



# FINAL REPORT

## City of Campbell River Integrated Stormwater Management Implementation Plan



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1479.0009.01 / March 24, 2008

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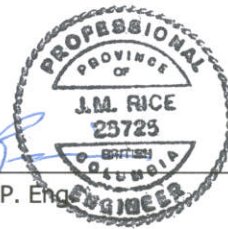
# City of Campbell River Integrated Stormwater Management Implementation Plan

## Final Report

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**Date issued:** 2008/03/24

**Project No.:** 1479.0009.01

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## EXECUTIVE SUMMARY

Over the past four years, the City of Campbell River has developed six integrated stormwater management plans (ISMPs), which provide the City with roadmaps to innovative management of stormwater in the community. To date, the City has adopted ISMPs for the following specific areas or watersheds:

- Holly Hills and Perkins Road catchments (North Campbell River) (completed 2004)
- Nunns Creek watershed (completed 2005)
- Willow Creek watershed (completed 2005)
- Simms Creek watershed (completed 2005)
- Foreshore area (areas draining directly to Discovery Passage) (completed 2005)
- Quinsam River/Campbell River area (Campbellton area plus Detweiler Creek and Haig Brown Kingfisher Creek watersheds) (completed 2006)

This report provides a summary of all recommendations, both capital and programmatic, as proposed in each ISMP; updates costs from those ISMPs; develops a framework for setting priorities among the recommendations; and proposes an improvement program for near-, mid-, and long-term periods into the future. As shown in Table E-1, after some fine tuning, the six ISMPs generated 172 initiatives. Together, these initiatives total over \$50 million in one-time costs. Initiatives include traditional municipal infrastructure construction projects as well as programmatic actions such as adopting new stormwater policies and regulations.

**Table E-1: Project List Summary**

| <b>Category</b>                          | <b>Number of Initiatives</b> | <b>Total Estimated Cost (Jan. 2007) *</b> |
|------------------------------------------|------------------------------|-------------------------------------------|
| Environmental Protection and Enhancement | 35                           | \$2,405,000                               |
| Municipal Infrastructure                 | 79                           | \$49,437,000                              |
| Pilot Projects                           | 6                            | \$682,000                                 |
| Planning and Analysis                    | 34                           | \$719,000                                 |
| Policy and Regulation                    | 14                           | \$110,000                                 |
| Public Education and Outreach            | 4                            | \$21,000                                  |
| <b>Total</b>                             | <b>172</b>                   | <b>\$53,374,000</b>                       |

*\*For certain projects, costs were undefined, and have therefore not been included in the total.*



Priorities were assigned to the 172 initiatives in order to produce an implementation plan; the plan identifies the recommended timing and associated costs for each initiative. As shown in Table E-2, we recommend that 58 of the initiatives be implemented within the next five years.

**Table E-2: Implementation Plan Summary**

| <b>Year</b>                     | <b>Number of Initiatives</b> | <b>Total Estimated Cost (Jan. 2007)<sup>1</sup></b> |
|---------------------------------|------------------------------|-----------------------------------------------------|
| Year 1                          | 32                           | \$2,345,336                                         |
| Year 2                          | 7                            | \$343,000                                           |
| Year 3                          | 15                           | \$2,810,032                                         |
| Year 4                          | 3                            | \$66,000                                            |
| Year 5                          | 1                            | \$500,000                                           |
| Years 6 – 10                    | 26                           | \$2,098,427                                         |
| Years >10                       | 59                           | \$7,690,000                                         |
| <b><i>Sub-total</i></b>         | <b><i>143</i></b>            | <b><i>\$15,852,795</i></b>                          |
| Works and Services <sup>2</sup> | 21                           | \$35,891,000                                        |
| Other <sup>3</sup>              | 8                            | \$1,613,784                                         |
| <b><i>Total</i></b>             | <b><i>172</i></b>            | <b><i>\$53,357,579</i></b>                          |

<sup>1</sup>For certain projects, costs were undefined or are dependent on the final scope of work once defined; these have not been included in the total.

<sup>2</sup>The timing of projects to be completed by the developer through works and services will be determined by the timing of development; these projects do not impose costs on the City

<sup>3</sup>A number of other projects have not yet been given a preferred timing for development. Most of these projects are in the City's proposed DCC program.



## 1.0 INTRODUCTION

Over the past four years, the City of Campbell River has developed integrated stormwater management plans (ISMPs) for the entire urbanized and urbanizing areas of the City. These plans are innovative in their approach to managing stormwater (“drainage”) within the community, incorporate current scientific understandings of urban hydrology, and provide a sound basis for adopting more sustainable approaches to controlling runoff in Campbell River. The ISMPs were developed by a multidisciplinary team representing engineering, planning, environmental and financial perspectives, in consultation with numerous stakeholders, including senior environmental agencies, the development community and local streamkeepers groups.

To date, ISMPs have been developed and adopted in principle by City Council for the following specific areas or watersheds:

- Holly Hills and Perkins Road catchments (North Campbell River) (completed 2004)
- Nunns Creek watershed (completed 2005)
- Willow Creek watershed (completed 2005)
- Simms Creek watershed (completed 2005)
- Foreshore area (areas draining directly to Discovery Passage) (completed 2005)
- Quinsam River/Campbell River area (Campbellton area plus Detweiler Creek and Haig Brown Kingfisher Creek watersheds) (completed 2006)

Among the ISMPs, nearly 200 initiatives for infrastructure improvements, policy changes, environmental enhancements and more were recommended. Faced with the extent of the recommendations, the City commissioned Urban Systems Ltd. to develop an overall implementation plan for all of Campbell River. The purpose of the work is to provide City Council and staff with a work plan for implementing the combined recommendations from the ISMPs.

This report provides a summary of the recommendations, both capital and programmatic, as presented in the six ISMPs; updates costs from those ISMPs to a common base of January 2007; develops a framework for setting priorities among the recommendations; and proposes an improvement program for near-, mid-, and long-term periods into the future. The implementation plan has been developed in cognizance of the City's available funding for stormwater projects, though without simply being constrained by it. Currently the City raises roughly \$140,000 from the stormwater parcel tax; in addition, once updated, the City's DCC will provide funds for work specifically related to new growth.



The proposed implementation plan includes projects, activities and proposals for capital improvements, on-going analytical planning and engineering functions, operations activities, bylaw changes, administrative concerns and other related aspects for stormwater management in the City. Table 1 is a summary of the proposed initiatives.

**Table 1: Project List Summary**

| <b>Category</b>                          | <b>Number of Initiatives</b> | <b>Total Estimated Cost (Jan. 2007) *</b> |
|------------------------------------------|------------------------------|-------------------------------------------|
| Environmental Protection and Enhancement | 35                           | \$2,405,000                               |
| Municipal Infrastructure                 | 79                           | \$49,437,000                              |
| Pilot Projects                           | 6                            | \$682,000                                 |
| Planning and Analysis                    | 34                           | \$719,000                                 |
| Policy and Regulation                    | 14                           | \$110,000                                 |
| Public Education and Outreach            | 4                            | \$21,000                                  |
| <b>Total</b>                             | <b>172</b>                   | <b>\$53,374,000</b>                       |

*\*For certain projects, costs were undefined, and have therefore not been included in the total.*

This report has been organized into the following sections:

- Section 1 – Introduction
- Section 2 – Project List
- Section 3 – Priority Setting
- Section 4 – Implementation Plan
- Section 5 – Next Steps

Tables listing specific information (as described in the text) for the initiatives can be found in Schedules A through F, at the end of this report.



## 2.0 PROJECT LIST

Schedule A contains a listing of the recommendations from the six integrated stormwater management plans. They have been grouped into six categories:

- **Environmental Protection and Enhancement** – projects generally intended to mitigate or enhance in-stream conditions for fish and wildlife
- **Municipal Infrastructure** – projects to improve the functioning of the City's stormwater collection, conveyance, control, treatment and discharge systems; this includes upgrades to existing storm drains, construction of new trunk storm drains, detention ponds and runoff treatment systems, replacement of inadequately sized culverts, and repair of erosion that directly impacts property or other local infrastructure such as roads
- **Pilot Projects** – small scale projects intended to demonstrate the applicability of innovative stormwater controls to the Campbell River area
- **Planning and Analysis** – activities and tasks to enhance the City's understanding of local streams and storm systems, to evaluate the success of past actions, and to determine the feasibility of undertaking additional actions or adapting to changed conditions
- **Policy and Regulation** – development and adoption of bylaws, guidelines and other regulatory tools, including updates to the ISMPs
- **Public Education and Outreach** – programs and activities intended to educate the public, developers, contractors and others about stormwater management and its benefits to Campbell River

To accompany Schedule A, Maps 1A through 1C show the locations for the recommended municipal infrastructure improvements.

In the course of developing Schedule A, we made adjustments to the original recommendations as originally proposed in the ISMPs. This included:

- Eliminating duplicate recommendations (generally related to the Policy and Regulations category)
- Combining or consolidating activities or tasks that could be better accomplished together, e.g., grouping a series of storm drain replacements into one project, based on proximity
- Eliminating clearly infeasible activities or tasks





- Eliminating recommendations that the City has already implemented or constructed
- Adding recommendations that enhance or complement those from the ISMPs
- Clarifying the scope or content of some projects to better fit within the overall implementation plan
- Removing projects that implied or appeared to suggest that one of the local First Nations is or will be required to construct stormwater facilities

With regard to adding recommendations, several have been added that merit specific mention at this point:

- The City could benefit from formulating a general policy for incorporating or addressing the impact of global warming, specifically as it relates to rising sea levels and changing rainfall patterns, on stormwater systems design and overall stormwater management
- The City could benefit from reviewing and potentially adopting ISO 14001 Environmental Management Systems as a basis for tracking stormwater (and general environmental) indicators

Upon completing the basic list of recommendations, a number of attributes were determined for each, as applicable. These are:

- **Estimated cost, in January 2007 dollars** – Capital cost if a construction project; cost to perform if a study or other similar analysis
- **Estimated on-going annual cost, in January 2007 dollars** - Includes operation, maintenance, repair, and replacement costs as well as other annual costs such as water quality sampling
- **Funding source** – Identifies likely funding sources such as DCCs, works and services improvements for new subdivisions, and designated stormwater funds (either from the current stormwater parcel tax or a future user rate charge)
- **Outsource or in-house?** – Indicates whether the work is likely to be undertaken by City staff or through outsourcing (consultants; contractors; other local groups)
- **Development pressure?** – Indicates that a project is required to meet immediate or imminent development pressure
- **Addresses current significant flooding or erosion issues?** – Indicates whether a project is required to mitigate or alleviate severe flooding or erosion problems that exist now



- **Annual TSS loading reduction** – Provides an estimate of the annual reduction in total suspended solids discharges for proposed water quality treatment systems
- **Area of habitat improvement** – Provides an estimate in the total area directly impacted by proposed in-stream environmental protection and enhancement projects
- **Annual increase in smolts** – Using commonly applied fish production rates, provides an estimate of the annual increase in numbers of fish resulting from proposed in-stream environmental protection and enhancement projects
- **Environmental benefit** – Narrative description of specific environmental benefits of proposed environmental and infrastructure improvement projects
- **Concurrent with other project(s)?** – Indicates whether a project can/should be undertaken in conjunction with other municipal initiative(s)

The next section describes how priorities were set among the recommendations.



### 3.0 PRIORITY SETTING

The implementation plan outlined in the following section proposes which projects should be undertaken in each of the next five years, six to ten years, and eleven or more years. The following initial steps were taken to develop these recommendations:

- **Step 1 – Identify projects to be funded by developers (as opposed to the City)**

The first step was to identify those projects required exclusively for growth, and that would be entirely funded by the developers. It is expected that the developer will pay for these projects through works and services agreements.<sup>1</sup> Since the City will not be responsible for the costs associated with constructing these projects (which are mostly detention ponds and trunk storm sewers), these projects have not been included in the City's implementation plan. These projects will occur as development proceeds, independent of the City's implementation plan for City-funded projects. Projects to be completed through works and services are listed in Schedule B. As shown in Table 2, these projects total **\$35,891,000** in capital costs, which will be paid entirely by development.

**Table 2: Municipal Infrastructure Projects to be Funded by Developers**

| Watershed Location | Number of Initiatives | Total Estimated Cost (Jan. 2007)* |
|--------------------|-----------------------|-----------------------------------|
| CR/QR              | 7                     | \$11,387,000                      |
| Nunns              | 4                     | \$4,506,000                       |
| Simms              | 4                     | \$2,143,000                       |
| Willow             | 6                     | \$17,855,000                      |
| <b>Total</b>       | <b>21</b>             | <b>\$35,891,000</b>               |

*\*For certain projects, costs were undefined, and have therefore not been included in the total.*

- **Step 2 – Identify timing of Development Cost Charge (DCC) projects**

The next step was to determine which projects were DCC projects. Since DCC projects are built to support growth, the timing of each DCC project is determined by the anticipated timing of future development. Therefore, the timing of the DCC projects shown in the implementation plan directly reflects the timing of new development as currently anticipated.

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<sup>1</sup> Development does pay for certain projects through development cost charges (DCCs) (see Step 2 discussion). As the City makes a contribution to these projects through the municipal assist factor and portion of costs allocated to existing development, these initiatives have been included in the implementation plan.



- **Step 3 – Prioritize City-funded initiatives**

The fourth step was to categorize the remaining City-funded initiatives as “near-term”, “mid-term”, or “long-term.” Near-term initiatives are those that should be undertaken within the next five years; mid-term should be undertaken within the next six to ten years; and long-term initiatives are assigned for implementation in the years beyond or as funds become otherwise available. High priority projects are, logically, recommended to be undertaken in the next few years, whereas relatively lower priority projects are recommended to be undertaken further in the future, although factors come into play in each case.

While there were exceptions, in general, the priority timing was defined using these guides:

- **Near-Term (1–5 years)** – High priority initiatives are those initiatives that exhibit one or more of these characteristics:
  - Generate information that will affect the delivery of subsequent projects or execution of subsequent initiatives (e.g., flow and rainfall monitoring);
  - Result in policies, procedures or regulations that will affect future development (e.g., erosion control bylaw);
  - Address significant existing flooding or erosion issues;
  - Correspond to works in an area with significant development pressure;
  - Are high-profile and have significant “educational” value (e.g., high-profile pilot projects); or
  - Significantly reduce discharge of pollutants in runoff (i.e., reduce total suspended solids discharges by more than 10,000 kilograms per year).

To provide the City with further direction, a year-by-year implementation plan for the first five years was developed. This information can be incorporated into the City’s five-year capital plan.

- **Mid-Term (6 – 10 years)** – Priority initiatives in this category are those that:
  - Result in moderate improvements to water quality (i.e., reduce total suspended solid discharges by less than 10,000 kilograms per year);
  - Correspond to works in an area with moderate development pressure;
  - Respond to a local interest in the project; or
  - Would generate new and useful information for the City (e.g., pilot projects).
- **Long-Term (> 10 years)** – While these initiatives are not considered to be urgent, over the long-term, these projects may be no less important than other projects. Long-term initiatives are those that:



- Are not required in the near- or mid-term; or
- Do not address current significant flooding, erosion, or water quality issues.

The City has indicated that Environmental Protection and Enhancement initiatives will be undertaken on a case by case basis, generally when they can be accomplished in conjunction with other municipal infrastructure improvements or repair. Thus, within the context of overall City services, these initiatives are considered to be important priorities that should be seen as long-term undertakings. Alternatively, a number of the in-stream environmental works can be done in partnership with other groups that can champion the project (e.g., Streamkeepers) or can be bundled with works and services agreements for new developments. Thus over time, some or perhaps many, of these worthy projects will be undertaken. For purposes of this Implementation Plan, environmental initiatives are listed in the “long-term” category.

#### **Step 4 – Coordinate projects**

The last step was to refine the implementation plan to coordinate projects where possible. The recommended timing of a bundle of coordinated projects is driven by the most urgent project. For example, all Environmental Protection and Enhancement projects are considered to be long-term priority (i.e., they can be initiated at any time but have generally been placed in eleven or more years); however, eight of the environmental projects are recommended to be initiated earlier because these projects can be coordinated with other projects that are near- or mid-term priority.

Storm drain upgrades recommended in the ISMPs were generally not considered critical to alleviating existing flooding problems and Municipal Infrastructure projects that involve these upgrades need not be advanced immediately but can be coordinated with any other future municipal works that disturb the road right-of-way (these have not been identified in this report). Thus, storm drain upgrade projects have been identified as “long-term” priority, but may in fact occur earlier depending on the City’s other capital plans.

Schedule C identifies the groups of coordinated projects.

#### **Step 5 – Adjust for expenditure pattern**

Initially, priorities were set without particular regard for total annual cost of all proposed initiatives. Perhaps not surprisingly this resulted in a “front-end heavy” plan with an associated very high first year price tag. Thus the timing of projects was adjusted to yield total annual costs that fit better with currently available dedicated stormwater



funding, consisting primarily of the stormwater management parcel tax, plus allowance for other financing methods. The parcel tax generates roughly \$140,000 per year for stormwater-related projects, based on a \$12 per property annual levy. The parcel tax has been in place since 2000, with funds going primarily to integrated stormwater management planning and essential infrastructure improvements (e.g., erosion control along Woodburn Road in the Holly Hills area). Presently the fund has about \$300,000 available to commence projects included in this implementation plan. This will of course be supplemented each year with an additional \$140,000.

The stormwater management parcel tax will expire in 2010 (i.e., with the funds available for expenditure in 2011), thus a critical aspect of this implementation plan is the development of a financing strategy for stormwater management. One key aspect of that strategy, as recommended in the ISMPs, is development and adoption of a stormwater user charge system for the City. Such a system will allow the City to raise dedicated funds based on the stormwater-related services provided to its residents and businesses. In addition to the user charges, the City can also make use of other financing methods, including local improvement taxes, grants and borrowing.



#### 4.0 IMPLEMENTATION PLAN

The implementation plan is summarized in Schedules D through F. Schedule D lists projects to be completed within the next five years; Schedule E lists projects to be completed in six to ten years; and Schedule F lists projects to be initiated over the long-term. In addition to initial capital costs, Schedules D and E also show annual operating/maintenance/repair/replacement costs as well. Annual costs have not been included in Schedule F at this time. DCC projects for which timing has not been determined as of this writing are listed in Schedule G. We assume that the City's stormwater management plans will be updated at regular intervals, thus generating refinements in the proposed capital projects and their costs and timing.

As summarized in Table 3, over \$6 million of works is recommended to be undertaken within the next five years. Another \$2.1 million is recommended in Years 6 to 10, and a further \$7.7 million is recommended beyond Year 10, or as funds become available. The City is expected to expend an estimated total of \$15.9 million in one-time costs to implement the recommendations contained in the six ISMPs.

On-going annual costs are also shown in Table 3, at least for the first years of the program. As listed, these costs rise over the early years of the program as more of the proposed infrastructure is constructed and is added to the City's long-term maintenance obligations.

**Table 3: Implementation Plan Summary**

| Year         | Number of New Initiatives | Estimated Cost*     | Estimated Ongoing Annual Cost | Total Estimated Cost |
|--------------|---------------------------|---------------------|-------------------------------|----------------------|
| Year 1       | 28                        | \$315,000           | N/A                           | \$315,000            |
| Year 2       | 12                        | \$1,361,000         | \$54,500                      | \$1,415,500          |
| Year 3       | 11                        | \$1,655,000         | \$136,000                     | \$1,791,000          |
| Year 4       | 7                         | \$1,168,000         | \$230,300                     | \$1,398,300          |
| Year 5       | 4                         | \$1,582,000         | \$268,700                     | \$1,850,700          |
| Years 6 – 10 | 26                        | \$2,098,000         | \$336,400                     |                      |
| Years >10    | 59                        | \$7,690,000         |                               |                      |
| <b>Total</b> | <b>147</b>                | <b>\$15,869,000</b> |                               |                      |

*\*For certain projects, costs were undefined and have therefore not been included in the total. See Schedule A for additional details.  
All costs are in January 2007 dollars.*



Given the large number of recommendations in the ISMPs, setting priorities among the many important initiatives is not easy. Aside from the key policy and regulation initiatives that are critical for overall success of stormwater management in the City and that we have recommended for early implementation, it seemed important to select one or more projects that could yield early, high value for the City. “High value” in this context meant initiating a coordinated group of projects centering on the Nunns Creek Park area (see Schedule C, Group 1), including replacement of the 16<sup>th</sup> Avenue culvert, initiation of installing water quality treatment structures at four storm sewer outfalls, and installation of in-stream enhancements within the park. In advance of finalizing the plans for these projects, upgrading the current hydrologic/hydraulic modeling of the creek is important as this will provide critical information on flooding (and its alleviation), managing erosion, and establishing environmental flows in the creek. Together this bundle of projects addresses several key stormwater issues and is located in a highly visible area of the community for added public educational value. This work is proposed to commence in Year 1 (modeling; preliminary engineering for the culvert replacement), followed by construction in Year 2. Runoff treatment structures are proposed to be installed over four years, beginning in Year 2.

For subsequent years in the near-term, we selected projects that address stormwater treatment at seven additional significant outfall locations (and including an in-depth assessment of the role street sweeping in the City’s overall stormwater management approach), flooding in the downtown area, and erosion at several locations in streams. In the later ISMPs, it became increasingly clear that stormwater quality is a significant issue in a community whose motto is “Salmon Fishing Capital of the World,” thus the stormwater treatment projects were given a high priority. Flooding in the downtown area was exacerbated by completion of the Discovery Highway, creating a small “bowl” effect and causing regular and widespread flooding there. With respect to the creek erosion, we especially note the importance of addressing severe bank erosion along Simms Creek immediately downstream of the Galerno Road culvert potentially affecting private property; other in-stream enhancements have been recommended to coincide with this work.

Pilot projects are a good way to address real problems as well as demonstrate to the community how and where more sustainable stormwater practices can be used. Thus, we also recommended several pilot projects for the first five years, including a “green parking lot,” a pilot roof leader disconnection program and a sustainable street project (“green street”).





## 5.0 NEXT STEPS

To move forward with this implementation plan, we recommend the following steps:

- Obtain Council support in principle for the implementation plan
- Develop a financing strategy for the recommended initiatives, incorporating it into the City's 5-year financial plan, for Council's consideration at budget deliberations in early 2008
  - o Continue work towards development and adoption of a stormwater user charge to secure dedicated stormwater funds
  - o Review other options for project-specific financing, including grants, borrowing, and local improvement taxes
  - o Undertake a resource review to ensure adequate management of the stormwater program and implementation of its recommended initiatives.
- Refine work scopes and cost estimates where warranted, over time



# SCHEDULE A

## Summary of Recommendations

(Including Project Location Maps 1A through 1C)

CAMPBELL RIVER INTEGRATED STORMWATER MANAGEMENT - SUMMARY OF RECOMMENDATIONS

| ID  | Watershed Location | Category                       | Recommendation                                                                                                                                                                   | Schedule  |            |            | Estimated Cost (Jan. 2007) | Ongoing Annual Cost (Jan. 2007) | Funding Source (DCC; W&S; DSF; GR; Partnership; Other) <sup>1</sup> | Outsource or In-House? | Development Pressure? | Addresses Current Significant Flooding or Erosion Issues? | Annual TSS Loading Reduction (Kg) | Potential Area of Habitat Improvement (m <sup>2</sup> ) | Potential Annual Increase in Smolts (#) | Environmental Benefit                                                                                | Concurrent with other project(s)? | Comments                                                                                         |
|-----|--------------------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------|------------|----------------------------|---------------------------------|---------------------------------------------------------------------|------------------------|-----------------------|-----------------------------------------------------------|-----------------------------------|---------------------------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------|-----------------------------------|--------------------------------------------------------------------------------------------------|
|     |                    |                                |                                                                                                                                                                                  | 0-5 Years | 6-10 Years | > 10 Years |                            |                                 |                                                                     |                        |                       |                                                           |                                   |                                                         |                                         |                                                                                                      |                                   |                                                                                                  |
| E1  | CR/QR              | Env'l Protection & Enhancement | Restore or reroute groundwater flows into existing Island Hwy rearing channel                                                                                                    |           |            | Y          | \$ 8,000                   | \$ 400                          |                                                                     | Outsource              |                       |                                                           |                                   | 550                                                     | 369                                     | Improves rearing habitat                                                                             |                                   |                                                                                                  |
| E2  | CR/QR              | Env'l Protection & Enhancement | Improve East Fork HBKC channel into Pease Marsh                                                                                                                                  |           |            | Y          | \$ 5,000                   | \$ 300                          |                                                                     | Outsource              |                       |                                                           |                                   | 29,200                                                  | 21,900                                  | Facilitates fish access to off-channel rearing habitat; improves groundwater flow to marsh           |                                   |                                                                                                  |
| E3  | CR/QR              | Env'l Protection & Enhancement | Reconstruct perched forest road culvert at logging road 650 m u/s of east/west fork HBKC confluence                                                                              |           |            | Y          | \$ 15,000                  | \$ 800                          |                                                                     | Outsource              |                       |                                                           |                                   | 3,000                                                   | 2,250                                   | Improve fish access to good quality spawning and rearing habitat                                     |                                   |                                                                                                  |
| E4  | CR/QR              | Env'l Protection & Enhancement | Assess functioning of the diversion/bifurcation structure on HBKC; make adjustments as required                                                                                  |           |            | Y          | \$ 5,000                   | \$ 300                          |                                                                     | Outsource              |                       |                                                           |                                   |                                                         |                                         | Mitigate potential fish stranding; improved management of salmonid immigration and emigration        |                                   |                                                                                                  |
| E5  | CR/QR              | Env'l Protection & Enhancement | Restore riparian corridor through Sequoia Springs Golf Course                                                                                                                    |           |            | Y          | \$ 9,000                   | \$ 500                          |                                                                     | Outsource              |                       |                                                           |                                   | 474                                                     | 356                                     | Increased riparian structure, function and diversity; improved water quality                         |                                   |                                                                                                  |
| E6  | CR/QR              | Env'l Protection & Enhancement | Remove debris and garbage in channel at culvert immediately d/s of the forestry road crossing (HBKC forestry road)                                                               |           |            | Y          | \$ 2,000                   | \$ 100                          |                                                                     | Outsource              |                       |                                                           |                                   | 50                                                      | 30                                      | Improved water quality                                                                               |                                   |                                                                                                  |
| E7  | Fore. A            | Env'l Protection & Enhancement | Infill riprap with fines/soil and plant with native species to accelerate recolonization of high foreshore riprap (12 outfalls - DT01, 04, 05 & 08; OG 01 thru 04; SW06 thru 09) |           | Y          |            | \$ 18,000                  | \$ 900                          |                                                                     | Outsource              |                       |                                                           |                                   | 1,200                                                   |                                         | Improved wildlife habitat                                                                            | Y (w/ M22)                        |                                                                                                  |
| E8  | Fore. A            | Env'l Protection & Enhancement | Enhance plunge pool and channel at Outfall DT13                                                                                                                                  |           |            | Y          | \$ 7,000                   | \$ 400                          |                                                                     | Outsource              |                       |                                                           |                                   | 50                                                      | 30                                      | Increased in-channel habitat                                                                         |                                   |                                                                                                  |
| E9  | Fore. A            | Env'l Protection & Enhancement | Develop foreshore rearing pond/wildlife habitat area supplied by groundwater seepage (Outfall DT19)                                                                              | 3         |            |            | \$ 15,000                  | \$ 800                          |                                                                     | Outsource              |                       |                                                           |                                   | 150                                                     | 101                                     | New in-channel habitat                                                                               | Y (w/ M23)                        |                                                                                                  |
| E10 | Fore. A            | Env'l Protection & Enhancement | Enhance upper foreshore channels (2 outfalls - OC06 & SW07)                                                                                                                      |           |            | Y          | \$ 7,000                   | \$ 400                          |                                                                     | Outsource              |                       |                                                           |                                   | 40                                                      | 24                                      | Improved in-channel habitat and access                                                               |                                   |                                                                                                  |
| E11 | Nunns              | Env'l Protection & Enhancement | Restore riparian structure downstream of storm drain outfalls at 2nd & 4th Aves                                                                                                  | 4         |            |            | Needs further assessment   | \$ -                            |                                                                     | Outsource              |                       |                                                           |                                   | 900                                                     |                                         | Improved water quality; increased high water refuge                                                  | Y (w/M36, PA7)                    |                                                                                                  |
| E12 | Nunns              | Env'l Protection & Enhancement | Mitigate erosion in Evergreen Road ditch with riffle / pools, riprap and bioengineering                                                                                          |           |            | Y          | \$ 40,000                  | \$ 2,000                        |                                                                     | Outsource              |                       | Y?                                                        |                                   | 825                                                     |                                         | Increased bank stability; enhanced instream complexity and pool habitat; improved water quality      |                                   |                                                                                                  |
| E13 | Nunns              | Env'l Protection & Enhancement | Consolidate Willis Road ditches into one swale / ditch system in conjunction with road widening program; lower driveway culverts as needed; enhance instream habitat             |           |            | Y          | \$ 135,000                 | \$ 6,800                        |                                                                     | Outsource              |                       |                                                           |                                   | 750                                                     | 443                                     | Improved water quality and instream habitat; improved upstream access                                |                                   |                                                                                                  |
| E14 | Nunns              | Env'l Protection & Enhancement | Realign existing channel (currently on private lands) through better quality habitat along Petersen Road and Merecroft Road right-of-ways                                        |           |            | Y          | \$ 410,000                 | \$ 20,500                       |                                                                     | Outsource              |                       |                                                           |                                   | 2,250                                                   | 1,328                                   | Improved instream habitat and water quality                                                          |                                   | Does not account for potential credit for abandoning old channel                                 |
| E15 | Nunns              | Env'l Protection & Enhancement | Install detention//treatment feature at Trask and Merecroft                                                                                                                      |           |            | Y          | Needs further assessment   | \$ -                            |                                                                     | Outsource              |                       |                                                           |                                   |                                                         |                                         | Enhanced habitat / water quality; restored baseflow                                                  |                                   |                                                                                                  |
| E16 | Nunns              | Env'l Protection & Enhancement | Install culvert at Trask Road crossing, rebuild wetland pond outlet, repair channels and replant riparian habitat with native species                                            |           |            | Y          | \$ 135,000                 | \$ 6,800                        |                                                                     | Outsource              |                       |                                                           |                                   | 825                                                     | 487                                     | Restoration of natural riparian habitat                                                              |                                   |                                                                                                  |
| E17 | Nunns              | Env'l Protection & Enhancement | Add ponds / rock weirs to ditch above Evergreen Road; plant with native vegetation                                                                                               |           |            | Y          | \$ 95,000                  | \$ 4,800                        |                                                                     | Outsource              |                       |                                                           |                                   | 600                                                     | 354                                     | Repaired riparian structure, function and diversity; increased rearing and high water refuge habitat |                                   |                                                                                                  |
| E18 | Nunns              | Env'l Protection & Enhancement | Install check dams in ditch system at Pinecrest Road / Petersen Road; plant with native vegetation                                                                               |           |            | Y          | \$ 13,000                  | \$ 700                          |                                                                     | Outsource              |                       |                                                           |                                   | 120                                                     | 71                                      | Reduced bank erosion; improved riparian habitat and water quality                                    |                                   |                                                                                                  |
| E19 | Nunns              | Env'l Protection & Enhancement | Perform instream boulder/LWD placement and gravel recruitment through Nunns Creek Park.                                                                                          | 2         |            |            | \$ 160,000                 | \$ 8,000                        | DCC (DSF to cover municipal responsibility)                         | Outsource              |                       |                                                           |                                   | 4,000                                                   | 2,360                                   | Increased stream complexity; enhanced spawning habitat                                               | Y (w/M47,M48,M51,M60,PA12,PA28)   | DCC Drainage Project # 9; benefit factor of 67%. Highly visible project. Total value: \$160,000. |
| E20 | Nunns              | Env'l Protection & Enhancement | Install riparian planting and boulder/gravel recruitment in Nunns Crk West Arm near Willis Road                                                                                  |           |            | Y          | Needs further assessment   | \$ -                            |                                                                     | Outsource              |                       |                                                           |                                   |                                                         |                                         | Repaired riparian structure, function and diversity; increased rearing and high water refuge habitat |                                   |                                                                                                  |
| E21 | Simms              | Env'l Protection & Enhancement | Perform instream Boulder/LWD placements and replace gravel downstream of Galerno Road culvert                                                                                    | 2         |            |            | \$ 100,000                 | \$ 5,000                        |                                                                     | Outsource              |                       |                                                           |                                   | 2,500                                                   | 1,475                                   | Increased instream complexity; potential spawning habitat                                            | Y (w/ M61)                        |                                                                                                  |

CAMPBELL RIVER INTEGRATED STORMWATER MANAGEMENT - SUMMARY OF RECOMMENDATIONS

| ID  | Watershed Location | Category                       | Recommendation                                                                                                                                                                             | Schedule  |            |            | Estimated Cost (Jan. 2007) | Estimated Ongoing Annual Cost (Jan. 2007) | Funding Source (DCC; W&S; DSF; GR; Partnership; Other) <sup>1</sup> | Outsource or In-House? | Development Pressure? | Addresses Current Significant Flooding or Erosion Issues? | Annual TSS Loading Reduction (Kg) | Potential Area of Habitat Improvement (m <sup>2</sup> ) | Potential Annual Increase in Smolts (#) | Environmental Benefit                                                                                 | Concurrent with other project(s)? | Comments                                                   |
|-----|--------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------|------------|----------------------------|-------------------------------------------|---------------------------------------------------------------------|------------------------|-----------------------|-----------------------------------------------------------|-----------------------------------|---------------------------------------------------------|-----------------------------------------|-------------------------------------------------------------------------------------------------------|-----------------------------------|------------------------------------------------------------|
|     |                    |                                |                                                                                                                                                                                            | 0-5 Years | 6-10 Years | > 10 Years |                            |                                           |                                                                     |                        |                       |                                                           |                                   |                                                         |                                         |                                                                                                       |                                   |                                                            |
| E22 | Simms              | Env'l Protection & Enhancement | Install flow deflectors/rock weirs as needed between South Alder Street and Hwy 19A                                                                                                        | 2         |            |            | \$ 18,000                  | \$ 900                                    |                                                                     | Outsource              |                       |                                                           |                                   | 2,500                                                   | 1,475                                   | Improved channel and bank stability; provides high water refuge habitat                               | Y (w/ M61)                        |                                                            |
| E23 | Simms              | Env'l Protection & Enhancement | Place wood/rock weirs and install riparian planting in existing wetland at South McPhedran Rd                                                                                              |           |            | Y          | \$ 30,000                  | \$ 1,500                                  |                                                                     | Outsource              |                       |                                                           |                                   | 300                                                     | 177                                     | Increased size and quality of salmonid rearing habitat                                                |                                   |                                                            |
| E24 | Simms              | Env'l Protection & Enhancement | Install wood/rock weirs to enhance wetlands west of Inland Island Highway                                                                                                                  |           |            | Y          | \$ 25,000                  | \$ -                                      |                                                                     | Outsource              |                       |                                                           |                                   | 25,500                                                  | 15,045                                  | Improved aaquatic and wildlife habitat                                                                |                                   |                                                            |
| E25 | Simms              | Env'l Protection & Enhancement | Redirect ditches on Inland Island Highway to adjacent wetlands (where possible), install check dams and plant vegetation                                                                   |           |            | Y          | \$ 100,000                 | \$ 5,000                                  |                                                                     | Outsource              |                       |                                                           |                                   | 15,200                                                  | 8,968                                   | Improved wildlife habitat & water quality                                                             |                                   |                                                            |
| E26 | Simms              | Env'l Protection & Enhancement | Regrade ditch behind Springbok Road; install check dams and plantings; install culvert at trail crossing; expand pond and install appropriate outlet structure with path to creek          |           |            | Y          | \$ 35,000                  | \$ 1,800                                  |                                                                     | Outsource              |                       |                                                           |                                   | 750                                                     |                                         | Reduced high flows; increased riparian area and water quality                                         |                                   |                                                            |
| E27 | Willow             | Env'l Protection & Enhancement | Restore riparian areas along ditches and wetland complexes near airport by fill planting with native species                                                                               |           |            | Y          | \$ 95,000                  | \$ -                                      |                                                                     | Outsource              |                       |                                                           |                                   | 7,500                                                   |                                         | Enhanced riparian structure, function and diversity; improved downstream water quality and base flows |                                   |                                                            |
| E28 | Willow             | Env'l Protection & Enhancement | Construct backwater channel off Larwood Creek tributary downstream of Erickson Road                                                                                                        |           | Y          |            | \$ 55,000                  | \$ 2,800                                  |                                                                     | Outsource              |                       |                                                           |                                   | 400                                                     | 236                                     | Enhanced rearing habitat                                                                              | Y (w/ M74)                        |                                                            |
| E29 | Willow             | Env'l Protection & Enhancement | Increase baseflows to Larwood Crk through the splitter at Larwood St; construct small ponds / wetland features along north branch of Larwood Creek tributary                               |           | Y          |            | \$ 445,000                 | \$ 22,300                                 |                                                                     | Outsource              |                       |                                                           |                                   | 2,400                                                   | 1,416                                   | Reduced flooding and increased summer flows                                                           | Y (w/ M74)                        |                                                            |
| E30 | Willow             | Env'l Protection & Enhancement | Reconstruct rock weirs and add gravels to Willow Crk upstream of Erickson Rd                                                                                                               |           |            | Y          | \$ 75,000                  | \$ -                                      |                                                                     | Outsource              |                       |                                                           |                                   | 400                                                     | 236                                     | Increased rearing habitat                                                                             |                                   |                                                            |
| E31 | HH/PR              | Env'l Protection & Enhancement | Widen, deepen, complex and consolidate ditches along Woodburn and Spring Rds; re-activate remnant pond as a detention structure on Woodburn road; plant riparian areas with native species |           |            | Y          | \$ 330,000                 | \$ 16,500                                 |                                                                     | Outsource              |                       |                                                           |                                   | 2,400                                                   | 1,416                                   | Increased instream habitat and increased summer flows                                                 |                                   |                                                            |
| E32 | HH/PR              | Env'l Protection & Enhancement | Improve inlet of Holly Hills/Woodburn culvert into Baikie Slough; perform instream complexing upstream of culvert                                                                          |           |            | Y          | \$ 8,000                   | \$ 400                                    |                                                                     | Outsource              |                       |                                                           |                                   |                                                         |                                         | Improved fish access                                                                                  |                                   |                                                            |
| E33 | HH/PR              | Env'l Protection & Enhancement | Upgrade or modify culvert at Vallejo & Woodburn Rds for fish passage                                                                                                                       |           |            | Y          | \$ 10,000                  | \$ 500                                    |                                                                     | Outsource              |                       |                                                           |                                   | 900                                                     | 675                                     | Improved fish access; increased instream habitat                                                      |                                   |                                                            |
| E34 | HH/PR              | Env'l Protection & Enhancement | Install instream habitat improvements to Vanstone Channel in Perkins and Perth Rds area                                                                                                    |           |            | Y          | Needs further assessment   | \$ -                                      |                                                                     | Outsource              |                       |                                                           |                                   |                                                         |                                         | Improved fish access; increased instream habitat                                                      |                                   |                                                            |
| E35 | All                | Env'l Protection & Enhancement | Revegetate and enhance ditches wherever possible (in conjunction on-going work)                                                                                                            |           |            | Y          | \$30-\$365/M               | \$ -                                      |                                                                     | Outsource              |                       |                                                           |                                   |                                                         |                                         | Improved water quality; reduction in peak flows                                                       |                                   | Cost depends on specific enhancements applied in each case |
| M1  | All                | Municipal Infrastructure       | Prepare operations and maintenance schedule for stormwater system, incl street cleaning                                                                                                    | 1         |            |            | \$ 5,000                   | \$ 5,000                                  | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                                                                                                       |                                   |                                                            |
| M2  | All                | Municipal Infrastructure       | Upgrade existing catch basins with deeper sumps and trapping hoods                                                                                                                         | 1         |            |            | \$2400/CB                  | \$240/CB                                  | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                                                                                                       | Y (w/ relevant works within ROW)  |                                                            |
| M3  | CR/QR              | Municipal Infrastructure       | Construct detention pond for future development - Kingfisher Creek (Upper Reach) site                                                                                                      |           |            |            | \$ 3,129,000               | \$ 100,200                                | W&S                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                                                       |                                   | See Map 1A                                                 |
| M4  | CR/QR              | Municipal Infrastructure       | Construct detention pond for future development - Detweiler Creek (Lower Reach) site                                                                                                       |           |            |            | \$ 744,000                 | \$ 23,900                                 | W&S                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                                                       |                                   | See Map 1A                                                 |
| M5  | CR/QR              | Municipal Infrastructure       | Construct detention pond for future development - Detweiler Creek (Upper Reach) site                                                                                                       |           |            |            | \$ 1,845,000               | \$ 59,100                                 | W&S                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                                                       |                                   | See Map 1A                                                 |
| M6  | CR/QR              | Municipal Infrastructure       | Construct detention pond for future development - Kingfisher Creek (Lower Reach East) site                                                                                                 |           |            |            | \$ 1,357,000               | \$ 43,500                                 | W&S                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                                                       |                                   | See Map 1A                                                 |
| M7  | CR/QR              | Municipal Infrastructure       | Construct detention pond for future development - Kingfisher Creek (Lower Reach West) site                                                                                                 |           |            |            | \$ 1,050,000               | \$ 33,600                                 | W&S                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                                                       |                                   | See Map 1A                                                 |

CAMPBELL RIVER INTEGRATED STORMWATER MANAGEMENT - SUMMARY OF RECOMMENDATIONS

| ID  | Watershed Location | Category                 | Recommendation                                                                                   | Schedule  |            |            | Estimated Cost (Jan. 2007) | Estimated Ongoing Annual Cost (Jan. 2007) | Funding Source (DCC; W&S; DSF; GR; Partnership; Other) <sup>1</sup> | Outsource or In-House? | Development Pressure? | Addresses Current Significant Flooding or Erosion Issues? | Annual TSS Loading Reduction (Kg) | Potential Area of Habitat Improvement (m <sup>2</sup> ) | Potential Annual Increase in Smolts (#) | Environmental Benefit   | Concurrent with other project(s)? | Comments   |
|-----|--------------------|--------------------------|--------------------------------------------------------------------------------------------------|-----------|------------|------------|----------------------------|-------------------------------------------|---------------------------------------------------------------------|------------------------|-----------------------|-----------------------------------------------------------|-----------------------------------|---------------------------------------------------------|-----------------------------------------|-------------------------|-----------------------------------|------------|
|     |                    |                          |                                                                                                  | 0-5 Years | 6-10 Years | > 10 Years |                            |                                           |                                                                     |                        |                       |                                                           |                                   |                                                         |                                         |                         |                                   |            |
| M8  | CR/QR              | Municipal Infrastructure | Construct detention pond for future development - Kingfisher Creek (Middle Reach East) site      |           |            |            | \$ 805,000                 | \$ 25,800                                 | W&S                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                         |                                   | See Map 1A |
| M9  | CR/QR              | Municipal Infrastructure | Construct detention pond for future development - Kingfisher Creek (Middle Reach West) site      |           |            |            | \$ 2,457,000               | \$ 78,700                                 | W&S                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                         |                                   | See Map 1A |
| M10 | CR/QR              | Municipal Infrastructure | Construct water quality treatment system for Outfall CR1                                         |           | Y          |            | \$ 113,000                 | \$ 3,600                                  | DSF                                                                 | In-House               |                       |                                                           | 1,090                             |                                                         |                                         | Improved water quality. |                                   | See Map 1A |
| M11 | CR/QR              | Municipal Infrastructure | Construct water quality treatment system for Outfall CR2                                         |           | Y          |            | \$ 135,000                 | \$ 4,300                                  | DSF                                                                 | In-House               |                       |                                                           | 3,200                             |                                                         |                                         | Improved water quality. |                                   | See Map 1A |
| M12 | CR/QR              | Municipal Infrastructure | Construct water quality treatment system for Outfall CR3                                         |           | Y          |            | \$ 113,000                 | \$ 3,600                                  | DSF                                                                 | In-House               |                       |                                                           | 200                               |                                                         |                                         | Improved water quality. |                                   | See Map 1A |
| M13 | CR/QR              | Municipal Infrastructure | Construct water quality treatment system for Outfall CR4                                         | 4         |            |            | \$ 326,000                 | \$ 10,500                                 | DSF                                                                 | In-House               |                       |                                                           | 18,540                            |                                                         |                                         | Improved water quality. |                                   | See Map 1A |
| M14 | CR/QR              | Municipal Infrastructure | Construct water quality treatment system for Outfall CR5                                         |           | Y          |            | \$ 113,000                 | \$ 3,600                                  | DSF                                                                 | In-House               |                       |                                                           | 1,130                             |                                                         |                                         | Improved water quality. |                                   | See Map 1A |
| M15 | CR/QR              | Municipal Infrastructure | Construct water quality treatment system for Outfall CR6                                         |           | Y          |            | \$ 113,000                 | \$ 3,600                                  | DSF                                                                 | In-House               |                       |                                                           | 650                               |                                                         |                                         | Improved water quality. |                                   | See Map 1A |
| M16 | CR/QR              | Municipal Infrastructure | Construct water quality treatment system for Outfall CR6.5                                       | 4         |            |            | \$ 219,000                 | \$ 7,000                                  | DSF                                                                 | In-House               |                       |                                                           | 12,490                            |                                                         |                                         | Improved water quality. |                                   | See Map 1A |
| M17 | CR/QR              | Municipal Infrastructure | Construct water quality treatment system for Outfall CR7                                         | 4         |            |            | \$ 219,000                 | \$ 7,000                                  | DSF                                                                 | In-House               |                       |                                                           | 12,490                            |                                                         |                                         | Improved water quality. |                                   | See Map 1A |
| M18 | CR/QR              | Municipal Infrastructure | Construct water quality treatment system for Outfall CR8                                         |           | Y          |            | \$ 113,000                 | \$ 3,600                                  | DSF                                                                 | In-House               |                       |                                                           | 280                               |                                                         |                                         | Improved water quality. |                                   | See Map 1A |
| M19 | CR/QR              | Municipal Infrastructure | Upgrade storm drains, 14th Ave from Spruce St to Redwood St (165 m)                              |           |            | Y          | \$ 245,000                 | \$ 2,200                                  | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                         | Y (w/ relevant works within ROW)  | See Map 1A |
| M20 | CR/QR              | Municipal Infrastructure | Upgrade storm drains, Redwood St from 14th Ave to 19th Ave (516 m)                               |           |            | Y          | \$ 1,144,000               | \$ 9,600                                  | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                         | Y (w/ relevant works within ROW)  | See Map 1A |
| M21 | Fore. A            | Municipal Infrastructure | Construct water quality treatment system for Outfall DT 06 (priority habitat enhancement site)   | 3         |            |            | \$ 411,000                 | \$ 3,400                                  | DSF                                                                 | In-House               |                       |                                                           | 23,600                            |                                                         |                                         | Improved water quality. |                                   | See Map 1B |
| M22 | Fore. A            | Municipal Infrastructure | Construct water quality treatment system for Outfall DT04/05 (priority habitat enhancement site) |           | Y          |            | \$ 142,000                 | \$ 1,200                                  | DSF                                                                 | In-House               |                       |                                                           | 1,840                             |                                                         |                                         | Improved water quality. | Y (w/ E7)                         | See Map 1B |
| M23 | Fore. A            | Municipal Infrastructure | Construct water quality treatment system for Outfall DT19 (priority habitat enhancement site)    | 3         |            |            | \$ 255,000                 | \$ 2,000                                  | DSF                                                                 | In-House               |                       |                                                           | 11,280                            |                                                         |                                         | Improved water quality. | Y (w/ E9)                         | See Map 1A |
| M24 | Fore. A            | Municipal Infrastructure | Construct water quality treatment system for Outfall DT20                                        | 5         |            |            | \$ 333,000                 | \$ 2,700                                  | DSF                                                                 | In-House               |                       |                                                           | 15,680                            |                                                         |                                         | Improved water quality. |                                   | See Map 1A |
| M25 | Fore. A            | Municipal Infrastructure | Construct water quality treatment system for Outfall DT25                                        |           | Y          |            | \$ 227,000                 | \$ 1,900                                  | DSF                                                                 | In-House               |                       |                                                           | 6,720                             |                                                         |                                         | Improved water quality. |                                   | See Map 1A |
| M26 | Fore. A            | Municipal Infrastructure | Construct water quality treatment system for Outfall DT27                                        |           | Y          |            | \$ 191,000                 | \$ 1,500                                  | DSF                                                                 | In-House               |                       |                                                           | 4,560                             |                                                         |                                         | Improved water quality. |                                   | See Map 1A |
| M27 | Fore. A            | Municipal Infrastructure | Construct water quality treatment system for Outfall DT31                                        | 5         |            |            | \$ 411,000                 | \$ 3,400                                  | DSF                                                                 | In-House               |                       |                                                           | 22,320                            |                                                         |                                         | Improved water quality. |                                   | See Map 1A |
| M28 | Fore. A            | Municipal Infrastructure | Downtown flooding mitigation project (Cost unknown until study is completed)                     | 3         |            |            | \$ 500,000                 | \$ 10,000                                 | DSF?                                                                | In-House               |                       | Y                                                         |                                   |                                                         |                                         |                         | Y (w/ PP1)                        | See Map 1A |

CAMPBELL RIVER INTEGRATED STORMWATER MANAGEMENT - SUMMARY OF RECOMMENDATIONS

| ID  | Watershed Location | Category                 | Recommendation                                                                                                                    | Schedule  |            |            | Estimated Cost (Jan. 2007) | Estimated Ongoing Annual Cost (Jan. 2007) | Funding Source (DCC; W&S; DSF; GR; Partnership; Other) <sup>1</sup> | Outsource or In-House? | Development Pressure? | Addresses Current Significant Flooding or Erosion Issues? | Annual TSS Loading Reduction (Kg) | Potential Area of Habitat Improvement (m <sup>2</sup> ) | Potential Annual Increase in Smolts (#) | Environmental Benefit                                      | Concurrent with other project(s)? | Comments                                                                                |
|-----|--------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------|------------|------------|----------------------------|-------------------------------------------|---------------------------------------------------------------------|------------------------|-----------------------|-----------------------------------------------------------|-----------------------------------|---------------------------------------------------------|-----------------------------------------|------------------------------------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------|
|     |                    |                          |                                                                                                                                   | 0-5 Years | 6-10 Years | > 10 Years |                            |                                           |                                                                     |                        |                       |                                                           |                                   |                                                         |                                         |                                                            |                                   |                                                                                         |
| M29 | Fore. A            | Municipal Infrastructure | Upgrade storm drains, 2nd Ave from upper end to Thulin St (436 m)                                                                 |           |            | Y          | \$ 442,000                 | \$ 4,100                                  | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                                                            | Y (w/ relevant works within ROW)  | See Map 1A                                                                              |
| M30 | Fore. A            | Municipal Infrastructure | Upgrade storm drains, Alder St to Evergreen St to McLean St (189 m)                                                               |           |            | Y          | \$ 186,000                 | \$ 1,500                                  | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                                                            | Y (w/ relevant works within ROW)  | See Map 1A                                                                              |
| M31 | Fore. A            | Municipal Infrastructure | Upgrade storm drains, Cormorant Rd and Albotross Cr. Area (354 m)                                                                 |           |            | Y          | \$ 368,000                 | \$ 3,400                                  | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                                                            | Y (w/ relevant works within ROW)  | See Map 1B                                                                              |
| M32 | Fore. A            | Municipal Infrastructure | Upgrade storm drains, Eardly Rd and Dino Rd (45 m)                                                                                |           |            | Y          | \$ 45,000                  | \$ 500                                    | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                                                            | Y (w/ relevant works within ROW)  | See Map 1C                                                                              |
| M33 | Fore. A            | Municipal Infrastructure | Upgrade storm drains, Homewood Rd south of Maple St (423 m)                                                                       |           |            | Y          | \$ 783,000                 | \$ 6,600                                  | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                                                            | Y (w/ relevant works within ROW)  | See Map 1A                                                                              |
| M34 | Fore. A            | Municipal Infrastructure | Upgrade storm drains, So Alder St, Frances Ave to Marina Blvd (202 m)                                                             |           |            | Y          | \$ 200,000                 | \$ 1,900                                  | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                                                            | Y (w/ relevant works within ROW)  | See Map 1B                                                                              |
| M35 | Fore. A            | Municipal Infrastructure | Upgrade storm drains, Thulin St and 6th Ave (81 m)                                                                                |           |            | Y          | \$ 90,000                  | \$ 900                                    | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                                                            | Y (w/ relevant works within ROW)  | See Map 1A                                                                              |
| M36 | Nunns              | Municipal Infrastructure | Construct check dams / rock liners / downstream of 2nd Avenue and 4th Avenue outfalls (2 sites total)                             | 4         |            |            | \$ 61,000                  | \$ 3,100                                  | DSF                                                                 | In-House               |                       | Y                                                         |                                   |                                                         |                                         | Corrects existing erosion problems; enhanced habitat value | Y (w/ E11, PA7)                   | See Map 1A                                                                              |
| M37 | Nunns              | Municipal Infrastructure | Construct detention pond for existing development (Upper Catchment site)                                                          | 3         |            |            | \$ 21,000                  | \$ 67,300                                 | DCC (DSF to cover municipal responsibility)                         | In-House               |                       |                                                           |                                   |                                                         |                                         |                                                            |                                   | DCC Drainage Project # 11; benefit factor of 100%. Total value: \$2,103,150. See Map 1B |
| M38 | Nunns              | Municipal Infrastructure | Construct detention pond for existing development (Middle Catchment site; Evergreen alternate)                                    |           | Y          |            | \$ 14,000                  | \$ 46,200                                 | DCC (DSF to cover municipal responsibility)                         | In-House               |                       |                                                           |                                   |                                                         |                                         |                                                            |                                   | DCC Drainage Project # 12; benefit factor of 100%.Total value: \$1,442,700. See Map 1A  |
| M39 | Nunns              | Municipal Infrastructure | Construct detention pond for future development - 2 <sup>nd</sup> Ave / Nunns Creek site                                          |           |            |            | \$ 1,243,000               | \$ 39,800                                 | W&S                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                            |                                   | See Map 1A                                                                              |
| M40 | Nunns              | Municipal Infrastructure | Construct detention pond for future development - 4 <sup>th</sup> Ave / Nunns Creek site                                          |           |            |            | \$ 690,000                 | \$ 41,500                                 | DCC (DSF to cover municipal responsibility)                         | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                            |                                   | DCC Drainage Project # 7; benefit factor of 50%. Total value: \$1,367,100. See Map 1A   |
| M41 | Nunns              | Municipal Infrastructure | Construct detention pond for future development - Old Petersen Road site                                                          |           |            |            | \$ 2,207,000               | \$ 70,800                                 | W&S                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                            |                                   | See Map 1A                                                                              |
| M42 | Nunns              | Municipal Infrastructure | Construct detention pond for future development - Willis Road / Inland Highway site                                               |           |            |            | \$ 243,000                 | \$ 7,800                                  | W&S                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                            |                                   | See Map 1A                                                                              |
| M43 | Nunns              | Municipal Infrastructure | Construct detention pond for future development - Willis Road / Inland Highway site                                               |           |            |            | \$ 813,000                 | \$ 26,000                                 | W&S                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                            |                                   | See Map 1A                                                                              |
| M44 | Nunns              | Municipal Infrastructure | Construct new trunk sewer for future development, ERT to Campbell River (2200 m)                                                  |           |            |            | \$ 28,000                  | \$ 22,500                                 | DCC (DSF to cover municipal responsibility)                         | In-House               |                       |                                                           |                                   |                                                         |                                         |                                                            |                                   | DCC Drainage Project # 3; benefit factor of 100%. Total value: \$2,781,450. See Map 1A  |
| M45 | Nunns              | Municipal Infrastructure | Construct new trunk sewer for future development, Evergreen Rd to Nunns Crk SW Arm (1400 m)                                       |           |            |            | \$ 18,000                  | \$ 14,300                                 | DCC (DSF to cover municipal responsibility)                         | In-House               |                       |                                                           |                                   |                                                         |                                         |                                                            |                                   | DCC Drainage Project # 5; benefit factor of 100%. Total value: \$1,769,250. See Map 1A  |
| M46 | Nunns              | Municipal Infrastructure | Construct new trunk sewer for future development, Willis Rd to Nunns Crk West Arm (950 m)                                         |           |            |            | \$ 12,000                  | \$ 9,700                                  | DCC (DSF to cover municipal responsibility)                         | In-House               |                       |                                                           |                                   |                                                         |                                         |                                                            |                                   | DCC Drainage Project # 4; benefit factor of 100%. Total value: \$1,201,200. See Map 1A  |
| M47 | Nunns              | Municipal Infrastructure | Install water quality units at existing storm sewer outfalls from industrial/commercial area (Nunns Creek Park) (one of 4 sites). | 2         |            |            | \$ 338,000                 | \$ 10,800                                 | DSF                                                                 | In-House               |                       |                                                           | 27,950                            |                                                         |                                         | Improved water quality.                                    | Y (w/E19,M48,M51,M60,PA12,PA28)   | See Map 1A                                                                              |
| M47 | Nunns              | Municipal Infrastructure | Install water quality units at existing storm sewer outfalls from industrial/commercial area (Nunns Creek Park) (one of 4 sites). | 3         |            |            | \$ 338,000                 | \$ 10,800                                 | DSF                                                                 | In-House               |                       |                                                           | 27,950                            |                                                         |                                         | Improved water quality.                                    | Y (w/E19,M48,M51,M60,PA12,PA28)   | See Map 1A                                                                              |
| M47 | Nunns              | Municipal Infrastructure | Install water quality units at existing storm sewer outfalls from industrial/commercial area (Nunns Creek Park) (one of 4 sites). | 4         |            |            | \$ 338,000                 | \$ 10,800                                 | DSF                                                                 | In-House               |                       |                                                           | 27,950                            |                                                         |                                         | Improved water quality.                                    | Y (w/E19,M48,M51,M60,PA12,PA28)   | See Map 1A                                                                              |

CAMPBELL RIVER INTEGRATED STORMWATER MANAGEMENT - SUMMARY OF RECOMMENDATIONS

| ID  | Watershed Location | Category                 | Recommendation                                                                                                                                                                 | Schedule  |            |            | Estimated Cost (Jan. 2007) | Estimated Ongoing Annual Cost (Jan. 2007) | Funding Source (DCC; W&S; DSF; GR; Partnership; Other) <sup>1</sup> | Outsource or In-House? | Development Pressure? | Addresses Current Significant Flooding or Erosion Issues? | Annual TSS Loading Reduction (Kg) | Potential Area of Habitat Improvement (m <sup>2</sup> ) | Potential Annual Increase in Smolts (#) | Environmental Benefit   | Concurrent with other project(s)? | Comments                                                                                                                                                                  |
|-----|--------------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------|------------|----------------------------|-------------------------------------------|---------------------------------------------------------------------|------------------------|-----------------------|-----------------------------------------------------------|-----------------------------------|---------------------------------------------------------|-----------------------------------------|-------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     |                    |                          |                                                                                                                                                                                | 0-5 Years | 6-10 Years | > 10 Years |                            |                                           |                                                                     |                        |                       |                                                           |                                   |                                                         |                                         |                         |                                   |                                                                                                                                                                           |
| M47 | Nunns              | Municipal Infrastructure | Install water quality units at existing storm sewer outfalls from industrial/commercial area (Nunns Creek Park) (one of 4 sites).                                              | 5         |            |            | \$ 338,000                 | \$ 10,800                                 | DSF                                                                 | In-House               |                       |                                                           | 27,950                            |                                                         |                                         | Improved water quality. | Y (w/E19,M48,M51,M60,PA12,PA28)   | See Map 1A                                                                                                                                                                |
| M48 | Nunns              | Municipal Infrastructure | Discovery Harbour Highway culvert replacement.                                                                                                                                 | 2         |            |            | \$ 100,000                 | \$ 10,800                                 | DCC (DSF to cover municipal responsibility)                         | Outsource              |                       |                                                           |                                   |                                                         |                                         | Enhanced fish access.   | Y (w/E19,M47,M51,M60,PA12,PA28)   | DCC Drainage Project # 1; benefit factor of 67%. Total value: \$930,000. The City has committed to fund \$100,000; remainder to be funded by DCCs and the MoT. See Map 1A |
| M49 | Nunns              | Municipal Infrastructure | Construct detention pond - Willis Road (east detention facility)                                                                                                               |           |            |            | \$ 840,000                 | \$ 39,900                                 | DCC (DSF to cover municipal responsibility)                         | Outsource              |                       |                                                           |                                   |                                                         |                                         |                         |                                   | DCC Drainage Project # 6; benefit factor of 33%. Total value: \$1,248,000. See Map 1A                                                                                     |
| M50 | Nunns              | Municipal Infrastructure | Construct detention pond - Willis Road (west detention facility)                                                                                                               |           |            |            | \$ 26,000                  | \$ 81,900                                 | DCC (DSF to cover municipal responsibility)                         | Outsource              |                       |                                                           |                                   |                                                         |                                         |                         |                                   | DCC Drainage Project # 10; benefit factor of 100%. Total value: \$2,560,000. See Map 1A                                                                                   |
| M51 | Nunns              | Municipal Infrastructure | Replace culvert at 16th Avenue with open bottom arch culvert or bridge structure (Old Island Highway and Island Highway upgrades also recommended, but under MoT jurisdiction) | 2         |            |            | \$ 413,000                 | \$ 24,500                                 | DCC (DSF to cover municipal responsibility)                         | Outsource              |                       | Y                                                         |                                   |                                                         |                                         | Enhanced fish access    | Y (w/E19,M47,M48,M60,PA12,PA28)   | DCC Drainage Project # 2; benefit factor of 67%. Total value: \$1,226,400. See Map 1A                                                                                     |
| M52 | Nunns              | Municipal Infrastructure | Upgrade storm drains, 4th Ave east of Dogwood St (123 m)                                                                                                                       |           |            | Y          | \$ 122,000                 | \$ 1,000                                  | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                         | Y (w/ relevant works within ROW)  | See Map 1A                                                                                                                                                                |
| M53 | Nunns              | Municipal Infrastructure | Upgrade storm drains, 9th Ave west of Maple Rd (69 m)                                                                                                                          |           |            | Y          | \$ 68,000                  | \$ 700                                    | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                         | Y (w/ relevant works within ROW)  | See Map 1A                                                                                                                                                                |
| M54 | Nunns              | Municipal Infrastructure | Upgrade storm drains, Dogwood St south of Pinecrest Rd (92 m)                                                                                                                  |           |            | Y          | \$ 91,000                  | \$ 900                                    | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                         | Y (w/ relevant works within ROW)  | See Map 1B                                                                                                                                                                |
| M55 | Nunns              | Municipal Infrastructure | Upgrade storm drains, Greenwood Rd from 9th to 10th Aves (257 m)                                                                                                               |           |            | Y          | \$ 312,000                 | \$ 2,700                                  | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                         | Y (w/ relevant works within ROW)  | See Map 1A                                                                                                                                                                |
| M56 | Nunns              | Municipal Infrastructure | Upgrade storm drains, Hemlock St & 10th Avenue area (145 m)                                                                                                                    |           |            | Y          | \$ 176,000                 | \$ 1,700                                  | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                         | Y (w/ relevant works within ROW)  | See Map 1A                                                                                                                                                                |
| M57 | Nunns              | Municipal Infrastructure | Upgrade storm drains, Ironwood Rd south of 14th Ave (231 m)                                                                                                                    |           |            | Y          | \$ 402,000                 | \$ 3,400                                  | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                         | Y (w/ relevant works within ROW)  | See Map 1A                                                                                                                                                                |
| M58 | Nunns              | Municipal Infrastructure | Upgrade storm drains, Munson Rd south of 2nd Ave (300 m)                                                                                                                       |           |            | Y          | \$ 364,000                 | \$ 3,100                                  | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                         | Y (w/ relevant works within ROW)  | See Map 1A                                                                                                                                                                |
| M59 | Nunns              | Municipal Infrastructure | Upgrade storm drains, Trask & Merecroft Rds (10 m)                                                                                                                             |           |            | Y          | \$ 12,000                  | \$ 200                                    | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                         | Y (w/ relevant works within ROW)  | See Map 1B                                                                                                                                                                |
| M60 | Nunns              | Municipal Infrastructure | Lower Nunns Creek sediment removal.                                                                                                                                            | 2         |            |            | \$ 7,000                   |                                           | DCC (DSF to cover municipal responsibility)                         | In-House               |                       |                                                           |                                   |                                                         |                                         |                         | Y (w/E19,M47,M48,M51,PA12,PA28)   | DCC Drainage Project # 8; benefit factor of 67%. Total value: \$22,000. See Map 1A                                                                                        |
| M61 | Simms              | Municipal Infrastructure | Mitigate / repair erosion at Galerno Road culvert outlet through construction of baffles, rip-rap, flow deflectors, bio-engineering, etc.                                      | 2         |            |            | \$ 38,000                  | \$ 1,500                                  | DSF                                                                 | In-House               |                       | Y                                                         |                                   |                                                         |                                         |                         | Y (w/ E21, E22)                   | Addresses risk ot property due to erosion. See Map 1B                                                                                                                     |
| M62 | Simms              | Municipal Infrastructure | Construct detention pond for future development - South Alder / Simms Creek site                                                                                               |           |            |            | \$ 491,000                 | \$ 15,800                                 | W&S                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                         |                                   | See Map 1B                                                                                                                                                                |
| M63 | Simms              | Municipal Infrastructure | Construct detention pond for future development - South Dogwood St / Merecroft Rd north site                                                                                   |           |            |            | \$ 222,000                 | \$ 7,100                                  | W&S                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                         |                                   | See Map 1B                                                                                                                                                                |
| M64 | Simms              | Municipal Infrastructure | Construct detention pond for future development - South Dogwood St / Merecroft Rd south site                                                                                   |           |            |            | \$ 383,000                 | \$ 12,400                                 | W&S                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                         |                                   | See Map 1B                                                                                                                                                                |
| M65 | Simms              | Municipal Infrastructure | Construct new trunk sewer for future development, So. Dogwood & Cortez St (122 m), plus expansion to detention pond at So Dogwood & So McPhedran (1500 m3)                     |           |            |            | \$ 1,047,000               | \$ 27,900                                 | W&S                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                         |                                   | See Map 1B                                                                                                                                                                |
| M66 | Simms              | Municipal Infrastructure | Upgrade storm drains, So McPhedran Rd and Cortez Rd (245 m)                                                                                                                    |           |            | Y          | \$ 236,000                 | \$ 2,000                                  | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                         | Y (w/ relevant works within ROW)  | See Map 1B                                                                                                                                                                |



CAMPBELL RIVER INTEGRATED STORMWATER MANAGEMENT - SUMMARY OF RECOMMENDATIONS

| ID  | Watershed Location | Category                 | Recommendation                                                                                                                                   | Schedule  |            |            | Estimated Cost (Jan. 2007) | Estimated Ongoing Annual Cost (Jan. 2007) | Funding Source (DCC; W&S; DSF; GR; Partnership; Other) <sup>1</sup> | Outsource or In-House? | Development Pressure? | Addresses Current Significant Flooding or Erosion Issues? | Annual TSS Loading Reduction (Kg) | Potential Area of Habitat Improvement (m <sup>2</sup> ) | Potential Annual Increase in Smolts (#) | Environmental Benefit | Concurrent with other project(s)? | Comments                                                                                                                          |
|-----|--------------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------|------------|----------------------------|-------------------------------------------|---------------------------------------------------------------------|------------------------|-----------------------|-----------------------------------------------------------|-----------------------------------|---------------------------------------------------------|-----------------------------------------|-----------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
|     |                    |                          |                                                                                                                                                  | 0-5 Years | 6-10 Years | > 10 Years |                            |                                           |                                                                     |                        |                       |                                                           |                                   |                                                         |                                         |                       |                                   |                                                                                                                                   |
| M67 | Simms              | Municipal Infrastructure | Upgrade storm drains, So Dogwood St and Cortez Rd (122 m)                                                                                        |           |            | Y          | \$ 148,000                 | \$ 1,200                                  | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                       | Y (w/ relevant works within ROW)  | See Map 1B                                                                                                                        |
| M68 | Willow             | Municipal Infrastructure | Construct detention pond for future development - north Airport site                                                                             |           |            |            | \$ 1,511,000               | \$ 48,500                                 | W&S                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                       |                                   | See Map 1C                                                                                                                        |
| M69 | Willow             | Municipal Infrastructure | Construct detention pond for future development - south Airport site                                                                             |           |            |            | \$ 1,350,000               | \$ 43,200                                 | W&S                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                       |                                   | See Map 1C                                                                                                                        |
| M70 | Willow             | Municipal Infrastructure | Construct detention pond for future development - Goodwin Road / Milford Road site                                                               |           |            |            | \$ 438,000                 | \$ 14,100                                 | W&S                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                       |                                   | See Map 1C                                                                                                                        |
| M71 | Willow             | Municipal Infrastructure | Construct detention pond for future development -Jubilee Pkwy / S. Dogwood St site                                                               |           |            |            | \$ 4,557,000               | \$ 145,900                                | W&S                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                       |                                   | See Map 1C                                                                                                                        |
| M72 | Willow             | Municipal Infrastructure | Construct new trunk sewer for future development, Airport to Erickson Rd (3500 m)                                                                |           |            |            | \$ 6,363,000               | \$ 51,000                                 | W&S                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                       |                                   | See Map 1C                                                                                                                        |
| M73 | Willow             | Municipal Infrastructure | Construct new trunk sewer for future development, Erickson Rd to Discovery Passage (2000 m)                                                      |           |            |            | \$ 3,636,000               | \$ 29,100                                 | W&S                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                       |                                   | See Map 1C                                                                                                                        |
| M74 | Willow             | Municipal Infrastructure | Install diversion structures to maintain base flows in Larwood Creek tributary                                                                   |           | Y          |            | \$ 10,000                  | \$ -                                      | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                       | Y (w/ E28, E29)                   | Local streamkeepers group proponent of project. See Map 1C                                                                        |
| M75 | Willow             | Municipal Infrastructure | Place riprap at Erikson Road crossing to stabilize erosion of road embankments                                                                   | 3         |            |            | \$ 10,000                  | \$ -                                      | DSF                                                                 | In-House               |                       | Y                                                         |                                   |                                                         |                                         |                       |                                   | See Map 1C                                                                                                                        |
| M76 | Willow             | Municipal Infrastructure | Plant riparian vegetation at Georgia Park pond and pond outlet                                                                                   | 1         |            |            | \$ 12,000                  | \$ -                                      | DSF                                                                 | In-House               |                       | Y                                                         |                                   |                                                         |                                         |                       |                                   | See Map 1C                                                                                                                        |
| M77 | Willow             | Municipal Infrastructure | Upgrade storm drains, at Nature Park Dr (28 m)                                                                                                   |           |            | Y          | \$ 31,000                  | \$ 300                                    | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                       | Y (w/ relevant works within ROW)  | See Map 1C                                                                                                                        |
| M78 | Willow             | Municipal Infrastructure | Upgrade storm drains, Milford Rd, south of Goodwin Rd (261 m)                                                                                    |           |            | Y          | \$ 259,000                 | \$ 2,400                                  | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                       | Y (w/ relevant works within ROW)  | See Map 1C                                                                                                                        |
| M79 | Willow             | Municipal Infrastructure | Upgrade storm drains, Soderholm Rd, Bartlett to Harrogate Rd (233 m)                                                                             |           |            | Y          | \$ 231,000                 | \$ 2,200                                  | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                       | Y (w/ relevant works within ROW)  | See Map 1C                                                                                                                        |
| PP1 | Any                | Pilot Projects           | "Green" parking lot with pervious pavement, bioswales and/or rain gardens (best location in downtown) (10 stalls)                                | 3         |            |            | \$ 50,000                  | \$ -                                      | Partnership/DSF/Other                                               | Outsource              |                       |                                                           |                                   |                                                         |                                         |                       | Y (w/ PE3; M28)                   | High profile project ; educational value                                                                                          |
| PP2 | Any                | Pilot Projects           | Roof Leader Disconnection Program (1 block area for 1 year)                                                                                      | 3         |            |            | \$ 12,000                  | \$ -                                      | Partnership/DSF/Other                                               | In-House               |                       |                                                           |                                   |                                                         |                                         |                       | Y (w/ PE3)                        | High profile project ; educational value; best candidate area in middle upper Nunns, east of the creek or Simms east of the creek |
| PP3 | All                | Pilot Projects           | Shallow infiltration trenches in existing roadside ditches west of Nunns Creek (1 block)                                                         |           | Y          |            | \$ 40,000                  | \$ -                                      | Partnership/DSF/Other                                               | Outsource              |                       |                                                           |                                   |                                                         |                                         |                       | Y (w/ PE3)                        | High profile project ; educational value                                                                                          |
| PP4 | Any                | Pilot Projects           | Sustainable street pilot project including porous pavement and other LID techniques (1 block)                                                    | 5         |            |            | \$ 500,000                 | \$ -                                      | Partnership/DSF/Other                                               | Outsource              |                       |                                                           |                                   |                                                         |                                         |                       | Y (w/ PE3)                        | High profile project ; educational value                                                                                          |
| PP5 | Any                | Pilot Projects           | Install a stormwater deep infiltration well and monitor performance (1 location for 2 years)                                                     |           | Y          |            | \$ 60,000                  | \$ -                                      | Partnership/DSF/Other                                               | Outsource              |                       |                                                           |                                   |                                                         |                                         |                       | Y (w/ PE3)                        | High profile project ; educational value                                                                                          |
| PP6 | Any                | Pilot Projects           | Undertake a native planting program with private landowners within riparian corridor (100 m corridor)                                            |           | Y          |            | \$ 20,000                  | \$ -                                      | Partnership/DSF/Other                                               | In-House               |                       |                                                           |                                   |                                                         |                                         |                       | Y (w/ PE3)                        | High profile project ; educational value                                                                                          |
| PA1 | All                | Planning & Analysis      | Develop evaluation and adaptive management program: conduct base flow monitoring (on-going) (manually-read ditch staff gauges - assume 10 total) | 1         |            |            | \$ 5,000                   | \$ 5,000                                  | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                       |                                   |                                                                                                                                   |



CAMPBELL RIVER INTEGRATED STORMWATER MANAGEMENT - SUMMARY OF RECOMMENDATIONS

| ID   | Watershed Location             | Category            | Recommendation                                                                                                                                                                                                                                                                                                                            | Schedule  |            |            | Estimated Cost (Jan. 2007) | Estimated Ongoing Annual Cost (Jan. 2007) | Funding Source (DCC; W&S; DSF; GR; Partnership; Other) <sup>1</sup> | Outsource or In-House? | Development Pressure? | Addresses Current Significant Flooding or Erosion Issues? | Annual TSS Loading Reduction (Kg) | Potential Area of Habitat Improvement (m <sup>2</sup> ) | Potential Annual Increase in Smolts (#) | Environmental Benefit                                                                              | Concurrent with other project(s)?         | Comments                                                               |
|------|--------------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------|------------|----------------------------|-------------------------------------------|---------------------------------------------------------------------|------------------------|-----------------------|-----------------------------------------------------------|-----------------------------------|---------------------------------------------------------|-----------------------------------------|----------------------------------------------------------------------------------------------------|-------------------------------------------|------------------------------------------------------------------------|
|      |                                |                     |                                                                                                                                                                                                                                                                                                                                           | 0-5 Years | 6-10 Years | > 10 Years |                            |                                           |                                                                     |                        |                       |                                                           |                                   |                                                         |                                         |                                                                                                    |                                           |                                                                        |
| PA2  | All                            | Planning & Analysis | Develop evaluation and adaptive management program: conduct continuous flow monitoring (one year minimum; 2 sites)                                                                                                                                                                                                                        | 1         |            |            | \$ 30,000                  | \$ 18,000                                 | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                                                    |                                           |                                                                        |
| PA3  | All                            | Planning & Analysis | Develop evaluation and adaptive management program: re-establish digital recording of continuous rainfall measurements at the airport rain gauge                                                                                                                                                                                          | 1         |            |            | \$ 2,000                   | \$ 1,500                                  | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                                                    |                                           |                                                                        |
| PA4  | All                            | Planning & Analysis | Develop evaluation and adaptive management program: establish long-term biophysical inventory program (at least 2 sites; 2 times per year)                                                                                                                                                                                                | 2         |            |            | \$ 2,000                   | \$ 20,000                                 | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                                                    |                                           |                                                                        |
| PA5  | All                            | Planning & Analysis | Develop evaluation and adaptive management program: establish long-term outfall water and sediment quality monitoring program (5 sites)                                                                                                                                                                                                   | 1         |            |            | \$ 2,000                   | \$ 10,000                                 | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                                                    |                                           |                                                                        |
| PA6  | All                            | Planning & Analysis | Develop evaluation and adaptive management program: initiate soils property verification program, including test pits (10 pits first year; 5 per year thereafter)                                                                                                                                                                         |           | Y          |            | \$ 5,000                   | \$ 2,500                                  | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                                                    |                                           |                                                                        |
| PA7  | Nunns                          | Planning & Analysis | Investigate need for flow and erosion controls at storm drain outfalls at 2nd and 4th Streets                                                                                                                                                                                                                                             | 4         |            |            | \$ 5,000                   | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                                                    | Y (w/ M36,E11)                            |                                                                        |
| PA8  | All                            | Planning & Analysis | Undertake a wetlands inventory (historical location, extent, etc.) and prepare wetland management plan                                                                                                                                                                                                                                    |           | Y          |            | \$ 75,000                  | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                                                    |                                           |                                                                        |
| PA9  | All                            | Planning & Analysis | Obtain updated, detailed aerial contour mapping of area (supplemented by ground survey)                                                                                                                                                                                                                                                   | 1         |            |            | \$ 60,000                  | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                                                    |                                           |                                                                        |
| PA10 | All                            | Planning & Analysis | Enhance & update GIS database with information from new developments (soils, watercourse, etc)                                                                                                                                                                                                                                            | 1         |            |            | \$ -                       | \$ 10,000                                 | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                                                                                                    |                                           |                                                                        |
| PA11 | Nunns, Simms and Willow; CR/QR | Planning & Analysis | Prepare a beaver management plan                                                                                                                                                                                                                                                                                                          |           |            | Y          | \$ 10,000                  | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                                                    |                                           |                                                                        |
| PA12 | Nunns                          | Planning & Analysis | Refine the current XP-SWMM model for the Nunns Creek Watershed to perform extended period (continuous) simulations. This will include compiling manhole rim data throughout the area; obtaining detailed cross section and profile survey of the creek; surveying erosion sites; and verifying connections to ERT ditches to Nunns Creek. | 1         |            |            | \$ 35,000                  | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                                                    | Y (w/ E19, M47, M48,M51, M60, PA19, PA28) | Modeling required to assist with design for16th Avenue culvert upgrade |
| PA13 | Willow                         | Planning & Analysis | Refine the current XP-SWMM model for the Willow Creek Watershed to perform extended period (continuous) simulations. This will include compiling manhole rim data throughout the area; obtaining detailed cross section and profile survey of the creek; and surveying erosion sites.                                                     | 3         |            |            | \$ 35,000                  | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                                                    | Y (w/ PA20)                               | Active Streamkeepers Group will likely support advancing this work     |
| PA14 | Simms                          | Planning & Analysis | Refine the current XP-SWMM model for the Simms Creek Watershed to perform extended period (continuous) simulations. This will include compiling manhole rim data throughout the area; obtaining detailed cross section and profile survey of the creek; and surveying erosion sites.                                                      |           | Y          |            | \$ 35,000                  | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                                                    | Y (w/ PA21)                               |                                                                        |
| PA15 | CR/QR                          | Planning & Analysis | Refine the current XP-SWMM model for the Campbell River/Quinsam River Watershed to perform extended period (continuous) simulations. This will include compiling manhole rim data throughout the area; obtaining detailed cross section and profile survey of the creek; and surveying erosion sites.                                     |           | Y          |            | \$ 35,000                  | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                                                    | Y (w/ PA22)                               |                                                                        |
| PA16 | HH/PR                          | Planning & Analysis | Refine the current XP-SWMM model for the Holly Hills/Perkins Road Watershed to perform extended period (continuous) simulations. This will include compiling manhole rim data throughout the area; obtaining detailed cross section and profile survey of the creek; and surveying erosion sites.                                         |           |            | Y          | \$ 35,000                  | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                                                    | Y (w/ PA23)                               |                                                                        |
| PA17 | Fore. A                        | Planning & Analysis | Refine the current XP-SWMM model for the Foreshore Area Watershed to perform extended period (continuous) simulations. This will include compiling manhole rim data throughout the area; obtaining detailed cross section and profile survey of the creek; and surveying erosion sites.                                                   |           |            | Y          | \$ 35,000                  | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                                                    | Y (w/ PA24)                               |                                                                        |
| PA18 | All                            | Planning & Analysis | Conduct an inventory of potential sources of pollutants from commercial and industrial uses ("hot-spot" study).                                                                                                                                                                                                                           | 2         |            |            | \$ 25,000                  | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           | Unknown                           |                                                         |                                         | Potentially significant long-term water quality improvements through targetting hot spots for BMPs |                                           |                                                                        |
| PA19 | Nunns                          | Planning & Analysis | Generate improvement plan for erosion sites                                                                                                                                                                                                                                                                                               | 1         |            |            | \$ 8,000                   | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                                                    | Y (w/ PA12)                               |                                                                        |

CAMPBELL RIVER INTEGRATED STORMWATER MANAGEMENT - SUMMARY OF RECOMMENDATIONS

| ID   | Watershed Location | Category            | Recommendation                                                                                                                                                                                          | Schedule  |            |            | Estimated Cost (Jan. 2007) | Estimated Ongoing Annual Cost (Jan. 2007) | Funding Source (DCC; W&S; DSF; GR; Partnership; Other) <sup>1</sup> | Outsource or In-House? | Development Pressure? | Addresses Current Significant Flooding or Erosion Issues? | Annual TSS Loading Reduction (Kg) | Potential Area of Habitat Improvement (m <sup>2</sup> ) | Potential Annual Increase in Smolts (#) | Environmental Benefit                                                      | Concurrent with other project(s)?    | Comments                                  |
|------|--------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------|------------|----------------------------|-------------------------------------------|---------------------------------------------------------------------|------------------------|-----------------------|-----------------------------------------------------------|-----------------------------------|---------------------------------------------------------|-----------------------------------------|----------------------------------------------------------------------------|--------------------------------------|-------------------------------------------|
|      |                    |                     |                                                                                                                                                                                                         | 0-5 Years | 6-10 Years | > 10 Years |                            |                                           |                                                                     |                        |                       |                                                           |                                   |                                                         |                                         |                                                                            |                                      |                                           |
| PA20 | Willow             | Planning & Analysis | Generate improvement plan for erosion sites                                                                                                                                                             | 3         |            |            | \$ 8,000                   |                                           | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                            | Y (w/ PA13)                          |                                           |
| PA21 | Simms              | Planning & Analysis | Generate improvement plan for erosion sites                                                                                                                                                             |           | Y          |            | \$ 8,000                   |                                           | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                            | Y (w/ PA14)                          |                                           |
| PA22 | CR/QR              | Planning & Analysis | Generate improvement plan for erosion sites                                                                                                                                                             |           | Y          |            | \$ 8,000                   |                                           | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                            | Y (w/ PA15)                          |                                           |
| PA23 | HH/PR              | Planning & Analysis | Generate improvement plan for erosion sites                                                                                                                                                             |           |            | Y          | \$ 8,000                   |                                           | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                            | Y (w/ PA16)                          |                                           |
| PA24 | Fore. A            | Planning & Analysis | Generate improvement plan for erosion sites                                                                                                                                                             |           |            | Y          | \$ 8,000                   |                                           | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                            | Y (w/ PA17)                          |                                           |
| PA25 | HH/PR              | Planning & Analysis | Vanstone channel study to enhance anadromous fish habitat, including bypassing the existing long culvert that serves as a barrier and to establish compensation or mitigation banking area              |           |            | Y          | \$ 25,000                  | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                            |                                      |                                           |
| PA26 | Fore. A            | Planning & Analysis | Downtown Flooding Study                                                                                                                                                                                 | 2         |            |            | \$ 60,000                  | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                            |                                      |                                           |
| PA27 | All                | Planning & Analysis | Street Sweeping & Runoff Treatment Cost Effectiveness Study                                                                                                                                             | 2         |            |            | \$ 100,000                 | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                            |                                      |                                           |
| PA28 | Nunns              | Planning & Analysis | Review and update 2004 recommendation to remove culvert on Nunns Creek at 16th Avenue; develop final scope of work for Nunns Creek Park area coordinated initiatives (E19, M47, M48, M51 & M60)         | 1         |            |            | \$ 25,000                  | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                            | Y (w/ E19, M47, M48, M51, M60, PA12) |                                           |
| PA29 | Nunns              | Planning & Analysis | Update Nunns Creek ISMP (6 year cycle)                                                                                                                                                                  |           | Y          |            | \$ 5,000                   | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                            |                                      |                                           |
| PA30 | Willow             | Planning & Analysis | Update Willow Creek ISMP (6 year cycle)                                                                                                                                                                 |           | Y          |            | \$ 5,000                   | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                            |                                      |                                           |
| PA31 | Simms              | Planning & Analysis | Update Simms Creek ISMP (6 year cycle)                                                                                                                                                                  |           |            | Y          | \$ 5,000                   | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                            |                                      |                                           |
| PA32 | CR/QR              | Planning & Analysis | Update Campbell River / Quinsam River ISMP (6 year cycle)                                                                                                                                               |           |            | Y          | \$ 5,000                   | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                            |                                      |                                           |
| PA33 | HH/PR              | Planning & Analysis | Update Holly Hills / Perkins Road ISMP (6 year cycle)                                                                                                                                                   |           |            | Y          | \$ 5,000                   | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                            |                                      |                                           |
| PA34 | Fore. A            | Planning & Analysis | Update Foreshore Area ISMP (6 year cycle)                                                                                                                                                               |           |            | Y          | \$ 5,000                   | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                            |                                      |                                           |
| PR1  | All                | Policy & Regulation | Update MOU with DFO and MOE to include ISMPs.                                                                                                                                                           | 1         |            |            | \$ 5,000                   | \$ -                                      | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                                                                            |                                      |                                           |
| PR2  | All                | Policy & Regulation | Adopt a single, consistent 5-year level of service for minor conveyance systems                                                                                                                         | 1         |            |            | \$ -                       | \$ -                                      | N/A                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                                                                            |                                      |                                           |
| PR3  | All                | Policy & Regulation | Adopt performance targets for stormwater volume, peak and quality                                                                                                                                       | 1         |            |            | \$ -                       | \$ -                                      | N/A                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         | Mitigate long-term impacts on hydrology and water quality of local streams |                                      |                                           |
| PR4  | All                | Policy & Regulation | Require specific stormwater quality treatment for all new commercial and industrial sites                                                                                                               | 1         |            |            | \$ -                       | \$ -                                      | N/A                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         | Enhanced protection from "hot spot" pollution                              |                                      |                                           |
| PR5  | All                | Policy & Regulation | Require the use of LID techniques (where appropriate and feasible) for new development and adopt the City's draft "alternate design standards"                                                          | 1         |            |            | \$ -                       | \$ -                                      | N/A                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         | Mitigate long-term impacts on hydrology and water quality of local streams |                                      |                                           |
| PR6  | All                | Policy & Regulation | Update draft OCP document to: ensure land uses indicated within Agricultural Land Reserve lands are appropriate; and include measurable targets for preserving tree cover and limiting impervious area. |           | Y          |            | \$ -                       | \$ -                                      | GR                                                                  | In-House               |                       |                                                           |                                   |                                                         |                                         |                                                                            |                                      | Update as per five-year OCP review cycle. |

CAMPBELL RIVER INTEGRATED STORMWATER MANAGEMENT - SUMMARY OF RECOMMENDATIONS

| ID   | Watershed Location | Category                    | Recommendation                                                                                                                                                               | Schedule  |            |            | Estimated Cost (Jan. 2007) | Estimated Ongoing Annual Cost (Jan. 2007) | Funding Source (DCC; W&S; DSF; GR; Partnership; Other) <sup>1</sup> | Outsource or In-House? | Development Pressure? | Addresses Current Significant Flooding or Erosion Issues? | Annual TSS Loading Reduction (Kg) | Potential Area of Habitat Improvement (m <sup>2</sup> ) | Potential Annual Increase in Smolts (#) | Environmental Benefit                                                      | Concurrent with other project(s)? | Comments                                          |
|------|--------------------|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------|------------|----------------------------|-------------------------------------------|---------------------------------------------------------------------|------------------------|-----------------------|-----------------------------------------------------------|-----------------------------------|---------------------------------------------------------|-----------------------------------------|----------------------------------------------------------------------------|-----------------------------------|---------------------------------------------------|
|      |                    |                             |                                                                                                                                                                              | 0-5 Years | 6-10 Years | > 10 Years |                            |                                           |                                                                     |                        |                       |                                                           |                                   |                                                         |                                         |                                                                            |                                   |                                                   |
| PR7  | All                | Policy & Regulation         | Develop and adopt a stormwater user charge system to finance all aspects stormwater management                                                                               | 1         |            |            | \$ 50,000                  | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                            |                                   |                                                   |
| PR8  | All                | Policy & Regulation         | Develop and adopt an Erosion and Sediment Control Bylaw                                                                                                                      | 1         |            |            | \$ 15,000                  | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         | Control erosion and subsequent sediment deposition in sewers and streams   | Y (w/ PE2)                        |                                                   |
| PR9  | All                | Policy & Regulation         | Update zoning bylaw to include maximum parking space and impervious area limits, encourage vegetation retention and native species plants, and encourage cluster development | 1         |            |            | \$ -                       | \$ -                                      | N/A                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                                                                            |                                   |                                                   |
| PR10 | All                | Policy & Regulation         | Develop and adopt a Pesticide Use Bylaw                                                                                                                                      | 1         |            |            | \$ 10,000                  | \$ -                                      | N/A                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         | Improved water quality and protection of aquatic life                      |                                   |                                                   |
| PR11 | All                | Policy & Regulation         | Develop and adopt a Tree Retention Bylaw                                                                                                                                     | 1         |            |            | \$ 10,000                  | \$ -                                      | N/A                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         | Mitigate long-term impacts on hydrology and water quality of local streams |                                   |                                                   |
| PR12 | All                | Policy & Regulation         | Require use of deep sump catch basins with trapping hoods                                                                                                                    | 1         |            |            | \$ -                       | \$ -                                      | N/A                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         | Improved water quality                                                     |                                   |                                                   |
| PR13 | All                | Policy & Regulation         | Review potential to implement ISO 14001 Environmental Management System                                                                                                      | 1         |            |            | \$ 10,000                  | \$ -                                      | GR                                                                  | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                            |                                   |                                                   |
| PR14 | All                | Policy & Regulation         | Develop appropriate guidelines to incorporate global warming issues into stormwater systems design                                                                           | 1         |            |            | \$ 10,000                  | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                            |                                   |                                                   |
| PE1  | All                | Public Education & Outreach | Conduct a long term public education and outreach program                                                                                                                    | 1         |            |            | \$ 10,000                  | \$ 3,000                                  | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                                                                            | Y (All)                           |                                                   |
| PE2  | All                | Public Education & Outreach | Prepare and distribute to builders an Erosion and Sediment Control Brochure                                                                                                  | 1         |            |            | \$ 6,000                   | \$ -                                      | DSF                                                                 | Outsource              |                       |                                                           |                                   |                                                         |                                         |                                                                            | Y (w/ PR8)                        |                                                   |
| PE3  | All                | Public Education & Outreach | Publicize stormwater pilot projects (cost should be included in each pilot project)                                                                                          |           |            |            | \$ -                       | \$ -                                      | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                                                                            | Y (w/ PP1-6)                      | Timing concurrent with individual pilot projects. |
| PE4  | All                | Public Education & Outreach | Develop an annual stewardship award for the development community                                                                                                            | 1         |            |            | \$ 5,000                   | \$ 2,000                                  | DSF                                                                 | In-House               |                       |                                                           |                                   |                                                         |                                         |                                                                            | Y (All)                           |                                                   |

\$ 53,374,000

Notes

- 1
- DCC - development cost charges; W&S - works and services; DSF- dedicated stormwater fund; GR- general revenue
- 2
- The Willow Creek ISMP recommended a detention pond on the Homalco First Nation site (capital costs: \$1,617,000; annual operating costs: \$51,900). This project is not included in this implementation plan as the project is located outside of the City's boundaries on First Nations' land.

Estimated Costs based on Construction Costs (which includes Mob/Demb) as listed in ISMP reports, plus 35% contingency, 15% engineering, 10% administration costs and land (if applicable)  
Total construction cost multiplier is (1+35%)\*(1+15%+10%) = 1.6875 (not including land cost)  
Estimated costs rounded to nearest \$1,000; annual costs rounded to nearest \$100

- Construction Costs from ISMP May 2005; updated to Jan 2007 at 26% (20% to Jan 2006, per DCC study, plus 5%)
- Construction Costs from ISMP May 2005; updated to Jan 2007 at 26% (20% to Jan 2006, per DCC study, plus 5%)
- Construction Costs from ISMP May 2005; updated to Jan 2007 at 26% (20% to Jan 2006, per DCC study, plus 5%)
- Construction Costs from ISMP Dec 2006; no increase to Jan 2007
- Construction Costs from ISMP Oct 2005; updated to Jan 2007 at 26% (20% to Jan 2006, per DCC study, plus 5%)
- Construction Costs from DCC Capital Cost background report June 2006; updated to Jan 2007 at 5%

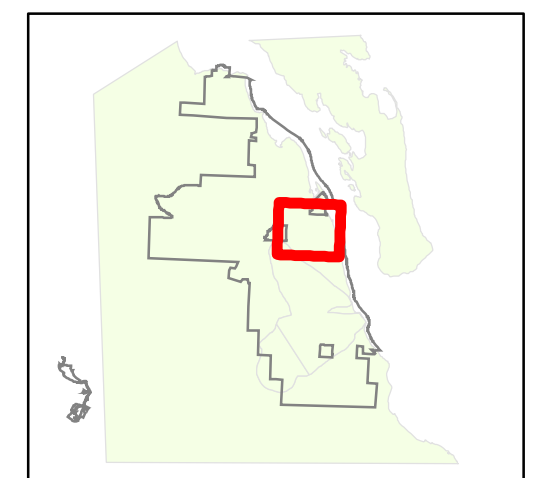


## City of Campbell River

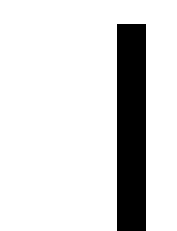
### Stormwater Management Implementation Plan

### Recommended Municipal Infrastructure Improvements

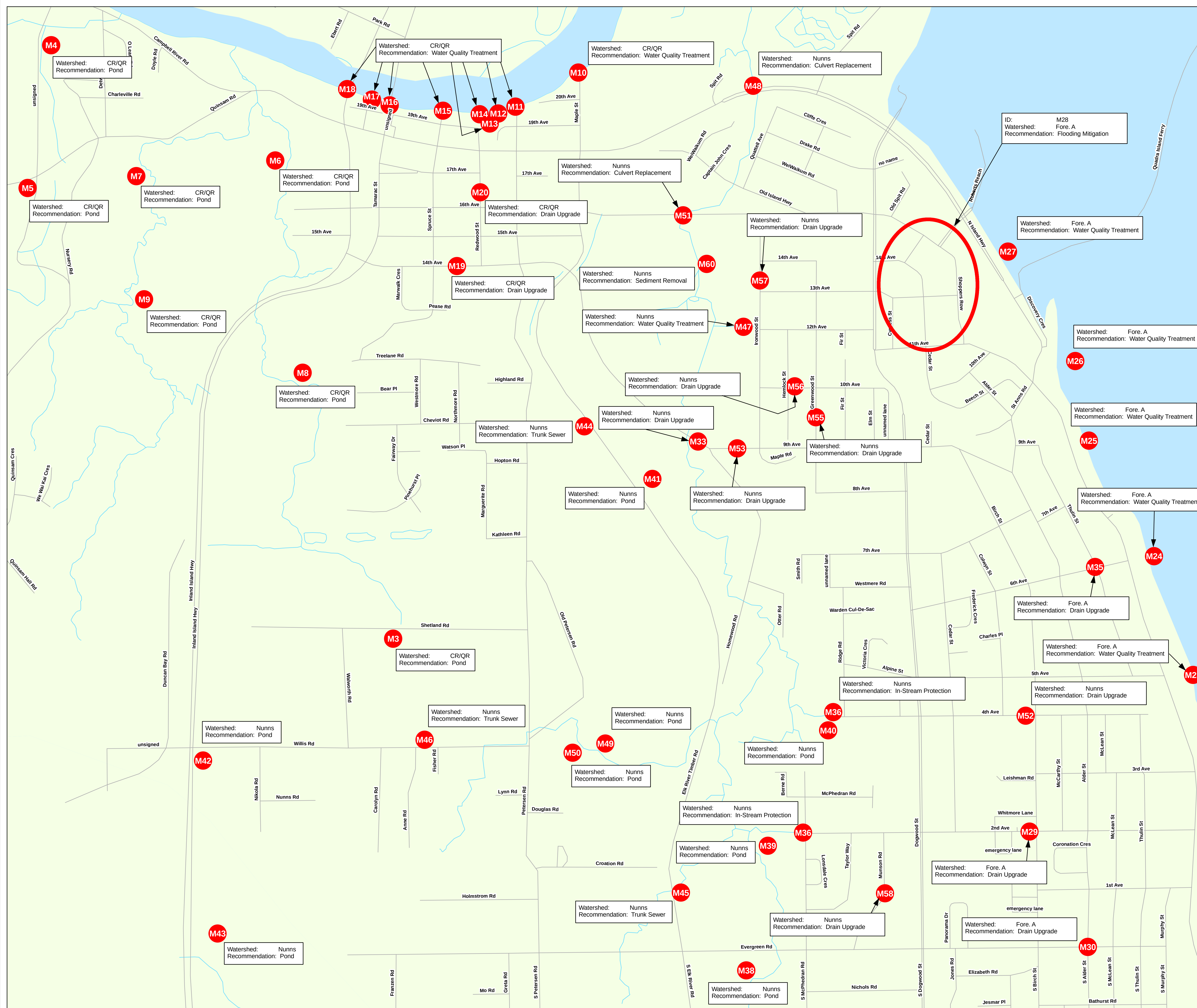
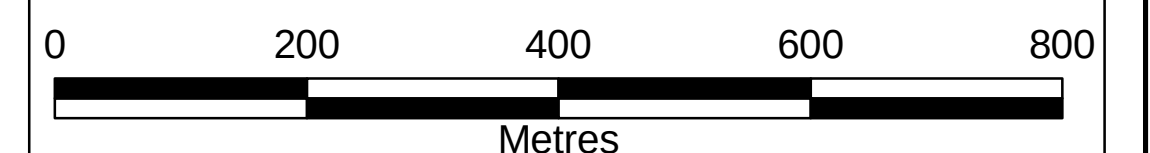
Map 1A



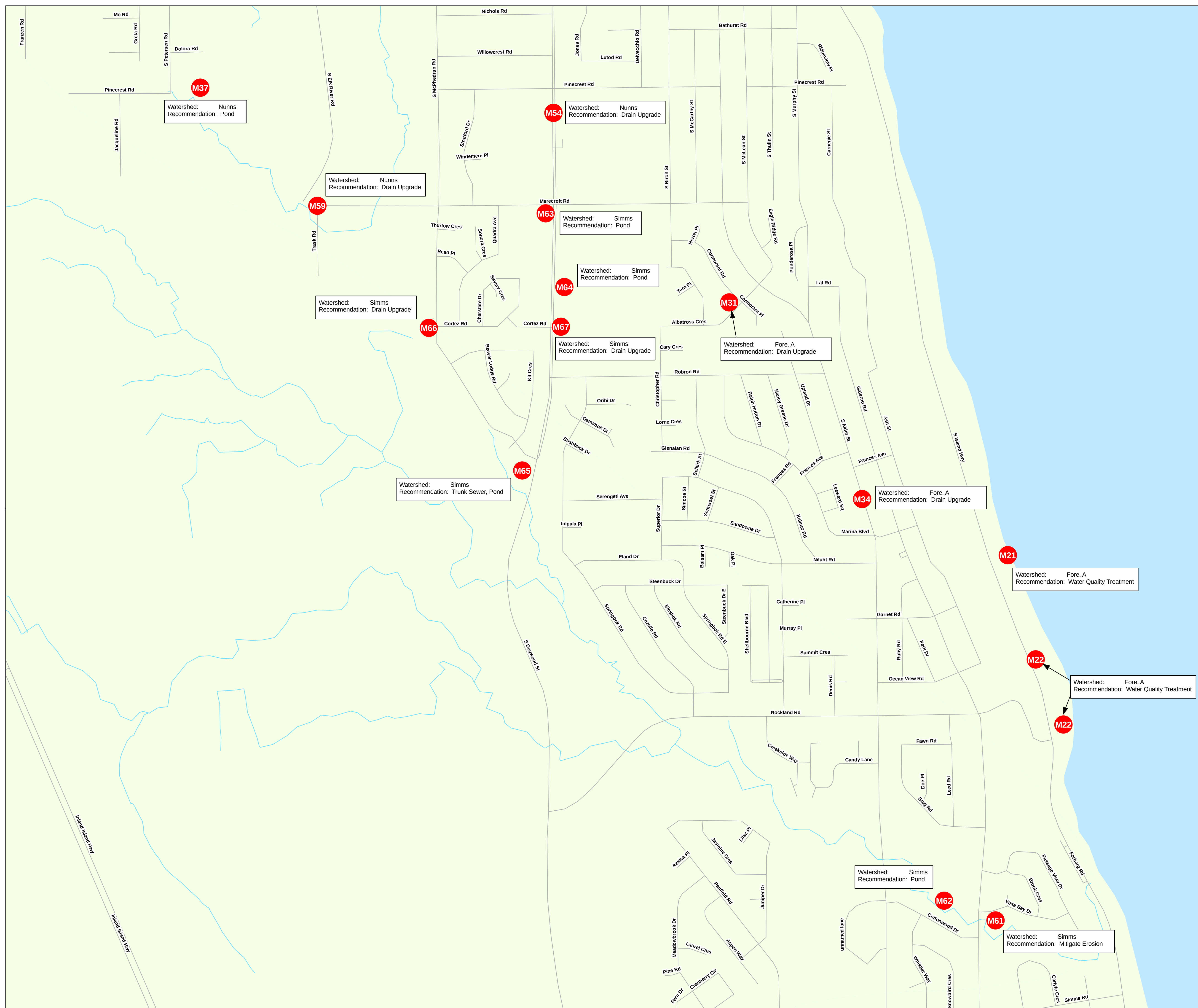
Note:  
Recommendation locations  
depicted on this map are  
approximate. This map is for  
illustrative purposes only.  
See text for fuller project  
descriptions.



1:6,000







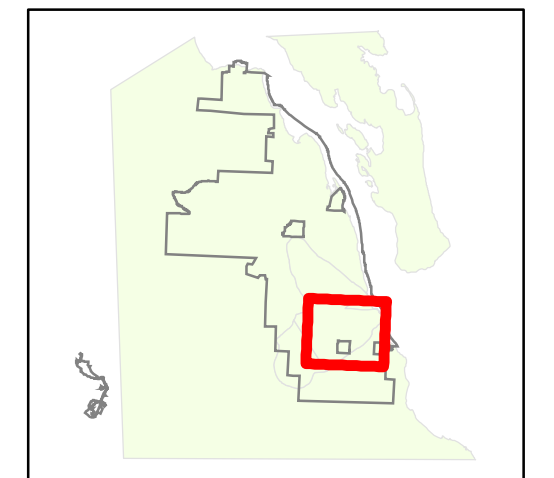


## City of Campbell River

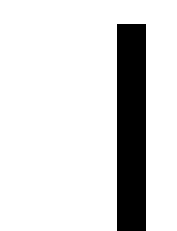
### Stormwater Management Implementation Plan

### Recommended Municipal Infrastructure Improvements

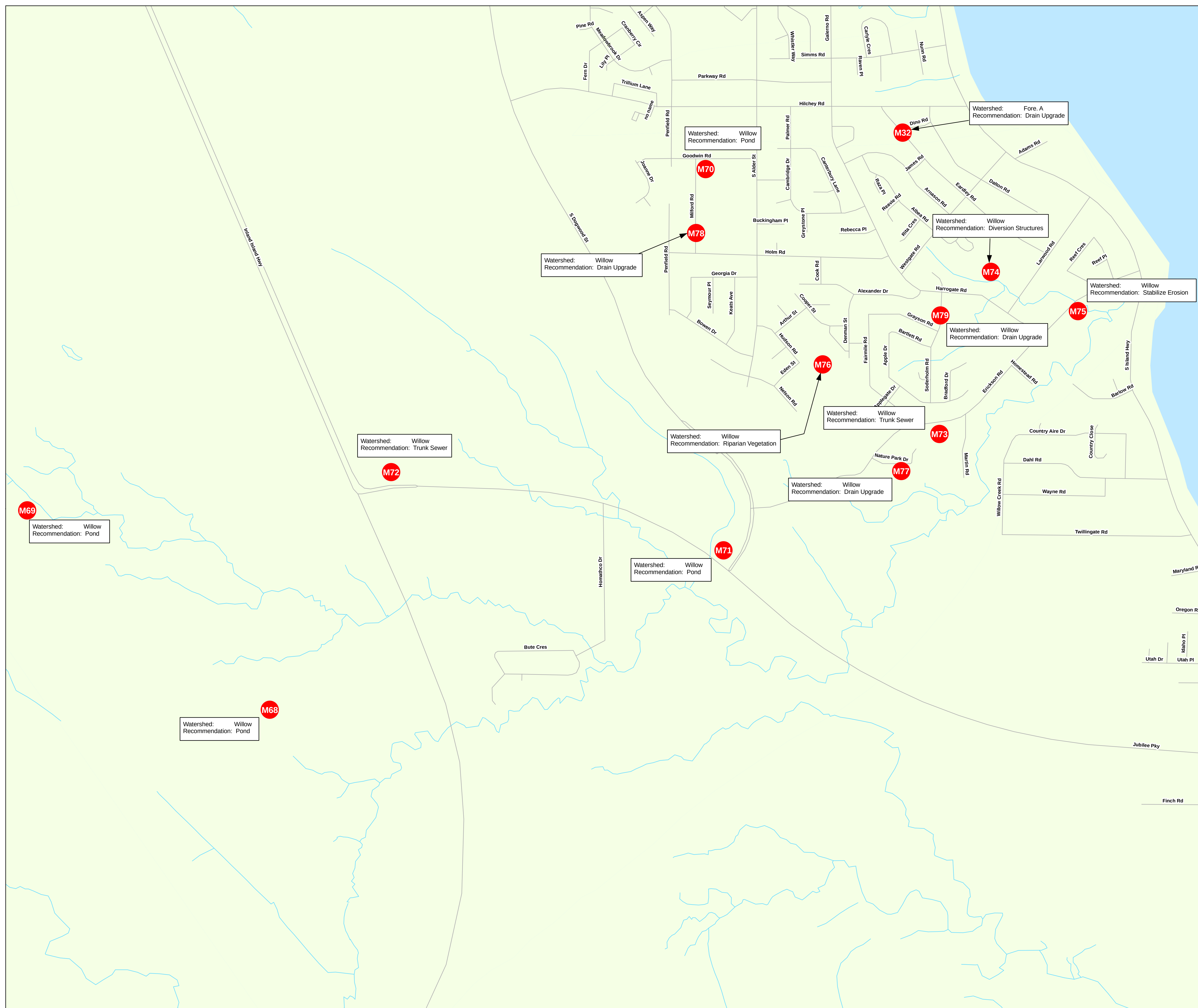
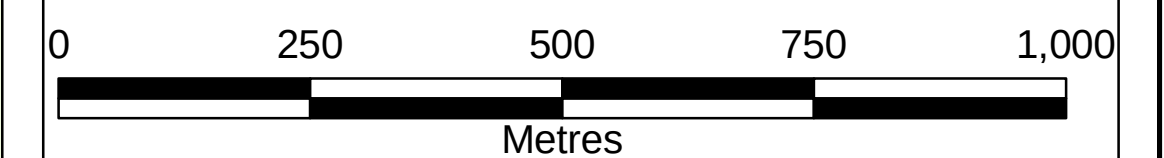
#### Map 1C



Note:  
Recommendation locations  
depicted on this map are  
approximate. This map is for  
illustrative purposes only.  
See text for fuller project  
descriptions.



1:7,500





# SCHEDULE B

**Municipal Infrastructure Project to be Completed by Developer**

## CAMPBELL RIVER INTEGRATED STORMWATER MANAGEMENT INITIATIVES TO BE FUNDED BY DEVELOPER THROUGH WORKS AND SERVICES

| ID  | Watershed Location | Recommendation                                                                               | Estimated Cost (Jan. 2007) | Estimated Ongoing Annual Cost (Jan. 2007) |
|-----|--------------------|----------------------------------------------------------------------------------------------|----------------------------|-------------------------------------------|
| M3  | CR/QR              | Construct detention pond for future development - Kingfisher Creek (Upper Reach) site        | \$ 3,129,000               | \$ 100,200                                |
| M4  | CR/QR              | Construct detention pond for future development - Detweiler Creek (Lower Reach) site         | \$ 744,000                 | \$ 23,900                                 |
| M5  | CR/QR              | Construct detention pond for future development - Detweiler Creek (Upper Reach) site         | \$ 1,845,000               | \$ 59,100                                 |
| M6  | CR/QR              | Construct detention pond for future development - Kingfisher Creek (Lower Reach East) site   | \$ 1,357,000               | \$ 43,500                                 |
| M7  | CR/QR              | Construct detention pond for future development - Kingfisher Creek (Lower Reach West) site   | \$ 1,050,000               | \$ 33,600                                 |
| M8  | CR/QR              | Construct detention pond for future development - Kingfisher Creek (Middle Reach East) site  | \$ 805,000                 | \$ 25,800                                 |
| M9  | CR/QR              | Construct detention pond for future development - Kingfisher Creek (Middle Reach West) site  | \$ 2,457,000               | \$ 78,700                                 |
| M39 | Nunns              | Construct detention pond for future development - 2nd Ave / Nunns Creek site                 | \$ 1,243,000               | \$ 39,800                                 |
| M41 | Nunns              | Construct detention pond for future development - Old Petersen Road site                     | \$ 2,207,000               | \$ 70,800                                 |
| M42 | Nunns              | Construct detention pond for future development - Willis Road / Inland Highway site          | \$ 243,000                 | \$ 7,800                                  |
| M43 | Nunns              | Construct detention pond for future development - Willis Road / Inland Highway site          | \$ 813,000                 | \$ 26,000                                 |
| M62 | Simms              | Construct detention pond for future development - South Alder / Simms Creek site             | \$ 491,000                 | \$ 15,800                                 |
| M63 | Simms              | Construct detention pond for future development - South Dogwood St / Merecroft Rd north site | \$ 222,000                 | \$ 7,100                                  |



## CAMPBELL RIVER INTEGRATED STORMWATER MANAGEMENT INITIATIVES TO BE FUNDED BY DEVELOPER THROUGH WORKS AND SERVICES

| ID  | Watershed Location | Recommendation                                                                                                                                             | Estimated Cost (Jan. 2007) | Estimated Ongoing Annual Cost (Jan. 2007) |
|-----|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------------|
| M64 | Simms              | Construct detention pond for future development - South Dogwood St / Merecroft Rd south site                                                               | \$ 383,000                 | \$ 12,400                                 |
| M65 | Simms              | Construct new trunk sewer for future development, So. Dogwood & Cortez St (122 m), plus expansion to detention pond at So Dogwood & So McPhedran (1500 m3) | \$ 1,047,000               | \$ 27,900                                 |
| M68 | Willow             | Construct detention pond for future development - north Airport site                                                                                       | \$ 1,511,000               | \$ 48,500                                 |
| M69 | Willow             | Construct detention pond for future development - south Airport site                                                                                       | \$ 1,350,000               | \$ 43,200                                 |
| M70 | Willow             | Construct detention pond for future development - Goodwin Road / Milford Road site                                                                         | \$ 438,000                 | \$ 14,100                                 |
| M71 | Willow             | Construct detention pond for future development - Jubilee Pkwy / S. Dogwood St site                                                                        | \$ 4,557,000               | \$ 145,900                                |
| M72 | Willow             | Construct new trunk sewer for future development, Airport to Erickson Rd (3500 m)                                                                          | \$ 6,363,000               | \$ 51,000                                 |
| M73 | Willow             | Construct new trunk sewer for future development, Erickson Rd to Discovery Passage (2000 m)                                                                | \$ 3,636,000               | \$ 29,100                                 |

**TOTAL      \$35,891,000      \$904,200**

### Notes

1. Estimated ongoing annual costs are assumed to occur each year after the project is initiated.



# SCHEDULE C

## Coordinated Projects

**Table C.1: Coordinated Projects**

| Group | ID   | Recommendation                                                                                                                                                                                                                                                                                                                            |
|-------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | E19  | Perform instream boulder/LWD placement and gravel recruitment through Nunns Creek Park.                                                                                                                                                                                                                                                   |
|       | M47  | Install water quality units at existing storm sewer outfalls from industrial/commercial area (Nunns Creek Park).                                                                                                                                                                                                                          |
|       | M48  | Discovery Harbour Highway culvert replacement.                                                                                                                                                                                                                                                                                            |
|       | M51  | Replace culvert at 16th Avenue with open bottom arch culvert or bridge structure (Old Island Highway and Island Highway upgrades also recommended, but under MoT jurisdiction)                                                                                                                                                            |
|       | M60  | Lower Nunns Creek sediment removal.                                                                                                                                                                                                                                                                                                       |
|       | PA12 | Refine the current XP-SWMM model for the Nunns Creek Watershed to perform extended period (continuous) simulations. This will include compiling manhole rim data throughout the area; obtaining detailed cross section and profile survey of the creek; surveying erosion sites; and verifying connections to ERT ditches to Nunns Creek. |
|       | PA28 | Study to review culvert removal on Nunns Creek at 16th Avenue                                                                                                                                                                                                                                                                             |
| 2     | M36  | Construct check dams / rock liners / downstream of 2nd Avenue and 4th Avenue outfalls                                                                                                                                                                                                                                                     |
|       | E11  | Restore riparian structure downstream of storm drain outfalls at 2nd & 4th Aves                                                                                                                                                                                                                                                           |
|       | PA7  | Investigate need for flow and erosion controls at storm drain outfalls at 2nd and 4th Streets                                                                                                                                                                                                                                             |
| 3     | PE2  | Prepare and distribute to builders an Erosion and Sediment Control Brochure                                                                                                                                                                                                                                                               |
|       | PR8  | Develop and adopt an Erosion and Sediment Control Bylaw                                                                                                                                                                                                                                                                                   |
| 4     | E7   | Infill riprap with fines/soil and plant with native species to accelerate recolonization of high foreshore riprap (12 outfalls - DT01, 04, 05 & 08; OG 01 thru 04; SW06 thru 09)                                                                                                                                                          |
|       | M22  | Construct water quality treatment system for Outfall DT04/05 (priority habitat enhancement site)                                                                                                                                                                                                                                          |
| 5     | E9   | Develop foreshore rearing pond/wildlife habitat area supplied by groundwater seepage (Outfall DT19)                                                                                                                                                                                                                                       |
|       | M23  | Construct water quality treatment system for Outfall DT19 (priority habitat enhancement site)                                                                                                                                                                                                                                             |
| 6     | E21  | Perform instream Boulder/LWD placements and replace gravel downstream of Galerno Road culvert                                                                                                                                                                                                                                             |
|       | M61  | Address erosion at Galerno Road culvert outlet through construction of baffles, riprap, flow deflectors, bio-engineering, etc.                                                                                                                                                                                                            |
| 7     | E22  | Install flow deflectors/rock weirs as needed between South Alder Street and Hwy 19A                                                                                                                                                                                                                                                       |
|       | M61  | Address erosion at Galerno Road culvert outlet through construction of baffles, riprap, flow deflectors, bio-engineering, etc.                                                                                                                                                                                                            |
| 8     | M74  | Install diversion structures to maintain base flows in Larwood Creek tributary                                                                                                                                                                                                                                                            |



| Group | ID                                         | Recommendation                                                                                                                                                                                                                                                                                                                            |
|-------|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | E28                                        | Construct backwater channel off Larwood Creek tributary downstream of Erickson Road                                                                                                                                                                                                                                                       |
| 9     | M74                                        | Install diversion structures to maintain base flows in Larwood Creek tributary                                                                                                                                                                                                                                                            |
|       | E29                                        | Increase baseflows to Larwood Crk through the splitter at Larwood St; construct small ponds / wetland features along north branch of Larwood Creek tributary                                                                                                                                                                              |
| 10    | M2;M19;M20;M29-M35;M52-M59;M66;M67;M77-M79 | Storm drain upgrades; catch basin upgrades                                                                                                                                                                                                                                                                                                |
|       | N/A                                        | Relevant right-of-way improvements undertaken as part of other City initiatives                                                                                                                                                                                                                                                           |
| 11    | PA12                                       | Refine the current XP-SWMM model for the Nunns Creek Watershed to perform extended period (continuous) simulations. This will include compiling manhole rim data throughout the area; obtaining detailed cross section and profile survey of the creek; surveying erosion sites; and verifying connections to ERT ditches to Nunns Creek. |
|       | PA19                                       | Generate improvement plan for erosion sites                                                                                                                                                                                                                                                                                               |
| 12    | PA13                                       | Refine the current XP-SWMM model for the Willow Creek Watershed to perform extended period (continuous) simulations. This will include compiling manhole rim data throughout the area; obtaining detailed cross section and profile survey of the creek; and surveying erosion sites.                                                     |
|       | PA20                                       | Generate improvement plan for erosion sites                                                                                                                                                                                                                                                                                               |
| 13    | PA14                                       | Refine the current XP-SWMM model for the Simms Creek Watershed to perform extended period (continuous) simulations. This will include compiling manhole rim data throughout the area; obtaining detailed cross section and profile survey of the creek; and surveying erosion sites.                                                      |
|       | PA21                                       | Generate improvement plan for erosion sites                                                                                                                                                                                                                                                                                               |
| 14    | PA15                                       | Refine the current XP-SWMM model for the Campbell River/Quinsam River Watershed to perform extended period (continuous) simulations. This will include compiling manhole rim data throughout the area; obtaining detailed cross section and profile survey of the creek; and surveying erosion sites.                                     |
|       | PA22                                       | Generate improvement plan for erosion sites                                                                                                                                                                                                                                                                                               |
| 15    | PA16                                       | Refine the current XP-SWMM model for the Holly Hills/Perkins Road Watershed to perform extended period (continuous) simulations. This will include compiling manhole rim data throughout the area; obtaining detailed cross section and profile survey of the creek; and surveying erosion sites.                                         |
|       | PA23                                       | Generate improvement plan for erosion sites                                                                                                                                                                                                                                                                                               |



| Group | ID      | Recommendation                                                                                                                                                                                                                                                                          |
|-------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 16    | PA17    | Refine the current XP-SWMM model for the Foreshore Area Watershed to perform extended period (continuous) simulations. This will include compiling manhole rim data throughout the area; obtaining detailed cross section and profile survey of the creek; and surveying erosion sites. |
|       | PA24    | Generate improvement plan for erosion sites                                                                                                                                                                                                                                             |
| 17    | PE3     | Publicize stormwater pilot projects (cost should be included in each pilot project)                                                                                                                                                                                                     |
|       | PP1-PP6 | All pilot projects                                                                                                                                                                                                                                                                      |
| 18    | PE1     | Conduct a long term public education and outreach program                                                                                                                                                                                                                               |
|       | All     | All projects                                                                                                                                                                                                                                                                            |
| 19    | PE4     | Develop an annual stewardship award for the development community                                                                                                                                                                                                                       |
|       | All     | All projects                                                                                                                                                                                                                                                                            |



# SCHEDULE D

**Implementation Plan: Near-Term Period  
(1-5 years)**



## CAMPBELL RIVER INTEGRATED STORMWATER MANAGEMENT RECOMMENDED INITIATIVES (YEAR 1)

| ID   | Watershed Location | Category                 | Recommendation                                                                                                                                                                                                                                                                                                                            | Estimated Cost (Jan. 2007) | Estimated Ongoing Annual Cost (Jan. 2007) |
|------|--------------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------------|
| M1   | All                | Municipal Infrastructure | Prepare operations and maintenance schedule for stormwater system, incl street cleaning                                                                                                                                                                                                                                                   | \$ 5,000                   | \$ 5,000                                  |
| M2   | All                | Municipal Infrastructure | Upgrade existing catch basins with deeper sumps and trapping hoods                                                                                                                                                                                                                                                                        | \$2400/CB                  | \$240/CB                                  |
| M76  | Willow             | Municipal Infrastructure | Plant riparian vegetation at Georgia Park pond and pond outlet                                                                                                                                                                                                                                                                            | \$ 12,000                  | \$ -                                      |
| PA1  | All                | Planning & Analysis      | Develop evaluation and adaptive management program: conduct base flow monitoring (on-going) (manually-read ditch staff gauges - assume 10 total)                                                                                                                                                                                          | \$ 5,000                   | \$ 5,000                                  |
| PA2  | All                | Planning & Analysis      | Develop evaluation and adaptive management program: conduct continuous flow monitoring (one year minimum; 2 sites)                                                                                                                                                                                                                        | \$ 30,000                  | \$ 18,000                                 |
| PA3  | All                | Planning & Analysis      | Develop evaluation and adaptive management program: re-establish digital recording of continuous rainfall measurements at the airport rain gauge                                                                                                                                                                                          | \$ 2,000                   | \$ 1,500                                  |
| PA5  | All                | Planning & Analysis      | Develop evaluation and adaptive management program: establish long-term outfall water and sediment quality monitoring program (5 sites)                                                                                                                                                                                                   | \$ 2,000                   | \$ 10,000                                 |
| PA9  | All                | Planning & Analysis      | Obtain updated, detailed aerial contour mapping of area (supplemented by ground survey)                                                                                                                                                                                                                                                   | \$ 60,000                  | \$ -                                      |
| PA10 | All                | Planning & Analysis      | Enhance & update GIS database with information from new developments (soils, watercourse, etc)                                                                                                                                                                                                                                            | \$ -                       | \$ 10,000                                 |
| PA12 | Nunns              | Planning & Analysis      | Refine the current XP-SWMM model for the Nunns Creek Watershed to perform extended period (continuous) simulations. This will include compiling manhole rim data throughout the area; obtaining detailed cross section and profile survey of the creek; surveying erosion sites; and verifying connections to ERT ditches to Nunns Creek. | \$ 35,000                  | \$ -                                      |
| PA19 | Nunns              | Planning & Analysis      | Generate improvement plan for erosion sites                                                                                                                                                                                                                                                                                               | \$ 8,000                   | \$ -                                      |
| PA28 | Nunns              | Planning & Analysis      | Review and update 2004 recommendation to remove culvert on Nunns Creek at 16th Avenue; develop final scope of work for Nunns Creek Park area coordinated initiatives (E19, M47, M48, M51 & M60)                                                                                                                                           | \$ 25,000                  | \$ -                                      |
| PR1  | All                | Policy & Regulation      | Update MOU with DFO and MOE to include ISMPs.                                                                                                                                                                                                                                                                                             | \$ 5,000                   | \$ -                                      |
| PR2  | All                | Policy & Regulation      | Adopt a single, consistent 5-year level of service for minor conveyance systems                                                                                                                                                                                                                                                           | \$ -                       | \$ -                                      |
| PR3  | All                | Policy & Regulation      | Adopt performance targets for stormwater volume, peak and quality                                                                                                                                                                                                                                                                         | \$ -                       | \$ -                                      |
| PR4  | All                | Policy & Regulation      | Require specific stormwater quality treatment for all new commercial and industrial sites                                                                                                                                                                                                                                                 | \$ -                       | \$ -                                      |

## CAMPBELL RIVER INTEGRATED STORMWATER MANAGEMENT RECOMMENDED INITIATIVES (YEAR 1)

| ID   | Watershed Location | Category                    | Recommendation                                                                                                                                                               | Estimated Cost (Jan. 2007) | Estimated Ongoing Annual Cost (Jan. 2007) |
|------|--------------------|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------------|
| PR5  | All                | Policy & Regulation         | Require the use of LID techniques (where appropriate and feasible) for new development and adopt the City's draft "alternate design standards"                               | \$ -                       | \$ -                                      |
| PR7  | All                | Policy & Regulation         | Develop and adopt a stormwater user charge system to finance all aspects stormwater management                                                                               | \$ 50,000                  | \$ -                                      |
| PR8  | All                | Policy & Regulation         | Develop and adopt an Erosion and Sediment Control Bylaw                                                                                                                      | \$ 15,000                  | \$ -                                      |
| PR9  | All                | Policy & Regulation         | Update zoning bylaw to include maximum parking space and impervious area limits, encourage vegetation retention and native species plants, and encourage cluster development | \$ -                       | \$ -                                      |
| PR10 | All                | Policy & Regulation         | Develop and adopt a Pesticide Use Bylaw                                                                                                                                      | \$ 10,000                  | \$ -                                      |
| PR11 | All                | Policy & Regulation         | Develop and adopt a Tree Retention Bylaw                                                                                                                                     | \$ 10,000                  | \$ -                                      |
| PR12 | All                | Policy & Regulation         | Require use of deep sump catch basins with trapping hoods                                                                                                                    | \$ -                       | \$ -                                      |
| PR13 | All                | Policy & Regulation         | Review potential to implement ISO 14001 Environmental Management System                                                                                                      | \$ 10,000                  | \$ -                                      |
| PR14 | All                | Policy & Regulation         | Develop appropriate guidelines to incorporate global warming issues into stormwater systems design                                                                           | \$ 10,000                  | \$ -                                      |
| PE1  | All                | Public Education & Outreach | Conduct a long term public education and outreach program                                                                                                                    | \$ 10,000                  | \$ 3,000                                  |
| PE2  | All                | Public Education & Outreach | Prepare and distribute to builders an Erosion and Sediment Control Brochure                                                                                                  | \$ 6,000                   | \$ -                                      |
| PE4  | All                | Public Education & Outreach | Develop an annual stewardship award for the development community                                                                                                            | \$ 5,000                   | \$ 2,000                                  |

**\$ 315,000    \$ 54,500**

### Notes

1. Totals do not include costs associated with project M2.
2. Estimated ongoing annual costs are assumed to occur each year after the project is initiated.

## CAMPBELL RIVER INTEGRATED STORMWATER MANAGEMENT RECOMMENDED INITIATIVES (YEAR 2)

| ID   | Watershed Location | Category                       | Recommendation                                                                                                                                                                 | Estimated Cost (Jan. 2007) | Estimated Ongoing Annual Cost (Jan. 2007) |
|------|--------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------------|
| E19  | Nunns              | Env'l Protection & Enhancement | Perform instream boulder/LWD placement and gravel recruitment through Nunns Creek Park.                                                                                        | \$ 160,000                 | \$ 8,000                                  |
| E21  | Simms              | Env'l Protection & Enhancement | Perform instream Boulder/LWD placements and replace gravel downstream of Galerno Road culvert                                                                                  | \$ 100,000                 | \$ 5,000                                  |
| E22  | Simms              | Env'l Protection & Enhancement | Install flow deflectors/rock weirs as needed between South Alder Street and Hwy 19A                                                                                            | \$ 18,000                  | \$ 900                                    |
| M47  | Nunns              | Municipal Infrastructure       | Install water quality units at existing storm sewer outfalls from industrial/commercial area (Nunns Creek Park) (one of 4 sites).                                              | \$ 338,000                 | \$ 10,800                                 |
| M48  | Nunns              | Municipal Infrastructure       | Discovery Harbour Highway culvert replacement.                                                                                                                                 | \$ 100,000                 | \$ 10,800                                 |
| M51  | Nunns              | Municipal Infrastructure       | Replace culvert at 16th Avenue with open bottom arch culvert or bridge structure (Old Island Highway and Island Highway upgrades also recommended, but under MoT jurisdiction) | \$ 413,000                 | \$ 24,500                                 |
| M60  | Nunns              | Municipal Infrastructure       | Lower Nunns Creek sediment removal.                                                                                                                                            | \$ 7,000                   | \$ -                                      |
| M61  | Simms              | Municipal Infrastructure       | Mitigate / repair erosion at Galerno Road culvert outlet through construction of baffles, rip-rap, flow deflectors, bio-engineering, etc.                                      | \$ 38,000                  | \$ 1,500                                  |
| PA4  | All                | Planning & Analysis            | Develop evaluation and adaptive management program: establish long-term biophysical inventory program (at least 2 sites; 2 times per year)                                     | \$ 2,000                   | \$ 20,000                                 |
| PA18 | All                | Planning & Analysis            | Conduct an inventory of potential sources of pollutants from commercial and industrial uses ("hot-spot" study).                                                                | \$ 25,000                  | \$ -                                      |
| PA26 | Fore. A            | Planning & Analysis            | Downtown Flooding Study                                                                                                                                                        | \$ 60,000                  | \$ -                                      |
| PA27 | All                | Planning & Analysis            | Street Sweeping & Runoff Treatment Cost Effectiveness Study                                                                                                                    | \$ 100,000                 | \$ -                                      |

**SUB-TOTAL \$ 1,361,000 \$ 81,500**

**ONGOING ANNUAL COSTS  
(associated with Year 1 initiatives) \$ 54,500**

**TOTAL \$ 1,415,500**

### Notes

- Estimated ongoing annual costs are assumed to occur each year after the project is initiated.

## CAMPBELL RIVER INTEGRATED STORMWATER MANAGEMENT RECOMMENDED INITIATIVES (YEAR 3)

| ID   | Watershed Location | Category                       | Recommendation                                                                                                                                                                                                                                                                        | Estimated Cost (Jan. 2007) | Estimated Ongoing Annual Cost (Jan. 2007) |
|------|--------------------|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------------|
| E9   | Fore. A            | Env'l Protection & Enhancement | Develop foreshore rearing pond/wildlife habitat area supplied by groundwater seepage (Outfall DT19)                                                                                                                                                                                   | \$ 15,000                  | \$ 800                                    |
| M21  | Fore. A            | Municipal Infrastructure       | Construct water quality treatment system for Outfall DT 06 (priority habitat enhancement site)                                                                                                                                                                                        | \$ 411,000                 | \$ 3,400                                  |
| M23  | Fore. A            | Municipal Infrastructure       | Construct water quality treatment system for Outfall DT19 (priority habitat enhancement site)                                                                                                                                                                                         | \$ 255,000                 | \$ 2,000                                  |
| M28  | Fore. A            | Municipal Infrastructure       | Downtown flooding mitigation project (Cost unknown until study is completed)                                                                                                                                                                                                          | \$ 500,000                 | \$ 10,000                                 |
| M37  | Nunns              | Municipal Infrastructure       | Construct detention pond for existing development (Upper Catchment site)                                                                                                                                                                                                              | \$ 21,000                  | \$ 67,300                                 |
| M47  | Nunns              | Municipal Infrastructure       | Install water quality units at existing storm sewer outfalls from industrial/commercial area (Nunns Creek Park) (one of 4 sites).                                                                                                                                                     | \$ 338,000                 | \$ 10,800                                 |
| M75  | Willow             | Municipal Infrastructure       | Place riprap at Erikson Road crossing to stabilize erosion of road embankments                                                                                                                                                                                                        | \$ 10,000                  | \$ -                                      |
| PP1  | Any                | Pilot Projects                 | "Green" parking lot with pervious pavement, bioswales and/or rain gardens (best location in downtown) (10 stalls)                                                                                                                                                                     | \$ 50,000                  | \$ -                                      |
| PP2  | Any                | Pilot Projects                 | Roof Leader Disconnection Program (1 block area for 1 year)                                                                                                                                                                                                                           | \$ 12,000                  | \$ -                                      |
| PA13 | Willow             | Planning & Analysis            | Refine the current XP-SWMM model for the Willow Creek Watershed to perform extended period (continuous) simulations. This will include compiling manhole rim data throughout the area; obtaining detailed cross section and profile survey of the creek; and surveying erosion sites. | \$ 35,000                  | \$ -                                      |
| PA20 | Willow             | Planning & Analysis            | Generate improvement plan for erosion sites                                                                                                                                                                                                                                           | \$ 8,000                   | \$ -                                      |

**SUB-TOTAL \$ 1,655,000 \$ 94,300**

**ONGOING ANNUAL COSTS  
(associated with Year 1 initiatives) \$ 54,500**

**ONGOING ANNUAL COSTS  
(associated with Year 2 initiatives) \$ 81,500**

**TOTAL \$ 1,791,000**

### Notes

1. Estimated ongoing annual costs are assumed to occur each year after the project is initiated.

## CAMPBELL RIVER INTEGRATED STORMWATER MANAGEMENT RECOMMENDED INITIATIVES (YEAR 4)

| ID  | Watershed Location | Category                       | Recommendation                                                                                                                    | Estimated Cost (Jan. 2007) | Estimated Ongoing Annual Cost (Jan. 2007) |
|-----|--------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------------|
| E11 | Nunns              | Env'l Protection & Enhancement | Restore riparian structure downstream of storm drain outfalls at 2nd & 4th Aves                                                   | Needs further assessment   | \$ -                                      |
| M13 | CR/QR              | Municipal Infrastructure       | Construct water quality treatment system for Outfall CR4                                                                          | \$ 326,000                 | \$ 10,500                                 |
| M16 | CR/QR              | Municipal Infrastructure       | Construct water quality treatment system for Outfall CR6.5                                                                        | \$ 219,000                 | \$ 7,000                                  |
| M17 | CR/QR              | Municipal Infrastructure       | Construct water quality treatment system for Outfall CR7                                                                          | \$ 219,000                 | \$ 7,000                                  |
| M36 | Nunns              | Municipal Infrastructure       | Construct check dams / rock liners / downstream of 2nd Avenue and 4th Avenue outfalls (2 sites total)                             | \$ 61,000                  | \$ 3,100                                  |
| M47 | Nunns              | Municipal Infrastructure       | Install water quality units at existing storm sewer outfalls from industrial/commercial area (Nunns Creek Park) (one of 4 sites). | \$ 338,000                 | \$ 10,800                                 |
| PA7 | Nunns              | Planning & Analysis            | Investigate need for flow and erosion controls at storm drain outfalls at 2nd and 4th Streets                                     | \$ 5,000                   | \$ -                                      |

|                                                                  |                     |                  |
|------------------------------------------------------------------|---------------------|------------------|
| <b>SUB-TOTAL</b>                                                 | <b>\$ 1,168,000</b> | <b>\$ 38,400</b> |
| <b>ONGOING ANNUAL COSTS (associated with Year 1 initiatives)</b> | <b>\$ 54,500</b>    |                  |
| <b>ONGOING ANNUAL COSTS (associated with Year 2 initiatives)</b> | <b>\$ 81,500</b>    |                  |
| <b>ONGOING ANNUAL COSTS (associated with Year 3 initiatives)</b> | <b>\$ 94,300</b>    |                  |
| <b>TOTAL</b>                                                     | <b>\$ 1,398,300</b> |                  |

### Notes

1. Totals do not include costs identified as "needs further assessment".
2. Estimated ongoing annual costs are assumed to occur each year after the project is initiated.

## CAMPBELL RIVER INTEGRATED STORMWATER MANAGEMENT RECOMMENDED INITIATIVES (YEAR 5)

| ID  | Watershed Location | Category                 | Recommendation                                                                                                                    | Estimated Cost (Jan. 2007) | Estimated Ongoing Annual Cost (Jan. 2007) |
|-----|--------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------------|
| M24 | Fore. A            | Municipal Infrastructure | Construct water quality treatment system for Outfall DT20                                                                         | \$ 333,000                 | \$ 2,700                                  |
| M27 | Fore. A            | Municipal Infrastructure | Construct water quality treatment system for Outfall DT31                                                                         | \$ 411,000                 | \$ 3,400                                  |
| M47 | Nunns              | Municipal Infrastructure | Install water quality units at existing storm sewer outfalls from industrial/commercial area (Nunns Creek Park) (one of 4 sites). | \$ 338,000                 | \$ 10,800                                 |
| PP4 | Any                | Pilot Projects           | Sustainable street pilot project including porous pavement and other LID techniques (1 block)                                     | \$ 500,000                 | \$ -                                      |

**SUB-TOTAL \$ 1,582,000 \$ 16,900**

**ONGOING ANNUAL COSTS  
(associated with Year 1 initiatives) \$ 54,500**

**ONGOING ANNUAL COSTS  
(associated with Year 2 initiatives) \$ 81,500**

**ONGOING ANNUAL COSTS  
(associated with Year 3 initiatives) \$ 94,300**

**ONGOING ANNUAL COSTS  
(associated with Year 4 initiatives) \$ 38,400**

**TOTAL \$ 1,850,700**

### Notes

- Estimated ongoing annual costs are assumed to occur each year after the project is initiated.



# SCHEDULE E

**Implementation Plan: Mid-Term Period  
(6-10 years)**



## CAMPBELL RIVER INTEGRATED STORMWATER MANAGEMENT RECOMMENDED INITIATIVES (6-10 YEARS)

| ID  | Watershed Location | Category                       | Recommendation                                                                                                                                                                   | Estimated Cost (Jan. 2007) | Estimated Ongoing Annual Cost (Jan. 2007) |
|-----|--------------------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------------|
| E7  | Fore. A            | Env'l Protection & Enhancement | Infill riprap with fines/soil and plant with native species to accelerate recolonization of high foreshore riprap (12 outfalls - DT01, 04, 05 & 08; OG 01 thru 04; SW06 thru 09) | \$ 18,000                  | \$ 900                                    |
| E28 | Willow             | Env'l Protection & Enhancement | Construct backwater channel off Larwood Creek tributary downstream of Erickson Road                                                                                              | \$ 55,000                  | \$ 2,800                                  |
| E29 | Willow             | Env'l Protection & Enhancement | Increase baseflows to Larwood Crk through the splitter at Larwood St; construct small ponds / wetland features along north branch of Larwood Creek tributary                     | \$ 445,000                 | \$ 22,300                                 |
| M10 | CR/QR              | Municipal Infrastructure       | Construct water quality treatment system for Outfall CR1                                                                                                                         | \$ 113,000                 | \$ 3,600                                  |
| M11 | CR/QR              | Municipal Infrastructure       | Construct water quality treatment system for Outfall CR2                                                                                                                         | \$ 135,000                 | \$ 4,300                                  |
| M12 | CR/QR              | Municipal Infrastructure       | Construct water quality treatment system for Outfall CR3                                                                                                                         | \$ 113,000                 | \$ 3,600                                  |
| M14 | CR/QR              | Municipal Infrastructure       | Construct water quality treatment system for Outfall CR5                                                                                                                         | \$ 113,000                 | \$ 3,600                                  |
| M15 | CR/QR              | Municipal Infrastructure       | Construct water quality treatment system for Outfall CR6                                                                                                                         | \$ 113,000                 | \$ 3,600                                  |
| M18 | CR/QR              | Municipal Infrastructure       | Construct water quality treatment system for Outfall CR8                                                                                                                         | \$ 113,000                 | \$ 3,600                                  |
| M22 | Fore. A            | Municipal Infrastructure       | Construct water quality treatment system for Outfall DT04/05 (priority habitat enhancement site)                                                                                 | \$ 142,000                 | \$ 1,200                                  |
| M25 | Fore. A            | Municipal Infrastructure       | Construct water quality treatment system for Outfall DT25                                                                                                                        | \$ 227,000                 | \$ 1,900                                  |
| M26 | Fore. A            | Municipal Infrastructure       | Construct water quality treatment system for Outfall DT27                                                                                                                        | \$ 191,000                 | \$ 1,500                                  |
| M38 | Nunns              | Municipal Infrastructure       | Construct detention pond for existing development (Middle Catchment site; Evergreen alternate)                                                                                   | \$ 14,000                  | \$ 46,200                                 |
| M74 | Willow             | Municipal Infrastructure       | Install diversion structures to maintain base flows in Larwood Creek tributary                                                                                                   | \$ 10,000                  | \$ -                                      |
| PP3 | All                | Pilot Projects                 | Shallow infiltration trenches in existing roadside ditches west of Nunns Creek (1 block)                                                                                         | \$ 40,000                  | \$ -                                      |
| PP5 | Any                | Pilot Projects                 | Install a stormwater deep infiltration well and monitor performance (1 location for 2 years)                                                                                     | \$ 60,000                  | \$ -                                      |
| PP6 | Any                | Pilot Projects                 | Undertake a native planting program with private landowners within riparian corridor (100 m corridor)                                                                            | \$ 20,000                  | \$ -                                      |
| PA6 | All                | Planning & Analysis            | Develop evaluation and adaptive management program: initiate soils property verification program, including test pits (10 pits first year; 5 per year thereafter)                | \$ 5,000                   | \$ 2,500                                  |

## CAMPBELL RIVER INTEGRATED STORMWATER MANAGEMENT RECOMMENDED INITIATIVES (6-10 YEARS)

| ID   | Watershed Location | Category            | Recommendation                                                                                                                                                                                                                                                                                        | Estimated Cost (Jan. 2007) | Estimated Ongoing Annual Cost (Jan. 2007) |
|------|--------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------------|
| PA8  | All                | Planning & Analysis | Undertake a wetlands inventory (historical location, extent, etc.) and prepare wetland management plan                                                                                                                                                                                                | \$ 75,000                  | \$ -                                      |
| PA14 | Simms              | Planning & Analysis | Refine the current XP-SWMM model for the Simms Creek Watershed to perform extended period (continuous) simulations. This will include compiling manhole rim data throughout the area; obtaining detailed cross section and profile survey of the creek; and surveying erosion sites.                  | \$ 35,000                  | \$ -                                      |
| PA15 | CR/QR              | Planning & Analysis | Refine the current XP-SWMM model for the Campbell River/Quinsam River Watershed to perform extended period (continuous) simulations. This will include compiling manhole rim data throughout the area; obtaining detailed cross section and profile survey of the creek; and surveying erosion sites. | \$ 35,000                  | \$ -                                      |
| PA21 | Simms              | Planning & Analysis | Generate improvement plan for erosion sites                                                                                                                                                                                                                                                           | \$ 8,000                   | \$ -                                      |
| PA22 | CR/QR              | Planning & Analysis | Generate improvement plan for erosion sites                                                                                                                                                                                                                                                           | \$ 8,000                   | \$ -                                      |
| PA29 | Nunns              | Planning & Analysis | Update Nunns Creek ISMP (6 year cycle)                                                                                                                                                                                                                                                                | \$ 5,000                   | \$ -                                      |
| PA30 | Willow             | Planning & Analysis | Update Willow Creek ISMP (6 year cycle)                                                                                                                                                                                                                                                               | \$ 5,000                   | \$ -                                      |
| PR6  | All                | Policy & Regulation | Update draft OCP document to: ensure land uses indicated within Agricultural Land Reserve lands are appropriate; and include measurable targets for preserving tree cover and limiting impervious area.                                                                                               | \$ -                       | \$ -                                      |

|                                                                                              |                     |                   |
|----------------------------------------------------------------------------------------------|---------------------|-------------------|
| <b>TOTAL</b>                                                                                 | <b>\$ 2,098,000</b> | <b>\$ 101,600</b> |
| <b>ONGOING ANNUAL COSTS OVER 5 YEARS</b><br><b>(associated with Year 1 initiatives)</b>      | <b>\$ 272,500</b>   |                   |
| <b>ONGOING ANNUAL COSTS OVER 5 YEARS</b><br><b>(associated with Year 2 initiatives)</b>      | <b>\$ 407,500</b>   |                   |
| <b>ONGOING ANNUAL COSTS OVER 5 YEARS</b><br><b>(associated with Year 3 initiatives)</b>      | <b>\$ 471,500</b>   |                   |
| <b>ONGOING ANNUAL COSTS OVER 5 YEARS</b><br><b>(associated with Year 4 initiatives)</b>      | <b>\$ 192,000</b>   |                   |
| <b>ONGOING ANNUAL COSTS OVER 5 YEARS</b><br><b>(associated with Year 5 initiatives)</b>      | <b>\$ 84,500</b>    |                   |
| <b>ONGOING ANNUAL COSTS OVER 5 YEARS</b><br><b>(associated with Years 6 -10 initiatives)</b> | <b>\$ 254,000</b>   |                   |
| <b>TOTAL</b>                                                                                 | <b>\$ 3,780,000</b> |                   |
| <b>AVERAGE ANNUAL COSTS</b>                                                                  | <b>\$ 756,000</b>   |                   |

## Notes

- For Years 1 through 5, estimated ongoing annual costs are assumed to occur the year after the project is initiated.
- To provide an estimate of ongoing annual costs associated with projects initiated in Years 6 through 10, it is assumed that ongoing costs occur midway through the 5 year time period. Therefore, ongoing costs for each initiative are multiplied by 2.5.



# SCHEDULE F

**Implementation Plan: Long-Term Period  
( >10 years)**

## CAMPBELL RIVER INTEGRATED STORMWATER MANAGEMENT RECOMMENDED INITIATIVES (>10 YEARS or "As Opportunities Arise")

| ID  | Watershed Location | Category                       | Recommendation                                                                                                                                                       | Estimated Cost (Jan. 2007) | Estimated Ongoing Annual Cost (Jan. 2007) |
|-----|--------------------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------------|
| E1  | CR/QR              | Env'l Protection & Enhancement | Restore or reroute groundwater flows into existing Island Hwy rearing channel                                                                                        | \$ 8,000                   | \$ 400                                    |
| E2  | CR/QR              | Env'l Protection & Enhancement | Improve East Fork HBKC channel into Pease Marsh                                                                                                                      | \$ 5,000                   | \$ 300                                    |
| E3  | CR/QR              | Env'l Protection & Enhancement | Reconstruct perched forest road culvert at logging road 650 m u/s of east/west fork HBKC confluence                                                                  | \$ 15,000                  | \$ 800                                    |
| E4  | CR/QR              | Env'l Protection & Enhancement | Assess functioning of the diversion/bifurcation structure on HBKC; make adjustments as required                                                                      | \$ 5,000                   | \$ 300                                    |
| E5  | CR/QR              | Env'l Protection & Enhancement | Restore riparian corridor through Sequoia Springs Golf Course                                                                                                        | \$ 9,000                   | \$ 500                                    |
| E6  | CR/QR              | Env'l Protection & Enhancement | Remove debris and garbage in channel at culvert immediately d/s of the forestry road crossing (HBKC forestry road)                                                   | \$ 2,000                   | \$ 100                                    |
| E8  | Fore. A            | Env'l Protection & Enhancement | Enhance plunge pool and channel at Outfall DT13                                                                                                                      | \$ 7,000                   | \$ 400                                    |
| E10 | Fore. A            | Env'l Protection & Enhancement | Enhance upper foreshore channels (2 outfalls - OC06 & SW07)                                                                                                          | \$ 7,000                   | \$ 400                                    |
| E12 | Nunns              | Env'l Protection & Enhancement | Mitigate erosion in Evergreen Road ditch with riffle / pools, riprap and bioengineering                                                                              | \$ 40,000                  | \$ 2,000                                  |
| E13 | Nunns              | Env'l Protection & Enhancement | Consolidate Willis Road ditches into one swale / ditch system in conjunction with road widening program; lower driveway culverts as needed; enhance instream habitat | \$ 135,000                 | \$ 6,800                                  |
| E14 | Nunns              | Env'l Protection & Enhancement | Realign existing channel (currently on private lands) through better quality habitat along Petersen Road and Merecroft Road right-of-ways                            | \$ 410,000                 | \$ 20,500                                 |
| E15 | Nunns              | Env'l Protection & Enhancement | Install detention//treatment feature at Trask and Merecroft                                                                                                          | Needs further assessment   | \$ -                                      |
| E16 | Nunns              | Env'l Protection & Enhancement | Install culvert at Trask Road crossing, rebuild wetland pond outlet, repair channels and replant riparian habitat with native species                                | \$ 135,000                 | \$ 6,800                                  |
| E17 | Nunns              | Env'l Protection & Enhancement | Add ponds / rock weirs to ditch above Evergreen Road; plant with native vegetation                                                                                   | \$ 95,000                  | \$ 4,800                                  |
| E18 | Nunns              | Env'l Protection & Enhancement | Install check dams in ditch system at Pinecrest Road / Petersen Road; plant with native vegetation                                                                   | \$ 13,000                  | \$ 700                                    |
| E20 | Nunns              | Env'l Protection & Enhancement | Install riparian planting and boulder/gravel recruitment in Nunns Crk West Arm near Willis Road                                                                      | Needs further assessment   | \$ -                                      |
| E23 | Simms              | Env'l Protection & Enhancement | Place wood/rock weirs and install riparian planting in existing wetland at South McPhedran Rd                                                                        | \$ 30,000                  | \$ 1,500                                  |

## CAMPBELL RIVER INTEGRATED STORMWATER MANAGEMENT RECOMMENDED INITIATIVES (>10 YEARS or "As Opportunities Arise")

| ID  | Watershed Location | Category                       | Recommendation                                                                                                                                                                             | Estimated Cost (Jan. 2007) | Estimated Ongoing Annual Cost (Jan. 2007) |
|-----|--------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------------|
| E24 | Simms              | Env'l Protection & Enhancement | Install wood/rock weirs to enhance wetlands west of Inland Island Highway                                                                                                                  | \$ 25,000                  | \$ -                                      |
| E25 | Simms              | Env'l Protection & Enhancement | Redirect ditches on Inland Island Highway to adjacent wetlands (where possible), install check dams and plant vegetation                                                                   | \$ 100,000                 | \$ 5,000                                  |
| E26 | Simms              | Env'l Protection & Enhancement | Regrade ditch behind Springbok Road; install check dams and plantings; install culvert at trail crossing; expand pond and install appropriate outlet structure with path to creek          | \$ 35,000                  | \$ 1,800                                  |
| E27 | Willow             | Env'l Protection & Enhancement | Restore riparian areas along ditches and wetland complexes near airport by fill planting with native species                                                                               | \$ 95,000                  | \$ -                                      |
| E30 | Willow             | Env'l Protection & Enhancement | Reconstruct rock weirs and add gravels to Willow Crk upstream of Erickson Rd                                                                                                               | \$ 75,000                  | \$ -                                      |
| E31 | HH/PR              | Env'l Protection & Enhancement | Widen, deepen, complex and consolidate ditches along Woodburn and Spring Rds; re-activate remnant pond as a detention structure on Woodburn road; plant riparian areas with native species | \$ 330,000                 | \$ 16,500                                 |
| E32 | HH/PR              | Env'l Protection & Enhancement | Improve inlet of Holly Hills/Woodburn culvert into Baikie Slough; perform instream complexing upstream of culvert                                                                          | \$ 8,000                   | \$ 400                                    |
| E33 | HH/PR              | Env'l Protection & Enhancement | Upgrade or modify culvert at Vallejo & Woodburn Rds for fish passage                                                                                                                       | \$ 10,000                  | \$ 500                                    |
| E34 | HH/PR              | Env'l Protection & Enhancement | Install instream habitat improvements to Vanstone Channel in Perkins and Perth Rds area                                                                                                    | Needs further assessment   | \$ -                                      |
| E35 | All                | Env'l Protection & Enhancement | Revegetate and enhance ditches wherever possible (in conjunction on-going work)                                                                                                            | \$30-\$365/M               | \$ -                                      |
| M19 | CR/QR              | Municipal Infrastructure       | Upgrade storm drains, 14th Ave from Spruce St to Redwood St (165 m)                                                                                                                        | \$ 245,000                 | \$ 2,200                                  |
| M20 | CR/QR              | Municipal Infrastructure       | Upgrade storm drains, Redwood St from 14th Ave to 19th Ave (516 m)                                                                                                                         | \$ 1,144,000               | \$ 9,600                                  |
| M29 | Fore. A            | Municipal Infrastructure       | Upgrade storm drains, 2nd Ave from upper end to Thulin St (436 m)                                                                                                                          | \$ 442,000                 | \$ 4,100                                  |
| M30 | Fore. A            | Municipal Infrastructure       | Upgrade storm drains, Alder St to Evergreen St to McLean St (189 m)                                                                                                                        | \$ 186,000                 | \$ 1,500                                  |
| M31 | Fore. A            | Municipal Infrastructure       | Upgrade storm drains, Cormorant Rd and Albotross Cr. Area (354 m)                                                                                                                          | \$ 368,000                 | \$ 3,400                                  |
| M32 | Fore. A            | Municipal Infrastructure       | Upgrade storm drains, Eardly Rd and Dino Rd (45 m)                                                                                                                                         | \$ 45,000                  | \$ 500                                    |
| M33 | Fore. A            | Municipal Infrastructure       | Upgrade storm drains, Homewood Rd south of Maple St (423 m)                                                                                                                                | \$ 783,000                 | \$ 6,600                                  |

**CAMPBELL RIVER INTEGRATED STORMWATER MANAGEMENT  
RECOMMENDED INITIATIVES (>10 YEARS or "As Opportunities Arise")**

| ID   | Watershed Location                | Category                 | Recommendation                                                        | Estimated Cost (Jan. 2007) | Estimated Ongoing Annual Cost (Jan. 2007) |
|------|-----------------------------------|--------------------------|-----------------------------------------------------------------------|----------------------------|-------------------------------------------|
| M34  | Fore. A                           | Municipal Infrastructure | Upgrade storm drains, So Alder St, Frances Ave to Marina Blvd (202 m) | \$ 200,000                 | \$ 1,900                                  |
| M35  | Fore. A                           | Municipal Infrastructure | Upgrade storm drains, Thulin St and 6th Ave (81 m)                    | \$ 90,000                  | \$ 900                                    |
| M52  | Nunns                             | Municipal Infrastructure | Upgrade storm drains, 4th Ave east of Dogwood St (123 m)              | \$ 122,000                 | \$ 1,000                                  |
| M53  | Nunns                             | Municipal Infrastructure | Upgrade storm drains, 9th Ave west of Maple Rd (69 m)                 | \$ 68,000                  | \$ 700                                    |
| M54  | Nunns                             | Municipal Infrastructure | Upgrade storm drains, Dogwood St south of Pinecrest Rd (92 m)         | \$ 91,000                  | \$ 900                                    |
| M55  | Nunns                             | Municipal Infrastructure | Upgrade storm drains, Greenwood Rd from 9th to 10th Aves (257 m)      | \$ 312,000                 | \$ 2,700                                  |
| M56  | Nunns                             | Municipal Infrastructure | Upgrade storm drains, Hemlock St & 10th Avenue area (145 m)           | \$ 176,000                 | \$ 1,700                                  |
| M57  | Nunns                             | Municipal Infrastructure | Upgrade storm drains, Ironwood Rd south of 14th Ave (231 m)           | \$ 402,000                 | \$ 3,400                                  |
| M58  | Nunns                             | Municipal Infrastructure | Upgrade storm drains, Munson Rd south of 2nd Ave (300 m)              | \$ 364,000                 | \$ 3,100                                  |
| M59  | Nunns                             | Municipal Infrastructure | Upgrade storm drains, Trask & Merecroft Rds (10 m)                    | \$ 12,000                  | \$ 200                                    |
| M66  | Simms                             | Municipal Infrastructure | Upgrade storm drains, So McPhedran Rd and Cortez Rd (245 m)           | \$ 236,000                 | \$ 2,000                                  |
| M67  | Simms                             | Municipal Infrastructure | Upgrade storm drains, So Dogwood St and Cortez Rd (122 m)             | \$ 148,000                 | \$ 1,200                                  |
| M77  | Willow                            | Municipal Infrastructure | Upgrade storm drains, at Nature Park Dr (28 m)                        | \$ 31,000                  | \$ 300                                    |
| M78  | Willow                            | Municipal Infrastructure | Upgrade storm drains, Milford Rd, south of Goodwin Rd (261 m)         | \$ 259,000                 | \$ 2,400                                  |
| M79  | Willow                            | Municipal Infrastructure | Upgrade storm drains, Soderholm Rd, Bartlett to Harrogate Rd (233 m)  | \$ 231,000                 | \$ 2,200                                  |
| PA11 | Nunns, Simms and Willow;<br>CR/QR | Planning & Analysis      | Prepare a beaver management plan                                      | \$ 10,000                  | \$ -                                      |

### CAMPBELL RIVER INTEGRATED STORMWATER MANAGEMENT RECOMMENDED INITIATIVES (>10 YEARS or "As Opportunities Arise")

| ID   | Watershed Location | Category            | Recommendation                                                                                                                                                                                                                                                                                    | Estimated Cost (Jan. 2007) | Estimated Ongoing Annual Cost (Jan. 2007) |
|------|--------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------------|
| PA16 | HH/PR              | Planning & Analysis | Refine the current XP-SWMM model for the Holly Hills/Perkins Road Watershed to perform extended period (continuous) simulations. This will include compiling manhole rim data throughout the area; obtaining detailed cross section and profile survey of the creek; and surveying erosion sites. | \$ 35,000                  | \$ -                                      |
| PA17 | Fore. A            | Planning & Analysis | Refine the current XP-SWMM model for the Foreshore Area Watershed to perform extended period (continuous) simulations. This will include compiling manhole rim data throughout the area; obtaining detailed cross section and profile survey of the creek; and surveying erosion sites.           | \$ 35,000                  | \$ -                                      |
| PA23 | HH/PR              | Planning & Analysis | Generate improvement plan for erosion sites                                                                                                                                                                                                                                                       | \$ 8,000                   | \$ -                                      |
| PA24 | Fore. A            | Planning & Analysis | Generate improvement plan for erosion sites                                                                                                                                                                                                                                                       | \$ 8,000                   | \$ -                                      |
| PA25 | HH/PR              | Planning & Analysis | Vanstone channel study to enhance anadromous fish habitat, including bypassing the existing long culvert that serves as a barrier and to establish compensation or mitigation banking area                                                                                                        | \$ 25,000                  | \$ -                                      |
| PA31 | Simms              | Planning & Analysis | Update Simms Creek ISMP (6 year cycle)                                                                                                                                                                                                                                                            | \$ 5,000                   | \$ -                                      |
| PA32 | CR/QR              | Planning & Analysis | Update Campbell River / Quinsam River ISMP (6 year cycle)                                                                                                                                                                                                                                         | \$ 5,000                   | \$ -                                      |
| PA33 | HH/PR              | Planning & Analysis | Update Holly Hills / Perkins Road ISMP (6 year cycle)                                                                                                                                                                                                                                             | \$ 5,000                   | \$ -                                      |
| PA34 | Fore. A            | Planning & Analysis | Update Foreshore Area ISMP (6 year cycle)                                                                                                                                                                                                                                                         | \$ 5,000                   | \$ -                                      |

**TOTAL \$ 7,690,000 \$ 123,000**

#### Notes

1. Totals do not include costs associated with project E35 or for projects with costs identified as "needs further assessment".
2. Estimated ongoing annual costs are assumed to occur each year after the project is initiated.
3. Environmental initiatives can be advanced at any time, as funding becomes available and/or opportunity arises.



# SCHEDULE G

## DCC Projects with Undetermined Timing



## CAMPBELL RIVER INTEGRATED STORMWATER MANAGEMENT DCC PROJECTS - TIMING UNDETERMINED

| ID           | Watershed Location | Category                 | Recommendation                                                                              | 0-5 Years | 6-10 Years | > 10 Years | Estimated Cost (Jan. 2007) | Estimated Ongoing Annual Cost (Jan. 2007) |
|--------------|--------------------|--------------------------|---------------------------------------------------------------------------------------------|-----------|------------|------------|----------------------------|-------------------------------------------|
| M40          | Nunns              | Municipal Infrastructure | Construct detention pond for future development - 4th Ave / Nunns Creek site                | 0         | 0          | 0          | \$ 690,000                 | \$ 41,500                                 |
| M44          | Nunns              | Municipal Infrastructure | Construct new trunk sewer for future development, ERT to Campbell River (2200 m)            | 0         | 0          | 0          | \$ 28,000                  | \$ 22,500                                 |
| M45          | Nunns              | Municipal Infrastructure | Construct new trunk sewer for future development, Evergreen Rd to Nunns Crk SW Arm (1400 m) | 0         | 0          | 0          | \$ 18,000                  | \$ 14,300                                 |
| M46          | Nunns              | Municipal Infrastructure | Construct new trunk sewer for future development, Willis Rd to Nunns Crk West Arm (950 m)   | 0         | 0          | 0          | \$ 12,000                  | \$ 9,700                                  |
| M49          | Nunns              | Municipal Infrastructure | Construct detention pond - Willis Road (east detention facility)                            | 0         | 0          | 0          | \$ 840,000                 | \$ 39,900                                 |
| M50          | Nunns              | Municipal Infrastructure | Construct detention pond - Willis Road (west detention facility)                            | 0         | 0          | 0          | \$ 26,000                  | \$ 81,900                                 |
| <b>TOTAL</b> |                    |                          |                                                                                             |           |            |            | <b>\$ 1,614,000</b>        | <b>\$ 209,800</b>                         |

### Notes

1. This table lists DCC projects for which construction timing has not yet been determined. Six other DCC projects have been given recommended construction years and are included in the relevant tables.
2. Estimated ongoing annual costs are assumed to occur each year after the project is initiated.