



Going Forward in Watershed Stewardship
for the Upper Kiskatinaw River:
A Summary of Implementation Progress

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Report Summary: The following are a series of tables that present an abbreviated list of issues, recommended actions for Watershed Stewardship dating back to the first Integrated Watershed Management plan in 1991 and its updated version in 2003. Since that time, an additional Source Water Protection Plan that focused primarily on river water quality issues was added. As can be seen, there are long-standing concerns and proposed actions that are in continuous progress, while some other proposed actions have not yet been achieved. Considerable development activity has ensued within the upper Kiskatinaw River since attention has been focused, and a clear need was identified to have much greater understanding of watershed function and processes (for both flows, and quality). Since the Watershed Program and Watershed Steward position was created in 2009, considerable effort was therefore aimed at achieving this goal while also addressing the proposed actions from the management plans. Although much remains to be done, there has indeed been progress and these can be seen from the action status highlights.



Field monitoring of land-use activities



Doing shallow ground water gauging



Monitoring river flows



Checking on Arras river intake reservoir

Stewardship Element	1991 Integrated Watershed Management Plan		2003 Integrated Watershed Management Plan	Actions
Resource Mgt Guidelines	1980 Guidelines for Watershed Management of Crown Lands Used as Community Water Supplies			
Watershed Component	Concerns	Recommended Response	Concerns	Recommended Response
Quality	<ul style="list-style-type: none"> - removal of vegetative cover causing turbidity, changes in colour, odour and taste - declining Lake levels in watershed 	<ul style="list-style-type: none"> - adherence to Guidelines for Canadian Drinking Water Quality – GCDW 4th Edition applied to raw-water source; - EMR & Oil industry contingency plans for spills (OSCAR) linked to Prov Emergency Plan - intake raw-water sampling; - main corridor assessment for suspended sediment sources - MoE licencing of all river users - BC Hydro notification to NHA to track domestic waste systems 	<ul style="list-style-type: none"> - upstream oil pipeline risk to Arras intake - cumulative access development potential for inc sediment - risk of drilling mud waste leaching into ground or surface water - road runoff has risk as potential source of contaminants - roads potential source of spill contaminants - natural erosion continuing source of sediment from peak flow events due to erosion 	<ul style="list-style-type: none"> - develop contingency plan for water quality emergency response (forest fire, spills, etc.)
	<ul style="list-style-type: none"> - lack of clarity around source water quality monitoring 			<ul style="list-style-type: none"> - continue actions for water quality protection (sediment source reduction, oil contaminant prevention, general resource development, recreation) - install hydrocarbon monitor at raw-water intake; - oil pipeline maintenance, automatic shutoffs at watercourse crossings, along with formal monitoring and inspection (Burlington Resources)
	<ul style="list-style-type: none"> - use of chemicals (agricultural pesticides/fertilizers, silviculture, fire retardant, oil/gas dev; weed control on both Crown/private land, grazing tenures) 	<ul style="list-style-type: none"> - promote manual applications where feasible for vegetation/weed control - reduce chemical use - promote organic practices - continued spring/fall water sampling by Pesticide Control Branch 		
Fish & Wildlife	<ul style="list-style-type: none"> - removal of streamside vegetation; - effects of resource dev on fur-bearers/beaver habitat; conversely, inc beaver activity affecting flows and quality (possible Giardia outbreaks) - lack of resource inventories, esp endangered species 	<ul style="list-style-type: none"> - use of F&W Habitat Protection Guidelines for Petroleum Industry; Interior Fish, Forestry & Wildlife guidelines for Forest Industry; - trapper/guide outfitter notification 		
Recreation	<ul style="list-style-type: none"> - effects of resource development and roads on wilderness recreation activities (camping, fishing, hiking) - inc opportunities for ATV, snowmobiling, X-country skiing 	<ul style="list-style-type: none"> - encourage consideration of recreation in resource development planning; - public education on sanitary practices 	<ul style="list-style-type: none"> - human waste potential - localized sediment and fuel contaminants from inc ATV activity 	<ul style="list-style-type: none"> - develop ATV awareness program for environmental protection and responsible vehicle use

Stewardship Element	1991 Integrated Watershed Management Plan		2003 Integrated Watershed Management Plan	Actions
Watershed Component	Concerns	Recommended Actions/Results	Concerns	Recommended Actions/Results
Agriculture and Grazing	<ul style="list-style-type: none"> - grazing of cattle near water courses - land clearing for agriculture and monitoring of private land activity 	<ul style="list-style-type: none"> - 10 metre leave strip for riparian zone - promote off-stream watering (dugouts, troughs) - drain feedlots/holding areas away from river/tributaries - promote conservation tillage - promote ALDA Guidelines² 	<ul style="list-style-type: none"> - unrestricted access by cattle to streams can introduce bacteria and parasites, and cause erosion - crop mgt nutrients and chemicals potential source of contaminants 	<ul style="list-style-type: none"> - develop partnerships with MoF and grazing licences to limit cattle impact to streams; - need to implement more demonstration/best mgt practices
Forestry	<ul style="list-style-type: none"> - rate of harvest, size of cutblocks, reserve strips, site prep and timber harvesting on steep slopes (i.e. fish/wildlife habitat, erosion) 	<ul style="list-style-type: none"> - cutblock layout to enhance annual and snow melt period runoff while minimizing high runoff that causes erosion - apply Dawson TSA Res Mgt Plan forestry guidelines³ - develop new MoE/ MoF guidelines for timber/agr dev 	<ul style="list-style-type: none"> - disturbed soils potential source of sediment 	<ul style="list-style-type: none"> - shifting of harvest times, site/road maintenance, deactivation and restoration; - adopt all LRMP strategies & Forest Practices Code; - develop Total Chance Plans - develop coordinated Access Management Plans to minimize unnecessary roads - conduct annual (and joint) MoF inspections of forest development impacts on water, and referral of results with City (need reporting of MPB harvesting issues and research/monitoring) - results-based mgt system to minimize water quality degradation
Soil Erosion	<ul style="list-style-type: none"> - induced sediment transfer from all dev activity roads, seismic lines, landings, well sites, stream crossings, gravel extraction - private land clearing of riparian zones - soil conservation on agricultural lands 	<ul style="list-style-type: none"> - strict adherence to MoE in-stream work guidelines; - recognition of erosion and soil stability concerns in res dev activity planning - coordinate road access development by resource users - cessation of construction under wet conditions (Apr-June), and peak storm periods; - design with 18 in+ culverts; 25 year return period peak flow⁴ 		<ul style="list-style-type: none"> - undertake sediment source identification and risk rate potential assessment with remedial plan - explore river riparian restoration opportunities
Waste Management	<ul style="list-style-type: none"> - lack of site monitoring for silvicultural activities 			<ul style="list-style-type: none"> - issue addressed through Hazard Assessment and monitoring

² Agriculture Land Development Assistance Program (PFRA administered)

³ Guidelines for Cutblock, shape, and reserve, reforestation

⁴ Guidelines for Watershed Management of Crown Lands Used as Community Water Supplies



Stewardship Element		1991 Integrated Watershed Management Plan		2003 Integrated Watershed Management Plan		Actions	
Watershed Component	Concerns	Recommended Actions	Concerns	Recommended Actions	Concerns	Recommended Actions	Recommended Actions
Oil & Gas			<ul style="list-style-type: none"> - City not able to remove a wide range of dissolved chemicals or hydrocarbons and risk of filter fouling and treatment failure - Lack of hydrocarbon detection system with auto shut-down at water intake, and lack of back-up source water for City 				<ul style="list-style-type: none"> - develop joint watershed monitoring program with industry, stakeholders, agencies (priority above raw-water intake, selected active development for point-source determination)
Mineral			<ul style="list-style-type: none"> - disturbed soils potential for stream sediment - potential water contaminants from processing and acid rock run-off 				
Watershed Monitoring	<ul style="list-style-type: none"> - lack of Land Use activity monitoring 	<ul style="list-style-type: none"> - develop an GIS based to track foot-print for watershed and eventually on sub-basin basis - establish a Crown land referral "notification of interest" - install 'Community Water Supply' signage - annual Plan review; 5 yr comp review 	<ul style="list-style-type: none"> - lack of watershed monitoring - lack of domestic watershed awareness - lack of awareness of water conservation opportunities 				<ul style="list-style-type: none"> - develop watershed signage plan (updated 2011, 12) - develop ongoing communication & education strategy to promote domestic water use conservation)) -water supply and treatment system tours (done annually) - annual watershed field tour for stakeholders to demonstrate stewardship best-practices (completed aerial 2008, ground 2012) - develop water-smart/watershed awareness program, - "watershed improvement day" , annual cleanup/restoration (presently focuses on urban watershed – Kids on the Creek/Clean-up)

Stewardship Element		1991 Integrated Watershed Management Plan		2003 Integrated Watershed Management Plan		Actions	
Watershed Component	Concerns	Recommended Actions	Concerns	Recommended Actions	Concerns	Recommended Actions	Concerns
Long Term Actions (Assessments, Planning, Education, Infrastructure)			<ul style="list-style-type: none"> - insufficient collaboration with stakeholders - increasing evidence of watershed condition decline 			<ul style="list-style-type: none"> - develop partnership with licensees, stakeholders (needs to be renewed) - develop long-term monitoring plan of watershed conditions - periodic reporting on watershed condition (health, function) – Forest Practices Board (2011) provides indication 	
			<ul style="list-style-type: none"> - need for addressing gaps in watershed management and policy due to i) lack of water/land protection responsibilities by individual licensees/ resource stakeholders and collectively by users and agencies ii) lack of communication plan (interface) between City and resource-users 			<ul style="list-style-type: none"> - policy analysis in regulatory regime (all gov't levels) to achieve improved stewardship while supporting economic dev. - develop partnership with Peace River Regional District - annual "State of the Watershed" assessments - annual reporting on Plan milestones (completed 2011, in progress 2012) 	
			<ul style="list-style-type: none"> - risk of water supply shortages with rising water demand 			<ul style="list-style-type: none"> - develop additional supplies (storage) and conservation (increase reservoir capacity to 18 mo storage due to spill risk) - facility security measures - watershed "observe, record and report" program 	

2007 Watershed Source Protection Plan (WSPP): Upper Kiskatinaw River

- Focus on multi-barrier approach to drinking water protection arising from 2003 Drinking Water Protection Act
- Integrates work of Integrated Watershed Mgt Plans (1991, 2003) and Dawson Ck. LRMP (1999) and Kiskatinaw River Watershed Assessment (2004)

Key Plan Objectives

- Characterize the source area and land use activities
- Identify hazards and vulnerabilities that may threaten the safety and sustainability of the water supply
- Recommend risk management actions to address identified hazards

Process

- Module 1 - Delineate and characterize drinking water source(s); Module 2 - Conduct contaminant survey; Module 7 - Characterize drinking water risks from source to tap; Module 8 - Recommend actions to improve drinking water protection

Drinking Water Quality Considerations ⁵	Recommended Actions	Assessment and Plan Implementation Issues
(A) Hazard Assessment		
Physical Hazards Natural sources of turbidity and sediment Industrial sources of sediment (oil and gas, forestry, and transportation corridors, grazing, recreation)	<ul style="list-style-type: none"> • Planning, implementation, monitoring of works by watershed stakeholders and compliance monitoring by regulators (e.g. best-practices in engineering design with cross-ditching/ditch blocks, culvert and ditch vegetation maintenance, well-site revegetation, road closures at vulnerable periods in spring, wet-periods) 	<ul style="list-style-type: none"> • Considerable research on watershed hydrology characterization with gov't and industry • Standard project referrals process in place
Biological Hazards Bacteria, Protozoa, Viruses linked to wildlife, cattle and humans/domestic animals;	<ul style="list-style-type: none"> • Adherence to approved practices by stakeholders for human waste disposal (industry camps/worksites, resource users) • Regulator education on disposal and compliance monitoring 	<ul style="list-style-type: none"> • Ongoing monitoring in watershed and water intake to track and treat with Class IV water treatment
Chemical Hazards (Hydrocarbons, Pesticides/Herbicides, Fertilizers, Road de-icing salt and chemical runoff) THM precursors (function of total organic carbons) and nutrient loading Refers to point-source, non-point and cumulative impacts	<ul style="list-style-type: none"> • Pipeline risk monitoring by owner and spill contingency communication protocol with City with oversight by OGC • City to install, maintain and test hydrocarbon detection system at intake • Adherence to Applicator permits and regulatory monitor • Regulator education and compliance monitoring for pesticide, herbicides, and fertilizer use with focus on immediate upstream areas 	<ul style="list-style-type: none"> • Need to consider other well development operations (produced water, frac operations, well seal failures, land-disposal of industrial waste, orphaned wells) • Upgraded hydrocarbon monitor proposed 2013 • Need for improved reporting to City by OGC on water risks and industry monitoring results • Need for interagency working group • Updated Source Water Protection Plan 2013

⁵ Based on Ministry of Environment Contaminants and Hazards Assessments (Physical, Biological and Chemical Hazards)

Drinking Water Quality Considerations ⁶	Recommended Actions	Assessment and Plan Implementation Issues
(B) Monitoring	<ul style="list-style-type: none"> • Apply 2002 baseline characterization report • That a permanent monitoring program be developed and supported by MOU (all agencies) , City and stakeholders, with results reported to Drinking Water Officer (DWO), MOU agencies, and stakeholders annually 	<ul style="list-style-type: none"> • Need for expanded surface and groundwater classification and monitoring to manage risk to supply (ground to surface flows) and quality (contaminant pathways) – Proposed WQ monitoring/tracking system proposed 2013 • Need for continuing rural land-owner water stewardship awareness and regulatory compliance (agriculture activities, septic system maintenance mgt) – Rural Community Outreach initiatives (Brassey Watershed; One Island Lake Community)
(C) Compliance Reporting	<ul style="list-style-type: none"> • Annual compliance reporting by MOU Agencies, with annual reports to DWO; • Summary report provided to MOU Agencies, stakeholders at annual watershed mtg • Adapt and update Source Protection Plan following monitoring and compliance reports 	<ul style="list-style-type: none"> • Need for compliance reporting by regulators to City

⁶ Based on Ministry of Environment Contaminants and Hazards Assessments (Physical, Biological and Chemical Hazards)