



C·V·R·D

ENVIRONMENT COMMISSION

JUNE 7, 2010

6:00 PM – CVRD Board

AGENDA

	PAGES
1. <u>APPROVAL OF AGENDA:</u>	1-2
2. <u>ADOPTION OF MINUTES:</u>	
M1 Adoption of minutes of Environment Commission from April 15, 2010	3-6
3. <u>BUSINESS ARISING FROM THE MINUTES:</u>	
B1 Environment Commission State of the Environment presentation to the CVRD Board	Verbal
B2 Environment Commission Proposed 2010/11 Work Plan	Verbal
B3 Ecostravaganza Fair feedback and report card	7
4. <u>NEW BUSINESS:</u>	
NB1 Policy on Grant funding and sponsorships	8
NB2 Cowichan-Koksilah Integrated Flood Management Plan	9-26
5. <u>CORRESPONDENCE:</u>	
C1 Email from Dave Polster re Floodplain Management	27
6. <u>INFORMATION:</u>	
IN1 CEEI community GHG Emissions Report	28-37
IN2 Engineering Department New Smart Car	Verbal
IN3 CVRD Environmental Lens Implementation update	Verbal
IN4 2010 Budget Decision report	38
7. <u>NEXT MEETING:</u> June 17, 2010 or tba	
8. <u>ADJOURNMENT:</u>	

Distribution:

CVRD Director Gerry Giles (Chair)
Roger Wiles
Peter Keber
Chris Wood
Dave Polster
CVRD Director Phil Kent
CVRD Director Rob Hutchins
CVRD Director Lori Iannidinaro

Rodger Hunter (Co-Chair)
Kevin Visscher
Bruce Sampson
Bruce Fraser
Justin Straker
Judy Stafford
Larry George, Cowichan Tribes
John Morris, Economic Development Rep

As Well As Full Agenda:

Director T. Walker
Warren Jones, CAO, CVRD
Brian Dennison, General Manager, Engineering and Environment Services
Kate Miller, Manager, Regional Environmental Policy Division

Full Agenda as Hard Copy

Director M. Marcotte
Director I. Morrison
Director L. Duncan

Agenda Cover Only:

Director G. Seymour
Director K. Kuhn
Director M. Dorey
Director B. Harrison
Tom Anderson, Manager, Planning and Development Services

Director T. McGonigle
Director D. Haywood
Director K. Cossey
Paul Fletcher

ENVIRONMENT COMMISSION MINUTES – APRIL 15, 2010

Minutes of the regular meeting of the ENVIRONMENT COMMISSION held in the CVRD Boardroom, 175 Ingram Street, Duncan, on April 15, 2010 at 6:00 pm.

PRESENT: Rodger Hunter, Chair Director Giles
 Director Hutchins Dave Polster
 Bruce Fraser Roger Wiles
 Bruce Sampson Justin Straker
 Judy Stafford Pete Keber
 Kevin Visscher Chris Wood
 John Morris Larry George

ALSO Kate Miller, Manager, Regional Environmental Policy

PRESENT: Dyan Freer, Recording Secretary

ABSENT: Director Kent, Director Iannidinardo, Brian Dennison

**APPROVAL
OF AGENDA**

It was moved and seconded that the agenda be approved with the following additions: correspondence from Peter Nix and Jean Crowder, information on the Sustainable Community conference in Kelowna, and ideas for upcoming presenters.

MOTION CARRIED

**ADOPTION
OF MINUTES**

It was moved and seconded that the minutes of the March 18, 2010 Environment Commission meeting be adopted.

MOTION CARRIED

**CO-CHAIR'S
REPORT**

CR1 Announcing John Morris has been appointed the member of the Economic Development Commission serving as the representative to this commission.

Directors Hutchins and Giles left the meeting at 6:30 pm
Bruce Sampson offered to speak to the Chief Financial Officer about future cost savings related to full cost accounting/life cycle costing.

2. **Agricultural Committee** – Pete Keber noted that the Agricultural Committee will present the plan on May 4th to the Electoral Services Committee. The planning team hopes to form a committee to head up and implement the 72 actions in the plan.

- B1 It was moved and seconded to pay \$50 to have a booth at Ecostravaganza on June 5th in Mill Bay.**

MOTION CARRIED

Commission members have offered to man the booth - Chris and Rob will do first two hours plus set up from 10 am to noon; Gerry and Kevin from 12 – 2 pm; and Pete and Phil 2 - 4 pm. We will showcase a summary of the State of the Environment Report. Gerry will coordinate with Engineering to see if they would like to showcase composters and recycling information. Chris will prepare a one – two pager outlining the highlights.

- B2** Planning has been done for the Sustainability Modeling Workshop to take place April 16th in the CVRD Board Room, with speakers on the Quest model and clean energy act. A demonstration of the MetroQuest tool will show how CVRD can make sustainability planning decisions. Agenda was distributed. Several board members have registered.

- B3 State of the Environment Draft Report** - working draft distributed and update was given by Justin Straker. Time line is to finish the technical review and the final report will be ready by end of next week. Formatting the report (300 pages) will be done but more financing needed for additional formatting and copying. Discussion ensued.

\$5000 Formatting and copies of the SoE and Communication Strategy – after presentation to the board end of May

\$500 Dinner and presentation of report before board meeting with interested leaders who will champion this report.

Kate and/or Dyan will look into purchasing flash drives as a means of distributing the report.

It was moved and carried to allocate funding of \$5000 to finish the State of Environment report and make roughly 20 bound copies; and furthermore to allocate \$500 to bring interested people together to kick-off of this report.

MOTION CARRIED

It was moved and seconded that a presentation of the State of Environment report be made to the Regional Services Committee on May 26, 2010.

MOTION CARRIED

It will be put on next agenda for the commission to finalize.

B4 Commission Work Plan and Budget. Discussion ensued.

It was moved and seconded that Commission members will form work groups and invite the general public to join in them to give input and help implement the approaches for continuing the work of the Environment Commission.

MOTION CARRIED

CORRESPONDENCE

CR1 Letter to our Environment Commission Chair dated April 7, 2010, from Judy Stafford of the Cowichan Green Community, representing the Cowichan Earth Day Planning Committee, asking for \$1000 to support staging the event “Earth Day” taking place on April 24th, 2010, in Charles Hoey Park, Duncan.

8:23 pm Judy Stafford excused herself due to a possible perception of conflict of interest.

It was moved and seconded to approve the request for the CVRD Environment Commission to be a sponsor of Earth Day on April 24, 2010, at the Charles Hoey Park in the amount of \$1000 and therefore, there is an opportunity to have a booth and/or a presence at the Earth Day event.

MOTION CARRIED

8:40 pm Judy Stafford returned to meeting.

It was moved and seconded to ask staff to develop

- i. a policy on requests to the Environment Commission for funding, and**
- ii. a policy on conflict of interest, and**
- iii. to prepare a framework for how budget requests should be made.**

MOTION CARRIED

We need to develop a policy on sponsorship. Should we be a granting agency? Discussion ensued and will be continued next meeting.

CR2 Letter from Peter Nix to Gerry Giles dated March 24, 2010 requesting support.

It was suggested to write a letter to Peter Nix saying we are working on a policy on funding; as well we are working on our 2010 budget and haven't delegated the funds at this time, and to also encourage him to become part of one of our future committees.

CR3 Letter from Jean Crowder to encourage us to be part of our local Earth Day events.

INFORMATION

IN1 Sustainability and Sewage tour – April 28th. If interested, people need to sign up themselves.

IN2 Sustainable Communities Conference in Kelowna Nov 15 – 18, 2010

IN3 Possible ideas for presenters for this year are: Bruce Fraser on Forestry Practices, Social Planning Cowichan on Environment and the Nature Conservancy.

NEXT MEETING

May 20, 2010 Focus of the meeting will be the State of the Environment report.

ADJOURNMENT

It was moved and seconded that the meeting be adjourned.

MOTION CARRIED

The meeting adjourned at 9:10 pm.

Chair

Recording Secretary

Dated: _____

2010 state of the environment

A FIRST REPORT CARD

How's our environment doing?

Cowichan residents care deeply about their environment, but until now have had no way of truly understanding how it is doing, or whether things are getting better or worse.

To fill this knowledge gap, the Cowichan Valley Regional District (CVRD) Environment Commission asked qualified experts to review the health of our region's air, water, local food supply, diverse natural ecology and resilience to climate change.

We're pleased to announce that the 2010 Cowichan Region State of the Environment Report is now available online at www.12things.ca, or at www.cvrld.bc.ca.

This report will be updated from time to time, so we can all measure the progress we're making toward becoming an environmentally secure, sustainable and resilient community.

Here is a quick summary of the State of Environment Report's findings. The report essentially asks the question: "How is our environment doing?" If this was a school report card, the teacher's reply would be:

"Cowichan shows great promise but needs to work harder in almost every area, with extra effort strongly recommended in a few critical areas."



12 big ideas for a strong, resilient community



00 07

You can't manage if you don't measure.

2010 state of the environment

A FIRST REPORT CARD

GUIDE TO GRADING:



= generally good, with some concerns.



= needs work, but showing effort.



= needs attention now!

OVERALL 'ENVIRONMENTAL FOOTPRINT'



Settlement (including agriculture and logging) has impacted more than 75% of our landscape. Natural shorelines are disappearing fast. Protected areas, at less than 8% of the CVRD, are well below recommended levels.

POPULATION AND GROWTH



Lifestyle amenities attract newcomers, but our low-density settlement pattern increases reliance on personal vehicles, makes 'smart growth' hard to achieve, and threatens many waterways.

BIODIVERSITY



Despite a few bright spots (chum salmon returns are the highest in decades) many key assets like fall coho and chinook runs, and Garry Oak, coastal Douglas-fir and wetland ecosystems, are at risk.

AGRICULTURE



Farming thrives in the Cowichan and has potential to reach the goal of regional food security. Ongoing challenges include seasonal water availability, labour shortages and high land costs.

WATER



In general, our water is clean and abundant. But seasonal shortages (likely to worsen as the climate changes), unprotected aquifers and unmetered water use are all areas of concern.

CLIMATE CHANGE



The CVRD, regional municipalities and many groups and individuals have recognized the need to prepare for and reduce climate change, but action has been slow to get under way.

AIR QUALITY



Air pollution in the region is low except when seasonal yard waste and wood burning create problems. Above-average hospital admissions for respiratory problems are a concern.

WASTE MANAGEMENT



The region has set a laudable goal of 'zero waste,' and residents are recycling in greater volume than ever. But greater buying and disposal of all kinds of 'stuff' has blunted that good effort.

If you have comments or good ideas about how we can improve our marks for the next report card on the region's environment, we'd love to hear from you at 12things@cvrdenvironiro.com



Prepared by the volunteer members of the CVRD Environment Commission.

Environment Commission 'Financial Support Policy'

The Environment Commission does not have the budget or mandate to act as a granting agency that would flow CVRD funds to other organizations for their individual purposes or ongoing programs. The CVRD has a Grant in Aid program for that purpose.

There are, however, occasions where the Commission may wish to provide financial support for public events that are consistent with the environmental communications being pursued as part of the commission's annual work plan.

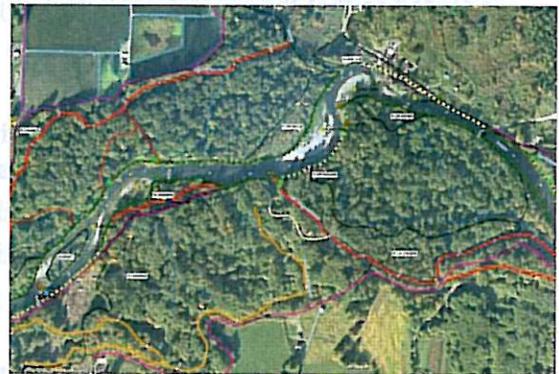
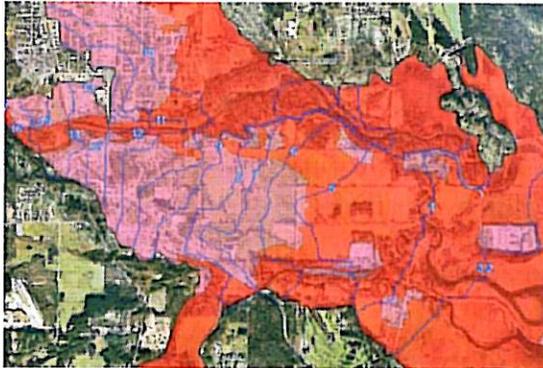
The criteria to be applied in providing funding to support public events include:

- i. The event is sponsored by public agencies and/or non-profit NGO's focusing on environmental or sustainability issues relevant to the region and consistent with the aims of the Commission
- ii. The Environment Commission is a participant or sponsoring partner in the event
- iii. Funding is earmarked for specific purposes related to the public communication or engagement purposes of the event and transparently budgeted
- iv. The Commission's budget is sufficient and the expenditure is endorsed by resolution of the Commission as relevant and appropriate in both character and scale

NOTE: The Commission's financial support of the Earth Day request would be consistent with this proposed policy, while providing funds for a travelling sustainability bus would not. Engagement of an individual in work groups that are part of the Commission's State of the Environment rollout plan would be appropriate and consistent with the general request actually made.

Support does not have to be just money: it could be in the form of sponsorship, volunteer help, ideas and/or displays.

COWICHAN VALLEY REGIONAL DISTRICT



LOWER COWICHAN / KOKSILAH RIVER INTEGRATED FLOOD MANAGEMENT PLAN FINAL REPORT

SEPTEMBER 2009

nhc northwest
hydraulic
consultants

Leaders in water resource technology

EXECUTIVE SUMMARY

The Cowichan Valley Regional District (CVRD), in partnership with Cowichan Tribes, the City of Duncan and the District of North Cowichan (DNC), retained Northwest Hydraulic Consultants (NHC) to update existing floodplain mapping and to develop an Integrated Flood Management Plan for the Lower Cowichan-Koksilah River floodplain, including major tributaries. Funding for this program was built by a partnership of supporting funds from the following organisations: Union of BC Municipalities Innovations Fund, Cowichan Tribes and the BC Provincial Emergency Program as well as substantial in-kind contributions from local government organisations.

Given the very broad nature of the study, NHC recommended that a phased approach be adopted so that the project goals and objectives could be refined over the course of the project. The main outputs of the project are summarized in four documents:

- Volume 1 - Scoping Report
 - Field investigations and base map development, including substantial field reviews and GIS analysis
 - Literature review of local and international flood management practices
- Volume 2 - Technical Investigations
 - Technical investigations related to hydrology, hydraulics, sedimentation and channel hazards
 - Detailed assessments of the capacity of existing flood control structures using numerical models
 - Environmental investigations including habitat and fisheries values, threats and opportunities
- Volume 3 - Integrated Flood Management Plan (this report)
 - Summary of findings from Volumes 1 and 2
 - Mapping tools for flood hazard, channel erosion and habitat value
 - Analysis of flood management best management practices
 - Project goals, guiding principles and proposed actions (priority and long-term)
- Summary Paper

COWICHAN FLOOD MANAGEMENT AREA

The headwaters of the Cowichan River/Koksilah River system are located in the rugged mountains of southern Vancouver Island. The Cowichan River has its headwaters in Cowichan Lake, and then flows in an easterly direction into Cowichan Bay. The smaller Koksilah River joins the south branch of the Cowichan River approximately 1 km upstream of Cowichan Bay. The lower slopes and floodplain of the river system contain significant areas of agricultural land as well as rural, urban and industrial development. Dikes have been built along both banks of the Cowichan River to protect the developed urban core of the City

of Duncan and the extensive agricultural and industrial zones downstream. Dikes have also been constructed on lands of the Cowichan Tribes at various times including along the Koksilah River

The Cowichan River is designated as a Heritage River and recognized for its highly valuable and productive fish habitat. The river supports seven species of salmon and trout including important stocks of chinook, coho, chum, steelhead trout, brown trout, rainbow trout and cutthroat trout. The mainstem Cowichan River supports a unique run of summer run chinook that is considered by Fisheries and Oceans Canada (FOC) to be one of the highest value stocks on Vancouver Island based on conservation concerns and rebuilding efforts. The Cowichan River also supports a highly valued wild winter run of Steelhead trout whose status is also a conservation concern with active stock rebuilding efforts undertaken by the BC Ministry of Environment (MOE).

The valley has experienced many flood events resulting from high flows in the Cowichan River and its tributaries, and from ponding in low-lying areas during heavy rain events. Large flow events in the Cowichan River were documented in 1979, 1986 and 2007. The most recent flood event of 2007 resulted in the closure of the Island Highway as well as the evacuation of 17 families living on the floodplain.

The flood management area extends along the Cowichan River from below the Catalyst water intake down to the ocean and along the Koksilah River from just below Bright Angel Park down to the ocean. Also included in the project area are Somenos Creek and Somenos Lake. In order to assess the hydrology, sedimentation processes and factors affecting channel erosion and debris hazards, the investigations have extended beyond the limits of the flood management area. These related studies have been conducted at a watershed scale and extend over the Cowichan River basin downstream of Cowichan Lake and portions of the Koksilah basin.

The City of Duncan, with a population of approximately 5,000 lies at the centre of the floodplain. The Cowichan Tribes has about 3,800 members, many of whom live on the floodplain. In addition to residential areas, there is urban and agricultural development in the floodplain as well as significant critical infrastructure. To date, land-use planning has not controlled the establishment of houses and other critical infrastructure from being developed on the floodplain.

PROJECT TOOLS AND RESULTS

This present study has provided technical information and a range of new management tools (GIS-based flood, erosion and habitat maps), that can be used as a road map for implementing Integrated Flood Management in the Cowichan-Koksilah basin. However, it will take various stakeholders, local organizations and participating agencies to build and implement a long-term sustainable program.

Over the course of the project, two major technical tools were developed to help in the planning process. A two-dimensional hydraulic model was developed to assess the

magnitude and extent of flood hazards in the study area. The development of this model is detailed in Volume 2 – Technical Investigations. In addition, a comprehensive GIS database that includes habitat sensitivity and flood hazard mapping was developed. Mapsheet 1 shows flood hazard areas established from the hydraulic models and erosion hazard assessments. Two hazard zones have been defined, where areas in the “floodway” are expected to experience deeper and faster flows, and therefore more hazardous conditions, during a flood event. By comparison the “flood fringe” represents the portion of the floodplain that may be subject to inundation and ponding but only contributes marginally to conveying the flood.

Extensive background studies were made using the models and mapping to assess the magnitude and extent of the flood hazards in the study area. Results of the analysis showed none of the existing dikes have adequate freeboard for a 200-year flood over their entire length. Key conclusions from the hydraulic analyses are as follows:

- None of the existing dikes have adequate freeboard for a 200-year flood over their entire length. Portions of the City of Duncan are vulnerable to flooding due to overtopping or breaching of the JUB lagoon dike, as well as from backwater flooding from Somenos Creek in the Lakes Road area. Critical infrastructure such as the JUB sewage lagoons and outfall are vulnerable to damage from flooding and bank erosion.
- Under 200-year flood conditions, large spills occur along both banks of the Koksilah River, resulting in overtopping of the Trans-Canada Highway. Deep and fast flow conditions occur on the floodplain, which could pose high erosion hazards to buildings or other structures on the floodplain.
- Flooding and bank erosion can be aggravated by log jams and sediment deposition, so that the most severe potential flood damages may not necessarily arise from the most severe hydro-meteorological events. The log debris and sediment originate in the headwaters of the watersheds, upstream of the flood management planning area.
- Flood levels and flood spills over the entire floodplain area are vulnerable to alterations in dike crest levels. Furthermore, raising roads on the floodplain can have a similar effect as raising dikes. Raising or extending a dike or road at one location may raise flood levels farther upstream. It appears many local dikes were constructed without assessing their effect on adjacent areas. Further raising or extension of dikes should not be permitted unless it can be demonstrated there will be no net water level rise at other locations.
- The Cowichan River has been artificially straightened, re-located and confined by riprap dikes, producing a canal-like appearance over much of its length. This produces high velocities and scour through narrow sections, together with localized gravel deposition and channel instability in wider sections. This type of channelized river generally requires regular maintenance and repair. Also, it adversely impacts fisheries habitat by reducing complexity.
- Currently simulated 200-year flood levels on portions of the Cowichan River, portions of Koksilah River upstream of the Trans-Canada Highway, and all of Somenos Creek and Somenos Lake are generally higher than those predicted in earlier studies. Most of the bridges in the study area appear to have inadequate

clearance under open water conditions, and are therefore susceptible to trapping logs and floating debris and potential structural failure.

The habitat sensitivity pilot project completed as part of this study is intended to be an iterative product that will be reviewed and updated with collection of new data or integration with other mapping products. The intent of the pilot mapping tool is to provide a starting point as a tool for land and resource management that illustrates known fisheries and wildlife habitat values and conceptual habitat restoration opportunities.

Several different types of flood mapping products were produced in this study.

Updated Floodplain Maps: showing 200-year flood construction levels, flood extent, and a higher hazard “floodway” zone. The floodway classification is intended to differentiate the higher hazard (deeper and faster flood water) areas on the floodplain from the lower hazard (shallow or low velocity) “flood fringe” zone.

Flood Scenario Maps: are intended to assist in emergency response planning since they show a number of hypothetical flood spills and inundation zones during future events. The information is available in three formats - printed copies, digital GIS output and as digital output that can be displayed via the internet using Google Earth.

Habitat Sensitivity Maps: A habitat ranking system has been developed and applied to the study area using a GIS-based mapping system to support strategic planning and operational investigations related to habitat and restoration.

INTEGRATED FLOOD MANAGEMENT PLAN GOALS

Integrated Flood Management (IFM) is a relatively new concept, emerging out of broader water management policies that promote the development and management of water, land and related resources without compromising the sustainability of vital ecosystems. The defining characteristic of IFM is integration, expressed simultaneously in different forms: an appropriate mix of strategies, location of interventions, types of interventions (structural or non-structural), and a participatory and transparent approach to decision making - particularly in terms of institutional integration.

Improving integrated flood management in the region will be a challenge. Fortunately, there is a strong base of community stakeholder involvement through the Cowichan Round Table and a Water Management Plan has already been prepared. The overall strategy and goals of the plan are consistent with the aims and general direction in the new BC Living Water Smart initiative.

The overall goals of this study, as stated in the Call for Proposals, are as follows:

Goal 1

The plan should aim to reduce flood risk to all communities on the floodplain, while protecting aquatic and riparian habitat and addressing the cultural values of the rivers.

Goal 2

The plan should promote innovative methods of flood hazard management to minimise short and long-term economic, environmental and social costs and where possible, provide an increase in the environmental and social capital of the region.

In addition to these two explicit goals, the scope has also been broadened to incorporate new information and lessons-learned from other integrated flood management planning organizations.

Goal 3

The plan should be achievable and should be supported by project stakeholders and the community at large. And, tools and recommended actions should be sustainable in the long-term.

The following nine guiding principles have been followed in preparing preliminary concepts and initiatives in support of the plan and the goals outlined above.

- **Return the rivers to a more naturalised state.** The Cowichan River has been artificially straightened and confined by riprap and dikes. This type of channelized river generally requires a high degree of maintenance and repair. In the Cowichan, some of the dikes are the responsibility of local government or individuals who may not have the resources to maintain them. Channelization also adversely impacts fisheries habitat by reducing habitat complexity. Therefore, restoring the river to a more “naturalized” channel configuration that has room to convey water within a broad floodway should be a part of a long-term strategy.
- **Sustain the natural state of existing floodplain.** Remaining undeveloped floodplain areas should be sustained in a natural state. Initiatives should be compatible or be integrated with programs that protect and enhance aquatic and riparian habitat.
- **Site future development in areas with low flood hazard and low habitat sensitivity.**
- **Ensure new or upgraded flood protection structures do not adversely increase the overall flood hazard.** Based on past experience along the river, a “no-net adverse impact” flood level policy for future developments on the floodplain, including future diking and flood protection works, is needed. Constructing new dikes or extending existing ones should not increase the risk of flood damage in other vulnerable areas.
- **Mitigate impacts of high flows on mainstem.** Impacts of high flows (erosion) on mainstem should be mitigated by facilitating flow through suitable off-channel habitat.
- **Maintain channel conveyance.** Consider and maintain sites of debris jams and debris/gravel accumulation. An “adaptive” maintenance approach that incorporates habitat enhancement as part of channel maintenance is needed.
- **Create accessible and sustainable tools for flood management.** New tools developed for the project need to be designed so they can be used interactively and

dynamically for emergency management, improved land-use planning, public awareness and education.

- **Promote basin-wide planning initiatives.** Basin-wide planning is important, particularly since most of the flood water, sediment and debris originates upstream of jurisdictional boundaries in the basin headwaters.
- **Monitor and maintain flood management program.** Monitoring and maintenance are essential components of a flood management program. This should not just apply to dikes or bank protection works, but the channel as a whole. This is particularly important when considering the unknown future implications of climate change that may affect hazard levels in the region.

RECOMMENDED ACTIONS

A portfolio of planning and structural (engineering) measures was developed as part of the flood plan. Key structural projects are shown in Figures 8.1 and 8.2. Twenty specific projects that promote the guiding principles (above) and include habitat enhancement as a project component are also outlined in this report and include:

- Dike upgrades or new dike construction (two priority projects are described below)
- Channel maintenance and improvement programs
- Gravel removal and maintenance programs
- Log jam removal and modification programs
- Selective vegetation removal
- Set-back dike construction
- Upstream sediment and debris control
- Road modifications
- Bridge replacements
- Recommended compensation projects

The existing flood protection around critical infrastructure and higher density populated areas in Duncan should be upgraded as soon as possible. In particular, the existing dikes around the JUB sewage lagoon should be raised and provided with erosion protection and tied in to the Cowichan (City of Duncan) Dike. A design review of the lagoons should be carried out as part of this work.

The Koksilah Village Dike is vulnerable to overtopping and erosion and local residences are exposed to a higher flood risk than most other locations on the floodplain. Given the deep and fast flow conditions after a dike breach, floodproofing the residences is not a practical option. Discussions should be held with residents on options for dike strengthening and raising versus re-settlement.

Land use planning instruments including the use of floodproofing and a two-zone flood map are described in this report. These are in addition to further policy instruments including public education, flood warning mechanisms and emergency response planning.

Finally, consideration was given on ways to promote integrated flood management in the region and assisting in its implementation. Forming a Basin Council (modelled on the Fraser Basin Council) would be one option for promoting integrated, basin-wide sustainable water management. The Council would still require existing authorities for implementing major projects. Forming a Basin Water Board (modelled after the Okanagan Board) would provide powers for raising funds and implementing programs directly. The two organizations are not incompatible.

CONCLUSIONS

The results of this study are intended to assist the communities with developing strategies and plans to address mutual flood hazards over the next decade. The measures include both structural flood control and non-structural flood mitigation initiatives in addition to providing resources for future planning. The aim is to help provide a “road map” leading to more flood-resistant communities and a more natural, ecologically productive and sustainable river system. This approach requires that floodwaters and floodways be seen as a resource and opportunity rather than simply a management issue, and that habitat enhancement is carried out as part of the flood protection work, rather than simply trying to mitigate environmental impacts from new flood infrastructure. Ultimately, the stakeholders, local governments and Cowichan Tribes will need to frame their own goals and objectives in order to implement the final plan.

TABLE OF CONTENTS

List of Tables..... 13

List of Figures 14

List of Maps 16

List of Appendices..... 16

1 Introduction 17

 1.1 Purpose 17

 1.2 Integrated Flood Management..... 17

 1.3 Project Direction 18

 1.4 Study Extent 19

 1.5 Outline of Study 19

 1.6 Outline of Report..... 20

2 Biophysical Setting 22

 2.1 Study Area 22

 2.2 Physiography 23

 2.2.1 Watersheds 23

 2.2.2 Topography 23

 2.2.3 Channel Stability..... 23

 2.3 Hydrology and Ocean Levels..... 25

 2.3.1 Flood Hazards 25

 2.3.2 Flood Record..... 25

 2.3.3 Design Parameters..... 30

 2.3.4 Effect of Climate Change..... 32

 2.4 Infrastructure..... 32

 2.4.1 Road, Rail and Miscellaneous Infrastructure..... 32

 2.4.2 Flood Control Dikes 33

 2.5 Habitat and Fisheries Resources 34

 2.5.1 Habitat Types 34

 2.5.2 Fisheries Resources..... 36

 2.5.3 Conservation Areas 37

 2.5.4 Known Species at Risk..... 38

 2.5.5 Environmental Impacts of Past Land Use Activities 38

 2.5.6 Habitat Restoration Efforts 40

 1.1 Current Process for Habitat Restoration 41

 1.1.1 Selection of Restoration Projects 41

 1.1.2 Permitting Requirements 41

3	Assessment of Flood Hazards	43
3.1	Method of Approach	43
3.2	Present Conditions	43
3.3	Existing Infrastructure	44
3.4	Dike Breach Scenarios	45
3.4.1	Breach of JUB lagoon dike	45
3.4.2	Breach of Cowichan South Side dike	45
3.5	Existing Dikes Raised Scenario	46
3.6	Effect of New and Modified Dikes	47
3.6.1	Set-Back Dike on South Side of Cowichan River	47
3.6.2	New Lakes Road Dike	48
3.6.3	New Koksilah River Dike	48
3.7	Effects of Climate Change	48
3.7.1	Effects of Increased Ocean Level Only	49
3.7.2	Effects of Increased Ocean Level and Peak Discharges	49
3.8	Relation Between Channelization and Habitat.....	49
3.9	Summary of Flood Hazard Issues.....	50
4	Mapping Tools	52
4.1	Flood Hazard Mapping	52
4.1.1	General Method of Approach	52
4.1.2	Flood Construction Levels.....	53
4.1.3	Floodway Zone.....	54
4.1.4	Limitations of Mapping.....	55
4.1.5	Flood Scenario Maps.....	55
4.2	Channel Erosion Hazard Mapping	56
4.2.1	Overview.....	56
4.2.2	Historic Mapping.....	56
4.2.3	Hazard Zone Classification.....	57
4.2.4	Channel Migration Zone	57
4.3	Habitat Mapping.....	58
5	British Columbia’s Flood Management Climate	60
5.1	Policy and Legislative Environment	60
5.1.1	Federal Legislation	60
5.1.2	Provincial Legislation and Policy	61
5.1.3	Local Government Legislation	64
5.2	Flood Management Policy Instruments.....	65
5.2.1	Permits and Regulations	66
5.3	Institutional Frameworks	67

5.3.1	Water Stewardship and Floodplain Mapping.....	67
5.3.2	Operation and Maintenance of Existing Dikes.....	68
5.3.3	Emergency Management British Columbia	68
5.3.4	Cowichan Tribes.....	69
5.3.5	Living Rivers Trust.....	69
5.3.6	Cowichan Stewardship Round Table	70
5.3.7	Cowichan Estuary Environmental Management Plan	71
6	Flood Management – Best Management Practices	72
6.1	Evolution in Flood Management	72
6.2	Reliance on Dikes and Levees	72
6.3	Flood Protection Standards	73
6.4	Floodway Preservation	73
6.5	Integrated Flood Management.....	74
6.6	Collaborative Watershed Governance	75
6.7	Technical Tool - Flood Hazard Mapping	77
6.8	Policy Instruments	78
6.8.1	Economic Incentives.....	78
6.8.2	Action Through Education	78
6.9	Actions for Best Practice.....	79
6.9.1	Floodproof Development	79
7	Integrated Flood Management for The Cowichan River - Guiding Principles.....	82
7.1	Study Goals	82
7.2	Guiding Principles and Strategies.....	83
7.3	Key Challenges.....	84
7.3.1	Disconnect Between Basin and Administrative Boundaries.....	84
7.3.2	Fragmentation of Administrative Boundaries.....	84
7.3.3	Planning Under Uncertainty.....	84
7.3.4	Support to Local Governments.....	85
7.3.5	Future of Cowichan Basin Water Advisory Council.....	85
8	Integrated Flood Management For the Cowichan River – Proposed Actions.....	86
8.1	Land Use Planning	87
8.1.1	Sustain the Natural State of the Remaining Undeveloped Floodplain Areas.....	87
8.1.2	Promote future urban development in areas with low flood risk and lower habitat sensitivity.....	88
8.1.3	Flood Proofing	89

8.2	Priority Structural Projects	89
8.2.1	Dike Upgrade or New Dike Construction.....	90
8.2.2	Channel Maintenance and Improvement Programs.....	94
8.2.3	Gravel Removal and Maintenance	96
8.2.4	Log Jam Modification and Removal	97
8.2.5	Selective Vegetation Removal.....	97
8.2.6	Recommended compensation projects	98
8.2.7	Orphan Projects.....	99
8.3	Long-Term Structural Projects	102
8.3.1	Set-Back Dikes	102
8.3.2	Dike Modification	104
8.3.3	Upstream Sediment and Debris Control.....	106
8.3.4	Road Modifications	107
8.3.5	Bridge Replacements	107
8.4	Policy Instruments	108
8.4.1	Public Education.....	108
8.4.2	Flood Warning	108
8.4.3	Emergency Response Planning	109
8.5	Implementation of the Plan	109
8.5.1	Organizational Structure.....	109
9	Conclusions and Recommendations	112
9.1	Conclusions	112
9.2	Recommendations.....	113
1.2	Recommendations for Future Habitat Sensitivity and Restoration Mapping	114
10	References	116

11 Photos

LIST OF TABLES

Table 2.1:	Floodplain Area in Each Jurisdiction	22
Table 2.2:	Historic Flooding Prior to 2000.....	25
Table 2.3:	Updated Flood Frequency Estimates.....	31
Table 2.4:	Estimated Coastal Flood Levels.....	31
Table 2.5:	Summary of Bridges in Study Area	33
Table 2.6:	Dikes in Study Area	33

Table 2.7: Summary of Major Habitat Restoration Projects by Category within the Cowichan Flood Study Area	40
Table 2.8: Agency contacts and permitting requirements for instream works undertaken in the Lower Cowichan/Koksilah Flood Study area.....	42
Table 3.1 : Summary of Dike Conditions.....	44
Table 3.2: Dike Breach Scenarios.....	45
Table 3.3: Vertical Clearance above 200-Year Flood at Bridges	47
Table 4.1: Summary of Model Simulations to Determine FCL	52
Table 5.1: Federal Legislation Related to Integrated Flood Management.....	61
Table 5.2: Provincial Legislation Related to Integrated Flood Management.....	62
Table 5.3: Permits and Regulations Related to Development on Floodplains	66
Table 6.1: Options for Reducing Flood Risk - World Meteorological Organisation ..	74
Table 8.1: Assessment of Dike Upgrade Priorities.....	90
Table 8.2. Summary of critical dike projects, anticipated ecological effects and recommended measures	91
Table 8.3: Rotary Park Channel Improvement Project Summary	94
Table 8.4: Jayne's Sidechannel Improvement Project Summary.....	95
Table 8.5: Comparison of options for dike modification	103

LIST OF FIGURES

Figure 1.1: Flood Management Planning Area.....	19
Figure 1.2: Jurisdictional Boundaries.....	19
Figure 2.1: Flood Management Planning Area Land Use	22
Figure 2.2: Cowichan and Koksilah Watersheds	23
Figure 2.3: Flood Management Planning Area Topography	23
Figure 2.4: Channel Development: 1867 to 2005	24
Figure 2.5: Channel Development: Results of 1948-49 Disturbance	24
Figure 2.6: Historic Bankline Changes, Cowichan River	24
Figure 2.7: Sediment Sources along Cowichan River.....	24
Figure 2.8: Flood Management Planning Area – Key Infrastructure.....	32
Figure 2.9: Existing Flood Control Dikes	33
Figure 2.10: Key features associated with fisheries and wildlife.	35
Figure 2.11: Sensitive Ecosystem Inventory polygons.	35
Figure 2.12: Historic changes, Priest's Marsh.....	36
Figure 3.1: Modelling Results - Existing Conditions: 200 Year Flood Water Depth ..	44
Figure 3.2: Modelling Results – Quamichan Dike Breached – 200 Year Flood Water Depth	45

Figure 3.3: Modelling Results – JUB Lagoon Dike Breached – 200 Year Flood Water Depth	45
Figure 3.4: Modelling Results – Hatchery, Mission and South Side Spur Dikes Breached – 200 Year Flood Water Depth.....	45
Figure 3.5: Modelling Results – Cowichan (City of Duncan) Dike Breached – 200 Year Flood Water Depth.....	45
Figure 3.6: Modelling Results – Cowichan South Side and South Side Spur Dikes Breached – 200 Year Flood Water Depth.....	45
Figure 3.7: Modelling Results – Confined Flow: Cowichan River and JUB Sewage Lagoon Dikes and Flood Profiles	46
Figure 3.8: Modelling Results – Confined Flow: Cowichan River South Side and South Side Spur Dikes and Flood Profiles	46
Figure 3.9: Modelling Results – Confined Flow: Mission Road and Hatchery Dikes and Flood Profiles.....	46
Figure 3.10: Modelling Results – Confined Flow: Quamichan and Tooshley Island Dikes and Flood Profiles.....	46
Figure 3.11: Modelling Results – Confined Flow: Koksilah Village and Clem Clem Dikes and Flood Profiles.....	46
Figure 3.12: Modelling Results – Set-Back Dike on South Side of Cowichan – 200 Year Flood Water Depth.....	47
Figure 3.13: Modelling Results – New Lakes Road Dike – 200 Year Flood Water Depth	48
Figure 3.14: Modelling Results – New Koksilah Dike – 200 Year Flood Water Depth	48
Figure 3.15: Modelling Results – Increase Due to Climate Change – 200 Year Flood Water Depth.....	49
Figure 3.16: Modelling Results – Relative Change Due to Climate Change – 200 Year Flood Water Depth Difference.....	49
Figure 4.1: Flood Fringe and Floodway Classification	54
Figure 4.2: Flood Scenario Maps – 25 Year Flood – Water Depth.....	55
Figure 4.3: Flood Scenario Maps – 50 Year Flood – Water Depth.....	55
Figure 4.4: Flood Scenario Maps – 100 Year Flood – Water Depth.....	55
Figure 4.5: Flood Scenario Maps – 200 Year Flood – Water Depth.....	55
Figure 4.6: Historic Channel Shifting	57
Figure 4.7: Channel Migration Hazard Zone Mapping	57
Figure 4.8: Erosion Vectors and Predicted Erosion Limits	58
Figure 4.9: Habitat Map C2	58
Figure 4.10: Habitat Map C3	58
Figure 6.1: Example of floodproofed home.....	80

Figure 6.2: Flood damage to mobile home 81
Figure 8.1: Flood Management Plan – Early Implementation Projects - Structural .. 89
Figure 8.2: Flood Management Plan – Long-term Projects - Structural..... 102

LIST OF MAPS

Map 1 Floodplain Hazard Map

LIST OF APPENDICES

- Appendix A: Ecology and Habitat Investigations
- Appendix B: GIS Database - Habitat Mapping and Sensitivity
- Appendix C: Review of Flood Hazard Management in Other Jurisdictions

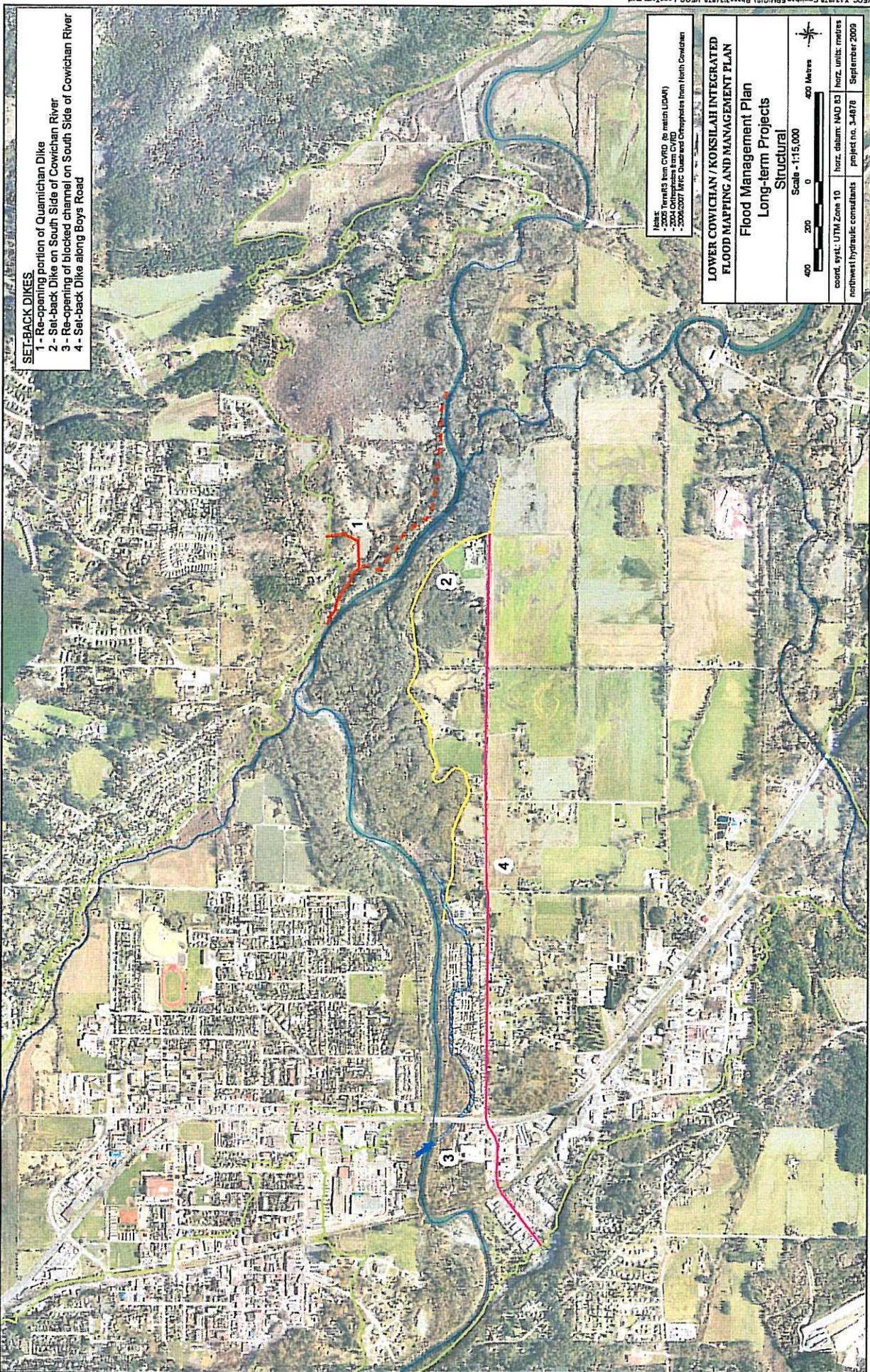
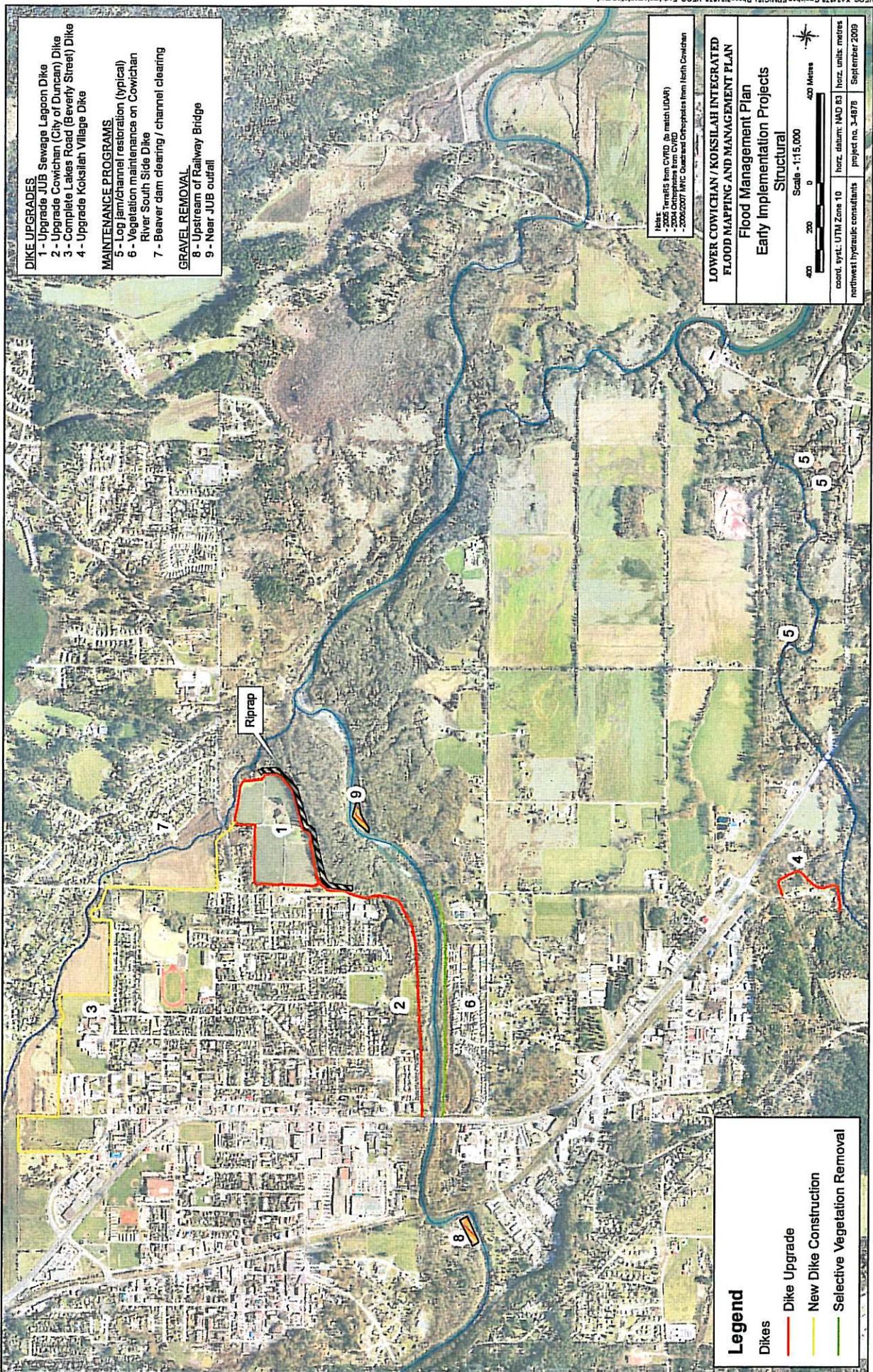


Figure 8.2



- DIKE UPGRADES**
- 1 - Upgrade JUB Sewage Lagoon Dike
 - 2 - Upgrade Cowichan (City of Duncan) Dike
 - 3 - Complete Lakes Road (Beverly Street) Dike
 - 4 - Upgrade Koistian Village Dike
- MAINTENANCE PROGRAMS**
- 5 - Log jam/channel restoration (typical)
 - 6 - Vegetation maintenance on Cowichan River South Side Dike
 - 7 - Beaver dam clearing / channel clearing
- GRAVEL REMOVAL**
- 8 - Upstream of Railway Bridge
 - 9 - Near JUB outfall

Notes: Terrain is from CVD, do not match LIDAR
 - 2004 Orthophoto from CVD
 - 2006/2007 IMC, Quad and Orthophotos from North Cowichan

LOWER COWICHAN / KOSILAH INTEGRATED FLOOD MAPPING AND MANAGEMENT PLAN
Flood Management Plan
Early Implementation Projects
 Structural

Scale - 1:15,000

400 200 0 400 Meters

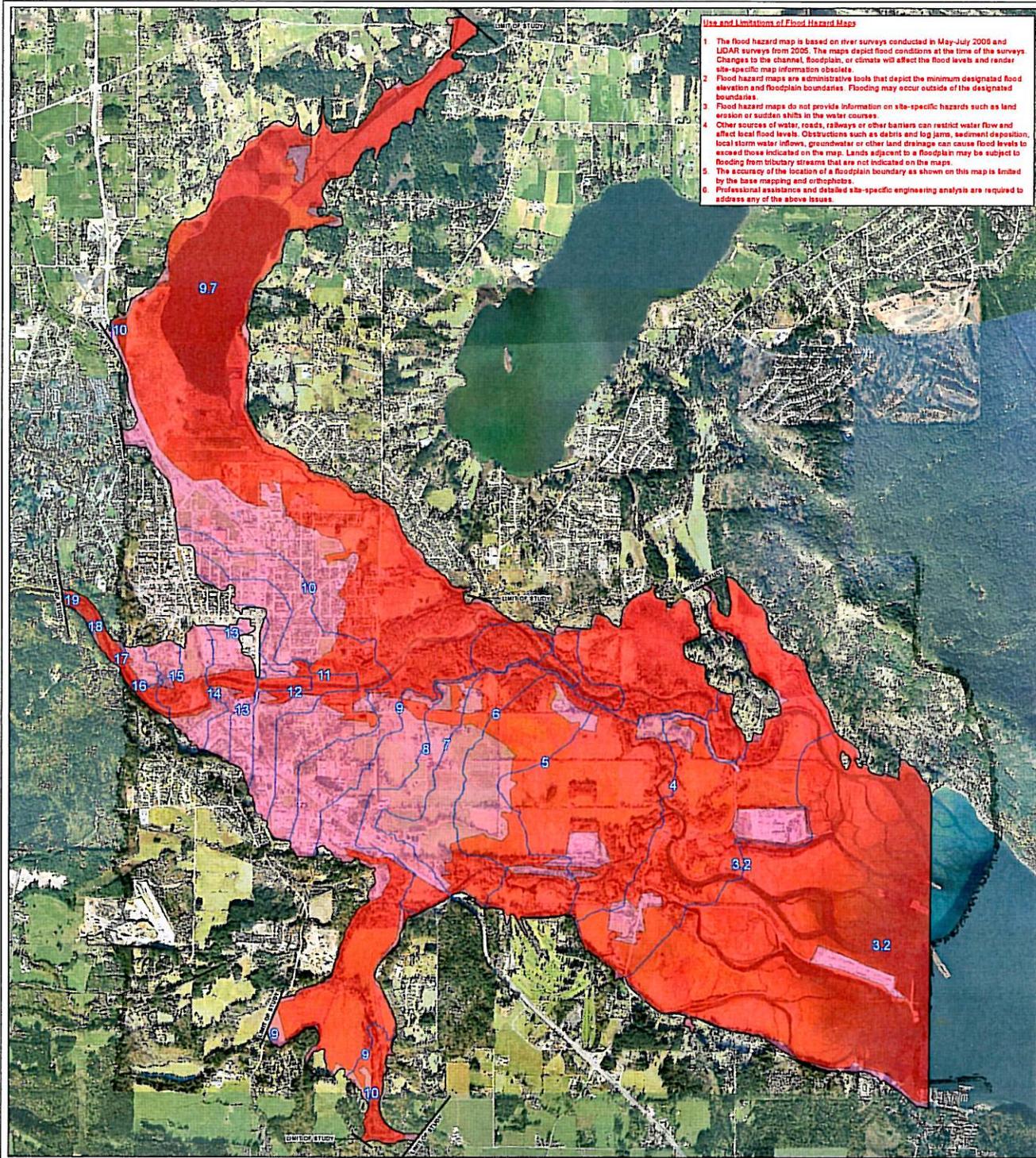
cont'd. syst. UTM Zone 10 horz. datum: NAD 83 horz. units: metres
 northwest hydraulic consultants project no. 3-4878 September, 2009

Legend

Dikes

- Dike Upgrade
- New Dike Construction
- Selective Vegetation Removal

Figure 8.1



Use and Limitations of Flood Hazard Maps

1. The flood hazard map is based on river surveys conducted in May-July 2008 and LIDAR surveys from 2005. The maps depict flood conditions at the time of the surveys. Changes to the channel, floodplain, or climate will affect the flood levels and render site-specific map information obsolete.
2. Flood hazard maps are administrative tools that depict the minimum designated flood elevation and floodplain boundaries. Flooding may occur outside of the designated boundaries.
3. Flood hazard maps do not provide information on site-specific hazards such as land erosion or sudden shifts in the water courses.
4. Other sources of water, roads, railways or other barriers can restrict water flow and affect local flood levels. Obstructions such as debris and log jams, sediment deposition, local storm water inflows, groundwater or other land drainage can cause flood levels to exceed those indicated on the map. Lands adjacent to a floodplain may be subject to flooding from tributary streams that are not indicated on the maps.
5. The accuracy of the location of a floodplain boundary as shown on this map is limited by the base mapping and orthophotos.
6. Professional assistance and detailed site-specific engineering analysis are required to address any of the above issues.



Legend

- Level of Study
- Flood Condition on Levels (elevation in metres SGL)
- Contours
- Floodable Zone (Deep and Fast Flowing water)
- Flood Fringe Zone

Notes:

- *2005 TerraB from CVRD
- *2004 Orthophotos from CVRD
- *2006/2007 MHC Quadrand
- *Orthophotos from North Cowichan
- *Ground Survey by: nhc 2008

- Notes to Users:**
1. The Designated Flood has a statistical return period of 200-years.
 2. Flood levels were computed using the hydraulic model MIKE Flood, as described in the report "Lower Cowichan/Koksilah River Integrated Flood Management and Mapping Plan, Volume 2 - Technical Investigations", April 2009 by Northwest Hydraulic Consultants.
 3. The flood fringe limits assume the absence of all dikes.
 4. The flood construction level (FCL) was computed as the 200-year flood level + 0.6 m freeboard.
 5. The floodplain limits are not established on the ground by legal survey.
 6. The floodplain limits are not delineated for side streams, local drainage or storm water runoff.
 7. The floodway boundary is based on US Department of the Interior, "Downstream Hazard Classification Guidelines", Bureau of Reclamation (1995) and is intended to delineate a zone of "Deep and Fast" flow conditions. Areas outside of this zone may also be subject to high hazards.
 8. Flooding may occur outside of the designated floodplain areas. MHC do not assume any liability by reason of the designation or failure to designate areas on the map.
 9. Numerical modelling simulations: maximum values from 200-year scenarios 101, 201, 301, 401, 601, and 701 in the report "Lower Cowichan/Koksilah River Integrated Flood Management and Mapping Plan, Volume 2 - Technical Investigations", April 2009 by Northwest Hydraulic Consultants.
 10. Recommended setback distance on the Cowichan Mainstem is 50 metres from top of bank and 40 metres for the Koksilah River.
 11. The study does not include Quamichan Lake.

Designed by: VFOC and DGM
 Reviewed by: MM
 Prepared by: JXD

LOWER COWICHAN/KOKSILAH INTEGRATED FLOOD HAZARD AND MANAGEMENT PLAN
Flood Hazard Map
 Scale = 1:12,000
 Date: 2010-08-14
 Project No: 2008-01-01
 Revision: 2.0
 Drawing No: 2.01-01

Map 1

I am sending you this ad from Island Press (the official publisher of the Society for Ecological Restoration International) because I am concerned that the solutions that are contemplated for the Duncan floods are setting us up for similar problems to the ones experienced in Nashville. In addition, I am concerned about the impacts of increased water levels on the rare plants in the Somenos Garry Oak area. We need to pay attention to what the engineers from North Cowichan are planning for the Somenos watershed.

See you all on the 20th...

Cheers,
Dave

Island Press E-News

May 6

Greetings!

Tennessee, Kentucky and Mississippi have seen massive storms and flooding over the past week causing unprecedented disasters. More than thirty people are dead, and the Cumberland River reached 50 feet. The flood, the highest in almost half a decade, forced the evacuation of thousands, submerged one of Nashville's two water treatment plants and left over 14,000 without power.

Nashville Mayor Karl Dean was upbeat, saying "There's a lot to be done, but we'll get it done." Yet, rebuilding the city without preparing for the future invites another disaster. The authors of *Floodplain Management*, Robert Freitag, Susan Bolton, Frank Westerlund and Julie Clark, explain that the current strategy of building levees and dams does not account for new information on river behavior. They call for solutions that work with the natural tendencies of rivers, which can become cost-effective, long-term successes by integrating physical and biological systems with our societal capabilities.

As the frequency of natural disasters increase in the wake of climate change, who should pay the cost? Presidential declarations of "disasters" have increased dramatically, ensuring federal emergency relief. But, asks Rutherford Platt in *Disasters and Democracy*, federalizing the cost of disasters may make matters worse by lightening the burden on local communities and state governments. With this shift, what are the incentives for individuals and local communities to take measures to plan ahead to protect themselves?

Island Press has been urging responsible land use and development for over twenty-five years. We hope to support the affected regions and flood victims by drawing lessons from current events to prevent even greater devastation in the future.

Sincerely,
Chuck Savitt
President

 Join Our Mailing List

 Forward to a Friend

Upcoming Events

5/25: [Ed Grumbine, author of *Where the Dragon Meets the Angry River*, Tempe AZ](#)

[All events >>](#)

ON THE BLOG

[Terry Tamminen's "teachable moment"](#)

[Menhaden muddle: part 5](#)

[Menhaden muddle: part 4](#)

SOCIAL NETWORKING







[Stay updated with Island Press on these social networking sites and others!](#)

MAKE A DONATION





NEWS RELEASE

For Immediate Release
2010ENV0028-000630
May 31, 2010

Ministry of Environment

A NORTH AMERICA FIRST: COMMUNITY GHG EMISSIONS REPORTS

VANCOUVER – The Province has released the Community Energy and Emissions Inventory (CEEI) reports for all B.C. local governments to assist them in creating community-wide GHG emissions baselines for their official community plans, John Yap, Minister of State for Climate Action announced today.

“These community emissions reports are the first of their kind in North America,” said Yap. “Local governments are key players in our Province’s push towards lowering its carbon footprint. By putting this information in their hands, they are further empowered to measure and track emissions to reduce their carbon-pollution levels.”

The CEEI reports provide a consistent set of estimates of 2007 energy consumption and GHG emissions for all B.C. communities. Local governments can use this baseline to track the progress of policies and programs that are designed to lower GHG emissions.

Activities covered under the inventory include on-road transportation, buildings and solid waste. As well, estimates of land-use change from deforestation activities and emissions from livestock are also available in the CEEI at the regional district level.

“Since the Climate Action Charter was first introduced, local governments have said that we needed new tools to measure community emissions,” said UBCM President Harry Nyce. “The Province is to be commended for providing communities with a benchmark to aid the assessment of local reduction strategies.”

The CEEI will help local governments meet their commitments under the Climate Action Charter to measure and report on community GHG emissions profiles. It will help inform targets and policies for local governments under the new green communities legislation. Alongside official community plans and regional growth strategies, the inventory will assist in providing a fuller climate action picture for local governments.

“As a proactive leader and advocate in the area of climate action and addressing GHG emissions, the City of North Vancouver supports the Province’s creation of community emissions reports,” says Mayor Darrell Mussatto. “The Province has taken on the considerable task of providing this baseline and tracking system so that municipalities can focus on developing policies and actions – reducing greenhouse-gas emissions from on-road transportation, buildings, and solid waste. This program will be a useful tool for all B.C. communities and it will help the city to further monitor and measure our reduction strategies, meet our targets and note our successes.”

-more-

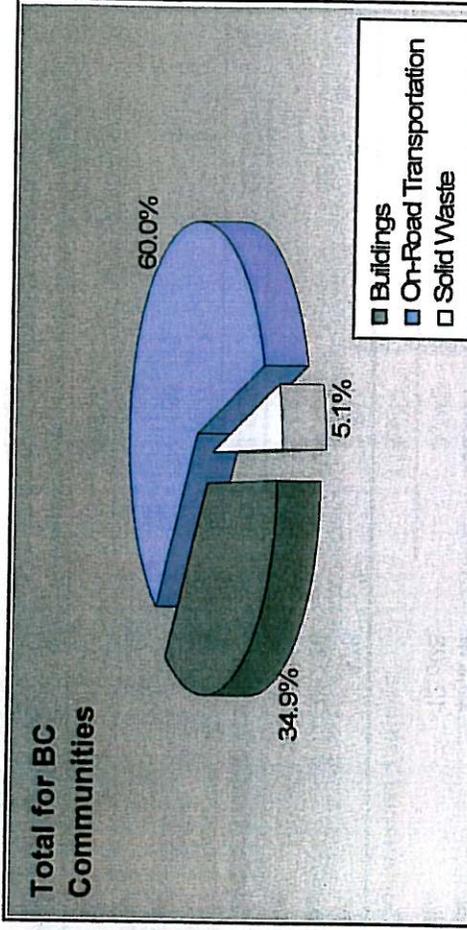
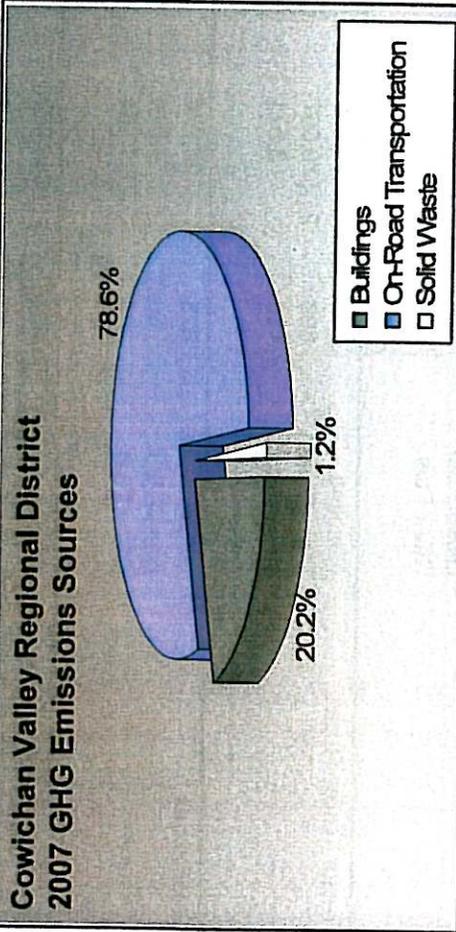
To link to the full CEEI reports, visit:
<http://www.env.gov.bc.ca/cas/mitigation/ceei/index.html>.

Media Contact: Suntanu Dalal
 Media Relations
 Ministry of Environment
 250 387-9745

For more information on government services or to subscribe to the Province's news feeds using RSS, visit the Province's website at www.gov.bc.ca.

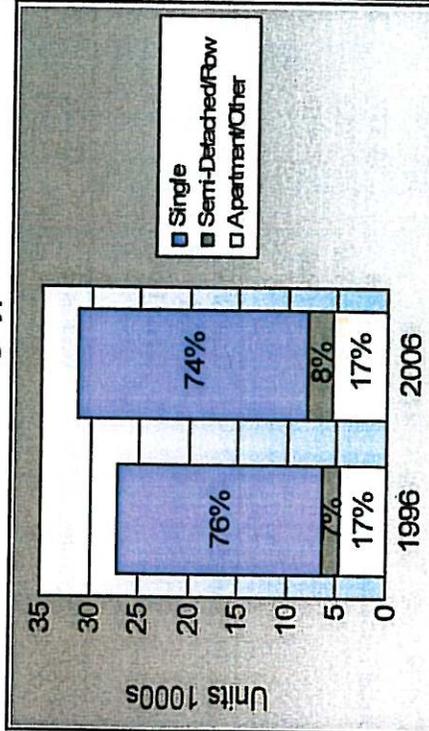
BC's Community Energy and Emission Inventories...supporting efforts towards Complete, Compact, Energy-Efficient Communities

Where are the majority of our community's emissions coming from?



Are we living more compactly?

Housing Type



In BC, single family detached housing made up 49% of housing in 2006.

Are we driving less?

Commute To Work

Mode	1996	2006
Car	82.5%	80.9%
Bus	7.5%	8.9%
Train	0.8%	1.1%
Bike	6.4%	6.5%
Walk	1.2%	0.9%

In BC, 10% of people took transit, 7% walked, and 2% cycled to work in 2006.

Residential Density

This data is only available for municipalities.
BC municipal average: 7.4 people per net ha

Are we living closer to where we work?

Commute Distance

This data is currently unavailable in the CEEI 2007 Reports

In BC, 41% of people lived within 5km of their work in 2006.

For more information and to provide feedback on your Community Energy and Emissions Inventory (CEEI) Report see back page.

Cowichan Valley Regional District Updated 2007 Community Energy and Emissions Inventory

Sectors

On Road Transportation		<u>Vehicles</u>	<u>Consumption</u>	<u>Measurement</u>	<u>Average-VKT(km)</u>	<u>Energy (GJ)</u>	<u>CO₂e (t)</u>
Small Passenger Cars		16,377	22,091,561	Litres	13,168	773,205	52,868
Gasoline		763	754,504	Litres	13,731	28,897	2,060
Diesel Fuel		<10	1,304	Litres	10,677	50	2
Other Fuel							
				Small Passenger Cars		802,152	54,930
Large Passenger Cars		8,557	20,140,107	Litres	18,967	704,904	47,993
Gasoline		203	482,708	Litres	18,387	18,488	1,317
Diesel Fuel		31	85,374	Litres	16,161	3,270	131
Other Fuel							
				Large Passenger Cars		726,662	49,441
Light Trucks, Vans, SUVs		23,022	67,405,250	Litres	19,548	2,359,184	161,794
Gasoline		2,210	5,286,458	Litres	18,478	202,471	14,441
Diesel Fuel		205	512,543	Litres	13,158	19,630	785
Other Fuel							
				Light Trucks, Vans, SUVs		2,581,285	177,020
Commercial Vehicles		221	1,030,366	Litres	15,129	36,063	2,411
Gasoline		473	2,108,113	Litres	20,214	80,741	5,673
Diesel Fuel		21	82,230	Litres	12,508	3,149	126
Other Fuel							
				Commercial Vehicles		119,953	8,210
Tractor Trailer Trucks		19	108,889	Litres	15,676	3,811	255
Gasoline		698	21,570,667	Litres	79,738	826,157	58,046
Diesel Fuel		<10	3,571	Litres	7,085	137	5
Other Fuel							
				Tractor Trailer Trucks		830,105	58,306
Motorhomes		628	28,774	Litres	2,470	1,007	67
Gasoline		86	4,074	Litres	2,335	156	11
Diesel Fuel		10	1,384	Litres	2,189	53	2
Other Fuel							
				Motorhomes		1,216	80
Motorcycles, Mopeds		993	386,662	Litres	5,155	13,533	903
Gasoline							
				Motorcycles, Mopeds		13,533	903
Bus		46	330,447	Litres	20,119	11,566	776
Gasoline		82	773,264	Litres	20,477	29,616	2,081
Diesel Fuel		<10	32,802	Litres	14,682	1,256	50
Other Fuel							
				Bus		42,438	2,907

Cowichan Valley Regional District Updated 2007 Community Energy and Emissions Inventory

On Road Transportation Totals		351,797
Gasoline:	3,903,273	267,067
Diesel:	1,186,526	83,629
Other Fuel:	27,545	1,101
All Fuels:	5,117,344	351,797

Type	Connections	Consumption	Measurement	Energy (GJ)	CO2e (t)
Buildings					
Residential					
Electricity	33,690	528,140,280	Kilowatt Hour	1,901,303	13,028
Natural Gas	5,823	278,209	GigaJoules	278,209	14,189
Heating Oil		465,769	GigaJoules	465,769	32,832
Propane		80,315	GigaJoules	80,315	4,900
Wood		567,961	GigaJoules	567,961	210
		Residential		3,293,557	65,159
Commercial/Small-Medium Industrial					
Electricity	4,252	248,783,669	Kilowatt Hour	895,620	6,137
Natural Gas	936	377,056	GigaJoules	377,056	19,230
		Commercial/Small-Medium Industrial		1,272,676	25,367
Buildings Totals					
Electricity:				2,796,923	19,165
Natural Gas:				655,265	33,419
Propane:				80,315	4,900
Wood:				567,961	210
Heating Oil:				465,769	32,832
Buildings:				4,566,233	90,526

Solid Waste		5,472
	Mass (t)	CO2e (t)
Community Solid Waste	27,948	5,472

Cowichan Valley Regional District Updated 2007 Community Energy and Emissions Inventory

	CONSUMPTION	ENERGY (GJ)	CO2e (t)
Grand Total			
Diesel Fuel	30,979,788 L	1,186,526	83,629
Electricity	776,923,949 kWh	2,796,923	19,165
Gasoline	111,522,056 L	3,903,273	267,067
Heating Oil	465,769 GJ	465,769	32,832
Natural Gas	655,265 GJ	655,265	33,419
Other Fuel	719,208 L	27,545	1,101
Propane	80,315 GJ	80,315	4,900
Solid Waste	27,948 T	0	5,472
Wood	567,961 GJ	567,961	210
Total of Transportation / Buildings / Solid Waste:		9,683,577 GJ	447,795 tonnes

Memo Items

Buildings	Type	Connections	Consumption	Measurement	Energy (GJ)	CO2e (t)
Large Industrial	Electricity	6	withheld	Kilowatt Hour:	-	-
	Natural Gas	1	withheld	GigaJoules	-	-
			Large Industrial		-	-

Agriculture	Number of Animals	Methane	CO2e (t)
Enteric Fermentation	15,297	878	18,438

Land-Use Change	Area (ha)	CO2e (t)
Deforestation from Settlement	29	26,128
Deforestation from Agriculture	14	9,337
Deforestation:	43	35,465

Supporting Indicators

Below you will find supporting indicators for which data is provided. These are the first five supporting indicators for which data is provided as a part of the updated 2007 CEEI. Thirteen additional supporting indicators are under consideration for future reports (see next page). Local government feedback is requested on all supporting indicators. Please take the time to complete the short CEEI Survey at <http://www.env.gov.bc.ca/cas/mitigation/ceei/index.html> or contact us directly at CEEIRPT@gov.bc.ca

Housing Type - Private dwellings by structural type

Housing type is important for reducing building-related GHG emissions and energy consumption. A trend toward fewer single family dwellings indicates an increase in residential density, which is known to reduce transportation-related GHG emissions.

	1996		2001		2006	
	Units	%	Units	%	Units	%
Single Detached House	20,760	76	21,940	76	23,200	74
Semi-Detached House	905	3	900	3	1,240	4
Row House	930	3	1,240	4	1,335	4
Apartment, Duplex	580	2	480	2	865	3
Apartment, 5 storeys or higher	10	0	15	0	10	0
Apartment, under 5 storeys	2,640	10	2,830	10	3,240	10
Other Single Attached House	55	0	140	0	130	0
Movable Dwelling	1,320	5	1,300	5	1,200	4

Residential Density

* Net of Crown land, parks, Indian Reserves, water features, airports, ALR, waste disposal sites.

Increasing residential densities is known to reduce vehicle use resulting in fewer transportation-related GHG emissions. There are many additional benefits from more compact development.

2009

This data is currently unavailable in the CEEI 2007 Reports.

Commute to Work - Employed labour force - by mode of commute

An increase in the number of people choosing to walk, cycle and use transit reduces GHG emissions. More compact, complete, connected communities should see an increase in the use of these transportation modes.

	1996		2001		2006	
	People	%	People	%	People	%
Car, Truck, Van as Driver	22,145	83	23,165	84	25,685	81
Car, Truck, Van as Passenger	2,005	7	1,990	7	2,825	9
Public Transit	215	1	170	1	340	1
Walked	1,705	6	1,705	6	2,050	6
Bicycle	310	1	265	1	300	1
Motorcycle	40	0	45	0	105	0
Taxicab	20	0	0	0	25	0
Other Method	395	1	320	1	425	1

Commute Distance

Shorter commute distances generally reduce GHG emissions by increasing the likelihood of people walking, cycling or using transit. Commute distance is also indicative of the 'completeness' of a community from an employment perspective.

2006

People %

This data is currently unavailable in the CEEI 2007 Reports.

Cowichan Valley Regional District Updated 2007 Community Energy and Emissions Inventory

Parks and Protected Greenspace

* Total is net of Indian Reserves
** The quantity of parkland may be underestimated

Parks and protected greenspaces are important for the protection and enhancement of community carbon sinks.

	2009	
	Area (ha)	%
National Parks	5,582.4	1.6
Provincial Parks / Protected Areas	18,862.4	5.4
Local Parks	1,217.1	0.4
Agricultural Land Reserve	18,998.9	5.4
Other land use	304,848.1	87.2
Total Land Area	349,528.9	100.0

Supporting Indicators Under Consideration

The following supporting indicators are under consideration for inclusion in future CEEI reports. The 2007 CEEI reports provide these 'placeholder' indicators to give indication of data that may be provided in the future by the Province on an ongoing basis to assist in monitoring actions to reduce GHG emissions and energy consumption. Please submit feedback to CEEIRPT@gov.bc.ca (see survey on CEEI website).

On-Road Transportation (and Land Use)

Proximity to Transit	Persons, dwelling units (du) and employment within 400m of a quality transit stop/line
Proximity to Services	Persons and dwelling units (du) within 400m of services (e.g. grocery store, school, other retail etc.)
Transit Ridership	Annual per capita transit ridership

Buildings

Residential; Public Building Energy Intensity Floor Space	Average energy use per person per square metre of floor space
	Average residential dwelling unit size

Solid Waste (and Water)

Waste Diversion	Tonnes of waste diverted
Avoided Waste Emissions	Tonnes of CO ₂ e of avoided future emissions due to reduced waste since 2007
Water Use	Per capita residential water use

Land-Use Change

Impervious Surface Cover	% change in impervious surface cover
Tree Canopy Cover	% change in tree canopy cover

Community and Renewable Energy Supply

District Energy	# and energy output (e.g. buildings connected, energy consumed in GJ or kWh) of district energy systems by energy type (e.g. renewable or non-renewable)
On-Site Renewable Energy	# and energy output (in GJ or kWh) from households producing and/or consuming on-site renewable heat (e.g. biomass, solar thermal, geo-exchange) and/or electrical (e.g. solar photovoltaic, small wind, small scale hydro) energy
Energy Recovery From Waste	Energy (GJ or kWh) recovered from waste (e.g. from landfill gas, sewage treatment, industrial operations, farm)

This is your local government's Updated 2007 Community Energy and Emissions Inventory (CEEI) Report

What is a CEEI Report?

CEEI Reports are a result of a multi-agency effort to provide a province-wide solution to assist local governments in BC to track and report on community-wide energy consumption and greenhouse gas (GHG) emissions every two years. CEEI Reports are one of the many resources available through the Climate Action Toolkit (<http://www.toolkit.bc.ca>), a web-based service provided through the ongoing collaboration between UBCM and the Province.

Why does my local government need a CEEI Report?

A community energy and GHG emissions inventory can be a valuable tool that helps local governments plan and implement GHG and energy management strategies, while at the same time strengthening broader sustainability planning at the local level. CEEI reports fulfill local governments' Climate Action Charter commitment to measure and report their community's GHG emissions profile, establish a base year inventory for local governments to consider as they develop targets, policies, and actions related to BC's *Local Government Act* requirements, and fulfill Milestone One requirements for those local government members of the Federation of Canadian Municipalities' (FCM's) Partners in Climate Protection (PCP) program.

A first in North America!

CEEI is a first in North America and a first step for BC communities. The 2007 CEEI Reports are based on best available province-wide data. The accuracy and detail of CEEI reports will continue to improve to meet increasing local and provincial government information needs. Improvements have been made from the original draft 2007 CEEI Reports posted in Spring 2009. These include estimates for residential heating oil, propane and wood use, breaking out small and medium from large industrial buildings, including updated land-use change and new agricultural sectors as 'memo items', and the first of a suite of 'supporting indicators'. Following the 2010 CEEI Reports, inventories will be generated every two years, and will continue to improve as government information needs, international protocols and new data sources emerge.

+++++

For More Information:

- The full list of all BC local government Updated 2007 CEEI Reports, CEEI Data Summary Report, Technical Methods and Guidance Document, and additional information on the Secondary Indicators are available at: <http://www.env.gov.bc.ca/cas/mitigation/ceei/index.html>.
- For guidance on target setting and community actions, go to <http://www.toolkit.bc.ca> and <http://www.cd.gov.bc.ca/lgd/greencommunities/targets.htm>.

We Need Your Feedback:

- To continue to guide us on CEEI, particularly now with the new Indicators. Please take the time to complete the short CEEI Survey at <http://www.env.gov.bc.ca/cas/mitigation/ceei/index.html> or contact us directly at CEEIRPT@gov.bc.ca

Notice to the Reader: This CEEI Report uses information from a variety of sources to estimate GHG emissions. While the methodologies, assumptions and data used are intended to provide reasonable estimates of greenhouse gas emissions, the information presented in this report may not be appropriate for all purposes. The Province of BC and the data providers do not provide any warranty to the user or guarantee the accuracy or reliability of the data contained in this report. The user accepts responsibility for the ultimate use of such data. We need your help to make these reports better, where you do note inaccuracies, please contact us.



STAFF REPORT

REGIONAL SERVICES MEETING OF MAY 26, 2010

DATE: May 18, 2010 **FILE NO:** 5280—01/BUD

FROM: Kate Miller, Manager, Regional Environmental Policy Division

SUBJECT: 2010 budget update

Recommendation: for information purposes only

Purpose:

To update the Board regarding the disposition of approved funds.

Financial Implications:

No change to the approved budget.

Interdepartmental/Agency Implications:

The proposed plan will assist with meeting Board commitments to fulfill Climate Action Charter commitments and lend additional capacity to the Environmental Policy Division department.

Background:

The Environmental Policy Division and the CVRD Environment Commission made a number of recommendations for the 2010 budget year. These included a recommendation that additional staff be allocated and that a corporate GHG plan be developed. The Board approved a total allocation of \$85,000 to the annual budget and requested that staff report back on how to achieve the proposed objectives.

Additional staff will be hired in June to fill the approved position, and the residual budget in concert with the new position will allow the division to undertake the Corporate GHG Analysis and Reduction Plan in combination with the approved 2010 Regional Gas Tax funding. The provincial government Climate Action Revenue Incentive Program (CARIP) is designed to offset the carbon tax paid by local governments who have committed to the goal of becoming carbon neutral in their corporate operations by 2012 under the BC Climate Action Charter. These funds can also be used to offset the costs of the CVRD to develop its strategic plans to meet the Climate action charter obligations.

Submitted by,

Kate Miller, Manager
Regional Environmental Policy Division

Z:\Staff Reports\2010 Budget decision.docx

General Manager Approval:

Signature