EcoTec Environmental Consultants Inc. All field data was recorded on Field Collection Record forms and are provided as attachments to this letter. The field investigations were conducted along the nearshore of the Ottawa River from the boat launch on Rowatt Street to the pier at the end of Greenview Ave., and included identification of the following:

- existing fish communities with the use of a seine net;
- aquatic habitat features; and
- riparian vegetation.

A photographic record was kept for the study area shoreline, which is also provided as an attachment to this letter. Background information on fisheries and aquatic habitat within the study area was acquired from the Ministry of Natural Resources (MNR) Natural Heritage Information Centre (NHIC).

## **EXISTING CONDITIONS**

M. Doornekamp and M. Lay of EcoTec Environmental Consultants Inc. completed a field survey within the Britannia Bay flood control project study area on May 13, 2008 during late spring flood conditions. During the time of the survey, water levels had already partly receded. A photo indicating the high water mark (HWM) can be seen in Appendix A (Photo 1). The purpose of the survey was to identify the aquatic and terrestrial habitat provided by the study area and the possible impacts due to berm/seawall creation at these locations. The riparian and aquatic survey was completed within the study limits along the path of the proposed seawall/berm, and included an assessment of existing fish communities and both onshore and in-water vegetation communities.

## **Fisheries and Aquatic Ecosystems.**

A seine net survey was conducted at a number of locations between the boat launch at Rowatt Street and just south of the pier at the end of Greenview Ave. During the spring survey, four (4) fish species were captured and included young of year (YOY) yellow perch (*Perca flavescens*), Johnny darter (*Etheostoma nigrum*) which included a gravid female, pumpkinseed (*Lepomis gibbosus*) and spottail shiner (*Notropis hudsonius*).

Four main aquatic habitat/shore line areas were noted within the study area and are shown in Figure 1. These include the sandy substrate/rip rap area adjacent to the boat launch at Rowatt Street (Photo 2), the area bounded by the existing concrete retaining wall (Photo 3), and the sandy beach area to the south of the study area (Photo 4). The flooded shoreline just south of the pier was also sampled for fish as it represented the most natural habitat type in the area. During spring flood conditions this area potentially provides spawning habitat for northern pike (*Esox lucius*) (Photo 5). Pike preferentially spawn between April and May amidst flooded terrestrial vegetation (Scott and Crossman, 1998), which was characteristic of this small area. The substrate within the aquatic communities identified within the study area was mostly sand/silt in nature.

During the spring survey, a substantial amount of bank instability was noted adjacent to the boat launch in the sandy substrate/rip rap area. A large percentage of the rip rap placed on the shore had been washed out, exposing the underlain geotextile fabric (Photo 6).

According to the MNR Natural Heritage Information Centre (NHIC), no fish species at risk are located in the vicinity of the study area. It should be noted that the information collected represents only one spring survey and does not represent year round aquatic habitat assemblages.

## **Vegetation Communities**

The majority of the terrestrial vegetation communities within the study area are characteristic of disturbed habitat, typical of residential areas. Manicured lawn and small deciduous and coniferous trees retained for their aesthetic value accounted for the majority of vegetation species. Near the southern limit of the study area the proposed berm turns to the east to avoid the beach area. The proposed berm would be built away from the water and crosses within the parkland area between Salina Street and Rue Howe. This area which is often used as a picnic area contained manicured grass but was also characterized by a mix of larger deciduous trees including eastern cottonwood (*Populus deltoids*), red maple (*Acer rubrum*), paper birch (*Betula papyrifera*), Manitoba maple (*Acer negundo*), and willow (*Salix* sp.).

Due to the altered shoreline within the study area, minimal riparian vegetation was noted as it had been replaced largely with rip rap or concrete. At the time of the survey, minimal submergent or emergent aquatic vegetation was noted. According to the MNR Natural Heritage Information Centre (NHIC) three (3) aquatic plant species at risk are located in the vicinity of the study area and include cloud sedge (*Carex haydenii*), Hornleaf Riverweed or Threadfoot (*Podostemum ceratophyllum*), and Grass leaved water pliantain (*Alisma gramineum*). However, none of these species were observed during the survey.

## **PRELIMINARY IMPACT ASSESSMENT**

The largest impact of the proposed flood control structures will primarily be to aquatic features. The placement of embankment material and the mobilization of equipment/materials for flood control in any of the permanent or seasonally flooded areas of the Britannia Village shoreline

may permanently displace fish habitat. If there is a potential for Harmful Alteration, Disruption or Destruction (HADD) of fish due to the preferred option for flood control, appropriate approvals must be acquired from the Ministry of Natural Resources and Department of Fisheries and Oceans in accordance with the requirements of the federal *Fisheries Act*.

The placement of embankment fill adjacent to the Ottawa River can result in sediment transport to this waterbody during rain events. Suspension of sediments may have direct negative effects on resident fish such as respiratory stress, reduced feeding efficiency, and impairment of physiologic processes such as growth and reproduction. Indirect effects may include changes in the diversity of benthic invertebrates (food sources) and the loss of spawning and nursery habitat. Elevated levels of suspended sediments may result in a shift in fish population diversity and density, as various species will leave the area for more suitable environments. Therefore, impacts due to construction activities may effect immediate fish populations as well as those within downstream reaches. Consideration should be given to implementing standard sediment control measures (e.g. turbidity curtain, coffer dam) around the site during any in-water or shoreline fill placement in order to minimize suspended sediment release to other areas.

Since the nearshore area is utilized by numerous warmwater fish species for spawning and nursery habitat, construction in this area should be restricted to a suitable warmwater timing window, as applied by the local Ministry of Natural Resources office.

No significant impact is expected on terrestrial vegetation communities as these features primarily consist of manicured lawn/parkland and do not represent rare or significant habitat areas.

If you have any questions with regard to the preceding natural resource scoping and preliminary impact assessment, please do not hesitate to contact the undersigned.

Sincerely,  
EcoTec Environmental Consultants Inc.



Douglas R. Clark, B.Sc.  
Senior Biologist, Principal



Marten Doornekamp, B.Sc.  
Biologist, Eastern Branch Manager

## References

Ministry of Natural Resources (MNR) (2008) Natural Heritage Information Centre (NHIC)

[http://nhic.mnr.gov.on.ca/nhic\\_.cfm](http://nhic.mnr.gov.on.ca/nhic_.cfm)

Scott, W.B., and Crossman, E.J., (1998) Freshwater Fishes of Canada, Galt House Publications Ltd.

APPENDIX A: Field Collection Records  
and Study Area Photographs



Photo 1. High water mark (HWM) visible immediately below writing May 13, 2008.



Photo 2. Sandy substrate/rip rap area adjacent to the boat launch at Rowatt Street. Facing north, May 13, 2008.



| Photo 3. Concrete wall from Jamieson Street to beach area. Facing southeast, May 13, 2008.



Photo 4. Beach area adjacent to concrete wall structure. Facing south, May 13, 2008.



Photo 5. Flooded vegetated area, adjacent to pier. Facing north, May 13, 2008.



Photo 6. Rip rap displacement and erosion adjacent to boat launch. Facing south, May 13, 2008.

# PONDS / LAKES FIELD COLLECTION RECORD



Project #:		Name of Waterbody: <b>R. River</b>			Day <b>13</b>	Month <b>05</b>	Year <b>08</b>				
Location of Station:					Station #:						
Collectors: <b>M. Lay M. Doornekamp</b>											
Weather Conditions: <b>Warm Sunny</b>											
Time Started: <b>1:30 pm</b>		Time Finished:		Sampling Duration:							
Type of Waterbody <input type="radio"/> Large Lake <input type="radio"/> Small Lake <input type="radio"/> Pond <input checked="" type="radio"/> <b>River</b> <input type="radio"/> Dug-out <input type="radio"/> Run-Off <input type="radio"/> Spring-fed <input type="radio"/> Connected <input type="radio"/> By-Pass <input type="radio"/> In-Stream											
Plant Type (% surface area)											
Submergent _____ %		Floating _____ %		Emergent _____ %		<b>None</b>					
e.g. _____		e.g. _____		e.g. _____							
Bottom Type (%)											
Rock <input checked="" type="checkbox"/>	Boulder _____	Rubble _____	Gravel _____	Sand <input checked="" type="checkbox"/>	Silt _____						
Clay _____	Muck _____	Marl _____	Detritus _____	Other _____							
Dimensions:				Nearshore Slope (%)		Shoreline Substrate					
Length (m) _____		Mean Width _____	Max. Depth _____			<b>Rip Rap or Sand</b>					
WATER CHEMISTRY:				WATER COLOUR:							
pH	Secchi Depth	Surface Conditions		Conductivity (µS)	<input type="radio"/> colourless <input type="radio"/> blue/green <input type="radio"/> turbid <input checked="" type="radio"/> yellow/brown <input type="radio"/> clear <input type="radio"/> other						
		<input checked="" type="radio"/> calm <input type="radio"/> rippled <input type="radio"/> wavy <input type="radio"/> rough									
D.O. / Temperature Profile: <span style="float: right;">Time:</span>											
Depth (m)	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
Water Temp. (°C)											
D.O. (mg/L)											
Depth (m)	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0
Water Temp. (°C)											
D.O. (mg/L)											
Bank Characteristics (stability, slopes, vegetation etc): <b>Washed out (Rip Rap only)</b>				Surrounding Land Use/Terrain: <b>Maintained lawn, beach</b>							
Underwater Cover (% of area): <b>0%</b>											
Undercut Banks _____	Boulders _____	Logs & Trees _____	Organic Debris _____	w/c Macrophytes _____	Combination _____	None _____					
Additional Data: (Pollution, Migratory Obstructions, etc.) <b>Residential Garbage</b>											



FISH COMMUNITY FIELD COLLECTION RECORD - (page 1)



Project #		Name of Waterbody Rideau River		Day 13	Month 05	Year 08
Location of Station				Station Length (m)		
Collectors: M. Lay, M. Doornekamp						
Weather Conditions: Warm, Sunny 25°C						
Time Started: 1:30 pm		Time Finished: 4:00 pm		Sampling Duration: 2.5 hrs		
WATER CHEMISTRY: Water temp. (°C)		Air temp. (°C)		Conductivity (µS)		
GEAR: Electrofisher <input type="checkbox"/>		Seine <input checked="" type="checkbox"/> # hauls 5		Minnow Trap <input type="checkbox"/> # _____		Surber <input type="checkbox"/>
Length (m) _____		Trap Net <input type="checkbox"/>		Dip Net <input type="checkbox"/>		Other <input type="checkbox"/>
Seconds _____		Settings _____				
Size of Net: Length (m):		Mesh Size: Smallest (cm): Largest (cm):		Depth of Capture: Minimum (m): Maximum (m):		
Fish kept? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		# of Bags	Preservative: <input type="checkbox"/> Formalin <input type="checkbox"/> Frozen <input type="checkbox"/> Alcohol <input type="checkbox"/> Other			
Comments						

Manicured lawns  
Concrete retaining walls  
beach.

Cottonwoods, large tooth aspen, manitoba maple,  
willow, cow vetch,