HARRISON HOT SPRINGS
Naturally Refreshed

VILLAGE OF HARRISON HOT SPRINGS
NOTICE OF MEETING AND AGENDA

REGULAR COUNCIL MEETING

Date: Monday, September 12, 2011
Time: 7:00 p.m.
Location: Council Chambers, Village Office, 495 Hot Springs Road, Harrison Hot Springs, British Columbia

1. CALL TO ORDER			
	(a)	Meeting called to order by Mayor Becotte	
2. INTRODUCTION OF LATE ITEMS			
3. APPROVAL OF AGENDA			
4. ADOPTION OF COUNCIL MINUTES			
❑ **Regular Council Meeting Minutes – August 8, 2011**		**THAT** the minutes of the Regular Council Meeting of August 8, 2011 be adopted.	**Item 4.1 Page 1**
5. BUSINESS ARISING FROM THE MINUTES			
			Item 5.1
6. CONSENT AGENDA			
i. Bylaws ❑ **Bylaw No. 960 Development Cost Charge** ❑ **Bylaw No. 983 Parking Repeal Bylaw** Recommendation: **THAT** Bylaw No. 960 Development Cost Charge Bylaw be adopted; and **THAT** Bylaw No. 983 Parking Repeal Bylaw be adopted.			**Item 6.i Page 9 Page 19**
ii. **Agreements** None			**Item 6.ii**

iii. Committee/ Commission Minutes Advisory Planning Commission June 21, 2011 Communities in Bloom of June 9, 2011 Community Sustainability Action Committee of July 20, 2011	Item 6.iii Page 21 Page 23 Page 27
iv. Correspondence Letter from BC Hydro – Funding Available for Electric Beautification Projects – September 2, 2011 Letter from British Columbia Achievement Foundation – August 25, 2011	Item 6 iv Page 31 Page 35
Recommendation: **THAT** the bylaws on the consent agenda be adopted and the Committee/Commission Minutes be received.	

7. DELEGATIONS AND PETITIONS

	Item 7.1

8. CORRESPONDENCE

	Item 8.1

9. BUSINESS ARISING FROM CORRESPONDENCE

10. REPORTS OF COMMITTEES, COMMITTEE OF THE WHOLE AND COMMISSIONS

11. REPORTS FROM MAYOR

K. Becotte – verbal

12. REPORTS FROM COUNCILLORS

D. Harris - verbal
D. Kenyon - verbal
A. Jackson - verbal
B. Perry – verbal

13. REPORTS FROM STAFF

❑ Appointment of Deputy Fire Chief	**Report of Fire Chief – September 2, 2011** Re: Appointment of Deputy Fire Chief Recommendation:	Item 13.1 Page 37

	THAT Mayor and Council ratify the appointment of Mr. Don Driedger to the position of Deputy Fire Chief for the Village of Harrison Hot Springs until the next scheduled fire department election in January 2012	
❑ Social Media Policy 2.13	**Report of Deputy Chief Administrative Officer/ Corporate Officer – September 8, 2011** Re: Social Media Policy 2.13 Recommendation: **THAT** Social Media Policy 2.13 be adopted.	Item 13.2 Page 39
❑ Water System Supply and Treatment	**Report of Operations Manager – September 12, 2011** Re: Water System Supply and Treatment Recommendation: **THAT** Council approves proceeding with the Ground Water Supply and Treatment option.	Item 13.3 Page 43
❑ Draft Integrated Community Sustainability Plan (Sustainable Harrison)	**Report of Community and Economic Development Officer – September 12, 2011** Re: Draft Integrated Community Sustainability Plan (Sustainable Harrison) Recommendation: **THAT** Council receive the Draft Report and authorize staff to host a Public Open House to have further community dialogue on the Sustainable Harrison ICSP.	Item 13.4 Page 133
14. BYLAWS		
❑ Bylaw 982, 2011 – Waste Collection and Disposal Amendment	**Report of Deputy Chief Administrative Officer/ Corporate Officer – August 30, 2011** Re: Waste Collection and Disposal Amendment Bylaw No. 982, 2011 Recommendations: **THAT** third reading of Waste Collection and Disposal Amendment Bylaw No. 982 be rescinded; and **THAT** Waste Collection and Disposal Amendment Bylaw No. 982 be given third reading as amended.	Item 14.1 Page 135
❑ Bylaw 984, 2011 - Water Regulation Amendment Bylaw	**Report of Deputy Chief Administrative Officer/ Corporate Officer – August 30, 2011** Re: Water Regulation Amendment Bylaw No. 984, 2011 Recommendations: **THAT** Water Regulation Amendment Bylaw No. 984, 2011 receive first,	Item 14.2 Page 139

	second and third reading.	
❑ Bylaw 985, 2011 - Sewer Regulation Amendment Bylaw	**Report of Deputy Chief Administrative Officer/ Corporate Officer – August 30, 2011** Re: Sewer Regulation Amendment Bylaw No. 985 Recommendations: **THAT** Sewer Regulation Amendment Bylaw No. 985, 2011 receive first, second and third reading.	Item 14.3 Page 143
❑ Bylaw 987, 2011 - Sign Amendment Bylaw	**Report of Chief Administrative Officer –September 8, 2011** Re: Sign Bylaw No. 987 Recommendations: **THAT** Council gives Sign Bylaw No. 987, 2011 first, second and third reading.	Item 14.4 Page 149
❑ Bylaw 988, 2011 – OCP Amendment Bylaw	**Report of Community and Economic Development Officer –September 8, 2011** Re: OCP Amendment Bylaw No. 988 Recommendation: **THAT** OCP Amendment Bylaw No. 988, 2011 be read for a first and second time; and **THAT** Council authorize a Public Hearing; and **THAT** OCP Amendment Bylaw No. 988, 2011 be referred to the Advisory Planning Commission for review and comment.	Item 14.5 Page 161
❑ Bylaw 989, 2011 – Zoning Amendment Bylaw	**Report of Community and Economic Development Officer –September 8, 2011** Re: Zoning Amendment Bylaw No. 989 Recommendation: **THAT** Zoning Amendment Bylaw No. 989, 2011 be read for a first and second time; and **THAT** Council authorize the Public Hearing; and **THAT** Zoning Amendment Bylaw No. 989, 2011 be referred to the Advisory Planning Commission for review and comment.	Item 14.6 Page 177
❑ Bylaw 990, 2011 – Zoning	**Report of Community and Economic Development Officer –September 8, 2011**	Item 14.7

Amendment Bylaw	Re: Bylaw No. 990 Zoning Amendment – Zoning Application – Jacobi, Lot B Echo Avenue Recommendations: **THAT** Bylaw No. 990 Zoning Amendment be read a first, second time and authorize the holding of a public hearing; and **THAT** the application be referred to the Advisory Planning Commission for review and comment.	Page 181

15. QUESTIONS FROM THE PUBLIC (PERTAINING TO AGENDA ONLY)

16. ADJOURNMENT

HARRISON HOT SPRINGS
Naturally Refreshed

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15. QUESTIONS FROM THE PUBLIC (PERTAINING TO AGENDA ONLY)

16. ADJOURNMENT

VILLAGE OF HARRISON HOT SPRINGS
MINUTES OF THE REGULAR MEETING OF COUNCIL

DATE: August 8, 2011
TIME: 7:00 p.m.
PLACE: Council Chambers, 495 Hot Springs Road

IN ATTENDANCE: Mayor Ken Becotte
Councillor Bob Perry
Councillor Dave Harris
Councillor Allan Jackson
Councillor Dave Kenyon

CAO, Ted Tisdale
CEDO, Andre Isakov
DCAO/Corporate Officer, Debra Key
Operations Manager, Ian Gardner
Manager of Revenue Services, Peggy Parberry

Recording Secretary, Krystal Sobie

ABSENT:

1. CALL TO ORDER

The Mayor called the meeting to order at 7:00 p.m.

2. INTRODUCTION OF LATE ITEMS

❑ Development Cost Charge Bylaw No. 960

Development Cost Charge Bylaw No. 960.

3. APPROVAL OF AGENDA

Moved by Councillor Perry
Seconded by Councillor Harris

THAT the agenda be approved as amended.

CARRIED UNANIMOUSLY

4. ADOPTION AND RECEIPT OF MINUTES

Moved by Councillor Kenyon
Seconded by Councillor Jackson

❑ Regular Council Meeting Minutes – July 11, 2011

THAT the minutes of the Regular Council Meeting of July 11, 2011 be adopted;

CARRIED UNANIMOUSLY

5. **BUSINESS ARISING FROM THE MINUTES**

None

CONSENT AGENDA

i. Bylaws None

None

ii. Agreements

iii. Committee/ Commission Minutes Canada Day Committee of June 21, 2011
Community Sustainability Action Committee of July 5, 2011

iv. Correspondence None

Moved by Councillor Jackson
Seconded by Councillor Harris

THAT the Committee/Commission Minutes be received.

CARRIED UNANIMOUSLY

DELEGATIONS

❑ BC Transit

Johann Van Schaik of BC Transit provided a brief overview of the 25 year Transit Future Plan. It was noted by Council that once the second bus was brought in, on time service was greatly improved. The Mayor noted that a 25 year plan may be too long of a period due to how fast technology changes.

8. **CORRESPONDENCE**

None

9. **BUSINESS ARISING OUT OF CORRESPONDENCE**

None

REPORTS OF COMMITTEES, COMMITTEE OF THE WHOLE AND COMMISSIONS

None

10. **REPORTS FROM MAYOR**

A special thank you to the Operations Manager and the Public Works Staff for all of the hard work being done on the beach front.

The Band Stand is close to completion.

The Suppression Crew was reluctant to work on the Campbell Lake Trail without a dangerous tree report due to the number of trees that have fallen. It was noted that they would most likely be able to return in the fall to continue the work.

An Open for House for the Traffic Calming Plan has been scheduled for Wednesday, August 10, 2011 from 4:00 – 8:00 p.m.

11. **REPORTS FROM COUNCILLORS**

Councillor Harris Communities in Bloom evaluation took place July 19, 20, and 21st.

Councillor Kenyon Has been talking with locals and tourists on their opinion of what our community is like.

Councillor Jackson CSAT's vision is on the Village's website, as well as a survey to provide comment and feedback.

Councillor Perry Attended Fraser Health's Government meeting on July 20, 2011 in Guildford.

Attended Community to Community Forum. Next meeting will take place in Chehalis.

12.

❑ Appointments – 2011 Election

Moved by Councillor Jackson
Seconded by Councillor Harris

Report of Deputy Chief Administrative Officer/Corporate Officer – August 3, 2011
Re: Appointment – 2011 Election

THAT pursuant to Section 41(1) and (2) of the *Local Government Act,* Janice Fulton be appointed Chief Election Officer for conducting the 2011 general local elections with power to appoint other election officials as required for the administration and conduct of the 2011 general local elections;

AND THAT Margaret Wootten be appointed Deputy Chief Election Officer for the 2011 general local elections.

CARRIED UNANIMOUSLY

❑ Blue Flag Program Update

Moved by Councillor Kenyon
Seconded by Councillor Harris

Report of Community Economic Development Officer – August 3, 2011
Re: Blue Flag Program Update

THAT Council receive the Blue Flag Feasibility Study and authorize the staff to proceed with the implementation of the report recommendations;

AND THAT Council send a letter of support to the Blue Flag Program welcoming it and its delegates to Harrison Hot Springs for the informational meeting.

CARRIED UNANIMOUSLY

❑ CIB Conference – October 2011 – Quebec City, Quebec

Moved by Councillor Kenyon
Seconded by Councillor Perry

Report of Admin/Finance Clerk – August 3, 2011
Re: 2011 CIB Conference – October 2011 – Quebec City, Quebec

THAT staff research cost for accommodations, flights, and registration for four committee members to attend the Communities in Bloom conference in Quebec City;

AND THAT Councillor's Jackson's cost be allocated to his Council budget.

CARRIED UNANIMOUSLY

❑ Canadian Cancer Society – Banning of Cosmetic Chemical Pesticides

Moved by Councillor Jackson
Seconded by Councillor Perry

Report of Deputy Chief Administrative Officer/Corporate Officer – August 3, 2011
Re: Canadian Cancer Society – Banning of Cosmetic Chemical Pesticides

THAT a letter be forwarded to the Canadian Cancer Society to support their campaign to the Province to ban the use and sale of cosmetic chemical lawn and garden pesticides in BC.

CARRIED UNANIMOUSLY

Councillor Harris excused himself from chambers at 8:01 p.m. due to any potential conflict of interest as he is employed with Civic Consultants.

❑ Sanity Sewer Rehabilitation Project

Moved by Councillor Jackson
Seconded by Councillor Perry

Report of Operations Manager – August 8, 2011
Re: Sanitary Sewer Rehabilitation Project

THAT the Sanitary Sewer Rehabilitation Project Contract be awarded to Mar-Tech Underground Services Ltd. for the tendered amount of $239,729.00 plus HST.

CARRIED UNANIMOUSLY

Councillor Harris re-entered the chambers at 8:03 p.m.

❑ Purchase of New Village Pins

Moved by Councillor Kenyon
Seconded by Councillor Perry

Report of Manager of Revenue Services – July 27, 2011
Re: Purchase of New Village Pins

THAT Council accepts the quote from Treasure House Imports for the new design and purchase of lapel pins with a stainless steel boarder.

CARRIED UNANIMOUSLY

13. **BYLAWS**

❑ Repealing Bylaw No. 983

Moved by Councillor Jackson
Seconded by Councillor Harris

Report of Deputy Chief Administrative Officer/Corporate Officer – August 2, 2011
Re: Repealing Bylaw No. 983

THAT Repeal Bylaw be given first, second, and third reading.

CARRIED UNANIMOUSLY

❑ Waste Collection and Disposal Amendment Bylaw No. 982

Moved by Councillor Kenyon
Seconded by Councillor Jackson

Report of Deputy Chief Administrative Officer/Corporate Officer – August 2, 2011
Re: Waste Collection and Disposal Amendment Bylaw No. 982

THAT Waste Collection and Disposal Amendment Bylaw No. 982 receive first, second and third reading.

CARRIED UNANIMOUSLY

❑ Development Cost Charge Bylaw No. 960

Moved by Councillor Perry
Seconded by Councillor Jackson

Development Cost Charge Bylaw No. 960

THAT the third reading of Development Cost Charge Bylaw No. 960 be rescinded.

CARRIED UNANIMOUSLY

Moved by Councillor
Seconded by Councillor

THAT Development Cost Charge Bylaw No. 960 receives third reading as amended.

CARRIED UNANIMOUSLY

14. **QUESTIONS FROM THE PUBLIC**

A member of the public asked when the bus stop sign that was outside of the Visitor Centre would be replaced.

A member of the public asked if the Blue Flag Programs addresses boats being parked on Rendall Park.

A member of the public addressed the concern of lack of garbage cans along the south side of Esplanade between Hot Springs Road and Maple.

A member of the public requested that the one way traffic signs be re-painted on Hot Springs Road and Esplanade.

15. **ADJOURNMENT**

Moved by Councillor Jackson
Seconded by Councillor Perry

THAT the meeting be adjourned.

The meeting adjourned at 8:24 p.m.

CARRIED UNANIMOUSLY

Ken Becotte
Mayor

Debra Key
Corporate Officer

7

HARRISON HOT SPRINGS
Naturally Refreshed

VILLAGE OF HARRISON HOT SPRINGS
BYLAW NO. 960

A bylaw to impose Development Cost Charges

WHEREAS pursuant to Sections 933 and 934 of the *Local Government Act* Council may impose terms and conditions for Development Cost Charges.

AND WHEREAS the Development Cost Charges may be imposed for the purpose of providing funds to the Village to pay the Capital Costs of constructing, altering or expanding sewage, water, drainage and highways and for providing and improving parkland in order to serve, directly or indirectly the developments for which the charges are imposed.

AND WHEREAS a Development Cost Charge is not payable if a development cost charge has been previously paid for the same development, unless as a result of further development, new capital cost burdens will be imposed on the Village.

AND WHEREAS in imposing the development cost charges, Council has taken into consideration future land use patterns and development, the phasing of works and services, the provision and improvement of parkland and whether the charges:

1. Are excessive in relation to the capital cost of prevailing standards of service in the Village;
2. Will deter development;
3. Will discourage the construction of reasonably priced housing or the provision of reasonably priced serviced land in the Village; or
4. Will discourage the development or redevelopment of commercial properties which would otherwise provide employment and economic diversity and stability in the community.

AND WHEREAS, the Village has not viewed its Development Cost Charge bylaw since 2000, and the new charges imposed by this bylaw are related to the capital costs of projects included in the Village's 10 year financial plan.

NOW THEREFORE in open meeting assembled, the Mayor and Council of the Village of Harrison Hot Springs enacts as follows:

1. CITATION

This Bylaw may be cited for all purposes as the Village of Harrison Hot Springs "Development Cost Charges Bylaw No. 960, 2011".

2. DEFINITIONS

"Campsite" means an area within a campground or Recreational Vehicle park that is primarily designated for camping purposes including the use of Recreational Vehicle trailers and similar devices.

"Commercial Development" means a building or structure or land used or intended to be used for the carrying on of any business, including the sale and provision of goods, accommodations, entertainment, meals or services, but excludes institutional or residential development.

"Dwelling Unit" means a self contained residential unit including a cooking facility and consisting of one or more habitable rooms designed and used for the accommodation of one person or family.

"Gross Floor Area" means the combined area of all floors within a building, including any basement, cellar or crawlspace, measured to the inside surface of the exterior walls of the building, but excluding areas for parking, elevator shafts, stairwells, and heating and ventilating fixtures.

"Institutional Development" means a building or structure used or intended to be used only on a non-profit basis for cultural, recreational, social, religious, governmental, public hospital or educational purposes.

"Multi-Family Residential Development" means a development for residential purposes, which results in more than one dwelling or sleeping unit on a single property and has an overall net minimum density of 25 units per hectare.

"Residential Subdivision" means a subdivision under the *Land Title Act* or the *Strata Property Act* which creates parcels for residential occupancy.

"Single Family Residential Development" means a development for residential purposes, which results in one dwelling or sleeping unit on a single property.

"Sleeping Unit" means one or more habitable rooms used for the lodging of a person or persons.

3. DEVELOPMENT COST CHARGES

a. Every person who obtains approval of a residential subdivision or a building permit authorizing the construction alteration or extension of a building a structure shall pay at the time of the approval of the subdivision or the issuance of a building permit, as applicable, the relevant development cost charges as set out in Schedules "A" to "D" of this bylaw.

b. Section 3.a does not apply to those properties that are exempt from taxation and Section 220 (1) (h) or 224 (2) (f) of the *Community Charter*, or if the total value of the work authorized in the building permit is less than $50,000 or another amount prescribed by the Minister of Community, Sport and Cultural Development.

c. DCC'S less than $50,000.00 must be paid in full at the time of subdivision approval or issuance of a building permit.

d. DCC'S in excess of $50,000.00 may be paid by installments as authorized by the ministerial regulation.

4. DEVELOPMENT COST CHARGE CREDITS

a. Where development cost charges (DCCs) are payable and the services are constructed by the owner, a DCC credit will be provided and calculated as the lesser of:

   i) the estimated cost of construction of the services including engineering, design and inspection less the Village's assist factor;
   ii) The estimated DCCs as provided for in the DCC Bylaw;
   iii) The amount of DCCs payable for each service as set out in the DCC Bylaw.

b. Credits will be applied towards DCCs payable as follows:

   i) Where DCCs are paid as a lump sum, the rebate will be credited towards the lump sum payments; and

   ii) Where the DCCs are to be paid in installments the credits will be deducted from the total DCCs payable.

5. **MULTIPLE USE**

When a building or structure is used or intended to be used for more than one class of development, charges under this bylaw shall be calculated separately for each class as though the area was a separate building and the amount payable shall be considered for all classes.

6. **EXCEPTIONS**

Regardless of Section 3, Development Cost Charges are not payable under this schedule within an area of land that is:

a. Not serviced by a community water system; and

b. Will not be provided with a community water system that will not serve the subdivision or development for which approval is sought.

7. **SCHEDULES**

(a) Schedule "A" Development Cost Charges for Community Water Service

(b) Schedule "B" Development Cost Charges for a Community Sanitary Sewer System

(c) Schedule "C" Development Cost Charges for Community Drainage Services

(d) Schedule "D" development Cost Charges for Parkland Acquisition and improvements

attached hereto and forming part of this bylaw.

10. **REPEAL**

(a) "The Village of Harrison Hot Springs Bylaw No. 506 and all amendments, 536, 744 and 763 thereto are hereby repealed in their entirety.

READINGS AND ADOPTION

READ A FIRST TIME THIS 6th DAY OF JANUARY, 2011

AMENDED AND READ A SECOND TIME THIS 14th DAY OF MARCH, 2011

READ A THIRD TIME THIS 14th DAY OF MARCH, 2011

RESCINDED THIRD READING THIS 8th DAY OF AUGUST, 2011

AMENDED AND RE-READ A THIRD TIME THIS 8th DAY OF AUGUST, 2011

APPROVED BY THE INSPECTOR OF MUNICIPALITIES THIS 26th DAY OF AUGUST, 2011

ADOPTED THIS DAY OF , 2011

Mayor	Corporate Officer

Schedule "A"

Development Cost Charges for Community Water Service

1. Development Cost Charges are payable for community water services as follows:

Class of Development	Development Cost Charge
Residential Subdivision or Single Family Building Permit	$5,357/unit/parcel
Multi-Family Residential	$4,018/unit
Commercial (a) if a building or structure (b) if a campsite Institutional	 $21. Per square metre of gross floor area $9.50 Per square metre of the gross area of the campsite $21. Per square metre of gross floor area

2. The assist factor for a community water system will be 5%.

Schedule "B"

Development Cost Charges for a Community Sanitary Sewer System

1. The development cost charges are payable for a community sanitary sewer services as follows:

Class of Development	Development Cost Charge
Residential Subdivision or Single Family Building Permit	$6,653/unit/parcel
Multi-Family Residential Dwelling	$4,990/unit
Commercial (a) if building or structure (b) if campsite Institutional	 $53/square metre of gross floor area $17/square metre of land designated for the campsite $53/square metre of gross floor area

2. The assist factor for a community sanitary sewer system will be 5%.

Schedule "C"

Development Cost Charges for Community Drainage Service

1. Development Cost Charges are payable for community drainage services as follows:

Class of Development	Development Cost Charge
Residential Subdivision or Single Family Building Permit	$4,294/unit/parcel
Multi-Family Residential Dwelling	$3,435/unit
Commercial (a) if building or structure (b) if campsite Institutional	 $21/square metre of gross floor area $0 $21/square metre of gross floor area

2. The assist factor for a community drainage services will be 5%.

Schedule "D"

Development Cost Charges for Parkland Acquisition and Improvements

1. Development Cost Charges are payable for parkland acquisition and improvements as follows:

Class of Development	Development Cost Charge
Residential Subdivision or Single Family Building Permit	$2,290/unit/parcel
Multi-Family Residential Dwelling	$2,290/unit
Commercial (a) if building or structure (b) if campsite Institutional	 $0 $0 $0

2. The assist factor for a parkland acquisition and improvements will be 5%.

BRITISH COLUMBIA

Statutory Approval

Under the provisions of section 937

of the Local Government Act

I hereby approve Bylaw No. 960

of the Village of Harrison Hot Springs,

a copy of which is attached hereto.

Dated this 26th *day*

of August *, 2011*

Deputy inspector of Municipalities

Stat Appl 31/04/2011

HARRISON HOT SPRINGS
Naturally Refreshed

VILLAGE OF HARRISON HOT SPRINGS
BYLAW NO. 983

A bylaw to repeal Parking Bylaw No. 587 and amendment No. 658

WHEREAS the Mayor and Council adopted Parking Bylaw No. 587 and Parking Amendment Bylaw No. 658;

AND WHEREAS Parking Bylaw No. 587 and Parking Amendment Bylaw No. 658 must be repealed;

NOW THEREFORE in open meeting assembled, the Mayor and Council of the Village of Harrison Hot Springs enacts as follows:

1. CITATION

This Bylaw may be cited for all purposes as the Village of Harrison Hot Springs "Parking Repeal Bylaw No. 983, 2011".

2. REPEAL

The following bylaws are hereby repealed:

(a) The Corporation of the Village of Harrison Hot Springs Parking Bylaw No. 587, 1993; and

(b) The Corporation of the Village of Harrison Hot Springs Bylaw Parking Amendment Bylaw 658, 1995.

7. READINGS AND ADOPTION

READ A FIRST TIME THIS 8th DAY OF AUGUST, 2011

READ A SECOND TIME THIS 8th DAY OF AUGUST, 2011

READ A THIRD TIME THIS 8th DAY OF AUGUST, 2011

ADOPTED THIS DAY OF , 2011

Mayor

Corporate Officer

VILLAGE OF HARRISON HOT SPRINGS
ADVISORY PLANNING COMMISSION MEETING

DATE: June 21, 2011
TIME: 9:00 a.m.
PLACE: Council Chambers

IN ATTENDANCE: Leo Facio (Chair)
Councillor, Allan Jackson
Alan Birtch
Marg Doman
Ted Tisdale, Chief Administrative Officer
Brian Bignell
Harvey Ruggles
Andre Isakov, CEDO

Recording Secretary, K. Sobie

ABSENT:

Michael Rosen, Planning Consultant
Raymond Hooper
Lorne Lees (Deputy Chair)

1. **CALL TO ORDER**

The Chair called the meeting to order at 9:00 a.m.

2. **LATE ITEMS**

3. **ADOPTION OF MINUTES**

❒APC minutes of February 15, 2011

Moved by Marg Doman
Seconded by Harvey Ruggles

THAT the minutes of the Advisory Planning Commission meeting of February 15, 2011 be adopted.

CARRIED

4. **DELEGATIONS/PETITIONS**

None

5. **CHAIRPERSON REPORT**

None

6. **ITEMS FOR DISCUSSION**

❒ Planning Area One/ Juneau Property

Discussion of Juneau's plans went around the table. It was mentioned that look of the building was very uniform and some diversity would be nice. It was noted that to proceed with the plans an OCP amendment will be needed.

❒ Report of Planning Consultant – Rezoning Application Kingma

Discussion of the access point to Campbell Lake Trail went around the table. At this time the APC agrees with what happened at the Council meeting and look forward to the next steps.

7. **ADJOURNMENT**

Moved by Harvery Ruggles
Seconded by Marg Doman

THAT the meeting be adjourned at 9:45 a.m.

CARRIED

Leo Facio
Chair

Krystal Sobie
Recording Secretary

VILLAGE OF HARRISON HOT SPRINGS
MINUTES OF THE COMMUNITIES IN BLOOM COMMITTEE

DATE: June 9, 2011
TIME: 2:30 p.m.
PLACE: Council Chambers, Harrison Hot Springs, BC

IN ATTENDANCE: Dave Harris, Chair
Allan Jackson, Co-Chair
Jane Kivett
Maureen Wendt
Heather Coxon

Heather Grant, Recording Secretary

ABSENT: Carol Hepnar

1. **CALL TO ORDER**

The Chair called the meeting to order at 2:30 p.m.

2. **INTRODUCTION OF LATE ITEMS**

(g) Naming of Bridges
(h) Children's Garden

2. **RECEIPT OF MINUTES**

☐Adoption of Minutes May 19, 2011

Moved by Jane Kivett
Seconded by Heather Coxon

THAT the minutes of the May 19, 2011 Communities in Bloom meeting be adopted.

CARRIED

3. **CHAIRPERSON'S REPORT**

COMMITTEE MEMBERS REPORT

4. **ITEMS FOR DISCUSSION**

☐ Winter Banners

Tabled.

❒ Potato Boxes	Meeting with grade 4 class Monday, June 13, 2011 at 12:45pm at the Community Garden to introduce them to the potato boxes.
❒ CIB Vests	The vests were shown to the committee. The committee discussed what type of decal they would place on the vest to identify them as committee members. The chair agreed to have 10 decals made for the vests.
❒Judges Evaluation Itinerary	Not discussed.
❒ Judges Presentation Book	The committee discussed items that should be included in book: carbon neutrality, sustainability, recycling program. At the next committee meeting the committee will discuss answers to judges questions and the logistics of their visit. The committee discussed what other projects they can get involved in; discussion of whether or not to display the name of those who paid for the wayfinding signage. The committee discussed the 2011 Evaluation form and its categories. It was suggested that the committee review the documents and discuss at the next meeting.
❒ CIB July Garden Tour and Tea	The committee discussed the package for Harrison Hot Springs. The committee discussed the logistics of moving people from one garden to the next. The committee agreed that an agenda should be prepared for the tour. The committee discussed gifts for the homeowners, it was decided that thank you notes would be appropriate and sufficient. The committee discussed getting a quote from Lori's Catering for the tea.
❒ Naming of Bridges	John Greene, Ed North, Inkman, Ruth Altendorf, Charlie Wilson were some of the suggested names. It may be required to obtain permission from the Ministry of Transportation before the bridges are named. **Moved by Jane Kivett** **Seconded by Maureen Wendt** **THAT** it will be recommended to Council that the bridges in Harrison Hot Springs be named after contributors to the community. CARRIED
❒ Children's Garden Clean up	Date TBD

4. **ADJOURNMENT**

Moved by Heather Coxon
Seconded by Maureen Wendt

The meeting adjourned at 3:57p.m.

_____ _____

Dave Harris, Chair Allan Jackson, Co-Chair

VILLAGE OF HARRISON HOT SPRINGS
COMMUNITY SUSTAINABILITY ACTION COMMITTEE

DATE: July 20, 2011
TIME: 10:30 a.m.
PLACE: Council Chambers

IN ATTENDANCE:

Andre Isakov, CEDO
Gail Guimont
Donna Cooney
Andy Strothotte
Leo Facio
Robert Reyerse
Barbara Smith
Bill Dietrich
Veronique Asters
Niek DeBrouwer
Shannon Gordon (by telephone)
Erin (by telephone)

Recording Secretary, K. Burr

ABSENT:

Mayor Ken Becotte
Councilor Alan Jackson, Chair
Councilor Dave Harris
Ray Hooper
Ed Stenson

1. **CALL TO ORDER**

In absents of the Chair, Andre Isakov, Community Economic Development Officer called the meeting to order at10:35 a.m.

Moved by Robert Reyerse
Seconded by Gail Guimont

THAT Leo Facio be appointed as acting Chair for the purpose of the meeting of July 20, 2011.

CARRIED

2. **LATE ITEMS**

3. **ADOPTION OF MINUTES**

☐CSAT minutes of June 7, 2011

Moved by Andy Strothotte
Seconded by Donna Cooney

THAT the minutes of the Community Sustainability Action Committee meeting of July 5, 2011 be adopted.

CARRIED

4. **DELEGATIONS/PETITIONS**

None

5. **CHAIRPERSON REPORT**

None

6. **ITEMS FOR DISCUSSION**

❒ Review and Confirm Meeting agenda

A brief overview of the meeting was provided.

❒ Discription of DOS Statements

Art, Culture, Recreation and Leisure

- "Harrison's offerings authentically reflect and respect the scale, nature and vibrant yet serene character of the community allowing pride of community."
- Non-motorized recreation – is meant to minimize the impact and focus on low impact options
- "Harrison continues to encourage recreation offerings that are low-impact, non-motorized options that are serviced by preferred forms of transportation."
- "Preferred" to be identified in the glossary
- "The arts, culture, recreation and leisure sectors protect Harrison's natural and recreational areas as essential community assets, monitoring and managing carrying capacities to ensure ongoing use."

Economy and Tourism

- "Harrison tourism experience is memorable authentic and transformational – it meets needs and exceeds their expectations."
- Transformational – reconnect, refresh, rejuvenate
- Add transformational to the glossary

Building and Site

- Authentic/Unique to describe – authentic is the best choice

Land Use Areas

- No further comments

Bill left the meeting at 11:46 a.m.
Education, Health and Social Services

- Changes will be made on the next update

Transportation and Mobility

- Universally accessibly will be added to the glossary

Food

- Veronique's changes will be added to the updated draft that will be e-mailed out

Energy, Waste and Water System

- "Harrison's lake is protected as the community's water source through careful management of access and activities are carefully managed within."

❒ Dicussion/Feedback regarding CR elements

Some committee members did not receive the CR elements so it will be tabled until the next meeting.

❒ Discussion of Indicators

Indicators are based on measuring what matters in Harrison.
Indicator are selected by four main components:
1.Validity
2.Reliability
3.Resource intensity
4.Comparability

❒ Next Steps and Meeting

Next meeting will be held on August 9, 2011. Community input will be acknowledged through an online survey in the near future.

7. **ADJOURNMENT**

Moved by Andy Strothotte
Seconded by Donna Cooney

THAT the meeting be adjourned at 12:09 p.m.

CARRIED

Debra Key
Corporate Officer

Krystal Sobie
Recording Secretary

6.iv

BC hydro REGENERATION | 50

RECEIVED
BY V. OF H.H.S.

Distribution Engineering & Design
British Columbia Hydro and Power Authority
Phone: 604.543.4147
Fax: 604.543.6030
email: gerald.gerwin@bchydro.com

FILE #	DATE	
1855-01	Sept 6/11	
CAO	☐ CO	
☐ DCAO	☐ ADMIN/ FINANCE	
☐ DIRF	☐ B/L ENF	
☐ MGR DEV SVCS	☒ MAYOR	
☐ CEDO	☒ COUNCIL	
☐ OP. MGR		
ITEM - A	B (C)	
COUNCIL AGENDA		
DATE Sept 6/11		
	INITIAL	
(ITEMS: A-REQ. ACTION; B - INFO - W/RESP; C - INFO ONLY)		

2 September 2011

The Mayor and Council
Village of Harrison Hot Springs
Box 160, 495 Hot Springs Road
Harrison Hot Springs, BC V0M 1K0

Fax: 604.796.2192

Dear Mayor and Council:

Subject: Funding Available for Electric Beautification Projects

Annually, BC Hydro budgets one million dollars for municipal beautification projects. Municipalities wanting to place existing overhead distribution lines underground to address environmental concerns, improve visual aesthetics or accommodate community redevelopment projects are welcome to apply for funding.

Funding is available for one-third of the BC Hydro beautification project estimated cost and the original scope. The attachment describes our program in more detail.

If you are considering a beautification project, an application form (attached) not attached must be returned by October 1, 2011 with a description of the project, a map showing the extent of the project and an explanation of the project's objectives.

After receiving your application, we will prepare a "ballpark" estimate of cost for your municipality to consider. The municipality will be asked to confirm intent to fund two-thirds of the project's estimated cost and to confirm that the telephone utility has been advised of the project details. This confirmation must be received at BC Hydro by November 15, 2011 to be reviewed by our VP, Distribution Engineering & Design and the successful applicants will be notified in February. All accepted projects must begin within the fiscal year that they are approved and be completed within 12 months.

I would be pleased to answer any questions you may have about the program. If you would like to be considered for funding in 2012, please submit your application no later than October 1, 2011.

Sincerely,

Gerry Gerwin
Sr. Design Manager
Fraser Valley

cc: Ingo Moxon, BC Hydro
Arlene Shwetz, BC Hydro
Telus

Attachments:
i Application for Beautification Project Participation form
ii Beautification Projects information pamphlet

Application for Beautification Project Participation

BC hydro

Name of Municipality or City: _____

Location of Proposed Project: _____

_____

_____

_____

Site Plan Attached: ☐ Yes ☐ No

Reason For Project: _____

_____

_____

_____

_____

_____

_____

_____

Name and Position of responsible person completing this application:

_____ _____
Name *(please print)* Phone Number

_____
Position

_____
Signature

Distribution

Beautification Projects

Introduction

The purpose of BC Hydro's participation in Beautification Projects is to cooperate with municipal governments in achieving their objectives related to environmental concerns and visual aesthetics. This summarizes Hydro's policy and describes the principal considerations that should be included in a proposal for participation by Hydro.

Funding Objective

Municipal governments may request Hydro to share 1/3 of the cost to convert overhead distribution lines to underground.

The municipal objective will be one or more of the following:

a) to minimize or eliminate environmental concerns;
b) to improve visual aesthetics;
c) to accommodate a public redevelopment project.

In addition, consideration will be given to:

a) confirmed financing of remaining two-thirds;
b) projects which also provide benefits to Hydro.

Hydro Funding

Hydro's budget for Beautification Project participation is fixed annually (April 1 to March 31).

Applications must be received by October 1 for Hydro's upcoming fiscal year.

Applications which collectively exceed Hydro's budget must be reapplied for the following year.

Construction of Beautification projects must begin within the fiscal year Hydro has committed its share, and the applicant's intention must be to complete the project within 12 months.

Hydro participation is not contingent on provincial participation. Applications for provincial funding under the Revenue Sharing Act are at the discretion of municipalities.
NOTE: Municipalities must deal directly with Telephone and other third parties to negotiate the costs of undergrounding their facilities on the same poles.

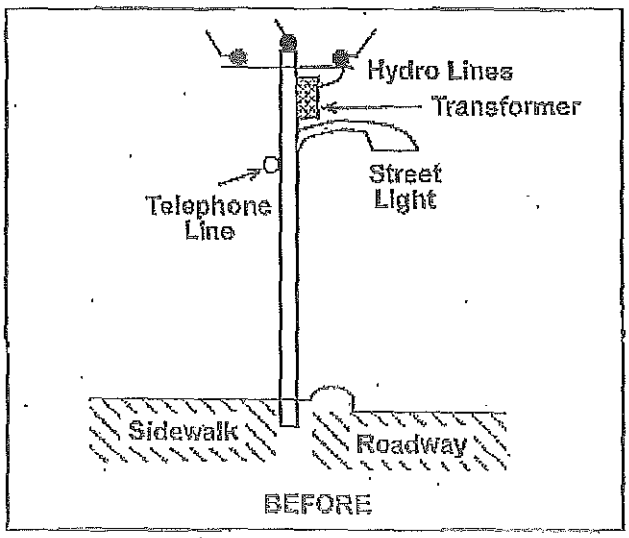
NOTE: Payment must be made to BC Hydro in advance of construction

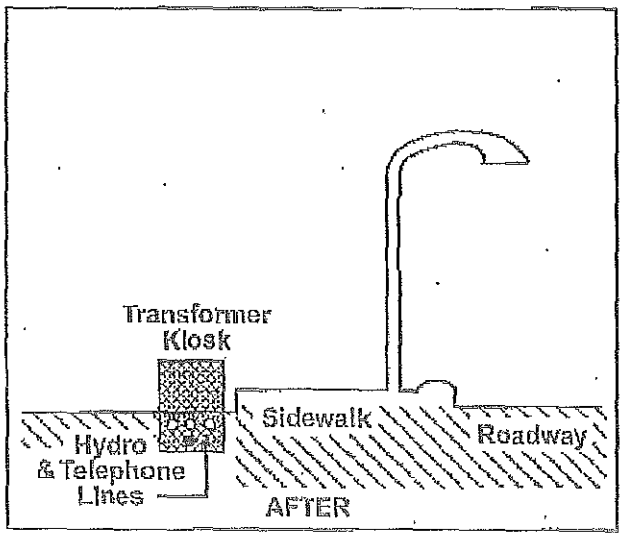
Cost Sharing (based on estimated cost & original project scope)

Includes work on:

a) physical plant and equipment owned and maintained by Hydro;
b) temporary overhead lines needed during the conversion;
c) restoration of roads, lawns, etc to a condition similar to that prevailing prior to the project;

(continued)





Diagrams illustrating a typical overhead electrical service before the work, and how underground service is typically arranged after the work. The example includes an instance where a transformer, street light and telephone line are involved.

Shared costs exclude work on:

a) ornamental street lighting systems;
b) physical plant and equipment not owned and maintained by Hydro;
c) customer requests for alterations to service wiring or wiring within buildings;
d) converting overhead private-property lines to underground;
e) restoration of land beyond the level existing before the project began;
f) provisions for telephone or other third-party requirements (municipalities must deal directly with such third parties)

Application to Hydro

Proposals for Beautification participation should be forwarded to Hydro's Area Office nearest you. The deadline for proposals is October 1.

Proposals need to be in writing and include a complete description of the project, location maps and the Municipality's reasons for the project.

The project is as follows:

a) your application is made by the dates noted previously;
b) we then will develop a rough cost estimate for the project and send it to you within a week;
c) you will confirm your acceptance of the estimate and intent to proceed with the project within 2 weeks of receiving it.
d) the successful applications will be announced January 31 for the upcoming fiscal year.

6.1V

BRITISH COLUMBIA ACHIEVEMENT FOUNDATION

August 25, 2011

I am pleased to announce the ninth annual British Columbia Community Achievement Awards. The awards celebrate the spirit, imagination and dedication of British Columbians who make a significant difference in their communities.

We all know people who work tirelessly for the betterment of others either as committed volunteers or in the course of their work. These individuals bring strength to their communities and enrich our great province.

I invite you to reflect on these British Columbians, who inspire us by their example, and to nominate them for an award this year.

Thank you for supporting the British Columbia Community Achievement Awards.

Sincerely,

Christy Clark
Premier, Province of British Columbia
Board Member, British Columbia Achievement Foundation

PO Box 3663 Stn. Terminal, Vancouver, British Columbia, V6B 3Y8
T: 604-261-9777/1-866-882-6088 F: 604-261-1964
info@bcachievement.com www.bcachievement.com

HARRISON HOT SPRINGS
Naturally Refreshed

VILLAGE OF HARRISON HOT SPRINGS

REPORT TO COUNCIL

TO: Mayor and Council **DATE:** 2011-09-02

FROM: Fire Chief Don Labossiere **FILE:** 2600-01

SUBJECT: Appointment of Deputy Fire Chief

ISSUE: Vacancy for Position of Deputy Fire Chief

BACKGROUND:

Mr. Driedger is currently the 2nd Captain/ Training Officer and has recently completed his Officer Training Course.

DISCUSSION:

The fire department executive committee has met and unanimously recommends that 2nd Captain Don Driedger be appointed as Deputy Fire Chief. Mr. Driedger has a proven record with the Department as a Fire Officer and has shown that he is very capable of serving as the Village's Deputy Fire Chief.

The Harrison Hot Springs Fire Department has a vacancy in the Deputy Fire Chief position due to the appointment of Don Labossiere as Fire Chief in September 2010. I have filled both positions since September 2010. The fire department has deemed it necessary to appoint a Deputy Fire Chief as the number of Fighter fighters and workload has increased.

RECOMMENDATION:

That Mayor and Council ratify the appointment of Mr. Don Driedger to the position of Deputy Fire Chief for the Village of Harrison Hot Springs until the next scheduled fire department election in January 2012.

Respectfully submitted:

Don Labossiere
Fire Chief

DIRECTOR OF FINANCE COMMENTS:

I concur.

Dale Courtice
Director of Finance

CHIEF ADMINISTRATIVE OFFICER COMMENTS:

I concur.

Ted Tisdale
Chief Administrative Officer

HARRISON HOT SPRINGS
Naturally Refreshed

VILLAGE OF HARRISON HOT SPRINGS

REPORT TO COUNCIL

TO: Mayor and Council **DATE: September 8, 2011**

FROM: Debra Key, Deputy Chief Administrative Officer/Corporate Officer **FILE: 0340-50**

SUBJECT: Social Media Policy 2.13

ISSUE:

To adopt Social Media Policy 2.13

BACKGROUND:

The Village of Harrison Hot Springs' website has recently been updated with a new branding image. The focus of the Village is to improve and enhance the website by providing an additional tool to effectively communicate internally and externally with its viewers. By widening its audience, residents and visitors will be able to obtain information, education, news and other data and to socially communicate interactively with the Village.

RECOMMENDATION:

THAT Social Media Policy 2.13 be adopted.

Respectfully submitted for your consideration,

Debra Key
Deputy Chief Administrative Officer/Corporate Officer

DIRECTOR OF FINANCE COMMENTS:

Dale Courtice
Director of Finance

CHIEF ADMINISTRATIVE OFFICER COMMENTS:

Ted Tisdale
Chief Administrative Officer

HARRISON HOT SPRINGS Naturally Refreshed	VILLAGE OF HARRISON HOT SPRINGS POLICY
POLICY NAME	POLICY NUMBER
SOCIAL MEDIA POLICY	DATE ADOPTED

1. PURPOSE

To establish procedures for creating and maintaining a social media and online community presence in accordance with policies and directives established by the Village of Harrison Hot Springs.

2. DEFINITION

"Social Media" - Includes but are not limited to blogs, podcasts, discussion forums, on-line collaborative information and publishing systems that are accessible to internal and external audiences (i.e., Wikis), RSS feeds, video sharing, and social networks like MySpace, Facebook, Twitter, Flickr, YouTube, etc.

3. POLICY

1. This policy shall apply to all Village elected or appointed officials, employees and contracted employees utilizing social media web sites.

2. The Village uses social media as an additional communication tool that is intended to encourage information sharing and dialogue. The use of social media shall be consistent with strong business practices and be a viable means to achieving business objectives and goals.

3. All Village of Harrison Hot Springs social networking sites shall adhere to applicable provincial, federal and local laws, regulations and policies including all Information Technology and Records Management policies and other applicable Village policies.

4. All social media sites must be approved by the Chief Administrative Officer or designate. Designated staff members posting to social media sites are responsible for regularly reviewing comments and posting. Inappropriate posting by staff or the general public will be removed immediately and the commenter will be blocked from any further postings on the social media site.

5. Social media content and comments containing any of the following forms of content will not be posted:

    a. Slanderous or defamatory remarks, obscene language, sexual content or links leading to such content
    b. Promotion of political candidates
    c. Promotion or encouragement of illegal activities
    d. Non-public information of any kind
    e. Solicitations of commerce
    f. Personal, sensitive or confidential information regarding anyone including Mayor and Council, staff or members of the public.
    g. Topics not related to the social media site or posted material
    h. No Village employee, Mayor or Councillor shall divulge confidential information on social media sites, in camera items and personnel matters
    i. All Village information posted on the social media site must correspond with content on the Village website.

The *Freedom of Information and Protection of Privacy Act* applies to social media content and therefore content must be able to be managed, stored and retrieved to comply with the act.

HARRISON HOT SPRINGS
Naturally Refreshed

VILLAGE OF HARRISON HOT SPRINGS

REPORT TO COUNCIL

TO: Mayor and Council **DATE:** September 12, 2011

FROM: Ian Gardner, Operations Manager **FILE:** 5340-03-01

SUBJECT: Water System Supply and Treatment

ISSUE: For Council to consider the options of Lake Water Supply and Treatment or Ground Water Supply and Treatment to comply with the Operating Permit with the Ministry of Health.

BACKGROUND: Currently the Village's water is supplied from Harrison Lake through an intake, pumps, chlorination station to a reservoir and out to the distribution system.

In November 2009 The Ministry of Health sent the Village an amendment to the operating permit to include Treatment to have 4 log removal of viruses, 3 log removal of Giardia cysts and oocytes, and 3 log removal of Cryptosporidium cysts and oocytes. Commonly known as 4-3-3 removal. Research and costing for treatment was done. A Cartridge Filtration system with post Chlorination was recommended and a budget of $450,000.00 put into place. Since then, further investigation has revealed that, due to the high turbidity levels in the Lake source a Cartridge Filtration system cannot handle the turbidity levels we are experiencing. The need for a more complex Filtration Treatment System was required.

Civic Consultants provided the Village with a study to determine the needs to fully deal with the Treatment issues. Options were presented to Council in July 2011.

Lake Supply Option: Extension of the Intake line to deeper water, upgrading the 3 intake pumps and a Filtration Treatment Plant. An estimated cost of $1,715,000 was indicated.

Ground Water (Deep Well) Supply Option; To develop a Deep well pumping system and installation of a Green Sand Filtration Treatment Plant. An estimated cost of $1,148,927 was indicated.

The risk of contamination by outside influences is extremely higher in a Lake surface water source than in a Deep Well ground water source. The Ministry of Health has historically shown preference to a Deep Well Ground Source over a Surface Water Source. This was indicated by the Ministry of Health's Senior Engineer Tin Tun at a Council meeting of July 11, 2011.

Positives and Negatives of Lake Supply and Treatment vs. Ground Water Supply and Treatment;

Lake Water Supply (Surface) and Treatment

Positives (pros)	Negatives (cons)
• Abundant supply of source water to meet demand • Will have excellent water quality after Treatment	• High contamination risk of water source from outside influences • Treatment needed for removal of viruses, Giardia, Cryptosporidium and Turbidity. • Higher Operation and Maintenance costs • Interruption of water supply during construction • Higher project cost

Ground Water Supply (Deep Well) and Treatment

Positives (pros)	Negatives (cons)
• Abundant supply of source water to meet demand • Will have excellent water quality after treatment • Very low contamination risk of water source from outside influences • Lower Operation and Maintenance costs • No interruption of water supply during construction • Lower project cost	• Treatment needed for removal of Manganese and Sulfide

Since July it has been determined that, the operating costs for the Lake Source Treatment will exceed the operating costs for the Ground Water Source

Treatment by approximately 25% TO 35%. The life expectancy for each treatment plant option is 25 years.

The Hydrology report indicates that, the quality and quantity of water in the aquifer is acceptable as a source for water supply and will meet the requirements needed. If a second well is needed in the future to supplement the primary well for community growth needs, there is capacity in the aquifer to accommodate the requirement.

On Monday August 22, 2011 the Fraser Health Authority informed us, via email, they are taking extra Water Distribution samples to test for THMs. THM (Trihalomethane) is a byproduct produced from the combination of Chlorine and organic matter primarily found in Chlorinated water systems with high turbidity levels, such as our system is currently experiencing and has for several years. We also sent samples in for testing by our independent Laboratory for analysis. Chlorine dosage was increased to help offset the effects of higher Turbidity.

On Wednesday August 24, 2011, the Fraser Health Authority Inspector visited the Village to do an onsite system check. She requested we post a Water Quality Advisory, because of the continuous high turbidity levels in our Distribution system. This Advisory will remain in place until we have dealt with the turbidity issue.

During our discussion the Inspector was asked about Chlorination if we went to a Ground Water Deep Well Supply source. The Inspector indicated we would have to still Chlorinate the system until, the Village, could prove to the Ministry that, the Village has thoroughly cleaned the entire Water Distribution system due to the ongoing Turbidity issues and the fact the older distribution lines have never been cleaned properly by 'pigging' the lines. This would entail cleaning from the Reservoir through the entire Distribution system. During the Line cleaning process we would also install water sampling stations. These would be above ground stand-alone sampling pedestals at various locations throughout the water distribution system. This will eliminate obtaining samples from house taps and Fire Hydrants, both of which are undesirable sources. Approximately 10 units would be needed. The estimated cost to do this is $131,000.00 for Line and Reservoir cleaning and $15,000 for water sampling pedestals. These costs would apply to both Treatment options.

It was also learned from the Inspector that, if treatment of a Surface Water Supply does not meet the 4-3-3 log removal, Ultraviolet Light (UV) disinfection has to be installed as an addition to Chlorination. As stated in Civic Consultants report in July the Treatment option, A-C Water Treatment Plant, for the Lake Water Supply will only achieve 4-2.5-2.5 log removal. Therefore, a UV Disinfection system will have to be added to this option. Estimated cost is $50,000 - $70,000.

The following is to summarize the cost estimates of the two Supply and Treatment options, taking into consideration all the information provided.

Lake Water supply and Treatment

• Intake extension	$850,000
• Upgrade of Pumps	$150,000
• Treatment Plant	$702,000
• UV Disinfection	$ 70,000
• Cleaning of Reservoir and Lines	$ 131,000
• Water sampling Pedestals	$ 15,000
Total	$1,918,000

Ground Water supply and Treatment

• Well and Pumping system	$ 130,000
• Treatment Plant	$ 931,000
• Cleaning of Reservoir and Lines	$ 131,000
• Water sampling Pedestals	$ 15,000
Total	$1,207,000

POLICY CONSIDERATIONS: (if any)

RECOMMENDATION: THAT Council approves proceeding with the Ground Water Supply and Treatment option.

Respectfully submitted for your consideration;

Ian Gardner
Operations Manager

DIRECTOR OF FINANCE COMMENTS:
Either option will involve a significant portion of the costs to be funded by borrowing.

Dale Courtice
Director of Finance

CHIEF ADMINISTRATIVE OFFICER COMMENTS:
I concur with the recommendation.

Ted Tisdale
Chief Administrative Officer

Village of Harrison Hot Springs
Water Treatment Plant Report

Project Description

The Ministry of Health has directed the Village of Harrison Hot Springs to provide treatment to the Village water system. This directive was issued in a letter dated Nov. 6th, 2009, from Ms. Jeniene Lutz, C.P.H.I. stating;

> As a follow up to the Village of Harrison Hot Springs Council resolution of April 19, 2007 regarding the treatment of the Village's water supply, the following terms and conditions were added to the operating permit:
>
> On or before December 31, 2010, the finished water supplied by the Village of Harrison Hot Springs water system must have undergone treatment that achieves the following:
>
> - At least a 4-log (99.9 9%) reduction and/or inactivation of viruses
> - At least a 3-log (99.9 %) reduction and/or inactivation of Giardia cysts and oocysts
> - At least a 3-log (99.9 %) reduction and/or inactivation of Cryptosporidium cysts and oocysts
>
> Please advise Fraser Health in writing as to how the Village of Harrison Hot Springs intends to meet the above terms and conditions.

Village staff was unaware of the extent of the works and the cost that this would entail until they tried to implement the objectives. The deadline to have this work done has passed and the Village and the Ministry are anxious to have the works completed.

The removal and/or inactivation of *Giardia* cysts and *Cryptosporidium* oocysts from raw water are complicated by their small size and resistance to commonly used oxidants such as chlorine. *Cryptosporidium* oocysts are harder to eliminate but are fortunately much less common in Canadian surface waters.

It is possible to reduce the viability of *Giardia* cysts by 99.9% using chlorination alone but long contact times are required. Ozone and chlorine dioxide are much better disinfectants but both are expensive and result in the formation of unwanted by-products (particularly chlorite formation in the case of chlorine dioxide). Ozone is a better choice but is unreliable when turbidity is high (as can be the case for the Village's Lake supply) or variable because cysts are protected in flocculated particles.

Inactivation of Cryptosporidium oocysts by chlorination alone is impractical but ozonation can be effective when used properly.

Filtration followed by chlorination is a practical and cost effective answer to solve the problem. The estimate for this solution is in the range of $450,000 (BI Purewater). Based on this estimate, the Village set a budget for this solution at $450,000.

However, upon further investigation, it was determined that the TSS (total suspended solids) of the Lake supply runs from 3 - 5 mg/l (during normal periods) to 15 mg/l (or higher) during storms or periods when the Lake turns over. The filtration of water with a TSS of 4 - 5 mg/l and above, is complicated by the need to backwash and/or replace filters too often. The higher levels of TSS result in a large increase in the operations and maintenance costs which negates the cost advantages for this solution.

The next choice is filtration with the aid of coagulation/flocculation. This is the most practical method to achieve high removal/inactivation rates of cysts and oocysts in turbid water to meet the requirements of the Ministry of Health and the Canadian Drinking Water Guidelines.

Reverse osmosis (RO) plants are the high end solution. Not only do they remove cysts and oocysts, they also remove a wide variety of impurities and bacteria. However, the cost for this solution is too exorbitant for a small community.

The Village therefore continued on with the investigation of the mid priced treatment systems.

Project Details

Civic Consultants provided the Village with a study to determine their present and future water requirements. The present maximum daily water demand (MDD) is 30 l/sec at 565 kPa and is borne out by the Village records. This is without any effort at water conservation. With water conservation policies in place, it is estimated that the current capacity could be maintained to the year 2018.

The Village asked three manufactures (BI Purewater, Corix and Timbro) to provide concept and Class C budgets for solutions to the problem.

BI Purewater, the company that provided the initial estimates, did not provide a proposal. Their primary treatment product is cartridge filtration plants. Once they were informed of the level of TSS in the Lake, they decided not to submit a quote. The problem with TSS was discussed previously in this Brief.

The proposals received were as follows;

1. A-C (Absorbent Clarifier) Water Treatment Plant by Corix Water Systems.
   The AC water treatment plants use a combination of hydraulic "tortuous path" flocculation/clarification filtration and rapid rate filtration to produce a superior quality of potable water. They are suitable for stable, well or surface waters where turbidity levels seldom exceed 50 NTU.

   The final water quality is
   - less than 0.1 NTU final turbidity.
   - 2.5 log, multi-barrier protection against Giardia and Cryptosporidium.

   Enclosed are conceptual design drawings for the AC System. For more information go to www.keywin.mb.ca/files/CWS_AC%20Water%20Treatment%20Plant.pdf

2. Trident Model TR-210 A by Siemens Water Technologies

3. Culligan Hi-Flo 50 Series Industrial Water Filter System

4. Z-Box S-18 Ultrafiltration Water Treatment System by GE

Estimate of Costs (including breakdown)

	Optional Treatment Plants	
1	A-C Water Treatment Plant by Corix Water Systems	$518,000
	Miscellaneous 10%	$51,800
	Engineering 10 %	$56,980
	HST 12%	$75,214
		$701,994
2	Trident Model TR-210 A by Siemens Water Technologies	$1,089,717
	Miscellaneous 10%	$108,972
	Engineering 10%	$119,869
	HST 12%	$158,227
		$1,476,784
3	Culligan Hi-Flo 50 Series Industrial Water Filter System	$656,880
	Miscellaneous 10%	$65,688
	Engineering 10%	$72,257
	HST 12%	$95,379
		$890,204
4	Z-Box S-18 Ultrafiltration Water Treatment System by GE	$1,092,063
	Miscellaneous 10%	$109,206
	Engineering 10%	$120,127
	HST 12%	$158,568
		$1,479,964

Based on the above, the cost to provide treatment of the Lake supplied water should be $700,000. which includes HST.

The initial quote from IDL of $483,415 included exceptions. I have gone back to them to get them to remove the exceptions.

The new estimate is $518,000.
The changes to the previous proposal include

a) Added dry chlorination system
b) location of plant moved to flat area next to old reservoir up steep access road.
c) 3 phase power is located at the site and no additional power pole is required to connect power to building
d) cut into raw water forcemain to new reservoir and connect raw water line from lake pumps to raw water intake
e) connect plant treated water line and back wash line to the forcemain section going to the new reservoir
f) connect plant backwash waste line to existing reservoir overflow line to rock pit.

The above works assumes that no rock blasting or removal is required and the existing forceman and overflow pipe are within 50ft of the location of the plant

As well as the requirements for treatment by the Ministry of Health, the Village water supply intake is also a concern. The intake is located approximately 1 km off shore in about 3.5 meters of water at low levels. It poses a risk for purposeful or accidental contamination. However, to date, no problems have occurred.

The two solutions to reduce or eliminate the risk are;

- to move the inlet further out into deeper water (more than 18 meters) which will reduce the risk, or
- change the supply of water from the Lake to a protected groundwater source which will eliminate the risk.

1. Civic Consultants provided the Village with a report entitled "Harrison Hot Springs Water Study Nov 2007". This Report looked at relocating the inlet out to deeper water to reduce the risk of contamination. The cost was estimated to be about $850,000 for the relocation of the inlet and an additional $150,000 to change the pumps to obtain the same capacity. As well, the water would still require treatment to achieve the Ministry of Health requirements.

To reduce the risk of Lake Water contamination and to meet the Ministry of Health requirements the estimated cost would be approximately $1,715,000 (relocated inlet plus treatment).

2. Providing a ground water supply and incorporating a ground water protection plan, the risk of purposeful or accidental contamination is virtually eliminated.

The new requirements from the Ministry of Health apply to surface water or groundwater under the direct influence of surface water (GUDI). If the source of supply was changed from Harrison Lake to a ground water supply that was not under the direct influence of surface water, these new requirements would not apply. GUDI wells are generally less than 18 meters deep.

The cost to switch over to a ground water supply, if an adequate supply of ground water meeting the Guidelines for Canadian Drinking Water Quality were found, would be approximately;

Well Drilling	$15,000
Hydrology Report	$7,000
Capacity Testing	$5,000
Chemical Testing	$500
Well Construction	$60,000
Pipe Work	$50,000
Well Protection Plan	$25,000
	$162,500
Contingencies 20%	$32,500
HST 12%	$23,400
	$218,400

This solution would obviously be the least expensive solution if an adequate supply of ground water meeting the Guidelines for Canadian Drinking Water Quality could be found. The Village explored this option by drilling a 200 mm test well. Sufficient water was found but unfortunately, the water did not meet the Canadian Guidelines. The water is high in manganese and hydrogen sulphide (H_2S).

The Village conducted a demonstration treatment project to determine if there was an adequate solution for the parameters not meeting the Guidelines. A "green sand" filtration plant was provided by Corix and a three day testing program undertaken. The manganese and the H_2S were successfully removed to acceptable limits.

The Village obtained conceptual estimates for a "green sand" treatment plant with the following results.

1 Corix PF-485-3 WTP	$629,415
Miscellaneous 20%	$125,883
Engineering 10 %	$75,530
HST 12%	$99,699
	$930,527
2 Aeralater Type II Plant by Siemens	$878,577
Miscellaneous 10%	$87,858
Engineering 10%	$96,643
HST 12%	$127,569
	$1,190,648
3 Hi-Flo 50 Cullsorb Filter System by Culligan	$998,589
Miscellaneous 10%	$199,718
Engineering 10%	$119,831
HST 12%	$158,176
	$1,476,314

In total, the cost to convert the Lake Supply to a Ground Water Supply would be approximately $1,148,927. This would meet the Ministry of Health requirements and eliminate the risk of contamination.

I have enclosed a copy of the estimate for the PF - 485-3. As with the AC Plant, there are exceptions with the quotation. I have made allowance for these by adding a 20% miscellaneous amount.

Another major factor that will affect the decision is the cost of operations and maintenance. As can be seen from the initial concept of applying a straight forward filtering system, the costs for labour and filters would be excessive. BI Purewater's primary treatment plants are cartridge filter plants. Due to the high levels of turbidity, they decided not to provide a quote for their plants.

The effect of the turbidity problem is demonstrated in the existing water lines. When the public works crews flush the lines, the mains run extremely dirty until most of the settled solids are flushed out. The muck in the lines also causes problems with the chlorine residual values and can lead to failing test results in the water system.

Alum is the coagulant that is generally added to the raw water to precipitate dissolved contaminants and encourage suspended particles to group together in the form of "floccs". As the water passes upward through the upflow clarifier filter, these grow and are removed by the coarse media. The clarified water then passes on to the downflow rapid gravity filter for final polishing. Solids that accumulate within both the upflow and downflow filters are periodically removed by automatically controlled air/water backwashing.

The more turbid the water is, the more frequent the backwashing program will be. Manual operation of the backwashing process may be required due to fluctuating levels of TSS. Manual operations require labour which can be expensive. As well, backwashing also requires energy demand and is a negative for water conservation. .

The ground water supply does not have the TSS or turbidity problem that the Lake supply does. What is being filtered out is the excessive manganese. This is in much lower concentrations than the TSS and therefore requires much less backwashing than the AC plants does. The backwashing can generally be done on an automatic schedule to reduce operational labour costs.

The regeneration of the potassium permanganate does add costs but it mostly done on an automatic basis.

To this point, we have not done a detailed analysis of the labour costs for each process.

Village of Harrison Hot Springs
Water Treatment Plant Report
Supplemental Information

There are other works that will be required for water supply that will be necessary either for a Lake Supply or a Ground Water Supply. The existing water mains have an excess of sands/silts built up over the years due to the use of the turbid Lake Supply. These mains need to be cleaned. Treating the water at the source will not protect the users from the sands or silts already in the system.

To clean out the lines properly requires a process known as "pigging" the lines. A series of small polyethylene foam cleaning devices are put into the pipe line through a fire hydrant barrel. They are also retrieved from another fire hydrant barrel down the line. A short video of this process can be seen at *www.youtube.com/watch?v=alij-Ts61Tw* .

We have contacted ABC Pipe Cleaning for a rough budget estimate. Their response was that it would be in the range of $____/m. The Village has _____ m of mains for an estimate of *$80,000* (temporary guesstimate) for this work. A contingency amount of 35% should be added for a total estimate of $121,000 (which includes HST) . The total should be added to either the Lake Supply Grant application or the Groundwater Supply Grant application.

Before an application for a Grant is made, a more detailed estimate for the pigging process should be obtained.

If the lines are cleaned, the Ministry of Health has stated that they would consider not requiring chlorination of the groundwater supply. The Lake Water Supply would need chlorination in either case.

As well, the Ministry of Health would like to see proper sampling ports on the water system. Currently samples are being taken from individual home taps and or fire hydrants. This methodology is not acceptable.

The proposed sampling ports would be similar to those used in the District of Kent. For budgetary purposes, I have estimated that 10 sampling ports should be installed at a cost of $1,000 each for a total of $10,000 plus contingencies plus HST.

Comments from Corix on the comparison between an AC plant and Cartridge filter plants.

To meet GCDWQ guidelines a 1 micron cartridge filter must be installed. We know of one plant up north in which the owners specified and ordered a cartridge filter plant. The data they presented indicated the turbidity was <2 NTU. However there were incidences this spring in which the turbidity went much higher. The town was changing filters every day at great expense. It is our experience that anything over 2 NTU for a 1 micron filter will greatly increase cartridge filter replacement.

The AC plant on the other hand will handle turbidity up to 25 with normal operation. Higher turbidities are possible however backwashing will increase considerable as will operator attention. This gives the Village a significant safety factor from turbidity increases. Under 25 NTU, one essentially pays only for extra chemicals as the turbidity increases. It is difficult to predict how much the chemical use will increase with higher turbidity, but it's probably in the neighborhood of 20%.

Tin Tun, the Ministry of Health Regional Engineer stated at the last meeting that the Harrison Hotel had provided a cartridge filtration system for their treatment. It became so plugged up that they had to disconnect it.

Civic is aware of a cartridge plant that was supplied for a small water system on Shuswap Lake. The filters had to be changed two or three times a day. The Owners had to purchase a different type of plant to cope with the turbidity.

The estimate for the groundwater supply included an estimate for the construction of a well and the installation of a well pump. We have since obtained a more detailed estimate from Corix. Their estimate is as follows;

The scope for the well pump equipment includes:
- o Well pump and cables, c/w leak detection and overload protection
- o low water level detector
- o Well pipe
- o pitless adaptor
- o Pump controls and starter added to WTP PLC
- o Local well disconnect (equipment will be in the WTP building)
- o 60m power and instrumentation cable (WTP to well)

Grundfos Pump information
Pump to handle 486 usgpm water at (149.8 psig) 346 ft TDH at the worst case scenario (i.e. filter is plugged); pump will deliver 550 usgpm water at (125 psig) 289 ft TDH when filter is completely clean.
The system will require a modulating valve at discharge to keep flow rate constant at 400 usgpm. (More is available if needed in the future)

One only Grundfos model 475S600-6 all stainless steel submersible well pump end, 8" dia. pump with 6" FNPT connection; ship wt. 107 lbs

One only Grundfos 6" dia. 60 hp, 304SS motor for above pump, 3450rpm, 575v, 3ph, 60hz, 13000 lbs maxi. thrust capable, std. 312" long motor lead; ship wt. 390 lbs

Note 1: TWU6-4 pump cable good for 550 ft continuous run on 60hp, 575 volt application; Nema 4 starter required, A/B J45 heater for overload relays or equal, overload relay amp sets at 67.0 to maxi. of 72.8 (60hp, 575v motor rated at 64.4 amps)

Note 2: Pumps specs to be fine tuned upon detail design

Installation scope:
- o Install force main from well to WTP 50m
- o Install well pump, cable and sensors
- o Install 50m of u/g cable and local disconnect
- o install well head protection 1m deep, 5 meter radius, plastic sheet, bentonite seal

Total cost of well pump, cables, installation, well head protection, etc. is $45,000

The cost for a well would be;

Well drilling	$12,000	complete
Hydrology Report	$ 3,000	underway
Capacity testing	$ 5,000	complete
Chemical Testing	$ 500	complete
3 phase power to well head	$20,000	
Well Construction	$45,000	
	$85,500	
Contingencies 20%	$30,200	
HST 12%	$13,884	
	$129,584	

Previous estimate was $218,400

In Summary the Lake Supply Treatment System should cost approximately;

Treatment Plant (including contingencies and HST)		$702,000
Cleaning the lines (including contingencies and HST)		$121,000
Sampling Ports (including contingencies and HST)		$ 15,000
	Total	$838,000

The Groundwater Supply and Treatment System should cost approximately

Treatment Plant (including contingencies and HST)		$931,000
Well and pumping system (including contingencies and HST)		$130,000
Cleaning the lines (including contingencies and HST)		$121,000
Sampling Ports (including contingencies and HST)		$ 15,000
	Total	$1,197,000

Operating Costs

1. Cartridge Filtration System was not estimated due to the unknown number of filter changes.

2. AC PLANT (assumes 10 NTU lake water)

Chemicals: Polymer, Alum, Soda Ash.	Total $538.30/week
Power: Mostly due to pumping to WTP from primary pumps	Total $381.92/week
Power: Due to pumping from WTP to reservoir	Total $124.33/week
Operating Labour 2 hours/day. 4 hours/week for chemical replenishment.	
Total 14 hours/week Assume labour costs @ $40/hour	Total $560.00/week
	$1,604.55/week
Total cost / m^3 (based on a MDD of 2,242 m^3/day)	$0.10/$m^3$

3. PRESSURE FILTER

Chemicals: KmnO4	Total $164.50/week
Power: Mostly due to well pump	Total $556.50/week
Labour hour/week 14 Assume labour costs @ $40/hour	Total $560.00/week
	$1,281.00/week
Total cost / m^3 (based on a MDD of 2,242 m^3/day)	$0.08/$m^3$

Life Expectancy.

The life expectancy of the two systems is an average of 25 years. The tanks themselves should last for about 40 years.

We have asked Corix to provide some assurance that H2S and Manganese will be removed

Their response;

The pilot test is our best assurance that sulphides (and Manganese will be removed)
The reported values and observations from the April pilot test were:

"Manganese Tests
GCDWQ aesthetic objective: <0.05 mg/l
Raw water average: 0.12 mg/l
Treated water average 0.008 mg/l
Average removal efficiency 93%

Sulphide Tests
GCDWQ aesthetic objective: <0.05 mg/l
Raw water average: 0.023 mg/l 400 gpm value 0.027 mg/l
Treated water average 0.007 mg/l
Average removal efficiency 70%

The results indicate that all measured treated water parameters were within GCDWQ by a safe margin. This result is indicative that the manganese green sand filter system would safely and economically meet VHHS's potable water objectives.

The pilot test operator also indicated that the water taste quality was good with only very faint odours before treatment and no odours following treatment. "

PITEAU ASSOCIATES
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Our file: 3127

September 2, 2011

Civic Consultants Ltd.
410 – 3rd Street
New Westminster, B.C.
V3L 2S2

Attention: Lorne Davidson, P.Eng.

Dear Sirs:

Re: Groundwater Supply Test Well, Harrison Hot Springs

In response to your recent request for comment on the groundwater supply test well installed in 2010 in the Village of Harrison Hot Springs, Piteau Associates Engineering Ltd. (Piteau) is pleased to provide the following letter to outline our opinions on well efficacy, water quality and development risks associated with use of this site for converting the communities water supply to a local groundwater source.

BACKGROUND

In March 2010, A & H Drilling Ltd. under contract to Corix Water Systems (Corix), completed installation and pump testing of a 31.7m (104') test well within a 41m (135') borehole on community property in the Village of Harrison Hot Springs (Fig. 1). Piteau understands that the objective was to test for local potential to convert the community water supply from a surface water source to a groundwater source to mitigate drinking water quality problems experienced by the community, including issues with turbidity and the potential for microbiological contamination associated with a surface water supply. The future water demand is 25 L/s (400 USgpm).

Based on apparent sulphide odours noted during drilling and subsequent exceedance of Canadian Drinking Water Guidelines aesthetic objectives for manganese from water quality testing, a field filtration test was conducted by Corix in 2011 (Corix, 2011) to test the effectiveness of Greensand and activated carbon filter media for removing these ions. They reported that manganese tests showed 93% average removal efficiency and 70% average removal efficiency for sulphide, reducing concentrations of the respective ions to well below water quality guidelines at a pilot plant scale.

WELL HYDROGEOLOGY AND CONSTRUCTION

A test well was drilled to 41m (135') depth into an unconfined sand and gravel aquifer. This composition is consistent with the highly productive Agassiz – Seabird Island Aquifer which has been mapped to extend from below the Fraser River, through Agassiz and below Harrison Hot Springs and Harrison Lake (Fig. 1). This aquifer comprises generally coarse-grained alluvial

sediments and overbank deposits associated with the Quaternary path of the Fraser River and its local tributaries extending as far north as Harrison Lake.

The driller's log for the test well is included as Appendix A. The well consists of 200mm (8") casing with a 4.9m (16'2") length of stainless steel well wire-wound screen exposed to sand and gravel between depths of 26.8 and 31.7m (87.8 and 104'). The screen slot size used was 0.5mm (0.020"). The static water level at the time of well construction was 3.4m (11') below ground.

REVIEW OF PUMP TEST DATA

Corix Water Systems conducted a variable-rate aquifer pumping test on the test well on April 13 and 14, 2010. According to the well test record (Appendix B), the well was pumped at rates of 5.0, 8.3, 13.6, 17.9, and 25.5 L/s (80, 131, 216, 284, and 404 USgpm) for intervals each lasting 20 minutes, and the final interval was extended provide a total test duration of 1,180 minutes (19.7 hours). Although not indicated in the well test record, it is understood that the pumping rate was increased to 31.5 L/s (500 USgpm) during the initial "constant-rate" portion step of the test, between about 90 and 200 minutes after pumping began.

The pumping test results are illustrated on Fig. 2. Drawdown is plotted versus the logarithm of time from the beginning of the test. The aquifer transmissivity estimated from the portion of the drawdown curve between 90 and 200 minutes using the Cooper-Jacob (1946) method is estimated at 5.3×10^{-3} m^2/s. This was calculated using the recorded flow rate of 25.5 L/s. The actual rate recorded during this portion of the test may have been greater, which would result in a higher value of transmissivity. Water level recovery data was insufficient to provide a reliable estimate of transmissivity.

Extrapolating the portion of the drawdown curve between 90 and 200 minutes to 100 days yields a projected drawdown of 12.9m (42.3'). Using this value in a calculation of safe yield based on an allowable drawdown after 100 days equivalent to 70% of the available drawdown (Table I) results in a value of 28.4 L/s (450 USgpm).

A commonly accepted design concept is that water wells should be constructed with sufficient open area within the well screen so that during pumping the calculated entrance velocity will not exceed 0.1 feet per second (ft/second). The basis for this is that it is believed to maintain friction losses to a minimum, and to minimize potential for chemical encrustation and/or corrosion of the screens. The maximum capacity of the test well based on this limiting criteria (Table I) would be 15 L/s (241 USgpm). However, as the scientific basis for this 0.1 ft/second threshold is unclear, and it is judged that pumping the test well at rates up to 25 L/s (400 USgpm) is unlikely to result in any noticeable decrease in long-term well performance. Nevertheless, it is recommended that any new production wells should be designed to achieve a 0.1 ft/second screen entrance velocity.

REVIEW OF WATER QUALITY ANALYSIS

A summary of all available water quality analyses is provided in Table II, including two water quality samples taken in 2010 following well construction, and one during the filtration test in 2011. All analyte concentrations were found to be below Canadian Drinking Water Guideline maximum acceptable concentrations and aesthetic objectives, except for manganese, which ranged from 0.112 to 0.115 mg/L, versus the aesthetic objective of 0.05 mg/L. Sulphurous smells noted from water samples and the high total sulphur content suggests that dissolved sulphide (H_2S) may exceed aesthetic guidelines. Corix (2011) indicated that sulphide concentrations were elevated, but the average concentration of 0.023 mg/L does not exceed the 0.05 mg/L. The source of this analysis was not available at the time of this report. Olfactory indications of the presence of sulphide dissolved in the well water observed during drilling and filtration tests indicate the water is chemically reduced.

CONCLUSIONS AND RECOMMENDATIONS

Piteau has completed a review of available data from the Harrison Hot Springs test well program including a review of pump test and water quality data and offers the following conclusions:

1. The relatively high transmissivity and calculated sustainable yield indicate that the local aquifer below the test site will likely sustain a groundwater flow sufficient to meet a demand of 25 L/s (400 USgpm).
2. Preliminary water quality analyses of samples from the test well indicate most major element concentrations are below detectable limits or at concentrations well below the maximum allowable concentrations and aesthetic objectives outlined by the Canadian Drinking Water Quality Guidelines. Corix (2011) demonstrated that concentrations of those elements which exceed, or potentially exceed, the guidelines (manganese and sulphide, respectively) can be reduced to achieve levels below the water quality guidelines.
3. The test well is situated within a region utilized for residential and agricultural purposes, and is in close proximity to natural mineral springs. Groundwater quality analyses should therefore be expanded to include potential contaminants from these sources, which could include bacteria, nutrients (ammonia, nitrite, & nitrate), pesticides and herbicides, and radionuclides.
4. An analysis of the potential for groundwater to be under the direct influence of surface water should be undertaken before the groundwater is utilized for drinking water purposes. Providing that the well is more than 100m (330') from the nearest surface watercourse, and that there are no E.Coli or coliform bacteria present in the groundwater from the well, it is likely that a determination that the well is not under the direct influence of surface water can be made.

5. It is recommended that the capture zone(s) for all new supply wells should be estimated to enable definition of a wellhead protection zone, and development of an aquifer protection plan.
6. Due to the apparent heavy utilization of the aquifer illustrated by the density of reported groundwater wells in the aquifer (Fig. 1), and the anticipated stress this well will apply to the aquifer, an analysis of the potential for local well interference in the vicinity of the test well is advisable to ensure that the abilities of other wells in the vicinity are not affected.

LIMITATIONS

This letter of opinion has been prepared using a standard of care consistent with that expected of scientific and engineering professionals undertaking similar work under similar conditions in B.C. No warranty is expressed or implied.

This letter of opinion is prepared for the sole use of Civic Consultants Ltd. and their client, the Village of Harrison Hot Springs. Any use, interpretation, or reliance on this information by any third party, is at the sole risk of that party, and Piteau accepts no liability for such unauthorized use.

CLOSURE

We trust these comments are sufficient for your present needs. Please contact the either of the undersigned if you require further assistance.

Yours truly,

PITEAU ASSOCIATES ENGINEERING LTD.

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA M. L. STEWART #31069 GEOSCIENTIST

Martin L. Stewart, P.Geo.
Hydrogeologist

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA D. J. TIPLADY 16053 Sept 1 2011

David J. Tiplady, P.Eng.
Principal Hydrogeologist
Vice President – Groundwater

MLS/DJT/slc
Att.

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TABLES

TABLE I
TEST WELL YIELD CALCULATION

LEVELS AND RATES	UNIT	TEST WELL
CASING ELEVATION (ESTIMATE)	m-geod	10.97
STATIC WATER DEPTH [1]	m-bgl	4.27
STATIC WATER ELEVATION [2]	m-geod	6.71
ESTIMATED INTERFERENCE FROM OTHER WELLS [2]	m	
ALLOWANCE FOR SEASONAL WATER LEVEL REDUCTION	m	2.00
ESTIMATED MINIMUM STATIC DEPTH[3]	m-bgl	6.27
DEPTH TO TOP OF WELL SCREEN	m-bgl	26.77
DEPTH TO PUMP INTAKE [4]	m-bgl	24.77
RECOMMENDED LOWEST PUMPING DEPTH [5]	m-bgl	22.77
AVAILABLE DRAWDOWN [6]	m	20.50
FACTOR OF SAFETY	m	0.30
MAXIMUM ALLOWABLE DRAWDOWN [7]	m	14.35
PUMP TEST LENGTH	min	1180
FINAL WATER DEPTH	m	13.87
DRAWDOWN AT END OF TEST	m	9.60
PROJECTED 100-DAY DRAWDOWN	m	12.90
PROJECTED 100-DAY SPECIFIC CAPACITY [8]	L/s/m	1.98
TEST PUMPING RATE	L/s	25.5
	m^3/day	2202
	USGPM	404
	IGPM	337
CALCULATED LINEAR YIELD [9]	L/s	28.36
ESTIMATED SUSTAINABLE SAFE YIELD [10]	L/s	**>25.5**
	m^3/day	>2203
	USGPM	>404
	IGPM	>337
SCREEN LENGTH	m	4.9
OPEN AREA	cm^2 / m	1016
TOTAL AREA	m^2	0.5
MAXIMUM SCREEN CAPACITY [11]	L/s	**15**
	m^3/day	1311
	USGPM	241
	IGPM	200

H:\Project\3127\2011\[Safe well yield Mar2010 production well-v2.xls]Well yield

1 Static water elevation at time of test.
2 No known well interference
3 Estimated minimum static depth is taken as measured static depth
4 Assumes pump intake is 2m above the base of lowest screen (i.e., motor 1m above bottom of screen and motor 1m in length).
5 Calculated as 2m above the pump intake
6 Difference between recommended lowest pumping level and estimated static elevation.
7 Allowable drawdown equals available times(1-factor of safety). No factor of safety used for dewatering design.
8 Specific capacity is pump test rate divided by drawdown at end of pump test.
9 Calculated linear yield is the allowable drawdown times the 100-day specific capacity.
10 Estimated sustainable yield is the calculated linear yield where this is less than the test pumping rate. For linear yields greater than the pump test flow rate, the sustainable yield may be nonlinear and therefore the pump test rate provides a minimum guideline sustainable safe yield.
11 Maximum screen capacity is calculated as screen opening area times recommended maximum entrance velocity of 0.1 ft/s.

TABLE II
WATER QUALITY ANALYSES 2010/2011 AND DRINKING WATER GUIDELINES

Sample ID Date Sampled	UNITS	WELL SAMPLE #1 [1] 14-APR-10	WELL SAMPLE #2 [1] 14-APR-10	SAMPLE AJ2988 [2] 27-Apr-11	CDWQ [3] GUIDELINES MAC	CDWQ [4] GUIDELINES AO
Physical Tests						
Hardness [5] (as CaCO3)	mg/L	127	126		see below	see below
Total Metals						
Aluminum (Al)-Total	mg/L	<0.010	<0.010	<0.003		0.1
Antimony (Sb)-Total	mg/L	<0.00050	<0.00050	<0.0005	0.006	
Arsenic (As)-Total	mg/L	0.00453	0.00446	0.00570	0.01	
Barium (Ba)-Total	mg/L	0.033	0.032	0.036	1	
Boron (B)-Total	mg/L	<0.10	<0.10	<0.05	5	
Cadmium (Cd)-Total	mg/L	<0.00020	<0.00020	<0.0001	0.005	
Calcium (Ca)-Total	mg/L	36.9	36.7	39.1		
Chromium (Cr)-Total	mg/L	<0.0020	<0.0020	<0.001	0.05	
Copper (Cu)-Total	mg/L	<0.0010	0.0019	<0.0002		1
Iron (Fe)-Total	mg/L	0.062	0.103	0.076		0.3
Lead (Pb)-Total	mg/L	<0.00050	<0.00050	<0.0002	0.01	
Magnesium (Mg)-Total	mg/L	8.40	8.35	8.98		
Manganese (Mn)-Total	mg/L	**0.112**	**0.115**	**0.115**		0.05
Mercury (Hg)-Total	mg/L	<0.00020	<0.00020	<0.00005	0.001	
Molybdenum (Mo)-Total	mg/L			0.001		
Nickel (Ni)-Total	mg/L			0.001		
Potassium (K)-Total	mg/L	1.90	1.89	2.15		
Selenium (Se)-Total	mg/L	<0.0010	<0.0010	<0.0001	0.01	
Silver (Ag)-Total	mg/L			<0.00002		
Sodium (Na)-Total	mg/L	2.9	2.9	3.1		200
Sulfur (S)-Total [6]	mg/L	**0.97**	**0.96**	<3		
Uranium (U)-Total	mg/L	<0.00010	<0.00010	<0.0001	0.02	
Vanadium (U)-Total	mg/L			<0.005		
Zinc (Zn)-Total	mg/L	<0.050	<0.050	<0.005		5

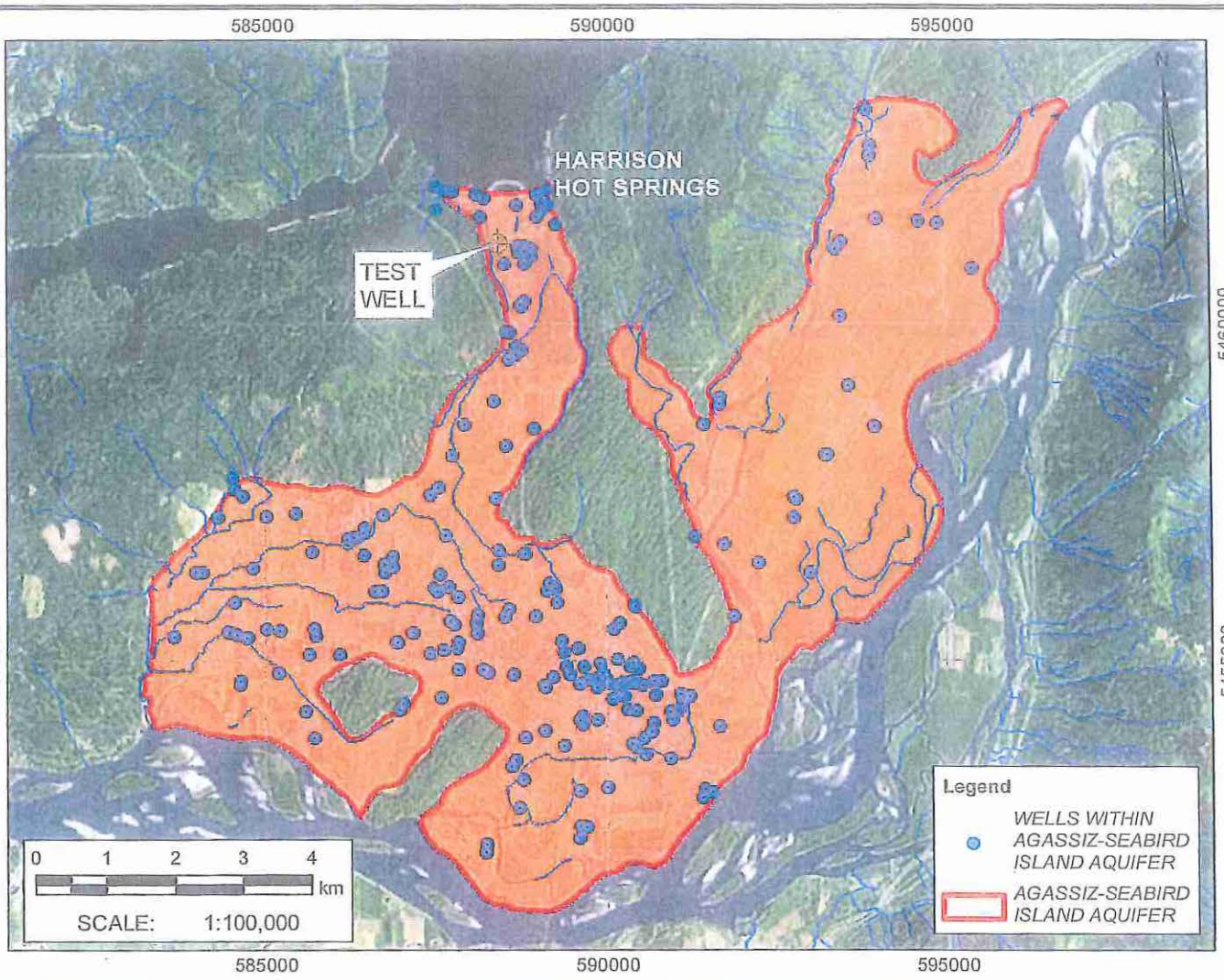
H:\Project\3127\2011\[Water Quality Summary 30Aug11.xlsx]Results of Analysis

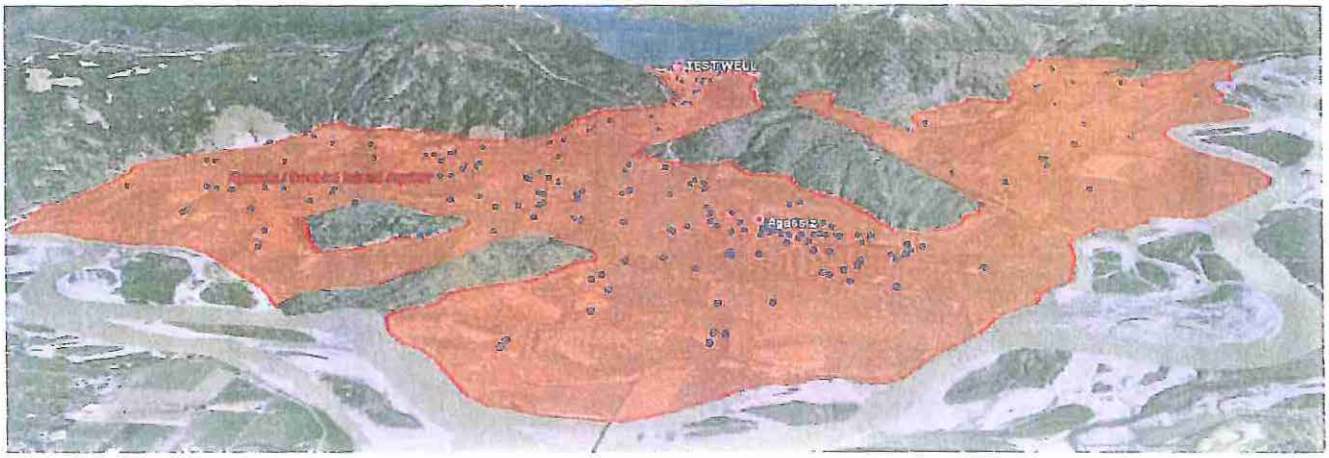
Notes:

1. Sample results from April 14, 2010 following well construction
2. Sample results from Corix (2011) pilot study
3. Canadian Drinking Water Quality Guidelines - Maximum acceptable concentrations (GCDWQ, 2010)
4. Canadian Drinking Water Quality Guidelines - Aesthetic objectives (GCDWQ, 2010)
5. "Generally, hardness levels between 80 and 100 mg/L (as CaCO3) are considered acceptable; levels greater than 200 mg/L are considered poor but can be tolerated; those in excess of 500 mg/L are normally considered unacceptable." (GCDWQ, 2010)
6. Canadian Drinking Water Quality Guidelines - Aesthetic objective for sulphide (H_2S) is 0.05 mg/L (GCDWQ, 2010)

FIGURES

H:\Project\3127\2011\ArcGIS\Arcmaps\Aug2011 review Figrue 1.mxd





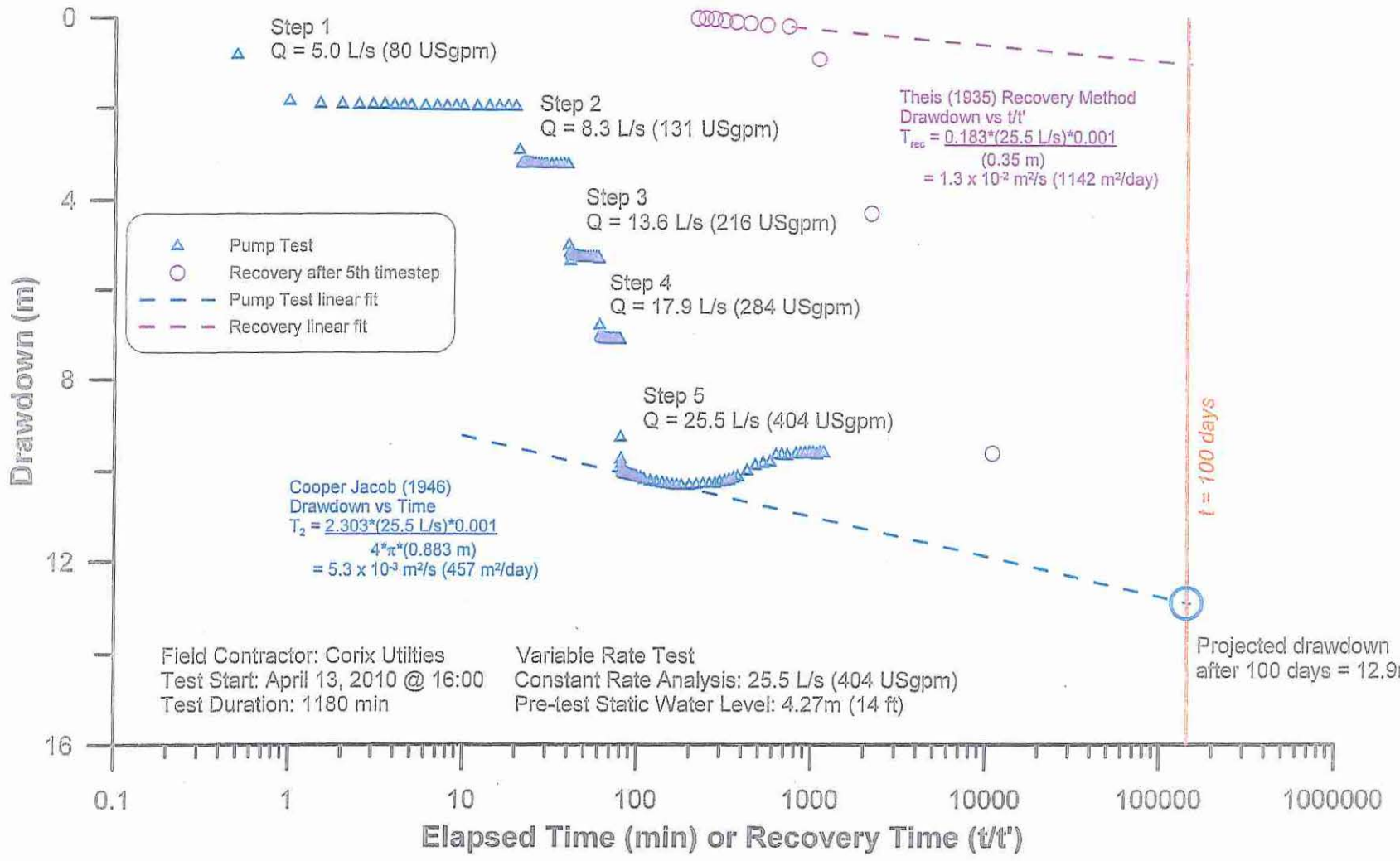
VILLAGE OF HARRISON HOT SPRINGS
WELL WATER PILOT STUDY REVIEW

PITEAU ASSOCIATES
GEOTECHNICAL AND HYDROGEOLOGICAL CONSULTANTS

PLAN MAP AND OBLIQUE AERIAL VIEW OF HARRISON HOT SPRINGS AND THE AGASSIZ -SEABIRD ISLAND AQUIFER

BY:	DATE:
MLS	AUG 11
APPROVED:	FIG:
DJT	1

H:\Project\3127\2011\Test Well Pumping rate Test.grf



Field Contractor: Corix Utilties
Test Start: April 13, 2010 @ 16:00
Test Duration: 1180 min

Variable Rate Test
Constant Rate Analysis: 25.5 L/s (404 USgpm)
Pre-test Static Water Level: 4.27m (14 ft)

Cooper and Jacob (1946)

$$T = \frac{2.303 * Q * 0.001}{4*\pi*\Delta s}$$

Theis (1935)

$$T = \frac{0.183 * Q * 0.001}{\Delta(s-s')}$$

CIVIC CONSULTANTS LTD
VILLAGE OF HARRISON HOT SPRINGS

PITEAU ASSOCIATES
GEOTECHNICAL AND HYDROGEOLOGICAL CONSULTANTS

SEMI-LOG PLOT OF WATER LEVELS IN HARRISON HOT SPRINGS TEST WELL; VARIABLE RATE PUMP TEST RESULTS AND CALCULATED TRANSMISSIVITY

BY:	DATE:
MLS	AUG 11
APPROVED:	FIG:
DJT	2

APPENDIX A

A & H DRILLING WELL RECORD

A & H Drilling Ltd.

WELL RECORD

48987 CHILLIWACK CENTRAL ROAD CHILLIWACK, BC V2P 6H3

TEL: (604)794-5544 CELL: (604)864-1919 FAX: (604)794-5545

TOLL FREE: 1(877)794-5544

C\O:	CIVIC CONSULTANTS
OWNER:	CITY OF HARRISON
ADDRESS:	410-3TH STREET
CITY:	NEW WESTMINSTER, BC V3L 2S2
PHONE:	

DATE:	MARCH	31	2010	INVOICE:	2825
SITE ADDRESS:	495 HOT SPRINGS ROAD				
CITY:	HARRISON HOT SPRINGS				
NAD:	83	ZONE:	10	UTM EASTING:	588455
ELEVATION:	36 FEET			UTM NORTHING:	5461207
ACCURACY:	59 FEET			WELL ID PLATE #	29881

CONSTRUCTION X

CLOSURE : _____ ALTERATION: _____

WELL LOG INFORMATION

FROM	TO	
0	4	SAND GRAVEL/FILL
4	10	CLAY GRAVEL WITH WOOD
10	17	SILTY SAND
17	30	SAND GRAVEL
30	35	MEDIUM SAND/SOME GRAVEL
35	45	MEDIUM SAND/WOOD MIXED
45	80	FINE SAND W.B.
80	85	FINE TO MEDIUM SAND
85	110	MEDIUM TO COARSE SAND SOME GRAVEL SMALL
110	135	FINE SAND

START DATE:	MARCH	29	2010	
COMPLETION:	MARCH	30	2010	
RIG NO:	5	TYPE:	DUAL ROTARY	
DRILLER:	JOHN McDONALD		WD#04110301	
HELPER:	BILL CLARKE			
CASING SIZE:	8	INCH		
SURFACE CASING:	12	INCH		
SURFACE CASING DEPTH	15	FEET		
CASING SHOE:	8	INCH		

HOLE DEPTH:	104	FEET		INCHES
CASING BOTTOM:	89	FEET		INCHES
STICK UP:	2	FEET	6	INCHES
OPEN HOLE FROM:		FEET TO:		FEET

SCREENS

NO. OF SCREENS:	THREE				
SLOT:	20	SLOT:	20	SLOT:	20
SLOT:		SLOT:		SLOT:	
SCREEN LENGTH:	16	FEET	2	INCHES	
TOP AT:	87	FEET	10	INCHES	
BOTTOM AT:	104	FEET		INCHES	
K PACKER:	YES	BAIL BOTTOM:		YES	
RISER:	NO	TAIL PIPE:		NO	

IRON CONTENT: APPROX 0.5 P.P.M.

REMARKS: PULLED BACK TO 104 FEET

WELL SHOULD BE PUMP TESTED

SET 15 FEET OF 12 INCH SURFACE CASING AND BENTONITE SEAL

WELL PRODUCING

APPROXIMATE FLOW RATE :	300	GPM
APPROXIMATE STATIC H20 :	11	FEET
SET SCREEN & DEVELOP:	5.5	HOURS
RECOMMENDED PUMP SETTING:	80	FEET

APPENDIX B

CORIX UTILITIES WELL TEST REPORT

CORIX™
Water Systems

Harrison Hot Springs Pilot Study
April 2011

Objective of the study
To determine if removal of unacceptable levels of Manganese and Hydrogen Sulphide from a well water source is possible using Greensand filter media at a pumped flow rate equivalent to what would be required to service the community's treated water needs.

Provide raw water analysis of the parameters required in the Canadian Drinking Water Guidelines (CDWG).

Description of water source
Harrison Hot Springs well head behind the fire hall. The well was drilled and tested for draw down characteristics in April, 2010 by Corix Utilities.

Source water testing parameters
Source flow rates for testing: 10 and 400 GPM
Time line: 3 days of testing with 2 samples taken per day.
The first 2 days at low flow, 3rd day at high flow

Filtering parameters
Filter Media used: 610 mm (24") of Greensand plus, 505 mm (12") of anthracite
The Pilot Plant flow rate for the testing: 1 Litre/min. (0.264 gal/min.)
Surface area of the filter: 12.57 sq.in. (0.087 sq.ft.)
Surface loading: 3.03 GPM/ sq.ft.

Batch regeneration of the media was accomplished using Potassium Permanganate powder. See the "Testing Methods" section at the end of the document for details.

Analysis
Analysis of the water samples was by Maxxam Analytical, Burnaby BC.

Results of lab analysis
A summary of the comparison of the Guidelines for Canadian Drinking Water Quality to the Maxxam lab results is as follows.

General Drinking Water Parameter Test:
All raw water measured parameters were below regulated and aesthetic limits except for Manganese.

Manganese Tests

GCDWQ aesthetic objective:	<0.05 mg/l
Raw water average:	0.12 mg/l
Treated water average	0.008 mg/l
Average removal efficiency	93%

Sulphide Tests

GCDWQ aesthetic objective:	<0.05 mg/l		
Raw water average:	0.023 mg/l	400 gpm value	0.027 mg/l
Treated water average	0.007 mg/l		
Average removal efficiency	70%		

The results indicate that all measured treated water parameters were within GCDWQ by a safe margin. This result is indicative that the manganese green sand filter system would safely and economically meet VHHS's potable water objectives.

The pilot test operator also indicated that the water taste quality was good with only very faint odours before treatment and no odours following treatment.

Please see the test results below.

Pictures of the pilot equipment and site are included on the last page

Please note that the Mn and H2SO4 test results for the first day's tests are included as part of the CDWG spreadsheets.

A complete copy of the Maxxam Analytical analysis documents is available from Corix Water Systems on request.

Sample results

Day 1 - 10 GPM well flow rate.
One Raw Water sample taken at the same time as the first filtered (Filtered 1) sample.
Raw Water sample taken for CDWG analysis.

Maxxam

Maxxam Job #: B131477
Report Date: 2011/04/27

Corix Water Systems Inc.

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		AJ2988	AJ2989	AJ3007	AJ3008		
Sampling Date		2011/04/19 12:15	2011/04/19 12:15	2011/04/19 12:15	2011/04/19 15:00		
COC#		G033607	G033607	G033607	G033607		
	Units	1L - CDWG, 240ML MICROBIOLOGY, 120ML METAL	120ML - RW MN/SULPHIDE	120ML - FILTERED 1 MN/SULPHIDE	120ML - FILTERED 2 MN/SULPHIDE	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.005				0.005	4804541
Calculated Parameters							
Filter and HNO3 Preservation	N/A		FIELD	FIELD	FIELD	N/A	ONSITE
Total Hardness (CaCO3)	mg/L	135				0.5	4800415
Nitrate (N)	mg/L	<0.02				0.02	4800334
Misc. Inorganics							
Fluoride (F)	mg/L	0.07				0.01	4810203
Alkalinity (Total as CaCO3)	mg/L	140				0.5	4801188
Alkalinity (PP as CaCO3)	mg/L	<0.5				0.5	4801188
Bicarbonate (HCO3)	mg/L	170				0.5	4801188
Carbonate (CO3)	mg/L	<0.5				0.5	4801188
Hydroxide (OH)	mg/L	<0.5				0.5	4801188
Anions							
Dissolved Sulphate (SO4)	mg/L	1.9				0.5	4804489
Dissolved Chloride (Cl)	mg/L	3.5				0.5	4804485
MISCELLANEOUS							
True Colour	Col. Unit	<5				5	4802659
Sulphide	mg/L		0.017	0.007	<0.005	0.005	4902907
Nutrients							
Nitrate plus Nitrite (N)	mg/L	<0.02				0.02	4804492
Physical Properties							
Conductivity	uS/cm	272				1	4801186
pH	pH Units	8.10					4801179
Physical Properties							
Total Dissolved Solids	mg/L	170				10	4809605
Turbidity	NTU	0.2				0.1	4802366

N/A = Not Applicable
RDL = Reportable Detection Limit

CORIX Water Systems

Maxxam

Maxxam Job #: B131477
Report Date: 2011/04/27

Corix Water Systems Inc.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		AJ2986	AJ2989	AJ3007	AJ3008		
Sampling Date		2011/04/19 12:15	2011/04/19 12:15	2011/04/19 12:15	2011/04/19 15:00		
COC#		G033607	G033607	G033607	G033607		
	Units	1L - CDWG, 240ML MICROBIOLOGY, 120ML METAL	120ML - RW MN/SULPHIDE	120ML - FILTERED 1 MN/SULPHIDE	120ML - FILTERED 2 MN/SULPHIDE	RDL	QC Batch
Dissolved Metals by ICPMS							
Dissolved Manganese (Mn)	ug/L		111	5	2	1	4801040
Total Metals by ICPMS							
Total Aluminum (Al)	ug/L	<3				3	4806525
Total Antimony (Sb)	ug/L	<0.5				0.5	4806525
Total Arsenic (As)	ug/L	5.7				0.1	4806525
Total Barium (Ba)	ug/L	36				1	4806525
Total Boron (B)	ug/L	<50				50	4806525
Total Cadmium (Cd)	ug/L	<0.01				0.01	4806525
Total Chromium (Cr)	ug/L	<1				1	4806525
Total Cobalt (Co)	ug/L	<0.5				0.5	4806525
Total Copper (Cu)	ug/L	<0.2				0.2	4806525
Total Iron (Fe)	ug/L	76				5	4806525
Total Lead (Pb)	ug/L	<0.2				0.2	4806525
Total Manganese (Mn)	ug/L	115				1	4806525
Total Mercury (Hg)	ug/L	<0.05				0.05	4806525
Total Molybdenum (Mo)	ug/L	1				1	4806525
Total Nickel (Ni)	ug/L	<1				1	4806525
Total Selenium (Se)	ug/L	<0.1				0.1	4806525
Total Silver (Ag)	ug/L	<0.02				0.02	4806525
Total Uranium (U)	ug/L	<0.1				0.1	4806525
Total Vanadium (V)	ug/L	<5				5	4806525
Total Zinc (Zn)	ug/L	<5				5	4806525
Total Calcium (Ca)	mg/L	39.1				0.05	4801203
Total Magnesium (Mg)	mg/L	5.56				0.05	4801203
Total Potassium (K)	mg/L	2.15				0.05	4801203
Total Sodium (Na)	mg/L	3.11				0.05	4801203
Total Sulphur (S)	mg/L	<3				3	4801203

RDL = Reportable Detection Limit

corix Water Systems

Maxxam

Maxxam Job #: B131477
Report Date: 2011/04/27

Corix Water Systems Inc.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		AJ2988	AJ2989	AJ3007	AJ3008		
Sampling Date		2011/04/19 12:15	2011/04/19 12:15	2011/04/19 12:15	2011/04/19 15:00		
COC#		G033607	G033607	G033607	G033607		
	Units	1L - CDWG, 240ML MICROBIOLOGY, 120ML METAL	120ML - RW MN/SULPHIDE	120ML - FILTERED 1 MN/SULPHIDE	120ML - FILTERED 2 MN/SULPHIDE	RDL	QC Batch
Dissolved Metals by ICPMS							
Dissolved Manganese (Mn)	ug/L		111	5	2	1	4801840
Total Metals by ICPMS							
Total Aluminum (Al)	ug/L	<3				3	4806525
Total Antimony (Sb)	ug/L	<0.5				0.5	4806525
Total Arsenic (As)	ug/L	5.7				0.1	4806525
Total Barium (Ba)	ug/L	36				1	4806525
Total Boron (B)	ug/L	<50				50	4806525
Total Cadmium (Cd)	ug/L	<0.01				0.01	4806525
Total Chromium (Cr)	ug/L	<1				1	4806525
Total Cobalt (Co)	ug/L	<0.5				0.5	4806525
Total Copper (Cu)	ug/L	<0.2				0.2	4806525
Total Iron (Fe)	ug/L	76				5	4806525
Total Lead (Pb)	ug/L	<0.2				0.2	4806525
Total Manganese (Mn)	ug/L	115				1	4806525
Total Mercury (Hg)	ug/L	<0.05				0.05	4806525
Total Molybdenum (Mo)	ug/L	1				1	4806525
Total Nickel (Ni)	ug/L	<1				1	4806525
Total Selenium (Se)	ug/L	<0.1				0.1	4806525
Total Silver (Ag)	ug/L	<0.02				0.02	4806525
Total Uranium (U)	ug/L	<0.1				0.1	4806525
Total Vanadium (V)	ug/L	<5				5	4806525
Total Zinc (Zn)	ug/L	<5				5	4806525
Total Calcium (Ca)	mg/L	39.1				0.05	4801203
Total Magnesium (Mg)	mg/L	8.98				0.05	4801203
Total Potassium (K)	mg/L	2.15				0.05	4801203
Total Sodium (Na)	mg/L	9.11				0.05	4801203
Total Sulphur (S)	mg/L	<3				3	4801203

RDL = Reportable Detection Limit

CORIX Water Systems

Sample results
Day 2 - 10 GPM well flow rate.
One Raw Water sample taken at the same time as the first filtered (Filtered 3) sample

CORIX Water Systems

Maxxam

Maxxam Job #: B132044
Report Date: 2011/04/26

Corix Water Systems Inc.

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		AJ6404	AJ6405	AJ6406	AJ6407	AJ6408	AJ6409		
Sampling Date		2011/04/20 11:20	2011/04/20 11:20	2011/04/20 11:20	2011/04/20 11:20	2011/04/20 13:30	2011/04/20 13:30		
COC#		G033606	G033606	G033606	G033606	G033606	G033606		
	Units	120ML- FILTER 3 RW MN	120ML- FILTER 3 RW SULPHIDE	120ML- FILTERED 3 MN	120ML- FILTERED 3 SULPHIDE	120ML- FILTERED 4 MN	120ML- FILTERED 4 SULPHIDE	RDL	QC Batch
Calculated Parameters									
Filter and HNO3 Preservation	N/A	FIELD		FIELD		FIELD		N/A	ONSITE
MISCELLANEOUS									
Sulphide	mg/L		0.017		0.007		0.007	0.005	4805406

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		AJ6404	AJ6406	AJ6408		
Sampling Date		2011/04/20 11:20	2011/04/20 11:20	2011/04/20 13:30		
COC#		G033606	G033606	G033606		
	Units	120ML- FILTER 3 RW MN	120ML- FILTERED 3 MN	120ML- FILTERED 4 MN	RDL	QC Batch
Dissolved Metals by ICPMS						
Dissolved Manganese (Mn)	ug/L	114	<1	<1	1	4807391

N/A = Not Applicable
RDL = Reportable Detection Limit

Sample results
Day 3 - 400 GPM well flow rate.

One Raw Water sample was taken at the same time as each of the filtered samples (Filtered 5 & 6). This provides a direct comparison for the flow over time.

COFIX Water Systems

Maxxam

Maxxam Job #: B132081
Report Date: 2011/04/28

Corix Water Systems Inc.
Client Project #: HARRISON WELL TEST
Site Reference: HARRISON HOT SPRINGS

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		AJ6663	AJ6664	AJ6665	AJ6666		
Sampling Date		2011/04/21 10:00	2011/04/21 10:00	2011/04/21 12:00	2011/04/21 12:00		
COC#		G033608	G033608	G033608	G033608		
	Units	FILTER 5 RW MN/SULPHIDE	FILTERED 5 MN/SULPHIDE	FILTERED 6 RW MN/SULPHIDE	FILTERED 6 MN/SULPHIDE	RDL	QC Batch
Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	FIELD	N/A	ONSITE
MISCELLANEOUS							
Sulphide	mg/L	0.024	0.007	0.027	0.007	0.005	4813393

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		AJ6663	AJ6664	AJ6665	AJ6666		
Sampling Date		2011/04/21 10:00	2011/04/21 10:00	2011/04/21 12:00	2011/04/21 12:00		
COC#		G033608	G033608	G033608	G033608		
	Units	FILTER 5 RW MN/SULPHIDE	FILTERED 5 MN/SULPHIDE	FILTERED 6 RW MN/SULPHIDE	FILTERED 6 MN/SULPHIDE	RDL	QC Batch
Dissolved Metals by ICPMS							
Dissolved Manganese (Mn)	ug/L	126	22	124	18	1	4809118

N/A = Not Applicable
RDL = Reportable Detection Limit

Testing method, details and notes

Monday, April 18th
I traveled to Harrison Hot Springs on the morning of April 18th. The pilot equipment was picked up from our yard by Corix Utilities and arrived at site shortly afterward. It was placed (and operated) outside near the well head at the back of the fire hall.

Corix Utilities installed a 10 GPM pump for the first set of tests. Power for the pump was provided from the distribution panel in the fire hall via our connection box. The first day was spent setting up the equipment and making the connections for power for the filter skid and 10 GPM pump. After set-up was completed the plant was run overnight.

Tuesday, April 19th
The plant ran all night without incident and the clearwell was full to allow for backwashing. The filter media was soaked in a 0.5% KMNO4 solution for about an hour then backwashed until clear. The plant was put back on line and run continuously for the 2 days of testing at the 10 GPM flow rate.
Samples were taken as follows:

CDWG	12:15
Raw water - Mn	12:15
Raw water - Sulphide	12:15
Filtered water - Mn	12:15
Filtered water - Sulphide	12:15
Filtered water - Mn	15:00
Filtered water - Sulphide	15:00

The samples were delivered to UPS depot in Chilliwack for overnight shipping to Maxxam Analytical.

Wednesday, April 20th
Samples were taken as follows:
Pilot plant had run all night without incident.

Raw water - Mn	11:20
Raw water - Sulphide	11:20
Filtered water - Mn	11:20
Filtered water - Sulphide	11:20
Filtered water - Mn	13:30
Filtered water - Sulphide	13:30

The samples were delivered to UPS depot in Chilliwack for overnight shipping to Maxxam Analytical.

After the last samples were taken at 13:30 the Corix Utilities crew arrived with the 40 GPM pump and portable generator. The 10 GPM pump was removed and the 400 GPM pump installed and tested. The media was backwashed and soaked overnight in a 0.5% KMNO4 solution.

Thursday, April 21st

The media was backwashed until clear then the generator and 400 GPM pump were started (8:30). The plant was run until about 13:00 and samples taken as follows:

Raw water - Mn	10:00
Raw water - Sulphide	10:00
Filtered water - Mn	10:00
Filtered water - Sulphide	10:00
Raw water - Mn	12:00
Raw water - Sulphide	12:00
Filtered water - Mn	12:00
Filtered water - Sulphide	12:00

The samples were delivered to UPS depot in Chilliwack for overnight shipping to Maxxam Analytical.

The water level in the well was measured when the Utilities crew arrived to remove the pump. Water level before starting the pump was approx 14' below the well casing. After 5 hours of pumping at 400 GPM the water level was 42.2 ' below the well casing.

Two raw water samples were taken to determine how pumping at the high flow rate will affect the amount of Mn and Sulphide in the water over time.

At 13:00 the pump and generator were stopped and the equipment disconnected, packed up and loaded on the Utilities truck for shipping.
The last set of samples were hand delivered to Maxxam Analytical in Burnaby at 16:00, as there was no delivery service available from Chilliwack due to the Easter Friday holiday.

Note

It was mentioned by Dave Harris that there was a strong Sulfur odor during the initial 400GPM draw down test when the well was bored in April of 2010. This was not the case during this testing. Although there was some odor present it was not overpowering. No odor or taste of Sulfur could be detected from the filtered water in the clearwell.

Report compiled by:
David MacKay
Corix Water Systems
Langley, BC
2011/4/29


corix

October 2003

Turbidity

Guideline

Waterworks systems that use a surface water source or a groundwater source under the direct influence of surface water should filter the source water to meet the following health-based turbidity limits, as defined for specific treatment technologies. Where possible, filtration systems should be designed and operated to reduce turbidity levels as low as possible, with a treated water turbidity target of less than 0.1 NTU at all times. Where this is not achievable, the treated water turbidity levels from individual filters shall be:

1. *For **chemically-assisted filtration**, less than or equal to **0.3 NTU** in at least 95% of the measurements made, or at least 95% of the time each calendar month and not exceed 1.0 NTU at any time.*
2. *For **slow sand or diatomaceous earth filtration**, less than or equal to **1.0 NTU** in at least 95% of the measurements made, or at least 95% of the time each calendar month and not exceed 3.0 NTU at any time.*
3. *For **membrane filtration**, less than or equal to **0.1 NTU** in at least 99% of the measurements made, or at least 99% of the time each calendar month and not exceed 0.3 NTU at any time. If membrane filtration is the sole treatment technology employed, some form of virus inactivation[†] should follow the filtration process.*

It is not expected that all water supplies will be able to meet this revised turbidity guideline immediately. Therefore, suplimentary treatment should be considered in the interim to ensure delievery of a safe drinking water.

Executive Summary

Particles of matter are naturally suspended in water. These particles can be clay, silt, finely divided organic and inorganic matter, plankton and other microscopic organisms. Turbidity is a measurement of how light scatters when it is aimed at water and bounces off the suspended particles. It is not a measurement of the particles themselves. In general terms, the cloudier the water, the more the light scatters and the higher the turbidity.

The best means of reducing turbidity and safeguarding a drinking water supply is to apply a multiple-barrier approach (i.e., source to tap) to protect drinking water. The focus of this approach is to look at the entire drinking water supply, identify potential and existing hazards and then develop strategies to deal with each of the hazards.

Treatment plants can reduce turbidity by filtering particles out of the water. All filtration systems should be designed and operated to reduce turbidity levels as low as possible. The treated water turbidity target is 0.1 NTU at all times. However, even though effective filtration can be accomplished using any one of a number of technologies, the actual levels of turbidity

[†] Some form of virus inactivation is required for all technologies. The difference is that chemically-assisted, slow sand and diatomaceous earth filters are credited with log virus reductions and membrane filters receive no credit.

achieved will vary from technology to technology. For this reason, the turbidity guideline is broken down by type of technology.

The most important consideration when dealing with turbidity is to make sure the levels remain low and fairly constant over time. Concerns are most likely to result from a spike in the level of turbidity, due either to an increase in the amount of particulate matter in the source water (e.g., from heavy rains) or to a breakdown in the treatment process (e.g., inadequate coagulation, a ruptured filter). Because it might otherwise be difficult to notice a spike in turbidity when only one filter in a plant is not be working properly, the guideline applies to each individual filter within a filtration system.

Health considerations

It is important to control turbidity in public water supplies for both health and aesthetic reasons. Suspended matter can contain toxins such as heavy metals and biocides and can also harbour microorganisms, protecting them from disinfection. Recent research has correlated turbidity levels with treated water supplies being contaminated with *Giardia* and *Cryptosporidium*. These microorganisms can cause outbreaks of illness. As such, turbidity may be used as a health parameter to indicate the safety of water leaving a filtration system. Because turbidity can affect the microbiological quality of drinking water, this guideline should be read in conjunction with the bacteriological guidelines. Excessive turbidity may also be associated with unpleasant tastes and odours.

In addition, high turbidity can lead to an increase in the amount of disinfection by-products that form in treated water. Trihalomethanes (THMs), for instance, are a group of chemical compounds that form when chlorine reacts with organic material in water. By filtering out the organic matter to reduce turbidity, treatment plants also reduce the amount of THMs that may form in the water. For more information on these disinfection by-products, see the THMs guideline and supporting document.

The nature of turbidity and its health implications vary with the type of source water. Turbidity in surface water and groundwater that comes into contact with surface water (referred to as groundwater under the direct influence of surface water), however, is generally organic in nature and may contain toxins, harbour pathogens, or lead to the formation of THMs. Turbidity in secure groundwater supplies (i.e., not under the influence of surface water) is generally non-organic and should pose no health threat. The health-based guideline and target for turbidity therefore only apply to surface water sources and groundwater under its influence.

Analytical and Treatment Considerations

Turbidity is easy and inexpensive to measure. In addition to being a indicator for determining the relative safety of drinking water, it is a useful tool for assessing the performance of water treatment processes.

Turbidity is measured in nephelometric turbidity units, or NTU, using a device called a turbidimeter. Modern turbidimeters can make measurements of 0.1 NTU or lower. Levels of turbidity in raw waters can range from 1.0 NTU to more than 1000.0 NTU. Levels vary at individual locations over time.

A number of studies indicate that properly designed and well-operated conventional, chemically-assisted and direct filtration water treatment plants can readily achieve a safe finished water with turbidity levels lower than 0.2 NTU. Meeting the guideline level of 0.3 NTU for these systems should be straightforward. Slow sand and diatomaceous earth filtration plants can consistently achieve a safe finished water turbidity levels of less than 1.0 NTU. Membrane filtration plants can consistently achieve finished water turbidity of less than 0.1 NTU. For all filtration technologies, these limits are achievable and expected in 95-99% of measurements, but a target of 0.1 NTU should be sought at all times.

Application of the guideline

The health-based turbidity guideline applies to drinking water produced by systems that use either a surface water source or a groundwater source under the direct influence of surface water. The guideline is applied to individual filter turbidity. However, good operating practices suggest that both the individual filter turbidity and the combined filter turbidity should be continuously monitored. Drinking water taken from pristine sources may be exempt from the filtration requirements if it meets all of the criteria outlined below (see "Criteria for the exclusion of filtration in waterworks systems").

Surface water is defined as all waters open to the atmosphere and subject to surface runoff. Groundwater under the direct influence of surface water is defined as "any water beneath the surface of the ground with (i) significant occurrence of insects or other macro-organisms, algae, organic debris, or large-diameter pathogens such as *Giardia lamblia*, *Cryptosporidium*, or (ii) significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH which closely correlate to climatological or surface water conditions."[1] Key issues that should be considered when determining whether groundwater is under the influence of surface water are given in Appendix A.

The health-based turbidity guideline does not apply to secure groundwater sources, i.e., those not under the direct influence of surface water. Turbidity in these cases is non-organic, should pose no health threat and should not hinder disinfection. However, for effective operation of the distribution system , it is good practice to ensure water entering the distribution system has low turbidity levels of around 1.0 NTU.

Monitoring turbidity levels

For chemically-assisted filtration (i.e., continuous feed of a coagulant with mixing ahead of filtration), source water turbidity levels should be measured at least once per calendar day directly in front of where the first treatment chemical is applied. Treated water turbidity levels from individual filters should be continuously measured (with an on-line turbidimeter)at intervals no longer than five minutes apart at a point upstream of the combined filter effluent line or the clear water tank.

For slow sand or diatomaceous earth filtration, water turbidity levels from individual filters should be continuously measured (with an on-line turbidimeter) at intervals no longer than five minutes apart at a point upstream of the combined filter effluent line or the clear water

tank. However, the frequency of monitoring may be reduced to one grab sample per day if it can be demonstrated that this frequency gives a reliable measure of filter performance.

For membrane filtration, treated water turbidity levels from individual filters should be continuously measured (with an on-line turbidimeter) at intervals no longer than five minutes apart at a point upstream of the combined filter effluent line or the clear water tank. An individual membrane filter may be defined as a unit or group of membrane stacks or cartridges within a train that may be valved and isolated from the rest of the system for testing and maintenance. Process designs should include a minimum of two parallel trains, if practical. Consideration should be given to installing on-line turbidity meters to analyze the water unique to each "individual" filter.

Use of alternative filtration technology by waterworks systems

A waterworks system can use a filtration technology other than the technologies stipulated if, in combination with disinfection, it reliably achieves at least a 3-log reduction of *Giardia lamblia* cysts and *Cryptosporidium* oocysts and a 4-log reduction of viruses. Pilot studies or equivalencies from other jurisdictions should demonstrate that the technology meets these criteria.

Criteria for exclusion of filtration in waterworks systems

Filtration of a surface water source or a groundwater source under the direct influence of surface water may not be necessary if *all* of the following conditions are met:

1. Overall inactivation is met using a minimum of two disinfectants:
   - ultraviolet irradiation or ozone to inactivate cysts/oocysts;
   - chlorine (free chlorine) to inactivate viruses; and
   - chlorine or chloramines to maintain a residual in the distribution system.

   Disinfection should reliably achieve at least a 99% (2-log) reduction of *Cryptosporidium* oocysts[‡], a 99.9% (3-log) reduction of *Giardia lamblia* cysts and a 99.99% (4-log) reduction of viruses. If mean source water cyst/oocyst levels are greater than 10/1000 L, more than 99% (2-log) reduction of *Cryptosporidium* oocysts, and 99.9% (3-log) reduction of *Giardia lamblia* cysts should be achieved. Background levels for *Giardia lamblia* cysts and *Cryptosporidium* oocysts in the source water should be established by monitoring as described in the most recent "Protozoa" guideline document, or more frequently during periods of expected highest levels (e.g., during spring runoff, or after heavy rainfall).
2. Prior to the point where the disinfectant is applied, the number of *Escherichia coli* bacteria in the source water does not exceed 20/100 mL (or, if *Escherichia coli* data is not available, the number of total coliform bacteria does not exceed 100/100 mL) in at least 90% of the weekly samples from the previous six months.

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‡ Studies on human volunteers have demonstrated that *Cryptosporidium* oocysts are less infectious than *Giardia* cysts by about one order of magnitude.

3. Average daily source water turbidity levels measured at equal intervals (at least every four hours), immediately prior to where the disinfectant is applied, range around 1.0 NTU but do not exceed 5.0 NTU for more than two days in a 12-month period. Source water turbidity also does not show evidence of protecting microbiological contaminants.
4. A watershed control program (e.g., protected watershed, controlled discharges, etc.) is maintained that minimizes the potential for faecal contamination in the source water.

Considerations for groundwater systems

In keeping with the multi-barrier approach to drinking water quality management, systems using secure groundwater sources should:

1. Ensure groundwater wells are properly constructed, are located in areas where there is minimum potential for contamination, and have appropriate wellhead protection measures in place. These source protection measures protect public health by reducing the risk of the drinking water source becoming contaminated.
2. Ensure treatment is sufficient to achieve 4-log reduction of viruses by disinfection. It is important to confirm that elevated turbidity levels will not compromise the disinfection process.
3. Maintain a chlorine residual throughout the distribution system and ensure water quality is monitored and maintained. Well-designed and operated distribution systems are key to providing safe, clean drinking water to consumers.

Identity and Sources in the Environment

The sources and nature of turbidity are varied and complex and are influenced by the physical, microbiological and chemical characteristics of water. In surface waters and groundwater under the direct influence of surface water, turbidity can vary significantly over time which has important implications for drinking water treatment processes and the microbiological safety of the drinking water. Particulate matter is frequently a source of nutrients for microorganisms and can protect microorganisms from both chemical and ultraviolet light disinfection. Particles contributing to turbidity may also carry undesirable chemical contaminants such as heavy metals. Turbidity can seriously affect the safety and acceptability of drinking water to consumers.

Description of turbidity

Turbidity is a "measure of the relative clarity of water."[3] Turbidity in water is caused by suspended and colloidal matter, such as clay, silt, finely divided organic and inorganic matter, and plankton and other microscopic organisms. However, turbidity is not a direct measure of suspended particles suspended in the water. It is, rather, a measure of the scattering effect such particles have on light. A directed beam of light remains relatively undisturbed when transmitted through absolutely pure water, but even the molecules in a pure fluid will scatter light to a certain degree. *Standard Methods for the Examination of Water and Wastewater* defines

turbidity as an "expression of the optical property that causes light to be scattered and absorbed rather than transmitted with no change in direction or flux level through the sample."[4]

In samples containing suspended solids, the manner in which water interferes with light transmittance is related to the size, shape and composition of the particles in the water and to the wavelength (colour) of the light that falls on the particles (incident light).[5] A minute particle absorbs the incident light falling on it and then re-radiates the light in all directions.

The detection, measurement and visual perception of turbidity is influenced by a number of factors. Particle size has an impact on the direction in which light is scattered and on the intensity of scattered light of differing wavelengths (colours). The shape of the particle also influences light scattering, as does the refractive index of the water and the colour of the particles.

Light scattering intensifies as particle concentration increases. However, as scattered light strikes more and more particles, multiple scattering occurs, and absorption of light increases. When particulate concentration exceeds a certain point, detectable levels of both scattered and transmitted light drop rapidly, marking the upper limit of measurable turbidity. By decreasing the path length of light through the sample, the number of particles between the light source and light detector is reduced, extending the upper limit of turbidity measurement.

Because several factors affect the intensity of light scattering, it is not possible to relate scattered light measurements directly to the number or weight of suspended solids in a given volume of water with any accuracy. Direct correlations can be made only if such factors as the size, distribution, shape, refractive index and absorptive capacity of the suspended solids causing the turbidity remain constant; this can only be achieved in a laboratory and is therefore impractical and unnecessary in most cases.[5]

Sources

Levels of turbidity in raw water can range from less than 1.0 NTU to more than 1000.0 NTU. The particles that cause turbidity in water range in size from colloidal dimensions (approximately 10 nm) to diameters of the order of 0.1 mm and can be divided into three general classes: clays, organic particles resulting from decomposition of plant and animal debris, and fibrous particles from asbestos minerals.[20] Clay particles generally have an upper diameter limit of about 0.002 mm, but can be as large as 0.02 mm. Biological organisms may also cause turbidity.

Particulate material in natural waters is mostly made up of eroded soil particles from the surrounding area. Coarser sand and silt fragments are at least partially coated with organic material. Clay particles are composed of clay minerals, usually phyllosilicates, as well as non-clay material, such as iron and aluminum oxides and hydroxides, quartz, amorphous silica, carbonates and feldspar.[20] Clays and organic particles are often found together as a "clay organic complex."[20] To a certain extent, it is artificial to treat the organic (humic) component in isolation from the inorganic component when considering the behaviour of suspended matter. However, humic substances have a much higher adsorptive capacity than clays (870 meq/100 g and 80 100 meq/100 g, respectively[21]); the effect of humic components likely predominates in many instances.

Other particles in raw water and drinking water supplies include the group of naturally occurring hydrated silicate minerals with fibrous structures known as asbestos; inorganic precipitates, such as metal (iron or manganese) oxides and hydroxides; and biological organisms, such as algae, cyanobacteria, zooplankton, and filamentous or macrobacterial growths.[22,23] Due to the numerous types of source particles and their implications in the treatment process, raw water quality monitoring for turbidity should be done at least daily, and preferably more often.

Relationship between turbidity and other water quality parameters

Table 1 summarizes some of the relationships between the source of turbidity and water quality/treatment implications.

Microbiological characteristics

Relationship between turbidity and the presence of pathogenic/non-pathogenic organisms

The microbiological quality of drinking water can be significantly affected by turbidity. Microbial growth in water is most extensive on the surfaces of particles and inside loose flocs, both naturally occurring and those formed during treatment(see section "Treatment technology"). This growth occurs because nutrients adsorb to surfaces, allowing bacteria to grow more efficiently than when in free suspension.[56,57] Similarly, river silt has been shown to readily adsorb viruses.[58]

Studies of distribution systems have shown conflicting findings with respect to turbidity and microorganisms. Haas *et al.*[59] noted that increased values of pH, temperature and turbidity were associated with increased concentrations of microorganisms. HPC increases that parallel increases in turbidity have been found at turbidity levels lower than 2.0 NTU.[60] Similarly, work by Goshko *et al.*[61] found positive correlations between HPCs and turbidities in the 0.83–8.89 NTU range. On the other hand, a study reported by Reilly and Kippin[62] suggested that turbidity around 1.0 NTU does not affect the frequency with which either coliforms or HPC organisms occur in the analysis.

Table 1: Turbidity and implications for water quality and water treatment

Source of turbidity	Possible water quality/chemistry implications	Treatment implications
Inorganic particles (silt, clay, natural precipitants, e.g., $CaCO_3$, MnO_2, Fe_2O_3, etc.)	- raise/lower pH and alkalinity - source of micronutrients - affect zeta potential - source of metals and metal oxides - cloudy/turbid appearance - affect taste	- major influence on coagulation, flocculation and sedimentation design - harbour/protect microorganisms
Organic particles (decomposed plant and animal debris, humic substances)	- source of energy and nutrients for microorganisms - cause colour - impart taste and odour - serve as precursors for the formation of chlorinated or ozonated compounds	- high disinfectant demand - potential to form chlorinated organics - potential to form ozonation by-products - high coagulant dose - reduce clarifier overflow rates

Source of turbidity	Possible water quality/chemistry implications	Treatment implications
	- possess ion exchange and complexing properties that include association with toxic elements and micropollutants - affect pH - affect zeta potential	- increase flocculation/sedimentation times - harbour/protect microorganisms - reduce filter runs - can compete with pollutant compounds for adsorption sites in activated carbon adsorption - can precipitate in the distribution systems
Biological organisms (algae, cyanobacteria, zooplankton, filamentous or macrobacterial growth)	- impart taste and odour - potential source of toxin (microcystin-LR) - disease transmission - corrode tanks, pipes, etc. - stain fixtures - cause aesthetic problems due to sloughing of growths from tanks, filters, reservoirs and distribution system	- plug filters - high disinfectant demand - need multiple barriers to ensure effective microbial inactivation - flotation may be more effective than sedimentation - microbial inactivation required

In water with turbidities ranging from 3.8 to 84.0 NTU, Sanderson and Kelly[63] found coliform organisms even after the water was treated with chlorine (free chlorine residuals between 0.1 and 0.5 mg/L after a minimum contact time of 30 minutes).

Huck *et al.*,[64] in their investigation of *Cryptosporidium* removal by granular media filtration, noted that an increase in turbidity associated with suboptimal coagulation and breakthrough at the end of filtration runs resulted in deterioration in oocyst reduction, even at turbidity levels less than 0.3 NTU. Utilities should therefore carefully consider the effects of reducing coagulant dosage. To avoid breakthrough, plants should specify a maximum head loss and filter run times and should consider using particle counters to monitor for early breakthrough.

Effect of turbidity on disinfection

Particulate matter (e.g., organic, inorganic, higher microorganisms) can protect bacteria and viruses from the effects of disinfection. LeChevallier *et al.*,[65] studying the efficiency of chlorination in killing coliforms in unfiltered surface water supplies, found a negative correlation with turbidity. A derived model predicted that an increase in turbidity from 1.0 to 10.0 NTU would result in an eight-fold decrease in the disinfection efficiency at a fixed chlorine dose. A study by Hoff,[66] which examined the efficiency of disinfection at turbidities of 1.0 and 5.0 NTU on poliovirus and sewage effluent coliforms, found that viruses and coliforms that adsorbed to organic matter were more resistant to disinfection than those that adsorbed to inorganic material such as clay and aluminum phosphate. For organic particulates, a reduction of turbidity from 5.0 to 1.0 NTU reduced the concentrations of disinfectant-resistant organisms approximately five-fold.

Hoff and Geldreich[67] reiterated that particulate characteristics have a significant impact on protection effects. Studies with ozone by Sproul *et al.*[68] confirmed that alum and bentonite afforded little protection to a variety of test organisms at 1.0 and 5.0 NTU, whereas faecal

material and, in particular, human epithelial carcinoma cells did provide protection. Chlorine dioxide studies by Scarpino *et al.*[69] suggested that temperature and turbidity affected the rate of inactivation of bentonite-adsorbed poliovirus. At 25°C, turbidities in excess of 2.29 NTU reduced inactivation rates.

Free-living nematodes are relatively common in North American municipal water supplies. Nematodes of the Rhabditae family are known to ingest pathogenic bacteria and viruses, and hence are able to protect these pathogens from chlorine disinfection.[70] Studies indicate that more nematodes are found in higher-turbidity raw and treated waters.[71,72] In a study of the San Francisco water supply, coliform organisms were detected at chlorine levels of 0.35 mg/L or greater. Crustaceans apparently harboured the coliforms; on passing through a spigot, the crustaceans ruptured, and viable coliforms were released.[73] In laboratory tests, various clays and humic acid were shown to protect *Klebsiella aerogenes* from ultraviolet light disinfection.[74]

Chlorine (as hypochlorous acid) reacts readily with organic matter containing unsaturated bonds, phenolic groups and nitrogen groups, giving rise to taste- and odour-producing compounds[75] and trihalomethanes.[76] Hence, waters with high turbidity from organic sources may give rise to a substantial chlorine demand. This could result in reductions in the free chlorine residual in distribution systems as protection against possible recontamination. For Ottawa River plants, Otson *et al.*[77] noted that increased pre-chlorination dosage requirements were strongly correlated with increases in turbidity. In Oregon surface waters, chlorine demand had a positive correlation with both turbidity and total organic carbon levels.[65] The resultant model suggested a 180% increase in chlorine demand for a turbidity increase from 1.0 to 5.0 NTU.

In the United States, well-operated slow sand filtration plants may be allowed to have higher turbidity in filter effluents if there is no interference with disinfection and the turbidity level never exceeds 5.0 NTU.[78] Non-interference with disinfection may be assumed if the finished water meets the coliform maximum contaminant level and if there are fewer than 10 heterotrophic plate count bacteria per mL during times of highest turbidity.[78]

Effect of turbidity on microbial enumeration

The presence of turbidity may interfere with the quantification of bacteria and viruses. Bacteria are enumerated by counting the number of visible colonies that form on nutritive media when bacterial cells are incubated on the media for a fixed period of time. This process assumes that each colony represents one cell; however, a single colony could emanate from a particle containing many bacterial cells adsorbed on its surface. Fewer cells than were actually present would then be recorded. This phenomenon would also lead to an underestimation of bacterial numbers with the most probable number technique.

Geldreich *et al.*[79] noted that turbidity in a potable water sample may make membrane filtration impractical because of the volume of water the filter can pass, the character of the suspended material and the thickness of the deposit on the surface of the membrane. Although crystalline or siliceous materials may not be a problem, other substances may clog filter pores or cause a confluent growth to develop during incubation, hampering microbial enumeration. Coliform masking has been observed with membrane filters, with false-negative results occurring 17, 45 and more than 80% of the time for turbidities of less than or equal to 1.0, 5.0

and more than 10.0 NTU, respectively.[65,80] Additional studies suggested that levels of turbidity *per se* (up to approximately 10.0 NTU) did not greatly affect coliform discovery, although associated non-coliform bacteria seriously inhibited detections.[81]

Viruses can also be adsorbed on or within particulate matter and may be very difficult to remove; 1% recovery is not unusual.[82] A review of virus detection methods concluded that no simple and accurate system for enumerating viruses in highly turbid waters was available.[83]

Relationship between Turbidity Removal and Microbial Quality of Treated Water

Historically, filtration has been shown to substantially block disease-causing organisms from entering into the drinking water supply.[81] During coagulation, protozoa, bacteria and viruses, along with other sources of turbidity, become trapped in the floc and are removed by the filter.[85,86] However, sometimes floc breaks through filter beds; such breakthroughs have been shown to be accompanied by an increase in virus penetration, even though the turbidity of the finished water remained below 0.5 NTU.[82]

Studies have shown a correlation between decreased filtrate turbidity (down to 0.1 NTU) and reduced bacterial and algal counts.[84] Increases in the turbidity of filter effluent can signal the potential for increasing passage of unwanted organisms, even if the turbidity in the effluent is less than 1.0 NTU. For example, increasing concentrations of *Giardia* cysts can occur with turbidity increases of only 0.2–0.3 NTU.[87,88]

The Pennsylvania Department of Environmental Protection, in its 1996 Regulatory Basics Initiative Program report ,[89] gave its view of the relationship between turbidity and pathogen occurrence in finished filtered water. It stated that a relationship exists between turbidity spikes and *Giardia* breakthrough such that a stable filter with low turbidities that experiences a 0.1 NTU increase in turbidity can experience a 10- to 50-fold increase in cyst breakthrough from disturbance of the media.

In evaluating plant performance using endospores, researchers found that the log reduction of spores was similar in magnitude to the individual reduction of turbidity, total particles and particles in the *Cryptosporidium* oocyst size range. More important, spore removal closely paralleled particle and turbidity removal in response to coagulant dosage under all the water quality conditions examined.[90]

In examining relationships between turbidity and parasites, it was found that for every log removal of turbidity, a 0.89-log removal was achieved for *Giardia* and *Cryptosporidium*.[91] Conversely, increases in filtrate turbidity paralleled increases in the risk of *Cryptosporidium* breaking through the filter due to floc material breaking through that contained, or was associated with, oocysts. These increases occurred even with efficient chemical coagulation. It is therefore reasonable to assume that during the filter 'ripening' period at the beginning of a run, when turbidity is often greater than normal for the filter, the risk of *Cryptosporidium* breakthrough is higher.[92]

Table 2 shows average potential removal credits estimated for *Giardia lamblia*, *Cryptosporidium* and viruses, when treated water meets the prescribed turbidity limits. The log reduction credits outlined in Table 2 are based on the mean or median removal established by the US EPA as part of the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR).[126] Facilities that do not meet the requirements, or facilities that believe they can achieve a higher

log credit than is automatically given, can be granted a log reduction credit based on a demonstration of performance by the appropriate regulatory agency.

Table 2: *Giardia lamblia, Cryptosporidium* and virus potential reduction credits for various technologies.

Technology	Cyst/oocyst credit [c]	Virus credit
Conventional filtration [a]	3.0 log	2.0 log
Direct filtration [a]	2.5 log	1.0 log
Slow sand or diatomaceous earth filtration [a]	3.0 log	2.0 log
Micro- and ultrafiltration, nanofiltration and reverse osmosis [b]	Removal efficiency demonstrated through challenge testing and verified by direct integrity testing	No credit for micro- and ultrafiltration; for nanofiltration and reverse osmosis, removal efficiency demonstrated through challenge testing and verified by direct integrity testing

Notes:
[a]Conventional/direct/slow sand/diatomaceous earth filtration should be followed by free chlorination to obtain additional virus credit.
[b]Micro- and ultrafiltration should be followed by free chlorination for the inactivation of viruses.
[c]Depending on cyst/oocyst levels in source water, additional treatment is required using ultraviolet light, ozone, chlorine or chlorine dioxide (refer to protozoa/virological quality supporting documents for the level of inactivation required and the CT/IT tables for various disinfectants).

Chemical characteristics

Because of their adsorption capacity, suspended particulates have the ability to entrap undesirable organic and inorganic compounds; as such, an indirect relationship exists between turbidity and the chemical characteristics of these compounds in water. Most important in this respect is the organic or humic component of turbidity.

Humic substances are able to bind substantial amounts of metals and hydrous oxides together, forming complexes. An excellent review of metal–humate complexes, the mechanism of their formation and their properties is provided by Schnitzer and Kahn.[93] The ability of a number of natural waters in Ontario to complex copper has been demonstrated, with complexing capacities of up to 2.35 µmol Cu/L (0.149 mg/L) being reported.[94] A wide variety of heavy metal ions were found to be complexed in sediments of the Ottawa and Rideau rivers. A positive correlation between the unit surface area of the sediment and the concentration of adsorbed metal ions was observed.[95] In a study of mercury sorption and desorption characteristics of Ottawa River sediments, it was found that sorption rates were higher for organic-rich sands. Desorption of mercury was difficult, with less than 1% of the mercury being leached during a seven-hour contact period.[96] The strength of some metal–humate complexes may lead to negative errors in the analytical measurement of trace metals in natural water samples if turbidity exists.[97]

One method that is used to remove undesirable metal ions during water treatment is adsorption with activated carbon. This process is aided by the presence of organic matter.[98] Organic molecules are also adsorbed by natural organic matter. DDT, for example, is solubilized in 0.5% sodium humate solution by a factor of at least 20 over its solubility in pure water.[99]

Herbicides such as 2,4-D, paraquat and diquat can be adsorbed onto clay/humic acid particulates, the adsorption being greatly influenced by metal cations present in the humic material.[100] The presence of turbidity, therefore, might also interfere with the detection of biocides in water samples.

Chlorination of water containing organic matter such as humic acids can produce trihalomethanes, a group of chemical compounds that includes chloroform, bromodichloromethane, chlorodibromomethane and bromoform. The Canadian drinking water guideline for trihalomethanes is based on the known health effects associated with chloroform. Morris and Johnson[101] observed a relationship between raw water turbidity and trihalomethane concentration in finished Iowa City water. In laboratory tests, Stevens and co-workers[102] found that trihalomethane production was reduced if the water was filtered prior to chlorination. Harms and Looyenga[103] also reported that raw water turbidity was positively correlated with chloroform concentration in a South Dakota water supply. Strategies for addressing turbidity have implications related to controlling the potential formation of trihalomethanes, including the removal of organic matter, the use of alternative disinfectants, disinfectant application points and dosages, and the use of activated carbon.[104]

For plants using aluminum salts as coagulants, highest particulate aluminum concentrations (>200 μg/L) were measured when the turbidity was greater than 0.5 NTU.[105] The results of the study suggest that filtered water turbidity should be less than 0.1 NTU to minimize particulate aluminum concentrations that contribute to residual aluminum.[105]

At the asbestos levels commonly found in drinking water (of the order of 10^4–10^6 fibres/L),[106] very little, if any, correlation has been observed between turbidity and asbestos concentration.[3,107,108] However, a general but non-linear relationship has been reported at high levels of asbestos (10^9–10^{11} fibres/L).[109] Further studies on treatment efficiencies for asbestos removal have resulted in a recommendation by Logsdon and co-workers[110,111] that plants designed for asbestos removal should produce filtered waters with turbidities of 0.1 NTU or lower. McGuire *et al.*[112] suggested that this objective would help but not necessarily guarantee low asbestos counts (<10^6 fibres/L). Boatman[113] reported that turbidity could impede asbestos analyses because of restricted filter volumes. Asbestos-cement pipes are used in some localities to transport drinking water, and it has been demonstrated that water with an aggressivity index of less than 10 can cause the release of asbestos fibres into the drinking water.[114]

Physical characteristics

A considerable body of evidence suggests that a large part of colour in water arises from colloidal particles. These tiny particles have physical and chemical properties that allow them to stay suspended in the water, rather than settling down or dissolving. Black and co-workers[52,53] used electrophoretic studies to demonstrate the predominantly colloidal nature of colour in water; it has been claimed that about 50% of colour is due to a "colloidal fraction" of humic substances.[54] True colour is therefore defined as the colour of water from which turbidity has been removed.[3]

The relationship between high turbidity, in both raw and filtered water, and taste and odour has long been recognized.[55] Algal growths, actinomycetes and their debris also contribute

to taste and odour problems.[22] At 5.0 NTU and above, there is an increasing visual detection, which many consumers find unacceptable.

Analytical methods

Turbidity is measured using the nephelometric method. Nephelometry determines turbidity using the intensity of scattered light. Table 3 lists four nephelometric methods that meet the criteria of the American Water Works Association/American Public Health Association (AWWA/APHA) or the U.S. Environmental Protection Agency (USEPA) and one International Organization for Standardization (ISO) criteria for determining turbidity in drinking water.

Table 3: Recognized Analytical Methods for Measuring Turbidity in Drinking Water[a]

Method	Citation	Description
Nephelometric	AWWA/APHA 2130B[4]	Tungsten lamp@2200-3000°K and one or more perpendicular detectors (&filters) with spectral response peak of 400-600nm. Light path ≤10 cm.
Nephelometric	USEPA 180.1[6]	Tungsten lamp@2200-3000°K and one or more perpendicular detectors (&filters) with spectral response peak of 400-600nm. Light path ≤10 cm.
Optical	ISO 7027[8]	Tungsten lamp (&filters),Diode or Laser as radiation source at 860 nm (or 550nm if sample is colourless) with a perpendicular detector and aperture angle 20-30°
Great Lakes Instruments	USEPA GLI 2[7]	Two perpendicular 860nm light sources alternately pulse each 0.5 seconds & two perpendicular detectors alternately measure "reference" and "active" signals.
Hach Filter Trak	USEPA 10133[125]	Laser Diode @660 nm at 90° to detector/receiver (light path ≤10 cm) which may use Photo-Multiplier Tube and fibre-optic cable. Range is 0-1000 mNTU's.

Notes:
[a] Additional methods may be approved before this guideline is revised/updated in the future.

Nephelometric turbidity instrumentation varies in design, range, accuracy and application. The design of nephelometric instruments should take into account the physics of scattered light. As noted in a previous section (Identity and Sources in the Environment), the size, shape and concentration of the particles affect the intensity pattern and distribution of the scattered light. Small particles less than one-tenth of the light wavelength will scatter light uniformly in both forward and backward directions. As the particle size approaches and exceeds the wavelength of the incident light, more light is transmitted in the forward direction. Because of this intensity pattern, the angle at which the light is measured is a critical factor; the current international standards have determined the most appropriate angle to be 90 degrees.[8] As noted above in a previous section, as the concentration of particles increases, more particles reflect the incident light, which increases the intensity of the scattered light. As the concentration exceeds a

certain point determined by the specific optical characteristics of the process, the particles themselves begin to block the transmission of the scattered light. The result is a decrease in the intensity of the scattered light. The intensity at which various wavelengths of light are reflected or absorbed is also determined by the colour of the liquid and the reflecting surface. Industry standards require nephelometers to operate in the visible or infrared ranges: 400–600 and 800–900 nm, respectively.[9]

All these factors, along with the optical geometry of a particular instrument, cause measured values between instruments to vary widely; thus, criteria for instrument design have been developed to minimize these variables. Manufacture of turbidimeters is guided by recommendations provided by the U.S. Environmental Protection Agency[10] and the International Organization for Standardization (ISO 7027).[8]

Using special experimentation methods with a quartz iodine light source, the nephelometric response of exhaustively filtered de-ionized water has been shown to be 0.022–0.003 NTU.[11] Air bubbles and dirty sample tubes can cause false high readings for turbidity; very turbid samples or samples with colour due to dissolved substances will give low readings.[4,12]

For a finished water turbidity goal of 0.1 NTU, rigorous standard operating procedures and a high level of quality control are required; a small numeric change may result in a large percent change.[13,14] However, according to USEPA *Analytical Methods for Turbidity Measurement (180.1 and GLI 2)* and *Standard Methods for the Examination of Water and Wastewater (2130B)*, the sensitivity of nephelometers is such that turbidity differences of 0.02 NTU or less can be detected in waters having a turbidity of less than 1.0 NTU.[4,6,7] All three methods cite "reporting to the nearest 0.05 NTU where the turbidity range is 0–1.0 NTU." Thus, the practical lower limit of the standard nephelometric method can be considered to be 0.1 NTU.

Laser turbidimeters have recently entered the market. The manufacturers claim that these instruments are far more sensitive than the standard turbidimeters; purporting to accurately measure in the mNTU range. The USEPA has approved a laser turbidity method, "Method 10133, Determination of Turbidity by Laser Nephelometry." [125] Currently they are not widely used in the industry.[15]

Turbidity, as defined by the above methods, is a non-scientific measure of particle concentration. Electronic particle counters are now available that are capable of accurately counting and recording the number of particles as a function of size (often in the 1–150 µm range). Although there is a general relationship between particle counts and turbidity (below 1.0 NTU), a firm correlation does not exist.[16–18]

A simple conversion factor relating particle counting and turbidity measurements is not possible because the two techniques differ fundamentally in terms of discernment. Particle counting measures two characteristics of particulates: particle number and particle size. Samples with identical clarity can be distinguished on the basis of these two features; one sample may contain many small particles, whereas another may contain few large particles. Turbidity, on the other hand, cannot distinguish between two samples of identical clarity and different particulate composition.[19]

Particle counters are an excellent tool for optimizing treatment processes and for detecting the onset of filter breakthrough. Particle counters are restricted to performance verification only, and no limit is set as a maximum acceptable concentration for the number of particles in the treated water.

Treatment technology

Turbidity is reduced by removing particles from the water through filtration. Adequate filtration can be achieved by a variety of technologies: chemically-assisted filtration, slow sand filtration, diatomaceous earth filtration, membrane filtration or an alternative proven filtration technology.

Chemically-Assisted Filtration

The chemically-assisted filtration process generally includes chemical mixing, coagulation, flocculation, sedimentation (or dissolved air flotation) and rapid gravity filtration. Aluminum and ferric salts are used as primary coagulants. Cationic and anionic polymers are most commonly used as flocculation aids, and both, along with non-ionic polymers, have been used as filter aids. The coagulants and polymers are used to destabilize the generally negatively charged colloidal particles, which allows aggregation to occur via chemical and van der Waals interactions.[24,25] The resulting (much larger) particles are filtered out when the water passes through sand beds or other single-, dual- or mixed-media granular filters. In systems where the combined water from all filters is monitored continuously, this treatment process is capable of producing water with a turbidity of less than 0.3 NTU; turbidities of less than 0.2 NTU have been demonstrated to be achievable on an ongoing basis. Filter loading rates generally range from 3.0 to 12.0 m/h.[26,27]

Changes in alkalinity, colour, turbidity and orthophosphate concentrations affect coagulation reactions, and the properties and rate of settling of resulting floc particles. Temperature affects efficiency by influencing the rate of chemical reactions and the viscosity of water, thereby affecting the particle settling velocity and the filter backwash rate. The lower the temperature of the water, the more difficult it is to treat the water.

All filtration plants should provide for continuous monitoring of the effluent turbidity from each individual filter, as well as for continuous monitoring of the combined filtered water turbidity from all filters. Continuous monitoring is required because short-term turbidity spikes represent a process failure and potential health risk. Peak turbidity levels in the filtered water are a particular concern immediately after filter backwashing; therefore, all filters should be designed so that the filtered water immediately after filter backwashing is directed into a waste stream ('filter-to-waste' provision). When operating the filters, every effort should be made to minimize the magnitude and duration of turbidity spikes.[28]

Discharge of filter backwash water into a raw water reservoir should not be permitted unless the filter backwash water receives off-line treatment, or is returned to a location upstream of the coagulant dosage point, so that all processes of a conventional or direct filtration plant are employed. The off-line treatment may be acceptable depending on the method used to treat the backwash water.

Following filtration, turbidity in a waterworks may increase if any of the following occur:

- coagulants escape into the filtered water;
- dissolved metals oxidize;
- bacteria and other microflora grow;
- chemicals are added for stability or corrosion control;
- deposited materials (especially in low-flow parts of the system) are resuspended; or
- pipes corrode or lines break.[29,30]

Uncovered distribution system reservoirs may also lead to increased turbidities, mainly by encouraging biological production.[31,32]

In 1989, the American Water Works Association Research Foundation sponsored a study that identified design provisions and operational practices at high-rate filtration plants. For the study, researchers chose 21 plants that were successful in producing finished water with turbidity of less than 0.2 NTU.[27] In choosing the participating plants, consideration was given to geographic coverage as well as diversity of raw water types and treatment processes. In a different study, the Pennsylvania Department of Environmental Protection undertook performance evaluations of 150 surface water treatment plants that used filtration from 1988 to 1990 and found that a goal of 0.2 NTU was achievable for most plants.[33] An internal report, prepared in 1995 for the same department, also found that filtration plants can readily achieve finished water with turbidities of less than 0.5 NTU and that most plants can achieve less than 0.2 NTU.[26] In pilot tests involving treatment of Boston's low-turbidity surface water supply with dissolved air flotation, the turbidity goal of 0.1 NTU was met in more than 90% of the runs.[34] Operational studies at specific plants have indicated that low turbidities in plant effluent are readily achievable when competent operations are in place.[35,36] In another study, it was demonstrated that well-operated conventional treatment plants or direct filtration plants that produce water with low turbidity (less than 0.5 NTU) can achieve up to a 3-log reduction of *Giardia* cysts and up to a 2-log reduction of viruses.[37] The same study demonstrated that source waters with low raw water turbidity require filter effluent turbidities to be substantially lower than 0.5 NTU in order to effectively remove *Giardia* cysts and viruses.

The U.S. Environmental Protection Agency's 1997 Notice of Data Availability for Interim Enhanced Surface Water Treatment Rule shows that systems serving greater than 10 000 people are able to meet low turbidity limits. The same study indicated that chemically-assisted filtration is able to achieve a 2-log reduction of *Cryptosporidium* through filtration.[38,39] The US EPA has now concluded that conventional treatment plants in compliance with the IESWTR or LT1ESWTR achieve an average of 3-log reduction of *Cryptosporidium*. Direct filtration plants achieve an average of 2.5-log reduction of *Cryptosporidium*.[126]

Slow sand filtration

In slow sand filtration, filter effectiveness depends on the formation of schmutzdecke, which is a layer of bacteria, algae and other microorganisms on the surface of the sand, and the

formation of a biopopulation within the sand bed. Raw water passes through the sand bed where physical, chemical and biological mechanisms remove contaminants. The most important removal mechanism has been attributed to the biological process. No chemicals are added, nor is there a need to backwash.

Researchers have observed variation in the ability of slow sand filters to reduce turbidity. Fox *et al.*[40] found that when water was filtered at 0.12 m/h, after an initial ripening period had allowed the biopopulation to become established on new sand, the treated water turbidity was consistently less than 1.0 NTU. Raw water turbidity ranged from 0.2 to 10.0 NTU. Cleasby *et al.*[41] reported that typical effluent turbidity was 0.1 NTU for raw water with turbidity ranging from lower than 1.0 to 30.0 NTU, except during the first two days after scraping of the schmutzdecke. Pyper[42] observed slow sand filtered water with turbidity of 0.1 NTU or lower 50% of the time and 1.0 NTU or lower 99% of the time; raw water turbidity in this study ranged from 0.4 to 4.6 NTU. Slezak and Sims[43] reported that nearly half of the 27 slow sand filtration plants they surveyed produced filtered water turbidity of 0.4 NTU or lower; at the same time, 15% of the plants produced water with an average turbidity of 1.0 NTU or higher. Consistent 3-log reductions of particles sized from 2 to 4 μm upwards were also observed in this study. The size range of 7–12 μm is considered to be representative of the size of *Giardia* cysts. Bellamy *et al.*[44] studied the water treatment efficiency of slow sand filtration to ascertain removal of *Giardia* cysts, total coliform bacteria, heterotrophic plate count (HPC, formerly known as standard plate count) bacteria, particles and turbidity. Results showed that slow sand filtration is an effective water treatment technology. Using a biologically mature filter, *Giardia* cyst removal was virtually 100%; total and faecal coliform removal was approximately 99%; particle removal averaged 98%; HPC bacteria removal ranged from negative to 99%, depending on the influent concentration; and turbidity removal ranged from 0 to 40%.[39] The US EPA has now concluded that slow sand filtration plants in compliance with the IESWTR or LT1ESWTR achieve an average of 3-log reduction of *Cryptosporidium*.[126]

Slow sand filtration is appropriate for use when raw water turbidities are relatively low (e.g., <10.0 NTU).

As is the case with chemically-assisted filtration, a 'filter-to-waste' feature should be provided so that the filtered water immediately after filter cleaning is directed into a waste stream.

Diatomaceous earth filtration

Diatomaceous earth filters operate by passing water through a thin layer of diatomaceous earth about 3 mm thick supported on a septum or filter element. To prevent turbid water from clogging the filter, a small amount of diatomaceous earth is continually added as body feed to maintain a permeable filter cake. Once the headloss across the filter cake becomes too great or the filter cake begins to slough, the filter is removed from service and the filter cake is washed and reused. New precoat is applied, and the cycle starts again.

Diatomaceous earth filtration has been shown to attain excellent removal of *Giardia* cysts over a broad range of operating conditions. Cyst removals exceeding 99%, and often 99.9%, were reported by Lange *et al.*[45] for filtration rates of 2.4–9.6 m/h and for temperatures

from 3.5 to 15°C. Logsdon *et al.*[46] reported that when sufficient diatomaceous earth and body feed were used, removal of 9-µm radioactive beads was nearly always 99.9% or higher. The same study reported that 11 filter runs were made with *Giardia muris* cysts at filtration rates of 2.2–3.5 m/h. Cyst removal exceeded 99% in all runs and exceeded 99.9% in five of the runs. The US EPA has now concluded that diatomaceous earth filtration plants in compliance with the IESWTR or LT1ESWTR achieve an average of 3-log reduction of *Cryptosporidium*.[126]

Diatomaceous earth filtration is appropriate and effective in treating waters with low turbidity. Logsdon *et al.*[46] reported that turbidity reductions of 56–78% were attained with diatomaceous earth when raw water turbidity ranged from 0.95 to 2.5 NTU. Pyper[42] reported an average turbidity reduction of 75% with an effluent quality of 0.5 NTU.

As is the case with chemically-assisted filtration, a 'filter-to-waste' feature should be provided so that the filtered water immediately after filter backwashing is directed into a waste stream.

Membrane filtration

Four membrane treatment processes are currently used in the water industry, and all involve pressure-driven semi-permeable membranes. The most appropriate type of membrane depends on a number of factors, including targeted materials to be removed, source water quality characteristics, treated water quality requirements, membrane pore size, molecular weight cut-off, membrane materials and system/treatment configuration.[47] The four processes are:

1. **Reverse osmosis**: a high-pressure membrane treatment process originally developed to remove salts from brackish water.
2. **Nanofiltration**: a low-pressure reverse osmosis process for the removal of larger cations (e.g., calcium and magnesium ions) and/or organic molecules.
3. **Ultrafiltration**: a lower-pressure membrane process characterized by a wide band of molecular weight cut-off and pore sizes for the removal of dissolved organics and particulates.
4. **Microfiltration**: a low operating pressure membrane process used to remove particulates, including pathogenic cysts.[47,48]

Reverse osmosis and nanofiltration are very effective for absolute removal of cysts, bacteria and viruses.[48] Ultrafiltration (pore size 0.01 µm) and microfiltration (pore size 0.1 µm) are effective for absolute removal of *Giardia* cysts and partial removal of bacteria and viruses.[49] Filtrate turbidity can be achieved consistently at or below 0.1 NTU.[50,51]

Prefiltration and/or the addition of a scale-inhibiting chemical may be required to protect membranes from plugging effects, fouling and/or scaling.

If membrane filtration is the sole treatment technology in use then a form of virus inactivation should be incorporated into the treatment train after the filtering process.

'Filter-to-waste" feature should be provided for initial start-up and commissioning of the membrane system and for emergency diversion in the event of a membrane integrity breach.

Health considerations

Microbial

The most important health-related effect of turbidity is probably its ability to protect microorganisms from disinfection. Turbidity, which has been shown to be correlated with the contamination of water supplies by *Giardia* and *Cryptosporidium*,[119] serves as a surrogate measure for indicating the risk of contamination by these pathogens. A dramatic increase in turbidity levels at one of the Milwaukee water treatment plants (levels many times higher than those of the preceding 14 months) was associated with the outbreak of cryptosporidiosis in April 1993, when more than 400 000 people developed symptomatic gastrointestinal infections as a consequence of exposure to contaminated drinking water.[120] An outbreak of giardiasis in Rome, New York, where an unfiltered but chlorinated water supply was used, has been cited as illustrating the problem of particulates possibly protecting pathogens and interfering with marginal disinfection.[108] In another incident, high turbidities (>4.0 NTU), resulting from poor plant operation coupled with a malfunctioning chlorinator, were considered as causal factors in an outbreak of giardiasis.[84]

In most water treatment plants, *Giardia* removal is a physical process involving coagulation, flocculation and filtration; chlorine contact times alone are insufficient to result in complete destruction or removal.[121] Monitoring turbidity can therefore be a useful indicator of plant performance, including cyst removal. Studies have shown that small increases in turbidity (about 0.2 NTU) can result in significant passage of *Giardia* cysts.[87] It has been suggested that 0.1 NTU should be set as a goal or objective for treated water.[84,87,121,122] Giardiasis problems have, however, occurred where turbidity limits have been met, and it should not be assumed that achieving a turbidity limit will by itself prevent waterborne disease.[88,123]

A study in Philadelphia by Schwartz *et al.*,[51] which asserted a correlation between levels of turbidity and hospital admissions of elderly residents with gastrointestinal illnesses, highlights the fact that meeting the turbidity limits does not necessarily mean that disease can be prevented. The authors found that an increase in the weighted average turbidity of approximately 25% (0.035 NTU) was associated with a 9% increase in hospital admissions of elderly residents with gastrointestinal illness 9–11 days after exposure, even though the recorded average turbidities were well below the regulated limits. A similar study by Aramini *et al.*[124] has demonstrated a relationship between reported gastrointestinal illness and turbidities in excess of 1.0 NTU, the previous Canadian health-based drinking water guideline. Using a generalized additive model, the authors demonstrated that excess turbidities during the period 1992–1998 could explain 2.1%, 0.8% and 0.9% of emergency-associated, gastroenteritis-related physician visits by persons residing within the three water distribution areas, respectively. In addition, 1.3%, 0.2% and 0.3% of gastroenteritis-related hospitalizations of persons residing in the same three areas were explained by variations in turbidity. It is evident from these studies that change in turbidity levels in drinking water is a potential indicator for breakthrough of pathogenic organisms and increased consumer risk.

Hudson,[115] using 1953 data on infectious hepatitis and raw water turbidity for 12 U.S. cities, observed that infectious hepatitis incidence was greater with higher turbidity. A similar relationship appeared to exist between turbidity and cases of poliomyelitis, although this finding was based on a smaller sample.[115] Shaffer *et al.*[116] reported detection of poliovirus in waters with chlorine concentrations greater than 1 mg/L and turbidities less than 1.0 NTU, which indicates that protection from disinfection occurs even at very low turbidity levels. Although a study of 16 U.S. cities in 1961 failed to reveal a clearly defined relationship between hepatitis incidence and finished water turbidity, the authors stated that, because of the many factors involved, it should not be inferred that there is none.[117] The infectious hepatitis epidemic in Delhi, India, occasioned by the massive contamination of the raw water source of a treatment plant by sewage, was also accompanied by a significant increase in raw water turbidity. Even though chlorination was practised, it was apparently insufficient to inactivate the infectious hepatitis virus.[118] The protection from disinfection offered by organic or cellular material in particular has been reported in other studies.[66,68]

Chemical

Particulate matter in water is not usually a potential chemical hazard in itself, but may have indirect effects.[20] The concentrations of both heavy metal ions and biocides are usually much higher in suspended solids than in water. The possibility therefore exists that when such contaminated particles enter a different environment, such as the stomach, release of the pollutants could occur, with potentially deleterious effects.

The metal–ligand binding in humate complexes can be represented by the equation:[93]

$$M^{n+} + H_mA \rightleftharpoons M_mA_n + mH$$

where:

- M^{n+} = the metal ion
- H_mA = humic acid
- M_mA_n = the metal complex.

If, for instance, the hydrogen ion concentration is increased by stomach acid, the equilibrium will be displaced in favour of the free ion and the undissociated humic acid.

Similarly, the absorption of some herbicides, in particular s-triazine compounds, by soil organic matter, has been demonstrated to be pH dependent. Maximum absorption occurs at pH levels in the vicinity of the respective pK values of the herbicides (i.e., pH levels of about 4–6). Lowering or raising the pH decreases absorption and hence may lead to the release of free herbicides.[93]

Other considerations

Excessive turbidity has often been associated with unacceptable tastes and odours. Turbidity in excess of 5.0 NTU also becomes visually apparent and may be objected to by consumers. In some cases, if the level of turbidity is not lowered to reduce the organic loading in advance of applying certain chemicals, it may lead to other health concerns (e.g., the formation of trihalomethanes).

As noted above, turbidity measurement does not indicate the type, number or mass of particles. However, because of the ease of analysis and relative inexpensiveness of the equipment, it is a very useful tool to assess the performance of water treatment processes — especially for conventional surface water systems. Moreover, turbidity can serve to signal potential contamination problems or difficulties within a distribution system. Drinking water should be aesthetically pleasing. Every effort should be made to keep the turbidity as low as possible by flushing and cleaning the pipelines. For aesthetic purposes, turbidity should not exceed 5.0 NTU within the distribution system, especially at the point of consumption.

Rationale

Turbidity is a characteristic of all water supplies. In surface waters and groundwaters under the influence of surface water, turbidity is a concern for both health and aesthetic reasons. In these waters, the particulate matter that creates turbidity can contain toxins, harbour microorganisms and interfere with disinfection. In addition, organic matter in the water can react with disinfectants such as chlorine to create by-products. These by-products may cause adverse health effects.

While turbidity may be measured in secure groundwater supplies (i.e., not under the direct influence of surface water), it is not a concern in treated water from these sources provided it does not hinder disinfection. It is good practice to ensure water entering the distribution system from a secure groundwater supply has a low turbidity level around 1.0 NTU.

Turbidity is effectively reduced through filtration, using one of a number of common technologies. The most important consideration when dealing with turbidity is to reduce its level as low as possible and minimize fluctuation. For this reason, while the target is to reduce turbidity levels to below 0.1 NTU at all times, it is considered acceptable for treatment plants to achieve the following levels based on the type of technology used. The levels of turbidity in treated water should be:

1. For chemically-assisted filtration, less than or equal to 0.3 NTU in at least 95% of the measurements made, or at least 95% of the time each calendar month and not exceed 1.0 NTU at any time.
2. For slow sand or diatomaceous earth filtration, less than or equal to 1.0 NTU in at least 95% of the measurements made, or at least 95% of the time each calendar month and not exceed 3.0 NTU at any time.
3. For membrane filtration, less than or equal to 0.1 NTU in at least 99% of the measurements made, or at least 99% of the time each calendar month and not exceed 0.3 NTU at any time. If membrane filtration is the sole treatment technology employed, some form of virus inactivation should follow the filter process.

Most problems associated with turbidity are caused when the level of turbidity in the treated water spikes. Spikes can occur when the natural levels of particulate matter increase in the source water, when the filtration rate increases or when an individual filter breaks down. In order to quickly figure out that a filter is malfunctioning and to identify which one it is, this guideline applies to individual filters within a system.

Turbidity measured to be less than 5.0 NTU is not discernable to the naked eye but at higher levels the particulate matter in water may cause colour, taste and odour concerns for consumers. For this reason, utilities should try to maintain the level of turbidity in the distribution system to below 5.0 NTU. An aesthetic objective has not been set in order to avoid confusion with the health-related guideline.

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Appendix A

Determining if Groundwater Is Under the Direct Influence of Surface Water[2]

Determining whether groundwater is under the influence of surface water is a complex process. While there is considerable variation in the circumstances that may result in groundwater becoming contaminated with surface water, some key issues that should be considered include:

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Geology

- ❑ What are the characteristics of the aquifer deposit (i.e., lithology, stratigraphy and structure)?
- ❑ How was the deposit created (i.e., geomorphology)?
- ❑ What is the age of the deposit?
- ❑ Is it a confined, semi-confined or unconfined aquifer?
- ❑ If the aquifer was created during a recent geologic event (i.e., alluvial deposits/post-glaciation), is it likely to be connected to an existing surface water body? Is it susceptible to land surface use and influences? What are the consequences? What is the level of risk?
- ❑ If the aquifer was created during an ancient geologic event (i.e., unconsolidated deposits or bedrock deposits/pre-glaciation), is it likely to be connected to an existing surface water body? Is it susceptible to land surface use and influences? What are the consequences? What is the level of risk?
- ❑ What are the effects of local topography (e.g., mountains, foothills, plains)?
- ❑ What are the effects of local geology and geologic events (i.e., facies changes, complex geology, glaciation)?

Hydrogeology

- ❑ Do the aquifer characteristics (i.e., hydraulic head, intrinsic permeability, hydraulic conductivity, transmissivity, storitivity) imply direct surface water and/or land surface influence(s)?
- ❑ Is there evidence of local surface water "discharge/recharge" to/from the aquifer?
- ❑ What is the direction of groundwater flow (i.e., hydraulic gradient)?
- ❑ What is the consequence of pumping groundwater from the aquifer (cone of influence)? Is there a change in gradient?

Hydrochemistry

- ❑ Is there evidence of water quality similarities between the aquifer and surface water (i.e., chemistry, temperature, bacterial count)?
- ❑ Is there evidence through environmental isotope analysis (^{3}H, ^{14}C, ^{18}O, ^{2}H)?
- ❑ What is the chemical age of the groundwater (i.e., mineralization)? How does it compare with that of the local surface water?
- ❑ Is there evidence of a hydrochemical facies change?
- ❑ What is the level of bacterial contamination in the aquifer?

Land use issues

- ❑ What types of local land use are there (e.g., agricultural, industrial, municipal, recreational)?

Soil horizon

- ❑ What type of soil is there?

Tools for making the assessment

- ❑ Cross-sections, isopach maps, topographic maps and geological maps
- ❑ Aquifer pumping test, groundwater modelling and groundwater monitoring (observation wells, piezometers), soil percolation tests
- ❑ Local water balance exercises (groundwater vs. surface water recharge/discharge)
- ❑ Isotope analysis

Trihalomethane

From Wikipedia, the free encyclopedia

Trihalomethanes (**THMs**) are chemical compounds in which three of the four hydrogen atoms of methane (CH_4) are replaced by halogen atoms. Many trihalomethanes find uses in industry as solvents or refrigerants. THMs are also environmental pollutants, and many are considered carcinogenic. Trihalomethanes with all the same halogen atoms are called **haloforms**.

Contents

Table of common trihalomethanes

Common trihalomethanes (ordered by molecular weight)

Molecular formula	IUPAC name	CAS registry number	Common name	Other names	Molecule
CHF_3	trifluoromethane	75-46-7	fluoroform	Freon 23, R-23, HFC-23	
$CHClF_2$	chlorodifluoromethane	75-45-6	chlorodifluoromethane	R-22, HCFC-22	
$CHCl_3$	trichloromethane	67-66-3	chloroform	methyl trichloride	
$CHBrCl_2$	bromodichloromethane	75-27-4	dichlorobromomethane	BDCM	
$CHBr_2Cl$	dibromochloromethane	124-48-1	chlorodibromomethane	CDBM	
$CHBr_3$	tribromomethane	75-25-2	bromoform	methyl tribromide	
CHI_3	triiodomethane	75-47-8	iodoform	methyl triiodide	

Industrial uses

Refrigerants

Trifluoromethane and chlorodifluoromethane are both used as refrigerants in some applications. Trihalomethanes released to the environment break down faster than chlorofluorocarbons (CFCs), thereby doing much less damage to the ozone layer (if they contain chlorine). Chlorodifluoromethane is a refrigerant HCFC, or hydrochlorofluorocarbon, while fluoroform is an HFC, or hydrofluorocarbon. Fluoroform is not ozone depleting.

Unfortunately, the breakdown of trihalomethane HCFCs does still result in the creation of some free chlorine radicals in the upper atmosphere and subsequent ozone destruction. Ideally, HCFCs will be phased out entirely in favour of entirely nonchlorinated refrigerants.

Solvents

Chloroform is a very common solvent used in organic chemistry. It is a significantly less polar solvent than water, well-suited to dissolving many organic compounds.

Although still toxic and potentially carcinogenic, chloroform is significantly less harmful than carbon tetrachloride. Because of the health and regulatory issues associated with the use of carbon tetrachloride, in modern chemistry laboratories chloroform is used as a cheaper, cleaner alternative wherever possible.

Water pollutants

Trihalomethanes are formed as a by-product predominantly when chlorine is used to disinfect water for drinking. They represent one group of chemicals generally referred to as disinfection by-products. They result from the reaction of chlorine and/or bromine with organic matter present in the water being treated. The THMs produced have been associated through epidemiological studies with some adverse health effects. Many governments set limits on the amount permissible in drinking water. However, trihalomethanes are only one group of many hundreds of possible disinfection by-products—the vast majority of which are not monitored—and it has not yet been clearly demonstrated which of these are the most plausible candidate for causation of these health effects. In the United States, the EPA limits the total concentration of the four chief constituents (chloroform, bromoform, bromodichloromethane, and dibromochloromethane), referred to as total trihalomethanes (TTHM), to 80 parts per billion in treated water.

Chloroform is also formed in swimming pools which are disinfected with chlorine or hypochlorite in the haloform reaction with organic substances (e.g. urine, sweat, hair and skin particles). Some of the THMs are quite volatile and may easily vaporize into the air. This makes it possible to inhale THMs while showering, for example. The EPA, however, has determined that this exposure is minimal compared to that from consumption. In swimmers uptake of THMs is greatest via the skin with dermal absorption accounting for 80% of THM uptake[1]. Exercising in a chlorinated pool increases the toxicity of a "safe" chlorinated pool atmosphere[2] with toxic effects of chlorine byproducts greater in young swimmers than older swimmers[3].

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External links

- National Pollutant Inventory - Chloroform and trichloromethane (http://www.npi.gov.au/database/substance-info/profiles/23.html)
- How Ozone Technology Reduces Disinfection Byproducts (http://www.biozone.com/trihalomethanes.html)
- Testing for Trihalomethanes (http://www.caslab.com/News/testing-for-trihalomethanes-in-your-water-tthm.html)
- EPA - Trihalomethanes in Drinking Water (http://yosemite.epa.gov/water/owrccatalog.nsf/9da204a4b4406ef885256ae0007a79c7/be44ad7c8f83f25a85256b06007255e9!OpenDocument)

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Environmental and Workplace Health

Trihalomethanes

1.0 Guidelines

Trihalomethanes

The maximum acceptable concentration (MAC) for trihalomethanes[1] (THMs) in drinking water is 0.100 mg/L (100 µg/L) based on a locational running annual average of a minimum of quarterly samples taken at the point in the distribution system with the highest potential THM levels.

Bromodichloromethane

The maximum acceptable concentration (MAC) for bromodichloromethane (BDCM) in drinking water is 0.016 mg/L (16 µg/L) monitored at the point in the distribution system with the highest potential THM levels.

Other Considerations

Utilities should make every effort to maintain concentrations as low as reasonably achievable without compromising the effectiveness of disinfection.

2.0 Executive summary

Trihalomethanes are a group of compounds that can form when the chlorine used to disinfect drinking water reacts with naturally occurring organic matter (e.g., decaying leaves and vegetation). The use of chlorine in the treatment of drinking water has virtually eliminated waterborne diseases, because chlorine can kill or inactivate most microorganisms commonly found in water. The majority of drinking water treatment plants in Canada use some form of chlorine to disinfect drinking water: to treat the water directly in the treatment plant and/or to maintain a chlorine residual in the distribution system to prevent bacterial regrowth. The health risks from disinfection by-products, including trihalomethanes, are much less than the risks from consuming water that has not been disinfected. Utilities should make every effort to maintain concentrations of all disinfection by-products as low as reasonably achievable without compromising the effectiveness of disinfection.

The trihalomethanes most commonly found in drinking water are chloroform, bromodichloromethane (BDCM), dibromochloromethane (DBCM) and bromoform. Of these, chloroform has been most extensively studied, and there are some scientific data available on BDCM. However, insufficient data are available to develop a guideline for either DBCM or bromoform. Since chloroform is the trihalomethane most often found in drinking water, and generally at the highest concentrations, the trihalomethane guideline is based on health risks linked to chloroform. This guideline applies to the total concentration of chloroform, BDCM, DBCM and bromoform.

This Guideline Technical Document reviews all the health risks associated with trihalomethanes in drinking water, incorporating multiple routes of exposure to trihalomethanes via drinking water including ingestion, and both inhalation and skin absorption from showering and bathing. It

assesses all identified health risks, taking into account new studies and approaches, and applies appropriate safety factors. Based on this review, the guideline for total trihalomethanes in drinking water is established at a maximum acceptable concentration of 0.1 mg/L.

Although the concentration of BDCM is included in the concentration of trihalomethanes in the guideline, a separate guideline for BDCM is also deemed necessary. The guideline for bromodichloromethane in drinking water is established at a maximum acceptable concentration of 0.016 mg/L.

2.1 Health effects

Chloroform is considered to be a possible carcinogen in humans, based on limited evidence in experimental animals, and inadequate evidence in humans. Animal studies have shown links between exposure to specific trihalomethanes and liver tumours in mice and kidney tumours in both mice and rats; some studies in humans show data that are consistent with these findings. Human studies are suggesting a link between exposure to trihalomethanes and colorectal cancers.

Human studies also suggest a link between reproductive effects and exposure to high levels of trihalomethanes. However, an increase in the concentration of trihalomethanes could not be linked to an increase in risk, suggesting the need for more studies.

Preliminary animal studies indicate that BDCM and other trihalomethanes that contain bromine may be more toxic than chlorinated trihalomethanes such as chloroform. For this reason, and based on the availability of scientific data for BDCM, a separate guideline was also developed for BDCM. BDCM is considered to be a probable carcinogen in humans, with sufficient evidence in animals and inadequate evidence in humans. Animal studies have shown tumours in the large intestine in rats. Among the four trihalomethanes commonly found in drinking water, BDCM appears to be the most potent rodent carcinogen, causing tumours at lower doses and at more target sites than the other three compounds.

Exposure to BDCM at levels higher than the guideline value has also been linked to a possible increase in reproductive effects (increased risk for spontaneous abortion or stillbirth) above what can normally be expected. Further studies are required to confirm these effects.

2.2 Exposure

Levels of trihalomethanes, including BDCM, are generally higher in treated surface water than in treated groundwater, because of the high organic content in lakes and rivers, and will be higher in warmer months, because of the higher concentrations of precursor organic materials in the raw water and especially because the rate of formation of disinfection by-products increases at higher temperatures. Trihalomethanes levels are also affected by the choice and design of treatment processes. Recent data indicate that, in general, average trihalomethanes levels in Canadian drinking water supplies are well below the guideline. However, some systems show average levels well above the guidelines; these systems serve only a small proportion of Canadians (less than 4%) and are generally smaller treatment systems with limited ability to remove organic matter before adding the chlorine disinfectant. It should be noted that the presence of brominated by-products such as BDCM will also depend on the presence of bromine in the source water.

2.3 Treatment

Trihalomethanes and haloacetic acids are the two major groups of disinfection by-products found in drinking water and generally at the highest levels. Together, these two groups can be used as indicators for the presence of all disinfection by-products in drinking water supplies, and their control is expected to reduce the levels of all disinfection by-products and the corresponding risks to health. A guideline for haloacetic acids is expected to be available in 2006-2007.

The approach to reduce exposure to trihalomethanes is generally focussed on reducing the formation of chlorinated disinfection by-products. The concentrations of trihalomethanes and other chlorinated disinfection by-products in drinking water can be reduced at the treatment plant by

removing the organic matter from the water before chlorine is added, by optimizing the disinfection process or using alternative disinfection strategies, or by using a different water source. It is critical that any method used to control trihalomethanes levels **must not** compromise the effectiveness of disinfection. The Federal-Provincial-Territorial Committee on Drinking Water also recommends that every effort be made not only to meet the guideline, but to maintain concentrations of trihalomethanes as low as reasonably achievable.

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[1] Trihalomethanes refers to the total of chloroform, bromodichloromethane, dibromochloromethane and bromoform

Previous	Table of Contents	Next

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Tech Brief

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Line Pigging

By Zane Satterfield, P. E., NESC Engineering Scientist

Summary

Line pigging is an internal pipe-cleaning process used to remove biofilms or other foreign matter from the inside of water pipes. If performed correctly, line pigging will renew the flow rates to restricted piping systems and reduce pumping pressures. This Tech Brief discusses some of the techniques and processes used in cleaning waterlines in distributions systems.

Line Pigging

Line pigging (or line swabbing, as it sometimes known), is the process of cleaning distribution lines by inserting a small device known as a pig into the lines and pushing it through them. The term "pigging" originated in the gas and oil industry, where metal discs connected by a rod were moved through the oil pipelines to remove buildup of paraffin wax on the internal wall of the pipe. The action of metal on metal made a squealing noise like a pig and the name stuck. More and more, pigs are being used to clean pipelines in all types of industry including waterlines in municipal distribution systems.

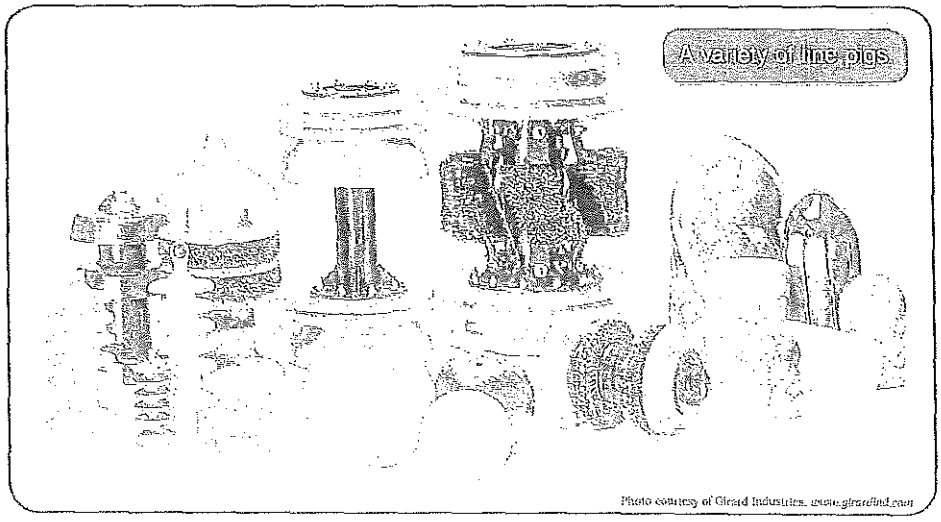
What is a pig?

A pig is the object, usually bullet shaped, that is pushed by the water in the pipe in the direction of normal flow. The pig can be made of different materials (foam, steel, plastic, polyurethane), but generally is food-grade silicon, which is tough yet flexible and safe to be in contact with drinking water.

Pigs range in size from 2- to 48-inches in diameter and can be made to order in varying lengths, styles, and configurations for specific applications. Not only are pigs used for cleaning but also for inspecting the inside of pipelines and determining interior dimensions.

Is pigging waterlines really necessary?

States and municipalities typically do not require regular pigging or swabbing of distribution lines in water systems. Some may only require pigging after initial construction of a new line to remove any debris left in the line because flushing alone will not always clean the dirt and debris out of the line.



A variety of line pigs.

Photo courtesy of Girard Industries, www.girardind.com

A photo of a 4 x 4 that was pushed out of an 8" waterline. It took several pigs to finally get it out, and it came out in pieces, but they finally pigged it out.

One reason to pig a waterline is that all distribution lines tend to have a biofilm coating the inside of the pipe. The bacteria are dormant until certain conditions activate the bacteria, causing problems. Regular flushing will not eliminate this biofilm. Regular pigging with flushing will reduce or eliminate biofilms.

A second reason to pig a line is inadequate water flow. More flow (volume) of water may be needed to support development or a growing population in the water system or to provide adequate water for fire fighting. In areas of water systems where increased development has caused water demand to surpass the flow output of an existing line, the system will usually need to replace the existing waterline with a line that can support the demand needed. If the existing flow is restricted due to excessive deposits, however, pigging may be the solution to the problem.

Third, most states require a minimum of a 6-inch diameter waterline when connecting a fire hydrant to provide adequate flow. After years of service, the inside of the pipe can become restricted with deposits making the fire hydrant less effective if not useless for its intended job. If fire flow is needed, the solution in the past has been to replace the whole waterline, which is very costly and time consuming. Pigging may restore adequate flow for fighting fires at a fraction of the time and cost.

Finally, pigging waterlines may lessen complaints from water customers regarding the very same deposits that have or can restricted fire flow. These deposits are unwanted foreign matter such as iron oxide (red water), alum, calcium carbonates, barium sulfide and sediment. Pigging, in most cases, provides a solution. Cleaning these deposits can also reduce pumping pressures in areas of water systems that have booster pump stations. Increased pumping pressures can result in line leaks and pipe failures.

Procedure

The procedure starts by determining if the waterline can be pigged. Not every water line is a candidate for line pigging. Is the water line so corroded that pigging can cause failure?

Does the waterline have reducers (i.e., the line getting smaller) that can cause the pig to get stuck? Does the line have increased pipe diameter sizes where the water pressure would be insufficient to move the pig?

One of the main things to look at is the condition of the interior of the pipe. If the pH of the water is low, the interior of the line could be so corroded that pigging could result in failure. If in doubt about the condition of the line, refer to past line repairs or talk to operators who have worked on any repairs of the particular line.

Much of this information can be obtained from as-built drawings or operators who have fixed leaks or installed the original water line. The line will have to be dug up to launch the pig. At that time, a visual inspection should be done to determine if pigging is possible. Another option is to use a low density foam pig in any unknown line and examine the foam pig for wear patterns, tears, or gouges. This may even help determine if the line can be successfully cleaned with a pig.

Before the pigging begins, it's useful to have information about the line:

1. Locate and mark all valves and meters.
2. Approximate all elbows and fittings in the line (again, refer to the as-built drawing if available).
3. Know the pressure and flows in the lines. This will also help determine if any flow increase and possibly pressure decrease was achieved by the pigging.

The more you know before you start, the fewer surprises you'll encounter once you start pigging.

Once the line has been inspected and appears suitable, the actual pigging begins. A pig is inserted into the line to be cleaned by means of a launcher. This is simply an oversized barrel with a reducer mating to the existing line. This allows for easy insertion of the pig, because the pig's outer diameter is larger than the pipe's internal diameter to maintain a good seal. Once in the launcher, clean water is introduced to send the pig on its way. This is usually the same water that is in the line from a nearby flushing hydrant or fire hydrant, or a tanker truck. The pig's path is determined by direction of flow and by isolating the line to be cleaned by closing valves to laterals, if present.

If the waterline is in service, you must notify your customers about the water interruption and possible dirty water after bringing the line back in service. If the water line has a lot of unwanted deposits, it may be wise to pull all water meters just before the pigging process starts and flush at the connection at the end of the process before you replace the meters. Foreign matter could stop-up the meter or cause the meter to malfunction. The debris could also get into the customers' plumbing and cause problems such as plugging the aerators on the faucets, dishwashers, or washing machines.

If the waterline to be pigged has severe scaling (tuberculation) due to iron oxide (red water), alum, calcium carbonates, barium sulfide, or sediment, a progressive or stepped approach must be taken to avoid getting a pig stuck or losing a pig. This approach is simply using a smaller diameter pig at first and working your way up incrementally to the inside diameter of the pipe. The stepped technique will minimize the risk of the pig getting stuck or large amounts of debris plugging the line by cleaning a little bit at a time.

Articles about locating distribution lines and valve exercising programs are available on the National Environmental Services Center Web site at *www.nesc.wvu.edu/ndwc*.

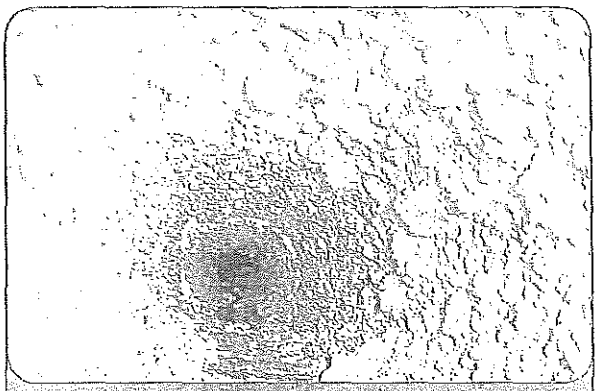
Smart Pigs

There are many different types and sizes of pigs. For waterline use, some nonstandard pigs include:

- Gauging pigs are mainly used after constructing the pipeline or before pigging an old line to determine if there are any obstructions in the pipeline.
- Profile pigs are gauging pigs with multiple gauging plates used to help map the inside condition of the pipe walls.
- Magnetic cleaning pigs are used to pick up ferrous debris left in the pipeline.
- Transmitter pigs or detector pigs are used to map out the location of pipeline or help locate a stuck pig.
- Spheres are round for ease in negotiating short radius 90-degree elbows, irregular turns, bends, and sweeps.

Dealing with a Stuck or Lost Pig

If a pipeline has not been pigged on a routine basis or has never been pigged, a pig can get stuck. If a pig becomes stuck, the first priority



A pipeline prior to line pigging.

is to find and retrieve it, but you must identify the cause. Usually one of two conditions exists when a pig is stuck: fluid bypassing around the pig (not pushing the pig) or a blockage of the flow.

In water distribution systems that have loops and multiple tee connections a pig can find its way out of the work area and get lost. It is important to locate all valves and close off the lines that are not being pigged and know the direction of water flow.

If you lose a pig, a smart pig such as a detector pig or transmitter pig can be launched to help find the lost pig. A transmitter can also be installed in the cleaning pig so that a second pig does not have to be launched to help locate it if it should get lost or stuck. Sometimes a pig gets stuck because of a broken or shut gate valve.

Procedures for dealing with a stuck pig or fluid going around the pig:

1. Increase the line pressure and flow rate, but do not exceed the safe limits of the pipeline allowing for age and/or condition of the line. The flow rate and pressure can be increased with a pumper and tanker fire truck.
2. Release pressure from the line and drain the line back toward the launcher. Releasing pressure allows the pig to relax to its normal shape and may even cause the pig to back up in the line. After pressure has dissipated completely for several minutes, re-pressurize the line in an attempted to drive the pig through the restriction. This may be repeated two or three times.
3. For a bypass situation, run a soft swab in behind the stuck pig to try and create a positive seal, stopping the bypass. Repeat step one above.
4. Back the pig up by applying pressure from the opposite end of the waterline using a pump or possibly a pumper fire truck.
5. If a foam pig is used and gets stuck a super-chlorinate mixture (3,000 to 5,000 ppm) in a slug form can be used to dissolve the pig. The line must be flushed and tested to be sure the chlorine residual is allowable limits after the super chlorination.

Water systems are advised not to undertake line pigging on their own. Shop around and find a reputable company with experience in line pigging with water lines. Start with an area of the water system that the line location, size, type, and condition are all known and the lines can be dug up easily if needed.

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Special thanks to Jim Burch at Girard Industries for his assistance.

NESC Engineering Scientist **Zane Satterfield** is a licensed professional engineer and previously worked for the West Virginia Bureau of Public Health, Environmental Engineering Division.

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Analytical Report

Bill To:	Fraser Health Authority	Project:		Lot ID:	822700
Report To:	Fraser Health Authority	ID:	Village of Harrison Springs	Control Number:	
	207 - 2776 Bourquin Crescent	Name:	THM	Date Received:	Aug 25, 2011
	Abbotsford, BC, Canada	Location:		Date Reported:	Aug 30, 2011
	V2S 6A4	LSD:		Report Number:	1465090
Attn:	Jeniene Lutz	P.O.:			
Sampled By:		Acct code:			
Company:					

Reference Number	822700-1
Sample Date	Aug 24, 2011
Sample Time	NA
Sample Location	
Sample Description	Village of Harrison Hot Springs
Matrix	Water

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Trihalomethanes Screen - Water						
Chloroform		mg/L	0.038			0.001
Bromodichloromethane		mg/L	<0.001			0.001
Dibromochloromethane		mg/L	<0.001			0.001
Bromoform		mg/L	<0.001			0.001
Total Trihalomethanes		mg/L	0.038			0.001
Trihalomethanes - Surrogate Recovery						
Dibromofluoromethane	EPA Surrogate	%	105			86-118
Toluene-d8	EPA Surrogate	%	101			85-115
Bromofluorobenzene	EPA Surrogate	%	92			86-115

Approved by:

Mathieu Simoneau
Operations Manager

Environmental and Workplace Health

Guidelines for Canadian Drinking Water Quality - Summary Table

Prepared by the
Federal-Provincial-Territorial Committee on Drinking Water of the
Federal-Provincial-Territorial Committee on Health and the Environment

December 2010

Help on accessing alternative formats, such as Portable Document Format (PDF), Microsoft Word and PowerPoint (PPT) files, can be obtained in the alternate format help section.

(PDF Version - 190 K)

Table of Contents

Introduction

The *Guidelines for Canadian Drinking Water Quality* are published by Health Canada on behalf of the Federal-Provincial-Territorial Committee on Drinking Water (CDW). This summary table is updated regularly and published on Health Canada's website (www.healthcanada.gc.ca/waterquality). It supersedes all previous versions, as well as the published booklet of the *Sixth Edition of the Guidelines for Canadian Drinking Water Quality*.

These guidelines are based on current, published scientific research related to health effects, aesthetic effects, and operational considerations. Health-based guidelines are established on the basis of comprehensive review of the known health effects associated with each contaminant, on exposure levels and on the availability of treatment and analytical technologies. Aesthetic effects (e.g., taste, odour) are taken into account when these play a role in determining whether consumers will consider the water drinkable. Operational considerations are factored in when the presence of a substance may interfere with or impair a treatment process or technology (e.g.,

turbidity interfering with chlorination or UV disinfection) or adversely affect drinking water infrastructure (e.g., corrosion of pipes).

The Federal-Provincial-Territorial Committee on Drinking Water establishes the Guidelines for Canadian Drinking Water Quality specifically for contaminants that meet all of the following criteria:

1. exposure to the contaminant could lead to adverse health effects;
2. the contaminant is frequently detected or could be expected to be found in a large number of drinking water supplies throughout Canada; and
3. the contaminant is detected, or could be expected to be detected, at a level that is of possible health significance.

If a contaminant of interest does not meet all these criteria, the Federal-Provincial-Territorial Committee on Drinking Water may choose not to establish a numerical guideline or develop a Guideline Technical Document. In that case, a Guidance Document may be developed.

Guidance Documents undergo a process similar to Guideline Technical Documents, including public consultations through the Health Canada website. They are offered as information for drinking water authorities, and help provide guidance relating to contaminants, drinking water management issues or emergency situations. Consultation documents, Guideline Technical Documents and Guidance documents are available from the Health Canada website (www.healthcanada.gc.ca/waterquality).

In general, the highest priority guidelines are those dealing with microbiological contaminants, such as bacteria, protozoa and viruses. Any measure taken to reduce concentrations of chemical contaminants should not compromise the effectiveness of disinfection.

Inquiries can be directed to: water_eau@hc-sc.gc.ca

Membership of the Federal-Provincial-Territorial Committee on Drinking Water

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Alberta	Department of Environment	Dr. Donald Reid
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Manitoba	Department of Water Conservation	Ms. Kim Philip
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Environment Canada/Canadian Council of Ministers of the Environment	Dr. Doug Spry

Committee secretary

Health Canada (Water, Air and Climate Change Bureau, Safe Environments Directorate, Healthy Environments and Consumer Safety Branch)	Ms. Anne Vézina

New, revised, reaffirmed and upcoming guidelines

Guidelines for several chemical, physical and microbiological parameters are new or have been revised since the publication of the *Sixth Edition of the Guidelines for Canadian Drinking Water Quality* in 1996. These new and revised guidelines are presented in Table 1.

Table 1. New and revised guidelines

Parameter	Guideline (mg/L)	Previous guideline (mg/L)	CHE approval
Microbiological parameters[a]			
Bacteriological		0 coliforms/100 mL	
E.coli	0 per 100 mL		2006
Total coliforms	0 per 100 mL		2006
Heterotrophic plate count	No numerical guideline required		2006
Emerging pathogens	No numerical guideline required		2006
Protozoa	No numerical guideline required	None	2004
Enteric viruses	No numerical guideline required	None	2004
Turbidity	0.3/1.0/0.1 NTU[b]	1.0 NTU	2004
Chemical and physical parameters			
Aluminum	0.1/0.2[c]	None	1999
Antimony	0.006	None	1997

[a]Refer to section on Guidelines for microbiological parameters.

[b]Based on conventional treatment/slow sand or diatomaceous earth filtration/membrane filtration.

[c]This is an operational guidance value, designed to apply only to drinking water treatment plants using aluminum-based coagulants. The operational guidance values of 0.1 mg/L applies to conventional treatment plants, and 0.2 mg/L applies to other types of treatment systems.

[d]The separate guideline for BDCM was rescinded based on new science. See addendum to the THM document. In certain situations, the Federal-Provincial-Territorial Committee on Drinking Water may choose to develop guidance documents: for contaminants that do not meet the criteria for guideline development, and for specific issues for which operational or management guidance is warranted.

Parameter	Guideline (mg/L)	Previous guideline (mg/L)	GCDWQ approval
Arsenic	0.010	0.025	2006
Benzene	0.005	0.005	2009
Bromate	0.01	None	1999
Chlorate	1.0	None	2008
Chlorine	No numerical guideline required	None	2009
Chlorite	1.0	None	2008
Cyanobacterial toxins--microcystin-LR	0.0015	None	2002
Fluoride	1.5	1.5	1996
Formaldehyde	No numerical guideline required	None	1998
Haloacetic Acids--Total (HAAs)	0.080	None	2008
2-Methyl-4-chlorophenoxyacetic acid (MCPA)	0.1	None	2010
Methyl *tertiary*-butyl ether (MTBE)	0.015	None	2006
Trichloroethylene (TCE)	0.005	0.05	2005
Trihalomethanes--Total (THMs)[d]	0.100	0.100	2006
Uranium	0.02	0.1	2000
Radiological parameters			
Cesium-137 (^{137}Cs)	10 Bq/L	10 Bq/L	2009
Iodine-131 (^{131}I)	6 Bq/L	6 Bq/L	2009
Lead-210 (^{210}Pb)	0.2 Bq/L	0.1 Bq/L	2009
Radium-226 (^{226}Ra)	0.5 Bq/L	0.6 Bq/L	2009
Strontium-90 (^{90}Sr)	5 Bq/L	5 Bq/L	2009
Tritium (^{3}H)	7000 Bq/L	7000 Bq/L	2009

[a]Refer to section on Guidelines for microbiological parameters.

[b]Based on conventional treatment/slow sand or diatomaceous earth filtration/membrane filtration.

[c]This is an operational guidance value, designed to apply only to drinking water treatment plants using aluminum-based coagulants. The operational guidance values of 0.1 mg/L applies to conventional treatment plants, and 0.2 mg/L applies to other types of treatment systems.

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Top of Page

In certain situations, the Federal-Provincial-Territorial Committee on Drinking Water may choose to develop guidance documents: for contaminants that do not meet the criteria for guideline development, and for specific issues for which operational or management guidance is warranted.

Table 2. Guidance documents

Boil water advisories	2009
Chloral hydrate	2008
Corrosion Control	2009
Drinking water avoidance advisories	2009
Potassium from water softeners	2008

The Federal-Provincial-Territorial Committee on Drinking Water has established a science-based process to systematically review older guidelines to assess the need to update them. Table 3 provides the list of parameters whose guidelines remain appropriate and have been reaffirmed as a result of this review. Health Canada and the FPT Committee on Drinking Water will continue to monitor research on these parameters and recommend any revision(s) to the guidelines that is deemed necessary.

Table 3. Reaffirmed guidelines (2005)

Asbestos	Cyanazine	Iron	Taste
Azinphos-methyl	Diazinon	Magnesium	Temperature
Bendiocarb	Dicamba	Malathion	Terbufos
Benzo(a)pyrene	2,4-Dichlorophenol	Methoxychlor	2,3,4,6-Tetrachlorophenol
Bromoxynil	Diclofop-methyl	Metribuzin	Toluene
Cadmium	Dimethoate	Odour	2,4,6-Trichlorophenol
Calcium	Diquat	Paraquat	Trifluralin
Carbaryl	Diuron	Pentachlorophenol	Xylenes
Carbofuran	Ethylbenzene	Phorate	Zinc
Chloride	Gasoline	Picloram	
Colour	Glyphosate	Silver	

Table 4 outlines documents which are being or have been developed and are awaiting approval through the Federal-Provincial-Territorial process.

Table 4. Upcoming documents (not yet finalized/approved)

Ammonia	GTD	In preparation[a]
Carbon tetrachloride	GTD	In preparation[a]
Chromium	GTD	In preparation[b]
Dichloroethane, 1,2-	GTD	In preparation[a]
Dichloromethane	GTD	In preparation[a]
E.coli	GTD	In preparation[b]
Enteric viruses	GTD	In preparation[b]
Fluoride	GTD	In preparation[a]
Heterotrophic plate count	guidance	In preparation[a]
Nitrate/Nitrite	GTD	In preparation[a]
N-Nitrosodimethylamine (NDMA)	GTD	In preparation[b]
Protozoa	GTD	In preparation[a]

[a]Final guideline technical document or guidance document in preparation for final approval/posting.

[b]Guideline technical document or guidance document being prepared for public consultation.

Parameter or subject	Document type (GTD or guidance)	Current status
Selenium	GTD	In preparation[b]
Tetrachloroethylene	GTD	In preparation[b]
Total coliforms	GTD	In preparation[b]
Turbidity	GTD	In preparation[b]
Vinyl chloride	GTD	In preparation[b]

[a]Final guideline technical document or guidance document in preparation for final approval/posting.

[b]Guideline technical document or guidance document being prepared for public consultation.

Guidelines for microbiological parameters

Currently available detection methods do not allow for the routine analysis of all microorganisms that could be present in inadequately treated drinking water. Instead, microbiological quality is determined by testing drinking water for *Escherichia coli*, a bacterium that is always present in the intestines of humans and other animals and whose presence in drinking water would indicate faecal contamination of the water.

Bacteriological guidelines

Escherichia coli

The maximum acceptable concentration (MAC) of *Escherichia coli* in public, semi-public, and private drinking water systems is none detectable per 100 mL.

Testing for *E. coli* should be carried out in all drinking water systems. The number, frequency, and location of samples for *E. coli* testing will vary according to the type and size of the system and jurisdictional requirements.

Total coliforms

The MAC of total coliforms in water leaving a treatment plant in a public system and throughout semi-public and private supply systems is none detectable per 100 mL.

For distribution systems in public supplies where fewer than 10 samples are collected in a given sampling period, no sample should contain total coliform bacteria. In distribution systems where greater than 10 samples are collected in a given sampling period, no consecutive samples from the same site or not more than 10% of samples should show the presence of total coliform bacteria.

Testing for total coliforms should be carried out in all drinking water systems. The number, frequency, and location of samples for total coliform testing will vary according to the type and size of the system and jurisdictional requirements.

Heterotrophic plate count

No MAC is specified for heterotrophic plate count (HPC) bacteria in water supplied by public, semipublic, or private drinking water systems. Instead, increases in HPC concentrations above baseline levels are considered undesirable.

Emerging pathogens

No MAC for current or emerging bacterial waterborne pathogens has been established. Current bacterial waterborne pathogens include those that have been previously linked to gastrointestinal illness in human populations. Emerging bacterial waterborne pathogens include, but are not limited to, *Legionella*, *Mycobacterium avium* complex, *Aeromonas hydrophila*, and *Helicobacter pylori*.

Protozoa

Although *Giardia* and *Cryptosporidium* can be responsible for severe and, in some cases, fatal gastrointestinal illness, it is not possible to establish MACs for these protozoa in drinking water at this time. Routine methods available for the detection of cysts and oocysts suffer from low recovery rates and do not provide any information on their viability or human infectivity. Nevertheless, until better monitoring data and information on the viability and infectivity of cysts and oocysts present in drinking water are available, measures should be implemented to reduce the risk of illness as much as possible. If the presence of viable, human-infectious cysts or oocysts is known or suspected in source waters, or if *Giardia* or *Cryptosporidium* has been responsible for past waterborne outbreaks in a community, a treatment and distribution regime and a watershed or wellhead protection plan (where feasible) or other measures known to reduce the risk of illness should be implemented. Treatment technologies in place should achieve at least a 3-log reduction in and/or inactivation of cysts and oocysts, unless source water quality requires a greater log reduction and/or inactivation.

Viruses

Although enteric viruses can be responsible for severe and, in some cases, fatal illnesses, it is not possible to establish MACs for enteric viruses in drinking water at this time. Treatment technologies and watershed or wellhead protection measures known to reduce the risk of waterborne outbreaks should be implemented and maintained if source water is subject to faecal contamination or if enteric viruses have been responsible for past waterborne outbreaks. Where treatment is required, treatment technologies should achieve at least a 4-log reduction and/or inactivation of viruses.

Turbidity

Waterworks systems that use a surface water source or a groundwater source under the direct influence of surface water should filter the source water to meet the following health-based turbidity limits, as defined for specific treatment technologies. Where possible, filtration systems should be designed and operated to reduce turbidity levels as low as possible, with a treated water turbidity target of less than 0.1 NTU at all times. Where this is not achievable, the treated water turbidity levels from individual filters:

1. For **chemically assisted filtration**, shall be less than or equal to **0.3 NTU** in at least 95% of the measurements made, or at least 95% of the time each calendar month, and shall not exceed 1.0 NTU at any time.

2. For **slow sand or diatomaceous earth filtration**, shall be less than or equal to **1.0 NTU** in at least 95% of the measurements made, or at least 95% of the time each calendar month, and shall not exceed 3.0 NTU at any time.

3. For **membrane filtration**, shall be less than or equal to **0.1 NTU** in at least 99% of the measurements made, or at least 99% of the time each calendar month, and shall not exceed 0.3 NTU at any time. If membrane filtration is the sole treatment technology employed, some form of virus inactivation* should follow the filtration process.

Top of Page

Guidelines for chemical and physical parameters

HARRISON HOT SPRINGS

Naturally Refreshed

Sustainable Harrison

Integrated Community Sustainability Plan

September, 2011

Prepared by:

CENTRE for SUSTAINABILITY
WHISTLER

The preparation of this Integrated Community Sustainability Plan was carried out with assistance from the Green Municipal Fund, a Fund financed by the Government of Canada and administered by the Federation of Canadian Municipalities. Notwithstanding this support, the views expressed are the personal views of the authors, and the Federation of Canadian Municipalities and the Government of Canada accept no responsibility for them.

Table of Contents

1.0 Background and Process

The Village of Harrison Hot Springs (HHS) engaged the services of the Whistler Centre for Sustainability to assist them and the community to develop an integrated community sustainability plan (ICSP) using a Quick Start process. The HHS had undertaken a number of sustainability-related initiatives, and had some sustainability-related policies in the current Official Community Plan, but had not previously undertaken a comprehensive community sustainability planning process that would create a shared vision for the community and integrate existing policies.

1.1 Purpose of Community Sustainability Planning

Sustainability planning helps communities gain insight into their long-term goals for success – the goals then shape and inform investment and infrastructure decisions, reducing potential costly short-term mistakes. Significant benefits accrue to communities moving in the direction of long-term success. As an energizing and motivating conversation for the community, sustainability planning helps to alleviate potential deadlock issues, attract new residents and niche businesses, as well as retain and motivate municipal talent. Local economies are prepared for the long-term impacts of climate change, shifting global priorities for goods and services and rising energy prices. Community members commit to maintaining their resilience, networks and quality of life through demographic shifts and other social challenges. Municipalities save significant money over time through reduced energy and waste management costs and are able to access funding through a variety of mechanisms through the sustainability plan.

1.2 What is an ICSP?

An Integrated Community Sustainability Plan (ICSP) is a document that is written by the community to guide the community toward a desirable and sustainable future. The ICSP identifies strategies and actions for implementation, monitors progress, and is reviewed and updated every year. An ICSP is the community's highest level policy document that integrates all existing plans and policies and gives direction to all future initiatives and provides a comprehensive framework for community decision-making.

An ICSP is as much a process as it is a plan; it is an on-going process of engaging the community in co-creating and updating a community vision and linking that to realistic planning and collaborative action today. ICSPs emphasize long-term thinking, collaboration between community residents and stakeholders, creating partnerships, and ongoing monitoring and evaluation to ensure success. Harrison's ICSP process is called Sustainable Harrison.

1.3 The Quick Start Integrated Community Sustainability Plan

Sustainable Harrison is being developed using a 'Quick Start' framework. This process is based on The Natural Step, as well as on Whistler2020, a multiple award-winning community sustainability plan and process, but is customized to Harrison's situation, needs, assets and visions. The Quick Start quickly and effectively provides Harrison with an ICSP and on-the-ground actions and implementation tools to get the community on its journey toward sustainability.

***Sustainable Harrison* is an integrated and comprehensive sustainability plan. What does this mean?**

This integrated planning approach sets this ICSP apart from other traditional community plans. As issues are often complex and overlapping, they cannot be solved in isolation and are best addressed using a comprehensive integrated approach. For example, toxic effluent in rivers affects fish health (environmental), which affects people's health (social) and their financial prosperity (economic). All of these elements and their connections must be considered to arrive at optimal practices.

1.4 Quick Start ICSP - Outcomes

While a comprehensive Integrated Community Sustainability Plan (ICSP) with an Official Community Plan (OCP) update and multi-stakeholder task forces is the ideal mechanism for advancing sustainability, we understand that the resources required to undertake such an intensive process are beyond what many small to medium sized communities have available. The Quick Start version of an ICSP is designed to get the community moving forward on its sustainability journey immediately and meaningfully. The Quick Start ICSP comprises:

- A sustainability strategy outlining a vision (descriptions of success), sustainability objectives, community priorities and eight strategy areas.
- A description of the current situation with respect to each strategy area.
- A set of clear recommended actions for immediate implementation, directed to specific organizations.
- A set of core indicators based on the four priority areas.
- An effective and easy-to-use monitoring and reporting system.
- A 'Next Steps' document that will provide a guide for continuing to develop and implement Sustainable Harrison in the years to come.

Can we afford to think about sustainability issues? Should we not concentrate our efforts on more pressing economic challenges?

Sustainability planning and actions is not about choosing between economic, environmental and social issues. Rather, it is about making smart decisions today to achieve all three in the future. Sustainability includes short and long-term economic success, which is essential to achieve our social and environmental objectives.

We cannot afford to lose sight of environmental or social issues. Our futures are intricately tied to the ability of natural systems to function.

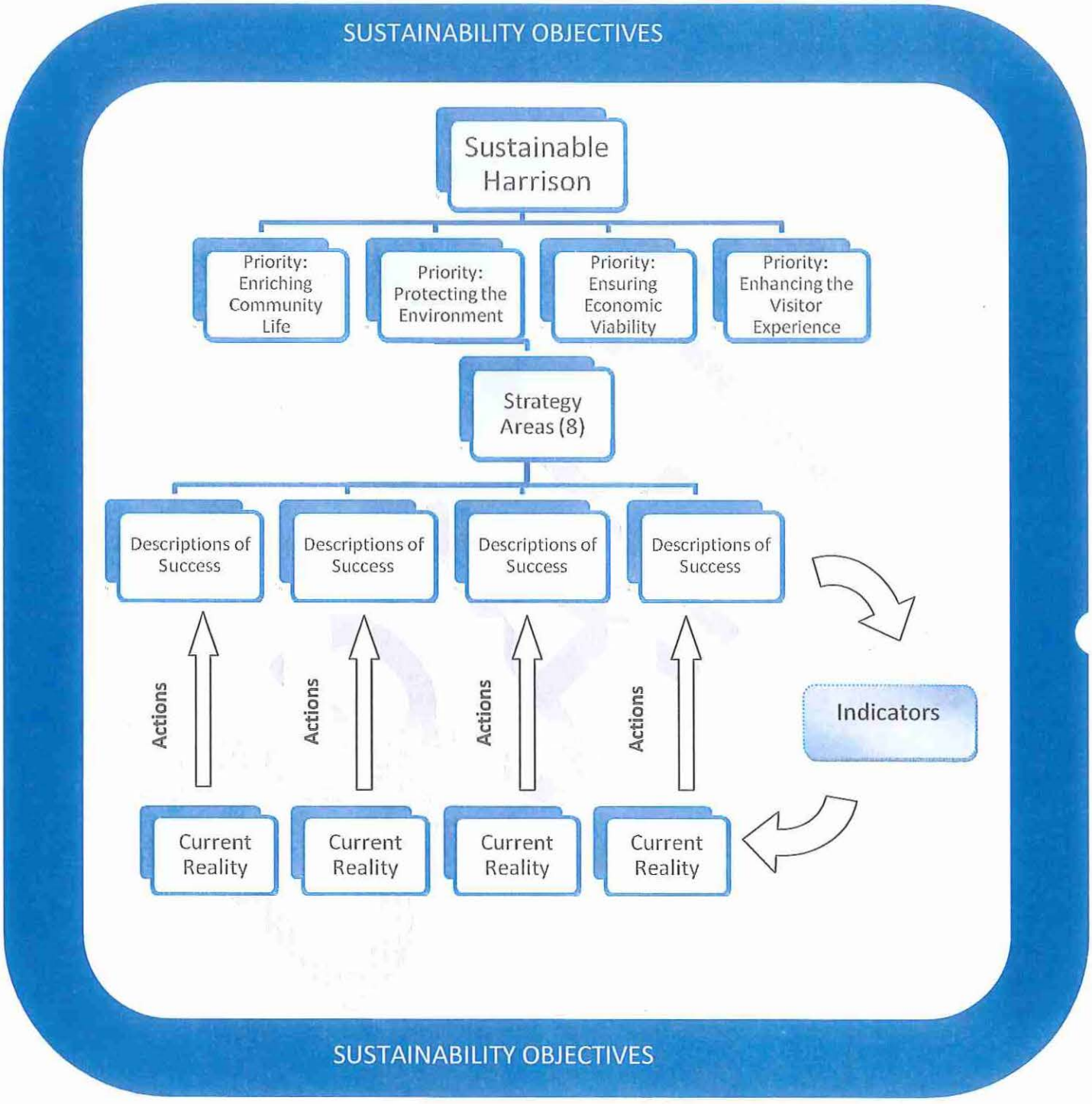
Attached as appendices to the ICSP are:

- All the proposed potential actions for future consideration.
- A number of other indicators that can be monitored in future years.
- An action monitoring table to keep track of the status of recommended actions.

1.5 Quick Start ICSP - Process

Sustainable Harrison followed this process to create the ICSP:

1. Community priorities and strategy areas were identified and confirmed by HHS staff for Harrison.
2. A Community Sustainability Action Team (CSAT) was created to work closely with the consultant on developing the process and content for the ICSP.
3. The CSAT members participated in a workshop to learn about the Natural Step and to develop a shared understanding of sustainability.
4. A shared a vision of the community's desired future (Descriptions of Success) in the strategy areas was developed by the CSAT and members of the community.
5. Descriptions of where the community is currently at with regards to the vision (i.e., "current reality") were researched and written.
6. A set of indicators based on the four priorities were developed. These indicators were recommended based on ease and availability of data.
7. The CSAT came up with ideas for actions that could be taken to move Harrison from its current reality to its articulated desired future.
8. Community partners were asked to take on actions for implementation.
9. A basic monitoring and reporting system for tracking and communicating progress was developed.
10. Implementation tools, including a sustainability decision-making tool based on the directions of the ICSP, were developed.


SUSTAINABILITY OBJECTIVES
Sustainable Harrison
Priority: Enriching Community Life
Priority: Protecting the Environment
Priority: Ensuring Economic Viability
Priority: Enhancing the Visitor Experience
Strategy Areas (8)
Descriptions of Success
Descriptions of Success
Descriptions of Success
Descriptions of Success
Actions
Actions
Actions
Actions
Indicators
Current Reality
Current Reality
Current Reality
Current Reality
SUSTAINABILITY OBJECTIVES

1.6 The Community Sustainability Action Team

The Community Sustainability Action Team (CSAT) worked closely with the consultant team and municipality on the project. The CSAT was the "advisory committee" for the project, and its members represented the community's interest in the project, as well as partner organizations that would implement actions. The CSAT provided input on public engagement opportunities, assisted in the development of the community's descriptions of success, provided input on current reality and indicators, and developed recommended actions. Individual organizations represented on the CSAT will work with the municipality to lead on implementing actions that will move the community towards its vision of success and sustainability.

The CSAT members were:

Mayor Ken Becotte
Councillor Allan Jackson
Councillor Dave Harris
Gail Guimont
Robert Reyerse
Ed Stenson
Leo Facio
Donna Cooney
Veronique Astles
Ray Hooper
Barbara Smith
Niek De Brouwer
Andy Strothotte
Bill Dietrich
Andre Isakov (non-voting staff liaison)

1.7 Shared Understanding of Sustainability

The Village of Harrison and the CSAT use the Brundtland definition of sustainability *"....meeting the needs of the present without compromising the ability of future generations to meet their own needs."* In order to 'operationalize' sustainability, Harrison has adopted specific sustainability objectives that will guide all decisions and actions.

2.0 Sustainability Objectives

Harrison has adopted the following sustainability objectives, derived from the Natural Step, as the overarching objectives that will guide Harrison on its journey towards sustainability. These objectives are the 'lighthouse' for the community, which provide clear direction towards a final destination. The four sustainability objectives are:

To reduce and eventually eliminate our need to extract non-renewable materials from the Earth's Crust (e.g. heavy metals, fossil fuels).

To reduce and eventually eliminate our contribution to the progressive build-up of synthetic materials produced by society (e.g. dioxins, PCB, DDT etc.).

To reduce and eventually eliminate our contribution to the ongoing physical degradation of nature (e.g. over harvesting fish stocks and paving over critical wildlife habitat etc.).

To reduce and eventually eliminate our contribution to conditions that undermine people's ability to meet their basic needs (e.g. unsafe working conditions, not enough income/profit to live on, restricting freedom of expression, using resources inefficiently, hoarding resources etc.).

3.0 Harrison's Four Community Priorities

The community of Harrison Hot Springs identified four priorities that provide a high level description of what is important to Harrison in order to achieve its vision in becoming a sustainable community. These priorities represent the important overarching values of the community, under which the eight strategy areas align. Each priority is equally important and supportive of the other, and all actions and planning need to support the values upheld in these four priorities.

Harrison's four community priorities are:

- Protecting the Environment
- Ensuring Economic Viability
- Enriching Community Life
- Enhancing the Visitor Experience

A set of recommended core indicators based on the priorities was developed to monitor sustainability performance and progress.

PROTECTING THE ENVIRONMENT

Through protecting the environment, in the year 2030, Harrison Hot Springs continues to prioritize and protect the beautiful natural surroundings in which they are situated, in particular Harrison Lake, scenic assets and environmentally sensitive areas. Buildings compliment Harrison's natural surroundings; there is a commitment to, and numerous learning opportunities for, environmental protection; recreational and leisure activities respect the environment and natural ecosystems; and business practices have transitioned towards renewables and sustainable practices. Development strategies are in harmony with nature and guide land use and development practices, encouraging the use of existing developed land and minimizing the encroachment on nature. Activity-based recreation offerings are promoted that are low-impact, non-motorized and serviced by preferred low-impact forms of transportation. The community has successfully transitioned to a 'conservation' culture where material inputs chosen are durable, natural, recyclable, and the outputs are minimized and managed to avoid negative impacts to land, air and water systems. The Village of Harrison Hot Springs has proactively influenced environmental and land use practices in the Valley, and as a result, the region collaboratively implements efforts to protect the environment.

Related Strategy Areas	Indicators
Buildings and Sites	Low impact recreation activities
Energy, Water and Waste systems	Energy use
Food	Water use
Land Use and Natural Areas	Waste Water Effluent Quality
Transportation and Mobility	Stream and Lake Health
	Village Core Traffic
	Average Density
	Materials Used
	Greenhouse gas emissions

ENSURING ECONOMIC VIABILITY

Through ensuring economic viability, in the year 2030, Harrison Hot Springs' economy is diverse and supported by local residence and visitors alike. Harrison Hot Springs is a business leader committed to sustainability practices. The municipality has collaborative partnerships and agreements within the community, with regional partners and with other levels of government help to ensure a strong local economy and the best use of resources. Because the community has done such a good job at protecting the environment, recreational and leisure opportunities are a big tourism driver. A strong year-round industry complements and supports the local economy, enhances the community's assets, and includes a vibrant cultural component. Educational opportunities create, attract and retain a locally-based skilled workforce. Harrison is easily accessible with affordable public transit between Harrison and neighbouring communities. A larger proportion of the community's dollars is kept in the community through local resident and tourist attractions, supporting local businesses, and reducing the need to travel outside the community for activities and entertainment. Harrison has a vibrant village center, with natural surroundings, hosting a range of amenities and services that meet the needs of residents and visitors as well as supports local businesses.

Related Strategy Areas	Indicators
Buildings and Sites	Local workforce
Education, Health, and Social Services	Economic Dependency Ratio
Economy and Tourism	Median income
Arts, Culture, Recreation and Leisure	Business Licenses
Energy, Waste and Water systems	Low income prevalence
Land Use and Natural Areas	Education Attainment
Transportation and Mobility	

ENRICHING COMMUNITY LIFE

Through enriching community life, in the year 2030, the community of Harrison Hot Springs is healthy, vibrant, and diverse with a strong sense of place and high quality of life. The built form is attractive, safe and accessible, and residents and visitors interact in the thriving village core and throughout the natural surroundings. All residents have access to affordable and comfortable housing, and enjoy leisure time and local activities year-round. Healthy, regional food choices are readily available, and there is a strong sustainable food culture. Harrison is a healing place, where community members maintain healthy lifestyles and are supported holistically to prevent illness. Diverse educational and informal learning opportunities allow lifelong learning in Harrison. The community embraces sustainability as a lens through which all planning and decisions are made. A culture of reducing waste and consumption is obvious contributing to a clean and healthy community. Permanent and seasonal residents are engaged in community life, collaborate respectfully in decision-making and their views are meaningfully considered. Residents and visitors can easily get around the community and region using public transit, cleaner vehicles, and a variety of non-motorized means.

Related Strategy Areas	Indicators
Buildings and Sites	Housing diversity
Education, Health, and Social Services	Population
Economy and Tourism	Arts, culture, recreation and leisure participation
Arts, Culture, Recreation and Leisure	Volunteer rates
Food	Drinking water quality
Land Use and Natural Areas	Length of like-friendly commuting routes
Transportation and Mobility	Local transportation satisfaction
Energy, Water and Waste systems	

ENHANCING THE VISITOR EXPERIENCE

Through enhancing the visitor experience, in the year 2030, the success of Harrison Hot Springs as a community is intertwined with the success of its tourism offerings and experiences within the community and the region. Being memorable and authentic are key attributes setting the Harrison experience apart as a destination for thousands of visitors each year. The arts and cultural scene enhances the vibrancy of the village core while the surrounding nature and recreational activities remain a key attraction for visitors from the region and abroad. Harrison is successful at providing exceptional experiences and excellent value to visitors by the welcoming and servicing of visitors before arrival, during their stay, and at their departure. Diverse experiences integrate opportunities for residents and visitors to learn about local culture, history, First Nations and the natural environment. Community members embrace visitors and are enthusiastic to contribute to the transformational experience Harrison Hot Springs has become known for.

Related Strategy Areas	Indicators
Education, Health, and Social Services	Usage of Lake and beachfront
Economy and Tourism	Visitor satisfaction
Arts, Culture, Recreation and Leisure	Community Parks Satisfaction
Food	
Land Use and Natural Areas	
Transportation and Mobility	

4.0 Sustainability Strategy Areas

There are a number of ways to understand and conceptualize community and community issues. While it is important for an ICSP to address relevant community sustainability issues such as climate change, intergenerational demands, affordability, the economic challenges, the ICSP doesn't need to be structured by every issue to do that. In fact, a plan structured by issues would likely be unruly and resource intensive to manage due to the sheer number and variety of issues!

The manner in which an ICSP is organized seeks to address the opportunities or challenges from all the important issues across a handful of relatively stable quality of life service and community systems. While we don't always think of a community as made up of an energy system, leisure system, health system, etc., we can all intuitively understand that they exist and will exist. For example, a community's energy system is the way that various organizations, infrastructure, and people combine to meet the community's energy needs. The way in which a system functions well – or not – is often the root cause of multiple issues, so addressing the system as a whole will bring us one step closer to solutions. Further to the energy system example, our current energy systems have impacts on air quality, climate change, water ecology, etc. Working comprehensively on energy system solutions help in all three areas.

For Harrison, eight strategy areas were identified that broadly address all the community systems and the broad range of issues within them. As the ICSP continues to be developed over the next number of years, these strategy areas may be combined, separated, or revised – that is all part of an ongoing community sustainability planning process. For the first year of Harrison's ICSP, these are the eight recommended strategy areas:

- Buildings and Sites
- Education, Health and Social Services
- Economy and Tourism
- Arts, Culture, Recreation and Leisure
- Food
- Land Use and Natural Areas
- Transportation and Mobility
- Energy, Water and Waste Systems

5.0 Descriptions of Success

A sustainability plan includes a vision of what a successful and sustainable future for the community looks like in each of the community systems in a specified year in the future. These specific mini-visions are represented by clearly articulated Descriptions of Success (DoS) statements that:

- describe what success will look like in a sustainable future in each strategy area framed by the sustainability objectives
- are statements of the highest aspirations and purpose for each strategy area
- are used for determining actions and decisions that need to be taken in order to move the community from where it is today to where it wants to be in a sustainable and successful future

DoS statements guide action planning so that all actions and initiatives that are developed aim to move the community towards the vision described by the DoS. DoS statements also guide the development of community indicators for measuring progress toward the vision and sustainability.

6.0 Current Reality

Descriptions of current reality describe the community today with respect to each of the strategy areas relative to the descriptions of success that have been identified. Current reality descriptions:

- Perform a high-level analysis to identify some high priority areas for action;
- Comprise a list of key sustainability gaps facing the community in each strategy area;
- Comprise a list of community assets that already exist and can be leveraged (current initiatives, programs, policies, actions);
- Include an analysis of key stakeholders who are affected by and can influence efforts.

The key assets and challenges facing Harrison Hot Springs can be summarized as:

"Harrison Hot Springs is a community historically based on the service industry. Over the years the outdoor lifestyle opportunities and beauty of the area has attracted a growing number of visitors creating an increased reliance on the tourism sector for the local economy. Situated in a scenic mountain setting, including Harrison Lake, the village has always attracted a large number of tourists and second home owners which have played a significant role in the establishment of a diverse business community.

A number of policies and plans are in place to encourage development in the village core to create more vibrancy and economic activity. Arts, Culture, Recreation and Leisure happenings are established in Harrison, however need to include more diverse and affordable offerings. These offering also need to expand beyond the summer season and long weekends.

Driving the community's evolution is growth which exploded between 1991 and 2006, after which stabilized at just over 1500 people. Due to the physical geography of the area there is a lack of expansion opportunities, presenting a challenge for future growth. Demand for vacation properties and second dwellings have created pressure on the existing boundary. This will lead to redevelopment of older parts of the village where appropriate opportunities exist for higher density development and where services are available.

The housing stock within the Village is younger than in the province having most buildings constructed between 1996 and 2000. The building stock reflects the relevant building codes of the day and as such varies in efficiency. That said, there are very few "tear downs" within the community and the new development is increasingly modern and efficient. The limited energy sources available to the community creates a situation of high energy costs. The community is currently very dependent on the private automobile as there is very limited public transit available. Policies to focus on the village core as well as pedestrian access and trails will help to encourage the shift to alternative modes of transportation. There is a demand for increased local food supply as there is currently little commercially available locally grown food."

Once the current reality was identified in each strategy area, actions and initiatives were developed that would move the community from its current situation to its articulated desired future in each strategy area. Appendix A - Current Reality, is the list of the current reality descriptions for each strategy area.

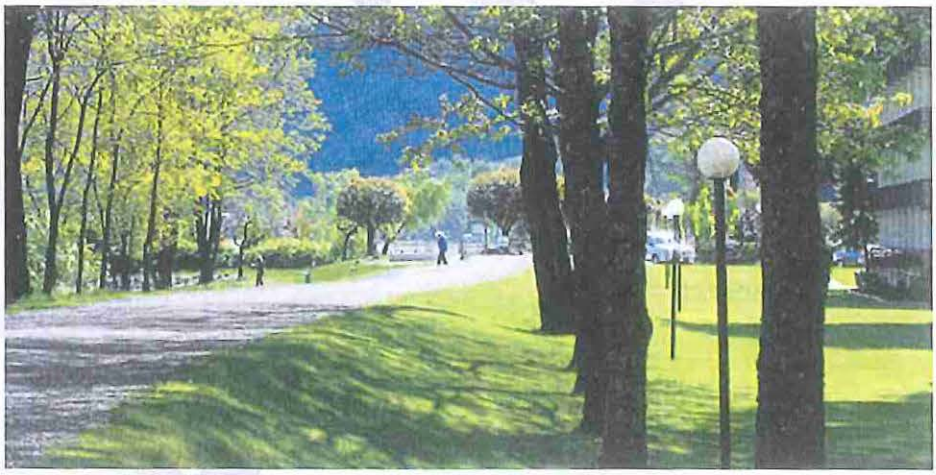
7.0 Harrison Hot Springs and the Fraser Valley

The Village of Harrison Hot Springs is tucked against British Columbia's picturesque southwestern mountains and the sandy beaches of Harrison Lake in the Fraser Valley. The Valley land base is predominantly made up of Agricultural Land Reserve and has become increasingly popular for retirees and visitors given its hospitable climate, natural beauty, high quality of life and recreational opportunities.

Harrison embarked on a community sustainability planning process and has committed to sustainability objectives and a shared community vision. In order to be successful in achieving its vision, Harrison must work closely and collaboratively with its neighbours in the Fraser Valley to collectively move towards that vision. Coordinated regional actions towards shared descriptions of success for transportation, economic development, environmental protection, health services, land use, and growth management are essential in order to become a more sustainable community and region.

8.0 Moving Harrison Hot Springs toward Success and Sustainability

The eight strategy areas and the DoS statements describe a shared vision of what a sustainable and successful Harrison will look like in the year 2030.



8.1 BUILDINGS AND SITES

The Building and Sites strategy area addresses how the physical characteristics of buildings and sites keep the community inclusive, affordable, liveable and sustainable. It includes residential dwellings, commercial, institutional and industrial buildings as well as their surrounding natural landscape, manicured landscape and hard surfaces. It deals with infrastructure, materials and practices related directly to the building or site, but generally excludes community infrastructure such as roads, energy supply systems, water and sewer lines.

Buildings and Sites
Descriptions of Success

1. A diverse mix and adequate supply of housing provides livable options for residents of all ages, incomes and needs.
2. Buildings are good quality, safe and accessible for people with all abilities, and they enable personal interactions that contribute to the social health of the community.
3. Buildings and sites enhance the village experience, protect views, are compatible with the small serene village atmosphere, and compliment Harrison's natural surroundings.
4. Buildings and sites are pedestrian-oriented and provide convenient access to preferred transportation modes.
5. During development, sites are maintained to reduce the negative impact on the village experience as much as possible.
6. Buildings are using energy, materials and water more efficiently, and transitioning to the use of renewable energy and more sustainable materials.
7. Sites are being managed to reduce and eventually eliminate the need for chemicals and excessive watering.
8. Buildings and sites avoid continuous encroachment on nature and protect natural areas within and around them as much as possible.

8.2 EDUCATION, HEALTH AND SOCIAL SERVICES

This strategy area is concerned with meeting residents' education, health and other social needs. Health needs include physical, mental, emotional, and spiritual health needs through services, infrastructure, interactions, relationships and a strong community fabric. It also includes community safety. From an individual perspective it addresses access to local and regional care services and health promotion. The education component addresses education-related participation, including formal and informal opportunities. It also addresses conditions required to make these services accessible and inclusive with minimized environmental impact. This strategy area is connected with the Arts, Culture, Recreation and Leisure strategy area since the illness prevention aspects of leisure pursuits are linked with health services.

Education, Health and Social Services
Descriptions of Success

1. The learning, health, safety and social needs of all residents and visitors are met as locally as possible, and convenient connections to services outside of Harrison are facilitated.
2. Harrison is a healing place, where community members maintain healthy lifestyles and are supported holistically to prevent illness and achieve a high quality of life.
3. Learning and wellness offerings contribute to the local economy and attract visitors to the community.
4. Opportunities exist for people to learn about local culture, history and the natural environment.
5. Services are delivered in a manner that use land, energy, materials, and water efficiently, and that are transitioning to the use of renewable energy and more sustainable materials.
6. Harrison is an inclusive community: accessible to people of all abilities and ages, and respectful of diverse views.
7. Permanent and seasonal residents are engaged in community life, collaborate respectfully in decision- making and their views are meaningfully and transparently considered.
8. A diversity of lifelong learning opportunities exist, and are often facilitated by creatively sharing the skills and knowledge found locally.

8.3 ECONOMY AND TOURISM

The Economy and Tourism strategy area focuses on bringing in sufficient dollars into the community and optimizing the impact of dollars within in order strengthen the local economy. For Harrison, this means a focus on the tourism aspects of the economy, while not excluding other aspects. This strategy area also addresses opportunities for meaningful work, sustainable businesses and creating a positive climate for local businesses. This strategy also focuses on providing exceptional experiences and excellent value to visitors with the intent being to increase repeat visitation and recommendations. It includes the welcoming and servicing of visitors: (1) before their visit; (2) upon their arrival and for the duration of the stay; and (3) upon leaving.

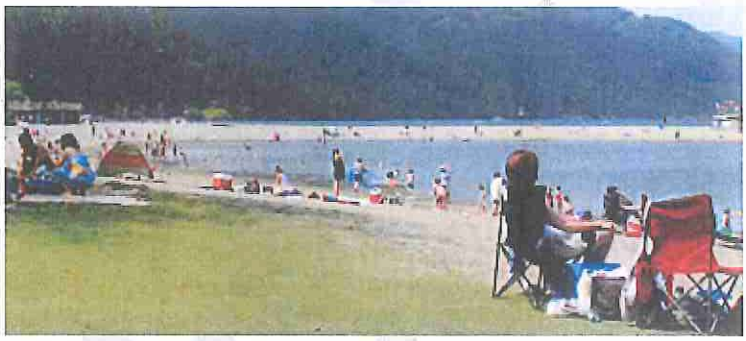
Economy and Tourism
Descriptions of Success

030

1. Harrison has a healthy, diversified year-round tourism-based economy that contributes to the economic, social, cultural and environmental well-being of the community.
2. Harrison's tourism experience is memorable and authentic, and it enables personal transformational change to occur.
3. Continuous encroachment on natural areas, parks and scenic assets within and beyond Harrison's borders is minimized, as their importance to the success of the tourism economy is well understood.
4. Harrison's economic and tourism activities contribute to the wellbeing of residents, exist in harmony with the residential community, and are planned using a participative approach with stakeholders.
5. Community members understand the value of tourism to the local economy, they contribute to the visitor experience and support local businesses.
6. Infrastructure is developed and maintained to ensure the economic, social, cultural and environmental well-being of the community.
7. Collaborative partnerships and agreements within the community, with regional partners and with other levels of government help to ensure a strong local economy, the best use of resources, and appropriate uses of areas surrounding Harrison.
8. Local independent businesses thrive, and they work collaboratively to position Harrison in the destination resort market and contribute to the community's vision.
9. Harrison's economic system is using energy, materials and water more efficiently, and transitioning to the use of renewable energy and more sustainable materials.
10. The value of diversified business to the community is recognized through on-going support and encouragement from local residents, government and visitors.

8.4 ARTS, CULTURE, RECREATION AND LEISURE

This strategy area addresses the key leisure pursuits of residents and visitors alike. It includes active and passive recreation and all forms of arts, culture and heritage, including performing, literary, visual arts, heritage buildings, biographies and the supporting built and natural infrastructure, resources, and delivery agents. This strategy addresses all expressions of culture and explores opportunities for building a flourishing and sustainable arts, culture, recreation and leisure scene in Harrison Hot Springs. It also addresses conditions required to make leisure pursuits accessible and inclusive with a minimized environmental impact. There is a connection to the economic and tourism strategy since Harrison in primarily a tourism-based economy and the main product is recreation and leisure. There is a connection to the Education, Health and Social Services strategy area since these leisure pursuits play a role in health and illness prevention.



Arts, Culture, Recreation and Leisure
Descriptions of Success

Diverse, year-round arts, culture, recreation and leisure activities enhance the quality of life for all residents and the visitor experience.

Collaborative partnerships exist within and beyond the community to deliver a full range of experiences to meet resident and visitor needs as locally as possible, with the most efficient use of limited resources.

Arts, culture, recreation and leisure experiences integrate opportunities for residents and visitors to learn about local culture, history, First Nations and the natural environment.

Harrison's offerings authentically reflect and respect the scale, nature and vibrant yet serene character of the community allowing pride of community.

Harrison's offerings provide good value and attract new and repeat visitors to the community.

Appropriate, multi-purpose and economically viable venues and infrastructure are in place to support, foster and celebrate arts, culture and heritage.

Local culture, history and natural assets are protected, shared and celebrated as part of the Harrison experience.

Harrison's arts, culture, recreation and leisure sectors are using energy, materials and water more efficiently, and transitioning to the use of renewable energy and more sustainable materials.

Harrison continues to encourage activity-based recreation offerings that are low-impact, non-motorized and serviced by preferred forms of transportation.

The arts, culture, recreation and leisure sectors protect Harrison's natural and recreational areas as essential community assets, monitoring and managing carrying capacities to enable ongoing use.

The community supports all aspects of local arts, culture, recreation and leisure, understanding the important role these sectors play in the local tourism economy and community life.

8.5 ENERGY, WASTE AND WATER SYSTEMS

The Energy, Waste and Water strategy area is concerned with supplying high quality water and energy and materials/waste services in an affordable, reliable and sustainable way. It focuses on provincial, regional and small district energy generation and delivery systems and management practices and appropriate sourcing of water and materials, delivery, use and end of life management related to the municipality's operations and community as a whole. The energy, materials and water demand from buildings, commercial activity, transportation and land use patterns is primarily covered by those respective strategies. The scope of this strategy also extends to flood control and stormwater management.

Energy, Waste and Water Systems
Descriptions of Success

2030

1. All systems are managed to protect air and water quality, biodiversity, and natural and scenic areas.
2. Local economic benefits are realized wherever possible from energy, water and materials supply, conservation and education activities.
3. The majority of Harrison's energy needs are met by conservation, efficiency and use local and regional renewable energy sources with minimal physical impact on natural systems.
4. Community members and visitors have reliable, affordable and convenient access to high quality drinking water, energy and waste management services to meet their needs.
5. Harrison has successfully transitioned from a 'disposable' culture to a 'conservation' culture where material inputs chosen are durable, natural, recyclable, and the outputs are minimized and managed to avoid negative impacts to land, air and water systems.
6. Stormwater management and flood control protects lives and property, mimics natural systems and is resilient to a changing climate and unusual storm events.
7. Wastewater discharge is minimized through water re-use and receiving water quality is not adversely impacted.
8. Harrison's water capture and delivery systems are reliable, high quality, resilient to a changing climate, and extremely resource efficient through a variety of technologies and management practices.
9. Harrison's water source is protected as the community's water source through the careful management of access, activities, and other potential impacts.
10. Businesses are leading by example when it comes to more sustainable use of energy, materials, water and waste disposal.
11. Collaborative partnerships exist within and outside the community to deliver a full range of services to meet needs as locally as possible, with the most efficient use of limited resources.

8.6 FOOD

The Food strategy area addresses how the community supports an affordable and reliable food system within and beyond its boundaries that nourishes resident's appetite, celebrations and culture. The strategy maintains the integrity of the land and people providing the food while moving toward a more sustainable system. It deals with food systems from farm to fork to disposal.

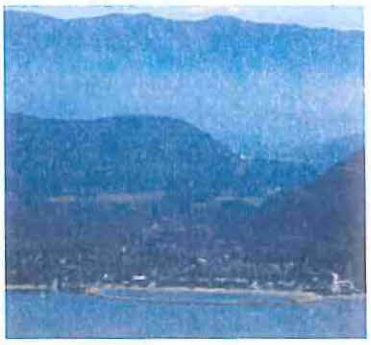
Food
Descriptions of Success

2030

1. Local and regional food is part of the cultural and wellness experience integrated throughout food offerings and contributes to the local and regional economy.
2. Community members have access to an equitable, sufficient, affordable, nutritious and reliable supply of food.
3. Harrison and regional producers work together to offer healthy, good quality, sustainable food in Harrison.
4. Community members support small-scale local and regional food producers because they understand its importance to their health and the health of the local economy.
5. Opportunities exist for community members and businesses to grow food in Harrison.
6. Community members and businesses support and purchase food from producers who have eliminated harmful chemical use ensuring human and ecosystem health is protected.
7. Waste from Harrison's food system is decreasing and being increasingly diverted from landfills.
8. Harrison's local food system uses water and energy efficiently, and natural water systems and biodiversity are protected.

8.7 LAND USE AND NATURAL AREAS

The Land Use and Natural Areas Strategy seeks to manage development in a way that maintains livability, natural areas, and economic development. The strategy addresses the locations, patterns and types of all physical development as well as the amount and timing of these developments. It also addresses how the community will protect, and attempt to restore ecosystem integrity and biodiversity throughout the area and region.



Land Use and Natural Areas
Descriptions of Success

1. Parks, green spaces, recreational areas and scenic assets are protected, used appropriately, connected by trails, restored where necessary, and designed to protect natural areas within and around them as much as possible.
2. The lakeshore has been restored to a more natural state, while maintaining recreational areas and features with easy access to and from the village.
3. Harrison's central village area is pedestrian-oriented, inviting and vibrant, with natural surroundings, providing services for residents and visitors alike.
4. Compact, liveable and mixed-use development is promoted and supported.
5. Development facilitates personal interactions, local food production, and enabling convenient access to green space, transit, trails and amenities.
6. Respecting limits to growth, development in Harrison has reached an optimal state that supports local economic viability, enhances the visitor experience and community life, and has protected natural areas and ecosystem health.
7. Harrison's land use patterns facilitate the efficient use of energy, materials and water, and the transition to the use of renewable energy and more sustainable materials.
8. Critical natural areas are protected, managed, connected and, where possible, restored to ensure ecological health and biological diversity.

8.8 TRANSPORTATION AND MOBILITY

The Transportation and Mobility strategy area is concerned with the movement of residents and materials to, from and within a community in a more efficient and sustainable manner that is consistent with the community's rural nature. It includes all modes of local and regional transportation and focuses on vehicles, roads, trails, lighting, mass transit and supportive technologies.

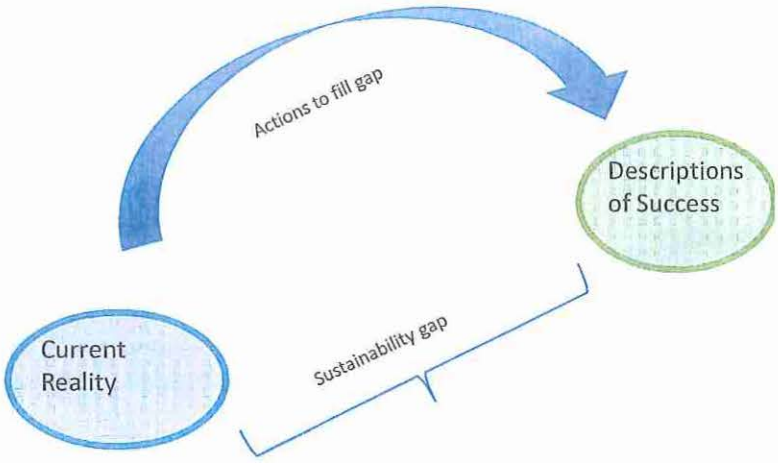
Transportation and Mobility
Descriptions of Success

2030

1. Harrison's policies and planning and development decisions promote and support preferred transportation options such as: non-motorized modes; public transit; high-occupancy and low-impact technology vehicles.
2. Harrison's transportation system utilizes renewable energy sources, improving air quality and maintaining ecosystem integrity.
3. A connected system of trails offers residents and visitors transportation alternatives within and beyond Harrison that are year-round, human-powered and safe.
4. Affordable public transit exists within Harrison and between neighbouring communities.
5. Transportation options moving people to, from and within Harrison are convenient, comfortable, universally accessible and safe.
6. The local and regional transportation system and infrastructure avoids continuous encroachment into natural areas.
7. Lake-based transportation options avoid negative impacts on the aquatic system and are easily accessed from the core village area, seamlessly connecting the lake to the Harrison experience.
8. The village core and waterfront areas are managed to create vibrant yet serene, people-friendly zones that are walkable and, seamlessly connect the village to the waterfront and beach.

9.0 Action Planning

Once the community developed its vision, i.e. the descriptions of success, and its current situation relative to its strategy areas, actions were then determined that would help the community move from its current position to where it wants to be in order to be more sustainable. The CSAT was tasked with reviewing Harrison's current reality and descriptions of success, and considering the 'sustainability gap,' came up with ideas for actions that could be undertaken by the Village of Harrison and community partners.



While a considerable number of actions were identified as potential ones to be undertaken, a set of 2-4 actions were prioritized for each strategy area to be undertaken in the first year. These priority actions were based on the following criteria:

1. Move toward one or more Descriptions of Success (meeting more DoS is better).
2. Moves toward multiple strategies and priorities.
3. Move toward all four sustainability principles (stronger sets of actions meet all four).
4. Contain at least one action of high impact, even if high level of implementation difficulty.
5. Have at least one action that is highly visible.
6. Mainly be low or moderate in difficulty of implementation.
7. Result in no decrease of resources or a surplus of resources to invest in future actions.
8. Be mostly started in the immediate/short-term.
9. Consist of a range of timeframes for the end effect of the actions, with at least one action per strategy having immediate on-the-ground results.
10. Present a flexible platform for further movement toward sustainability.

Each action statement:

- Starts with an action verb so that the action is clear (e.g. 'develop,' 'inventory,' 'build')
- Is specific enough to be linked to <u>one</u> lead organization
- It is clear what the outcome will be

Each action will be proposed to the lead partner organization, which will then decide whether it can take on the action this year (accept), postpone taking it on to the following year, or decline taking it on, in which case the organization needs to provide an explanation. About three-quarters of the actions were assigned to the Village of Harrison, and the others were assigned to organizations that were represented by other CSAT members.

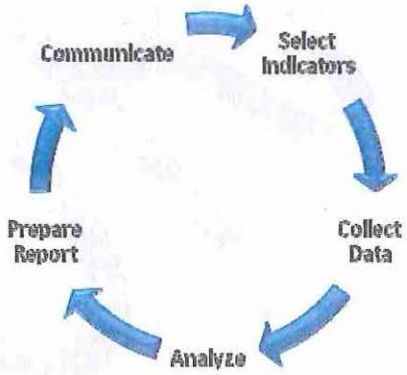
While action planning was done by CSAT members who addressed all eight Sustainable Harrison strategies, in future years, the community will determine the most effective model and process for action planning, e.g. to develop separate task forces to address each strategy area. A recommended process to move forward is included as an appendix to this ICSP document.

Appendix B - Proposed Initial Actions, is the list of the proposed initial actions recommended by the CSAT for consideration. Appendix C - All Actions, is the list of all the action ideas that were generated in the process.

As actions are undertaken and completed, they need to be tracked and communicated. An action monitoring tool is included in Appendix D - Action Monitoring Tool.

10.0 Indicators and Monitoring

Indicators are essential for measuring performance toward a goal and toward the descriptions of success as well as for communicating progress. Indicators should show trends over time and provide information as to where progress is being made, and if not being made, which areas actions should be directed. Monitoring and reporting should be done annually, and comprise the following steps:



For Sustainable Harrison, a set of core indicators based on the four priorities were developed. These indicators were selected based on representation of the priorities, and availability and accessibility of existing data. The core indicators are identified in Section 3.0 Community Priorities. Appendix E - Core Indicators, is a list of the core indicators along with a description and data sources. Appendix F - All Potential Indicators, is the list of other potential indicators that can be measured over time. A spreadsheet for monitoring and reporting on the indicators is attached separately; a sample indicator reporting sheet is in Appendix G - Monitoring and Reporting Spreadsheet.

11.0 Targets

Sustainable Harrison strives towards continuous measurable improvement in all of its performance indicators. As such, there were no specific numeric targets developed in this process. However, the following targets have been set for GHG emissions reductions; these targets are incorporated into the ICSP:

the Village will strive to reduce community greenhouse gas emissions 16% below 2007 levels by 2020;
the FVRD has a target of 25% reduction in the residential residual waste deposited at the curb-side by the year 2016, and a secondary target of an overall 70% diversion rate, encompassing all waste sectors, by the year 2016 (FVRD Solid Waste Management Plan).

12.0 Sustainability Decision-Making Tools

The ICSP is the community's highest level policy and as such, provides guidance and tools for all decision-making. The sustainability objectives and DoS statements can provide a framework for assessing all decisions and actions.

Appendix H - Decision Making Framework, is a decision-making framework based on the four sustainability principles, Harrison's four priorities and the descriptions of success. This tool can guide decision-making on purchasing, policies, plans, etc., and can be included in any report where a decision or assessment is required.

13.0 Continuing along the Sustainability Journey

The Quick Start process was a time- and cost-effective way to develop an Integrated Community Sustainability Plan for a community to create a shared vision and then immediately begin to implement actions on the ground. However, creation of the ICSP is just the first step of many in a community's journey toward sustainability. Ensuring continued progress towards the shared vision requires annual monitoring of performance, ongoing action planning and implementation, and building increased awareness, participation and community partnerships.

Community partners are essential in realizing the vision in Sustainable Harrison. Community partners participate in annual action planning and implementation of those actions, as well as incorporate the directions of Sustainable Harrison into their own operations and practices. A sample Partnership Agreement is attached as Appendix J - Sample Partnership Agreement.

Recommendations for moving forward to continue to advance and implement Sustainable Harrison are attached as Appendix I - Next Steps.

Appendices

Glossary of Terms

Backcasting: A basic planning approach where one begins with a vision of success in the future (in this case, a sustainable society) and then uses the question "what do we need to do to move from where we are today toward our vision?" to identify strategic actions.

Biodiversity: The diversity of plants, animals, and other living organisms in all their forms and levels of organization, including genes, species, ecosystems, and the evolutionary and functional processes that link them.

Carrying capacity: The maximum amount that the environment can sustain indefinitely.

Chemicals: Those substances which are known to be harmful or toxic if in contact with or ingested by humans.

Clean energy: Clean energy, also referred to as green energy, is defined here as non-polluting energy from renewable sources.

Climate change: Warming of the Earth's climate resulting from the buildup of greenhouse gases (e.g., carbon dioxide, methane) in our atmosphere due to human activities (primarily the combustion of fossil fuels).

District energy: A locally-based energy system from renewable sources that supplies a group of buildings that are located in close proximity to share infrastructure.

Economic diversification: The characteristic of business variety in the economy both across and within individual business sectors.

Ecosystem: A functional unit of any size consisting of all the living organisms (i.e., plants, animals, and microbes) in a given area, and all the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow.

Ecosystem management: A holistic approach to managing our environment and making land-use decisions. It meshes human purposes with natural systems, always asserting the protection of ecological integrity as its foremost environmental priority.

Efficient: Performing or functioning in the best possible manner with the least waste possible.

Environmentally Sensitive Areas: These areas incorporate unique and sensitive habitats such as streams, lakes, wetlands, old growth forests, alluvial forests, riparian areas, and the corridors connecting them. These areas are the focus for protection from development due to their fragile and rare nature.

Food security: A community enjoys food security when all people, at all times, have access to nutritious, safe, personally acceptable and culturally appropriate foods, produced in ways that are environmentally sound and socially just.

Lifelong learning: All learning activity undertaken throughout life, with the aim of improving knowledge, skills and competences within a personal, civic, social and/or employment-related perspective.

Locally-generated energy sources: Energy generated within the community, generally from renewable sources, for example, geothermal, wind or solar.

Low- impact: Technologies, supplies, fuels, etc., that produce little pollution (air, water, waste) or environmental impact (e.g. climate change).

Mixed-use: Developments that combine residential and commercial space in the same building or development. Residences above shops and live-work residences are examples of mixed-use developments. Mixed-use developments enable people to live close to work and amenities.

Official Community Plan (OCP): A bylaw adopted by Council that "a statement of objectives and policies to guide decisions on planning and land use management, within the area covered by the plan, respecting the purposes of local government." (Local Government Act)

Renewable energy: Energy from sources that produce electricity or thermal energy without depleting resources. Renewable energy includes solar, wind, water, earth and biomass power, and energy from waste.

Stakeholder: All individuals, groups, and interests that are affected by and/or affect Harrison and its activities. This includes the natural environment and future generations.

Sustainable: In compliance with the four Sustainability Principles based on the Natural Step.

Sustainability Principles: The Village of Harrison has adopted the four sustainability principles based on the Natural Step. The Sustainability Principles:

To reduce and eventually prevent stuff from the earth's crust from building up in nature
To reduce and eventually prevent manmade/unnatural stuff from building up in nature
To reduce and eventually eliminate the degradation of natural areas and their life-supporting functions
To allow all people to enjoy a high quality of life (through supportive and fair socio-cultural and economic conditions)

The Natural Step framework: A definition of sustainability and a long-term planning approach. See www.thenaturalstep.org/canada

Transportation alternatives: Commonly referred to as modes of transportation other than single-occupant gas or diesel powered vehicles.

Transformative or Transformational: A beneficial personal change that is sustained through time.

Appendix A: Current Reality

Arts, Culture, Recreation and Leisure

This strategy area addresses the key leisure pursuits of residents and visitors alike. It includes active and passive recreation and all forms of arts, culture and heritage, including performing, literary, visual arts, heritage buildings, biographies and the supporting built and natural infrastructure, resources, and delivery agents. This strategy addresses all expressions of culture and explores opportunities for building a flourishing and sustainable arts, culture, recreation and leisure scene in Harrison Hot Springs. It also addresses conditions required to make leisure pursuits accessible and inclusive with a minimized environmental impact. There is a connection to the economic and tourism strategy since Harrison in primarily a tourism-based economy and the main product is recreation and leisure. There is a connection to the Education, Health and Social Services strategy area since these leisure pursuits play a role in health and illness prevention.

Programs, products and services

Key Challenges and Gaps:

- Access: Lack of diversity in offerings and price points
- For youth/children: Younger age groups less satisfied with the diversity of arts and culture offerings and participate less.
- Diversification: Need to diversify beyond summer season and long weekends; Need for a night-time economy (particularly restaurants)
- Harrison Hot Springs residents noted film and literary needs as the only gaps in addition to child focussed needs.
- Sport culture needs to change, or be integrated with those happening in surrounding communities, to encourage non travel sports, local team interplay.

Opportunities and Assets:

- The four season climate and the geographic location provide the Mountain-Valley Community with a full range of recreational activities. Residents and visitors alike enjoy a variety of outdoor activities such as golf, backcountry camping, fishing, skiing (water, downhill and cross-country), snowshoeing, canoeing, hiking, cycling, and swimming.
- Communities in Bloom, Harrison Hot Springs Multicultural Choir, Social Club, Line Dancers, Harrison Festival of the Arts, Tulips of the Valley Festival, Kent Harrison Art Council
- Local government support arts and culture through project and operational grants, in-kind support, venues and infrastructure

Infrastructure and Sites

Key Challenges and Gaps:

- Arts/Culture space: Lack of exhibition opportunities to display art; Lack of associated programming e.g. live theatre. (Harrison gospel chapel as well as conference areas in the hotel sometimes work as venues to display artwork)

- Local transportation: The need for transit; lack of transportation options (public or private, i.e. taxi service) within the region to connect arts and culture events
- National/International transportation: There is no easy public transportation to or from the nearest airports. The closest airport with commercial flights is a 1.5 hr drive to the Vancouver or 45 minute to the Abbotsford airport. Harrison Hot Springs Resort & Spa has a bus plus there is a private company that provide airport service - both will pick you up at your house.
- Climate change indicators show an increase to wildfires, pests, air quality issues, evacuations and emergency preparedness, reduced recreation/backcountry access resulting in current infrastructure at many levels unable to adapt to these changes.

Opportunities and Assets:

- The Village core area is a very important business and service centre for the community.
- The beauty of the natural environment and the recreational opportunities have strengthened the attraction of the Harrison and Fraser Valley area.
- Harrison Lake, Harrison River, the mountains, and valley floor are the focus for recreational activities with summer activities for both.
- Harrison Lake has many uses and values including: cultural values for First Nations, currently a source of potable water for surrounding residents, fish and wildlife habitat, and high value recreational opportunities. The Village is currently working with Recreational Sites and Trails BC to protect Crown Land within the Bear Mountain flats area of the Village.
- Memorial Hall
- Parks and playgrounds
- Beach
- Boat launch facility
- Float plane dock and public wharf
- Ranger Station Public Art Gallery
- Proximity to Sasquatch Provincial Park
- Miami River

Communications/Education

Key challenges and gaps:

- The lack of communication strategies including networking systems
- Need for a central information directory or base to hold and dispense cultural information
- The understanding of various cultures is very limited
- Lack of trail networks and walking paths maps

Opportunities and assets:

- Village of Harrison and Tourism Harrison websites

Resources

Key challenges and gaps:

- Challenging to balance resources with the relatively large influx of weekend visitors and summer residents.

- Local and regional arts/culture organizations need to develop further to effectively support and grow arts and culture in the community and the region.
- As no staff currently exists to focus on Arts, Culture, Recreation and Leisure, new and creative ways to support activities are necessary.
- Lack of seasonal staff and staff accommodation is a concern.
- More supportive and closer connections between local culture and local business.
- Lack of partnerships in arts and culture education and workshops.

Opportunities and assets:

- Organizations: Village of Harrison, Harrison Festival Society, Parks & Recreation Commission, , Kent-Harrison Arts Council

Research and Studies

Key challenges and gaps:

- Lack of data on arts, culture, recreation and leisure activities

Opportunities and assets:

- Cultural Scan Report (2008)

Plans, Policies, Regulations

Key challenges and gaps:

- Motorized vehicle recreation on the lake sometimes creates conflicts with non-motorized interests generally on peak usage days.

Opportunities and assets:

- Relevant OCP Policies:

  4.3.1 Improvements of Lakeshore Beach and Public Use Area for the use and enjoyment of residents and visitors.

  4.3.2 Village Centre Area - work toward establishing an attractive and appealing streetscape.

  4.3.3 Waterfront Commercial Area - Within this area, the preferred form of development is tourist-oriented commercial uses such as hotels, motels, resorts, restaurants and specialty retail stores.

  4.3.4 Lakeshore Marine Tourist Commercial Area - Within this area, a range of marine-oriented tourism uses such as restaurants, marinas, small hotels and related retail services are permitted. This designation provides for 'marina accommodation' that caters to the boating tourist and tourism development.

  4.3.6 Parking and Traffic in the Lakeshore Area - Council intends to address the issue of parking shortages and traffic congestion in the Lakeshore area during peak demand periods, including special events and the peak tourism period.

  4.3.7 The Hot Springs - Residents of Harrison Hot Springs want to further develop and strengthen the hot springs identity of the community.

  13.3.1 Public lands used as parks and open space, both developed and undeveloped are designated as Park on the Land Use Map (ref. Schedule 1-B OCP).

13.3.2 Council intends to prepare a Parks and Trails Master Plan to provide long-term direction for developing the overall parks and trail system for the use and enjoyment of residents and tourists. The Parks and Trails Master Plan will address and provide direction on many issues, including:

- Determining the most appropriate locations size, and nature of future park land acquisitions.
- Further development and directions on the Miami River Greenway Trail
- Preservation and enhancement of the network of trails throughout the community, including the implementation of a Hot Springs Road Improvement Plan (ref. Section 10 OCP)

13.3.3 Council may request cash in lieu of land dedication during subdivision. New development will contribute toward the acquisition of parkland.

13.3.4 Council intends to work co-operatively with the District of Kent and the Fraser Valley Regional District on a number of initiatives of mutual benefit, such as:

- Development of a bicycle path between Agassiz and Kent; and
- Location acquisition and development of a regional park in the area
- Plans:
  - Parks and Trails Master Plan: Staff has begun developing a parks and recreation master plan including addressing the trail network system to ensure connectivity throughout the community.
  - Parks and Trails Report (2008)

Economy and Tourism

The Economy and Tourism strategy area focuses on bringing in sufficient dollars into the community and optimizing the impact of dollars within in order strengthen the local economy. For Harrison, this means a focus on the tourism aspects of the economy, while not excluding other aspects. This strategy area also addresses opportunities for meaningful work, sustainable businesses and creating a positive climate for local businesses. This strategy also focuses on providing exceptional experiences and excellent value to visitors with the intent being to increase repeat visitation and recommendations. It includes the welcoming and servicing of visitors: (1) before their visit; (2) upon their arrival and for the duration of the stay; and (3) upon leaving.

Programs, products and services

Key Challenges and Gaps:

- Income Data: Income data indicates that a significant percentage of permanent residents earn incomes of $18,000 (2006); Median employment income in 2005 was $21,884 ($26,324 (males), $17,914 (females)); $49,726 family median income (2005); 38% of residents worked full time, full year in 2005.
- Income on housing: According to the Local Health Area Socio-Economic Profile, 25% are paying 30% or more of their income on housing costs; average gross rent was $681 in 2006;
- Harrison is a very seasonal destination with visitation heavily concentrated in the summer months.
- The lack of a night-time economy
- Current challenge of breaking away from a monogamous workforce to that of workplace diversity. Harrison Hot Springs is comprised primarily of service businesses. Although some service sector jobs are higher paying and offer flexibility (e.g. consultants, lawyers), many are lower paying. Employees also face high cost housing and expensive day to day costs.
- Visitors will often seek out retail and dining options in the Village and although some excellent retail and dining options are available there is room for improvement.
- Lack of packaged, market-ready, year-round tourism experiences for all seasons
- The hotel's monopoly on the hot springs water as use of the water in the public pool is not sufficient.
- Lack of retail options

Opportunities and Assets:

- Tourism is the main economic base of the community
- The tourism market is shifting towards destinations with a wider array of outdoor activities and night life, higher quality facilities and experiences, and more diverse tourism opportunities.
- Harrison Hot Springs Resort & Spa is the village's largest visitor attraction and drives visitation on a year-round basis.
- The Village experienced a 23.4% population growth between 2001 and 2006.
- The top three industries with the greatest labour force in Harrison are accommodation and food services, manufacturing, and retail trade (including food, clothing and general merchandise stores). These stats indicate a community that over the past decade has become less diverse and increasingly reliant on visitors as the economic base. (BC Stats)

- The number of overnight visitors to Harrison has fluctuated with global and regional tourism trends, while the number of local day visitors has likely increased with population growth in the Fraser Valley and local festival activities.

Infrastructure and Sites

Key Challenges and Gaps:

- Accommodation is at capacity during the summer season; however waterfront condos at the east end of Esplanade are largely vacant during the year and often in the summer. Condo rentals are overseen by the strata with bylaws indicating the number of rentals allowed, the VoH currently has little influence in this area
- Limited parking availability during peak visitor days.
- National/International Transportation: There is no easy access for commercial flights. The closest airport with commercial flights is a 1.5 hr drive to the Vancouver or 45 minutes to Abbotsford airport, and there is no public transportation to the airports from Harrison. Harrison Hot Springs Resort & Spa has a bus plus there is a private company that provide airport service - both will pick you up at your house.
- Limited local transportation options for visitors.
- Lack of integrated on-line platforms and initiatives.

Opportunities and Assets:

- A distinct village core exists that can be developed in a way that reflects Harrison's character.
- Need to improve beachfront to better the experience when visiting the beach.
- Boat launch facility
- Plaza
- Parks and playgrounds
- Washrooms
- Float plane dock and public wharf
- Beach
- Harrison Visitor Centre
- Golf course
- Ranger Station Public Art Gallery
- Beachfront redevelopment

Communications/Education

Key challenges and gaps:

- Centralized resource to communicate
- Seasonal and conflicting attitudes to tourism exist
- Lack of understanding and education on the value of the tourism system, for all types of visitors (day use and over-night)

Opportunities and assets:

- Chamber of Commerce activities

Resources

Key challenges and gaps:

- Under developed relationships with government
- Fractured organizational structure
- Attracting and developing resources
- Unemployment rate is 8.3% compared to BC rate of 6% (2006)

Opportunities and assets:

- Communities in Bloom
- Harrison Business Community, Village of Harrison Hot Springs, Ministry of Community Services, Tourism Harrison Society, service clubs and community support groups

Research and Studies

Key challenges and gaps:

- Research on amount of economy locally-based
- Lack of ongoing research on tourism numbers and measurable results
- Lack of integration of policies and branding from muni and tourism Harrison

Opportunities and assets:

- Tourism Development Strategy
- Resort Development Strategy
- BC Community Profile statistics and census data (2006)

Plans, Policies, Regulations

Key challenges and gaps:

- Incomplete Village enhancement/reinvestment plan missing for core commercial area
- Lack of new/existing business enhancements/attraction initiatives
- Lack of priority from Village on development & enhancement of key tourism activity areas
- Lack of integration of Tourism Harrison and Village

Opportunities and assets:

- OCP Chapter 2 goals based on The Regional Growth Strategy (RGS):
  - Support and Enhance the Agriculture Sector
  - Achieve Sustainable Economic Growth
- OCP: Goal 3: Develop tourism and recreation features and activities for the benefit of residents and visitors
- OCP policy: Develop an attractive, visitor-friendly Village Centre that provides a wide range of accommodation and services
- OCP policy: Work toward the beautification of the entrance corridor into Harrison Hot Springs through the preparation and implementation of a Hotsprings Road Improvement Plan
- OCP policy: Develop a comprehensive and integrated system of green spaces and pedestrian and bicycles routes through the preparation and implementation of a Parks and Trails Master Plan
- Parks and Trails Master Plan
- Economic Development Action Plan
- Harrison Kent Regional Tourism Plan (2007)
- Tourism Development Strategy
- Resort Development Strategy

Buildings and Sites

This strategy area is concerned with meeting residents' education, health and other social needs. Health needs include physical, mental, emotional, and spiritual health needs through services, infrastructure, interactions, relationships and a strong community fabric. It also includes community safety. From an individual perspective it addresses access to local and regional care services and health promotion. The education component addresses education-related participation, including formal and informal opportunities. It also addresses conditions required to make these services accessible and inclusive with minimized environmental impact. This strategy area is connected with the Arts, Culture, Recreation and Leisure strategy area since the illness prevention aspects of leisure pursuits are linked with health services.

Programs, products and services

Key Challenges and Gaps:

- Green building/development incentive program
- According to the Local Health Area Socio-Economic Profile, 25% of residents pay 30% or more of their income on housing costs.

Opportunities and Assets:

- BC Assessment data reports the assessed value of single-family dwellings was $376,000 in 2009 and $344,000 in 2010. The average sale price of a single-family dwelling in Harrison Hot Springs has remained relatively consistent since 2007 staying in the mid $300,000s.

Infrastructure and Sites

Key Challenges and Gaps:

- **Space:** The limited development capacity due to the geography of the area the Village is situated in, and therefore the need to carefully integrate new development with the natural setting.
- **Density:** The supply of large vacant properties is diminishing. This will lead to redevelopment of older parts of Harrison Hot Springs where appropriate opportunities exist for higher density development and where services are available. Increased density would also create a livelier village environment.
- **Quality:** Significant residential growth has occurred in Harrison Hot Springs in recent years and there are concerns about the aesthetic appeal of development and the effects on the lakeshore scenery and on the small village character. Increased apartment development along the lakeshore has not led to significant redevelopment of the village centre or expansion of commercial services. Public space has been beautified, private space is run down however is slowly improving.
- **Effect on Tourism:** The lakeshore is a critical area of Harrison Hot Springs with a high potential for major new development and redevelopment. This area is part of the Village's commercial and tourism focus and requires special attention. Its development must be managed carefully to ensure the "small Village" character of Harrison is maintained while building on the opportunities that this area provides.
- The issues related to commercial development are primarily associated with developing an attractive and distinct tourist destination, and expanding the range of commercial services available for a growing residential population.

- **Cost:** Residents are concerned about the cost of servicing new development while also maintaining and upgrading the existing infrastructure, parks and amenities in Harrison Hot Springs.
- **Greenhouse Gas Emissions:** Buildings account for 42% of greenhouse gas emissions in the Village of Harrison Hot Springs (2007).
- **Energy Use:** Residential buildings utilize 100% of all propane distributed to community buildings and approximately 62% natural gas sold within the community (2007)
- **Energy Sources:** Most residential buildings in Harrison use either electric baseboard heating, or natural gas, also some heating oil and propane with some use of supplementary wood heating (Source: CEEP, 2010). Commercial buildings use electric baseboard heating, or natural gas. There are no shared energy systems in Harrison except for the electricity grid
- **Energy Costs:** Residential and commercial building energy costs are high due to the high cost of propane, oil, natural gas and electricity.
- **Material Use:** Residential and small commercial buildings are generally built by a local workforce, using materials imported from other parts of the country. Most homes are built to code.
- No green building design guide currently exists
- Invasive species may be included in certain landscapes, which can impact the local flora and fauna. Streamkeepers & a regional partnership exist to track and manage invasive species especially along waterways.
- Few rental opportunities exist in the VoH, most rental agreements are done privately
- Predominantly multi-family residential units are located in the lakeshore area and single family residential units are located in the remainder of the village.
- Standards for design need enhancing, current design guidelines for public and private spaces in OCP need updating

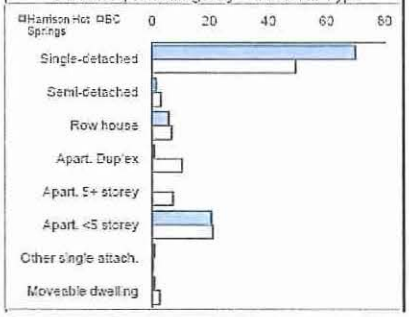
Opportunities and Assets:

- Excluding the option of future expansion into the East Sector, there are three potential approaches to accommodating growth in Harrison Hot Springs:
  - Infill development on existing vacant lots
  - Multi-family residential development in the Lakeshore area
  - Low/medium density residential subdivision within central Harrison
- There is currently about 730 residential units in the community (2007 OCP)
- Dwelling mix as per 2006 Census profile:

Dwellings

	Harrison Hot Springs	BC
Occupied private dwellings	705	1,643,150
Ave. number of rooms	6.2	6.4
Ave. number of bedrooms	2.5	2.7
Persons in priv households	1,555	4,054,110
Ave. # persons/household	2.2	2.5

% Distrib., Dwellings by Structural Type



- The housing stock within the Village is younger than in the province having most buildings constructed between 1996 and 2000.
- Influence new construction: The number of building permits issued has remained consistent between 2009 and 2010 at eight, this after seeing a significant decline in building permits being issued between 2005 and 2008 (from 16 to 3).

Communications/Education

Key challenges and gaps:

-

Opportunities and assets:

-

Resources

Key challenges and gaps:

-

Opportunities and assets:

- Village of Harrison Hot Springs, school district, landowners and developers, businesses, Harrison Hot Springs Resort, utility suppliers, home owners, renters

Research and Studies

Key challenges and gaps:

- Residential water use amounts are known for new construction only recently

Opportunities and assets:

- View Preservation Strategy
- Resort Development Strategy
- Regional Growth Strategy of the Fraser Valley Regional District (FVRD)

Plans, Policies, Regulations

Key challenges and gaps:

- Currently no green building policy or bylaw
- Incomplete Village enhancement/reinvestment plan missing for core commercial area

Opportunities and assets:

- OCP Chapter 2 goals based on The Regional Growth Strategy (RGS):
  - Manage Urban Land Responsibly
  - Protect and Manage Rural and Recreational Lands
- OCP Chapter 4 Policy: Within the Lakeshore Special Planning Area, provide for a variety of uses in locations designated on the Future Land Use Map, as follows:
  - Village Centre
  - Waterfront Commercial
  - Lakeshore Marine Tourist Commercial
  - Lakeshore Residential
  - Lakeshore Beach and Public Use
- Capital Works Plan
- Village Centre Design Plan
- View Preservation Strategy
- Resort Development Strategy
- Regional Growth Strategy of the Fraser Valley Regional District (FVRD)

Land Use and Natural Areas

The Land Use and Natural Areas Strategy seeks to manage development in a way that maintains livability, natural areas, and economic development. The strategy addresses the locations, patterns and types of all physical development as well as the amount and timing of these developments. It also addresses how the community will protect, and attempt to restore ecosystem integrity and biodiversity throughout the area and region.

Programs, products and services

Key Challenges and Gaps:

- Inadequate parking availability during peak visitor days
- Few well maintained hiking and biking trails exist in close proximity to the Village
- Ownership status of surrounding areas result in few options to be developed for visitor use (including the sole-ownership of the Hot Springs held by the Hotel)

Opportunities and Assets:

- Hot Springs, within Harrison and the surrounding area
- Hike-able mountain terrain and beauty

Infrastructure and Sites

Key Challenges and Gaps:

- Due to an increased rate of growth, the Village core area is under pressure to grow and redevelop. To encourage commercial redevelopment in this location, revitalization of the public infrastructure is required.
- No consistency in look or feel exists in the Village core
- The Village of Harrison Hot Springs is facing increasing growth pressures, particularly as a result of the demand for vacation properties and second dwellings. This creates a "shadow population" which generates seasonal or peak demands on both the Village's soft services (e.g. parks, recreation, protective services, health care, etc.) and hard services (water, waste, roads, etc.).
- Concern about the park lands in the East Sector: All Future planning should particularly consider protection of several designated rare and endangered species and threatened species of plants and animals, and other environmental factors.
- Climate change indicators show an increase to wildfires, pests, air quality issues, evacuations and emergency preparedness, reduced recreation/backcountry access resulting in current infrastructure at many levels unable to adapt to these changes.
- Geography:
    - The Village contains some known areas that are subject to hazardous conditions. These areas include the steep slopes at both the eastern and western boundaries of the Village. Significant portions of the Village are located within the floodplain.
    - On the western side of the Village, the Resource Area includes the area between the westernmost boundary of subdivided land and the west boundary of the Village. The majority of the western land consists of mountainous terrain which is heavily forested and lies entirely within the areas subject to hazardous conditions.
    - On the eastern side of the Village, the Resource Area includes the potentially unstable mountain slopes along the edge of the East Sector and relatively flat valley bottom land

between the base of Bear Mountain and McCombs Drive. These lands are partially within an area subject to hazardous conditions.

Opportunities and Assets:

- The Village currently owns about 50 ha of park land and holds a park reserve covering 32 ha on Crown land.
- Beachfront improvements are underway to mitigate erosion issues, and make the area more usable for visitors.
- The compact core area is a unique mix of stores, professional offices and restaurants that create a compact main street.
- Geography:
  - The East Sector Special Planning Area consists of about 162 hectares of land east of McCombs Drive, including the western slopes of Bear Mountain. The area is undeveloped and heavily wooded, and much of it lies within the Agricultural Land Reserve. A portion of the area is held by the Village for park (32 ha) and for public works (2 ha). The majority of the land is owned privately (29 ha) and by the Crown provincial (99 ha).
  - Harrison is located near Sasquatch Provincial Park. The Park draws in some visitors.
  - Harrison Hot Springs is located in a unique natural environment of woodlands, where still today viable native flora and fauna populations exist within and adjacent to the community. The Village is located at the south end of Harrison Lake, 124 km east of Vancouver, Harrison's land area 5.47 km2.
  - Harrison is a 120 km drive to Vancouver and 1 hr from the United States. The closest airport with commercial flights is a 1.5 hr drive to the Vancouver or 45 minute to the Abbotsford airport. There is no easy public transportation to or from the nearest airports. Harrison Hot Springs Resort & Spa has a bus plus there is a private company that provide airport service - both will pick you up at your house.
- Harrison Lake has many uses and values including: cultural values for First Nations, currently a source of potable water for surrounding residents, transportation route, fish and wildlife habitat and high value recreational opportunities.
- The lagoon (currently not being used to full potential. Some lagoon-restoration plans exist in the current OCP).

Communications/Education

Key challenges and gaps:

- Lack of information regarding flora and fauna of area for education of residents and visitors
- Lack of communication with key private as well as government officials and stake holders of the lands surrounding Harrison, and the impact any degradation of these lands would have on the economic development of Harrison as a key player in Tourism in BC as a whole.

Opportunities and assets:

- Miami River Planting Project

Resources

Key challenges and gaps:

- Access to data identifying ecosystems and habitat existing in parks, crown lands, and walkways

Opportunities and assets:

- Village of Harrison Hot Springs, Agricultural Land Commission, Ministry of Agriculture and Lands, Regional District of Kent, Provincial and National Parks

Research and Studies

Key challenges and gaps:

- Climate change indicators show an increase to wildfires, pests, air quality issues, evacuations and emergency preparedness, reduced recreation/backcountry access resulting in current infrastructure at many levels unable to adapt to these changes.

Opportunities and assets:

- View Preservation Strategy
- Slope Hazard Evaluation - Harrison Hot Springs 1988, supplemented by 'Hazard Lands - Secondary Study in 1992

Plans, Policies, Regulations

Key challenges and gaps:

- Protected area network mapping and strategy does not exist
- Climate change mitigation and adaptation strategy does not exist since climate change indicators show an increase to wildfires, pests, air quality issues, evacuations and emergency preparedness, reduced recreation/backcountry access resulting in current infrastructure at many levels unable to adapt to these changes.

Opportunities and assets:

- OCP Chapter 2 lists a number of goals based on The Regional Growth Strategy (RGS):
  - Protect the Natural Environment and Promote Environmental Stewardship
  - Protect and Manage Rural and Recreational Lands
- FUTURE LAND USE DESIGNATIONS (as per OCP):
  - Village Centre: To develop a distinct commercial and mixed commercial – residential town centre with a full range of services
  - Waterfront Commercial: To develop tourist-oriented commercial uses, with some residential uses, and sensitivity to protecting views of the lake
  - Lakeshore Marine Tourist Commercial: To develop an area of marine-oriented tourism uses with pedestrian connections to Esplanade Avenue
  - Lakeshore Residential: To develop an area of moderate density multifamily residential land uses
  - Low Density Residential: To develop an area of single family and two family dwellings
  - Tourist Commercial: To develop an area of tourist commercial uses that provides opportunities for growth of tourism activities
  - Resource: To maintain the natural resource features within the ALR and steep uplands surrounding the village
  - Public Use: To provide for a variety of school, institutional and park uses
- The East Sector to the community and the environmental and drainage concerns, no development, including park facilities, will be considered in this area until several issues are rectified – listed OCP Section 7.3.1.

- OCP policy: Areas which are physically difficult to develop will be designated as Resource
- OCP policy: Permitted uses on lands within the Resource designation include parks and public facilities, recreation facilities (private and public) agriculture, and one single family dwelling per parcel
- OCP policies: To protect development on or near steeply sloping lands; To protect development from flooding; To promote fire- smart practices in residential and commercial areas adjacent to forested areas
- OCP Section 3.3.4: Forest cover on private lands designated as Resource will be protected by a tree protection bylaw and development permit area.
- Village Centre Design Plan
- Future Land Use Designation Map
- Parks and Trails Master Plan
- Geotechnical Hazard Development Permit Area

Education, Health and Social Services

This strategy area is concerned with meeting residents' education, health and other social needs. Health needs include physical, mental, emotional, and spiritual health needs through services, infrastructure, interactions, relationships and a strong community fabric. It also includes community safety. From an individual perspective it addresses access to local and regional care services and health promotion. The education component addresses education-related participation, including formal and informal opportunities. It also addresses conditions required to make these services accessible and inclusive with minimized environmental impact. This strategy area is connected with the Arts, Culture, Recreation and Leisure strategy area since the illness prevention aspects of leisure pursuits are linked with health services.

Programs, products and services

Key Challenges and Gaps:

- No opportunities for higher formal education exist in the Village.
- No professional emergency health care services exist in the Village.
- The Village has a significant elderly population with the majority of residents over the age of 60. The proportion of seniors in the population is projected to increase, while the proportion of children and youth will decline.
- 49% of residents between the age of 25 and 54 do not have any post-secondary credentials.
- 49% of 18 year olds who did not graduate Grade 12 (Avg 2007/08-2008/09), compared to the BC average of 20%.
- Access to the hot springs water for many locals is not affordable, particularly the seniors who comprise a large portion of the residents.

Opportunities and Assets:

- The four season's climate and the geographic location provide the Mountain-Valley Community with a full range of recreational activities.
- Youth and senior interests generally met, but can be improved
- Hot springs water provides health and social opportunities to the community.
- Harrison has its own Elementary school and surrounding fields that could be utilized more for the community while school is not in session.

Infrastructure and Sites

Key Challenges and Gaps:

- Fire services may not be sufficient to meet future fire protection requirements.

Opportunities and Assets:

-

Communications/Education

Key challenges and gaps:

- More opportunities for workshops, training and lifelong learning

Opportunities and assets:

-

Resources

Key challenges and gaps:

-

Opportunities and assets:

- Village of Harrison Hot Springs, Health Authority, school district, residents, fire department

Research and Studies

Key challenges and gaps:

- 2008 BC Stats taxation statistics reported the Average Income as $36,129 (after tax)

Opportunities and assets:

- The community is approximately 1800 permanent residents. The summer population is estimated to double, possibly triple, on weekends. The VoH gets more than 6000 vehicles entering the Village on Hotsprings Road on Saturdays as second-homeowners and tourists descend upon the community to enjoy the main attraction of Harrison Lake.
- BC Stats "Community Facts" based on the 2006 Census predicted the VoH population to be 1,594 in 2009.
- Aboriginal identity 6% of total population (2006); At the north end of Harrison Lake is a small Indian community of the In-SHUCK-ch Nation, Port Douglas, British Columbia.
- Residents generally feel safe; Good sense of community – most feel connected; however, need to engage young, educated people better.

Plans, Policies, Regulations

Key challenges and gaps:

-

Opportunities and assets:

- OCP 6.3.3 Affordable, Rental and Special Needs Housing
  - The Zoning Bylaw will provide for the use of density bonusing in as a means of encouraging the development industry to incorporate the provision of affordable or special needs housing in their residential developments

Transportation and Mobility

The Transportation and Mobility strategy area is concerned with the movement of residents and materials to, from and within a community in a more efficient and sustainable manner that is consistent with the community's rural nature. It includes all modes of local and regional transportation and focuses on vehicles, roads, trails, lighting, mass transit and supportive technologies.

Programs, products and services

Key Challenges and Gaps:

- Limited public transportation options within the community. A bus operates to Agassiz and from Agassiz to Chilliwack.
- BC transit regional services: Very limited public transportation to and from other communities, although BC Transit has a limited bus route through Harrison-Agassiz-Bridal Falls-Rosedale-Chilliwack six days of the week.
- Transportation services could be improved in a number of ways including:
  - Closer airports;
  - Improved pedestrian connections;
  - Options for recreational vehicles to access Harrison Lake;
  - Improved parking solutions;
  - Providing better connections from highway traffic into Harrison's Village core; and
  - Unique opportunities for residents and visitors with accessibility challenges.
- There is no easy access for commercial flights. The closest airport with commercial flights is a 1.5 hr drive to the Vancouver or 45 minutes to the Abbotsford airport, and there is no public transportation to the airport from Harrison. Harrison Hot Springs Resort & Spa has a bus plus there is a private company that provide airport service - both will pick you up at your house.
- Transportation accounts for 50% of Harrison's greenhouse gas emissions.
- In 2010, more than 800,000 vehicles entered the gates of the Village of Harrison Hot Springs.

Opportunities and Assets:

- 84% of employed labour force commutes by automobile and 13.7% by walking/biking
- The Village of Harrison has kept records of their vehicle fleet but not the amount of fuel used per vehicle. In 2011, the Village of Harrison vehicle fleet consisted of 17 vehicles. Of these vehicles, 18% of the municipal fleet vehicles were more than twenty years old, 41% were from the 1990's, and 35% were 2000 model year vehicles or newer.

Infrastructure and Sites

Key Challenges and Gaps:

- Lillooet Ave is a provincial highway, and therefore has more restrictions on it.
- Logging trucks often drive through town taking away from the character and feel desired by the community

Opportunities and Assets:

- The Village of Harrison has a relatively compact core that is very walkable.

- Limited parking available

Communications/Education

Key challenges and gaps:

-

Opportunities and assets:

-

Resources

Key challenges and gaps:

- Translink bus system

Opportunities and assets:

- Strong desire to make the community more transit friendly and less dependent on automobiles.
- Village of Harrison Hot Springs, Ministry of Highways, residents, business owners, landowners and developers, government, Regional Tourism, BC Transit

Research and Studies

Key challenges and gaps:

- Due to the single road leading in and out of Harrison places an increased risk for evacuation options in case of disaster.

Opportunities and assets:

- A third party was recently hired to review the traffic plan for the Village focusing on traffic calming devices and speed limits within the Village area.

Plans, Policies, Regulations

Key challenges and gaps:

- Speed restrictions upon entrance to Village may not be sufficiently ensuring the safety of bikers and vehicles.
- Lack of consistency in village signage reflecting the Village character

Opportunities and assets:

- OCP Chapter 2 lists a number of goals based on The Regional Growth Strategy (RGS):
  - Increase Transportation Choice and Efficiency
- **OCP** policy: Develop a comprehensive and integrated system of green spaces and pedestrian and bicycles routes through the preparation and implementation of a Parks and Trails Master Plan
- **OCP** policies: Designate the Major Roads shown on the Future Land Use Designation Map; Minimize through traffic on roads in residential neighbourhoods; Develop a parking plan for Esplanade Avenue and Lillooet Avenue in conjunction with the proposed Village Centre Design Plan; In collaboration with Ministry of Transportation, apply for conversion of Hotsprings Road between Lillooet Avenue and Esplanade Avenue from Provincial Highway to local road; Improve sidewalks and bicycle paths in the Village, including measures to enhance pedestrian safety along Hotsprings Road; Work with representatives from the Ministry of Air, Water and Land Protection to improve signage to the Provincial Park, and to

minimize traffic impacts on the Village of visitors to the Provincial Park; Encourage the initiation of direct bus service from the long-distance bus terminal in Chilliwack to Harrison Hot Springs; Update Development Cost Charges to help finance the capital costs of providing roads to service new development.

- Hotsprings Road Improvement Plan
- Parks and Trails Master Plan

Current Reality-External Context

Relevant external context that provides additional challenges or opportunities to move toward the DOS (e.g. regional/global trends, external funding, other levels of government).

- Long-term transportation options are currently being explored by the provincial Government

Food

The Food strategy area addresses how the community supports an affordable and reliable food system within and beyond its boundaries that nourishes resident's appetite, celebrations and culture. The strategy maintains the integrity of the land and people providing the food while moving toward a more sustainable system. It deals with food systems from farm to fork to disposal.

Programs, products and services

Key Challenges and Gaps:

- Farming as a labour force experienced a 100% decrease from 2001 to 2006 (BC Stats)
- Most food is imported from facilities far outside regional boundaries which lead to dependency on transportation requirements, high energy consumption, and potentially unsecure supply chains.
- A significant amount of energy is used throughout the food supply chain.
- Lack of Farmer's Markets
- Participation in "handpicked in the Valley" programming with local areas
- Participation in fall fair in Agassiz

Opportunities and Assets:

- Accommodation and food services is the largest industry
- Slow Food Tour

Infrastructure and Sites

Key Challenges and Gaps:

- Non organic challenges lead to soil degradation
- A short growing season combined with unstable weather conditions creates a need for diversification of crops as well as available growing and storage facilities (greenhouses, cold frames, root cellars).
- A significant amount of energy is used throughout the food supply chain.

Opportunities and Assets:

- Need to develop a strategy to incorporate food waste into the Village's solid waste management program.
- Closest farmer's market is in Agassiz

Communications/Education

Key challenges and gaps:

- Workshops and programs on gardening, organic foods, cooking, etc.
- Usage of website to promote locally grown food

Opportunities and Assets:

- Slow Food Tour

Resources

Key challenges and gaps:

-

Opportunities and assets:

- Village of Harrison Hot Springs, Ministry of Agriculture, School District, Chamber of Commerce, BC Association of Farmers' Markets, developers, residents

Research and Studies

Key challenges and gaps:

-

Opportunities and assets:

-

Plans, Policies, Regulations

Key challenges and gaps:

-

Opportunities and assets:

- OCP Chapter 2 lists a number of goals based on The Regional Growth Strategy (RGS):
  - Support and Enhance the Agriculture Sector

Energy, Waste and Water Systems

The Energy, Waste and Water strategy area is concerned with supplying high quality water and energy and materials/waste services in an affordable, reliable and sustainable way. It focuses on provincial, regional and small district energy generation and delivery systems and management practices and appropriate sourcing of water and materials, delivery, use and end of life management related to the municipality's operations and community as a whole. The energy, materials and water demand from buildings, commercial activity, transportation and land use patterns is primarily covered by those respective strategies. The scope of this strategy also extends to flood control and stormwater management.

Programs, products and services

Key Challenges and Gaps:

- The Village of Harrison is facing increasing growth pressures, particularly as a result of the demand for vacation properties and second dwellings. This growth creates tangible costs for infrastructure required to service new developments. At the same time, it also creates a "shadow population" which generates seasonal or peak demands on the Village's soft services (e.g. parks, recreation, protective services, etc.).
- Vehicle fuels – little choice or resiliency or redundancy leaving community vulnerable to fossil fuel supply cost increases and shortages.
- Building heating energy – fair choice available between electricity, natural gas, propane, and wood heat. Electricity, natural gas and propane heated buildings are vulnerable to fuel supply cost increases and delivery disruption.

Opportunities and Assets:

- The Village has made a commitment to use the Village's influence to reduce both community, and municipal corporate emissions by signing on to the BC Climate Action Charter.
- In early 2011, the Village of Harrison Hot Springs joined the FCM–ICLEI (Local Governments for Sustainability) Partners for Climate Protection (PCP) program.
- The Village of Harrison has in place a number of initiatives and programs. Including:
  - Curb-side recycling pickup for single family residential areas, with a system in place to pay for extra bags
  - The FVRD has a target of 25% reduction in the residential residual waste deposited at the curb-side by the year 2016, and a secondary target of an overall 70% diversion rate, encompassing all waste sectors, by the year 2016 (FVRD Solid Waste Management Plan)

Infrastructure and Sites

Key Challenges and Gaps:

- Future growth of Harrison Hot Springs is constrained by the availability of water, sewer, drainage and other infrastructure.
- The capacity of the sewage treatment plant is estimated to serve a population of 4,750 permanent and seasonal residents and visitors to about year 2017, and the outfall peak capacity has a remaining 15 year design horizon, subject to being able to meet water

quality standards. (Harrison is projected to have a population of 3,000 during the decade 2020-2030).

- Water supply infrastructure is currently sufficient with regard to water storage and distribution system for fire protection. Not sufficient is the filtration system.
- Risk of availability of domestic water due to potential climate change impacts
- Concern over the decline of the Miami River due to sedimentation and development
- The infrastructure needs can be generally described as follows:
  - Water Supply – proposed expansion of the reservoir capacity and extension of the intake pipe, and extension of fire protection water supply to the southern areas of the village, as well as some older areas.
  - Wastewater Management – significant upgrading of the treatment plant to meet community demand and environmental standards, improvement of collection system, and long-term planning of a new plant or connection to a regional wastewater treatment facility.
  - Stormwater Management – development of a Drainage Plan, in conjunction with Miami River restoration and East Sector planning process that will improve flood protection, reduce and manage runoff, and encourage groundwater infiltration. Currently, most of the older neighbourhoods in the village have no storm water drains, or system. Many drain pipes are not connected or maintained.
  - Solid Waste Management – promotion of the "reduce, reuse and recycle" approach to waste management.
- Need to review and develop a strategy to incorporate food waste into the Village's solid waste management program
- Need to implement a water metering program
- Need to install a water treatment process to treat lake water for domestic use and investigate alternate source for safe water.
- Wells exist as a backup for the lake water. Much of the older section of the village still has private wells for each house. No connection to the community water system.
- Shared energy systems include is the electricity grid and the natural gas delivery system. There are no district heating systems.
- Currently no renewable energy systems for water and waste
- 50.0% of the community's GHG emissions are from transportation, 42.7% are from buildings, and 7.2% from solid waste. 83.8% of residents drive to work.

Opportunities and Assets:

- Construction of the $1.5 million Water Reservoir project got underway in the fall of 2009 and was commissioned in January of 2010.
- An upgrade of the Village's Waste Water Treatment plant is underway planned for completion in January 2012.
- The Village has a curb-side collection program that includes household waste, recycling and green waste.
- There is an abundance of wood biomass in the forests of BC because of fuel management treatments, ecosystem restoration, mountain pine beetle salvage, etc. At present, much of this is unused and is left to rot or burned on-site. The BC and Federal Governments are encouraging communities to explore bio-energy opportunities and have financial and technical support available.

- Electricity is supplied from the BC Hydro grid, with the majority of electricity generated from renewable hydro electric generation stations, plus natural gas and coal fired electricity imported from Alberta and Washington.
- The Village of Harrison Hot Springs waste and recycling is collected and processed at the following locations:
  - Curb-side recycling is collected in and trucked to the Emterra facility in Chilliwack and then processed at the company's recycling facility in Surrey. (FVRD Solid Waste Management Plan Update).
  - Curb-side pick-up for waste. Waste is transported for disposal to Bailey Landfill (FVRD Solid Waste Management Plan Update)
  - Curb-side pick-up for organics is collected and transported to the Parr Road Depot in Chilliwack. (FVRD Solid Waste Management Plan Update)
  - Sewage is collected and put through a primary lagoon process in Harrison Hot Springs (Right beside the hot springs source. West side of the lake just north of the hot springs source.)
- Residents can drop off blue bag recyclables and a variety of other recyclable items at Kent Recycling. (FVRD Solid Waste Management Plan Update)
- The Harrison Mills transfer station has free stores on site where reusable household items and appliances can be dropped off or picked up free of charge. (FVRD Solid Waste Management Plan Update)
- Water Reservoir and Water Reservoir construction
- Upgrade of Waste Water Treatment Plant
- The Village of Harrison Hot Springs has untapped Geothermal potential for heating and cooling

Communications/Education

Key challenges and gaps:

-

Opportunities and assets:

-

Resources

Key challenges and gaps:

- No alternative energy sources exist or are being considered at this time

Opportunities and assets:

- Harrison Hot Springs contains the Miami River and Miami Slough and their watersheds, the various natural habitats in the East Sector, and other natural resource values associated with the steep slopes and with Harrison River.
- The source of water for the Village of Harrison Hot Springs is Harrison Lake. Halfway down Harrison Lake on its eastern shore is the valley of the Silver River, also known as the Big Silver River, one of its tributaries being the Little Silver. Opposite Silver River on the west shore of Harrison Lake is Twenty-Mile Bay, site of one of the lake's many hotsprings. The Harrison enters the Fraser near the community of Chehalis.
- Village of Harrison, FCM–ICLEI (Local Governments for Sustainability), BC Hydro, Fraser Valley, businesses, residents, homeowners, land owners and developers, NGOs

Research and Studies

Key challenges and gaps:

- Climate change:
  - Is expected to impact water availability, forest ecosystems, seasons, and snowpack; over the past 50 years, the average temperature in British Columbia has risen by 1.5°C, which is greater than the global average;
  - impacts on water quantity include reduced or limited municipal water supply, reduced streamflow, decrease in aquifer recharge rate, increased flooding in early spring, drought conditions;
  - impacts on water quality include increased turbidity in streams, decreased watershed and wetland health and integrity, water treatment costs, decreased recreation.
- The 2010 corporate GHG inventory indicates that the Village of Harrison Hot Springs produced 90 tonnes of carbon dioxide (CO2) emissions through municipal operations that year. The inventory shows that most of the emission output came from the public vehicle fleet operation, 38.29 tCO2e that is 42.8% of the total CO2e in 2010. The sewer accounts for 14.85 tCO2e or 16.6% of the total CO2e in 2010. In 2010, recreation facilities (this includes the Memorial Hall, Village Centre Plaza Square, and municipal parks) produced 10.81 tCO2e, fire station produced 7.10 tCO2e, public works yard compound 7.89 tCO2e, and village office 6 tCO2e.

Opportunities and assets:

- Water and Wastewater Sustainability Strategy
- Community Sustainable Development Strategy

Plans, Policies, Regulations

Key challenges and gaps:

- Effective measures for the utilization of non-potable water do not exist.
- Water metering exists, new construction only, making consumption extremely difficult to track.
- Currently there are no practices of protecting water sources within Harrison Hot Springs

Opportunities and assets:

- The current Village of Harrison Hot Springs OCP states that the Village will strive to reduce community greenhouse gas emissions 16% below 2007 levels by 2020.
- LONG TERM VISION
  - Includes a compact village centre
- PRIORITY ACTIVITIES
  - Zoning Bylaw – Update the zoning bylaw, revisions to densities, density bonusing
  - Parks and Trails - Prepare a master plan for an integrated network of green spaces
  - Hotsprings Road Design – Enhancing pedestrian/bicycling corridor
  - Bus Service – encourage the provision of direct bus services
  - Waste Composting – Investigate the feasibility of establishing a municipal composting program
- GOALS
  - Goal 2: Establish a distinct, pedestrian-oriented village centre with a range of commercial services.

- Goal 3: Develop tourism and recreation features and activities for the benefit of residents and visitors.
- Goal 7: Manage traffic and parking and promote transportation alternatives.
- Goal 8: Provide for a mix of housing types for all ages and incomes.

- REGIONAL CONTEXT STATEMENT
  - The Village is addressing goals contained in the Regional Growth Strategy, which will support emissions reductions, including:
    - Increase Transportation Choice and Efficiency;
    - Manage Urban Land Responsibly;
    - Develop a Network of Sustainable Communities;
    - Protect the Natural Environment and Promote Environmental Stewardship;
    - Protect and Manage Rural and Recreational Lands; and
    - Manage Water, Energy Resources, and Waste Responsibly
- Work has begun on the Community Green House Gas reduction strategies to comply with the Climate Action Charter and Bill 27 requirements.
- OCP Chapter 2 lists a number of goals based on The Regional Growth Strategy (RGS):
  - Manage Water, Energy Resources and Waste Responsibly
- OCP 10.3.1 Transportation - Roads are primarily intended to provide for the safe and efficient movement of traffic with minimal direct access to fronting properties; Minimize through traffic on roads in residential neighbourhoods; Improve sidewalks and bicycle paths in the Village; improve signage to the Provincial Park, and to minimize traffic impacts on the Village of visitors to the Provincial Park; Encourage the initiation of direct bus service from the long-distance bus terminal in Chilliwack to Harrison Hot Springs
- OCP 10.3.3 Sanitary Sewer - Review engineering and financing options and prepare plans for expanding the sewage treatment plant to serve long term population growth and tourism expansion in the community and to protect ambient water quality
- OCP 10.3.4 Water Systems - Ensure that existing and potential well sites are identified and protected; Monitor proposals to withdraw water from Harrison Lake for GVRD residents and ensure consultation with Village residents
- OCP 10.3.5 Drainage - Prepare an overall Drainage Plan for the Village; Ensure that the Drainage Plan recognizes environmental considerations
- OCP 10.3.6 Solid Waste - Work with the Fraser Valley Regional District on the implementation of the Regional Solid Waste Plan; Continue to work with all levels of government and local interest groups in the promotion of waste reduction and recycling programs; Investigate the feasibility of establishing a municipal composting program, perhaps in conjunction with the District of Kent
- OCP 10.3.7 Energy and Climate Change - Promote energy conservation, transportation efficiency and public transit in public infrastructure investments and development planning; Encourage the Provincial government to expand local government infrastructure planning grants in support of local actions to address climate change (Action 13, Weather, Climate and the Future: BC's Plan, Dec 2004); Encourage energy conservation and efficiency and other green building measures in proposals for new tourist accommodation facilities and major public facilities, including future redevelopment of the Memorial Hall
- OCP Section 2.4: Goal 10: Reduce community greenhouse gas emissions 16% below 2007 levels by 2020.

- CEEI (2007)
- Corporate Greenhouse Gas Inventory and Reduction Plan

Appendix B: Proposed Initial Actions Recommended for Consideration by CSAT

Main Strategy Area	Action	Short Title	Action Description	Rationale/Comments	Which DoS?	Impact (high, medium, low)	Visibility	Ease of implement ation	Good ROI*	Timeframe for completion (# years)	Lead Partner	Other Partners	Other Strategy Links
1. Buildings and Sites	1	Improve the information centre visibility	Make the current visitor info centre more visible from the street, and make it more appealing to go into it.	The current information centre is not very visible or attractive from the road and it is easily missed. It could easily become a hub for the distribution of info about the village and its surroundings.	3	Medium	High	Easy	Yes	1	Tourism Harrison	Chamber of Commerce, VCM, HHS	Economy and Tourism
	2	Determine the best location for village services	Investigate moving space for community services, information centre, village office, maintenance yard to more suitable location.	The current lands could be used in a more efficient way for the whole of the community.	2, 3	High	High	Difficult	Yes	1-2	HHS	Developer, Public-Private Partnership	Land Use and Natural Areas
	3	Sustainable building guidelines	Develop guidelines to ensure that buildings adhere to the highest standards for sustainability.	As a leading edge sustainable community Harrison needs to modify building requirements to reflect its vision.	1, 6, 4, 8	High	Moderate	Medium	Yes	1	HHS	Developers	Energy, Waste and Water systems
	4	Modify Design guidelines	Revisit the village design guidelines.	Ensure the look and feel of Harrison is in tune with the overall sustainable vision and the small town setting.	3, 4, 7, 8	High	High	Medium	Yes	1	HHS	Developers, Businesses	Economy and Tourism

Main Strategy Area	Action	Short Title	Action Description	Rationale/Comments	Which DoS?	Impact (high, medium, low)	Visibility	Ease of implement ation	Good ROI*	Timeframe for completion (# years)	Lead Partner	Other Partners	Other Strategy Links
2. Education, Health and Social Services	1	Community Economic Vitality, Health & Wellness Workshops	Develop and implement Workshops allowing all stakeholders and entrepreneurs to become more aware of community business environment; increase awareness of health/wellness and technology.	Building capacity in the community.	1, 2, 3, 4, 5	Medium	High	Easy (if position available)	Possibly	Immediate & ongoing	Community Services	Partnerships with UFV/UBC/ BCIT; Tourism Harrison, Village; Fraser Health	Economy and Tourism
	2	Medical/Health /Wellness Incentive	Provide needs assessment (qualitative data collection) for use in soliciting medical caregivers in the private sector.	To encourage private sector medical care givers.	1, 2, 3, 5	Medium	High	Easy	Yes	Immediate	HHS	Fraser Health	
	3	Resident Online Survey	Online survey to gauge resident perceptions and attitudes.		6, 7	Medium	High	Easy	Yes	1 year	HHS		
3. Economy and Tourism	1	Hotel/Conference Center Initiative	Develop an incentive and information package to encourage hotel/conference center use	To encourage quality hotel and meeting space.	1	Extremely High	High	Easy	Yes	1 year	Tourism Harrison	Hotels, HHS	
	2	Visitor Surveys	Develop, operate and manage visitor satisfaction and needs surveys within Harrison during peak season.	To provide quantitative information with which to make decisions	1	High	High	Easy	Yes	1 year	HHS	Tourism Harrison	Arts, Culture, Recreation and Leisure
	3	Business Incentive Program	Develop and create an incentive and information package.	Encourage local quality business expansion, as well as bring in others to fill gaps.	1, 8, 10	High	High	Easy	Yes	1 year	HHS	Chamber, Tourism Harrison	
	4	Enhance & Promote Tourism Products	Improve and add to trail signage & QR codes and tourism product diversification.	Enhance existing and add new products and value added services like signage.	2, 4, 6	High	High	Easy	Yes	1-2 years	Tourism Harrison		Education, Health and Social Services
	5	Pursue opportunities of re-development of the hot springs source and pool	Explore options for making the hot springs easily available for members of the community.	Goal to make more usable for members of the community.	4, 7	Moderate	Moderate	Moderate	Likely		HHS	Tourism Harrison	Arts, Culture, Recreation and Leisure

Main Strategy Area	Action	Short Title	Action Description	Rationale/Comments	Which DoS?	Impact (high, medium, low)	Visibility	Ease of implement ation	Good ROI*	Timeframe for completion (# years)	Lead Partner	Other Partners	Other Strategy Links
4. Arts, Culture, Recreation and Leisure	1	Events and Recreation Coordinator	Create an event coordinator position (Overlapping with all areas)	To facilitate, attract and sustain a diverse offering of events and recreation activities.	1, 2, 3, 4, 6	High	High	Difficult	High	1 year	Partnership of Tourism Harrison/ HHS	Chamber, Art council	Economy and Tourism
	2	Hiking & Biking Trails	Develop a hiking/biking trail network (all types of biking – mountain, road, recreational). Use the natural areas surrounding the village.	Provide more opportunities for tourism products and commuting options.	1, 2, 3, 4, 5, 7, 8, 9, 10, 11	High	High	Difficult	High	2-3 years	HHS	Partnership Gov't tourism; Tourism Harrison; HHS, Clubs, Chamber of Commerce	Land Use and Natural Areas
	3	Vision Statement	To develop a community vision statement. (re-visit the vision statement in the next OCP update)	Having completed new branding and the ICSP, the Village is primed to update its vision statement in the OCP.	All	High	High	Moderate	Extreme ly High	1-2 years	HHS	All stakeholders	
	4	Arts & Culture School Initiative	Create an arts and culture school initiative to encourage the arts and culture economy. (i.e. summer stock theatre)	Assist in the operation and management of the arts society; bolster volunteers; enhance all types of arts and culture happenings in the village.	All	High	High	Easy	Extreme ly High	1-2 years	Art Council		Economy and Tourism
5. Energy, Waste and Water Systems	1	Renewable Energy Sources	Review and assess alternative energy sources	Provide renewable energy resources and provide energy security and a competitive advantage.	1, 2, 3	High	High	Easy	Yes	1	HHS	Environment al Groups, Developers, Utilities company	Buildings and Sites
	2	Reduce, Re-use, and Recycle program	Develop a comprehensive recycling and waste reduction program to include residents, businesses, and tourists.	Currently massive amounts of recyclable material is put in the garbage at local parks and beaches. Visitors and residents using Harrison businesses need to see that Harrison has adopted recycling at all levels of the community.	5, 7, 10	High	High	Medium	Yes	1	HHS	Environment al Groups, Chamber	Buildings and Sites

Main Strategy Area	Action	Short Title	Action Description	Rationale/Comments	Which DoS?	Impact (high, medium, low)	Visibility	Ease of implement ation	Good ROI*	Timeframe for completion (# years)	Lead Partner	Other Partners	Other Strategy Links
	3	Climate change adaptation and mitigation strategy	Develop a high level climate change adaptation and mitigation report highlighting the risks of climate change for the HHS.	Water shortages, floods, temperature changes, etc., are all potential risks facing the HHS. Information on these risks is beneficial for future planning.	6	High	low	Easy	Yes	1	HHS		Land Use and Natural Areas
6. Food	1	EAT LOCAL Harrison Hot Springs Program	Promote local growers and local restaurants.	To support local food producers and promote HHS as sustainable food community.	1, 3, 4	Medium	Medium/Low	Easy	Yes	1 year	Chamber	Tourism Harrison, Circle Farm,	Education, Health and Social Services
	2	Farmers Market	Encourage a Saturday Farmers Market.	To provide the space and the coordinator to organize and collect.	1, 2, 3, 4, 5, 6, 8	Medium	High	Moderate	Yes	1 year	HHS & Event Coordinator	Tourism Harrison	Education, Health and Social Services
7. Land Use and Natural Areas	1	Increase in Infill development	Increase the amount of infill development in the community through zoning and OCP revisions.	Encourage higher density, discourage sprawl, and provide for more diverse and affordable housing options.	2, 3, 4, 8	High	High	Difficult	Yes	Ongoing	HHS	Developers, businesses	Buildings and Sites
	2	Beachfront Improvements	Create a clean, inviting area in the current beachfront.	Improve safety, water quality and infrastructure.	1	High	High	Moderate	Yes	3 - 5	HHS	Chamber, Tourism Harrison, Environmental Groups	Economy and Tourism
	3	Hiking/walking trail program	Improve hiking/walking trails & augment them with interpretive signs and information to promote the importance of green space.	Green spaces are more likely to be considered important and to protect if consistently maintained and accessible.	1, 8	High	High	Difficult	Yes	immediate & ongoing	Streamkepers	HHS, Groups, MoE	Arts, Culture, Recreation and Leisure
8. Transportation and Mobility	1	Transportation Strategy	Develop a strategy to support low impact forms of transportation including walking, cycling, public transit and green energy vehicles.	Improve mobility while minimizing environmental impact and increase good health.	1, 3, 4, 5	High	High	Moderate	Yes	2 years	HHS	Developers, MoT	Education, Health and Social Services
	2	Pedestrian Areas	Focus on pedestrian oriented development that is safe and friendly to all.	Health and Safety	1, 2, 3, 5, 8	High	High	Medium	Yes	Ongoing	HHS	Developers, MoT	Economy and Tourism

* Does the proposed action and direction provide enough return on the financial, political and stakeholder investment in order to resource future actions?

- What is the financial impact of the action on the organization if they implement the action? (Does it reduce long-term operating costs, have a strong return on investment)?
- What is the financial impact on other stakeholders from implementing the action?
- If required, would citizens be willing to pay for this policy through a tax increase? or Would enough users pay a user fee to make this policy a reality?

Appendix C: List of all Action Ideas

Main Strategy Area	Action	Short Title	Action Description	Rationale/Comments	Which DoS?	Impact (high, medium, low)	Visibility	Ease of implementation	Good ROI*	Timeframe for completion (# years)	Lead Partner	Other Partners
1. Arts, Culture, Recreation and Leisure	1	Harrison Museum	Harrison should have its own museum	to enrich the visitors and residents of our own heritage which is different from Agassiz	7							
	2	Use of school buildings	In partnership with the school district, the gym could be used as a community center for public use	Elementary school with gym exists in the heart of the community. This facility, particularly the gym is under-utilized. A partnership could be made with the community and the school district to expand the existing gym facility to expand the offerings to include more of what the community needs making the facility better for everybody, and more used. Especially as the land area of the village could be used up in the foreseeable future, making a facility such as this one multi-purpose can not only conserve funds, but also space.								
	3	SuperHost (now WorldHost) program		To be mandatory for all who work with the public in Harrison								
	4	Use of the #1 attraction to Harrison – the Hot Springs.	Release the Hot Springs Water to be used by others than just the hotel	The hot springs water is not used effectively at this time in the larger picture of the community of Harrison Hot Springs. Visually, the source of the water is an embarrassing sight, and has been so for many years. Other commercial operations should have	several	high	High	Easy	Yes	1 - 2	HHS	Hotel, private partners

Main Strategy Area	Action	Short Title	Action Description	Rationale/Comments	Which DoS?	Impact (high, medium, low)	Visibility	Ease of implementation	Good ROI*	Timeframe for completion (# years)	Lead Partner	Other Partners
				access to the water, and also provide locals with affordable access.								
	5	Community outdoor pools	Outdoor, perhaps indoor swimming pool incorporated into the lagoon area or otherwise close the lakeshore tourist area. Water slides? This should be an attraction to both locals and tourists. Incorporate hot springs water for part of it.	Particularly with the frequency of swimmers itch appearing at the shore areas of the lake, as well as the bad reputation of the lagoon for its drop offs and weeks at the bottom, clean swimming areas are in demand.	Several	high	high	Medium	Yes	5	HHS	Hotel, private partners
	6	Hiking and biking trails	Use the natural areas surrounding the village. This would give more opportunities for tourists as well as locals to exercise and enjoy nature.	There is a lack of hiking and biking trails in the Harrison area	Several	High	High	Medium	Yes	2	HHS	Local businesses, new developers contributions
	7	Native people's tributary day.	A festival or weekend or day designated to the first nations people and Harrison's discovery.	It would expand our culture outlook and possibly bring in tourism and gather members of the community.	#3	high					HHS	Chehalis Band, Salish Band
	8	Snow sports day	Where the youth and village work together to make a small snowboard/ski park in the school field. (i.e. a pump track)	It would give the youth something to do, and give tourists that live close by another reason to come in the winter.	#1	medium					Village workers/HHS And the youth community members.	
	9	Events Coordinator Position	Festival and events duties and responsibilities	Ensure continuation of activities	1,2,3, 5,	High	High	Difficult	Yes	ongoing	Art Society & Tourism Harrison	Village contribution $$
	10	Survey – during and post-event (mail in)	Data base development	Ensure satisfaction and track trends (Event Coordinator position)	1, 2, 3, 5	High	High	Moderate	Yes	ongoing	Arts Society & Tourism Harrison	Tourism Harrison & Village contribution $$
	11	COMMUNITY VISION	This is critical step in the sustainability of Harrison for all sections	Without a vision created from ALL stakeholders, sustainable will never be attained.	ALL	High	High	High	High	High	Collaboratio: Tourism Harrison Lead	All stakeholders
	12	Support local Arts Groups	Provide ongoing financial support to local Arts	The best way to build arts and culture is to	1, 4	high					Village, Chamber	Prov Gov.t / Kent

Main Strategy Area	Action	Short Title	Action Description	Rationale/Comments	Which DoS?	Impact (high, medium, low)	Visibility	Ease of implementation	Good ROI*	Timeframe for completion (# years)	Lead Partner	Other Partners
			groups such as Harrison Festival and Arts Council	help existing groups to maintain and grow								
	13	Joint planning between Harrison & Agassiz	Harrison and Agassiz need to work together to provide a full range of arts, culture, rec and leisure opportunities	Both communities are too small to provide full range, by combining resources more can be accomplished then by duplicating	2, 6, 8	high					Village, Kent,	FVRD
	14	Harrison Museum	To provide learning's on FN history, Village history, Sasquatch legacy mini museum as part of visitor center	Many visitors to Harrison are curious about history of area and Sasquatch story	3, 1, 7						Village,	Harrison Tourism, Chamber
	15	Build a Skate Park and fix Lacrosse Box		So the young, both local and visiting, have somewhere to expend their energy without creating problems for others.								
	16	Provide more classes and activities.	Classes or lectures on gardening, the arts, our Gold Rush history, wind surfing etc.	To bring people together. Many groups are active in the village, e.g. hiking, arts, naturalists, Festival, craft shows etc. but currently little connection between them all.								
	17	Revive the Sand Castle Festivities		We are already noted for Sandcastles. Invite a group of Sand castle builders to construct 1 large sandcastle on the beach then offer lessons to families and children on weekends in how to build sand castles. Participation is the key not only art appreciation.								
2. Economy and Tourism	1	Develop a map of local attractions including slow food tour etc.	This would outline things that people could do while in Harrison. Package experiences together. I.e.;	Something like this may be available now, but is not readily available		High	High	Easy	Yes	1	HHS / chamber of commerce	

Main Strategy Area	Action	Short Title	Action Description	Rationale/Comments	Which DoS?	Impact (high, medium, low)	Visibility	Ease of implementation	Good ROI*	Timeframe for completion (# years)	Lead Partner	Other Partners
			overnight stay and boat tour, or fishing tour etc. Make this map available everywhere.									
	2	Add more large hotels and conference facilities to the offering	Attract a hotel developer or chain to build a hotel and conference center in Harrison. There are numerous locations that could be utilized for this.	Harrison could be marketed as a conference destination if there were more large meeting areas as well as more hotel rooms. This would improve the overall appeal of Harrison as a destination for conferences	Various	High	High	Medium	Yes	5	HHS to source a developer	
	3	International as well as local promotion of Harrison as a package, and as a destination.	Promote Harrison (not just the hotel) as an oasis of healing, relaxing destination with a vibrant arts scene. (arts scene to be developed)	Create packages that will give visitors choices of local offerings with the essence of the community	Various	High	High	Easy	yes	ongoing	Individual hotels in conjunction with the Chamber of commerce	
	4	Trail maintenance	A group works together to clean up the trails to make sure they're walkable and enjoyable.	If stream keepers or another nature-based group did this it would be voluntary and invasive species could also be looked after.	#1,2 and 5	high					Stream keepers or other nature-based groups	HHS
	5	Trail advertisement	Signs to advertise trails and their difficulty.	Allows tourists to realize how many opportunities there are to enjoy nature and the village and its trails.	#2 and 4						HHS?	
	6	Visitor Feedback	Visitor Surveys to monitor, track: visitor satisfaction levels and market needs	Imperative in gauging product/service satisfaction; WOM; gauge advertising reach & branding efforts; tracking visitor #'s as benchmarks on community success; opportunities to spot trends & demographic changes (Tourism Harrison New position)		High	High	Very Easy	Superb	Twice/year	Tourism Harrison	Village & Chamber of Commerce; Vancouver Coast & Mnts Govt investment (student)

Main Strategy Area	Action	Short Title	Action Description	Rationale/Comments	Which DoS?	Impact (high, medium, low)	Visibility	Ease of implementation	Good ROI*	Timeframe for completion (# years)	Lead Partner	Other Partners
	7	Tourism Resources/Assets	Undertake full inventory assessment of all tourism resources; categorize by themes; develop strategies for each segment	Spot opportunities and gaps in product line ups; prioritizes activities. This will likely require another staff for Tourism Harrison (Tourism Harrison New position)		High	High	Easy (staff assignment)	Excellent	1 month	Tourism Harrison	Vancouver Coast & Mnts
	8	Business incentive program	Work to building incentive to attract the "right" businesses to Harrison i.e. Art school		1	Medium	Medium	Easy (staff assignment)	Yes	5 year plan	Village of Harrison	Tourism Harrison; Chamber of Commerce
	9	Encourage Eco Tourism	As part of Harrisons vision for sustainable/green tourism policy/financial backing for encouraging tourism activities that support that vision should be implemented	Eco tourism is not currently very advanced in Harrison, it needs to be encouraged and supported for long term growth	1,2,8						Village	Chamber
	10	Improve communication	Improve communication & education between business community, Village and residents	Residents need to understand the positive impact of businesses to economy/tax base – businesses need to understand residential concerns and issues	4,5						Chamber	Residents, Village
	11	Business Improvement	Create program to encourage business improvement particularly of run-down buildings lots	Certain buildings and lots in Harrison look run-down or unkempt. This is a negative for both visitor and resident experience. A program or incentives for beautification could help.	2,1,6						Village	Chamber
	12	Pursue opportunities of re-development of the hot springs source and pool	Explore options for making the hot springs easily available for members of the community.	Goal to make more usable for members of the community.	4, 7	Moderate	Moderate	Moderate	Likely		HHS	Tourism Harrison (?)
	13	Utilise our interesting Gold Rush history to attract tourists	Have a Paddlewheeler week when the boat is in town, with history displays in shops, and contests for people wearing 19th	Many people have enjoyed this historic tour on the boat in the last four years, proving there is a core of local people								

Main Strategy Area	Action	Short Title	Action Description	Rationale/Comments	Which DoS?	Impact (high, medium, low)	Visibility	Ease of implementation	Good ROI*	Timeframe for completion (# years)	Lead Partner	Other Partners
			century costumes, etc.	interested in our First Nation, Fur trade and Gold Rush history.								
	14	Hotel/Conference Center Initiative	Develop an incentive and information package to encourage hotel/conference center use	To encourage quality hotel and meeting space.	1	Extremely High	High	Easy	Yes	1 year	Tourism Harrison	Hotels, HHS
3. Education, Health and Social Services	1	First Aid Volunteers	Level 3 First Aiders to volunteer in cases of emergency									
	2	"Book mobile"	Mobile or stationary library in the village									
	3	Establish medical facilities	Harrison needs a medical clinic and pharmacy of sorts to serve the community as well as the tourists. Offerings should include at least a part time physiotherapist, dentist as well as a full time GP in a walk in clinic.	There are no medical facilities for tourists, the hospitality work force, as well as the aging population.	Various	High	Low	Easy	Depends on need!	1 –start small and build services on it in time.	contractor	
	4	Bank or ATM machines.	Should be a trusted and recognized name brand of a bank machine i.e.; RBC or CIBC etc. People need to be able to access the cash that we want them to spend!	There are no banking services in Harrison.	Various	Medium	Low	Easy	Good	1	Recognized bank & local businesses for a location	
	5	Grocery store	Attract an investor to build and run a grocery store that could service all of the needs of the community.	Harrison needs to have a grocery store that is more than a convenience store to serve locals as well as tourists.	Various	High	High	Medium	Good	2 - 3	Grocery store chain	
	6	Community Economic Vitality, Health & Wellness Workshops	Develop and implement Workshops allowing all stakeholders and entrepreneurs to become more aware of community business environment; increase awareness of health/wellness and technology.	Building capacity in the community.	1, 2, 3, 4, 5	Medium	High	Easy (if human resources allow)	Long-term	ongoing	Community Services	Partnerships with UFV/UBC/ BCIT; Tourism Harrison, Village; Fraser Health

Main Strategy Area	Action	Short Title	Action Description	Rationale/Comments	Which DoS?	Impact (high, medium, low)	Visibility	Ease of implementation	Good ROI*	Timeframe for completion (# years)	Lead Partner	Other Partners
	7	Resident Surveys	Online surveys (ongoing) to gauge resident perceptions and attitudes	Ensure community is "on track" with public participation	6, 7	High	High	Easy	ongoing	ongoing	Village (event coordinator)	All local stakeholders. UFV/other (BCIT?); Provincial Govt agencies
	8	Annual Sustainability Awards	Reward local entrepreneurs, business leaders, companies engaging in sustainable efforts.	Shows encouragement of the values of sustainability; a celebration of everything and everyone that deserves recognition as a leader in sustainable initiatives and actions.	ALL	High	High	High	High	High	Collaboratio: Chamber of Commerce, Tourism Harrison & Village	All stakeholders
	9	Promote Harrison as a Healing Center	Promotion of Harrison as a healing center combined with financial incentives to encourage health related residential and visitor health services, i.e. hydrotherapy, massage, holistic medicine etc.	Harrison has a history of offering healing and to encourage this sector would support the ongoing vision for Harrison	2, 1, 3						Village	
	10	Encourage learning activities in conjunction with tourist offerings	Focus on attracting learning conferences around healthy living, FN knowledge, Sasquatch history, etc.	Try and associate Harrison with targeted learning opportunities that relate to our overall vision and are authentically Harrison	4, 3, 2							
	11	Residents Association	Create a Residents Association to provide the opportunity for community dialogue, education, input etc.	An association that could provide input to Council and other groups would give residents a stronger feeling of inclusion	6, 7						Residents	Village Chamber
4. Energy, Waste and Water Systems	1	Alternative Energy Sources	Review and assess alternative energy sources									
	2	Make use of the geothermal energy in the hot springs	Use the natural pent up energy to heat buildings or....	In today's age of green energy and lower carbon footprint, Harrison should be a model of energy sustainability by using the untapped natural geothermal	Various	High	high	Difficult	Good	5	HHS	

Main Strategy Area	Action	Short Title	Action Description	Rationale/Comments	Which DoS?	Impact (high, medium, low)	Visibility	Ease of implementation	Good ROI*	Timeframe for completion (# years)	Lead Partner	Other Partners
				energy that is within the community								
	3	Disguise or move the waste water treatment plant		The location that the water treatment plan is in now, being so close to the source of the hot springs often creates confusion amongst visitors that this facility is part of the hot springs. With the planned expansion of the plant, it would be an opportune time to move it away from where the public tourist areas are. In light of the fact that this is an expensive, long term endeavor, some sort of disguising of it would be a shorter term –quick fix.	Various	High	High	Quick fix solution – easy. Long term solution -difficult	good	Quick fix -1. Long term solution -5 - 10		
	4	Promote Recycling with Visitors	All public venues and parks should have recycling receptacles	Currently massive amounts of recyclable material is put in the garbage at local parks and beaches	5						Village	
	5	Promote Recycling with businesses	All businesses should adopt recycling programs and they should be visible to the extent possible	Visitors and residents using Harrison businesses need to see that Harrison has adopted recycling at all levels of the community	10						Village	Chamber
	6	Local renewable energy coop	Renewable energy options are identified and public (businesses residents) given opportunity to participate as part of coop	Local renewable energy options need to be identified and then implemented – a coop can help get community involved and deal with funding	3						Village	Chamber BC Hydro Residents
5. Food	1	Compost System	Develop and implement a compost system		7							

Main Strategy Area	Action	Short Title	Action Description	Rationale/Comments	Which DoS?	Impact (high, medium, low)	Visibility	Ease of implementation	Good ROI*	Timeframe for completion (# years)	Lead Partner	Other Partners
	2	Fish Market	Introduce a fish market for locally caught stock	The lake and river system provide an abundance of fish not currently available to those who do not fish themselves	5							
	3	More and diversified food offerings	Encourage more food establishments to open in Harrison to serve the increased tourist traffic that will result from the other implementations in this document.	There is a lack of quality fine dining options, as well as diversity in fast food outlets	Various	High	High	Medium	Yes	3 – 5	Private contractors	
	4	Seasonal offerings	Create distinct seasonal offerings in food and decorations across the restaurant offerings in the village. This can spread into the village atmosphere and will make people want to come and visit Harrison during each season. I.e.; Christmas spectacular	Creating distinct seasonal atmospheres and events can create an excuse to invite visitors to return to the village over and over.		High	High	Easy	Yes	1	HHS & Chamber of Commerce	
	5	Feasibility Study – Produce Market	Assess economic benefits to residents and local businesses of having a weekly product market held in town.	Promotes local growing of food	1, 2, 3, 4, 5, 6							
	6	Restaurant/Food Growers Collaboration	Promote local restaurants and dining out with locally grown produce	Like: Vancouver EAT OUT	1, 2, 3, 4, 5, 6							
	7	Eat Local Program	Integrate local foods, Circle Farm tour products into Harrison restaurants and café's	Healthy approach to local food that helps build the sustainable Harrison brand.	1.3.4						Chamber	
	8	Local Garden Program	Build on the current local garden program to stimulate production of local produce		5						Village	
6. Land Use and Natural Areas	1	Increase in Infill's	Increase the amount of Infill's in the community	Infill is preferred by the community	4							

Main Strategy Area	Action	Short Title	Action Description	Rationale/Comments	Which DoS?	Impact (high, medium, low)	Visibility	Ease of implementation	Good ROI*	Timeframe for completion (# years)	Lead Partner	Other Partners
	2	Convert the lagoon	Create a clean, inviting swimming area in the current lagoon area	Can be done in conjunction with "community pools" above. The lagoon as it is now is underutilized as a drawing card to attract visitors to Harrison. The water is dirty, full of weeds and has a bad reputation amongst visitors due to its drop offs and water weeds. The possibilities are endless as to what could be done here. I have many ideas!		High	High	Difficult	Very good ROI	3 - 5	HHS	Developers of other new local businesses, private partners, government grants
	3	Miami river restoration	Restore the river to what it was many years ago, and use it as an attraction for water activities within the village. Link it to the proposed park land in the East sector of the village. Use it as a transportation route.	The use of this waterway can add to the charm of the village while also providing an avenue to display some of the nature that this area has to offer.		High	High	Medium	Yes	2 – 5	HHS	Community groups, private contractor
	4	Surrounding lands	Gain access and control to surrounding crown lands as well as unused private holdings. This would include crown lands within eye sight of the touristic part of Harrison that if marred would impact the beauty and charm of what Harrison is trying to promote.	The visible and walk able lands surrounding the village could deter visitors from coming if they were destroyed or defaced, while they can also attract visitors if they are used for their benefit. The ones accessible from the village could be used to create hiking and or biking trails, while others can be preserved in their current state for locals and visitors alike to enjoy.		High	Low, and that is the desired effect!	Medium	Good	2 - 5	HHS	Government of BC, private land owners

Main Strategy Area	Action	Short Title	Action Description	Rationale/Comments	Which DoS?	Impact (high, medium, low)	Visibility	Ease of implementation	Good ROI*	Timeframe for completion (# years)	Lead Partner	Other Partners
	5	Municipal Government and Community Sustainable Stewardship Index	Online visual performance of Village decisions and actions according to resident VISION and community action teams.	Accountability and Transparency Index and Measurements of performance	ALL	High	High	Computer programming	High	High	Economic Development Committee – Village/Tourism Harrison/Art Council/Chamber	All stakeholders
	6	Limits of Acceptable Change	Determine the kinds of conditions that will be permitted to occur in the area	Recognize inevitable impacts as a result of human use. How much change is acceptable	1, 2, 6, 8	High	High	Moderate	High	High	Outside Party (lead)	All stakeholders
	7	Hiking trail program	Improve hiking trails & augment them with interpretive signs and information to promote the importance of green space	If green spaces are maintained and accessible they are more likely to be considered important to protect	1, 8	High	High				Streamkeepers	HHS, Groups, MoE
	8	Implement long term village vision	The vision and long term plan for the water front needs to be updated and implemented	The current vision for the waterfront needs to be revisited in light of the sustainability initiative, updated and implemented.	2						Village	
	9	Add pay parking		Use the income to clean up the lagoon and a bylaws enforcement officer.								
7. Buildings and Sites	1	Replacement of Memorial hall	Replace the current facility with a modern one that is more multi-purpose. Meeting rooms, function rooms, display rooms, office space, retail space etc.	The current facility, even though it was recently renovated, is out dated, and uninviting. The space that it occupies in the village is under-utilized with this building.		High	High	Difficult	Yes	3	HHS	BC government, private contractors
	2	Improve the info center visibility	Make the current visitor info center more visible from the street, and make it more appealing to go into it.	The current info center is not very visible or attractive from the road. It is easily missed. It could easily become a hub for the distribution of info about the village and its surroundings.		High	High	Easy	Yes	1	HHS	Chamber of Commerce, Tourism BC

Main Strategy Area	Action	Short Title	Action Description	Rationale/Comments	Which DoS?	Impact (high, medium, low)	Visibility	Ease of implementation	Good ROI*	Timeframe for completion (# years)	Lead Partner	Other Partners
	3	Determine the best location for village services	Investigate moving space for community services, information centre, village office, maintenance yard to more suitable location.	The current lands could be used in a more efficient way for the whole of the community.	2, 3	High (potentially - depending on what the land is used for)	High	Medium	Yes – potentially	2 - 4	RHS	Developer, Public-Private Partnership.
	4	Sustainable building	Buildings in Harrison should adhere to the highest standards for sustainability	As a leading edge sustainable community Harrison needs to modify building requirements	6						Village	
	5	Modify Design guidelines	The design guidelines for Harrison need to reflect the importance of the small village atmosphere and natural setting of the Village	The look and feel of Harrison needs to be in tune with the overall sustainable vision and the small town setting	3						Village	
8. Transportation and Mobility	1	Hotel shuttle service	Hotel(s) could have its (their) own airport shuttle van / bus like hotels in Whistler have. Could be shared with other hotels that will be built in the future									
	2	Transportation Strategy	Better signage, carriageway markings, road designs in the future and the knowledge that all forms of transport including cycling and walking must be addressed at the same time to save revisiting these problems in the future.	A generic management team would understand these problems and must be trained in all aspect of road and highway design.								
	3	Car Rentals	A car rental or drop off depot would be useful for people travelling to and from the airport									
	4	Pedestrian Areas	Designate the beach front –esplanade avenue in whole or in part as a pedestrian only area to encourage people being									

Main Strategy Area	Action	Short Title	Action Description	Rationale/Comments	Which DoS?	Impact (high, medium, low)	Visibility	Ease of implementation	Good ROI*	Timeframe for completion (# years)	Lead Partner	Other Partners
			out of their cars and mingling. An open market type atmosphere for vendors and shops.									
	5	Nightlife	All of those condos on the beach front between the memorial hall and the boat launch should have been built with commercial space facing Esplanade.									
	6	Mini busses – electrically powered	Provide transportation around the community and to Agassiz	Harrison, becoming a showpiece for sustainability, can provide transportation around the community and perhaps to Agassiz using energy efficient electric busses. Likely the extent of this service would vary depending on the season.		High	High	Medium	Yes	1 - 2	HHS	Private partner or translink
	7	Community airport shuttle van that can serve Abbotsford as well as YVR	Establish a "Harrison Airport Shuttle Bus" that will transport travellers to and from the airport on a daily basis.	There is no easy transportation to and from either of the airports in the GVRD. The cost of this should be shared by each of the hotels and motels in the village according to the number of rooms offered, as well as the passengers. The shuttle should be run by an independent entity, and this bus could also serve as a transportation connection to Vancouver, not just the airport.		High	High	Easy	Yes, potentially.	1	HHS & Private contractor (not connected to any of the local hotels)	
	8	Car free Resort Destination	Create hiking, biking and paddling routes that can be undertaken from the Village without use of car	Promoting Harrison as a car free holiday destination would support our sustainable	3, 8							

Main Strategy Area	Action	Short Title	Action Description	Rationale/Comments	Which DoS?	Impact (high, medium, low)	Visibility	Ease of implementation	Good ROI*	Timeframe for completion (# years)	Lead Partner	Other Partners
				vision								

* Does the proposed action and direction provide enough return on the financial, political and stakeholder investment in order to resource future actions?

- What is the financial impact of the action on the organization if they implement the action? (Does it reduce long-term operating costs, have a strong return on investment)?
- What is the financial impact on other stakeholders from implementing the action?
- If required, would citizens be willing to pay for this policy through a tax increase? or Would enough users pay a user fee to make this policy a reality?

Appendix D: Action Monitoring Tool

Ref #	Name of Action	Period	Status	Lead organization	Progress	Progress comment	Previous progress	Previous progress comment	Main Strategy	Strategy Links
1.1	Improve the information centre visibility			Tourism Harrison					Buildings and Sites	Economy and Tourism
1.2	Move the village services			VoH					Buildings and Sites	Land Use and Natural Areas
1.3	Sustainable building guidelines			VoH					Buildings and Sites	Land Use and Natural Areas
1.4	Modify Design guidelines			VoH					Buildings and Sites	Energy, Waste and Water Systems
2.1	Community Economic Vitality, Health & Wellness Workshops			VoH/Tourism Harrison					Education, Health and Social Services	Economy and Tourism
2.2	Medical/Health /Wellness Incentive			VoH					Education, Health and Social Services	Education, Arts, Culture and Recreation
2.3	Resident Online Survey			VoH					Education, Health and Social Services	
3.1	Hotel/Conference Centre Initiative			VoH					Economy and Tourism	
3.2	Visitor Surveys			VoH					Economy and Tourism	Arts, Culture, Recreation and Leisure
3.3	Business Incentive Program			VoH					Economy and Tourism	
3.4	Enhance & Promote Tourism Products			Tourism Harrison					Economy and Tourism	Education, Health and Social Services
3.5	Pursue opportunities of re-development of the hot springs source and pool			VoH					Arts, Culture, Recreation and Leisure	Education, Health and Social Services
4.1	Events and Recreation Coordinator			VoH/Tourism Harrison					Arts, Culture, Recreation and Leisure	Economy and Tourism
4.2	Hiking & Biking Trails			VoH					Arts, Culture, Recreation and Leisure	Education, Health and Social Services
4.3	Vision Statement			VoH					Arts, Culture, Recreation and Leisure	

4.4	Arts & Culture School Initiative			Art Council					Arts, Culture, Recreation and Leisure	Economy and Tourism
5.1	Renewable Energy Sources			VoH					Energy, Waste and Water Systems	Buildings and Sites
5.2	Reduce, Re-use, and Recycle program			VoH					Energy, Waste and Water Systems	Buildings and Sites
5.3	Climate change adaptation and mitigation strategy			VoH					Energy, Waste and Water Systems	Land Use and Natural Areas
6.1	EAT LOCAL Harrison Hot Springs Program			Chamber					Food	Education, Health and Social Services
6.2	Farmers Market			VoH					Food	Education, Health and Social Services
7.1	Increase in Infill development			VoH					Land Use and Natural Areas	Buildings and Sites
7.2	Beachfront improvements			VoH					Land Use and Natural Areas	Buildings and Sites
7.3	Hiking/walking trail program			VoH					Land Use and Natural Areas	Transportation and Mobility
8.1	Transportation Strategy			VoH					Transportation and Mobility	Education, Health and Social Services
8.2	Pedestrian Areas			VoH					Transportation and Mobility	Education, Health and Social Services

Appendix E: List of Recommended Core Indicators

Indicator Number	Short Name	Long Name	What is being measured	Rationale	Source	Sustainable Harrison Priority	Harrison Main Strategy
1	Low Income Prevalence	Proportion of economic families below the low income cutoffs.	Prevalence of low income - the percentage of a specific group below Statistics Canada's low income cut-offs (LICO).	Resident affordability is a challenge with a range of impacts, from community quality of life to health to economic viability. It is important that community members are able to afford the basic lifestyle that enticed them to live in Harrison, and that businesses are able to attract a strong local workforce.	Stats Canada Census	Ensuring Economic Viability	Education, Health and Social Services
2	Education Attainment	Proportion of residents having attained some level of post-secondary education.	This indicator reports how many people have achieved higher level education.	Individuals' prosperity, economic opportunity, inclusion, health and sense of wellbeing is often tied to education. Education also generally contributes to a skilled and productive workforce, and helps communities to address opportunities and challenges as they arise.	Stats Canada Census	Ensuring Economic Viability	Education, Health and Social Services
3	Local Workforce	Proportion of employed labour force that both lives and works in Harrison	This indicator measures the percentage of Harrison employees living within Harrison.		Stats Canada Census	Ensuring Economic Viability	Economy and Tourism
4	Economic Dependency Ratio	Economic Dependency Ratio of residents	The ratio of transfer payments to the total employment income reported by taxfilers within an area. This indicator reports the degree of dependence on transfer payments and income assistance programs by comparing the total amounts received from other levels of government to the total tax filed income generated in the community	The dependency ratio provides information on community economic health. Comparing dollars transferred into the community from other levels of government to the taxfiled income generated by a community provides a sense of the financial dependency and/or contribution	BC Stats (~2 year lag)	Ensuring Economic Viability	Economy and Tourism
5	Median Income	Real median income	This indicator measures 'real' median individual income of people who place a Harrison address on their annual tax return. Real median income reveals whether purchasing power is increasing or decreasing relative to inflation. Actual income reported unadjusted for inflation is also displayed for comparison purposes.	Median individual income can help reflect a community's overall economic wellbeing. As a proxy of purchasing power, it is also one measure contributing to individual quality of life. Median income is a commonly measured indicator and is readily comparable across communities.	Stats Can (costs $80)	Ensuring Economic Viability	Economy and Tourism

7	Business Licenses	Mix of new, closed and existing businesses	This indicator reports on the mix of -new business licenses, renewals and non-renewed business licenses.	A healthy investment climate can be reflected in the total number of new businesses forming, continuing operations and closing. Tracking new business licenses, renewals of licenses and non-renewals provides a proxy for these categories.	Village of Harrison (VoH)	Ensuring Economic Viability	Economy and Tourism
25	Population	Total Population of Harrison and Ratios of Age Structures	This indicator measures the total size of Harrison's full-time population	A population base that is not declining indicates a desire for people to live in Harrison and is a proxy for overall satisfaction with life in the community for various demographics. Diverse communities provide more opportunities for intergenerational interaction help to measure whether communities are attractive to a range of ages. Additional analysis: Dependency rate : (population 0-14 + population over 64)/(population 15-64)*100; Rejuvenation rate: (population over 65)/(population 0-14)*100; Substitution rate: (population 15-24)/(population 55-64)*100	BC Stats/MSP Stats/Census	Enriching Community Life	Education, Health and Social Services
16	Housing Diversity	Proportion of single-family dwellings compared to multi-family, secondary suites	This indicator measures the range of housing available and the relative proportion	More housing types provides greater choice and affordability	Stats Can/BC Stats	Enriching Community Life	Buildings and Sites
19	Arts, Culture, Recreation and Leisure Participation	Proportion of residents attending any category of arts, culture, recreation and leisure offering at least once a month	This indicator measures residents' attendance at arts, culture, recreation and leisure offerings and reports on the proportion attending at least one of these offerings once a month. Arts, culture, recreation and leisure offerings are defined as: films or slide shows; live music/concerts, live theatre, dance or literary events; art galleries, art displays, museums or heritage displays.	Arts, culture, recreation and leisure events are identified as very important components of community life in the Village of Harrison. To have an ongoing presence, these events require support from both community members and visitors. Monitoring resident participation at arts, culture, recreation and leisure offerings provides a sense of the support these offerings receive from community members.	VoH, Tourism Harrison, activity operators	Enriching Community Life	Arts, Culture, Recreation and Leisure
22	Length of bike-friendly commuting routes	Total length of commuting routes in Harrison	This measures accessibility and safety of non-motorized transportation options.		VoH	Enriching Community Life	Transportation and Mobility
23	Local Transport Satisfaction	Proportion of residents satisfied with alternative transport options in Harrison	This indicator reports on resident satisfaction with Harrison's transportation alternatives to the single occupancy vehicle such as cycling and pedestrian routes (and transit).	Alternative options for transportation are important in order to transition from single occupancy vehicle (SOV) travel to more benign modes of transportation such as walking, biking, transit and carpooling. These alternative options must be convenient and attractive for use by residents or visitors.	VoH Community Survey	Enriching Community Life	Transportation and Mobility

24	Volunteer Rates	Proportion of residents who volunteered in the past year	This indicator profiles the proportion of the population volunteering for at least one hour per month.	Volunteer rates provide a sense of the level of community members' engagement in various aspects of community life. High rates of volunteerism can contribute to stronger social and economic systems as volunteers build relationships and go unpaid to provide important services to the community.	VoH Community Survey	Enriching Community Life	Education, Health and Social Services
27	Drinking Water Quality	Drinking Water Quality	This indicator measures quality of Harrison's drinking water and takes into account the frequency, duration and magnitude of water advisories. Boil water advisories are issued when tested sample results do not meet Canadian Drinking Water Guidelines and as a precautionary measure when there is some cause for concern, such as a minor break somewhere in the water delivery system. The indicator does account for water quality issues for water pipes or systems on private property.	Access to clean, healthy drinking water is a basic health requirement for people living in or visiting Harrison.	VoH, Ministry of Environment	Enriching Community Life	Energy, Waste and Water Systems
28	Usage of Lake and Beachfront	Number of people using Harrison Lake and the Beachfront in summer and winter for recreation			Count & Tourism Survey & Municipal boat launch count	Enhancing the Visitor Experience	Arts, Culture, Recreation and Leisure
30	Visitor Satisfaction	Proportion selecting the top 2 choices on a five point scale.	This indicator measures visitors' satisfaction with their overall stay in Harrison reporting on the response to "How memorable, authentic and/or transformational would you say your experience in Harrison has been?"	A memorable, authentic, and transformational visitor experience in Harrison is an essential criteria for ensuring the long-term health of Harrison's tourism economy. A strong economy in turn helps to support the health and stability of local community life. Capturing perceived experience reveals visitor's feelings about their entire trip from start to finish and influences whether the visitor will return to Harrison and promote the resort community via word of mouth	Visitor Survey	Enhancing the Visitor Experience	Economy and Tourism
21	Community Parks Satisfaction	Proportion of residents and tourists satisfied with the proximity and availability of park space in Harrison	This indicator reports on community members and visitor satisfaction with the proximity and availability of park space in Harrison.	Accessible landscaped park areas are used by a wide variety of people and they enrich community life. Urban parks facilitate interaction amongst all demographic groups in individual neighbourhoods and in the resort community as a whole.	VoH Community Survey	Enhancing the Visitor Experience	Land Use and Natural Areas

32	Low impact recreation activities	Proportion of recreational activities that are non-motorized and/or are energy efficient			Count/survey	Protecting the Environment	Arts, Culture, Recreation and Leisure
33	Energy Use	Total primary energy used including intra-community transportation	Total energy used includes the energy employed to create the electricity delivered, the energy used to generate space and water heating/cooling, as well as transportation energy for some of the larger fleets of vehicles in Harrison. Not included is the private vehicle transportation energy in Harrison as well as the embodied energy of the products used in the community.	Energy is a critical input to certain aspects of day to day life in Harrison. At the same time, non-renewable energy use has an impact on future energy supplies as well as ecosystem and human health locally and abroad. Even large renewable projects such as hydroelectric dams have significant impacts on land and aquatic ecosystems. An ability to reduce Harrison's dependence on energy resources may help the community better adapt to future price shocks, reduce overall environmental impact, and avoid associated negative health issues.	VoH, CEEP	Protecting the Environment	Energy, Waste and Water Systems
34	Greenhouse Gas Emissions	Total greenhouse gas (ghg) emissions	Total greenhouse gas (GHG) emissions results include the GHGs created from generating the electricity that we use, the energy used to generate heat/cooling, transportation energy for the larger fleets of vehicles in Harrison and estimates of the emissions from intra-community transportation as well emissions resulting from Harrison's landfilled waste.	Scientists agree that greenhouse gas emissions (GHG) are contributing to global climate change. This changing climate will impact on Harrison's local economy, community life, visitor experiences as well as directly on the local natural environment. Climate change and GHG emissions are global and local issues that require solutions at all levels and reducing Harrison's contribution is an important aspect of our commitment to stewardship of the natural environment, environmental responsibility and long-term sustainability.	CEEP	Protecting the Environment	Energy, Waste and Water Systems
36	Water Use	Total potable and non-potable water flows	Water use measures the total of water extracted then delivered from water plants and non-potable systems to end users. Water uses that are not captured within this measure include private purpose uses such as for Harrison's golf course.	Water is one of Harrison's important assets, supporting natural areas, wildlife, residents and visitors. Using water resources wisely is fundamental to an environmentally-responsible approach to living. This issue relates not only to the availability of the resource; it is also a municipal infrastructure priority that can translate into millions of dollars spent or saved. This indicator provides an important snapshot of whether demand management of water resources are resulting in overall resource conservation.	VoH	Protecting the Environment	Energy, Waste and Water Systems
37	Waste Water Effluent Quality	Number of days waste water discharge flows are out of compliance with provincial permit requirements	This indicator tracks the number of days where effluent (water leaving the waste water plant) test results are out of compliance with the permit standards.	Waste Water is a potential pressure on local and regional water bodies.	VoH	Protecting the Environment	Buildings and Sites

41	Average density	Average density of all Harrison housing stock	This indicator measures the density of dwelling developments on land that is zoned for development. It excludes land used as parks, protected areas or very low density developments.	Density is a common measure of more sustainable planning. Increased density can reduce the costs of community infrastructure and operations, increase community interaction and vibrancy, and help protect green space. Density can also increase the viability of transit programs to reduce some of the negative impacts from transportation.	VoH	Protecting the Environment	Land Use and Natural Areas
42	Stream and Lake Health	Proportion of water bodies containing healthy populations of macroinvertebrates	This indicator helps us to better understand the health of Harrison's streams by tracking the mix and quantity of invertebrate species found in Harrison's water bodies. Complete stream and lake health monitoring is beyond the scope of the current methodology and these results should be viewed as providing preliminary knowledge.	One of Harrison's greatest assets is the abundance of healthy ecosystems supporting natural areas, wildlife, residents and visitors. Water body ecosystems are essential to the survival and enjoyment of residents/visitors and species in the natural environment. Sampling populations of small organisms is a relatively low-cost, replicable assessment that can easily illustrate the productivity of a stream.	Ministry of Environment, DFO, Streamkeepers	Protecting the Environment	Land Use and Natural Areas
45	Village Core Traffic	Annual Average Daily Traffic through the Village Core	This indicator measures the annual average daily two way traffic.	Annual average daily traffic downtown is used in this case as a proxy for the potential pollution impacts from transportation to and around Harrison, as well as modal split.	VoH count	Protecting the Environment	Transportation and Mobility
50	Materials Used	Estimated amount of all materials used and disposed (includes landfilled, recycled, composted etc...)	This indicator represents the estimated proportion of materials recycled/composted through Waste Services and collected at the Recycle Centres. This indicator includes biosolids if possible.	Offering visitor services and maintaining resident lifestyles and needs currently requires significant quantities of various materials. Waste is generally produced and energy generally used (embodied) in all stages of extracting, making, packaging, transporting, using and finally disposing of products and residuals. Currently, all of these lifecycle stages have potential negative environmental impacts which are measured using the proxy total material use in Kimberley. Managing material use is important and can contribute to a reduction of overall material flows. Ultimately this indicator focuses on the Reduce portion of the 3 R's.	First Class Waste Services	Protecting the Environment	Energy, Waste and Water Systems

Appendix F: List of All Potential Indicators

Indicator Number	Short Name	Long Name	What is being measured	Rationale	Source	Sustainable Harrison Priority	Harrison Main Strategy
1	Low Income Prevalence	Proportion of economic families below the low income cutoffs.	Prevalence of low income - the percentage of a specific group below Statistics Canada's low income cut-offs (LICO).	Resident affordability is a challenge with a range of impacts, from community quality of life to health to economic viability. It is important that community members are able to afford the basic lifestyle that enticed them to live in Harrison, and that businesses are able to attract a strong local workforce.	Stats Canada Census	Ensuring Economic Viability	Education, Health and Social Services
2	Education Attainment	Proportion of residents having attained some level of post-secondary education.	This indicator reports how many people have achieved higher level education.	Individuals' prosperity, economic opportunity, inclusion, health and sense of wellbeing is often tied to education. Education also generally contributes to a skilled and productive workforce, and helps communities to address opportunities and challenges as they arise.	Stats Canada Census	Ensuring Economic Viability	Education, Health and Social Services
3	Local Workforce	Proportion of employed labour force that both lives and works in Harrison	This indicator measures the percentage of Harrison employees living within Harrison.		Stats Canada Census	Ensuring Economic Viability	Economy and Tourism
4	Economic Dependency Ratio	Economic Dependency Ratio of residents	The ratio of transfer payments to the total employment income reported by taxfilers within an area. This indicator reports the degree of dependence on transfer payments and income assistance programs by comparing the total amounts received from other levels of government to the total tax filed income generated in the community	The dependency ratio provides information on community economic health. Comparing dollars transferred into the community from other levels of government to the taxfiled income generated by a community provides a sense of the financial dependency and/or contribution.	BC Stats (2 year lag)	Ensuring Economic Viability	Economy and Tourism
5	Median Income	Real median income	This indicator measures 'real' median individual income of people who place a Harrison address on their annual tax return. Real median income reveals whether purchasing power is increasing or decreasing relative to inflation. Actual income reported unadjusted for inflation is also displayed for comparison purposes.	Median individual income can help reflect a community's overall economic wellbeing. As a proxy of purchasing power, it is also one measure contributing to individual quality of life. Median income is a commonly measured indicator and is readily comparable across communities.	Stats Can (costs $80)	Ensuring Economic Viability	Economy and Tourism
6	Diversity of Economy	Number of industries supporting x% of Harrison's labour force.	Labour force breakdown by main industries	This measures the diversity and balance of industries employing Harrison's labour force.	BC Stats every 5 years	Ensuring Economic Viability	Economy and Tourism

7	Business Licenses	Mix of new, closed and existing businesses	This indicator reports on the mix of new business licenses, renewals and non-renewed business licenses.	A healthy investment climate can be reflected in the total number of new businesses forming, continuing operations and closing. Tracking new business licenses, renewals of licenses and non-renewals provides a proxy for these categories.	Village of Harrison (VoH)	Ensuring Economic Viability	Economy and Tourism
8	Housing Affordability	Proportion of residents paying more than 30% of household income on housing	This indicator measures the proportion of residents spending more than 30% of their household income on housing. Housing costs include rent or mortgage payments, water, energy and taxes minus any rental income per year.	Housing costs are a significant in determining whether local employees choose to live in the community. The proportion of household income spent on housing is a standard measure of housing affordability.	BC Stats	Ensuring Economic Viability	Buildings and Sites
9	Income Below Costs	Proportion of Harrison permanent common law couple households earning below the income required to afford a specified basket of goods	This indicator measures the estimated proportion of a particular demographic group reporting incomes below the cost of a basic basket of goods including housing, transportation, food, and clothing. It is based on the Canada-wide Market Basket Measure as well as data gathered by the Federation of Canadian Municipalities.	Resident affordability is a challenge with a range of impacts, from community quality of life to the village's economic viability. It is important that community members are able to afford the basic lifestyle that enticed them to live in Harrison, and that businesses are able to attract a strong local workforce. The affordability situation for various groups can be measured by comparing Harrison's cost of living to resident incomes.	VoH, Stats Can	Ensuring Economic Viability	Education, Health and Social Services
10	Recreation Participation	Proportion of residents participating in recreation activities on more than 3 days a week	This indicator measures the proportion of Harrison residents participating in recreation activities more than three times a week.	Recreation and leisure is an important aspect of community life in Harrison Residents are encouraged to participate to lead healthy lifestyles, and to help maintain a strong recreation culture in the community. Recreating on more than three days a week both benefits individual health and displays a commitment to a recreation lifestyle.	VoH Community Survey?	Enriching Community Life	Education, Health and Social Services
11	Farmers Markets	Number of farmers markets days in the local area	This indicator measures the contribution to the local economy and food supply by local producers. ("Local" refers to any area within approximately 100km of Harrison)		VoH	Enriching Community Life	Food
12	Local Food	The proportion of restaurants that serve local food or subscription to Oceanwise.	This indicator measures the contribution to the local economy by local producers and the reduced need for transportation of non-local food. ("Local" refers to any area within approximately 100km of Harrison)		Survey of restaurants	Enriching Community Life	Food

13	Services Proximity	Average distance from all dwellings in Harrison to the closest location with convenience services	This indicator reports the average distance as the crow flies from all Harrison properties to convenience service nodes.	Convenience services provide residents with products and services such as staple groceries that are required on a daily or every two days. As well, these locations can be gathering places, encouraging interaction among neighbourhood community members. Minimizing distances between resident homes and these basic services supports walking and other alternatives to vehicle transportation.	VoH	Enriching Community Life	Land Use and Natural Areas
14	Transit Availability	Transit frequency (hours or days) within Harrison's municipal boundary.	Measures availability of bus service from Harrison to neighbouring communities.		BC Transit	Enriching Community Life	Transportation and Mobility
15	Rental Availability	Average number of listed units available for rent	The number of long term rental units listed in local newspaper each week is counted and divided to provide the annual average number of units available for rent each week.	Housing availability at affordable prices is important to help maintain a strong vibrant community and in order to attract and retain a local workforce for Harrison businesses. The number of long term rentals provides a sense of Harrison's vacant housing supply and therefore the availability for community members.	VoH / Real Estate body	Enriching Community Life	Buildings and Sites
16	Housing Diversity	Proportion of single-family dwellings compared to multi-family, secondary suites	This indicator measures the range of housing available and the relative proportion	More housing types provides greater choice and affordability	VoH	Enriching Community Life	Buildings and Sites
17	Child Development	Proportion of total kindergarten children considered vulnerable based on the Early Childhood Development Index (EDI)	This indicator reports the proportion of kindergarten children considered provincially vulnerable based on the Early Childhood Development Index (EDI). The EDI, administered in BC school districts assesses children's school readiness through measuring the following five scales; physical health and wellbeing, social competence, emotional maturity, language and cognitive development, communication and general knowledge. 'Vulnerable' refers to a child scoring within the bottom 10% of the population.	Childhood development tends to reflect the social and economic environment in which a child lives, and often correlates with overall community health. Research also shows that a person's capacity for learning, coping and overall wellbeing is shaped in the first five years of their life. The frequent use of the indicator in other jurisdictions and background research support for the metric provides validation and opportunities for comparison.	Human Early Learning Partnership UBC	Enriching Community Life	Education, Health and Social Services

18	**Arts, Culture, Recreation and Leisure Programs**	Number of programs	Measures range of arts, culture, recreation and leisure opportunities		VoH, Harrison Festival Society, Parks & Recreation Commission, Kent-Harrison Arts Council	Enriching Community Life	Arts, Culture, Recreation and Leisure
19	**Arts, Culture, Recreation and Leisure Participation**	Proportion of residents attending any category of arts, culture, recreation and leisure offering at least once a month	This indicator measures residents' attendance at arts, culture, recreation and leisure offerings and reports on the proportion attending at least one of these offerings once a month. Arts, culture, recreation and leisure offerings are defined as: films or slide shows; live music/concerts, live theatre, dance or literary events; art galleries, art displays, museums or heritage displays.	Arts, culture, recreation and leisure events are identified as very important components of community life in the Village of Harrison. To have an ongoing presence, these events require support from both community members and visitors. Monitoring resident participation at arts, culture, recreation and leisure offerings provides a sense of the support these offerings receive from community members.	VoH	Enriching Community Life	Arts, Culture, Recreation and Leisure
20	**Home Gardens**	Proportion of homes with gardens	This indicator measures the ability to grow food locally.		VoH Community Survey	Enriching Community Life	Food
21	**Community Parks**	Proportion of residents and tourists satisfied with the proximity and availability of park space in Harrison	This indicator reports on community members satisfaction with the proximity and availability of park space in Harrison	Accessible landscaped park areas are used by a wide variety of people and they enrich community life. Urban parks facilitate interaction amongst all demographic groups in individual neighbourhoods and in the resort community as a whole.	VoH Community Survey	Enriching Community Life	Land Use and Natural Areas
22	**Length of bike-friendly commuting routes**	Total length of commuting routes in Harrison	This measures accessibility and safety of non-motorized transportation options.		VoH	Enriching Community Life	Transportation and Mobility
23	**Local Transport Satisfaction**	Proportion of residents satisfied with alternative transport options in Harrison	This indicator reports on resident satisfaction with Harrison's transportation alternatives to the single occupancy vehicle such as cycling and pedestrian routes (and transit).	Alternative options for transportation are important in order to transition from single occupancy vehicle (SOV) travel to more benign modes of transportation such as walking, biking, transit and carpooling. These alternative options must be convenient and attractive for use by residents or visitors.	VoH Community Survey	Enriching Community Life	Transportation and Mobility

24	**Volunteer Rates**	Proportion of residents who volunteered in the past year	This indicator profiles the proportion of the population volunteering for at least one hour per month.	Volunteer rates provide a sense of the level of community members' engagement in various aspects of community life. High rates of volunteerism can contribute to stronger social and economic systems as volunteers build relationships and go unpaid to provide important services to the community.	VoH Community Survey	Enriching Community Life	Education, Health and Social Services
25	**Population**	Total Population of Harrison and Ratios of Age Structures	This indicator measures the total size of Harrison's full-time population. Additional analysis: Dependency rate : (population 0-14 + population over 64)/(population 15-64)*100; Rejuvenation rate: (population over 65)/(population 0-14)*100; Substitution rate: (population 15-24)/(population 55-64)*100	A population base that is not declining indicates a desire for people to live in Harrison and is a proxy for overall satisfaction with life in the community for various demographics. Diverse communities provide more opportunities for intergenerational interaction help to measure whether communities are attractive to a range of ages.	BC Stats/MSP Stats/Census	Enriching Community Life	Education, Health and Social Services
26	**Arts, Culture, Recreation and Leisure Infrastructure and Facilities**	Number of infrastructure and facilities that are shared among arts, culture, recreation and leisure partners to provide programming	New programs and services provided due to partnerships and collaboration		VoH, Parks & Recreation Commission, Kent-Harrison Arts Council, Fraser-Cascade School District	Enriching Community Life	Arts, Culture, Recreation and Leisure
27	**Drinking Water Quality**	Drinking Water Quality	This indicator measures quality of Harrison's drinking water and takes into account the frequency, duration and magnitude of water advisories. Boil water advisories are issued when tested sample results do not meet Canadian Drinking Water Guidelines and as a precautionary measure when there is some cause for concern, such as a minor break somewhere in the water delivery system.	Access to clean, healthy drinking water is a basic health requirement for people living in or visiting Harrison	VoH, Ministry of Environment	Enriching Community Life	Energy, Waste and Water Systems
28	**Usage of Lake and Beachfront**	Number of people using Lake Harrison and the Beachfront in summer and winter for recreation			Count & Tourism Survey	Enhancing the Visitor Experience	Arts, Culture, Recreation and Leisure
29	**Diversity of Arts, Culture, Recreation and Leisure**	Types of arts, culture, recreation and leisure programs	Diversity of program offerings	A mix of year-round arts, culture, recreation and leisure opportunities enhances the quality of life and visitor experience for people of all ages, abilities, incomes and interests.	VoH	Enhancing the Visitor Experience	Arts, Culture, Recreation and Leisure

30	Visitor Satisfaction	Proportion selecting the top 2 choices on a five point scale.	This indicator measures visitors' satisfaction with their overall stay in Harrison reporting on the response to "How memorable, authentic and/or transformational would you say your experience in Harrison has been?"	A memorable, authentic, and transformational visitor experience in Harrison is an essential criteria for ensuring the long-term health of Harrison's tourism economy. A strong economy in turn helps to support the health and stability of local community life. Capturing perceived experience reveals visitor's feelings about their entire trip from start to finish and influences whether the visitor will return to Harrison and promote the resort community via word of mouth	VoH Community Survey, Visitor Survey	Enhancing the Visitor Experience	Economy and Tourism
31	Green Building	Proportion of new development that is built to a comprehensive 'green building' standard	This indicator is meant to measure the proportion of new development each year that is built to a comprehensive, certified green building standard such as: LEED, Built Green or Harrison's own green building standard (if and when one exists).	Buildings, while critical for housing and numerous commercial and recreation activities, can have significant contributions to resource intensive and unethical material sourcing, clearing of natural areas, and wasteful resource use during the buildings life. Human health and productivity can be impacted by poor design and material selection while construction and deconstruction can introduce significant amounts of waste to local landfills. Comprehensive 'Green Building Standards' have the ability to reduce the negative impacts of building often creating a more livable space. Additionally many of the design features even offer a direct return on investment.	VoH	Protecting the Environment	Buildings and Sites
32	Low impact recreation activities	Proportion of recreational activities that are non-motorized and/or are energy efficient			Count/survey	Protecting the Environment	Arts, Culture, Recreation and Leisure
33	Energy Use	Total primary energy used including intra-community transportation	Total energy used includes the energy employed to create the electricity delivered, the energy used to generate space and water heating/cooling, as well as transportation energy for some of the larger fleets of vehicles in Harrison. Not included is the private vehicle transportation energy in Harrison as well as the embodied energy of the products used in the community.	Energy is a critical input to certain aspects of day to day life in Harrison. At the same time, non-renewable energy use has an impact on future energy supplies as well as ecosystem and human health locally and abroad. Even large renewable projects such as hydroelectric dams have significant impacts on land and aquatic ecosystems. An ability to reduce Harrison's dependence on energy resources may help the community better adapt to future price shocks, reduce overall environmental impact, and avoid associated negative health issues.	VoH, CEEP	Protecting the Environment	Energy, Waste and Water Systems

34	**Greenhouse Gas Emissions**	Total greenhouse gas (ghg) emissions	Total greenhouse gas (GHG) emissions results include the GHGs created from generating the electricity that we use, the energy used to generate heat/cooling, transportation energy for the larger fleets of vehicles in Harrison and estimates of the emissions from intra-community transportation as well emissions resulting from Harrison's landfilled waste.	Scientists agree that greenhouse gas emissions (GHG) are contributing to global climate change. This changing climate will impact on Harrison's local economy, community life, visitor experiences as well as directly on the local natural environment. Climate change and GHG emissions are global and local issues that require solutions at all levels and reducing Harrison's contribution is an important aspect of our commitment to stewardship of the natural environment, environmental responsibility and long-term sustainability.	CEEP	Protecting the Environment	Energy, Waste and Water Systems
35	**Development Footprint**	Total developed footprint in Harrison	The physical footprint of Harrison's developed area is calculated for this indicator. Developed areas include all zoned boundaries of land except for those zoned as parks, protected areas or extremely low density parcels of land.	Green space and access to natural areas are one of Harrison's most attractive qualities. This indicator provides the ability to track the physical growth of the urban landscape with a goal to limit continuous encroachment on the surrounding natural areas.	VoH	Protecting the Environment	Land Use and Natural Areas
36	**Water Use**	Total potable and non-potable water flows	Water use measures the total of water extracted then delivered from water plants and non-potable systems to end users. Water uses that are not captured within this measure include private purpose uses such as for Harrison's golf course.	Water is one of Harrison's important assets, supporting natural areas, wildlife, residents and visitors. Using water resources wisely is fundamental to an environmentally-responsible approach to living. This issue relates not only to the availability of the resource; it is also a municipal infrastructure priority that can translate into millions of dollars spent or saved. This indicator provides an important snapshot of whether demand management of water resources are resulting in overall resource conservation.	VoH	Protecting the Environment	Energy, Waste and Water Systems
37	**Waste Water Effluent Quality**	Number of days waste water discharge flows are out of compliance with provincial permit requirements	This indicator tracks the number of days where effluent (water leaving the waste water plant) test results are out of compliance with the permit standards.	Waste Water is a potential pressure on local and regional water bodies.	VoH	Protecting the Environment	Buildings and Sites

38	Local Air Quality	Number of days that the particulate matter 2.5 (PM2.5) is over the 24 hour >15 ug/m3 health reference level	This indicator measures the number of days that particulate matter, a local air pollutant often related to energy use, exceeds suggested health levels.	Particulate matter (PM) is the term for particles found in the air, including dust, dirt, soot, smoke, and liquid droplets. It contributes to poor air quality that negatively affects human health, and is an important measure from both a health perspective as well as attractiveness as a resort destination. Particulate matter 2.5 measures locally based contributions with a threshold based on Canada Wide Health Standards.	BC Ministry of the Environment	Protecting the Environment	Education, Health and Social Services
39	Renewable Energy Installations	Number of distributed installations (solar thermal and electricity, efficient biomass, other, ground-source heat pump)	This indicator measures the number of renewable energy installations.		VoH Community Survey?	Protecting the Environment	Energy, Waste and Water Systems
40	Low-impact Energy Bylaw	Bylaws that require renewables or low-impact energy sources for buildings	This indicator measures the legal measures to stipulate renewable/low impact energy for buildings		VoH	Protecting the Environment	Energy, Waste and Water Systems
41	Average density	Average density of all Harrison housing stock	This indicator measures the density of dwelling developments on land that is zoned for development. It excludes land used as parks, protected areas or very low density developments.	Density is a common measure of more sustainable planning. Increased density can reduce the costs of community infrastructure and operations, increase community interaction and vibrancy, and help protect green space. Density can also increase the viability of transit programs to reduce some of the negative impacts from transportation.	VoH	Protecting the Environment	Land Use and Natural Areas
42	Stream and Lake Health	Proportion of water bodies containing healthy populations of macroinvertebrates	This indicator helps us to better understand the health of Harrison's streams by tracking the mix and quantity of invertebrate species found in Harrison's water bodies. Complete stream and lake health monitoring is beyond the scope of the current methodology and these results should be viewed as providing preliminary knowledge.	One of Harrison's greatest assets is the abundance of healthy ecosystems supporting natural areas, wildlife, residents and visitors. Water body ecosystems are essential to the survival and enjoyment of residents/visitors and species in the natural environment. Sampling populations of small organisms is a relatively low-cost, replicable assessment that can easily illustrate the productivity of a stream.	Ministry of Environment, DFO, Streamkeepers	Protecting the Environment	Land Use and Natural Areas

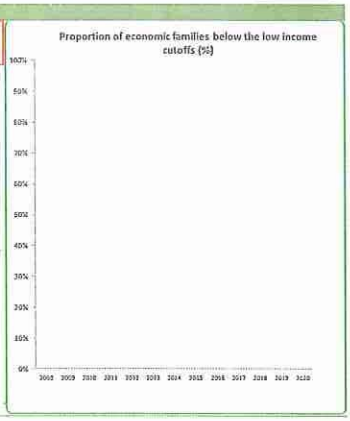
43	Sensitive Habitat	Total hectares of sensitive habitat or/include restored.	This indicator provides a coarse understanding of the amount of remaining sensitive ecosystems (permanent wetlands, old forests, and forested floodplains and riparian areas) in Harrison. This task is achieved by assessing the extent of sensitive areas that don't overlap with developed land. Developed areas include all zoned boundaries of land except for those zoned as parks, protected areas, development buffers, or extremely low density parcels of land.	One of Harrison's greatest assets is the abundance of healthy and intact land and water ecosystems. Due to past habitat losses the current extent of permanent wetlands, old forests, and forested floodplains and riparian areas should be maintained or enlarged. Failure to do so may contribute to the fragmentation and degradation of this critical environment.	VoH	Protecting the Environment	Land Use and Natural Areas
44	Invasive Species	Distribution and size of invasive species	This indicator measures the prevalence of invasive species the built environment.		Streamkeepers, Regional District partnership	Protecting the Environment	Land Use and Natural Areas
45	Village Core Traffic	Annual Average Daily Traffic through the Village Core	This indicator measures the annual average daily two way traffic.	Annual average daily traffic downtown is used in this case as a proxy for the potential pollution impacts from transportation to and around Harrison, as well as modal split.	VoH count	Protecting the Environment	Transportation and Mobility
46	Length of Roads	Total length of roads in the VoH	The length of all paved roads in Harrison are included in this indicator. While the width of roads also impacts the environment, it is not represented.	A greater distance of roads within a specified area generally indicates more physical encroachment on nature resulting in issues such as soil erosion, loss of habitat, disruption of wildlife, noise and loss of limited land.	VoH	Protecting the Environment	Transportation and Mobility
47	Waste Diversion	Estimated proportion of materials diverted from the landfill	This indicator represents the estimated proportion of materials recycled/compost through Waste Services. The measurement includes biosolids from the waste water treatment plant that are composted.	Solid waste takes up land, emits greenhouse gases, and among other things can leach harmful materials into the surrounding environment. Recycling, one of the "Three R's" following reduce and re-use, is one strategy employed to limit the impacts of waste, and to conserve virgin material stocks such as aluminum.	First Class Waste Services, VoH	Protecting the Environment	Energy, Waste and Water Systems

48	Hazardous Materials	Proportion of total hazardous waste diverted from landfills	This indicator provides a crude estimate of the percentage of Harrison's hazardous waste that is diverted from the landfill through waste stewardship bins. Note that hazardous waste flowing through the waste water system is not captured in this measure.	Hazardous waste impacts human health and degrades the environment. Since many hazardous substances are persistent, breaking down very slowly in the environment, they build up in the air, water, food and soil. Diverting hazardous materials from the landfill helps to minimize leakage into the environment and reuses these materials as inputs for other products. Though the indicator is an estimate, it still raises awareness levels to develop actions that improve the diversion of these materials.	First Class Waste Services, Public Works?, VoH	Protecting the Environment
49	Landfilled Waste	Total amount of waste landfilled	This indicator measures the total kilograms of solid waste material collected from Harrison and disposed of in the landfill. This measure probably captures most demolition waste.	Offering visitor services and maintaining resident lifestyles and needs currently requires significant quantities of various materials, which in turn can quickly produce 'waste'. Landfilled waste represents materials that are often unnecessary or may have been used for something more purposeful such as composting, recycling or potentially energy use. Solid landfilled waste also takes up land space, emits greenhouse gases, and among other things can leach harmful materials into the surrounding environment.	First Class Waste Services	Protecting the Environment
50	Materials Used	Estimated amount of all materials used and disposed (includes landfilled, recycled, composted etc...)	This indicator represents the estimated proportion of materials recycled/composted through Waste Services and collected at the Recycle Centres. This indicator includes biosolids if possible.	Offering visitor services and maintaining resident lifestyles and needs currently requires significant quantities of various materials. Waste is generally produced and energy generally used (embodied) in all stages of extracting, making, packaging, transporting, using and finally disposing of products and residuals. Currently, all of these lifecycle stages have potential negative environmental impacts which are measured using the proxy total material use in Kimberley. Managing material use is important and can contribute to a reduction of overall material flows. Ultimately this indicator focuses on the Reduce portion of the 3 R's.	First Class Waste Services	Protecting the Environment

Appendix G: Monitoring and Reporting Spreadsheet – sample indicator

Harrison
ICSP Indicators (2010-2020)

Enriching Community Life	B 2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Proportion of economic families below the low income cutoffs (%)													
Proportion of economic families below the low income cutoffs (%) - Absolute Change		-	-	-	-	-	-	-	-	-	-	-	-
Proportion of economic families below the low income cutoffs (%) - YOY % Change		-	-	-	-	-	-	-	-	-	-	-	-
Proportion of economic families below the low income cutoffs (%) - 3 year Rolling				-	-	-	-	-	-	-	-	-	-
Proportion of economic families below the low income cutoffs (%) - 3 year Rolling % Change				-	-	-	-	-	-	-	-	-	-
Notes or Commentary for Current Year:													



Appendix H: Sustainability Decision-Making Framework

Sustainable Harrison

Decision Making Framework

An Integrated Community Sustainability Plan is the community's highest level policy and guides decision-making at all levels. Ultimately, the vision articulated in the ICSP is implemented through daily decision-making. Below is a worksheet that outlines four strategic questions to help assess any type of action, (plan, policy, project, procurement, or practice) by using the *Sustainable* Harrison sustainability framework to inform decision-making. For a more comprehensive and user-friendly version of this tool, visit the http://harrisonhotsprings.ca/ web page.

NAME OF PROPOSED ACTION:

BRIEF DESCRIPTION OF THE ACTION:

DATE:

REVIEWED BY:

---

1 DOES THE ACTION MOVE HARRISON TOWARDS OUR SHARED VISION OF SUCCESS?

Indicate which priorities the action supports:

☐ 1. Protecting the Environment ☐ 2. Ensuring Economic Viability ☐ 3. Enriching Community Life ☐ 4. Enhancing the Visitor Experience

Indicate the top *Sustainable* Harrison Strategy Areas that the action supports:

☐ 1. Buildings and Sites ☐ 2. Education, Health & Social Services ☐ 3. Economy and Tourism
☐ 4. Arts, Culture, Recreation & Leisure ☐ 5. Energy, Waste & Water Systems ☐ 6. Food
☐ 7. Land Use and Natural Areas ☐ 8. Transportation and Mobility

Which main Descriptions of Success would the action move us toward?	Are there any Descriptions of Success that the action may move us away from?
1.	1.
2.	2.
3.	3.

How could we **maximize** the positive impacts of the action?	How could we avoid or **minimize** these potential negative impacts of the action?
1.	1.
2.	2.
3.	3.

Decision Making Framework

2 DOES THE ACTION MOVE HARRISON TOWARD OUR SHARED SUSTIANABILITY OBJECTIVES?

Does the action reduce and eventually eliminate Harrison's contribution to:

	Toward Quickly	Toward Slowly	Neutral	Away	If 'away,' how could you **avoid or minimize** this?
1 Ongoing build-up of **substances taken from the earth's crust.**	☐	☐	☐	☐	
2 Ongoing build-up of **toxic substances produced by society.**	☐	☐	☐	☐	
3 Ongoing **degradation of natural systems by physical means.**	☐	☐	☐	☐	
4 **Undermining the ability of people to meet their human needs.**	☐	☐	☐	☐	

3 DOES THE ACTION PRESENT A FLEXIBLE PLATFORM FOR FURTHER MOVEMENT TOWARDS *Sustainable* HARRISON?

In general, choosing actions that are as flexible as possible will help you avoid dead end situations. If technical or economic conditions change in the future, investments in flexible solutions will help ensure that these changes do not bring overly punitive costs, do not limit our ability to adapt with more sustainable solutions and ensure that future steps further reduce our impacts on natural systems.

Use the space to the right to indicate how your action incorporates long-term flexibility.

The action incorporates long-term flexibility by:

4 DOES THE ACTION PRESENT A GOOD FINANCIAL INVESTMENT?

	Capital: $		Operating: $/year	
What is the approximate cost of the action?				
Does this action reduce long term operating costs/ have a strong return on investment?	☐	Yes	☐	No
If so, what is the approximate associated pay-back period for the investment?	Years:			
Have non-market costs been considered in your decision making?	☐	Yes	☐	No
Are there financial costs to other stakeholders or citizens from the implementation of this action?	☐	Yes	☐	No

Given your assessment of the benefits, challenges and long-term costs associated with this action, what is your level of comfort with moving forward?

☐	Strongly support this action.
☐	Support in principle, but support will depend on how the action is executed.
☐	On the right track, but more information and/or substantial changes are required. Currently, not comfortable supporting this action.
☐	The action as proposed is not supportable.

Appendix I: Next Steps: Ensuring Ongoing Success and Sustainability in Harrison

Creation of the ICSP is just the first step of many in a community's journey toward sustainability. Ensuring continued progress towards the shared vision requires annual monitoring and reporting on progress, and continued development and implementation of actions and initiatives. This document outlines the main areas for building on Harrison's ICSP and creating an ongoing process for institutionalizing sustainability in the community.

Partner with Community Stakeholders on Implementation

Since an ICSP is a long-term plan for the whole community, it is imperative that community stakeholders participate as partners with the Village of Harrison in the development and ongoing implementation of the plan. Community partners can participate in annual action planning, accept actions for implementation, participate in communicating sustainability and outcomes of the plan, and get other community partners on board.

To ensure that roles and responsibilities of community partners are clear, a partnership agreement signed between the municipality and the community partner is a useful tool. The partnership agreement should articulate a commitment to use the ICSP and its stated directions in decision-making, as well as some principles for community partnerships (e.g. collaboration, transparency). Appendix J - Sample Partnership Agreement, is attached.

While it is ideal that community partners come on board during the development of the ICSP, they can come on board at any time, as long as they are provided an understanding of the process and the benefits – to them and to the broader community – of participating in a long-term sustainability journey.

Create Task Forces

The Sustainable Harrison Community Sustainability Action Team (CSAT) can continue its role in the ICSP process and cover all strategy areas or a number of Task Forces comprised of community partners can be created to move the community forward in specific strategy areas. The benefits of creating multiple Task Forces is that it increases the number of community members actively engaged in the process, shares the workload, and helps to broaden the perspectives and expertise brought to the table, thereby strengthening the outcomes overall. These benefits should be weighed against the resources it will take to convene multiple groups into the future. Two suggestions are offered for Task Force structure:

1. Each strategy has its own Task Force: In this option, there is one Task Force for each of the Sustainable Harrison strategy areas, i.e. eight Task Forces in total.
2. Groups of strategies share one Task Force: Here, related strategies are grouped together and one Task Force is convened for each grouping. For example, the following strategy areas could be grouped, therefore requiring only four Task Forces, rather than eight as with the above option. For example:
    a. Building and Sites + Energy, Water and Waste systems
    b. Education, Health and Social Services + Food

c. Land Use and Natural Areas + Transportation and Mobility
d. Economy and Tourism + Arts, Culture, Recreation and Leisure

Annual Action Planning

Regardless of whether the Sustainable Harrison CSAT continues or Task Forces are created, one or the other should be engaged in annual action planning to ensure that the ICSP continues to be a living process and, most importantly, that it creates on-the-ground action and results. The CSAT or each Task Force reviews the results of past recommended actions, evaluates the most current indicator data, strategically assesses local and regional opportunities, and then presents a recommended set of actions for the following year.

The action planning process should continue in a manner similar to what occurred during the development of the ICSP and the initial set of actions. Here is a high-level outline of the process:

1. Before the CSAT/Task Force meeting(s):
    a. Compile current reality information into strategy-specific documents for review by the CSAT or Task Forces before coming to the meeting. Current reality information should include: indicator performance data; status update on past actions; and updates on information critically relevant to the strategy area(s).
2. During the facilitated CSAT/Task Force meeting(s):
    a. Review the Descriptions of Success (DoS) statements to ensure common understanding;
    b. Review the current reality information and identify critical information gaps;
    c. Brainstorm action ideas to move the community from the current reality toward the DoS;
    d. Review and discuss the action ideas generated to ensure common understanding among the participants and to ensure that the actions will indeed move the community in the desired direction and won't have any unintended negative impact on other strategy area DoS;
    e. Prioritize the actions to maximize the return (economic, sociocultural and/or environmental) on the investment based on four strategic questions:
        1. Does this action move us toward our Descriptions of Success?
        2. Does this action move us toward our Sustainability Objectives?
        3. Is this action a flexible platform for future improvement toward sustainability and success?
        4. Is this action a good financial investment?
    f. Review and discuss the prioritized list to identify any potential gaps in the final set.
3. After the meeting(s):
    a. Compile the actions;
    b. Review to eliminate any overlapping and conflicting actions; and
    c. Refine and finalize actions to ensure clarity (e.g. outcomes, lead organizations).

The prioritized actions are recommended to potential implementing organizations throughout the community, not just to the municipality, to reinforce that the ICSP is owned and implemented by a wide range of community partners.

An action monitoring spreadsheet is provided as an Appendix in the ICSP for keeping track of actions and their progress/status.

Ongoing Monitoring and Reporting

Monitoring and reporting progress toward (or away from) Harrison's vision is essential to provide transparency, inform decision-making and enable continuous improvement.

Ongoing, reliable monitoring provides the community with a number of essential functions and benefits, including:

- Informing decision-making throughout the community;
- Informing task force action planning;
- Ensuring transparency and accountability to community stakeholders;
- Engaging businesses, residents and visitors in the journey toward the vision by providing meaningful and timely information in an interactive way.

Communicating results will build excitement and support for the overall process, and should ideally be done on a regular schedule in time for action planning. The most efficient method of reporting back to the community likely is through a website. Publically-accessible, easy to understand, and easily updated, a web-based platform is fast, efficient, and effective for communicating results. Reporting in the same format and using the same metrics year after year will allow for trend spotting and systematic updating. If access to more specific data is available it is a good idea to add to the initial set of perhaps more high-level indicators with supporting ones. For example, total energy used can be reported on by sector and by energy type as well.

The initial set of priority indicators provided with Sustainable Harrison is based what type of data is currently available. An appropriate set of indicators can typically be selected through dialogue with data users, data providers and the CSAT/Task Forces. External research is then conducted to identify best practice indicators used in other jurisdictions, as well as internal research to understand what was already being reported within the community. Once this initial set of indicators is selected, other indicators without such readily available data can be added and the data sought. It's important to keep in mind that an indicator is not going to be very useful if there is no way to collect the data necessary to inform it, or that tremendous resources would be required.

Indicator assessment criteria usually include:

- Validity – to measure progress toward the descriptions of success or priorities
- Reliability – to provide consistently measured date over time
- Resource intensity (including information availability) – to achieve a balance of good data for good value
- Comparability – to benchmark against other communities where possible

It is useful to identify what currently exists in the community, region, or province that has bearing on a particular strategy, and then to build an indicator based on what that particular source might already track, or is able to track. For example, the number of vehicles on roads has bearing on a transportation strategy and an energy strategy; the number of registered vehicles per community is currently tracked by ICBC, and the number of vehicles on highways is tracked by the Province. This is an example of a good, specific indicator that could track the progress of a couple of strategies, which would then inform the progress of community priorities (in Harrison's case, Protecting the Environment).

Over time, indicators will evolve as further learning and increased capacity develops for useful reporting and monitoring. Common existing data sources include organizations such as Tourism BC, BC Hydro and Statistics Canada, and in some communities, Community Surveys, which are a great way of collecting unique information for your community. New data collection tools and sources may come on stream in the future and should be included in the monitoring system to make indicator results more robust and reliable.

One of the most important, yet often forgotten, steps in the monitoring and reporting process is celebrating successes - big or small. Celebrating successes is one of the most impactful things that can be done to maintain enthusiasm and strengthen buy-in for the ICSP. The monitoring process provides the ammunition for celebrating achievements by providing a clear reflection of the community's movement along its path towards the vision. Make community achievements public by posting on the VoH and partners' websites, advertising in the local newspaper, and presenting at local gatherings. Increased presence in the public eye will result in an increased interest in the ICSP process and in turn, more support and input from the community.

Align Decision-making with the ICSP

The ultimate goal for ICSP implementation is that *all* decisions are aligned with the ICSP, and this includes the formal decisions made by Council on policies, plans and procedures, to the day to day decisions made by staff, partners and community members on projects, practices and purchasing. There are two factors critical for successful alignment: training and tools. Decision-makers should understand the ICSP framework and how to apply it to their decision-making processes. Further, they will likely benefit from decision-informing tools, such as the ones included in Sustainable Harrison, to assist them through the process.

Revisit Harrison's Current Vision Statement

Through the ICSP process a detailed vision of Harrison emerged. These vision details are articulated in the priorities, sustainability objectives and descriptions of success for each strategy area and may or may not be consistent with the current vision statement. As creating a Vision Statement is generally a bottom up exercise, where details like those in the ICSP are articulated and then summarized in to a short one or two sentence statement, now would be a perfect time to check to see if the current vision statement encompasses the ICSP detailed vision and revise as needed. Whatever emerges from this vision statement process should be added to this document.

Current Vision Statement:
"A residential and resort community with an attractive and inviting village core of shops and services. A strong commitment to maintaining the scenic qualities, the environment, the quality of life and the vibrant recreational and cultural life combined with a high standard of development."

Periodic Review and Refinement of the ICSP

Keeping the ICSP current and ensuring that it continues to connect with stakeholder values is another important factor to attend to moving forward. While the actions are reviewed and planned

on an annual basis, other elements of the plan should be held more constant so that they can effectively guide action planning. However, the need for constancy should not outweigh the importance of reflecting the community's changing vision for the future. The one thing that will remain unchanged is the set of long-term sustainability objectives that define sustainability in the future. The other elements of the ICSP and suggestions for the frequency and method for updating them in the future are provided below.

- **Indicators:** Core indicators (based on the priorities) should be kept as constant as possible so that trends can be monitored and performance evaluated over time. However, transitioning to new and improved indicators as they become available should be considered annually so that decision-makers are armed with the best possible information.
- **Descriptions of success statements:** These should be reviewed and refined every five to ten years and be done by a CSAT team representing key community partners and stakeholders or by the Task Forces that may be created for each strategy area.
- **Vision and priorities:** The vision and priorities should be reviewed and refined every ten to twenty years through a process that includes the community at large.

Appendix J: Sample Community Partner Agreement

Harrison is blessed with an exceptional abundance of scenic beauty, recreational opportunities, and public events. Those of us who live here place high value on the natural environment and our lifestyles. Residents are actively involved in the community, which fosters a spirit that is cooperative and transformational. Together we can continue to build Harrison's success through sustainability.

As Partners, we share Harrison's vision, values and sustainability objectives.

As Partners, we commit to participating in Harrison's ongoing sustainability journey by:

- Participating in annual action planning processes;
- Implementing actions assigned to us that are within our means;
- Adopting our community's shared descriptions of success as guiding visions in the areas that we impact through our work; and
- Incorporating sustainability planning and implementation strategies in the way we do business.

As Partners, we are guided by our Partnership Principles:

COLLABORATION	INTEGRITY
INCLUSIVE ENGAGEMENT	TRANSPARENCY
INNOVATION	OPEN COMMUNICATION

Debra Key

From: Martin Stol [MStol@scottres.ca]
Sent: Tuesday, August 30, 2011 8:22 AM
To: Gerrit Romeyn; cao
Cc: Andre Isakov; Debra Key
Subject: FW: McCombs Road Bridges, Revised Notifications
Attachments: LOA - Bridge Replacements at McCombs Drive, Miami Creek, Harrison Hot Springs.pdf

Hello all,

Attached is the DFO letter of advice for the bridge replacements.

It has been the 45 days required wait for MFLNRO review under Water Act notification and no comments were made. The only approval document left outstanding is from Transport Canada – Navigable Waters. If Roberta Dight has not sent Ted a signed approval yet, I will follow up with her to enquire when it can be expected.

Regards,
Martin

Martin Stol, *B.Sc., Dipl. Tech.*
Project Manager
SCOTT RESOURCE SERVICES INC.
604 701-6311 Tel.
604 701-6322 Fax.
604 798-4355 Cel.
Please consider the environment before printing this email.

From: Richardson, Tessa [mailto:Tessa.Richardson@dfo-mpo.gc.ca]
Sent: Monday, August 29, 2011 9:25 AM
To: Martin Stol
Cc: Thorpe, Suzanne
Subject: RE: McCombs Road Bridges, Revised Notifications

Hi Martin,

I have attached a letter of advice for the bridge replacements at McCombs Drive.

Regards

Tessa Richardson, B.Sc.

Habitat Biologist
Fisheries and Oceans Canada / Pêches et Océans Canada
Oceans, Habitat and Enhancement Branch / Direction des océans, de l'habitat et de la mise valeur
Lower Fraser River - Le Bas Fraser
Unit 3 - 100 Annacis Parkway

Delta, BC V3M 6A2
Tessa.Richardson@dfo-mpo.gc.ca

Ph: (604) 666-8988 / Fax: (604) 666-6627
Government of Canada - Gouvernement du Canada

From: Martin Stol [mailto:MStol@scottres.ca]
Sent: August 18, 2011 9:47 AM
To: Richardson, Tessa
Cc: Thorpe, Suzanne
Subject: FW: McCombs Road Bridges, Revised Notifications

Hi Tessa,

Attached are the project review notification documents submitted for both DFO and Transport Canada (Nav Waters).

The existing crossing structures are overlaid by the current plans on the attached drawings. The original plans called for removing all of the existing crib wall structure, regarding the banks, and adding rip rap. Both Suzanne and Catherine Galbrand (Transport Canada) expressed the proposed instream portion of the works would trigger CEAA screening. Given the short timeline and the now emergency status of installing the replacement crossings, the instream portion of the works was deferred until proper future assessment can be completed. The bridges will span the existing approaches and not require works below high water mark.

Catherine responded to the amended work plan yesterday as follows:

> Transport Canada Environmental Services has reviewed the revised project applications for the McCombs Road Bridges referenced below with the Navigable Waters Protection Program. Transport Canada determined that the proposed bridge crossings will require section 6(4) Approvals under the *Navigable Waters Protection Act* (NWPA), which require review under the *Canadian Environmental Assessment Act* (CEAA). However, section 50 of the Exclusion List Regulations under CEAA allows for the exclusion of single-span bridges and any supporting structures from a CEAA review if the project:
>
> a) results in a bridge that is no more than 30 m long and 20 m wide;
> b) does not involve the installation of any supporting structures in a water body;
> c) is not to be carried out in a water body (ie. below the annual HWM); and
> d) does not involve the likely release of a polluting substance into a water body.
>
> Given that the revised proposal meets the exclusion criteria above (ie. no rip rap below HWM, no instream decommissioning works), TC has determined that the subject project satisfies the requirements of section 50 for exclusion under CEAA, and the project will not require TC to conduct an environmental review under CEAA.
>
> Should decommissioning of the existing bridge structures be planned in the future, new NWPA Applications for the works will need to be submitted to the NWPP.
>
> **Please Note:** This letter does not constitute an approval of the project. An approval under Section 6(4) of the Navigable Waters Protection Act (NWPA) is still required before the project can proceed. Should you have any questions or comments regarding the exclusion, please contact Environmental officer Cat Galbrand by phone at 604-666-5439, or by fax at 604-666-8025. If you have any questions regarding the status of your NWPA approval, please contact NWPP Officer Roberta Dight at 604 666-2863, or by fax at 604-775-8828.
>
> Cat

Cat Galbrand, M.E.S. R.P.Bio.

Environmental Officer, Environmental Services
Transport Canada - Pacific Region
Suite 620 - 800 Burrard Street
Vancouver, BC V6Z 2J8
Telephone: (604) 666-5439
Facsimile: (604) 666-8025

Should you have any further questions regarding the proposed works, please contact me. While there is no longer an Instream portion to this phase of the project, so the Instream works window is not as much of a factor, the temporary repair at the north crossing (single lane bailey bridge overspan) apparently belongs to MoTI, and they now need it returned to them for use at another site. That will effectively close that McCombs Dr. crossing, which functions as the alternate emergency route in/out of town. Therefore the summer timeline remains critical to the Village.

Regards,
Martin

Martin Stol, *B.Sc., Dipl. Tech.*
Project Manager
SCOTT RESOURCE SERVICES INC.
604 701-6311 Tel.
604 701-6322 Fax.
604 798-4355 Cel.

From: Martin Stol
Sent: Monday, August 15, 2011 7:03 PM
To: 'Suzanne.Thorpe@dfo-mpo.gc.ca'; 'Dight, Roberta'; 'Galbrand, Catherine'
Subject: McCombs Road Bridges, Revised Notifications

The Village of Harrison Hot Springs wishes to proceed with the bridge replacements following a revised work plan that eliminates the instream works portion of the original submissions. At this time, the new abutments will be within the existing approach ramps, and do not require any works below top of bank. The north crossing has been lengthened to avoid encroachment, with changes as indicated by Neelco Construction on the applicable drawings.

Removal of the existing wood piles, boards, and excess fill would occur at a future date after adequate agency review has occurred.

If there are further questions, please let me know.

Martin Stol, *B.Sc., Dipl. Tech.*
Project Manager
SCOTT RESOURCE SERVICES INC.
604 701-6311 Tel.
604 701-6322 Fax.
604 798-4355 Cel.

Fisheries and Oceans Canada | Pêches et Océans Canada

100 Annacis Parkway, Unit 3
Delta, BC V3M 6A2

Your file *Votre référence*

August 29, 2011

Our file *Notre référence*
11-HPAC-PA2-00515

Mr. Ted Tisdale
Chief Administrative Officer
495 Hot Springs Road
PO Box 160
Harrison Hot Springs

Dear Mr. Tisdale:

Subject: Proposed works or undertakings will likely avoid negative effects to fish habitat.

Fisheries and Oceans Canada (DFO) received your proposal on August 15, 2011 concerning the McCombs Drive Bridge Replacements on Miami Creek in Harrison Hot Springs, BC. To expedite future correspondence or inquiries, please refer to your referral title when you contact us.

DFO File No.:	**11-HPAC-PA2-00515**
Title:	**Bridge Replacements at McCombs Drive, Miami Creek, Harrison Hot Springs**

It is our understanding that your proposal consists of:

- Removal of the existing bridge spans (North and South Bridges)
- Back-fill removal from behind wooden piles to provide clearance for pile driving, support slabs and deck installation (North and South Bridges)
- Installation of wooden piles using a drop hammer within the granular fill material behind the existing wooden piles and retaining wing walls (North and South Bridges)
- Installation of a two lane, single span concrete box girder bridge on pre-cast concrete structural supports (North and South Bridges)

as outlined in the following plans:

- Construction Environmental Management Plan McCombs Drive Bridge Replacements, dated August 10, 2011, produced by Scott Resource Services Inc., received August 15, 2011
- Drawings: 101, 102, and 201, 202, produced by All-Span Engineering & Construction Ltd dated February 23, 2010, received August 15, 2011

The proposal described above has been reviewed to determine whether it is likely to result in impacts to fish and fish habitat which are prohibited by the habitat protection provisions of the Fisheries Act or those prohibitions of the Species at Risk Act that apply to aquatic species. It is the understanding of DFO that the proposed works will be conducted within the footprint of the existing approaches and will not require works below the high water mark. It is also understood that the proposed design will not require the addition of any instream supporting structure. If the plans have changed or if the description of the proposal is incomplete the proponent should contact this office to determine if the advice in this letter still applies.

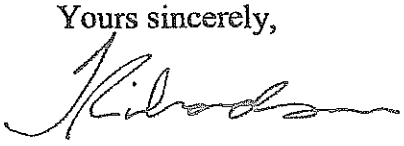
Salish Sucker (*Catostomus catostomus*) which are currently listed as endangered in Canada, are believed to use this area and have been considered as part of this assessment. If you would like more information about this species please visit the *Species at Risk Act* Public registry at www.sararegistry.gc.ca.

It is our opinion that a harmful alteration, disruption or destruction (HADD) of fish habitat is not likely to occur if you implement your plans as proposed. A subsection 35(2) *Fisheries Act* authorization is not necessary. However, failure to properly implement the measures outlined in your plans may result in contravention of subsection 35(1) of the *Fisheries Act*, which states: *"no person shall carry on any work or undertaking that results in the harmful alteration, disruption or destruction of fish habitat."*

This letter of advice does not allow the deposit of deleterious substance into waters frequented by fish nor does it release you from the responsibility to obtain any federal, provincial or municipal approvals that may be needed.

We request that a copy of this letter be kept on site while works are in progress. If you have any questions concerning the above, or if my understanding of the proposal is either incorrect, incomplete, or if there are changes to the proposed works or undertakings, please contact me directly by telephone at (604) 666-8988, by fax at (604) 666-6627, or by email at tessa.richardson@dfo-mpo.gc.ca.

Yours sincerely,



Tessa Richardson
Habitat Biologist

c.c.:Martin Stol, Scott Resource Services

Date	Item Code	Actual Hours	Premium Hours	Rate	Amount	E/V	GL-Acct-Dr	Account	GL-Acct-Cr	Item Units	Veh #	Wrk Crw
4157 : Malfait , Bruce A.T.												
22/08/2011	BPAY	8.00		31.0000	248.00	E	1142570000	BANKED TIME	1142510000			
23/08/2011	BPAY	8.00		31.0000	248.00	E	1142570000	BANKED TIME	1142510000			
24/08/2011	BPAY	8.00		31.0000	248.00	E	1142570000	BANKED TIME	1142510000			
25/08/2011	BPAY	8.00		31.0000	248.00	E	1142570000	BANKED TIME	1142510000			
26/08/2011	BPAY	5.50		31.0000	170.50	E	1142570000	BANKED TIME	1142510000			
29/08/2011	RT	2.00		28.0000	56.00	E	1123230110	WAGES - ROAD MARKING	1142510000			
29/08/2011	RT	6.00		28.0000	168.00	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
30/08/2011	RT	4.00		28.0000	112.00	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
30/08/2011	RT	4.00		28.0000	112.00	E	1123230150	WAGES - ROAD RESURFACING	1142510000			
31/08/2011	RT	8.00		28.0000	224.00	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
01/09/2011	RT	8.00		28.0000	224.00	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
02/09/2011	RT	5.50		28.0000	154.00	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
Employee Totals:		75.00	0.00		2,212.50							
Base Hours:		75.00										
4205 : Baxter, Teresa A												
22/08/2011	RT	2.00		28.0000	56.00	E	1127180200	WAGES - RENDALL PARK	1142510000			
22/08/2011	RT	2.00		28.0000	56.00	E	1127180600	WAGES - OTHER GREEN SPACES	1142510000			
22/08/2011	RT	1.00		28.0000	28.00	E	1127130300	WAGES - BOAT LAUNCH WASHROOMS	1142510000			
22/08/2011	RT	1.50		28.0000	42.00	E	1127130650	WAGES - BEACH WASHROOMS JANITO	1142510000			
22/08/2011	RT	1.00		28.0000	28.00	E	1127120150	WAGES - MEMORIAL HALL JANITORI	1142510000			
22/08/2011	RT	0.50		28.0000	14.00	E	1124330150	WAGES - SOLID WASTE & RECYCLIN	1142510000			
23/08/2011	RT	8.00		28.0000	224.00	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
24/08/2011	RT	4.00		28.0000	112.00	E	1127120145	WAGES - MEMORIAL HALL	1142510000			
24/08/2011	RT	1.00		28.0000	28.00	E	1127130330	WAGES - HARRISON LAKE PLAZA	1142510000			
24/08/2011	RT	3.00		28.0000	84.00	E	1127180600	WAGES - OTHER GREEN SPACES	1142510000			
25/08/2011	RT	1.00		28.0000	28.00	E	1124330150	WAGES - SOLID WASTE & RECYCLIN	1142510000			
25/08/2011	RT	1.00		28.0000	28.00	E	1123230180	WAGES - VILLAGE ENTRANCE	1142510000			
25/08/2011	RT	0.50		28.0000	14.00	E	1127120145	WAGES - MEMORIAL HALL	1142510000			
25/08/2011	RT	0.50		28.0000	14.00	E	1121210425	WAGES - MUNICIPAL HALL	1142510000			
25/08/2011	RT	0.50		28.0000	14.00	E	1127180600	WAGES - OTHER GREEN SPACES	1142510000			
25/08/2011	RT	4.50		28.0000	126.00	E	1123120150	PWKS - WAGES - TRAINING	1142510000			
26/08/2011	RT	1.00		28.0000	28.00	E	1127180600	WAGES - OTHER GREEN SPACES	1142510000			
26/08/2011	RT	1.50		28.0000	42.00	E	1127120145	WAGES - MEMORIAL HALL	1142510000			
26/08/2011	RT	2.50		28.0000	70.00	E	1124330150	WAGES - SOLID WASTE & RECYCLIN	1142510000			
26/08/2011	RT	0.50		28.0000	14.00	E	1121210425	WAGES - MUNICIPAL HALL	1142510000			
29/08/2011	V1	8.00		28.0000	224.00	E	1142720250	VACATION PAY PAYABLE	1142510000			
30/08/2011	V1	8.00		28.0000	224.00	E	1142720250	VACATION PAY PAYABLE	1142510000			
31/08/2011	V1	8.00		28.0000	224.00	E	1142720250	VACATION PAY PAYABLE	1142510000			
01/09/2011	V1	8.00		28.0000	224.00	E	1142720250	VACATION PAY PAYABLE	1142510000			
02/09/2011	V1	5.50		28.0000	154.00	E	1142720250	VACATION PAY PAYABLE	1142510000			
Employee Totals:		75.00	0.00		2,100.00							
Base Hours:		75.00										

Date	Item Code	Actual Hours	Premium Hours	Rate	Amount	E/V	GL-Acct-Dr	Account	GL-Acct-Cr	Item Units	Veh #	Wrk Crw
4206 : Moore, John W												
21/08/2011	V1	5.50		24.4700	134.59	E	1142720250	VACATION PAY PAYABLE	1142510000			
22/08/2011	V1	8.00		24.4700	195.76	E	1142720250	VACATION PAY PAYABLE	1142510000			
23/08/2011	V1	8.00		24.4700	195.76	E	1142720250	VACATION PAY PAYABLE	1142510000			
24/08/2011	V1	8.00		24.4700	195.76	E	1142720250	VACATION PAY PAYABLE	1142510000			
25/08/2011	V1	8.00		24.4700	195.76	E	1142720250	VACATION PAY PAYABLE	1142510000			
28/08/2011	RT	1.50		24.4700	36.71	E	1127180600	WAGES - OTHER GREEN SPACES	1142510000			
28/08/2011	RT	2.00		24.4700	48.94	E	1127130650	WAGES - BEACH WASHROOMS JANITO	1142510000			
28/08/2011	RT	1.00		24.4700	24.47	E	1123120100	WAGES - PUBLIC WORKS COMMON SE	1142510000			
28/08/2011	RT	1.00		24.4700	24.47	E	1127130300	WAGES - BOAT LAUNCH WASHROOMS	1142510000			
29/08/2011	RT	1.50		24.4700	36.71	E	1127130650	WAGES - BEACH WASHROOMS JANITO	1142510000			
29/08/2011	RT	1.00		24.4700	24.47	E	1127130300	WAGES - BOAT LAUNCH WASHROOMS	1142510000			
29/08/2011	RT	1.50		24.4700	36.71	E	1127120150	WAGES - MEMORIAL HALL JANITORI	1142510000			
29/08/2011	SICK	4.00		24.4700	97.88	E	1142720200	SICK LEAVE PAYABLE	1142510000			
30/08/2011	RT	2.00		24.4700	48.94	E	1127180600	WAGES - OTHER GREEN SPACES	1142510000			
30/08/2011	RT	6.00		24.4700	146.82	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
31/08/2011	RT	5.00		24.4700	122.35	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
31/08/2011	RT	0.50		24.4700	12.24	E	1123230150	WAGES - ROAD RESURFACING	1142510000			
31/08/2011	RT	2.50		24.4700	61.18	E	1124330150	WAGES - SOLID WASTE & RECYCLIN	1142510000			
01/09/2011	RT	2.00		24.4700	48.94	E	1127180600	WAGES - OTHER GREEN SPACES	1142510000			
01/09/2011	RT	6.00		24.4700	146.82	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
Employee Totals:		75.00	0.00		1,835.28							
Base Hours:		75.00										
4208 : Yasinski, Mark D												
23/08/2011	RT	3.00		28.0000	84.00	E	1524240510	WAGES - WASTE WATER TREATMENT	1142510000			
23/08/2011	RT	1.00		28.0000	28.00	E	1524250100	WAGES - LIFT STATIONS	1142510000			
23/08/2011	RT	4.00		28.0000	112.00	E	1624110150	WAGES - WATER SUPPLY & DISTRIB	1142510000			
24/08/2011	RT	1.00		28.0000	28.00	E	1524240510	WAGES - WASTE WATER TREATMENT	1142510000			
24/08/2011	RT	7.00		28.0000	196.00	E	1624110150	WAGES - WATER SUPPLY & DISTRIB	1142510000			
25/08/2011	RT	4.00		28.0000	112.00	E	1624110150	WAGES - WATER SUPPLY & DISTRIB	1142510000			
25/08/2011	RT	1.00		28.0000	28.00	E	1524250100	WAGES - LIFT STATIONS	1142510000			
25/08/2011	RT	3.00		28.0000	84.00	E	1123120150	PWKS - WAGES - TRAINING	1142510000			
26/08/2011	RT	1.00		28.0000	28.00	E	1524220100	WAGES - SEWER COLLECTION	1142510000			
26/08/2011	RT	3.00		28.0000	84.00	E	1624110150	WAGES - WATER SUPPLY & DISTRIB	1142510000			
26/08/2011	RT	1.00		28.0000	28.00	E	1524250100	WAGES - LIFT STATIONS	1142510000			
26/08/2011	RT	3.00		28.0000	84.00	E	1524240510	WAGES - WASTE WATER TREATMENT	1142510000			
26/08/2011	DT	2.00		56.0000	112.00	E	1624110150	WAGES - WATER SUPPLY & DISTRIB	1142510000			
27/08/2011	RT	1.00		28.0000	28.00	E	1524250100	WAGES - LIFT STATIONS	1142510000			
27/08/2011	RT	0.25		28.0000	7.00	E	1127120145	WAGES - MEMORIAL HALL	1142510000			
27/08/2011	RT	1.00		28.0000	28.00	E	1123120100	WAGES - PUBLIC WORKS COMMON SE	1142510000			
27/08/2011	RT	1.50		28.0000	42.00	E	1524240510	WAGES - WASTE WATER TREATMENT	1142510000			
27/08/2011	RT	1.75		28.0000	49.00	E	1624110150	WAGES - WATER SUPPLY & DISTRIB	1142510000			
27/08/2011	DT	2.00		56.0000	112.00	E	1624110150	WAGES - WATER SUPPLY & DISTRIB	1142510000			
30/08/2011	RT	7.00		28.0000	196.00	E	1624110150	WAGES - WATER SUPPLY & DISTRIB	1142510000			
30/08/2011	RT	1.00		28.0000	28.00	E	1524240510	WAGES - WASTE WATER TREATMENT	1142510000			
31/08/2011	RT	6.00		28.0000	168.00	E	1624110150	WAGES - WATER SUPPLY & DISTRIB	1142510000			
31/08/2011	RT	1.00		28.0000	28.00	E	1524220100	WAGES - SEWER COLLECTION	1142510000			
31/08/2011	RT	1.00		28.0000	28.00	E	1624140500	WAGES - WATER RESERVOIR	1142510000			

Date	Item Code	Actual Hours	Premium Hours	Rate	Amount	E/V	GL-Acct-Dr	Account	GL-Acct-Cr	Item Units	Veh #	Wrk Crw
01/09/2011	RT	4.00		28.0000	112.00	E	1624110150	WAGES - WATER SUPPLY & DISTRIB	1142510000			
01/09/2011	RT	1.50		28.0000	42.00	E	1624140500	WAGES - WATER RESERVOIR	1142510000			
01/09/2011	RT	2.50		28.0000	70.00	E	1624140550	WAGES - HYDRANTS	1142510000			
02/09/2011	RT	4.00		28.0000	112.00	E	1624110150	WAGES - WATER SUPPLY & DISTRIB	1142510000			
02/09/2011	RT	1.00		28.0000	28.00	E	1524250100	WAGES - LIFT STATIONS	1142510000			
02/09/2011	RT	3.00		28.0000	84.00	E	1524240510	WAGES - WASTE WATER TREATMENT	1142510000			
03/09/2011	RT	0.25		28.0000	7.00	E	1524220100	WAGES - SEWER COLLECTION	1142510000			
03/09/2011	RT	11.75		28.0000	329.00	E	1624110150	WAGES - WATER SUPPLY & DISTRIB	1142510000			
03/09/2011	RT	1.00		28.0000	28.00	E	1524250100	WAGES - LIFT STATIONS	1142510000			
03/09/2011	RT	1.00		28.0000	28.00	E	1123120100	WAGES - PUBLIC WORKS COMMON SE	1142510000			
03/09/2011	RT	1.50		28.0000	42.00	E	1524240510	WAGES - WASTE WATER TREATMENT	1142510000			
Employee Totals:		89.00	0.00		2,604.00							
Base Hours:		85.00										

4209 : Simmonds, Tyler W

21/08/2011	RT	1.00		24.4700	24.47	E	1524250100	WAGES - LIFT STATIONS	1142510000			
21/08/2011	RT	1.00		24.4700	24.47	E	1624110150	WAGES - WATER SUPPLY & DISTRIB	1142510000			
21/08/2011	RT	1.00		24.4700	24.47	E	1123120100	WAGES - PUBLIC WORKS COMMON SE	1142510000			
21/08/2011	RT	2.50		26.2000	65.50	E	1524240510	WAGES - WASTE WATER TREATMENT	1142510000			
21/08/2011	DT	2.00		48.9400	97.88	E	1624110150	WAGES - WATER SUPPLY & DISTRIB	1142510000			
22/08/2011	RT	1.00		24.4700	24.47	E	1524250100	WAGES - LIFT STATIONS	1142510000			
22/08/2011	RT	3.50		26.2000	91.70	E	1524240510	WAGES - WASTE WATER TREATMENT	1142510000			
22/08/2011	RT	3.50		24.4700	85.65	E	1624110150	WAGES - WATER SUPPLY & DISTRIB	1142510000			
23/08/2011	RT	1.00		24.4700	24.47	E	1524250100	WAGES - LIFT STATIONS	1142510000			
23/08/2011	RT	7.00		24.4700	171.29	E	1624110150	WAGES - WATER SUPPLY & DISTRIB	1142510000			
24/08/2011	RT	5.00		26.2000	131.00	E	1524240510	WAGES - WASTE WATER TREATMENT	1142510000			
24/08/2011	SICK	3.00		24.4700	73.41	E	1142720200	SICK LEAVE PAYABLE	1142510000			
25/08/2011	RT	2.00		24.4700	48.94	E	1123120100	WAGES - PUBLIC WORKS COMMON SE	1142510000			
25/08/2011	RT	4.00		24.4700	97.88	E	1123120150	PWKS - WAGES - TRAINING	1142510000			
25/08/2011	RT	2.00		26.2000	52.40	E	1524240510	WAGES - WASTE WATER TREATMENT	1142510000			
28/08/2011	RT	2.00		26.2000	52.40	E	1524240510	WAGES - WASTE WATER TREATMENT	1142510000			
28/08/2011	RT	1.50		24.4700	36.71	E	1624110150	WAGES - WATER SUPPLY & DISTRIB	1142510000			
28/08/2011	RT	1.00		24.4700	24.47	E	1524250100	WAGES - LIFT STATIONS	1142510000			
29/08/2011	RT	1.50		24.4700	36.71	E	1524250100	WAGES - LIFT STATIONS	1142510000			
29/08/2011	RT	3.50		24.4700	85.65	E	1624110150	WAGES - WATER SUPPLY & DISTRIB	1142510000			
29/08/2011	RT	3.00		26.2000	78.60	E	1524240510	WAGES - WASTE WATER TREATMENT	1142510000			
30/08/2011	RT	1.00		24.4700	24.47	E	1524250100	WAGES - LIFT STATIONS	1142510000			
30/08/2011	RT	3.00		24.4700	73.41	E	1624110150	WAGES - WATER SUPPLY & DISTRIB	1142510000			
30/08/2011	RT	4.00		26.2000	104.80	E	1524240510	WAGES - WASTE WATER TREATMENT	1142510000			
31/08/2011	RT	3.00		26.2000	78.60	E	1524240510	WAGES - WASTE WATER TREATMENT	1142510000			
31/08/2011	RT	1.00		24.4700	24.47	E	1524250100	WAGES - LIFT STATIONS	1142510000			
31/08/2011	RT	2.50		24.4700	61.18	E	1624110150	WAGES - WATER SUPPLY & DISTRIB	1142510000			
31/08/2011	SICK	1.50		24.4700	36.71	E	1142720200	SICK LEAVE PAYABLE	1142510000			
01/09/2011	RT	4.00		24.4700	97.88	E	1624110150	WAGES - WATER SUPPLY & DISTRIB	1142510000			
01/09/2011	RT	1.00		24.4700	24.47	E	1524250100	WAGES - LIFT STATIONS	1142510000			
01/09/2011	RT	3.00		26.2000	78.60	E	1524240510	WAGES - WASTE WATER TREATMENT	1142510000			
Employee Totals:		76.00	0.00		1,957.13							
Base Hours:		74.00										

Date	Item Code	Actual Hours	Premium Hours	Rate	Amount	E/V	GL-Acct-Dr	Account	GL-Acct-Cr	Item Units	Veh #	Wrk Crw
4210 : Kafi, Tahir J												
21/08/2011	RT	4.50		24.4700	110.12	E	1123120100	WAGES - PUBLIC WORKS COMMON SE	1142510000			
21/08/2011	RT	1.00		24.4700	24.47	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
21/08/2011	RT	2.50		24.4700	61.18	E	1124330150	WAGES - SOLID WASTE & RECYCLIN	1142510000			
22/08/2011	RT	0.50		24.4700	12.24	E	1127120145	WAGES - MEMORIAL HALL	1142510000			
22/08/2011	RT	1.50		24.4700	36.71	E	1127180200	WAGES - RENDALL PARK	1142510000			
22/08/2011	RT	3.00		26.2000	78.60	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
22/08/2011	RT	2.50		24.4700	61.18	E	1124330150	WAGES - SOLID WASTE & RECYCLIN	1142510000			
22/08/2011	RT	0.50		24.4700	12.24	E	1123120100	WAGES - PUBLIC WORKS COMMON SE	1142510000			
23/08/2011	RT	1.50		24.4700	36.71	E	1123120100	WAGES - PUBLIC WORKS COMMON SE	1142510000			
23/08/2011	RT	4.00		26.2000	104.80	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
23/08/2011	RT	2.50		24.4700	61.18	E	1524250100	WAGES - LIFT STATIONS	1142510000			
24/08/2011	RT	1.50		24.4700	36.71	E	1123120100	WAGES - PUBLIC WORKS COMMON SE	1142510000			
24/08/2011	RT	2.50		24.4700	61.18	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
24/08/2011	RT	4.00		24.4700	97.88	E	1524250100	WAGES - LIFT STATIONS	1142510000			
25/08/2011	RT	1.00		24.4700	24.47	E	1123120100	WAGES - PUBLIC WORKS COMMON SE	1142510000			
25/08/2011	RT	2.00		24.4700	48.94	E	1124330150	WAGES - SOLID WASTE & RECYCLIN	1142510000			
25/08/2011	RT	2.50		24.4700	61.18	E	1123120150	PWKS - WAGES - TRAINING	1142510000			
28/08/2011	RT	2.50		24.4700	61.18	E	1127180600	WAGES - OTHER GREEN SPACES	1142510000			
28/08/2011	RT	2.50		24.4700	61.18	E	1124330150	WAGES - SOLID WASTE & RECYCLIN	1142510000			
28/08/2011	RT	0.50		24.4700	12.24	E	1127130645	WAGES - BEACH WASHROOMS	1142510000			
28/08/2011	RT	1.00		24.4700	24.47	E	1123120100	WAGES - PUBLIC WORKS COMMON SE	1142510000			
28/08/2011	RT	1.50		24.4700	36.71	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
29/08/2011	RT	1.00		24.4700	24.47	E	1123120100	WAGES - PUBLIC WORKS COMMON SE	1142510000			
29/08/2011	RT	4.00		24.4700	97.88	E	1123230420	WAGES - DRAINAGE & DITCHING	1142510000			
29/08/2011	RT	1.50		24.4700	36.71	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
29/08/2011	RT	1.50		24.4700	36.71	E	1124330150	WAGES - SOLID WASTE & RECYCLIN	1142510000			
30/08/2011	RT	2.00		24.4700	48.94	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
30/08/2011	RT	5.00		24.4700	122.35	E	1123230110	WAGES - ROAD MARKING	1142510000			
30/08/2011	RT	1.00		24.4700	24.47	E	1127180600	WAGES - OTHER GREEN SPACES	1142510000			
31/08/2011	RT	1.50		24.4700	36.71	E	1124330150	WAGES - SOLID WASTE & RECYCLIN	1142510000			
31/08/2011	RT	1.50		24.4700	36.71	E	1127180600	WAGES - OTHER GREEN SPACES	1142510000			
31/08/2011	RT	2.00		26.2000	52.40	E	1127180200	WAGES - RENDALL PARK	1142510000			
31/08/2011	RT	3.00		26.2000	78.60	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
01/09/2011	RT	5.50		26.2000	144.10	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
	Employee Totals:	75.00	0.00		1,865.62							
	Base Hours:	75.00										
4211 : Haugen, Dwight K												
21/08/2011	DTb	0.50		48.9400	24.47	E	1127130300	WAGES - BOAT LAUNCH WASHROOMS	1142570000			
21/08/2011	DTb	2.00		48.9400	97.88	E	1123120100	WAGES - PUBLIC WORKS COMMON SE	1142570000			
21/08/2011	DTb	1.50		48.9400	73.41	E	1127130650	WAGES - BEACH WASHROOMS JANITO	1142570000			
23/08/2011	RT	1.00		24.4700	24.47	E	1127130650	WAGES - BEACH WASHROOMS JANITO	1142510000			
23/08/2011	RT	3.50		24.4700	85.65	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
23/08/2011	RT	0.50		24.4700	12.24	E	1127130300	WAGES - BOAT LAUNCH WASHROOMS	1142510000			
23/08/2011	RT	1.50		24.4700	36.71	E	1123120100	WAGES - PUBLIC WORKS COMMON SE	1142510000			
23/08/2011	RT	1.00		24.4700	24.47	E	1127120145	WAGES - MEMORIAL HALL	1142510000			

Date	Item Code	Actual Hours	Premium Hours	Rate	Amount	E/V	GL-Acct-Dr	Account	GL-Acct-Cr	Item Units	Veh #	Wrk Crw
23/08/2011	RT	0.50		24.4700	12.24	E	1127180600	WAGES - OTHER GREEN SPACES	1142510000			
24/08/2011	RT	0.50		24.4700	12.24	E	1127130300	WAGES - BOAT LAUNCH WASHROOMS	1142510000			
24/08/2011	RT	2.50		24.4700	61.18	E	1127120145	WAGES - MEMORIAL HALL	1142510000			
24/08/2011	RT	0.50		24.4700	12.24	E	1127180200	WAGES - RENDALL PARK	1142510000			
24/08/2011	RT	1.00		24.4700	24.47	E	1127130650	WAGES - BEACH WASHROOMS JANITO	1142510000			
24/08/2011	RT	3.50		24.4700	85.65	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
25/08/2011	RT	0.50		24.4700	12.24	E	1127120145	WAGES - MEMORIAL HALL	1142510000			
25/08/2011	RT	0.50		24.4700	12.24	E	1127130300	WAGES - BOAT LAUNCH WASHROOMS	1142510000			
25/08/2011	RT	0.50		24.4700	12.24	E	1123120100	WAGES - PUBLIC WORKS COMMON SE	1142510000			
25/08/2011	RT	3.00		24.4700	73.41	E	1123120150	PWKS - WAGES - TRAINING	1142510000			
25/08/2011	RT	1.50		24.4700	36.71	E	1127180170	WAGES - SPRING PARK	1142510000			
25/08/2011	RT	0.50		24.4700	12.24	E	1127180600	WAGES - OTHER GREEN SPACES	1142510000			
25/08/2011	RT	1.50		24.4700	36.71	E	1127130650	WAGES - BEACH WASHROOMS JANITO	1142510000			
26/08/2011	RT	1.50		24.4700	36.71	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
26/08/2011	RT	0.50		24.4700	12.24	E	1127130300	WAGES - BOAT LAUNCH WASHROOMS	1142510000			
26/08/2011	RT	0.50		24.4700	12.24	E	1127120145	WAGES - MEMORIAL HALL	1142510000			
26/08/2011	RT	1.50		24.4700	36.71	E	1127180600	WAGES - OTHER GREEN SPACES	1142510000			
26/08/2011	RT	1.50		24.4700	36.71	E	1127130650	WAGES - BEACH WASHROOMS JANITO	1142510000			
27/08/2011	RT	1.50		24.4700	36.71	E	1127180600	WAGES - OTHER GREEN SPACES	1142510000			
27/08/2011	RT	1.00		24.4700	24.47	E	1127130300	WAGES - BOAT LAUNCH WASHROOMS	1142510000			
27/08/2011	RT	2.00		24.4700	48.94	E	1127130650	WAGES - BEACH WASHROOMS JANITO	1142510000			
27/08/2011	RT	2.50		24.4700	61.18	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
27/08/2011	RT	1.00		24.4700	24.47	E	1123120100	WAGES - PUBLIC WORKS COMMON SE	1142510000			
30/08/2011	RT	0.50		24.4700	12.24	E	1123120100	WAGES - PUBLIC WORKS COMMON SE	1142510000			
30/08/2011	RT	0.50		24.4700	12.24	E	1127130300	WAGES - BOAT LAUNCH WASHROOMS	1142510000			
30/08/2011	RT	1.00		24.4700	24.47	E	1127130650	WAGES - BEACH WASHROOMS JANITO	1142510000			
30/08/2011	RT	6.00		24.4700	146.82	E	1127180600	WAGES - OTHER GREEN SPACES	1142510000			
31/08/2011	RT	0.50		24.4700	12.24	E	1127130300	WAGES - BOAT LAUNCH WASHROOMS	1142510000			
31/08/2011	RT	3.00		24.4700	73.41	E	1123230300	WAGES - SIDEWALKS	1142510000			
31/08/2011	RT	0.50		24.4700	12.24	E	1127130650	WAGES - BEACH WASHROOMS JANITO	1142510000			
31/08/2011	RT	3.50		24.4700	85.65	E	1127180600	WAGES - OTHER GREEN SPACES	1142510000			
31/08/2011	RT	0.50		24.4700	12.24	E	1127130290	WAGES - BOAT LAUNCH & WASHROOM	1142510000			
01/09/2011	RT	1.50		24.4700	36.71	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
01/09/2011	RT	0.50		24.4700	12.24	E	1127130300	WAGES - BOAT LAUNCH WASHROOMS	1142510000			
01/09/2011	RT	0.50		24.4700	12.24	E	1127130650	WAGES - BEACH WASHROOMS JANITO	1142510000			
01/09/2011	RT	1.50		24.4700	36.71	E	1127180170	WAGES - SPRING PARK	1142510000			
01/09/2011	RT	3.50		24.4700	85.65	E	1127180600	WAGES - OTHER GREEN SPACES	1142510000			
01/09/2011	RT	0.50		24.4700	12.24	E	1127180200	WAGES - RENDALL PARK	1142510000			
02/09/2011	RT	0.50		24.4700	12.24	E	1127130300	WAGES - BOAT LAUNCH WASHROOMS	1142510000			
02/09/2011	RT	3.50		24.4700	85.65	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
02/09/2011	RT	0.50		24.4700	12.24	E	1127130330	WAGES - HARRISON LAKE PLAZA	1142510000			
02/09/2011	RT	0.50		24.4700	12.24	E	1127180200	WAGES - RENDALL PARK	1142510000			
02/09/2011	RT	0.50		24.4700	12.24	E	1127130650	WAGES - BEACH WASHROOMS JANITO	1142510000			
03/09/2011	RT	3.50		24.4700	85.65	E	1127130120	WAGES - BEACH MAINTENANCE	1142510000			
03/09/2011	RT	1.50		24.4700	36.71	E	1624110150	WAGES - WATER SUPPLY & DISTRIB	1142510000			
03/09/2011	RT	1.50		24.4700	36.71	E	1127130650	WAGES - BEACH WASHROOMS JANITO	1142510000			
03/09/2011	RT	0.50		24.4700	12.24	E	1127130300	WAGES - BOAT LAUNCH WASHROOMS	1142510000			
03/09/2011	RT	1.00		24.4700	24.47	E	1123120100	WAGES - PUBLIC WORKS COMMON SE	1142510000			
Employee Totals:		79.00	0.00		2,031.22							
Base Hours:		75.00										

Date	Item Code	Actual Hours	Premium Hours	Rate	Amount	E/V	GL-Acct-Dr	Account	GL-Acct-Cr	Item Units	Veh #	Wrk Crw
	Report Totals:	544.00	0.00		14,605.75							

End Of Report

HARRISON HOT SPRINGS
Naturally Refreshed

VILLAGE OF HARRISON HOT SPRINGS

REPORT TO COUNCIL

TO: Mayor and Council **DATE:** September 7, 2011

FROM: Andre Isakov, Community and Economic Development Officer **FILE:** 6430-05-01

SUBJECT: Draft Integrated Community Sustainability Plan (Sustainable Harrison)

ISSUE:

The Draft Integrated Community Sustainability Plan has been developed and is ready for Council's review and direction for future action.

BACKGROUND:

An Integrated Community Sustainability Plan (ICSP) consists of a vision, strategic plan and process for creating the future we want for our community. It is a high-level policy document and participatory process that is comprehensive, community-wide and long-term. An ICSP should be developed by all community partners in order to successfully create the shared future articulated within it.

Integrated community sustainability planning is about transformative change as well as incremental improvements. It is about a new way of thinking, making decisions and collaborating. It's a long-term process that requires leadership, shared commitment, hard work and sustained effort.

Harrison Hot Springs ISCP was guided by the Community Sustainability Advisory Committee (CSAC) along with the community, using a transparent process to ensure accountability. The CSAC is established to guide the ICSP process and to provide advice to Council on the ICSP process. The Integrated Community Sustainability Plan achieves the following:

1. Provide guidance: It articulates a vision and priorities that outline what Harrison Hot Springs would like to look like and be in the future. It will also defines what our sustainability objectives are so we can create a successful community and do so in a way that aligns with the principles for a sustainable society.
2. Ensure action: It provides meaningful community participation and ultimately on-the-ground action toward the vision will be enabled by establishing concrete

strategy areas, a description of success within each, and an ongoing action planning process.
3. Measure progress: It provides a monitoring system to track our progress and performance in order to learn and improve.
4. Ensure continuous engagement and progress: The ongoing action planning process and decision-informing tools are designed to ensure continuous participation and improvement, building on existing and new approaches.

The Draft ICSP has now been produced by CSAC with public input and participation. The public has had multiple opportunities to provide input along the way. Here are just some of the public input opportunities (past and future):

- June kick-off event (to form Harrison's vision (to inform the DoS)
- August on-line survey (to confirm sentiments were captured in the DoS, and provide suggested actions)
- September on-line survey (on Draft ICSP)
- September Public Open House (on Draft ICSP)

For September 12th Council Meeting, staff will present a PowerPoint presentation with an overview of the Sustainable Harrison ICSP and the process.

The Draft Sustainable Harrison ICSP is attached to this report.

RECOMMENDATION:

THAT Council receive the Draft Report and authorize staff to host a Public Open House to have further community dialogue on the Sustainable Harrison ICSP.

Respectfully submitted for your
consideration;

Andre Isakov
Community and Economic Development Officer

DIRECTOR OF FINANCE COMMENTS:

Dale Courtice
Director of Finance

CHIEF ADMINISTRATIVE OFFICER COMMENTS:

Ted Tisdale
Chief Administrative Officer

HARRISON HOT SPRINGS
Naturally Refreshed

VILLAGE OF HARRISON HOT SPRINGS

REPORT TO COUNCIL

TO: Mayor and Council **DATE: August 30, 2011**

FROM: Debra Key, Deputy Chief Administrative Officer/ Corporate Officer **FILE: 3900-01**

SUBJECT: Waste Collection and Disposal Amendment Bylaw No. 982

ISSUE:

To rescind third reading, amend and obtain third reading as amended to the Waste Collection and Disposal Amendment Bylaw No. 982.

BACKGROUND:

When Waste Collection and Disposal Bylaw No. 959 was adopted in December 2010, amendments to the Bylaw were given three readings at a Council meeting on August 8, 2011. Further to those amendments, and after further consideration, it is recommended by staff that user rates be billed on a quarterly billing system and should be reflected in the amendment bylaw. Therefore, staff is recommending that third reading be rescinded and the bylaw be amended to fully incorporate these amendments.

RECOMMENDATION:

THAT third reading of Waste Collection and Disposal Amendment Bylaw No. 982 be rescinded; and

THAT Waste Collection and Disposal Amendment Bylaw No. 982 be given third reading as amended.

Respectfully submitted for your
consideration;

Debra Key
Deputy Chief Administrative Officer/Corporate Officer

DIRECTOR OF FINANCE COMMENTS:

Dale Courtice
Director of Finance

CHIEF ADMINISTRATIVE OFFICER COMMENTS:

Ted Tisdale
Chief Administrative Officer

HARRISON HOT SPRINGS
Naturally Refreshed

VILLAGE OF HARRISON HOT SPRINGS
BYLAW NO. 982

A bylaw to amend the Waste Collection and Disposal Bylaw No. 959

WHEREAS the Council has deemed it advisable to amend the Waste Collection and Disposal Bylaw No. 959, 2011;

NOW THEREFORE in open meeting assembled, the Mayor and Council of the Village of Harrison Hot Springs enacts as follows:

1. CITATION

This Bylaw may be cited for all purposes as the "Village of Harrison Hot Springs Waste Collection and Disposal Amendment Bylaw No. 982, 2011."

2. AMENDMENT

In the Waste Collection and Disposal Bylaw No. 959, 2011

a. On page 3, under the heading of Interpretation, amend to read:

"Residence" *means a single family dwelling unit or each dwelling unit of a duplex;*

b. On page 3 General Conditions, amend to read:

(a) This Bylaw only applies to residences.

c. On page 4 Residential Domestic Waste Collection Service, amend to read:

(c) Every owner of a residence within the Village shall be entitled to have their Domestic Waste, Recyclables and Green Waste collected and disposed of by the Waste Collector, except where a Resident commits an offence against this bylaw.

(d) *Every owner of a residence within the Village shall pay the applicable fees for this service as set out in Schedule "A".*

(f) On their Waste Collection Day, each residence requiring service shall not:

d. On page 5 Fees and Charges, amend 5(a) to read:

(a) The Annual fee applicable under this Bylaw for residences shall form a separate utility amount.

Delete (c) and (d)

e. On page 7, Schedule "A" under Annual Fee, amend to read:

1.	*Collection Fee per residence*	*$153.00*
2.	*Sticker Tags (each)*	*$ 2.00*

3. *The fees will be billed quarterly.*

4. *A 10% penalty will be applied to any unpaid balance on the fees and charges outstanding by the due date.*

5. *Any fees and charges remaining unpaid by the end of the calendar year shall be deemed to be taxes in arrears.*

3. **READINGS AND ADOPTION**

READ A FIRST TIME THIS 8th DAY OF AUGUST, 2011

READ A SECOND TIME THIS 8th DAY OF AUGUST, 2011

READ A THIRD TIME THIS 8th DAY OF AUGUST, 2011

RESCINDED THIRD READING THIS DAY OF SEPTEMBER, 2011

AMENDED AND READ A THIRD TIME THIS DAY OF SEPTEMBER, 2011

ADOPTED THIS DAY OF , 2011.

Mayor

Corporate Officer

HARRISON HOT SPRINGS
Naturally Refreshed

VILLAGE OF HARRISON HOT SPRINGS

REPORT TO COUNCIL

TO: Mayor and Council **DATE: August 30, 2011**

FROM: Debra Key, Deputy Chief Administrative Officer/ Corporate Officer **FILE: 3900-01**

SUBJECT: Water Regulation Amendment Bylaw No. 984

ISSUE:

To obtain first, second and third reading to Water Regulation Amendment Bylaw No. 984, 2011.

BACKGROUND:

When the Water Regulation Bylaw No. 967 was adopted in March 2011, the intent was to charge user rates on an annual basis and after further consideration, it is recommended by staff that we move to a quarterly billing system.

RECOMMENDATION:

THAT Water Regulation Amendment Bylaw No. 984, 2011 receive first, second and third reading.

Respectfully submitted for your consideration;

Debra Key
Deputy Chief Administrative Officer/Corporate Officer

DIRECTOR OF FINANCE COMMENTS:

Dale Courtice
Director of Finance

CHIEF ADMINISTRATIVE OFFICER COMMENTS:

Ted Tisdale
Chief Administrative Officer

HARRISON HOT SPRINGS
Naturally Refreshed

VILLAGE OF HARRISON HOT SPRINGS

BYLAW NO. 984

A bylaw to amend the Water Regulation Bylaw No. 967

WHEREAS the Village of Harrison Hot Spring has deemed it advisable to amend Water Regulation Bylaw No. 967;

NOW THEREFORE in open meeting assembled, the Mayor and Council of the Village of Harrison Hot Springs enacts as follows:

1. **CITATION**

This Bylaw may be cited for all purposes as the "Village of Harrison Hot Springs Water Regulation Amendment Bylaw No. 984, 2011".

2. **TEXT AMENDMENT**

a. That on page 10 under Section 12 User Fees amend by deleting 12.3 and 12.4;

b. That Schedule "A" of Bylaw No. 967 be replaced by Schedule "A" as attached.

3. **READINGS AND ADOPTION**

READ A FIRST TIME THIS DAY OF ,2011

READ A SECOND TIME THIS DAY OF ,2011

READ A THIRD TIME THIS DAY OF ,2011

ADOPTED THIS DAY OF ,2011

Mayor

Corporate Officer

SCHEDULE "A"

1. WATER CONNECTION FEE

(A)Single Family	$1500.00 plus tax
(B)Duplex (each unit	$1500.00 plus tax
(C) Multi-Family & Commercial	Actual cost plus tax ($1500.00 deposit)

2. METRE TEST

(A)Residential	$ 150.00 plus tax
(B)Commercial	$ 250.00 plus tax

3. DISCONNECTION FEE

(A)Disconnection Fee	$ 150.00 plus tax
(B)Inspection	$ 50.00 plus tax
(C)Water Turn on/off Fee	$ 50.00 plus tax

4. WATER USER RATES

(A)Residential Flat Rate	$ 311.00 annual
(B)Residential swimming pool	$ 311.00 annual
(C)Commercial Metered user rate (per cubic meter)	$ 0.51 per cubic Meter

5. The user rates will be billed quarterly.
6. A 10% penalty will be applied to any unpaid balance on the fees and charges outstanding by the due date.
7. Any fees and charges remaining unpaid by the end of the calendar year shall be deemed to be taxes in arrears.

HARRISON HOT SPRINGS
Naturally Refreshed

VILLAGE OF HARRISON HOT SPRINGS

REPORT TO COUNCIL

TO: Mayor and Council **DATE: August 30, 2011**

FROM: Debra Key, Corporate Officer **FILE: 3900**

SUBJECT: Bylaw No. 985 Sewer Regulation Amendment

ISSUE:

Bylaw No. 985, 2011 Sewer Regulation Amendment to receive three readings.

BACKGROUND:

When the Sewer Regulation Bylaw No. 980 was adopted on July 11, 2011, the intent was to charge user rates on an annual basis and after further consideration it is recommended by staff that we move to a quarterly billing system.

RECOMMENDATION:

THAT the Sewer Regulation Amendment Bylaw No. 985, 2011 be received for first, second and third reading.

Respectfully submitted for your
consideration;

Debra Key
Deputy Chief Administrative Officer/ Corporate Officer

DIRECTOR OF FINANCE COMMENTS:

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Dale Courtice
Director of Finance

CHIEF ADMINISTRATIVE OFFICER COMMENTS:

Ted Tisdale
Chief Administrative Officer

HARRISON HOT SPRINGS
Naturally Refreshed

VILLAGE OF HARRISON HOT SPRINGS

BYLAW NO. 985

A bylaw to amend the Sewer Regulation Bylaw No. 980

WHEREAS the Village of Harrison Hot Spring has deemed it advisable to amend Sewer Regulation Bylaw No. 980;

NOW THEREFORE in open meeting assembled, the Mayor and Council of the Village of Harrison Hot Springs enacts as follows:

1. **CITATION**

This Bylaw may be cited for all purposes as the "Village of Harrison Hot Springs Sewer Regulation Amendment Bylaw No. 985, 2011".

2. **TEXT AMENDMENT**

a. On page 14 Schedules be amended by the following:

(b) Schedule A – Prohibited Waste, Restricted Waste and Specified Waste be amended to read Schedule "B" – Prohibited Waste, Restricted Waste and Specified Waste

(c) Schedule B – Restricted Wastes – Sanitary Sewer Discharges amended to read Schedule "C" - Restricted Wastes – Sanitary Sewer Discharges attached hereto and forming part of this bylaw

b. That Schedule "A" of Bylaw No. 980 be replaced by Schedule "A" as attached

3. **READINGS AND ADOPTION**

READ A FIRST TIME THIS DAY OF ,2011

READ A SECOND TIME THIS DAY OF ,2011

READ A THIRD TIME THIS DAY OF ,2011

ADOPTED THIS DAY OF ,2011

Mayor

Corporate Officer

Schedule "A"
SANITARY SEWER COMMENCEMENT AND TERMINATION FEES

1. SERVICE CONNECTION FEE:	
(1)Single Family Residential	$ 800.00
(2)Multi-Family Residential	*Actual cost
(3)Commercial	*Actual cost
	(*shall be paid for each Service Connection with a minimum $800.00 deposit)
2. DISCONNECTION FEE:	$ 150.00
3. USER RATES:	**Annual**
Dwelling (per dwelling unit)	$ 150.00
Hotel (per room)	$ 86.00
Motel (per room)	$ 86.00
Campground	
Per sewered campsite (each)	$ 59.70
Sewered sani-dumps (each)	$ 59.70
Washroom Fixtures (each)	$ 59.70
Church	$ 140.00
Barbershop, Beauty Salon	$ 354.30
Laundry	$5,369.00
Coin Laundry (per machine)	$ 37.60
Commercial Pool	$2,193.80
Spa	$ 880.50
Licensed Establishment (per seat)	$ 14.40
Restaurant, Cafe (per seat)	$ 14.40
School (per classroom)	$ 172.00
Retail Establishment	$ 140.00
Service Station	$ 280.80
Office	$ 140.00
Repair Shop	$ 140.00
Storage/Maintenance Shop	$ 100.00
Swimming Pools and/or Spa Pools that discharge water on a constant basis and are metered	$ .41/m^3

4. User rates will be due and payable on a quarterly basis.

5. A 10% penalty will be applied to any unpaid balance on the fess and charges outstanding by the due date.

6. Any fees and charges remaining unpaid by the end of the calendar year shall be deemed to be taxes in arrears.

HARRISON HOT SPRINGS
Naturally Refreshed

VILLAGE OF HARRISON HOT SPRINGS

REPORT TO COUNCIL

TO: Mayor and Council

DATE: September 8, 2011.

FROM: Ted Tisdale,
Chief Administrative Officer

FILE: 3900-01

SUBJECT: Sign Bylaw No. 987

ISSUE:

The Sign Bylaw adopted in 2010 required several housekeeping amendments in relation to 3rd party sign, sandwich board, and general clean up.

BACKGROUND:

The focus of the sign bylaw "is to attract, encourage and enhance tourism and business development to the community."

Some provisions of the current Sign Bylaw are considered too regulatory and detracts from the purpose of promoting tourism and business development particularly in the area of 3rd party and sandwich board signs.

RECOMMENDATION:

THAT Council give Sign Bylaw No. 987, 2011 first, second and third reading.

Respectfully submitted for your
consideration;

Ted Tisdale
Chief Administrative Officer

DIRECTOR OF FINANCE COMMENTS:

Dale Courtice
Director of Finance

HARRISON HOT SPRINGS
Naturally Refreshed

VILLAGE OF HARRISON HOT SPRINGS
BYLAW NO. 987

A bylaw to regulate signs

WHEREAS the Village of Harrison Hot Springs has deemed it advisable to establish a bylaw to regulate signs in the Village of Harrison Hot Springs.

NOW THEREFORE in open meeting assembled, the Mayor and Council of the Village of Harrison Hot Springs enacts as follows:

1. CITATION

This Bylaw may be cited for all purposes as the "Village of Harrison Hot Springs Sign Bylaw No. 987, 2011".

2. INTERPRETATIONS

"Billboard" means a panel, sign-board, bulletin board, boarding or boarding mounted on a building or free-standing structure, and use or intended to be used for the posting or displaying of notices or advertising materials pasted, glued, fastened or otherwise affixed thereto.

"Business/Premises" means a building that is used to carry on commercial or industrial undertakings of any kind from within the boundaries of the Village, providing professional, personal, or other services for the purpose of gain or profit, but does not include an activity carried on by the Federal and/or Provincial Governments, their agencies or corporations.

"Election" as defined in the *Election Act* [RSBC 1996] Chapter 106.

"Civic Properties" means property owned by the Village and highways.

"Freestanding" means a sign wholly or partially supported from the ground by a structure which is independent of any building or structure

"Home Occupation" means a business carried on in a dwelling unit by a resident of that dwelling unit

"Promotional" means the publicizing, advancement, encouragement and fostering of an enterprise

"Sandwich Board" means a one or two face non-illuminated portable sign with a maximum area of 2 square meters on each side.

"Third Party" means a sign that directs attention to products sold or services on property other than which the sign is affixed

3. PURPOSE

The focus of the Village activities is to attract, encourage and enhance tourism and business development to the community, and therefore as a matter of interpretation a bylaw will always be interpreted in a way that will benefit the objectives of the Village in the promotion of tourism.

4. GENERAL PROVISIONS

4.1 Signs may be erected or lit providing they do not interfere with the visibility of a traffic control device or to interfere with an access or egress from a highway or intersection.

4.2 Signs may be equipped with flashing, oscillating or moving lights or beacons providing they do not cast a direct beam on any highway or business/residential premises or to interfere with the visibility of a motorist on a highway.

4.3 Only signs owned by Federal and Provincial Governments or the Village shall be permitted on a road right-of-way or on property owned by the Village, unless otherwise provided for in this bylaw.

4.4 Signs or part thereof shall not be suspended or projected over a highway right-of-way or property owned by the Village unless approved by the Village.

4.5 Signs projecting over private pedestrian area shall have a clearance to the underside of the projection of at least 2.5 meters above grade.

4.6 Signs shall not project over a travel portion of a lane or road right-of-way.

4.7 All signs must be aesthetically pleasing in appearance and maintained in a good state of repair pursuant to the Village's Sign Design Guidelines

4.8 Only signs authorized by the Village are permitted within the lakeshore beach area.

5. PROHIBITIONS

5.1 Except as provided elsewhere in this bylaw the following are prohibited.

a) Billboard signs

b) A sign located on a balcony or roof of a building

c) Signs in residential zones

d) A sign erected on Village owned property or highway

e) A sign situated on walls, fences or elsewhere on or adjacent to a highway or public place that exhibits writing or pictures or the writing of words or making of pictures or drawings which are indecent or may tend to corrupt or demoralize or considered grossly insulting language rather immoral or indecent

f) Signs or notices affixed to telephone/hydro poles.

6. EXEMPTIONS

6.1 The following signs are exempt from this bylaw.

a) Sign displayed within a shop or office

b) A sign that identifies a building

c) A sign owned or leased by the Village for municipal purposes

d) Sign of a construction company on the lands were construction is being carried out provided the sign does not exceed a copy area of 3 square meters.

e) A sign advertising the lease or sale of the property upon which the sign is located provided the sign shall not exceed 1.5 square meter copy area for residential properties and 4 square meters copy area for commercial properties copy area.

f) A temporary sign advertising special events including sporting events, community causes, charitable fundraising campaigns and non-profit arts and cultural events provided they are not displayed longer than 30 days and are removed within 4 days following the end of the event.

g) A sign on a building advertising a business or businesses within the building.

h) Signs on benches occupying municipal property under agreement with the Village.

i) Signs on municipal property where prior approval has been obtained from the Village.

j) Tourist information sign(s) with a copy area not to exceed 4 square meters.

7. DUTIES AND RESPONSIBILITIES OF THE SIGN OWNER

7.1 No person shall commence the installation of or authorize or permit the installation of a sign unless a valid permit as required by this bylaw has first been obtained.

7.2 The owner shall ensure any sign erected on his/her property when the purpose of the message thereon is no longer required is removed.

7.3 The owner shall ensure that all signs are constructed in accordance with all applicable legislation, regulations and bylaw and maintained to a safe and presentable standard to avoid risk of injury to any person or damage to any property.

7.4 Illuminated signs shall be connected to an electrical circuit on the premise which it pertains. All electrical installations shall be approved by the Province of British Columbia Electrical Safety Branch.

7.5 Freestanding signs and structures shall be designed and constructed in accordance with part 4 of the British Columbia Building Regulations to resist wind, seismic and dead loads. A professional engineer may be required to submit signed, sealed and dated structural drawings and may be required to supervise all engineering components of the sign.

7.6 Freestanding signs and signs located in landscaped areas shall have a clearance space of 2.5 meters between the lowest portion of the sign and the finished grade of sidewalk or street.

8. APPLICATION

8.1 An application for a sign permit shall be completed on the prescribed form and be accompanied by the fee as prescribed in Schedule "A".

8.2 The applicant, in addition to the requirements of the Village's building regulation bylaw shall provide a plan of the proposed copy area and the intended location of the sign on an appropriate site plan.

9. TYPES OF SIGNS AND REGULATIONS

9.1 Business/Premises Sign

Businesses may advertise their activity on their business premise by means of sign with a copy area of not more than of 3 square meters either attached to the building or a sign supported from the ground by structural members and independent from the building which shall be regulated, constructed, installed as follows:

a) Signs shall not extend beyond the property line and shall not interfere with public safety.

b) Only one sign shall be allowed on each property except

i) properties having a frontage of greater than 15 meters and an area exceeding ¼ hectare one freestanding sign shall be permitted for each additional ¼ ha or part thereof, or

ii) property situated on a corner lot one freestanding sign shall be permitted adjacent to each intersecting highway.

c) Business/Premise signs shall only be permitted in commercial and institutional zoned properties and shall be restricted to advertise the businesse(s) on that property unless otherwise provided for in this bylaw.

9.2 Village's Capital Works – Temporary Sign

For any business that may be affected by the Village's capital works or other construction projects may with the approval of the Village place a temporary business sign on road right-of-way or other commercial properties subject to the following:

a) prior permission is granted by the Village or Commercial Property owner.

b) the sign is removed within 10 days of completion of the capital works or other construction project or where the construction no longer interferes with the business to which the sign pertains.

c) the copy area of the sign shall not exceed 4 square meters.

9.3 Sandwich Board Signs

Sandwich board signs will be permitted subject to the following conditions:

a) Up to three (3) signs per business

b) the sandwich board sign may only be displayed adjacent to or within 300 meters of the business owner's property.

c) as determined by the building inspector or bylaw enforcement officer the sign shall not be placed in a manner that is a nuisance to or impede vehicle or pedestrian traffic or is a safety hazard.

d) the sign shall not be located in parking areas or parking stalls.

e) the sign must be kept in clean and good repair and in a presentable condition at all times, as determined by the Bylaw Enforcement Officer.

f) the Village at its sole discretion may have the signs removed if the owner fails to do so on notice by the Village.

9.4 Freestanding Signs

a) Freestanding signs are permitted subject to the following:

i) the number of freestanding sign located on the site shall not exceed the greater of 1 per each street frontage of the site or 1 for each 2 businesses located on the site.

ii) the area of the freestanding sign shall not exceed 4 square metres plus an additional 1 square metre for each 15 meters of street frontage of the site which abuts the street, provided that the maximum area of a freestanding sign shall not exceed 8 square metres.

iii) the maximum height of a freestanding sign shall not exceed 10 metres.

9.5 Third Party Signs

a) Third party signs including signs advertising the property for sale are permitted subject to the following conditions:

i) Third party signs may be permitted in commercially zoned properties or residential properties of 1 acre or greater located adjacent to Hot Springs Road.

ii) if the property is occupied by a business activity or residence up to two third party signs may be permitted.

iii) If it is vacant commercial property up to three third party signs may be permitted.

v) third party signs may have a copy area not greater than 4 square meters.

vi) all third party signs must be renewed annually.

9.6 Promotional Signs

a) Signs required to advertise a special or community event may be permitted subject to the following:

i) signs shall be located entirely on the property of the event or another location as approved by the Village.

ii) signs shall be displayed for not more than 30 day prior to the event and must be removed 4 days following the event.

iii) signs shall be limited to 2 sides with a maximum copy area of 3 square meters per side.

9.7 Home Occupation

a) Signs advertising accessory home occupation as defined and permitted in the Village's zoning bylaw may be permitted subject to the following:

i) signs shall not exceed a copy area of 1 square metre and only one sign shall be permitted.

ii) signs may be placed flat against an exterior wall of a building or attached to a fence or gate

iii) signs are to be non-illuminated

iv) a free standing sign shall not exceed 2 metres in height.

v) the sign must be contained within the property of the Home Occupation.

9.8 Election signs

a) Election signs are permitted subject to the following:

i) every candidate in an election wishing to post or display an election sign on civic property shall prior to the posting or display of any sign, make application to the Corporate Officer for an election sign permit on the form provided by the Village and shall at the time of application deposit $150.00 with the Village as security.

ii) every candidate who posts or displays an election sign on civic property shall remove the sign within 7 days after the election. If the person fails to remove the sign the sign shall be removed by the Village and the cost incurred for the removal shall be recovered from the deposit made by the candidate.

iii) election signs shall only be posted or displayed during the election period

iv) no signs shall be posted or displayed on or near civic property or sidewalk in a manner which interferes with motorist visibility or represents a safety hazard to the pedestrian traffic.

10. ENFORCEMENT

a) the Bylaw Enforcement Officer or Building Inspector are hereby empowered to:

i) enter at all reasonable times onto any property subject to the regulation of this bylaw to ascertain whether the regulations or directions are being observed.

ii) order a person who is violating any of the provisions of this bylaw to comply with such provisions within the time specified.

iii) order a "stop work" if any part of the work is proceeding in contravention of any of the provisions of this bylaw if there is an unsafe condition on the real property on which the work is being carried out.

iv) order the removal of any sign or part thereof constructed or maintained in contravention of any of the provisions of this bylaw or building code.

v) revoke the permit issued under this bylaw or building code if:

a) there is contravention of the bylaw

b) if the permit was issued in error

c) if the permit was issued on the basis of incorrect information or;

d) any fees required to be paid in this bylaw have not been paid.

11. PENALITIES

11.1 Every person who commits an offence contrary to the provisions of this Bylaw is liable on summary conviction to a penalty of not more than $2,000.00 or imprisonment for up to six months in addition to the costs of prosecution.

11.2 Each day that a violation is permitted to exist constitutes a separate offence.

12. REPEAL

That "Village of Harrison Hot Springs Sign Bylaw No. 949, 2010 be hereby appealed in its entirety.

13. READINGS AND ADOPTION

READ A FIRST TIME THIS DAY OF , 2011

READ A SECOND TIME THIS DAY OF , 2011

READ A THIRD TIME THIS DAY OF , 2011

ADOPTED THIS DAY OF , 2011

Mayor

Corporate Officer

BYLAW NO. 987 SIGN SCHEDULE "A"

Fee Schedule

1. All signs except sandwich boards & temporary signs.	$50.00

HARRISON HOT SPRINGS
Naturally Refreshed

VILLAGE OF HARRISON HOT SPRINGS

REPORT TO COUNCIL

TO: Mayor and Council **DATE:** September 8, 2011.

FROM: Andre Isakov, Community and Economic Development Officer **FILE:** 6520-20-08

SUBJECT: **OCP Amendment Bylaw No. 988, 2011 (Neighbourhood Plan – Pine Avenue and Neighbourhood Plan – Echo Avenue and Eagle Street)**

ISSUE:

Based on public comments, staff have identified practical amendments to the Schedule 1 – E (Neighbourhood Plan – Pine Avenue) and Schedule 1 – F (Neighbourhood Plan – Echo Avenue and Eagle Street) of the Village of Harrison Hot Springs OCP. The amendments are before Council for consideration.

BACKGROUND:

Following some dialogue with property owners and potential developers within the Pine Avenue Neighbourhood Plan (also known as the Planning Area 1), and the Echo Avenue and Eagle Street Neighbourhood Plan (also known as the Planning Area 2); staff have identified some practical amendments to the respective neighbourhood plans. The intention of the amendments is to allow for housekeeping changes and updates, further clarity in language and direction, as well as flexibility in regards to property development, without jeopardizing and losing key elements and the spirit of the outlined neighbourhood plans. With the changes, the main planning principles have not changed and are preserved.

The main changes to the neighborhood plans are summarized below. Most of the changes were minor in nature and are intended to make the Plans less rigid and inflexible. The replacement Bylaw No. 988, 2011 is attached to this report for your reference.

Neighbourhood Planning Area 1 – Pine Avenue (Schedule 1 – E)

1. Land Use: prescriptive reference to conventional residential lot development (697 sq. m. or 7500 sq. ft) along McCoombs Drive was deleted to allow for flexibility and the potential of small lot single family development (400 sq. m. or 4306 sq. ft. lot) along McCoombs.

2. Transportation and Access: changes were made to allow for a potential of a new public east – west road connecting Hot Springs Road and McCombs Drive for ease of mobility.

Neighbourhood Planning Area 2 – Echo Avenue and Eagle Street (Schedule 1 – F)

1. Land Use: the single family residential designation along the north side of Echo Avenue has been extended from Spruce Street to Eagle Street to allow for continuity in neighbourhood framework and to accommodate community sentiments. These changes are reflected in the revised Appendix A.

The following options are provided for Council's consideration:

Option 1

Read "OCP Amendment Bylaw No. 988, 2011" first and second time with the outlined text amendments and authorize the public hearing and the referral of the Bylaw to the Advisory Planning Commission for review and comment;

Option 2

Request staff to revise the "OCP Amendment Bylaw No. 988, 2011";

Option 3

Decide not to proceed further with "OCP Amendment Bylaw No. 988, 2011".

RECOMMENDATION:
Option one is recommended as a course of action to pursue.

Respectfully submitted for your
consideration;

Andre Isakov
Community and Economic Development Officer

DIRECTOR OF FINANCE COMMENTS:

Dale Courtice
Director of Finance

CHIEF ADMINISTRATIVE OFFICER COMMENTS:

Ted Tisdale
Chief Administrative Officer

HARRISON HOT SPRINGS
Naturally Refreshed

VILLAGE OF HARRISON HOT SPRINGS
BYLAW NO. 988

A bylaw to amend Village of Harrison Hot Springs Official Community Plan Bylaw 864, 2007

WHEREAS the Mayor and Council has deemed it advisable to amend the Village of Harrison Hot Springs Official Community Plan Bylaw No. 864, the Official Community Plan Bylaw for the Village of Harrison Hot Springs, as adopted May 7, 2007;

NOW THEREFORE in open meeting assembled, the Mayor and Council of the Village of Harrison Hot Springs enacts as follows:

I. CITATION

This Bylaw may be cited for all purposes as the "Village of Harrison Hot Springs Official Community Plan Amendment Bylaw No. 988, 2011".

II. TEXT AMENDMENT

A. That Schedule 1 - E, (Neighbourhood Plan – Pine Avenue) of the Village of Harrison Hot Springs Official Community Plan No. 864, be deleted and replaced with Schedule 1-E, Neighbourhood Plan – Pine Avenue, attached hereto and forming part of this Bylaw;

B. That Schedule 1 – F (Neighbourhood Plan – Echo Avenue and Eagle Street) of the Village of Harrison Hot Springs Official Community Plan No. 864, be deleted and replaced with Schedule 1-F, Neighourhood Plan – Echo Avenue and Eagle Street, attached hereto and forming part of this Bylaw.

III. READINGS AND ADOPTION

READ A FIRST TIME THIS DAY OF , 2011

READ A SECOND TIME THIS DAY OF , 2011

A PUBLIC HEARING WAS HELD ON THE DAY OF , 2011

READ A THIRD TIME THIS DAY OF , 2011

ADOPTED THIS DAY OF , 2011

_____ _____

Mayor Corporate Officer

SCHEDULE 1-E

NEIGHBOURHOOD PLAN – PINE AVENUE

A. POLICY FRAMEWORK

Council will utilize the following policies in guiding the development of land within the planning area:

1) Land Use Concept

A number of land use options were considered in the preparation of the **Neighbourhood Plan – Pine Avenue**. They differed with respect to the amount and location of small (400 square meters) and conventional lots (697 square meters), and low density multi family dwellings (townhouses). Only residential uses were considered.

The land use concept for the **Neighbourhood Plan – Pine Avenue** as outlined in **Appendix A**. All land fronting Hot Springs Road has been designated for small lot or multi-family residential development. New development on land fronting McCombs Drive can remain designated for conventional single family lots or alternatively be designated for small lot single family residential housing.

Based upon an average density of 35 units per hectare (14 units per acre), it is estimated that the maximum number of new dwelling units should not exceed 250 units.

2) Land Use and Density

a) The land within the **Neighbourhood Plan – Pine Avenue** shall be developed as a residential neighbourhood.

b) Within the **Neighbourhood Plan – Pine Avenue**, a mix of single family and multi family forms of residential development may be accommodated based upon the following maximum density limits:

i) Small residential lot – 400 sq. m. (4306 sq. ft.)

ii) Conventional residential lot – 697 sq. m. (7500 sq. ft.)

iii) Low density multi family residential – 35 units / ha (14 units / acre).

The maximum density limit of 35 units per ha. for the low density multi family residential development is equivalent to the density of a small residential lot subdivision.

c) Small lot single family developments and low density multi family housing should be concentrated along Hot Springs Road and near the centre of the neighbourhood.

d) To facilitate the efficient redevelopment of the lands, assembly of existing single family lots is the preferred approach; however redevelopment options for individual lots shall be considered.

e) To avoid piecemeal development, rezoning applications shall only be considered for small lot residential subdivision or multi family development on sites greater than 0.4 ha (1 acre).

f) Individual rezoning applications shall demonstrate the manner in which the proposed development will tie into adjacent lands or proposed development and to the neighbourhood as a whole.

g) Rezoning applications for new development that would result in affordable housing opportunities for seniors or young families and that would be constructed to a higher than normal standard with green building technology shall be favourably considered.

h) Secondary suites may be accommodated within houses on conventional single family lots subject to an amendment to the Zoning Bylaw.

3) Building Design and Landscaping

a) Upon rezoning, multi family residential development shall be included within Multi Family Residential Development Permit Area No 3 and shall be subject to the applicable guidelines.

b) Landscaping elements shall be incorporated along Hot Springs Road that will create a pleasing gateway into the Village.

c) Buffers will be required in the form of landscaping along the interface with the surrounding neighborhoods to the north, east and south.

4) Transportation and Access

a) Pine Avenue will continue to function as an east – west road within the neighbourhood.

b) A new public east – west road connecting Hot Springs Road and McCombs Drive may be considered for ease of mobility.

c) New internal public road(s) off Pine Avenue connecting back to Hot Springs Road or McCombs Drive may be considered.

d) Individual driveway access onto Hot Springs Road shall be minimized and eliminated where possible.

5) Parks and Trails

a) 0.2 ha (0.5 acre) of land, equivalent to 5% of the developable area of the neighbourhood, or payment equivalent in lieu.

b) The neighbourhood park should be located in the central portion of the neighbourhood and should be connected to the new residential areas with trails where possible.

c) The exact location of the proposed neighbourhood park shall be considered at the time of the subdivision or first rezoning application, however the ultimate decision shall depend upon the amount of land and location that is the subject of the first application.

d) Both north - south and east - west pedestrian and cycling linkages shall be secured within the neighbourhood providing neighbourhood residents with connections to Hot Springs Road, McCombs Drive, and local amenities.

6) Infrastructure

a) Although Village services are adequate for new development in the planning area, the adequacy of the existing infrastructure to service any new development shall be determined prior to rezoning the lands.

b) All on site works and upgrading of existing road frontages shall be the responsibility of the developer and shall be secured at the time of rezoning or subdivision.

c) A comprehensive storm water management plan shall be prepared at time of rezoning or subdivision.

7) Environment

a) Although there are no significant environmental features within the area, the Village shall encourage developers to retain mature trees where possible subject to the preparation of an arborist report.

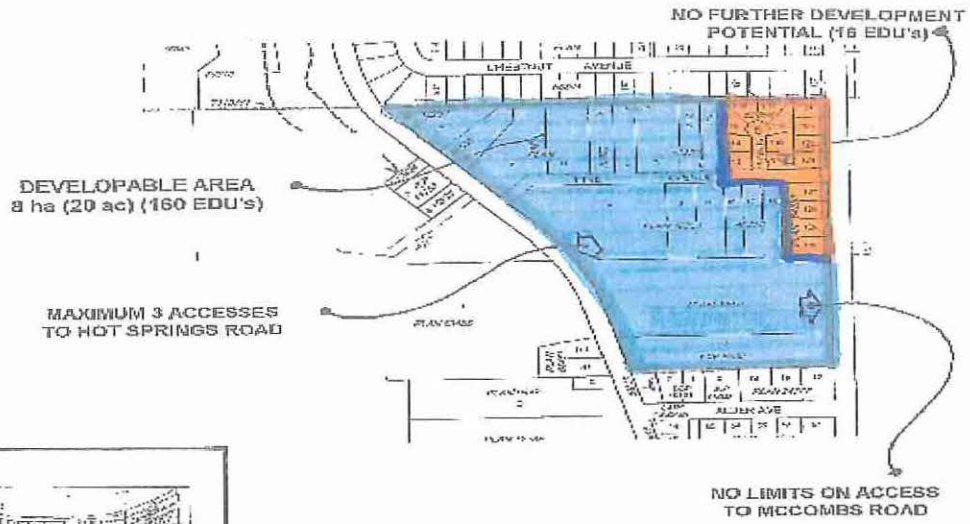
b) Clustering of development and smaller building footprints are encouraged to minimize the creation of impermeable surfaces.

c) All development shall conform to applicable flood protection requirements.

APPENDIX A

LAND USE CONCEPT

VILLAGE OF HARRISON HOT SPRINGS
NEIGHBOURHOOD PLANNING AREA 1
PLANNING FRAMEWORK PROPOSAL



REFERRAL DOCUMENTS
NTS
OCTOBER 28, 2009

SCHEDULE 1-F

NEIGHBOURHOOD PLAN – ECHO AVENUE AND EAGLE STREET

A. BACKGROUND AND PURPOSE

The Village's Official Community Plan (OCP) designates the area bounded by Lillooet Avenue to the north, Mount Street to the east, Echo Avenue to the south, and Miami Creek to the west as **Neighbourhood Planning Area 2.**Section 3.2.4 of the OCP speaks to **Neighbourhood Planning Area 2** by indicating that the area has the potential to accommodate medium density multi family development by extending the Lakeshore Residential area designation southward provided that the redesignation takes place on the basis of a comprehensive development proposal that addresses the overall area.

B. PLANNING AREA STATISTICS

The following general information is provided for the planning area:

1) Size of Area: 5.5 ha (13.5 acres)

2) Number of Existing Lots: 46

3) Current Zoning: Primarily R-2 (Two Family Residential)
2 lots: R-4 (Multi Family Residential - Medium Density)
2 lots: P-1 (Community Institutional)

4) Existing Municipal Services: Municipal water and sewer

C. PLANNING CONTEXT AND ISSUES

Neighbourhood Planning Area 2 has been identified in the Official Community Plan as an area that could transition from a predominantly single family area with smaller older homes to an area with a series of medium density multi-family residential buildings. This neighbourhood is in close proximity to the Village's primary commercial area and Harrison Lake. Consistent with current sustainability principles, the increase in density of this neighbourhood is seen as an opportunity to promote a more walkable community enabling more people to live close to the beach and community's major amenities. The challenge for the Village in planning for the redevelopment of an existing established residential neighbourhood is the consideration of the following issues:

1) is the infrastructure capable of accommodating an increase in development?;

2) what can be done to mitigate the impacts of a neighbourhood in transition?;

3) will people be displaced if older housing is replaced with new housing?;

4) can the older homes co-exist with new development?;

5) will the densities be high enough to enable a developer to purchase land at a price that will be acceptable to the existing property owner?;

6) what are the important design features for the new housing?; and

7) what features can be integrated in the design of the area that would promote sustainability?

D. PLANNING PRINCIPLES

In an attempt to address the above noted issues, the redevelopment of **Neighbourhood Planning Area 2** shall respect the following planning principles:

1) The change of use and density of the neighbourhood shall respect the character of the single family neighbourhood on the south side of Echo Avenue.

2) To facilitate the efficient redevelopment of properties, the assembly of existing single family lots is the preferred approach; however redevelopment options for individual lots shall be provided where possible.

3) Density of development shall decrease as the distance from the lake increases.

4) New development shall be designed to cater to full time residents as opposed to part time residents.

5) Development proposals shall identify the manner in which existing residents who may be displaced will be housed elsewhere.

6) If necessary, new zones will be created to accommodate innovative development proposals.

7) Density bonuses will be considered for development projects that provide:

   a) rental housing or have some units owned and operated by a housing society;

   b) community amenities either within the neighbourhood or elsewhere within the Village;

   c) green building elements that promote energy and water conservation; and

   d) tangible opportunities for promoting alternative modes of transportation.

7) Infrastructure upgrades shall be the responsibility of the developer.

E. LAND USE CONCEPT

A number of land use options were considered in the preparation of the **Neighbourhood Plan**. They differed with respect to the amount and location of small (400 square meters) and conventional lots (557 - 697 square meters), and multi family dwellings (townhouses and low rise apartments). The land use concept for the **Neighbourhood Plan** is outlined in **Appendix A**, the highlights of which are as follows:

- the land fronting Lillooet Avenue and Eagle Street is designated for multi-family residential development;

- the land on the north side of Echo between Eagle and Mount is intended to remain single family in character accommodating smaller lots and / or a second smaller dwelling such as a cottage or coach house;

- the church on the south side of Lillooet would remain as part of the neighbourhood;

- Bear Avenue between Eagle and Spruce could be closed;

- the park along the Miami River would be linked to a new park at the intersection of Spruce and Lillooet that would serve the local park needs of the neighbourhood.

- the land designated as multi family outlined in Appendix B is subject to a Development Permit.

Based upon an average density of 30 units per hectare (12 units per acre), it is estimated that the maximum number of new dwelling units would be in the 120 - 150 unit range.

F. POLICY FRAMEWORK

Council will utilize the following policies in guiding the development of land within the planning area:

1. Land Use and Density

a) The land within the **Neighbourhood Plan** shall be developed primarily as a residential neighbourhood. Commercial development as part of a mixed commercial / residential project will be accommodated on a small section of the south side of Lillooet Avenue between the Miami River park and Eagle Street. The church on the south side of Lillooet Avenue shall be retained adding diversity to the neighbourhood.

b) Within the **Neighbourhood Plan**, a mix of single family and multi family forms of residential development may be accommodated based upon the following maximum density limits:

i) Small residential lot – 400 sq. m. (4306 sq. ft.) minimum lot size with a 12 meter wide frontage except for panhandle lots;

ii) Conventional residential lot – 557 sq. m. (6000 sq. ft.) minimum lot size

iii) Low density multi family residential (townhouse –maximum 35 units / ha. (14 units / acre)

iv) Medium density multi family residential (low rise apartment – maximum 74 units / ha. (30 units / acre).

c) The multi family site designated at the east end of Echo Avenue along Mount Road shall be developed in such a manner that vehicular access shall be arranged off of Lillooet Avenue and not Echo.

d) For the lots on the north side of Echo Avenue designated Single Family, new zoning regulations shall be considered that will accommodate small cottages or guest houses in the rear portion of a lot, their size and siting to respect the single family character of the street.

e) The Village will consider innovative zoning regulations to retain the character house at the north-west corner of Echo and Eagle.

f) Secondary suites shall be accommodated within houses on conventional single family lots subject to an amendment to the Zoning Bylaw.

g) To facilitate the efficient redevelopment of the lands for multi family housing, assembly of existing single family lots is the preferred approach; however redevelopment options for individual lots shall be provided where possible.

i) Individual rezoning applications shall demonstrate the manner in which the proposed development will tie into adjacent lands or proposed development and to the neighbourhood as a whole.

j) Rezoning applications for new development that would result in affordable housing opportunities for seniors or young families and that would be constructed to a higher than normal standard with green building technology will be favourably considered.

2. Building Design and Landscaping

a) Multi family residential development shall be included within Multi Family Residential Development Permit Area No. 3 and shall be subject to the applicable guidelines.

b) Upon rezoning, small lot residential subdivision shall be the subject of development permit guidelines which shall be prepared in conjunction with the rezoning application.

3. Transportation and Access

a) No new public roads shall be developed within the neighbourhood.

b) The east end of Echo Road shall continue as a cul de sac and Mount Road between Lillooet and Echo will not be developed as a connecting road.

c) Bear Avenue may be closed and disposed of to the adjoining properties when redevelopment takes place, but a trail link shall be maintained between the Miami River trail and the new park at Spruce Street.

d) Spruce Street may be closed and converted into a neighbourhood park. That portion of Spruce Street that connects to Echo could be sold off as a single family lot, but in no way will any existing houses lose their driveway accesses.

4. Parks and Trails

a) A new neighbourhood park utilizing the Spruce Street and Bear Avenue rights of way should be created and connected to the residential areas with trails where possible.

b) As a condition of rezoning, developers will be requested to make a financial contribution towards the development of the Spruce Street Park or another community Park.

c) The trails along the east side of the Miami River and within the Mount Street road allowance shall continue to provide important north – south trail linkages.

5. Infrastructure

a) Although the Village wide water, sewer, and road systems are considered adequate for new development in the planning area, the adequacy of the existing on-site infrastructure to service new development shall be determined prior to rezoning the lands.

b) Any required off-site, on-site, or upgrading of existing road frontages shall be the responsibility of the developer and shall be secured at the time of rezoning or subdivision as the case may be.

6. Environment and Hazard Land

a) Although there are no significant environmental features within the area, the Village shall encourage developers to retain mature trees where possible subject to the preparation of an arborist report.

b) Clustering of development and smaller building footprints are encouraged to minimize the creation of impermeable surfaces.

c) All development shall conform to applicable flood protection requirements.

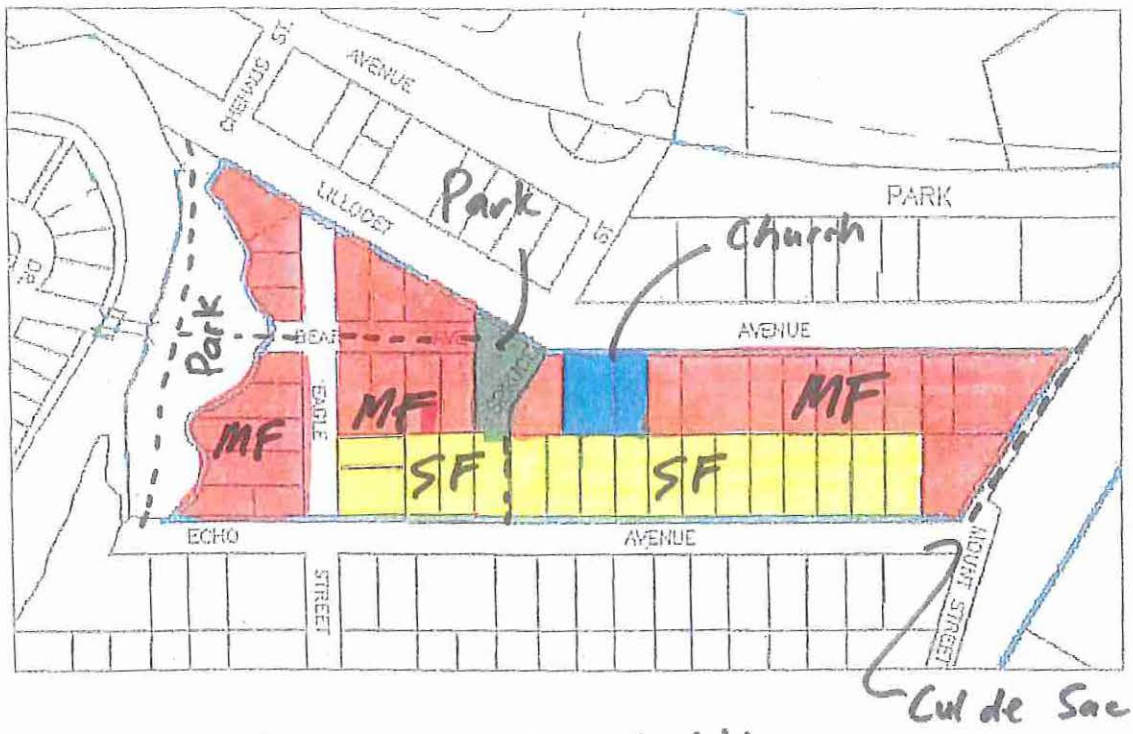
d) Redevelopment of the sites at the far east end of the Neighbourhood Plan area shall be subject to the applicable guidelines within the Geotechnical Hazards Development Permit Area No 4.

G. CONCLUSION

The Neighbourhood Plan has been devised in accordance with a series of planning principles that are consistent with best management practices related to sustainability. The density and housing form that has been established will enable the neighbourhood to provide a gradual transition from the higher density area along the lake to the single family neighbourhood to the south. It is anticipated that the changes to the neighbourhood will take place over time.

APPENDIX A

LAND USE CONCEPT



APPENDIX B

MULTI FAMILY RESIDENTIAL DEVELOPMENT PERMIT AREA

Multi Family Residential Development Permit Area

HARRISON HOT SPRINGS
Naturally Refreshed

VILLAGE OF HARRISON HOT SPRINGS

REPORT TO COUNCIL

TO: Mayor and Council **DATE:** September 8, 2011.

FROM: Andre Isakov, Community and Economic Development Officer **FILE: 3360-20-01**

SUBJECT: Zoning Amendment Bylaw No. 989

ISSUE:

Based on public comments, staff have identified practical text amendments to the Zoning Amendment Bylaw No. 672, 1996. The Bylaw No. 989 is attached to this report for reference. The text amendments within the Residential One (Small Lot) Zone (R3) allow for the flexibility of higher density residential development on small lots without strata designation. The amendments also allow for higher maximum building heights. The amendments are largely housekeeping in nature. The Zoning Bylaw is before Council for consideration.

The following options are provided for Council's consideration:

Option 1

Read "Zoning Amendment Bylaw No. 989" first and second time and authorize the public hearing and the referral of the Zoning Bylaw to the Advisory Planning Commission for review and comment;

Option 2

Request staff to revise the "Zoning Amendment Bylaw No. 989";

Option 3

Decide not to proceed further with "Zoning Amendment Bylaw No. 989".

RECOMMENDATION:

Option one is recommended as a course of action to pursue.

Respectfully submitted for your
consideration;

Andre Isakov
Community and Economic Development Officer

DIRECTOR OF FINANCE COMMENTS:

Dale Courtice
Director of Finance

CHIEF ADMINISTRATIVE OFFICER COMMENTS:

Ted Tisdale
Chief Administrative Officer

HARRISON HOT SPRINGS
Naturally Refreshed

VILLAGE OF HARRISON HOT SPRINGS
BYLAW NO. 989

A bylaw to amend Village of Harrison Hot Springs Zoning Bylaw 672, 1996

WHEREAS the Mayor and Council has deemed it advisable to amend the Village of Harrison Hot Springs Zoning Bylaw No. 672, 1996, the Zoning Bylaw for the Village of Harrison Hot Springs, as adopted October 28, 1996;

NOW THEREFORE in open meeting assembled, the Mayor and Council of the Village of Harrison Hot Springs enacts as follows:

I. CITATION

This Bylaw may be cited for all purposes as the "Village of Harrison Hot Springs Zoning Bylaw Amendment Bylaw No. 989, 2011".

II. TEXT AMENDMENT

That the Village of Harrison Hot Springs Zoning Bylaw Number 672-1996, be amended by:

1. Page 42, Section 7.3 Residential One (Small Lot) Zone (R3)

   (a) subsection .1 Intent, be amended by deleting the words, "on small bare land strata *parcels*";

   (b) subsection .3 Conditions of Use, delete in its entirety;

   (c) subsection .4 Regulations, Column II, section .8, Maximum Building Height, amend 6.0 m to 10.7 m and 2.4 m to 5.0 m.

III. READINGS AND ADOPTION

READ A FIRST TIME THIS DAY OF , 2011

READ A SECOND TIME THIS DAY OF , 2011

A PUBLIC HEARING WAS HELD ON THE DAY OF , 2011

READ A THIRD TIME THIS DAY OF , 2011

ADOPTED THIS DAY OF , 2011

Mayor

Corporate Officer

HARRISON HOT SPRINGS
Naturally Refreshed

VILLAGE OF HARRISON HOT SPRINGS

REPORT TO COUNCIL

TO: Mayor and Council **DATE:** September 8, 2011

FROM: Andre Isakov, Community and Economic Development Officer **FILE:** 3360-20-19

SUBJECT: Bylaw No. 990 Zoning Amendment - Zoning Application – Jacobi, Lot B Echo Avenue

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BACKGROUND:

The Village has received an application from Steven Jacobi and Diane Jacobi to rezone a property known as Lot B on Echo Avenue (north east corner of Echo Avenue and Eagle Street) from R-2 (Residential Two Zone) to R-3 (Residential Small Lot Zone) to accommodate the development of three small lot single family dwellings. The subject property is outlined below. The subject property is 0.318 ac/0.129Hect/13,860 SqFt/ 1,288SqM.

The subject property is designated Single Family Residential in the Official Community Plan. The rezoning is consistent with the policy framework of the Official Community Plan Schedule 1 – F (Neighbourhood Plan – Echo Avenue and Eagle Street) as the rezoning meets the following principles:

- The rezoning respects the character of the single family neighbourhood;

- The rezoning facilitates the efficient redevelopment of the property;
- The rezoning is consistent with the OCP provision that the development shall decrease in density as the distance from the lake increases;
- The rezoning does not cause any displacement of current residents;
- The rezoning is innovative in its approach to densification while respecting the neighbourhood characteristics.

The following options are provided for Council's consideration:

Option 1

Read Bylaw No. 990 Zoning Amendment a first and second time and authorize the public hearing and the referral of the application to the Advisory Planning Commission for review and comment;

Option 2

Decide not to proceed further with Rezoning Application.

RECOMMENDATION:

THAT Bylaw No. 990 Zoning Amendment be read a first and second time and authorize the holding of a public hearing; and

THAT the application be referred to the Advisory Planning Commission for review and comment.

Respectfully submitted for your
consideration;

A. Isakov

Andre Isakov
Community and Economic Development Officer

DIRECTOR OF FINANCE COMMENTS:

Dale Courtice
Director of Finance

CHIEF ADMINISTRATIVE OFFICER COMMENTS:

Tisdale

Ted Tisdale
Chief Administrative Officer

HARRISON HOT SPRINGS
Naturally Refreshed

VILLAGE OF HARRISON HOT SPRINGS
BYLAW NO. 990

A bylaw to amend Village of Harrison Hot Springs Zoning Bylaw 672, 1996

WHEREAS the Mayor and Council has deemed it advisable to amend the Village of Harrison Hot Springs Zoning Bylaw No. 672, 1996, the Zoning Bylaw for the Village of Harrison Hot Springs, as adopted October 28, 1996;

NOW THEREFORE in open meeting assembled, the Mayor and Council of the Village of Harrison Hot Springs enacts as follows:

I. CITATION

This Bylaw may be cited for all purposes as the "Village of Harrison Hot Springs Zoning Bylaw Amendment Bylaw No. 990, 2011".

II. AMENDMENT

That the Village of Harrison Hot Springs Zoning Bylaw Number 672-1996, be amended by:

(a) That the following property legally described as:

"Lot B, Plan LMP7279, Section 13, Township 4, Range 29, W6 Meridian, New Westminster District currently zoned as Residential Two Zone (R2) be rezoned as Residential One (Small Lot) Zone (R3)"

II. MAP AMENDMENT

A. That Schedule A, the Zoning Map of the Village of Harrison Hot Springs Bylaw No.672, be amended by rezoning the lands as outlined in red on Schedule 1 of this Bylaw from Residential Two Zone (R2) to Residential One (Small Lot) Zone (R3).

B. That the map appended hereto designated as Schedule 1 showing such amendment is an integral part of this Bylaw.

III. READINGS AND ADOPTION

READ A FIRST TIME THIS DAY OF , 2011

READ A SECOND TIME THIS DAY OF , 2011

A PUBLIC HEARING WAS HELD ON THE DAY OF , 2011

READ A THIRD TIME THIS DAY OF , 2011

ADOPTED THIS DAY OF , 2011

Mayor

Corporate Officer

Schedule 1 of Bylaw 990

Residential Two Zone (R2) to
Residential One (Small Lot) Zone (R3)