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1.0 Introduction

The Blue Jay Creek/Manitou River Enhancement Steering Committee is planning the rehabilitation and enhancement of the Blue Jay Creek and Manitou River ecosystems on Manitoulin Island through a multi-phase approach. The intention of this project is to optimize the overall potential of the streams in order to enhance the entire ecosystem of each watershed.

This project will provide benefits to all users of the streams by improving water quality, stream aesthetics and all associated fish and wildlife habitat. Fish, frogs, turtles, snakes, birds and various animals and insects will all enjoy the benefits of an improved ecosystem. The strategy developed for these rivers will provide a foundation for the future extension of site rehabilitation and enhancement projects to other streams across Manitoulin Island.

From the mid-nineties to present, small government grants have assisted local groups in carrying out smaller scale rehabilitation projects on various portions of these streams. It is now evident that although this was an important first step for garnering support, there is a demonstrated need to implement a more comprehensive level of rehabilitation.

A Steering Committee of Manitoulin Island stakeholders has been formed, composed of representatives from local fish and game organizations, local landowner and agricultural organizations, local retail and tourism businesses and area municipalities. This group is actively providing direction for the undertaking of this project.

Phase I of the study included the development of a work plan that identifies all additional field work that needed to be completed on the streams along with a cost estimate. This Phase I work plan classified and prioritized project components, identified where and when work needed to be done, estimated the cost for each component and identified material, equipment and labour needs along with any necessary legislative and regulatory requirements. Phase I of this project was intended to be a project scoping exercise to determine the relative size of the rehabilitation and enhancement required and was not meant to provide detailed design for the specific repairs and enhancement required. In addition, the Phase I portion of the project was limited to the main portions of the streams and was not intended to include all related tributaries. The final Phase I report was issued by Great Lakes Environmental Services (GLES) in October 2003.

Currently, in the Phase II portion of the project, a class environmental assessment is being conducted followed by the preparation of a detailed Strategic Plan. This Strategic Plan is to be part of a submission to federal and provincial funding agencies. Phase II includes consultation with the public and local landowners through advertising in local newspapers, open houses, presentations at local council meetings and a direct mail out to all interested parties (local land owners, regulatory agencies, First Nations etc.). Phase II also includes the preparation and submission of any necessary permit applications to ensure that the work complies with all appropriate regulations.

The final phases of the project will involve obtaining funding partnerships to undertake the actual rehabilitation, enhancement and monitoring work as well as any other work identified during the completion of the Phase I and II portions of the project.

The ultimate goal of this project is to create, through rehabilitation and enhancement of important coldwater streams, healthy and self sustaining ecosystems that contribute to the ecological, economic and social health of Manitoulin Island. Improvements to fish habitat, riparian vegetation, stream stability and water quality are key components of the project.

This report contains a Strategic Plan, which is a primary component of the Phase II portion of this project.

2.0 Strategic Plan

Following is a detailed Strategic Plan to guide work in years 2, 3, 4 and beyond.

Year 1 (2003)

In Year 1, Phase I of the project was completed with the preparation of the Blue Jay Creek and Manitou River Enhancement Strategy report (GLES, October 2003). In addition, Phase II of the project was initiated including the preparation of a Class EA, Strategic Plan (current document) and the submission of regulatory approval documents.

Year 2 (2004)

In Year 2 of the project, the following tasks directly related to the implementation of the restoration/enhancement projects should be completed:

- (January – February), Complete Phase II of the project by finalizing the Class EA process and submitting all regulatory approvals (MNR Work Permit, DFO Authorization or Letter of Advice and CCG Navigable Waters Protection Act approval),
- (February – March), Committee should select sites to be restored/enhanced in Year 2 based on the ranking provided in Section 3.0 below, the available budget and the ability to obtain agreements from landowners for selected sites,
- (March – April), Committee should select a qualified consultant to prepare the design for each enhancement/restoration site. The design should include at a minimum, the preparation of a Phase III Rosgen analysis for each specific site, the predicted impacts of the work on local flooding, the short and long term channel and shoreline stability, the specific measures to enhance and/or restore fish (and wildlife) habitat, preparation of the final landowner agreements and preparation of a tender package,
- (May), Committee should tender the work to allow contractors to bid on the projects scheduled for Year 2,
- (June), Committee should review tender submissions along with the contractor's experience and the available budget and award contract to successful contractor. It is recommended that the consultant who designed the works and prepared the tender documents, be retained to review the bids and prepare a recommendation to the Committee,

- (July – August), Complete construction in July and August. It is recommended that the Committee retain the services of the project designer to provide inspection (on an as required basis) and project management (i.e. ensure that proper documentation such as insurance, bonds, WSIB certification is in place prior to any work on the site, review progress and draws for payment and ensure that all final documentation is in place before the contractor leaves the work site) services to the Committee and,
- (September – November), Conduct post construction monitoring to ensure that the projects are stable.

In addition, the following generic work should be considered in Year 2,

- Conduct a pre-development fisheries inventory of both Blue Jay Creek and the Manitou River to provide a baseline set of data that can be used to monitor the effectiveness of restoration/enhancement projects.

Year 3 (2005)

In Year 3 of the project, the following tasks directly related to the implementation of the restoration/enhancement projects should be completed:

- (February – March), Committee should select sites to be restored/enhanced in Year 3 based on the ranking provided in Section 3.0 below, the available budget and the ability to obtain agreements from landowners for selected sites,
- (March – April), Committee should select a qualified consultant to prepare the design for each enhancement/restoration site. The design should include at a minimum, the preparation of a Phase III Rosgen analysis for each specific site, the predicted impacts of the work on local flooding, the short and long term channel and shoreline stability, the specific measures to enhance and/or restore fish (and wildlife) habitat, preparation of the final landowner agreements and preparation of a tender package,
- (May), Committee should tender the work to allow contractors to bid on the projects scheduled for Year 3,
- (June), Committee should review tender submissions along with the contractor's experience and the available budget and award contract to successful contractor. It is recommended that the consultant who designed the works and prepared the tender documents, be retained to review the bids and prepare a recommendation to the Committee,
- (July – August), Complete construction in July and August. It is recommended that the Committee retain the services of the project designer to provide inspection (on an as required basis) and project management (i.e. ensure that proper documentation such as insurance, bonds, WSIB certification is in place prior to any work on the site, review progress and draws for payment and ensure that all final documentation is in place before the contractor leaves the work site) services to the Committee and,
- (September – November), Conduct post construction monitoring to ensure that the projects are stable.

In addition, the following generic work should be completed,

- Conduct an inspection of the work completed in 2003 to review the design, the overall project stability and to determine whether the restoration/enhancement goals were achieved.

Year 4 and Beyond (2006 and beyond)

In the following years, the Committee should continue to select projects for restoration/enhancement as outlined in Year 2 and 3 above. In addition the following project should be implemented by the Committee depending on the progress of the restoration/enhancement projects and the available budget.

- Conduct post construction fish surveys following construction of restoration/enhancement works after a period of at least two years after the construction has been completed.

A sample plan is outlined below, assuming an average annual budget of approximately \$150,000 per year (note that the pre-development fish survey with a budget of \$50,000 has not been included in this plan).

Sample Plan for Years 2, 3 and 4 (2004 to 2006)

| Year | Project | Rank | Budget | Annual Budget (includes 10% engineering and 15% contingency) |
|----------------------|-----------------|-------------------|------------------|--|
| Year 2 (2004) | M-71 | Manitou River #1 | \$20,000 | |
| | M-37 | Manitou River #2 | \$92,500 | |
| | Subtotal | | \$112,500 | \$140,625 |
| Year 3 (2005) | M-35 | Manitou River #5 | \$130,500 | |
| | M-34 | Manitou River #3 | \$15,500 | |
| | Subtotal | | \$146,000 | \$182,500 |
| Year 4 (2006) | M-48 | Manitou River #4 | \$38,900 | |
| | M-06 | Manitou River #6 | \$6,000 | |
| | B-47 | Blue Jay Creek #1 | \$7,600 | |
| | B-33 | Blue Jay Creek #2 | \$13,800 | |
| | B-27 | Blue Jay Creek #3 | \$4,700 | |
| | B-15 | Blue Jay Creek #4 | \$6,100 | |
| | B-14 | Blue Jay Creek #5 | \$11,900 | |
| | B-13 | Blue Jay Creek #6 | \$6,260 | |
| | B-12 | Blue Jay Creek #7 | \$4,650 | |
| | B-11 | Blue Jay Creek #8 | \$7,400 | |
| | B-10 | Blue Jay Creek #9 | \$4,100 | |
| Subtotal | | \$111,410 | \$139,262 | |

3.0 Methodology of Ranking and Project Ranking

The projects identified in the Blue Jay Creek and Manitou River Enhancement Strategy (GLES, October 2003) were initially categorized as having a high, medium or low priority. This categorization was based on the impact of the concern on the overall ecosystem of the stream as well as its relative importance with respect to timing of the rehabilitation/enhancement. A high priority was given to concerns that were believed to be having a high impact on the overall ecosystem and should be addressed first. In this initial (Phase I) report, no attempt was made to rank individual concerns within the high, medium and low categories. The concerns within each category range were simply reported in the order that they were encountered from the mouth of each stream, moving in an upstream direction.

As part of the current Strategic Plan (Phase II study), each high, medium and low priority concern has been individually ranked within the broader category. This provides each concern with a specific overall rank (i.e. it is clear which project is to be completed first and last on a specific stream). Note that the concerns on Blue Jay Creek and the Manitou River were ranked separately so that the Committee can select the most important projects from each system at their discretion.

In order to rank each concern, the following parameters were considered,

- The rank category of each concern in the Phase I report (high, medium, low), where high priority concerns were ranked higher and low category concerns ranked lower,
- Off site impact (i.e. was the concern only local in nature such as a lack of instream cover or was the concern generating off site impacts such as a large area of active bank erosion) where concerns having off site impacts were ranked higher and those with only a local impact were ranked lower,
- Location of the concern on the stream, where upstream concerns were given a higher rank and those located further downstream (i.e. restoration/enhancement should generally be completed from the upstream end of the stream moving downstream to the mouth),
- Project visibility, where higher visibility sites were assigned a higher rank and those that were not readily visible a lower rank,
- Ease of construction, where sites that were easily accessed (and thus relatively less expensive to construct) were assigned a higher rank than those that were difficult (and more costly per unit of work or return) to access,
- Feasibility of construction, where projects of lower priority that were adjacent to higher priority projects may be re-assigned a higher rank as they would be more feasible to construct at the same time as an independent high priority project and,
- Restoration versus enhancement where projects that are designed to restore habitat and ecosystems that have been destroyed were given a higher priority than those that will enhance existing habitat.

During the Phase I portion of this project, GLES identified all sites that could be potentially rehabilitated or enhanced along both Blue Jay Creek and the Manitou River. In addition, generic rehabilitation/enhancement solutions were provided for each area of concern. Budget cost estimates were then prepared for all of the rehabilitation solutions.

Note that the estimates are budget figures only and an estimate of each individual project should be completed once it has been designed. In addition the length of treatment for which the estimate is provided is that indicated in the size column unless otherwise noted. For areas where both Improve Fish Habitat-Channel Edges and Reduce Stream Width and Increase Stream Depth are recommended, the estimate represents 100% of the length to be treated by the item Reduce Stream Width and Increase Stream Depth and 50% by the item Improve Fish Habitat – Channel Centre. In the item Limit Livestock Watering, the provision of fencing is usually a minimum of 100m in length.

The final ranking of both the Blue Jay Creek and Manitou River projects are provided independently below. The high priority sites are outlined both in the summary table and

on individual project sheets. Projects ranked as medium or low priority are outlined in the summary table only.

Manitou River High Priority Sites

| Site | Problem | Size | UTM 17N E N | Solution | Unit Cost | Estimated Cost |
|------------------------|--|--|---|---|---|--|
| M-71 | Manitou Dam outflow influence | | 422382 5061582 | -Regulate Dam Outflow (allowance) | \$20000 | \$20000 |
| M-37 | Eroded outside bend and lack of vegetation along stream, left side | 250m long by 2m high | 419170 5058913 | -Improve Fish Habitat- Channel Edges -Reduce Stream Width and Increase Stream Depth -Limit Livestock Watering -Improve Riparian Vegetation -Improve Canopy -Improve Substrate | \$100/m \$150/m \$10/m \$2500/unit \$30/m \$30/m \$40/m | \$25000 \$37500 \$2500 \$2500 \$7500 \$7500 \$10000 \$92500 |
| M-35 | General livestock watering area along right side | 400m long by 1m high | 416484 5056153 to 416814 5056409 | -Improve Fish Habitat- Channel Edges -Reduce Stream Width and Increase Stream Depth -Limit Livestock Watering -Improve Riparian Vegetation -Improve Canopy | \$100/m \$150/m \$10/m \$2500 \$30/m \$30/m | \$40000 \$60000 \$4000 \$2500 \$12000 \$12000 \$130500 |
| M-34 | Intensive livestock watering area, right side | 50m long by 1m high | 416589 5056242 | -Improve Fish Habitat- Channel Edges -Limit Livestock Watering (500m) -Improve Riparian Vegetation -Improve Canopy | \$100/m \$10/m \$2500 each \$30/m \$30/m | \$5000 \$5000 \$2500 \$1500 \$1500 \$15500 |
| M-48 | Eroded banks at livestock watering area | 100m long left and 10 and 20m long sections right (130m total) | 419669 5059764 | -Improve Fish Habitat- Channel Edges -Improve Fish Habitat-Channel Centre (50m) -Reduce Stream Width and Increase Stream Depth (100m) -Limit Livestock Watering (200m) -Improve Riparian Vegetation | \$100/m \$100/m \$150/m \$10/m \$30/m | \$13000 \$5000 \$15000 \$2000 \$3900 \$38900 |
| M-06 | Eroded outside bank on left side | 30m long by 2m high | 414201 5050697 | -Repair Erosion at Outside Bends and/or Improve Cover | \$200/m | \$6000 |
| Subtotal High Priority | | | | | | \$303,400 |
| Engineering 10% | | | | | | \$30,340 |
| Contingency 15% | | | | | | \$45,510 |
| Total High Priority | | | | | | \$379,250 |

Priority: **Manitou River #1**
Project: M-71
Location: 422382m east 5061582m north
Description: Regulate/Define Maximum Log Manipulations at Manitou Dam
Estimated Cost: \$20,000

Priority: **Manitou River #2**
Project: M-37
Location: 419170m east 5058913m north
Description: Eroded outside bend and lack of vegetation along stream, left side
(250m long by 2m high)
Tasks:
-Improve Fish Habitat- Channel Edges
-Reduce Stream Width and Increase Stream Depth
-Limit Livestock Watering
-Improve Riparian Vegetation
-Improve Canopy
-Improve Substrate
Estimated Cost: \$92,500

Priority: **Manitou River #3**
Project: M-35
Location: 416484m east 5056153m north to 416814m east 5056409m north
Description: General livestock watering area along right side (about 400m long)
Tasks:
-Improve Fish Habitat –Channel Edges
-Reduce Stream Width and Increase Stream Depth
-Limit Livestock Watering
-Improve Riparian Vegetation
-Improve Canopy
Estimated Cost: \$130,500

Priority: **Manitou River #4**
Project: M-34
Location: 416589m east 5056242m north
Description: Intensive livestock watering area along the right side (50m long by 1m high)
Tasks:
-Improve Fish Habitat- Channel Edges
-Limit Livestock Watering (500m)
-Improve Riparian Vegetation
-Improve Canopy
Estimated Cost: \$15,500

Priority: **Manitou River #5**
Project: M-48
Location: 419669m east 5059764m north
Description: Eroded banks at livestock watering area (100m long on left side and 10 and 20m long on right side, 130m total)
Tasks:
-Improve Fish Habitat- Channel Edges
-Improve fish habitat- Channel Centre (50m)
-Reduce Stream Width and Increase Stream Depth (100m)
-Limit Livestock Watering (200m)
-Improve Riparian Vegetation
Estimated Cost: \$38,900

Priority: **Manitou River #6**
Project: M-06
Location: 414201m east 5050697m north
Description: Eroded outside bank on left side
Tasks: -Repair Erosion at Outside Bend and/or Improve Cover
Estimated Cost: \$6,000

Manitou River Medium Priority Sites

| Site | Problem | Size | UTM 17N E N | Solution | Unit Cost | Estimated Cost |
|-------|--|---------------------|-------------------|---|--|---|
| M-49 | Eroded bank along left side at bridge abutment | About 30m | 419707 5059791 | -Repair Erosion at Outside Bends and/or Improve Cover -Improve Riparian Vegetation -Improve Canopy | \$200/m \$30/m \$30/m | \$6000 \$900 \$900 \$7800 |
| M-50 | Eroded outside bend with livestock watering area along left side | 30m long | 419721 5059790 | -Repair Erosion at Outside Bends and/or Improve Cover -Improve Riparian Vegetation -Improve Canopy | \$200/m \$30/m \$30/m | \$6000 \$900 \$900 \$7800 |
| M-45 | Eroded outside bend, left side at house | 30m long | 418700 5058356 | -Repair Erosion at Outside Bends and/or Improve Cover | \$200/m | \$6000 |
| M-44 | Eroded bank along left side | 30m long | 418674 5058277 | -Improve Fish Habitat- Channel Edges -Reduce Stream Width and Increase Stream Depth -Limit Livestock Watering (100m) -Improve Riparian Vegetation -Improve Canopy | \$100/m \$150/m \$10/m \$2500 \$30/m \$30/m | \$3000 \$4500 \$3000 \$2500 \$900 \$900 \$14800 |
| M-29 | Eroded outside bank | 70m long by 5m high | 415250 5054367 | -Repair Erosion at Outside Bends and/or Improve Cover | \$400/m | \$28000 |
| M-26 | Eroded outside bend in sand bank with clay base | 80m long by 6m high | 415034 5053767 | -Repair Erosion at Outside Bends and/or Improve Cover | \$400/m | \$32000 |
| M-15 | Eroded outside bank | 80m long by 5m deep | 414745 5052604 | -Repair Erosion at Outside Bends and/or Improve Cover | \$400/m | \$32000 |
| M-13 | Eroded bank left side | 30m long by 2m high | 414547 5052349 | -Repair Erosion at Outside Bends and/or Improve Cover | \$200/m | \$6000 |
| M-09A | Poor Cover along left bank | About 20m | | -Improve Riparian Vegetation | \$30/m | \$600 |
| M-09 | Eroded bank, left side, tributary in left side | 12m long by 2m high | 414060 5050985 | -Repair Erosion at Outside Bends and/or Improve Cover | \$200/m | \$2400 |
| M-66 | Livestock watering along right side | About 10m | 421151 5061130 | -Improve Fish Habitat- Channel Edges -Improve Riparian Vegetation | \$100/m \$30/m | \$1000 \$300 \$1300 |
| M-64 | Livestock watering area along right side with minor bank erosion | About 10m | 420606 5060598 | -Limit Livestock Watering (100m) -Improve Fish Habitat- Channel Edges -Improve Riparian Vegetation | \$10/m \$2500 \$100/m \$30/m | \$1000 \$2500 \$1000 \$300 \$4800 |

| | | | | | | |
|-------|---|---|-------------------|---|--|---|
| M-60 | Lack of vegetation along both sides | 100m long at left, 40m long at right (140m total) | 420156 5060293 | -Improve Fish Habitat- Channel Edges -Improve Fish Habitat- Channel Centre (70m) -Reduce Stream Width and Increase Stream Depth -Limit Livestock Watering (300m) (2 pads) -Improve Riparian Vegetation -Improve Canopy | \$100/m \$100/m \$150/m \$10/m \$2500 each \$30/m \$30/m | \$14000 \$7000 \$21000 \$3000 \$5000 \$4200 \$4200 \$58400 |
| M-70 | Manitou Dam to Case Road wide and shallow with little cover | About 2300m (allow 1000m) | | -Improve Fish Habitat- Channel Edges -Improve Fish Habitat- Channel Centre (500m) -Reduce Stream Width and Increase Stream Depth -Improve Substrate | \$100/m \$100/m \$150/m \$40/m | \$100000 \$50000 \$150000 \$40000 \$340000 |
| M-62A | Area between M-48 (change from deep stream form upstream of White's Lake to shallow form and Case Road has little habitat and is generally shallow and wide | Allow 400m | | -Improve Fish Habitat- Channel Edges -Improve Fish Habitat- Channel Centre (200m) -Reduce Stream Width and Increase Stream Depth -Improve Substrate | \$100/m \$100/m \$150/m \$40/m | \$40000 \$20000 \$60000 \$16000 \$136000 |
| M-43A | Coldwater inputs with increased brook trout habitat | About 200m | | -Improve Fish Habitat- Channel Edges | \$100/m | \$20000 |
| M-46 | Lack of vegetation along right side | 10m long | 418861 5058375 | -Improve Riparian Vegetation | \$30/m | \$300 |
| M-47 | Livestock holding and watering area along right side | About 50m | 418962 5058555 | -Limit Livestock Watering -Improve Riparian Vegetation | \$10/m \$2500/unit \$30/m | \$500 \$2500 \$1500 \$4500 |
| M-42 | Livestock watering area at barn. Left side | About 40m | | -Limit Livestock Watering -Improve Riparian Vegetation -Improve Canopy | \$10/m \$2500/unit \$30/m \$30/m | \$400 \$2500 \$1200 \$1200 \$5300 |
| M-62 | Livestock watering area right side | 10m long | 420338 5060389 | -Improve Fish Habitat- Channel Edges -Reduce Stream Width and Increase Stream Depth -Limit Livestock Watering (100m) -Improve Riparian Vegetation -Improve Canopy | \$100/m \$150/m \$10/m \$2500 \$30/m \$30/m | \$1000 \$1500 \$1000 \$2500 \$300 \$300 \$6600 |

| | | | | | | |
|--------------------------|---|---------------------|-------------------|--|--|---|
| M-61 | Eroded outside bank left side | 20m long | 420222 5060371 | -Repair Erosion at Outside Bends and/or Improve Cover -Improve Riparian Vegetation -Improve Canopy | \$200/m \$30/m \$30/m | \$4000 \$600 \$600 \$5200 |
| M-59 | Channel too wide, vegetation required along left side | 10m long | 420136 5060186 | -Improve Fish Habitat- Channel Edges -Reduce Stream Width and Increase Stream Depth -Limit Livestock Watering -Improve Riparian Vegetation -Improve Canopy | \$100/m \$150/m \$10/m \$2500 \$30/m \$30/m | \$1000 \$1500 \$100 \$2500 \$300 \$300 \$5700 |
| M-52 | Eroded bank at power line crossing, with livestock access | 20m long by 3m high | 419789 5059744 | -Improve Riparian Vegetation -Improve Canopy | \$30/m \$30/m | \$600 \$600 \$1200 |
| M-23 | Bank slump in sand along right side | 25m long by 5m high | 415007 5053397 | -Repair Erosion at Outside Bends and/or Improve Cover -Add access surcharge | \$400/m \$10000 | \$10000 \$10000 \$20000 |
| M-22 | Eroded outside bend, left side | 20m long by 5m high | 414971 5053298 | -Repair Erosion at Outside Bends and/or Improve Cover | \$400/m | \$8000 |
| M-16 | Eroded bank with tires cabled in place | 30m long by 4m deep | 414917 5052649 | -Repair Erosion at Outside Bends and/or Improve Cover | \$400/m | \$12000 |
| M-10 | Eroded outside bend, left side | 20m long by 2m high | 414174 5051204 | -Repair Erosion at Outside Bends and/or Improve Cover | \$200/m | \$4000 |
| M-05 | Lack of cover at rock protection along left side | 60m long | 414190 5050652 | -Improve Riparian Vegetation | \$30/m | \$1800 |
| M-01 | Minor bank erosion left | 12m long by 2m high | 413984 5050446 | -Improve Riparian Vegetation | \$30/m | \$360 |
| M-31 | Eroded bank at river access on right side | 5m long by 1m high | 416230 5055898 | -Improve Riparian Vegetation | \$30/m | \$150 |
| M-12 | Ford across bedrock substrate eroded at banks | 3m wide each side | 414502 5052034 | -Reduce Erosion at Crossings | \$500 each | \$500 |
| M-43 | General livestock watering area along right side | About 200m long | | -Limit Livestock Watering | \$10/m \$2500 | \$2000 \$2500 \$4500 |
| M-41 | Livestock watering area along right side | 20m | 417915 5057102 | -Limit Livestock Watering | \$10/m \$2500 | \$200 \$2500 \$2700 |
| Subtotal Medium Priority | | | | | | \$780,710 |
| Engineering 10% | | | | | | \$78,071 |
| Contingency 15% | | | | | | \$117,106 |
| Total Medium Priority | | | | | | \$975,887 |

Manitou River Low Priority Sites

| Site | Problem | Size | UTM 17N E N | Solution | Unit Cost | Estimated Cost |
|------|---|-----------------------------|-------------------|---|-----------------------------|--------------------------------------|
| M-68 | Livestock watering within fence left side | About 10m | 421619 5061211 | -Limit Livestock Watering (100m) | \$10/m \$2500 | \$1000 \$2500 \$3500 |
| M-67 | Livestock watering along right side with disturbed bank | About 30m | 421427 5061100 | -Limit Livestock Watering (100m) -Improve Fish Habitat- Channel Edges | \$10/m \$2500 \$100/m | \$1000 \$2500 \$3000 \$6500 |
| M-63 | Livestock watering area along left | About 20m | 420356 5060468 | -Limit Livestock Watering (100m) | \$10/m \$2500 | \$1000 \$2500 \$3100 |
| M-55 | Lack of vegetation along left side | 20m long | 419961 5059971 | -Improve Canopy | \$30/m | \$600 |
| M-54 | Lack of vegetation along left side | 20m long | 419873 5059890 | -Improve canopy | \$30/m | \$600 |
| M-53 | Lack of vegetation along right side | 35m long | 419850 5059835 | -Improve Canopy | \$30/m | \$1050 |
| M-51 | Eroded bank with livestock watering area, right side | 15m long | 419765 5059765 | -Improve Riparian Vegetation -Improve Canopy | \$30/m \$30/m | \$450 \$450 \$900 |
| M-39 | Eroded bank along left side | 100m long by 5m high | 417562 5056915 | -Improve Riparian Vegetation | \$30/m | \$3000 |
| M-28 | Eroding outside bend, with slumped banks | 100m long by 2m deep | 415082 5054219 | -Repair Erosion at Outside Bends and/or Improve Cover | \$200/m | \$20000 |
| M-27 | Corner slump along the right side | 15m long by 6m high | 415124 5053819 | -Repair Erosion at Outside Bends and/or Improve Cover -Add Access Allowance | \$400/m \$10000 | \$6000 \$10000 \$16000 |
| M-25 | Eroded sand bank along left side | 12m long by 5m high | 414925 5053483 | -Repair Erosion at Outside Bends and/or Improve Cover | \$400/m | \$4800 |
| M-21 | Eroded bank along left side | 15m long by 1m high | 414911 5053301 | -Repair Erosion at Outside Bends and/or Improve Cover | \$200/m | \$3000 |
| M-20 | Eroded outside bend, right side | 30m long by 3m high | 414924 5053125 | -Repair Erosion at Outside Bends and/or Improve Cover -Add Access Allowance | \$400/m \$10000 | \$12000 \$10000 \$22000 |
| M-19 | Minor bank erosion along right side | 25m long by 1.5m high | 414808 5053034 | -Repair Erosion at Outside Bends and/or Improve Cover -Add Access Allowance | \$200/m \$10000 | \$5000 \$10000 \$15000 |
| M-18 | Bank erosion along left side | 20m long by 2.5m high | 414806 5053087 | -Repair Erosion at Outside Bends and/or Improve Cover | \$400/m | \$8000 |

| | | | | | | |
|-----------------------|--|---------------------------|-------------------|--|-----------------------------|------------------------------------|
| M-17 | Eroded outside bend | 50m long by 4m deep | 414908 5052646 | -Repair Erosion at Outside Bends and/or Improve Cover | \$400/m | \$20000 |
| M-14 | Eroded outside bend | 50m long | 414622 5052417 | -Repair Erosion at Outside Bends and/or Improve Cover -Add Access Allowance | \$200/m \$10000 | \$10000 \$10000 \$20000 |
| M-11 | Eroded outside bank right side | 10m long by 2m high | 414197 5051197 | -Repair Erosion at Outside Bends and/or Improve Cover -Add Access Allowance | \$200/m \$10000 | \$2000 \$10000 \$12000 |
| M-04 | Outside bend requires additional cover | 15m long by 2m high | 414202 5050617 | -Repair Erosion at Outside Bends and/or Improve Cover | \$200/m | \$3000 |
| M-02 | Outside bend with shallow (<0.6m) pool requiring cover | 6m long by 1m high | 414030 5050462 | -Repair Erosion at Outside Bends and/or Improve Cover | \$200/m | \$1200 |
| M-40 | Additional vegetation required along right side | 100m long | 417693 5056989 | -Improve Riparian Vegetation | \$30/m | \$3000 |
| M-56 | Additional structure required | About 30m | 419995 5059989 | -Improve Fish Habitat -Channel Centre | \$100/m | \$3000 |
| M-38 | Ford crossing bedrock substrate with minor bank erosion | | 419219 5059306 | -Reduce Erosion at Crossings | \$500 each | \$500 |
| M-58 | Lack of vegetation on right side | 5m long | 420151 5060172 | -Improve Riparian Vegetation | \$30/m | \$150 |
| M-57 | Additional cover on outside bend | 20m long | 420123 5060079 | -Repair Erosion at Outside Bends and/or Improve Cover | \$200/m | \$4000 |
| M-03 | Erosion at ford | 4m wide both sides | 414100 5050501 | -Reduce Erosion at Crossings | \$500 | \$500 |
| M-08 | Increase canopy required | About 100m | 414324 5050954 | -Improve Canopy | \$30/m | \$3000 |
| M-33 | Field on left, reduced canopy | About 100m | 416448 5056121 | -Improve Canopy | \$30/m | \$3000 |
| M-65 | Rock lined livestock watering access | About 10m | 420680 5060737 | -Improve Fish Habitat- Channel Edges -Improve Riparian Vegetation -Improve Canopy | \$100/m \$30/m \$30/m | \$1000 \$300 \$300 \$1600 |
| M-30 | Vegetation removed at house on right | About 20m | 415341 5054565 | -Improve Riparian Vegetation | \$30/m | \$600 |
| Subtotal Low Priority | | | | | | \$183,600 |
| Engineering 10% | | | | | | \$18,360 |
| Contingency 15% | | | | | | \$27,540 |
| Total Low Priority | | | | | | \$229,500 |

Blue Jay Creek High Priority Sites

| Site | Problem | Size | UTM 17N E N | Solution | Unit Cost | Estimated Cost |
|------|--|-----------------------|-------------------|--|--|---|
| B-47 | Livestock watering area at barn along right side | 30m long by 0.3m high | 423073 5057347 | -Limit Livestock Watering -Improve Fish Habitat-Channel Edges -Improve Riparian Vegetation -Improve Canopy | \$10/m \$2500 \$100/m \$30/m \$30/m | \$300 \$2500 \$3000 \$900 \$900 \$7600 |
| B-33 | Intensive livestock watering and crossing area, both sides | 30m long by 0.6m high | 422975 5056239 | -Limit Livestock Watering (200m) -Improve Fish Habitat-Channel Edges -Reduce Stream Width and Increase Stream Depth -Improve Riparian Vegetation -Improve Canopy | \$10/m \$2500 \$100/m \$150/m \$30/m \$30/m | \$2000 \$2500 \$3000 \$4500 \$900 \$900 \$13800 |
| B-27 | Intensive livestock watering area along left side | 20m long by 0.3m high | 423067 5055617 | -Limit Livestock Watering (100m) -Improve Riparian Vegetation -Improve Canopy | \$10/m \$2500 \$30/m \$30/m | \$1000 \$2500 \$600 \$600 \$4700 |
| B-15 | Intensive livestock watering area along left side | 20m long by 1m high | 419376 5051598 | -Limit Livestock Watering (100m) -Repair Erosion at Outside Bends and/or Improve Cover -Improve Riparian Vegetation | \$10/m \$2500 \$100/m \$30/m | \$1000 \$2500 \$2000 \$600 \$6100 |
| B-14 | Intensive livestock watering area along left side | 30m long by 1.5m high | 419303 5051553 | -Limit Livestock Watering (100m) -Improve Fish Habitat- Channel Edges -Reduce Stream Width and Increase Stream Depth -Improve Riparian Vegetation | \$10/m \$2500 \$100/m \$150/m \$30/m | \$1000 \$2500 \$3000 \$4500 \$900 \$11900 |
| B-13 | Intensive livestock watering area along left side | 12m long by 0.6m high | 419253 5051482 | -Limit Livestock Watering (100m) -Repair Erosion at Outside Bends and/or Improve Cover -Improve Riparian Vegetation | \$10/m \$2500 \$200/m \$30/m | \$1000 \$2500 \$2400 \$360 \$6260 |
| B-12 | Intensive livestock watering area along left side | 5m long by 1.5m high | 419225 5051390 | -Limit Livestock Watering (100m) -Repair Erosion at Outside Bends and/or Improve Cover -Improve Riparian Vegetation | \$10/m \$2500 \$200/m \$30/m | \$1000 \$2500 \$1000 \$150 \$4650 |

| | | | | | | |
|------------------------|--|--|-------------------|---|---------------------------------------|---|
| B-11 | Intensive livestock watering area and lack of vegetation | 30m long by 0.6m high on left and 6m long on right | 419199 5051285 | -Repair Erosion at Outside Bends and/or Improve Cover -Limit Livestock Watering (100m) -Improve Riparian Vegetation | \$100/m \$10/m \$2500 \$30/m | \$3000 \$1000 \$2500 \$900 \$7400 |
| B-10 | Intensive livestock watering area, left side | 20m long by 0.3m deep | 419669 5059764 | -Limit Livestock Watering (100m) -Improve Riparian Vegetation | \$10/m \$2500 \$30/m | \$1000 \$2500 \$600 \$4100 |
| Subtotal High Priority | | | | | | \$66,510 |
| Engineering 10% | | | | | | \$6,651 |
| Contingency 15% | | | | | | \$9,976 |
| Total High Priority | | | | | | \$83,137 |

Priority: **Blue Jay Creek #1**
Project: B-47
Location: 423073m east 5057347m north
Description: Livestock watering area at barn along right side (30m long by 0.3m high)
Tasks:
-Limit Livestock Watering
-Improve Fish Habitat- Channel Edges
-Improve Riparian Vegetation
-Improve Canopy
Estimated Cost: \$7,600

Priority: **Blue Jay Creek #2**
Project: B-33
Location: 422975m east 5056239m north
Description: Intensive livestock watering and crossing area, both sides (30m long by 0.6m high)
Tasks:
-Limit Livestock Watering (200m)
-Improve Fish Habitat- Channel Edges
-Reduce Stream Width and Increase Stream Depth
-Improve Riparian Vegetation
-Improve Canopy
Estimated Cost: \$13,800

Priority: **Blue Jay Creek #3**
Project: B-27
Location: 423067m east 5055617m north
Description: Intensive livestock watering area along left side (20m long by 0.3m high)
Tasks: -Limit Livestock Watering (100m)
-Improve Riparian Vegetation
-Improve Canopy
Estimated Cost: \$4,700

Priority: **Blue Jay Creek #4**
Project: B-15
Location: 419376m east 5051598m north
Description: Intensive livestock watering area along left side (20m long by 1m high)
Tasks: -Limit Livestock Watering (100m)
-Repair Erosion at Outside Bend and/or Improve Cover
-Improve Riparian Vegetation
Estimated Cost: \$6,100

Priority: **Blue Jay Creek #5**
Project: B-14
Location: 419303m east 5051553m north
Description: Intensive livestock watering area along left side (30m long by 1.5m high)
Tasks:
-Limit Livestock Watering (100m)
-Improve Fish Habitat- Channel Edges
-Reduce Stream Width and Increase Stream Depth
-Improve Riparian Vegetation
Estimated Cost: \$11,900

Priority: **Blue Jay Creek #6**
Project: B-13
Location: 419253m east 5051482m north
Description: Intensive livestock watering area along left side (12m long by 0.6m high)
Tasks: -Limit Livestock Watering (100m)
-Repair Erosion at Outside Bend and/or Improve Cover
-Improve Riparian Vegetation
Estimated Cost: \$6,260

Priority: **Blue Jay Creek #7**
Project: B-12
Location: 419225m east 5051390m north
Description: Intensive livestock watering along left side (5m long by 1.5m high)
Tasks:
-Limit Livestock Watering (100m)
-Repair Erosion at Outside Bend and/or Improve Cover
-Improve Riparian Vegetation
Estimated Cost: \$4,650

Priority: **Blue Jay Creek #8**
Project: B-11
Location: 419199m east 5051285m north
Description: Intensive livestock watering area and lack of vegetation (30m long by 0.6m deep left and 6m long on right)
Tasks: -Repair Erosion at Outside Bends and/or Improve Cover
-Limit Livestock Watering (100m)
-Improve Riparian Vegetation
Estimated Cost: \$7,400

Priority: **Blue Jay Creek #9**
Project: B-10
Location: 419669m east 5059764m north
Description: Intensive livestock watering area along left side (20m long by 0.3m deep)
Tasks: -Limit Livestock Watering (100m)
-Improve Riparian Vegetation
Estimated Cost: \$4,100

Blue Jay Creek Medium Priority Sites

| Site | Problem | Size | UTM 17N E N | Solution | Unit Cost | Estimated Cost |
|---------------------------------|--|---|--|--|--|--|
| B-38 | Livestock watering area both sides, poor overhead cover | 5m by 0.6m right and 1.5m by 0.3m on left poor cover about 50m both sides | 423159 5056488 | -Limit Livestock Watering (100m) -Improve Fish Habitat-Channel Edges -Improve Riparian Vegetation -Improve Canopy | \$10/m \$2500 \$100/m \$30/m \$30/m | \$1000 \$2500 \$800 \$1500 \$1500 \$7300 |
| B-36 | Livestock watering area along left side | 10m long by 0.6m high | 423051 5056400 | -Limit Livestock Watering (100m) -Improve Fish Habitat-Channel Edges -Reduce Stream Width and Increase Stream Depth -Improve Riparian Vegetation -Improve Canopy | \$10/m \$2500 \$100/m \$150/m \$30/m \$30/m | \$1000 \$2500 \$1000 \$1500 \$300 \$300 \$6600 |
| B-17 | Limited vegetation along right side | 12m long | 419456 5051647 | -Limit Livestock Watering (100m) -Improve Fish Habitat-Channel Edges -Improve Riparian Vegetation -Improve Canopy | \$10/m \$2500 \$100/m \$30/m \$30/m | \$1000 \$2500 \$1200 \$360 \$360 \$5420 |
| B-28 | Drainage from livestock holding area along right side | | 423120 5055771 | -Improve Water Quality (allowance) | \$2000 | \$2000 |
| B-09 | Random livestock watering along both banks | About 2400m on both sides (4800m) | From 417776 5050304 To 419617 5051723 | -Limit Livestock Watering | \$10/m \$2500 (4) | \$48000 \$10000 \$58000 |
| B-53 | Limited cover along creek and limited in creek structure | From upstream of pond to Town Line or about 250m | 423314 5058129 | -Improve Riparian Vegetation -Improve Fish Habitat-Channel Edges -Improve riparian vegetation -Improve Canopy | \$30/m \$100/m \$30/m \$30/m | \$7500 \$25000 \$7500 \$7500 \$47500 |
| B-29 | Added stream side vegetation required both sides | About 300m total | From 423133 5055805 to 423033 5055519 | -Improve Riparian Vegetation -Improve Canopy | \$30/m \$30/m | \$9000 \$9000 \$18000 |
| B-26 | Added stream side vegetation required along right side (cut) | About 70m | From 423033 5055519 to 422969 5055488 | -Improve Riparian Vegetation -Improve Canopy | \$30/m \$30/m | \$2100 \$2100 \$4200 |
| Subtotal Medium Priority | | | | | | \$149,020 |
| Engineering 10% | | | | | | \$14,902 |
| Contingency 15% | | | | | | \$22,353 |
| Total Medium Priority | | | | | | \$186,275 |

Blue Jay Creek Low Priority Sites

| Site | Problem | Size | UTM 17N E N | Solution | Unit Cost | Estimated Cost |
|------|---|--|-------------------|---|---|--|
| B-37 | Minor livestock watering area | About 10m long | 423152 5056470 | -Limit Livestock Watering (100m) -Improve Fish Habitat-Channel Edges -Improve Riparian Vegetation -Improve Canopy | \$10/m \$2500 \$100/m \$30/m \$30/m | \$1000 \$2500 \$1000 \$300 \$300 \$5100 |
| B-18 | Intensive livestock watering area along left side | 10m long by 0.6m high | 419591 5051709 | -Limit Livestock Watering (100m) -Improve Riparian Vegetation -Improve Canopy | \$10/m \$2500 \$30/m \$30/m | \$1000 \$2500 \$300 \$300 \$4100 |
| B-16 | Eroded outside bend on left side | 12m long by 1.5m high | 419433 5051662 | -Limit Livestock Watering (100m) -Improve Fish Habitat- Channel Edges -Improve Riparian Vegetation -Improve Canopy | \$10/m \$2500 \$100/m \$30/m \$30/m | \$1000 \$2500 \$1200 \$360 \$360 \$5420 |
| B-35 | Small livestock watering area along left side, poor overhead canopy | Watering area about 3m long by 0.6m high | 423053 5056332 | -Limit Livestock Watering (100m) -Improve Riparian Vegetation | \$10/m \$2500 \$30/m | \$1000 \$2500 \$90 \$3590 |
| B-40 | Minor livestock watering area along left side at base of hill | About 10m long | 423092 5056593 | -Limit Livestock Watering (100m) -Improve Riparian Vegetation -Improve Canopy | \$10/m \$2500 \$30/m \$30/m | \$1000 \$2500 \$300 \$300 \$4100 |
| B-32 | Limited cover along both sides of creek | 20m long per side or 40m total | 423091 5056135 | -Improve Canopy | \$30/m | \$1200 |
| B-31 | Limited cover along right side | About 20m per side or 40m total | 423160 5056072 | -Improve Canopy | \$30/m | \$1200 |
| B-30 | Limited cover along creek both sides | 20m long per side or 40m total | 423173 5056045 | -Improve Canopy | \$30/m | \$1200 |
| B-50 | Limited overhead canopy both sides | About 50m both sides (100m total) | 423108 5057744 | -Improve Riparian Vegetation -Improve Canopy | \$30/m \$30/m | \$3000 \$3000 \$6000 |
| B-49 | Limited vegetation and cover both sides | 50m long by 0.6m high (100m total) | 423011 5057653 | -Improve Riparian Vegetation -Improve Canopy | \$30/m \$30/m | \$3000 \$3000 \$6000 |

| | | | | | | |
|------|--|---|--|---|------------------|-----------------------------|
| B-46 | Limited canopy both sides | 85m long by 0.6m high (170m total) | 423184 5057357 | -Improve Canopy | \$30/m | \$5100 |
| B-45 | Limited canopy along creek both sides | 40m long by 0.6m high | 423123 5057368 | -Improve Riparian Vegetation -Improve Canopy | \$30/m \$30/m | \$1200 \$1200 \$2400 |
| B-44 | Limited vegetation along right side of creek | 8m long by 0.6m high | 423257 5057371 | -Improve Riparian Vegetation -Improve Canopy | \$30/m \$30/m | \$240 \$240 \$480 |
| B-43 | Limited creek side vegetation along right side | 5m long by 0.6m high | 423266 5057361 | -Improve Riparian Vegetation -Improve Canopy | \$30/m \$30/m | \$150 \$150 \$300 |
| B-41 | Poor creek side vegetation and overhead cover both sides | About 30m per side or 60m total | 423211 5057161 | -Improve Riparian Vegetation -Improve Canopy | \$30/m \$30/m | \$1800 \$1800 \$3600 |
| B-48 | Limited cover both sides | 90m long by 0.6m high on left and 30m long by 0.6m high on right (150m total) | 422965 5057612 | -Improve Canopy | \$30/m | \$4500 |
| B-39 | Minor erosion along left bank | 12m long by 0.6m high | 423093 5056561 | -Improve Riparian Vegetation | \$30/m | \$360 |
| B-52 | No overhead cover along pond both sides | About 100m long per side (200m total) | From 423156 5057809 to 423314 5058129 | -Improve Riparian Vegetation -Improve Canopy | \$30/m \$30/m | \$6000 \$6000 \$12000 |
| B-34 | Limited overhead canopy both sides | About 50m per side or 100m total | 422974 5056239 | -Improve Canopy | \$30/m | \$3000 |
| B-25 | Limited canopy both sides | 50m long both sides or 100m total | 422904 5055437 | -Improve Canopy | \$30/m | \$3000 |
| B-24 | Limited canopy | About 100m on both sides or 200m | 422823 5055372 | -Improve Canopy | \$30/m | \$6000 |
| B-23 | Limited canopy | About 100m | 422781 5055288 | -Improve Canopy | \$30/m | \$3000 |

| | | | | | | |
|-----------------------|--------------------------------------|-----------------------|--|--|--------------------|-------------------------------|
| B-20 | Open field left side | About 200m | From 419912 5052063 to 419376 5051598 | -Improve Canopy | \$30/m | \$6000 |
| B-08 | Eroded sand bank on outside bend | 15m long by 2.5m high | 415413 5049485 | -Repair Erosion at Outside Bends and/or Improve Cover -Add Access Allowance | \$400/m \$10000 | \$6000 \$10000 \$16000 |
| B-07 | Eroded sand bank on outside bend | 40m long by 5m high | 415454 5049458 | -Repair Erosion at Outside Bends and/or Improve Cover | \$400/m | \$16000 |
| B-06 | Eroded outside bend along right side | 25m long by 3m high | 415474 5049421 | -Repair Erosion at Outside Bends and/or Improve Cover -Access Allowance | \$400/m \$10000 | \$10000 \$10000 \$20000 |
| B-05 | Four wheeler trail | | 415258 5049123 | -Reduce Erosion at Crossings | \$500 | \$500 |
| B-04 | Eroded sand bank left side | 30m long by 3m high | 415196 5049028 | -Improve Riparian Vegetation | \$30/m | \$900 |
| B-03 | Eroded outside sand bank, right side | 60m long by 2m high | 414877 5049021 | -Repair Erosion at Outside Bends and/or Improve Cover | \$200/m | \$12000 |
| B-02 | Eroded sand bank, right side | 25m long by 1.5m high | 414863 5049169 | -Repair Erosion at Outside Bends and/or Improve Cover | \$200/m | \$5000 |
| B-01 | Eroded outside bank left side | 100m long by 2m high | 414888 5049236 | -Repair Erosion at Outside Bends and/or Improve Cover | \$200/m | \$20000 |
| Subtotal Low Priority | | | | | | \$178,050 |
| Engineering 10% | | | | | | \$17,805 |
| Contingency 15% | | | | | | \$26,707 |
| Total Low Priority | | | | | | \$222,562 |

4.0 Closure

A Strategic Plan has been outlined to allow the Committee to implement the Blue Jay Creek and Manitou River Enhancement Strategy, which was summarized in the Phase I report.

Please contact the undersigned directly should you have any questions or wish to discuss any aspect of the work in greater detail.

Yours truly,

David Holla, P.Eng.
Fisheries Biologist/Water Resources Engineer
1353170 Ontario Ltd., o/a
Great Lakes Environmental Services