



**CITY OF DAWSON CREEK
&
FISHERIES RENEWAL BC**



**KISKATINAW RIVER
WATERSHED MANAGEMENT PLAN**



Acknowledgements

The authors would like to thank the Peace River Watershed Council and Fisheries Renewal BC for providing the funding for this project. Also special thanks to the City of Dawson Creek for taking the initiative to sponsor the project. And finally a vote of appreciation to all the stakeholders and agencies listed below who took the time to contribute their efforts to this project.

Bruce Simard, Peace River Regional District
Brian Haddow, Agriculture And Agri-Food Canada – Prairie Farm Rehabilitation Administration (PFRA)
Gord Humphrey, Oil & Gas Commission
Ted Henderson, Bear Mountain Grazing Association (BMGA)
Rod Kronlachner, Ministry of Forests (MOF)
John Stevenson, Ministry of Forests (MOF)
Darryl Melnyk, Ministry of Sustainable Resource Management (MSRM)
Mark Phinney, Louisiana Pacific Canada, FRD (LP)
Brendan Anderson, Ministry of Water, Land & Air Protection
Jesse Bassett, Bear Mountain Grazing Association
Graham Suther, Ministry of Sustainable Resource Management
Brian Pate, West Fraser Mills Chetwynd
Jim Gigger, Rancher
Jim Scafe, Rancher
Emil Heinrich, Rancher
Ed Hennon, Rancher
Jimmy Yee, Northern Health Authority
Brett Henschel, Agriculture and Agri-Food Canada - Prairie Farm Rehabilitation Administration (PFRA)
Murray Clark, Ducks Unlimited
Allan Blair, Ministry of Agriculture, Food and Fisheries
Pamela Laron, Northern Health Authority
Romona Blackwell, Ministry of Sustainable Resource Management
Mac and Jackie Leask, Ranchers
Alex and Evelyn Allan, Ranchers
Bruce Keech, Rancher
Dale Basset, Rancher
R. Wilson, Rancher
Gerald Feschuk, Devon Canada Corporation
Darren Rosie, El Paso Oil & Gas Canada Inc.
Doug Russell, Louisiana Pacific Canada
Mike Mulvahill, Rancher

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1.0 INTRODUCTION

This watershed plan was undertaken by the City of Dawson Creek (City), as a result of the efforts of the Peace River Watershed Council that was able to secure funding from Fisheries Renewal BC.

The City of Dawson Creek has recognized the importance of protecting its primary water source, the Kiskatinaw River (Figure 1-1), for short and long-term use. In addition to providing a community water supply, the Kiskatinaw River watershed has timber harvesting, agricultural, oil and gas, wildlife, and recreational values, as well as potential mineral resources. Human impacts and ongoing natural processes create challenges for the protection of the water quality in the Kiskatinaw River.

The Kiskatinaw River Watershed Management Plan (Plan) is an update to the Kiskatinaw River Integrated Watershed Management Plan completed in 1991, and complements the Dawson Creek Land and Resource Management Plan (LRMP) completed in 1999 [Appendix IV]. The goal of the Plan is to establish objectives and policies for protection of the water resource. The focus of the policies and objectives will be to minimize the impact of existing and future activities within the watershed on water quality. Consideration has been given to all resource activities that have an interest in the watershed. Due to the time at which funding became available to prepare this plan, and the limited funds, it was not possible to include a field component. The plan remains a "work in progress" where the results of future field assessments will be included as they are completed.

The approach used to develop this plan is an office-based approach using other similar planning projects as a guide. An initial stakeholder meeting was held on November 21, 2001 in the early stages of the project to advise all interested parties of the process being undertaken by the City and to solicit their input. After the draft plan was prepared, it was circulated to all stakeholders for review. A second stakeholder meeting was held on February 26, 2002 to discuss the draft report and receive comments. This final report includes consideration of all the comments received at that meeting and by mail following the meeting. Refer to Appendix I for minutes of the two stakeholder meetings.

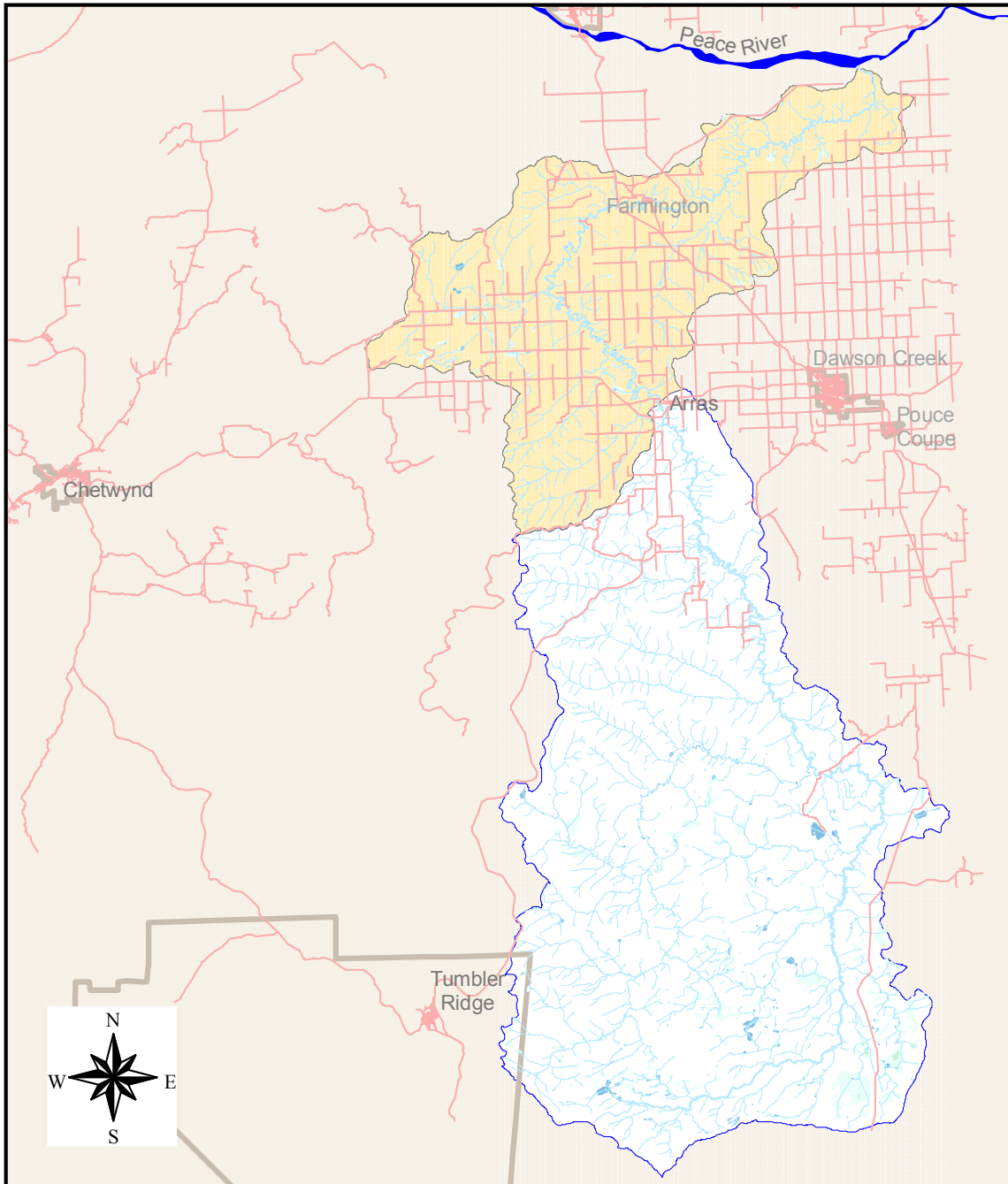
1.1 Goal





The goal of the Plan is to establish a set of objectives and policies for the protection of the water resource specifically water quality. The focus of the policies and objectives will be to minimize the impact of existing and future resource development on water quality. This document is the first step in a process to involve the licensed watershed users in the management of the watershed. The purpose of the plan is to establish improved communications between the City and the other licensees and agencies that have an interest in the watershed. It is recognized that there are gaps in the data that was available and that due to constraints on the time and funds a field component was not possible.

For the plan to be effective, it will require the recognition by the users that there is a legitimate concern about the water resource, and, an interest in developing a better understanding of each others watershed values. The objective of the City is to work towards a partnership of the stakeholders based on a common goal of protecting the water resource in the watershed as well as access to the diversity of other resource values in the watershed.

1.2 Plan Area

The Plan focuses on the Kiskatinaw River watershed upstream of the City's water intake at Arras [refer to Figure 1-1]. The City only has jurisdiction on those lands within the city boundary that is all outside the watershed. The boundaries of the Peace River Regional District (PRRD) encompasses the entire watershed but it has jurisdiction over the private land only. The amount of private land upstream of the intake is 21,300 ha, while the balance of the land (263,000 ha) is Crown land administered by the province (refer to Figure 2.4-1). Although the City does not have any enforcement authority in the watershed, it does have a mandate to provide safe drinking water to its users and to be familiar with the activities in the watershed that could affect the quality and quantity of its supply.



Legend	
	Principle Roads
	Municipal Boundary
	Kiskatinaw River Water Supply Area
	Remainder of Kiskatinaw Watershed

 DOBSON Engineering Ltd.
 PLANNERS • ENGINEERS • LANDSCAPE ARCHITECTS 1.07.14.46.1

Scale = 1: 625,000 Feb 01,2002

FIGURE 1-1
Kiskatinaw River
Water Supply
Tributary Area

For the purposes of the study, the area has been divided into 5 sub-basins (refer to Figure 1-2):

- Mainstem – 43,009 hectares;
- East Kiskatinaw – 100,970 hectares;
- West Kiskatinaw – 100,411 hectares;
- Halfmoon-Oetata – 19,077 hectares;
- Brassey – 21,140 hectares.

The Kiskatinaw River watershed has a total area of approximately 412,474 ha at the confluence with the Peace River. This plan covers that area upstream of the City's intake that has an area of 284,607 ha or 69% of the total watershed. Since the water system was constructed in the 1940s, the City has continued to improve it. It constructed the Hart and Trail storage reservoirs with booster stations, it has upgraded the intake and the pump station, and it has constructed an advanced water treatment plant. In total, to 2002, the City has spent approximately \$5 million on the water supply system. The development of this plan is the next step in the protection of water supply. Through this plan, it is the intent of the City to work with all the stakeholders in the watershed to maintain high standards of management. The benefit of good watershed management will benefit not only the watershed stakeholders including the City, but also the water quality in the Peace River. Due care and attention of the watershed and the water resource is the responsibility of all those who work or recreate in the watershed so that impacts are minimized at the local level but also for the benefit of those other users further downstream.

1.3 Information and Data Sources

The information in this report was obtained from a variety of documents, maps, and personal communications, as noted in the References section of the report. Base map information was provided by both private and government sources.

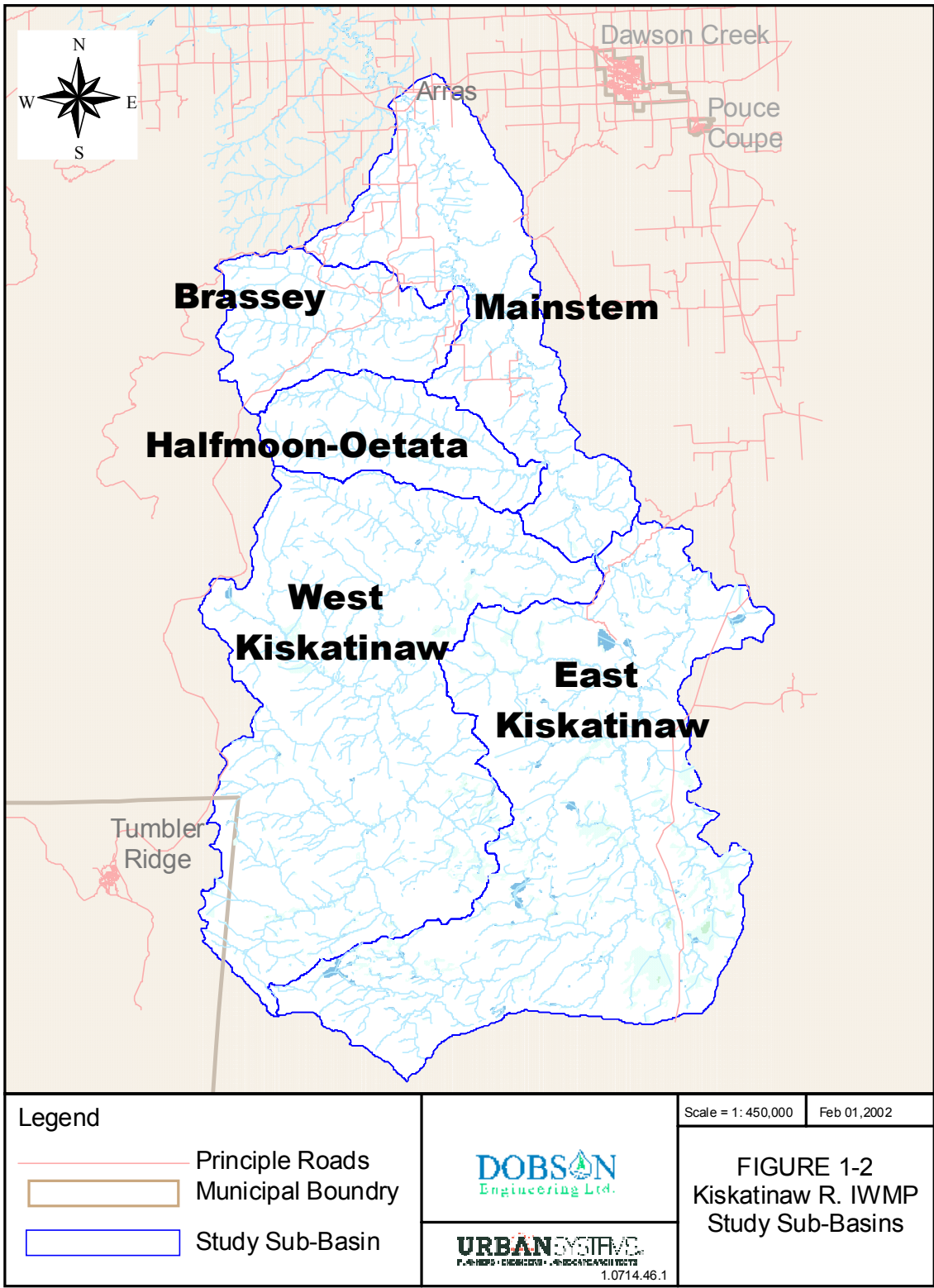
The Louisiana-Pacific Corporation provided a report on erosion potential for areas along the Kiskatinaw River mainstem.

The Ministry of Forests provided base mapping for logging and grazing activities, including grazing tenures, forestry service roads, and seismic lines.

The Oil and Gas Commission and Ministry of Sustainable Resource Management provided information on oil and gas wells.

The Peace River Regional District provided land-use and planning data for the watershed.

A significant source of background information and higher-level management guidelines was the *Dawson Creek Land and Resource Management Plan* (Province of British Columbia, March 1999).



1.4 Stakeholders and Tenures in the Watershed

The major stakeholders and tenures in the watershed are summarized in Table 1.4-1.

TABLE 1.4-1: Stakeholders and Tenures in the watershed

Activity	Stakeholder/Tenure Holder Name
Water Supply	Refer to Table 2.1-1 for list of licensees
	Northern Health Authority
	Ministry Of Water Land And Air Protection
	Ministry Of Sustainable Resource Management
	Ducks Unlimited
	Fisheries And Oceans
	Prairie Farm Rehabilitation Administration
	City of Dawson Creek
Timber Harvesting	District of Tumbler Ridge
	Louisiana Pacific Corporation
	Canadian Forest Products Limited
	Small Business Forest Enterprise Program
	West Fraser Mills
Oil and Gas Development	Ministry Of Forests
	Burlington Resources
	Devon Canada Corporation
	El Paso Oil & Gas Canada Inc.
Mineral Development	Oil And Gas Commission
	Ministry Of Energy And Mines
	Ministry Of Sustainable Resource Management
Range Use	Individual claim holders (i.e., Wapiti Claim)
	Bear Mountain Grazing Association
	Prairie Farm Rehabilitation Administration
	Peace River Regional District
Private Agricultural Land	Ministry Of Forests
	Peace River Regional District
	Individual property owners
	Ministry Of Agriculture, Food And Fisheries
Roads, Utilities	Agriculture And Agri-Food Canada
	Ministry of Transportation & Highways
	Burlington Resources (oil pipeline)
	Peace River Regional District
Recreation	Ministry Of Forests
	BC Parks (WLAP) One Island Lake Provincial Park
	Bearhole Chain Lakes Protected Area
	Ducks Unlimited

2.0 CURRENT WATERSHED CONDITION - STAGE 1

2.1 City of Dawson Creek

With a population of 10,754 (Statistics Canada, 2001 Census), the City of Dawson Creek is an important service centre for the Peace River region. The City's economy is agriculturally based but the three industries employing the most people in the area are retail trade, health and social services, and the hospitality service industry. The City also experiences a large amount of tourism because of its "Mile 0" Alaska Highway location and history. An oriented strand board processing facility is also an important source of employment for the City

The City of Dawson Creek has been drawing water from the Kiskatinaw River since the mid 1940's using an intake and pump house located at Arras, about 16 km west of the City. The headwaters of the Kiskatinaw River originate approximately 60 km south of the City at Bear Hole Lake (refer to Figure 2.4-5).

2.1.1 Water Supply Infrastructure

The water supply system for Dawson Creek was originally installed by the US Army during the Second World War. Since that time, upgrades to the system have been undertaken by the City to improve both the quality and quantity of water supplied. Currently, the system supplies water to about 11,000 people in Dawson Creek, approximately 800 people in the Village of Pouce Coupe, water haulers, and a bottling plant. Several farms along the Hart Highway also have access to untreated water from the mainline. The City's existing water supply infrastructure is depicted schematically on Figure 2.1-1 and consists of:



- Kiskatinaw River intake and raw water pump house
- Booster pump station
- 27,000 m³ settling ponds at "Hart" Road
- 450,000 m³ storage ponds at "Trail"
- 14 km of transmission mains
- Conventional water filtration plant

2.1.2 Intake and Distribution Facilities

The City has a single intake on the Kiskatinaw River, located 16 km west of the city limits and just south of the Hart Highway. The short 600mm-diameter intake pipe is part of the Arras pumping station. The pump station was upgraded in 1999 and has a maximum pumping capacity of 7,570 m³ per day.

A level control weir is located approximately 100 metres downstream of the intake, and consists of steel sheet piling with rip-rap placed on the downstream side. The weir was built in the fall of 1992 in response to a very low flow situation. Unusually low river levels made the water intake ineffective. By constructing the weir, river water levels were raised locally to allow uninterrupted pumping.

Storage Reservoirs

Two reservoirs and a booster pump are located between the Arras pumpstation and water treatment plant, a distance of approximately 16 km. The on-line booster pump at Deveraux is the second stage of lift after the Arras pumpstation to the first of two reservoirs.

The Hart Reservoir is situated at the high point between the Kiskatinaw River and water treatment plant. The Hart Reservoir functions as a primary settling tank. Sediment carried with the water from the Kiskatinaw River is allowed to settle out in the reservoir. In addition, the Hart Reservoir can store 27,200 m³ of water.

Water flows by gravity from the Hart Reservoir to the Trail Reservoir, a distance of approximately 7.5 km. The Trail Reservoir is larger than the Hart Reservoir with a total water storage capacity of 454,000 m³.

When the Kiskatinaw River has extremely high turbidity, the Arras pumps are turned off to avoid damaging the pumps. Under this condition, the Trail Reservoir can provide approximately 40 days of water supply to the City of Dawson Creek.

In addition to providing most of the water storage for the City's system, the Trail Reservoir improves the water quality and makes the water system easier to operate. Fine silts and clays that do not settle in the Hart Reservoir are more likely to settle out in the larger Trail Reservoir. This reduces the turbidity of the water. The Trail Reservoir also provides a pressure break in the system so that the filtration plant operates at a reliable and relatively constant inlet pressure.

Water Treatment Plant

The existing water treatment plant uses a conventional coagulation, flocculation, clarification, filtration train. A coagulant is added to the water as it enters the plant and causes very fine suspended sediments to flocculate. The flocculated particles are allowed to settle out before the water is directed to a sand filter where most of the remaining particles are removed. Once through the sand filter, the water is chlorinated and then enters the City's distribution system. The City employs a Class 4 treatment plant operator of which there are only two in BC. A schematic of the City's water infrastructure is presented in Figure 2.1-1.

2.1.3 Water Licences

Currently, there are 20 licences for direct withdrawal of water from the Kiskatinaw River (Table 2.1-1). The City is the largest user with four water licences: two are diversion licenses for the river, and two are storage licenses. The City is licenced to divert a total annual volume of 3,314,200 m³ and store up to 2,144,520 m³.

TABLE 2.1-1: Water Licenses for the Kiskatinaw River

LICENCE No.	MAP/POINT CODE	PURPOSE	ANNUAL LICENSED QUANTITY (m ³)	LICENSEE	LICENCE STATUS
C055604	93.P.078 B	Irrigation	86,274	Jangs Jack	Current
C062753	93.P.078 E	Irrigation	110,923	Hunter Gerald A	Current
C102413	93.P.039 B	Dust Control	16,582	Min. of Transportation & Highways	Current
"	93.P.078 M	Dust Control	16,582	Min. of Transportation & Highways	Current
C103920	93.P.087 E	Irrigation	61,624	Chimbudzi Enterprises Ltd.	Current
"	"	Stockwatering	1,658	Chimbudzi Enterprises Ltd.	Current
C103921	93.P.087 D	Domestic	829	Nimitz Ernest & Carol	Current
"	"	Irrigation	61,624	Nimitz Ernest & Carol	Current
"	"	Stockwatering	1,658	Nimitz Ernest & Carol	Current
C104526	93.P.078 N	Irrigation	8,627	Daub Brian A	Current
C105380	93.P.099 C	Irrigation	1,971,973	Borek Holdings (1975) Ltd.	Current
C105762	93P/NE(9-d) T4	Irrigation	123,248	Herron Eddie Don	Current
C107310	93.P.039 C	Dust Control	9,949	Min. of Transportation & Highways	Current
C107548	93.P.078 U	Dust Control	4,975	Min. of Transportation & Highways	Current
C108095	93.P.007 A	Storage	2,144,520	City of Dawson Creek	Current
"	"	Waterworks Local Auth	3,314,200	City of Dawson Creek	Current
"	93.P.078 A	Storage	2,144,520	City of Dawson Creek	Current
"	"	Waterworks Local Auth	3,314,200	City of Dawson Creek	Current
C111413	93.P.097 E	Oil Field Injection	446,856	Imperial Oil Resources Ltd.	Current
"	"	Storage	20,952	Imperial Oil Resources Ltd.	Current
TOTAL ALLOCATED WATER DIVERSION =			6,237,584 (0.198 L/s)		

2.2 Water Concerns and Issues

Because the Kiskatinaw River is the sole source of community water supply for the City, the City of Dawson Creek is very concerned about the management of the watershed. The City continues to explore the possibility of other sources but to date has not located any other viable options. There is no alternative source. The City has also developed the maximum feasible off stream storage that provides a limited back-up supply should there be interruptions of short duration. Based on a strict water conservation schedule, the City could provide water for domestic uses for a period of at least 40 days. However, if there was a large wild fire in the watershed upstream of the intake, an oil pipeline failure into the river, or a large bank failure that could obstruct the channel, the City could be faced with a desperate situation. Consideration has been given to developing upstream storage but even if this did occur, it would not address the issues of contamination between the intake and the storage site.

2.2.1 Future Demand

The City has experienced fluctuating water demand growth over the last 40 years (Figure 2.2-1). On average, water demand has grown at a rate of about 3.2% per year. However, the over-all growth in water demand over the last 4-5 years has remained flat.

Based on historical trends, the water demand is unlikely to exceed the permitted licensed withdrawal from the Kiskatinaw River in the near future. Assuming a linear annual growth rate of 3.2% into the future, the City's license will accommodate water demand for the next 30 years. (The projected population increase for the City is in the range of 0.9% – 1%.) The implementation of a water conservation program could extend the supply even further. Given that water meters are in-place for residential and commercial users, implementation of a water conservation program could be carried out by the City. Currently, the City distributes pamphlets describing methods for conserving water. The City is also considering by-law changes to promote the use of low-flow devices.

2.2.2 Increasing Turbidity

The raw water pumps on the Kiskatinaw River cannot operate under high turbidity levels. Turbidity is a measure of the "cloudiness" of the water. Turbidity is measured with instruments that use light to detect particulate matter in the water, and is reported in standardized Nephelometric Turbidity Units (NTU). The turbidity in the Kiskatinaw River can exceed 5,000 NTU during high flows in the spring. This contrasts with Canadian Drinking Water Guidelines which allows for a maximum of 1 NTU in treated water.

Turbidity of raw water has been measured and recorded by the City since 1960 (Appendix III). Before 1991, City employees manually measured turbidity on a limited basis. In 1991, the City installed an on-line turbidity probe at the Kiskatinaw River intake. Starting in 1995, consistent, daily turbidity readings have been taken. When the turbidity levels in the river exceed 600 NTU, the intake pumps are turned off to avoid damaging the impellers. During this shutdown period, stored water is used to supply City demands. Table 2.2-1 gives a summary of number of days where the turbidity exceeded 600 NTU (1995-2001). Typically, the highest levels of turbidity occur during the spring freshet when river flows are the highest. However, spikes in turbidity can occur during the summer months in years when rainstorms are frequent. It should be noted that these "spikes" may eventually extend into the fall since it has been noted elsewhere in the province that there may be a shift to less snow accumulation in the winter and an increase in fall rains. If this fall precipitation occurs as rainstorm events, then further turbidity events can be expected.

FIGURE 2.2-1: CITY OF DAWSON CREEK WATER CONSUMPTION (1960 to 2021)

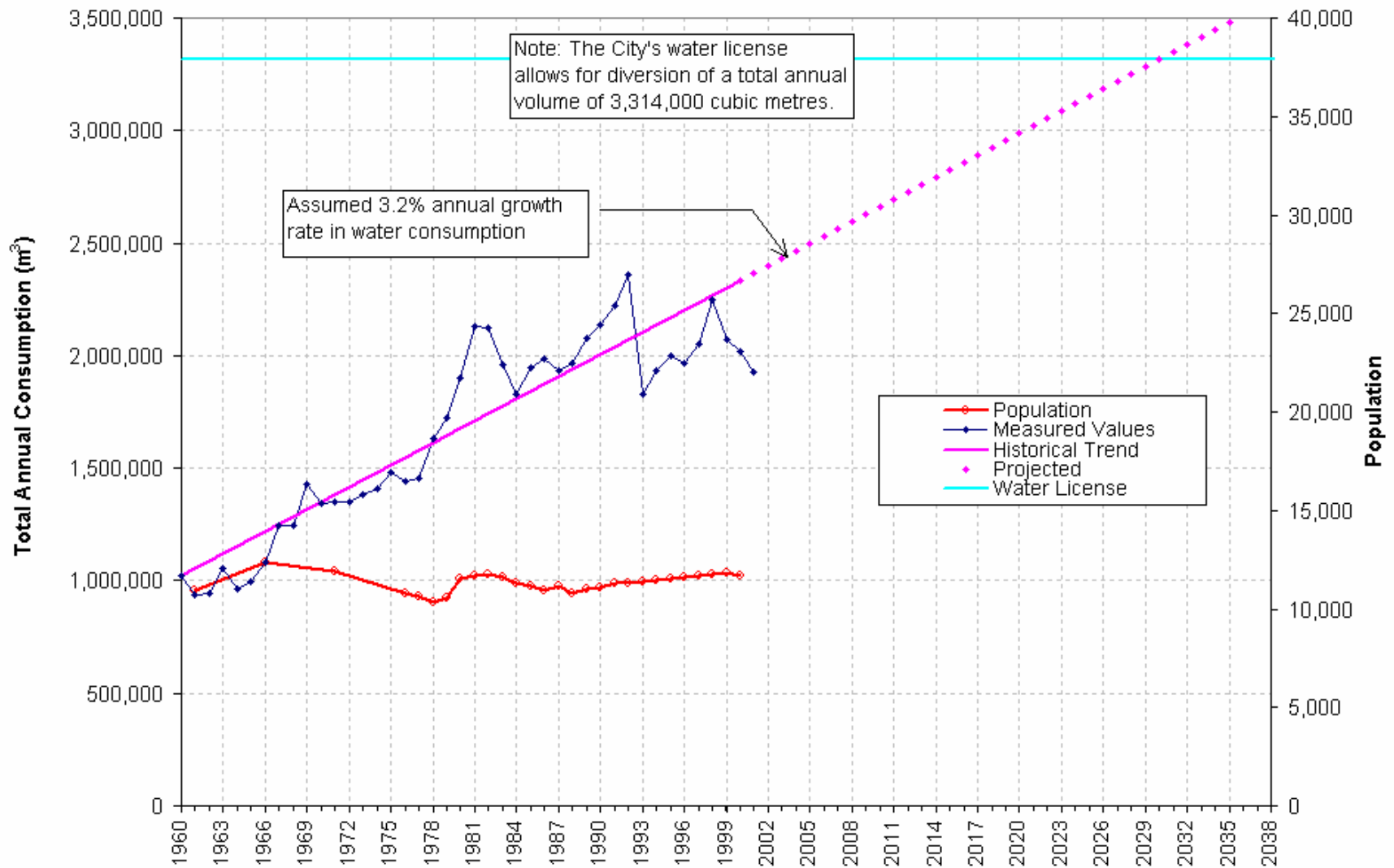


FIGURE 2.2-2: Comparison Of Measured Turbidity And Flowrate In The Kiskatinaw River

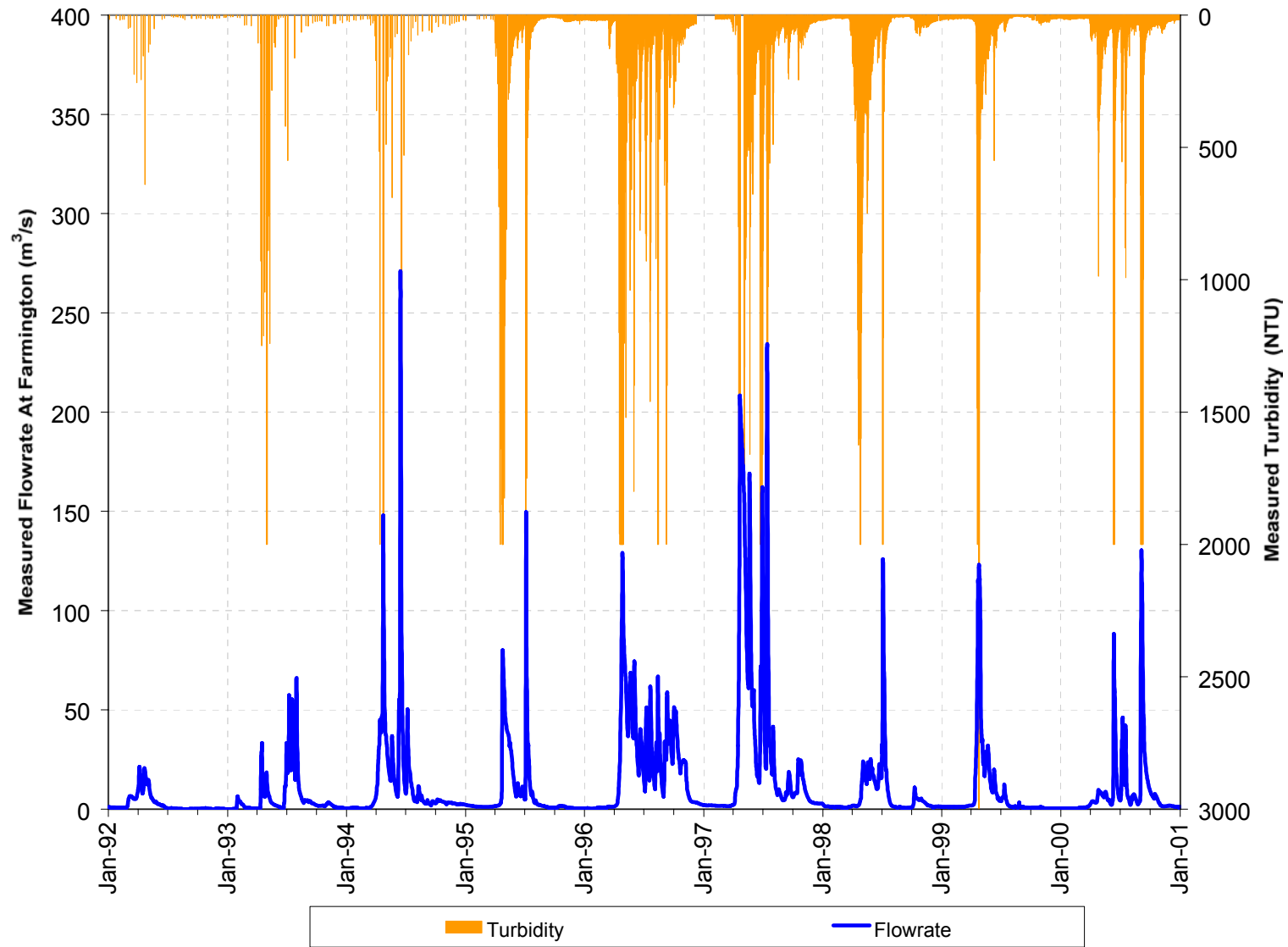


TABLE 2.2-1: Number of Days of Recorded Turbidity greater than 600 NTU

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
1995	0	0	0	15	3	0	3	0	0	0	0	0	21
1996	0	0	0	16	9	4	7	4	5	0	0	0	45
1997	0	0	0	8	11	7	7	0	0	0	0	0	33
1998	0	0	0	14	7	0	4	0	0	0	0	0	25
1999	0	0	0	10	0	0	0	0	0	0	0	0	10
2000	0	0	0	2	0	6	3	0	10	0	0	0	21
2001	0	0	0	5	10	17	12	0	0	0	0	0	44

2.2.3 Water Contamination

The City's water treatment plant is designed to remove turbidity and deactivate pathogens. The plant is not able to remove a wide variety of dissolved chemicals or hydrocarbons. Hydrocarbons would foul the filters and cause a treatment failure. Currently there is no hydrocarbon detection system before the treatment plant that would shut down the intake in case of a spill. Some dissolved chemicals would simply pass through the filters unimpeded. Under a contaminant spill scenario, the City would be forced to shut down the intake pumps or treatment plant. The City does not have a backup source of water and long-term contamination of the river water would severely impact the water system operation.

2.3 Watershed Physical Condition

This section documents physical and biological conditions in the watersheds of interest. The information presented should be sufficient to provide an understanding of the overall natural conditions and processes that affect water quality and supply.

2.3.1 Geography and Climate

The Kiskatinaw River watershed is located on the Alberta Plateau of northeastern British Columbia and is tributary to the Peace River. The water supply area rises from an elevation of 680 metres at Arras to 1,300 metres south at Bearhole Lake.

The western portion of the watershed is distinguished by steep slopes of the Rocky Mountain Foothills, while the eastern portion is characterized by undulating plains projecting into BC from Alberta (Kiskatinaw River IWMP, 1991).

The average annual temperature reported for Dawson Creek Airport is 1.4 degrees Celsius.

Most of the precipitation for the area is in the form of rain. On average, the watershed receives 499mm of precipitation during the year. Rain accounts for about 328 mm of the total precipitation. On average, about 179mm of the total precipitation falls as snow.

2.3.2 Geology, Soils, And Terrain Stability

Bedrock Geology

The bedrock within the watershed is composed predominately of interbedded Cretaceous shales and sandstones (BC Soil Survey, p.5). The Cretaceous shales contain minor amounts of sandstone, siltstone, and ironstone. The sandstones are medium to fine textured, evenly bedded with siltstone and carbonaceous shale. Inclusions of ironstone, coal, coarse sandstone, and fine conglomerate also occur in the sandstone. Outcrops of both these rock types occur in the Kiskatinaw River (*ibid.*).

Surficial Geology and Soils

The surficial geology of the watershed consists mainly of lacustrine deposits with until and alluvium. In many places, the Kiskatinaw River has steep, incised valleys through the easily eroded material (*ibid.*).

2.3.3 Stream Flow Analysis

Environment Canada (Water Survey of Canada [WSC]) has been collecting streamflow data for the Kiskatinaw River at Farmington since 1944 (refer to Figure 1-1). Consistent and uninterrupted data has been recorded since 1966. The Farmington gauging station is located 32 kilometres from the confluence of the Peace River and Kiskatinaw River. The area tributary to the gauging station is 366,000 ha; this compares to a tributary area of 285,000 ha for the Arras pumpstation.

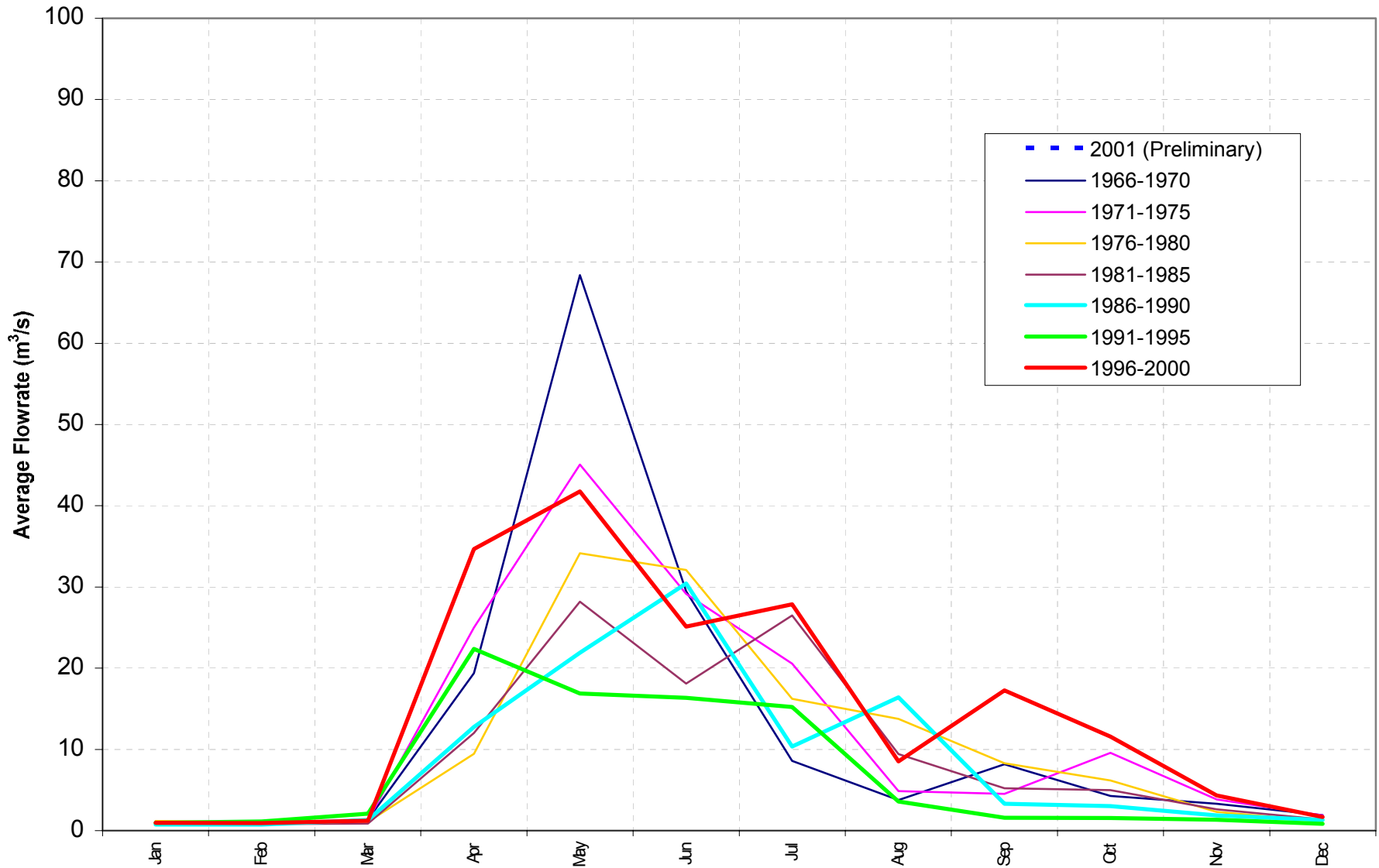
The average annual flow rate for the period between 1966 and 2001 is 10.7 m³/s. The flow rates fluctuate seasonally, in response to snowmelt and rain events. Fluctuations from year to year also occur as a result of large-scale climactic variations (Figure 2.3-1).

Seasonal low-flows typically occurs during the winter period, between January and March. However, the lowest flow on record occurred during August of 1992, because of drought conditions. The average flow rate for January was 0.052 m³/s, less than 0.5% the average flow rate.

The highest flows are typically associated with the spring snowmelt and occur between May and July. However, severe summer rainstorms can cause high peak flows. For example, rainstorms during July 2001 resulted in an average monthly flow rate comparable to spring runoff conditions.

A review of the historical hydrometric records suggests that there may be a trend to higher peak flows during the late summer months. If the trend continues the Kiskatinaw River could experience bi-modal seasonal peaks, the first in the spring and the second during the late summer. (This potential changing runoff pattern has been identified for other parts of the province in research carried out by Paul Whitfield of Environment Canada.) The change in flow regime would result in higher turbidity and suspended sediment loads during the summer.

FIGURE 2.3-1: Historical Flows for the Kiskatinaw River at Farmington



2.4 Watershed Activities

A variety of licensed activities occur within the Kiskatinaw River Watershed. The most important of these include timber harvesting, crop production, cattle grazing, and oil and gas exploration, drilling and transmission. This section will review the level of activity for each of these activities.

2.4.1 Land Ownership

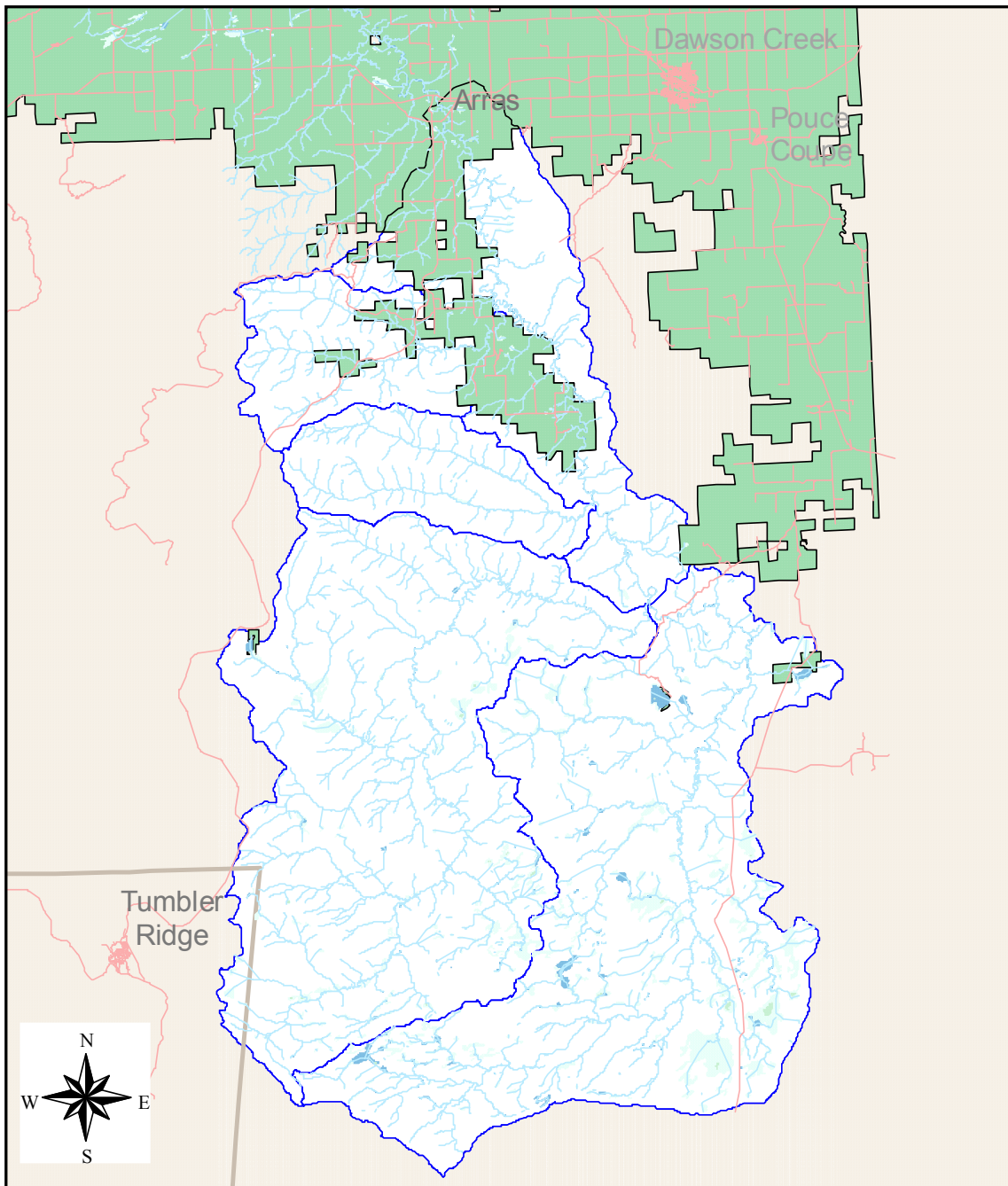
Lots owned by private landowners or leased from the Crown are located predominately in the lower Mainstem and Brassey Creek sub-basins (Figure 2.4-1). There are some isolated private lots around Cutbank Lank and One Island Lake in the East Kiskatinaw sub-basin, and Muskeg Lake in the West Kiskatinaw sub-basin. However, these lots represent a very small proportion of the total private land base in the watershed. There is approximately 21,300 hectares of private land held within the water supply area; this represents about 7.5% of the total area.



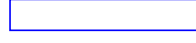


2.4.2 Timber Harvesting

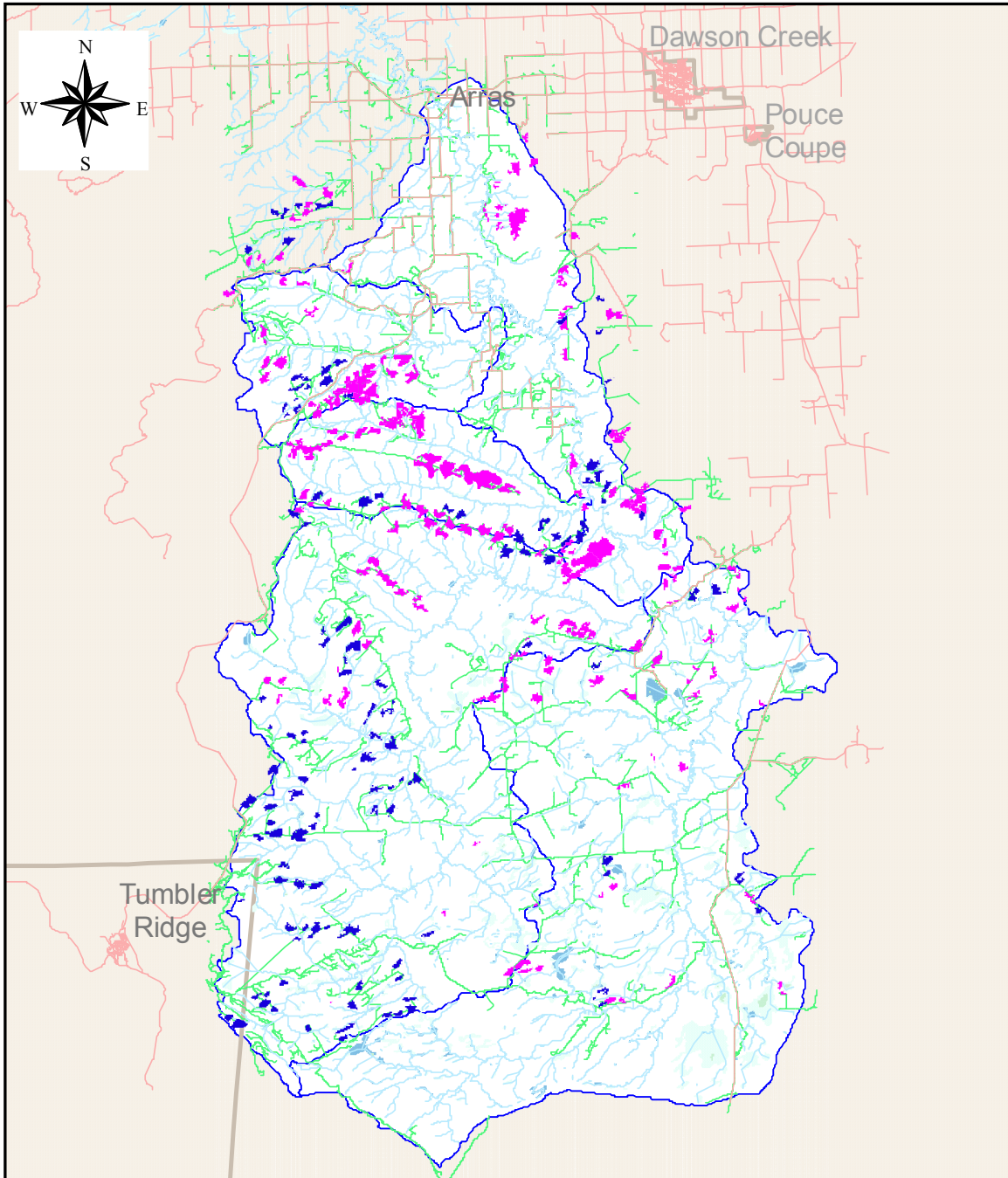
Unfortunately, the Dawson Creek Forest District database does not allow for the easy determination of the historical forest development in the watershed. It was not possible to include in this report accurate data for the total amount of harvesting to date or the extent of forest road development. This area will require further attention in the future. Based on the information that was available it is possible to show areas that have been logged in the last five years and areas that under existing forest development plans (FDP) are scheduled to be harvested over the next five years (Figure 2.4-2). Details of recent and future logging activities are presented in Table 2.4-1 and Table 2.4-2 respectively.

TABLE 2.4-1: Summary of Recently Logged Areas by Sub-Basin

Sub-Basin Name	Area (ha)	Recently Logged Area (<5 Yrs Old) (ha/%)		Total Length of Active Forestry Roads (km)	Estimated Number of Stream Crossings
Mainstem	43,009	289	0.67	253.9	63
East Kiskatinaw	100,970	307	0.030	357.7	86
West Kiskatinaw	100,411	2,361	2.4	503.7	95
Halfmoon-Oetata	19,077	402	2.1	111.6	15
Brassey	21,140	303	1.4	178.6	61
TOTAL	284,607	3,662	1.3	1,405.5	320



Legend  Principle Roads  Private Or Leased Lots  Study Sub-Basin	  <small>PLANNING • ENGINEERING • ARCHITECTURE • INTERIORS</small> 1.0714.46.1	Scale = 1: 450,000	Feb 08, 2002
		FIGURE 2.4-1 Kiskatinaw River Distribution of Private Property	





Legend  Planned Logging (5 Yr FDP)  Recent Logging (5 Yrs Or Less)  Principle Roads  Forestry Roads	  <small>PLANNING • ENGINEERING • CONSULTING ARCHITECTURE</small> <small>1.0714.46.1</small>	Scale = 1: 450,000	Feb 09, 2002
		FIGURE 2.4-2 Forestry Activities	

TABLE 2.4-2: Summary of Proposed Forest Development (2001-2006)*

	Estimate For Watershed	Comments
Logging Planned for Next 5 year Period (HA)	5,632	From 5 Year Future Development Plans (FDPs)
5 Year Logging % of Watershed	2	From 5 Year FDPs
Inblock Roads Planned for Deactivation over next 5 years (km)	217	From 5 Year FDPs
Access Road Estimates (excluding Inblock Roads) (km)	649	From 5 Year FDPs
Planned Cutblocks in Areas requiring a Terrain Stability Assessment (ha)	30	From 5 Year FDPs 1 cutblock on mapsheet 093P037

* information provided by Dawson Creek Forest District

Based on the Forest Development Plans, the rate of forest development in the watershed will continue to increase. The total area harvested in the last 5 years represents about 1.3% of the total watershed area. This cut rate is projected to increase to 2% for the next 5 years. The estimates of recent and future harvesting are based on best available data. These estimates will change as the Ministry of Forests refines and updates its database.

2.4.3 Agriculture

All agricultural activities are concentrated in the northern portion of the watershed. On private land the main activities are crop production (grain farming), and livestock farming (mainly cattle). Crown land is leased for cattle grazing.

Crop Production

Most of the agricultural development within the watershed occurred between 1960 and 1980. Relatively little new development has occurred within the last twenty years (McConnel).

Cattle Grazing

In 1995, the *Forest Practices Code of British Columbia Act* (the Code) required that all range tenure holders prepare a Range Use Plan prior to grazing on Crown land. The Code outlines the basic requirements needed in range use plans, while each District Manager can add to this if they deem it necessary. Range use plans are renewed every five years or at the expiry of the existing range tenure.

A Range Use Plan is the operational plan guiding the use of a range agreement area. It includes strategies for management of the range resource and information on livestock numbers, movement, season of use, and special conditions to be followed (ref. Range Manual Chapter 24-<http://www.for.gov.bc.ca/hfp/range/manual/TablCont.htm>).

Grazing agreements are based on the concept of an Animal Unit Month (AUM) for a specific amount of forage. An AUM is the amount of forage required for one month by an average cow, aged six months or older.

All grazing plans within the Kiskatinaw River watershed must provide for:

1. No salting within 400 metres of a watercourse; and
2. Provision of alternate water supply (dugouts) so that stock is not required to drink at creeks or wetlands (McConnell).

The 1991 *Kiskatinaw River Integrated Watershed Management Plan* reported that the watershed held a total of 10,950 Animal Unit Months (AUM's) on 60,380 hectares of land.

Currently, an estimated 45,623 ha of tenured grazing land are located within the water supply area. Based on information provided by the Ministry of Forests, 11,600 AUM's are located within the water supply area (McConnel). Figure 2.4-3 shows the location of grazing tenures within the water supply area.

2.4.4 Oil and Gas

Oil and gas development represents an important and growing resource development activity in the watershed. Since the Oil And Gas Commission is in the process of updating its database, information on roads associated with oil and gas development was not available. Current information provided by the Oil and Gas Commission indicates that 276 well sites are located within the water supply area (Figure 2.4-4). A summary of well sites by sub-basin is provided in Table 2.4-3.

An extensive oil and gas pipeline network is located within the watershed (Figure 2.4-4). Gas pipelines cross tributaries of the Kiskatinaw River, including Brassey Creek, West Kiskatinaw River, Oetta Creek, Hourglass Creek, and Sundown Creek.

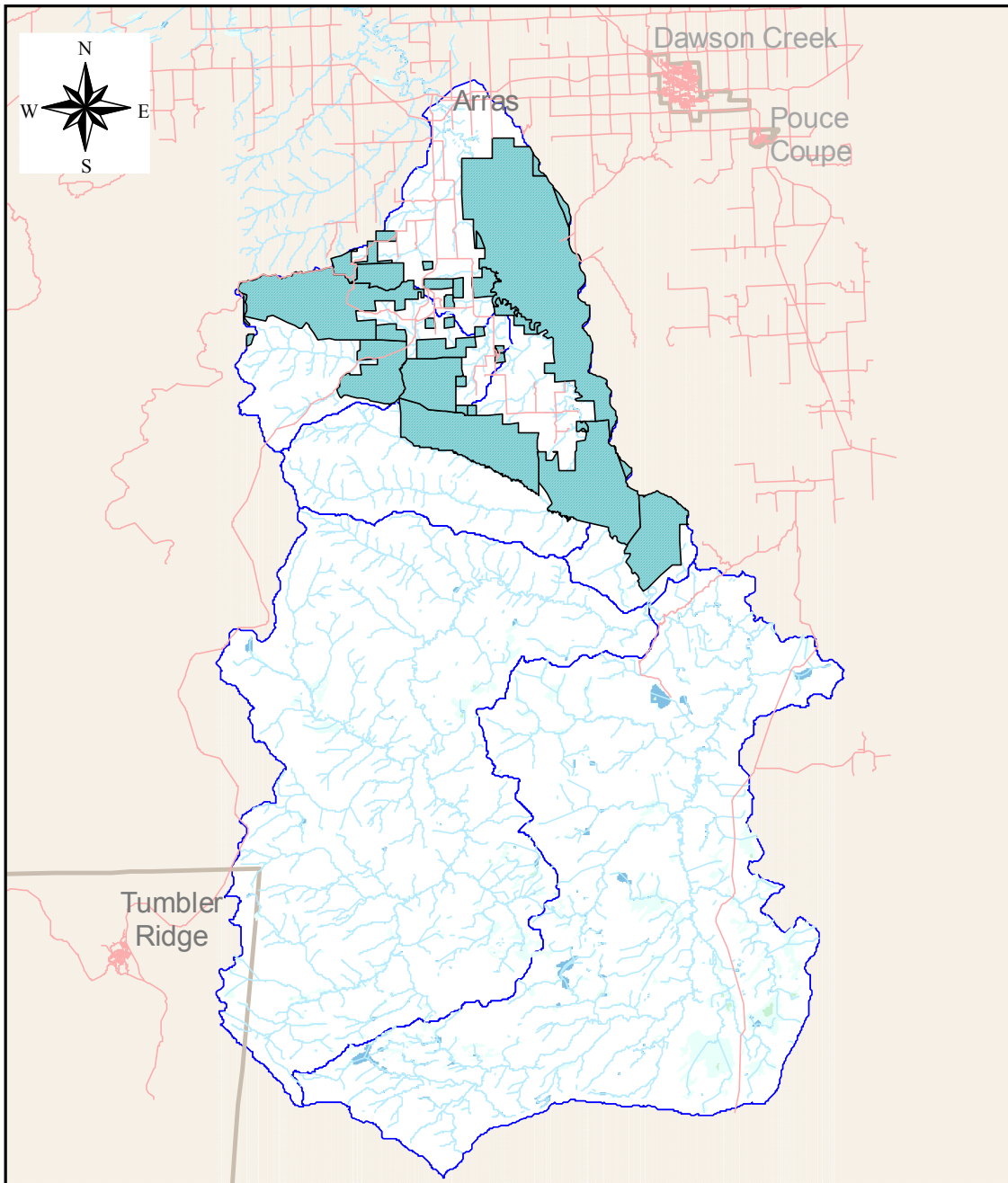
TABLE 2.4-3: Summary of Oil and Gas Well Sites






Sub-Basin Name	Area (ha)	Number of Well sites	Estimated Clear-cut Area (ha)	Number of Wells Within 250 metres of a stream
Mainstem	43,009	11	9	2
East Kiskatinaw	100,970	130	104	17
West Kiskatinaw	100,411	82	66	12
Halfmoon-Oetata	19,077	18	14	3
Brassey	21,140	35	28	5
TOTAL	284,607	276	221	39

An oil pipeline owned by Burlington Resources (formerly Canadian Hunter) crosses the Kiskatinaw River approximately 15 kilometres upstream of the City's intake on the river at Arras. The proximity of this pipeline upstream of the City's intake represents a potential risk to the water supply in case of a pipe failure. Currently, the City does not monitor for hydrocarbons in its water supply system. However, Burlington Resources does have an emergency response plan in-place. In case of a pipeline failure, the City would be notified and clean-up procedures would be undertaken.

2.4.5 Mineral Exploration and Development

According to the Mineral Assessment Report (Appendix II) there is currently only one active claim in the Kiskatinaw watershed known as the Wapiti Claim. It is rated as a "developed prospect" for coal. Should this claim be proposed for development it would be necessary for it to proceed



Legend		Scale = 1: 450000	Feb 09, 2002
 Grazing Tenures  Principle Roads  Sub-Basin		<p align="center">FIGURE 2.4-3 Grazing Tenures</p>	
 <small>P.LANNING • ENGINEERING • LANDSCAPE ARCHITECTURE</small> 1.0714.46.1			

through an environmental impact assessment process where it would be subject to review to ensure that the water supply was protected. Any mineral exploration or development is a concern in this watershed.

2.4.6 Recreation

The water supply area of the Kiskatinaw River watershed has considerable recreational value. The area is used by residents of the surrounding area for snowmobiling, off-road vehicles, snowshoeing, cross-country skiing, camping, fishing, horse riding, hunting and photography. There is a single provincial park and a protected area within the water supply area (Figure 2.4-5).

One Island Lake Provincial Park is a popular camping and fishing area located near the confluence of the Kiskatinaw River and West Kiskatinaw River. Estimates of campground and day visitors are given in Table 2.4-4.

TABLE 2.4-4: Campground and Day Visitors to One Island Lake Park

Year	Campground	Day Visitors
2001	3,200	NA
2000	2,600	11,600
1999	3,100	12,600
1998	4,000	11,000
1997	2,400	10,200
1986	1,900	8,500

A Protected Area was established near the headwaters of the Kiskatinaw River. The Bearhole Lake Protected Area (refer to Figure 2.4-5) was identified as a Goal 1 Protected Area in the Dawson Creek LRMP (p. 37). Goal 1 Protected Areas are unique ecosystems or landforms which are larger than 3,000 ha. The Bearhole Lake Area contains critical habitat for trumpeter swans. The undisturbed forests and wetlands also provide winter range for low elevation caribou and moose. Recreational activities such as fishing, canoeing, camping, hiking, and wildlife viewing are supported within the Protected Area.

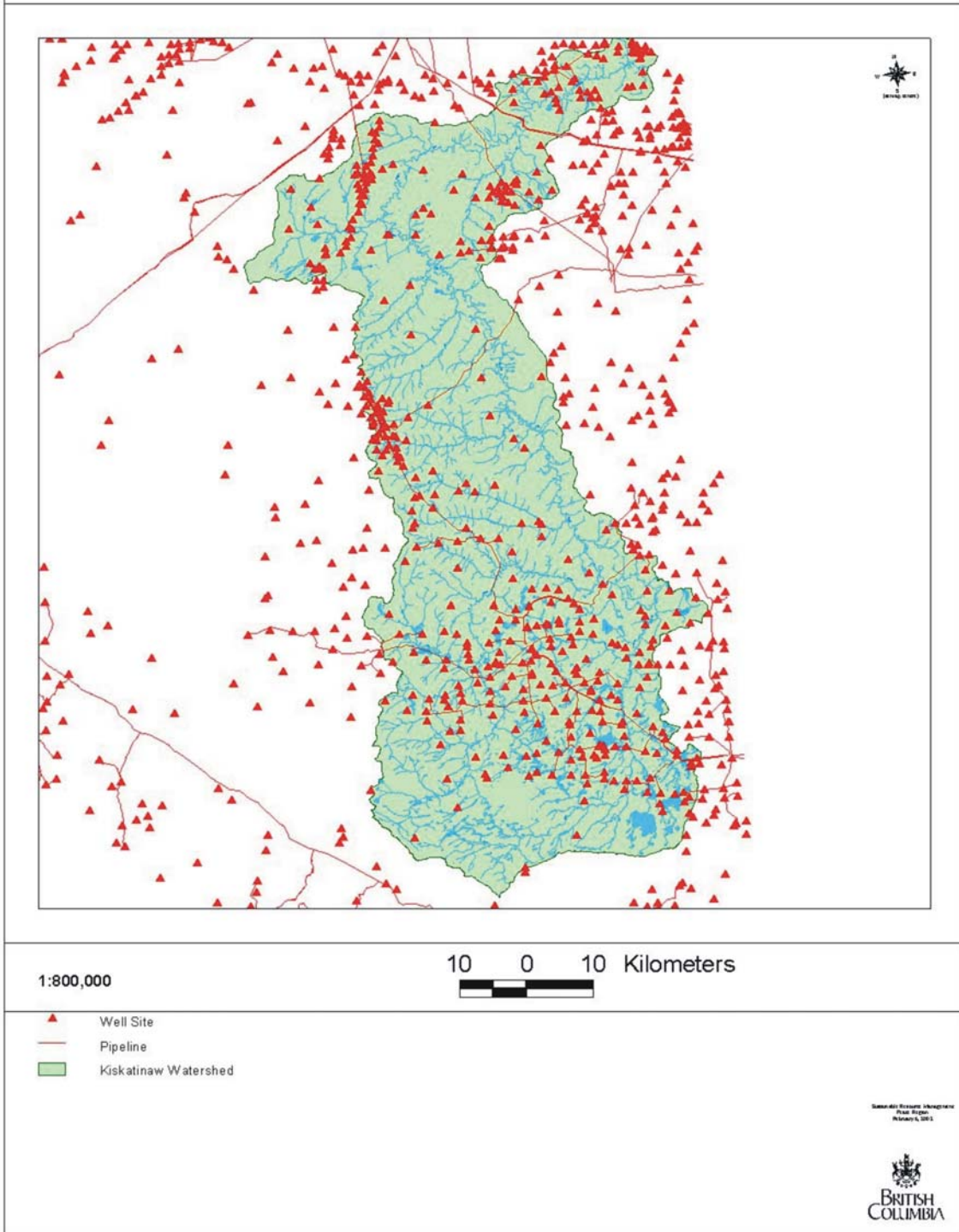
2.5 Current Watershed Condition

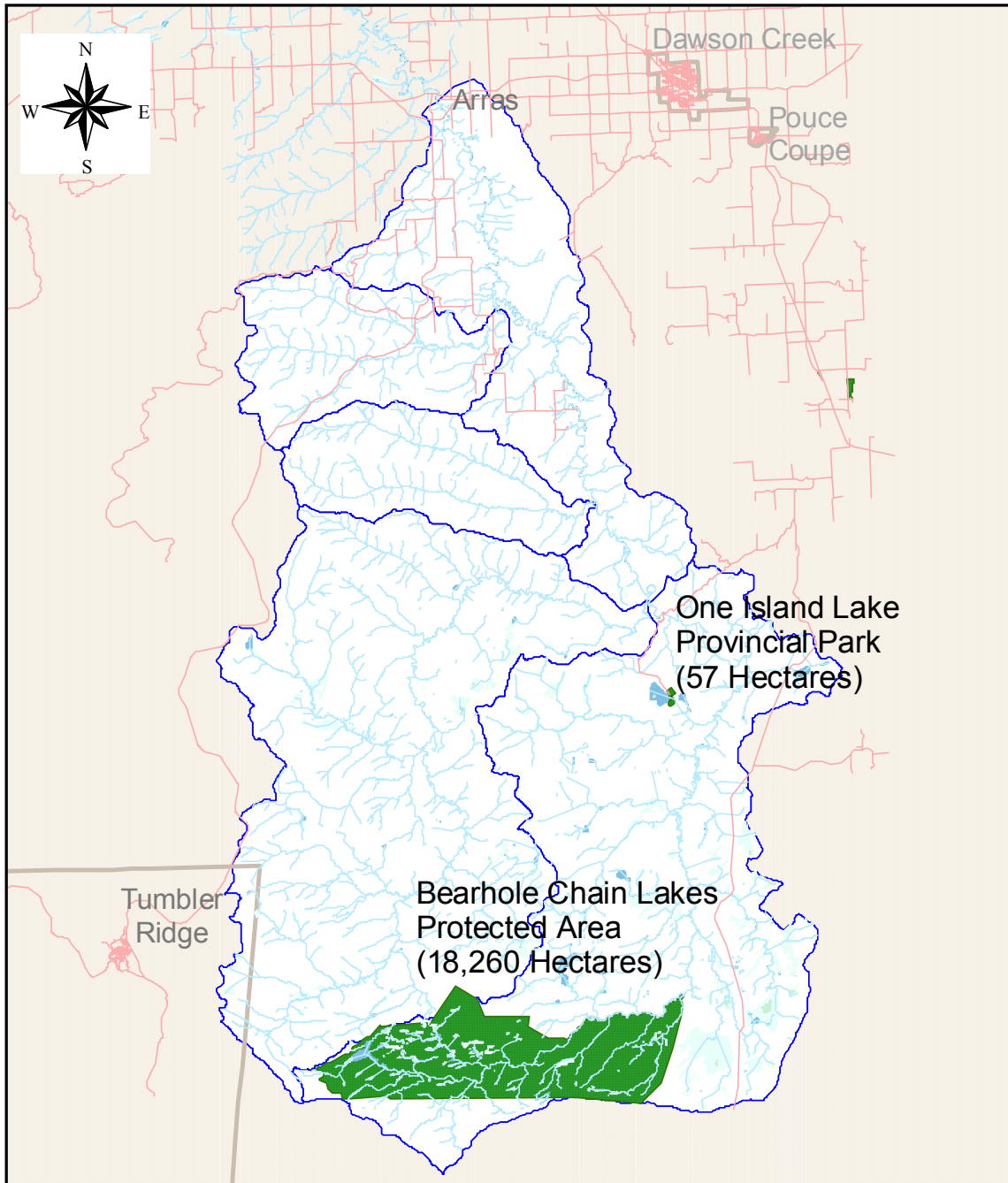
2.5.1 Water Quality – Natural And Human Factors

Suspended sediment concentrations can be very high during the spring freshet, ranging from 40 to 5,726 mg/L, with a mean of 1,402 mg/L (Kiskatinaw IWMP, p.8). Suspended sediment concentrations and turbidity vary directly with the discharge of the river. As flows increase, suspended sediment concentrations and turbidity also increase.

Although there are numerous natural sediment sources in the watershed due to bank erosion and bank sloughing, many of the major activities in the watershed also have the potential to impact water quality. The fine sediments typical of the banks and bed of the Kiskatinaw River and its tributaries are easily eroded. Construction of roads and pipelines, timber harvesting, disturbance to riparian vegetation can all result in increased mobilization of sediment during spring runoff or rain events.

FIGURE 2.4-4: Distribution of Oil And Gas Wells And Pipelines





Legend  Principle Roads  Park/ Protected Area  Study Sub-Basin	  <small>1.0714.46.1</small>	Scale = 1: 450,000	Feb 11, 2002
		FIGURE 2.4-5 Provincial Parks And Protected Areas	

Activities within the watershed can also release contaminants that may be carried by runoff to streams. The oil pipeline that crosses the Kiskatinaw River upstream of water intake is a particular concern since a failure could have catastrophic impacts on the City's works. Accidental spills of fuel or disposal of toxic material along roadways through recreational activities or resource development could also cause contamination of the water supply. Cattle foraging along creeks can be a source of pathogens. Table 2.5-1 presents a range of water quality impacts and potential causes.

2.5.2 Water Quantity

During some very low-flow periods, water demand by the City can exceed 50% of the flow in the Kiskatinaw River. However, the City is able to store large quantities of water for use during periods of low flow. The storage capacity is critical for reducing impacts on river flows downstream of the intake during periods of very low flows.

TABLE 2.5-1: Potential Water Quality Impacts

PROCESS/ ACTIVITY	IMPACT	SEASON	SERIOUSNESS	COMMENTS
Natural Erosion, Landslides	- sediment delivery - increased turbidity	SPRING, SUMMER, Fall	High	<ul style="list-style-type: none"> ◆ high potential for natural erosion exists due to presence of fine grained material along steep cutbanks along the river ◆ most common in spring during run-off/snow melt, however, is increasingly more common during summer with wetter weather ◆ increased sediment/turbidity can impact operation of treatment plant – higher turbidity results in more frequent filter backwash
Oil And Gas Development	- oil/fuel contamination - sediment mobilization and increased turbidity - possible water contamination from drilling mud	All Year	Potentially Very High	<ul style="list-style-type: none"> ◆ oil pipeline crossing upstream of intake presents a high hazard for contamination in the event of a failure ◆ development of roads, wells, and seismic lines may result in increased amount of sediment in runoff ◆ impact highly dependent on extent of activity and proximity to streams ◆ leachate from used drilling mud may transport contaminants into groundwater or surface water sources
Agriculture	- bacteria, Giardia, Cryptosporidium - increased sediment - nutrient/chemical contamination	Spring, Summer, Fall	Potentially high	<ul style="list-style-type: none"> ◆ unrestricted access by cattle to streams can introduce parasites and bacteria to water supply and as well as increased bank erosion ◆ run-off from crops can cause chemical contamination and elevated nutrient levels in streams
Forest Development	- sediment mobilization - increased turbidity - increased stream flows - stream channel changes	SPRING, Summer, Fall	Potentially high	<ul style="list-style-type: none"> ◆ run-off from roads, cutblocks, or other sites can increase sediment delivery and turbidity. ◆ higher potential for problems on steep and unstable terrain. ◆ impacts can be reduced through timing of harvest and site/road maintenance, deactivation, and restoration
Mineral Exploration/ Development	- sediment mobilization - increased turbidity - increased stream flows	SPRING, Summer, Fall	Potentially high	<ul style="list-style-type: none"> ◆ run-off from disturbed soils could increase sediment delivery to streams ◆ run-off could involve chemical contamination from mineral processing ◆ possible water contamination from acid rock run-off
Recreation	- bacteria, Giardia, Cryptosporidium - sediment delivery - hydrocarbon contamination - other chemical or waste contamination	SPRING, Summer, Fall	Moderate	<ul style="list-style-type: none"> ◆ humans can introduce parasites and bacteria to water systems ◆ impact highly dependent on type and extent of recreational activity. For example, in local areas motorized sports can cause high water quality impacts through increased sediment mobilization and fuel contamination. In contrast, canoeing in the headwater lakes will have a low impact.
Roads	- sediment delivery - contamination from hydrocarbons, salt, road de-icer, spills or accidents	WINTER, SPRING, Summer, fall	Moderate	<ul style="list-style-type: none"> ◆ run-off from roads can contaminate streams depending on location ◆ accidents can introduce large quantities of contaminants into streams
Private Lots Above Intake	Various	Year Round	Low	<ul style="list-style-type: none"> ◆ impact and seriousness dependent on activity, structures, and size

Note: Season shown as **bold** lettering indicates typically dominant period

2.5.3 Summary of Watershed Condition

As indicated in the introduction it was not possible to include a fieldwork component due to limited funding, therefore the watershed condition is based on a review of available information for forest development, oil and gas development, range use, utilities, agricultural development and recreation use. The current condition of the watershed by activity is;

- forest development – satisfactory
- oil and gas – satisfactory (except for pipelines that cross streams above intake with no automatic shutoff system)
- mineral exploration/development – satisfactory (no current development)
- range use – satisfactory (may be site specific areas that could be improved)
- utilities – satisfactory
- agricultural activity – satisfactory (may be site specific areas that could be improved)
- recreation – satisfactory (may be site specific areas that could be improved)

Overall, it appears that the current condition is rated as satisfactory. However, this needs to be confirmed through fieldwork.

3.0 DEVELOPING THE WATERSHED PLAN - STAGE 2

The management objectives for the watersheds have been determined from a review of risks and stakeholder input. The objectives are categorized as short-term or long-term. Short-term objectives address immediate concerns in the portion of the Kiskatinaw River that is the current water supply for the City. Long-term objectives address concerns related to sustainability of the various activities in the watershed.

3.1 Short-Term Objectives

Within the water supply area, the management objectives for the short term should be:

- Reduce, wherever practical, sources of sediment to streams
- Protect water supply from contamination from oil spills
- Protect water quality from impacts from resource development activities
- Minimize impacts on water quality and quantity from recreational activities
- Develop and implement a watershed monitoring program in cooperation with other stakeholders and agencies to identify sensitive areas and any high risk issues
- In cooperation with the agencies develop and implement a watershed signage plan
- Identify and risk rate potential or active natural sediment sources that may degrade water quality, and where feasible develop/implement remedial plans with appropriate agency
- Develop an effective ongoing communication/education strategy between stakeholders and the public that focuses on the priority watershed value – water for domestic use
- Develop a contingency plan, involving all stakeholders, that can be implemented in case of a water-related emergency in the watershed, e.g. petroleum spill, forest fire, etc.

3.2 Long-Term Objectives

Over the long term the watershed management objectives should be to:

- Develop a partnership with all licensed stakeholders in the watershed and the public for the protection of the water resource
- Develop and implement a long-term monitoring plan of watershed conditions that affect water quality
- Achieve a healthy, properly functioning watershed – protect areas that need protection
- Explore opportunities to reduce natural erosion rates through riverbank revegetation
- Meet the economic requirements of the surrounding communities
- Implement annual inspection program for the watershed
- Protect water quality from degradation from natural sediment sources
- Minimize impacts on water quality and quantity from recreational activities
- Maintain the water supply system to ensure adequate treatment and storage to meet the long-term needs of the users.
- Review the flow regime of the Kiskatinaw River to determine if the runoff characteristics have changed since the 1940s and if so why.

3.3 Desired Future Conditions

The City has long recognized that the Kiskatinaw River watershed is not an ideal source of water supply but it is the only feasible source at the present time. The City has developed its water system with appropriate works to treat the natural water quality deficiencies so that it can provide high quality safe water to its users. The City also recognizes that the watershed is licensed for multiple uses. The desired future watershed condition is one where the variety of other uses can continue recognizing that water for community use is the priority, and that the water quality should not be degraded by these other uses. Recognizing that the Kiskatinaw River will be the City's water source for the foreseeable future, the City is working towards a management framework where:

- There is a partnership between the stakeholders with the goal to protect the water resource.
- Water quality (after treatment) continues to meet all provincial and federal drinking water requirements.
- Water supply and storage are adequate to meet the demands (both consumptive and non-consumptive).
- Raw water quality is protected from impacts from resource development activities
- Integrated multiple resource use is compatible with the supply of safe drinking water and the risk of water contamination from all activities is low or moderate in the watershed.
- Integrated and comprehensive plans are developed over time to address all watershed activities and development.

Table 3-1 lists desired future conditions for all current land uses or those that potentially could occur within the watersheds.

Table 3-1: Desired future conditions

ACTIVITY	DESIRED FUTURE CONDITION	ACCEPTABLE FUTURE CONDITION
<p>Communications: - In order for the watershed plan to work and be effective it will be necessary to form a partnership between the stakeholders and through that partnership develop effective communications. Without the commitment to a partnership with the goal to protect the water resource, the plan will not become a reality.</p>		
<p>Natural Snowmelt And Rainstorm Runoff</p>	<ul style="list-style-type: none"> • Slow spring snowmelt and light summer rains to minimize erosion 	<ul style="list-style-type: none"> • Activities along corridors that could destabilize banks or increase sediment erosion are avoided –
<p>Oil and Gas Development</p>	<ul style="list-style-type: none"> • Oil or gas development upstream of the City's water intake is planned and implemented so as not to degrade existing water quality 	<ul style="list-style-type: none"> • • The clear-cut opening area required for wells is minimized and sediment is controlled • Road networks are developed in consultation with forest licensee • Roads and related drainage works are designed to minimize sediment transport to creeks • Future seismic lines are designed to have very low environmental impact • All oil and gas road and seismic line mapping is kept current
<p>Agriculture</p>	<ul style="list-style-type: none"> • Cattle grazing and other forms of intensive agricultural upstream of the City's water intake are undertaken so as not to degrade water quality or reduce water quantity in the Kiskatinaw River 	<ul style="list-style-type: none"> • Grazing tenure provisions to minimize cattle impacts on water quality are practiced, e.g. salting to take place at least 400m from a watercourse and dugouts or off-stream water sources provided to encourage cattle away from watercourses • A vegetative buffer between farms and streams or other Best Management Practices are implemented to address nutrient runoff
<p>Forest Development</p>	<ul style="list-style-type: none"> • Commercial forest development upstream of the City's water intake is planned and undertaken so as not to; degrade existing water quality, modify streamflow volumes beyond natural variations, shift the timing of runoff beyond the natural patterns 	<ul style="list-style-type: none"> • Watershed is mapped to determine the timber harvesting landbase (THLB) and the non-timber harvesting landbase (NTHLB). • For the THLB, total chance plans are prepared identifying all roads (permanent and temporary) and all potential cutblocks. • Road networks are developed in consultation with Oil and Gas licensees • Forest development is planned to promote forest health and to have minimal effect on water quality

Table 3-1: Desired future conditions - Continued

Recreation	<ul style="list-style-type: none"> • Recreational activities above water intake do not impact water quality 	<ul style="list-style-type: none"> • Recreational activities that could be detrimental to water quality are encouraged to locate in areas away from streams • Recreational areas are designed/upgraded to minimize the risk of water supply contamination through runoff control and implementation of appropriate wastewater treatment • Recreational users are purposefully informed of watershed status through user groups, brochures, and signage
Utilities	<ul style="list-style-type: none"> • Public roads above water intake are designed, constructed and maintained so as to have minimum impacts on water quality and runoff • Pipelines above the intake are designed, constructed and maintained to minimize the risk of failure and sedimentation to streams • Any oil pipeline stream crossings are designed to limit impact on water quality in the event of a line rupture 	<ul style="list-style-type: none"> • As part of future upgrades to any public roads situated upstream of the river intake, drainage is designed to minimize impacts on streams • Existing pipelines are maintained to limit possibility of failure • Right-of-ways, including any access roads are maintained to protect water quality • Any future lines are planned in consultation with the City • Risk of potential oil spills at stream crossings is addressed by installing automatic shutoff valves and pressure detectors
Private Lots	<ul style="list-style-type: none"> • In cooperation with the Peace River Regional District review and revise existing bylaws for private lots upstream of the intake to protect water quality. 	
Water Supply Infrastructure	<ul style="list-style-type: none"> • Water supply infrastructure is designed, operated and maintained to meet or exceed Canadian Drinking Water Quality Guidelines including removal/inactivation of Giardia and Cryptosporidium. Impact on low flows in the Kiskatinaw River downstream of the intake is minimized through the use storage 	

4.0 IMPLEMENTATION AND MONITORING – STAGE 3

4.1 Plan Framework

The purpose of the watershed management plan is to protect the source quality and quantity of water in the City's water supply area in order to meet the needs of the residents of Dawson Creek now and into the future. The goal is to develop a plan that results in a water supply area that are environmentally healthy and also meet the economic needs of the community. The plan is not intended to be a "cookbook" but rather a flexible framework designed to achieve the desired watershed conditions through cooperation not confrontation. The only way that the plan will work is if all the stakeholders and the public see themselves as partners with a common goal - the protection of the water.

Because it is unlikely that the plan could be implemented in total at the outset, it will be necessary to stage the process based on the priorities of the City. In Section 3, it has been suggested that there are both short and long term management objectives that were identified at the public/stakeholder open house, and through field inspections. These management objectives could also be considered priorities. When combined, these priorities form the framework for the plan as follows:

- develop partnerships to protect water resource
- address any gaps in policy and management
- protection of water quality
- achieve healthy properly functioning watersheds
- meet the economic needs of the community
- develop supplies to meet future demands
- implement watershed monitoring
- water education program
- recognition of downstream user
- recognition that the Kiskatinaw River watershed is part of a larger system – the Peace River

4.2 Existing Policies affecting Watershed Management and Identified Gaps

A logical starting point is to identify what policies already exist at the federal, provincial and local level that are intended to govern activities in the watershed. The next step would be to identify any obvious gaps that are considered to compromise the objective of protecting the water supply. Once any gaps have been identified, then options to address them should be developed with the cooperation of the stakeholders. Only then can the plan be completed.

Table 4-1 summarizes the existing policies affecting watershed management by resource concern and identifies the responsible agency, resource licensee, first contact, emergency response by the City and subsequent remedial response by agency/licensee. Based on this summary, there are two significant gaps. The first is the recognition, by the individual resource user/licensee and by **all** users and agencies collectively, of the responsibilities set out in the current legislation and policies for the protection of the land and water in the watersheds. The second is an effective communication plan that would allow a resource user and the City to be in contact when an emergency or potential problem occurs. As stated previously this plan will only work if everyone wants it to work.

TABLE 4-1: Resource use/Concerns and Responsibilities

RESOURCE CONCERN: Natural erosion					
IMPACT	RESPONSIBLE AGENCY	CONTACT	POLICY	ACTION	
				Emergency Response by City	Remedial Response by City/Agency
Sediment delivery	City, PRRD, WLAP	Works Superintendent	Operational Procedures	Close intake Assess	Develop remedial plan Implement remedial plan
Increased turbidity	City, PRRD, WLAP	City Works Superintendent, PRRD, WLAP	Operational Procedures	Close intake Assess	Develop remedial plan Implement remedial plan
Debris load	WLAP, City	WALP, City Works Superintendent	PEP, Operational Procedures	Close intake Assess	Develop remedial plan Implement remedial plan
Channel obstruction	WLAP, City	WALP, City Works Superintendent	PEP, Operational Procedures	Close intake Assess - determine land tenure	Develop remedial plan - on private land, landowner to do - on Crown land, MOF Implement remedial plan - on private land, landowner responsible - on Crown land MOF responsible
Flooding	WLAP/PEP	PEP	PEP	Assess water quality and risk to intake Close intake if poor water quality	Assess watershed condition and water quality Develop remedial plan as required to restore water quality

RESOURCE USE: Oil and Gas Development					
IMPACT	RESPONSIBLE AGENCY	CONTACT	POLICY	ACTION	
				Emergency Response by City	Remedial Response by City/Agency
Contaminated runoff	Oil and Gas Commission, WLAP	Permit Holder	Petroleum Act	Close intake, isolate watershed from water supply, Notify downstream users	Assess Develop and implement remedial plan
Sedimentation (roads, drill site)	Oil and Gas Commission, WLAP	Permit Holder	Petroleum Act, Water Act	Close intake, Notify downstream users	Assess Develop and implement remedial plan
Sedimentation (pipeline)	Oil and Gas Commission, WLAP	Permit Holder	Petroleum Act, Water Act	Close intake, Notify downstream users	Assess Develop and implement remedial plan
Oil spill	Oil and Gas Commission, WLAP	Waste Management	PEP, Waste Management Act	Close intake, Notify downstream users	Assess Develop and implement clean up, decontamination plan

RESOURCE USE: Timber Harvesting					
IMPACT	RESPONSIBLE AGENCY	CONTACT	POLICY	ACTION	
				Emergency Response by City	Remedial Response by City/Agency
Sedimentation (roads)	Ministry of Forests	Dawson Creek FD	FPC	Assess, Close intake if necessary	Assess, Prepare remedial plan, implement
Sedimentation (cutblock)	Ministry of Forests	Dawson Creek FD	FPC	Assess, Close intake if necessary	Assess, Prepare remedial plan, implement
Turbidity	Ministry of Forests	Dawson Creek FD	FPC	Close intake	Assess, Prepare remedial plan, implement
Peak flow increases	Ministry of Forests	Dawson Creek FD	FPC	Assess, monitor, protect intake	Assess, monitor
Petroleum spill	Ministry of Forests, WLAP	Dawson Creek FD, WLAP	FPC, Waste Management Act	Close intake	Assess Develop and implement clean up, decontamination plan
Landslide/debris torrent	Ministry of Forests	Dawson Creek FD	FPC	Assess, monitor, protect intake	Assess, Prepare remedial plan, implement
Channel disturbance	Ministry of Forests, WLAP	Dawson Creek FD	FPC, Water Act	Assess, Close intake if necessary	Assess, monitor

RESOURCE USE: Private Agricultural Land					
IMPACT	RESPONSIBLE AGENCY	CONTACT	POLICY	ACTION	
				Emergency Response by City	Remedial Response by City/Agency
Sedimentation	MAFF, WLAP, PRRD	MAFF, WLAP, PRRD	Water Act	Assess, Close intake if necessary	Assess, Prepare remedial plan, implement
Contamination of streams	MAFF, WLAP, PRRD	MAFF, WLAP, PRRD	Waste Management Act, Bylaws	Close intake	Assess Develop and implement clean up, decontamination plan
Refuse	WLAP, PRRD	WLAP, PRRD	Waste Management Act, Bylaws	Assess, monitor water quality	Assess Develop and implement clean up

RESOURCE USE: Roads, Utilities					
IMPACT	RESPONSIBLE AGENCY	CONTACT	POLICY	ACTION	
				Emergency Response by City	Remedial Response by City/Agency
Sedimentation	Ministry of Transportation, PRRD	Maintenance Contractor, PRRD	Highways Act, Water Act, Bylaws	Assess, Close intake if necessary	Assess, Prepare remedial plan, implement
Contamination	Ministry of Transportation, WLAP	Maintenance Contractor, WLAP	Waste Management Act	Close intake	Assess Develop and implement clean up, decontamination plan
Petroleum spill	Ministry of Transportation, WLAP	Maintenance Contractor, WLAP	Waste Management Act	Close intake	Assess Develop and implement clean up, decontamination plan
Refuse	Ministry of Transportation, WLAP, PRRD	Maintenance Contractor, PRRD	Waste Management Act, Bylaws	Assess, monitor	Assess Develop and implement clean up
Road de-ice runoff	Ministry of Transportation, WLAP	Maintenance Contractor, WLAP	Waste Management Act	Assess, monitor water quality	Assess Develop and implement clean up, decontamination plan

RESOURCE USE: Water Supply Infrastructure					
IMPACT	RESPONSIBLE AGENCY	CONTACT	POLICY	ACTION	
				Emergency Response by City	Remedial Response by City/Agency
Pipeline failure	City	Works Superintendent	Operational Procedures	Assess, isolate failure	Implement repairs
Sediment	City	Works Superintendent	Operational Procedures	Assess, protect works and water supply	Develop remedial plan, implement
Contamination	City, WLAP	Works Superintendent	Operational Procedures, Waste Management ACT	Assess, isolate contamination, protect water supply, advise public	Assess Develop and implement clean up, decontamination plan
Unscheduled loss of supply	City, PEP	Works Superintendent, PEP	Operational Procedures, PEP	Assess, advise public, provide alternate drinking water	Determine cause of loss of supply, develop remedial plan, keep public advised

RESOURCE USE: Range Use					
IMPACT	RESPONSIBLE AGENCY	CONTACT	POLICY	ACTION	
				Emergency Response by City	Remedial Response by City/Agency
Sedimentation	MAFF, WLAP	MAFF, WLAP	Water Act	Assess, Close intake if necessary	Assess, Prepare remedial plan, implement
Pathogenic organisms	Northern Health Authority (NHA), MAFF, WLAP	NHA-DAWSON CREEK	Health Act	Close Intake	Assess Develop and implement clean up, decontamination plan

RESOURCE USE: Recreation					
IMPACT	RESPONSIBLE AGENCY	CONTACT	POLICY	ACTION	
				Emergency Response by City	Remedial Response by City/Agency
Sedimentation	BCAL, WLAP	Licensed user, WLAP	Water Act	Assess, Close intake if necessary	Assess, Prepare remedial plan, implement
Chemical Contamination of streams	WLAP	Licensed user, WLAP	Waste Management Act	Close intake	Assess Develop and implement clean up, decontamination plan
Refuse	WLAP	Licensed user	Waste Management Act	Assess, monitor water quality	Assess Develop and implement clean up
Pathogenic organisms	Northern Health Authority (NHA), BCAL, WLAP	NHA-DAWSON CREEK	Health Act	Close Intake	Assess Develop and implement clean up, decontamination plan
Hydrocarbon contamination	BCAL, WLAP	Licensed user, WLAP	Waste Management Act	Close Intake	Assess Develop and implement clean up, decontamination plan

4.3 The Action and Implementation Plan

This Action Plan provides the strategies and actions that will be required to protect and sustain the water resource in the Kiskatinaw River watershed upstream of the Arras intake so that it can effectively and efficiently continue to meet the needs of the City of Dawson Creek. It is recognized at the outset of this plan that the natural suspended sediment load and turbidity level in the raw water often exceeds the recommended federal and provincial levels. Although the City is pursuing other supply options, the Kiskatinaw River will remain the primary source for the foreseeable future. It is also recognized that the current provincial policies governing the uses in the watershed are based on the philosophy of multiple resource use.

The plan is structured based on the priorities presented in section 4.1. And guided by the objectives set out in sections 3.1 and 3.2. A plan is presented for each objective involving sub-sections addressing the strategies, and the tasks required to implement the strategies.

Action #1: Develop partnerships for watershed protection

Objective: To build support from all the stakeholders in the watershed who have common interests and concerns regarding effective watershed management.

Strategies:

- The City accepted the role as the facilitator of this planning process as part of its ongoing commitment to the watershed, and to the residents of Dawson Creek, that builds on the 1991 *Kiskatinaw River Integrated Watershed Management Plan*
- The preparation of the draft management plan provides a common focus for stakeholders to meet and discuss issues and concerns
- Watershed management involves the recognition by the individual stakeholders of responsibilities related to impacts on resources
- Through discussions the intent is to develop creative and acceptable ways to protect the water resource

Tasks:

- The City has initiated the partnership building process by undertaking the preparation of the draft management plan.
- Stakeholders have the opportunity to be involved in the process through participating in the initial meetings and providing input to the final plan.
- The City will continue to improve communications with the stakeholders and agencies and actively pursue partnership opportunities.
- The City should review opportunities for joint monitoring of water quality and watershed activities.

Action #2: Address gaps in policy and management

Objective: *Through the review of the existing policies and management options, gaps were identified that need to be addressed in the plan. These include:*

- 1. The recognition by the stakeholders, both individually and collectively of their responsibilities to protect the water resource*
- 2. The need for effective communications between all the stakeholders and the city. This is a fundamental requirement for the implementation and operation of the plan as well as in the event of a water related emergency in the watershed.*
- 3. The need for contingency plans to address potential emergencies that could impact the water resource.*

Strategies:

- The plan includes a summary of the existing policies by resource use indicating agency responsible, contacts, emergency and remedial responses.
- The City should maintain an up to date directory of addresses and contact numbers for all licensed stakeholders.
- The City should work with stakeholders/agencies to develop contingency plans for high-risk events such as petroleum spills, forest fires, etc.

Tasks:

- Stakeholders should review the table applicable to their activities to confirm that the table is both complete and accurate.
- Stakeholders should provide current contact addresses and telephone numbers to the City Water Resource Coordinator.
- City should initiate discussions with oil and gas licensees, forest licensees and agencies to develop contingency plans for petroleum spills and wildfires.

Action #3: Protection of Water Quality

Objective 3.1: Protect water supply from contamination from oil spills

[The Burlington Resources (BR) oil pipeline crossing of the Kiskatinaw River approximately 15 km upstream of the City intake is of immediate concern. The Pembina pipeline failure on the Pine River in 2001 clearly underscored this issue. There are also other pipelines and other crossing elsewhere in the watershed but none as close to the intake as this one. However a spill into a watercourse anywhere upstream of the intake would likely result in a complete suspension of any diversion from the river until cleanup was complete]

Strategies:

- For all pipelines above the intake the priority strategy is to maintain the lines to avoid a failure.
- Ultimately if the goal was to limit the release of oil in any spill to a volume of a tanker truck or less through the installation of automatic shutoff valves on the line on both banks of a stream, the City would still have to increase its raw water storage by a three month supply to a six month supply in order to allow for cleanup. (Based on the Chetwynd experience, the alternative to an aggressive program to limit a spill is

for the City to increase its raw water storage to 18 months to allow sufficient time for cleanup of a larger spill.)

- Install a hydrocarbon sensor in the City intake wet well at Arras that would automatically shut down the pump station and send an alarm if hydrocarbons were detected.
- For all other oil pipelines that cross streams or have the potential to spill oil into a stream, implement a formal monitoring and inspection program to ensure that the works are in good repair and meet or exceed industry standards.

Tasks:

- BR to confirm that the condition of the pipeline crossing the Kiskatinaw River meets all industry requirements.
- BR to investigate the feasibility of installing automatic shut-off valves at the crossing
- BR and DC to investigate the feasibility of installing a hydrocarbon detection system in the Arras wet well.
- BR to provide DC with locations of all pipelines and stream crossings within the Kiskatinaw River watershed, including pipeline size and capacity, an accurate up to date map and GPS co-ordinates for each crossing, etc.
- BR to advise DC of the date and details of the last inspection for each line, including any repairs or maintenance.

Objective 3.2: Protect water quality from impacts from resource development activities

[The resource activities to be addressed include; timber harvesting, oil and gas development, cattle grazing, agricultural practices on private land.]

Strategies:

Forest Development:

- The priority strategies should be to avoid disturbances that would increase sediment transport to, or in streams. Activities of concern are soil disturbance, e.g. from roads, skid trails and landings, as well as increases in peak flows that could affect sediment transport rates and aggravate existing natural sediment sources, e.g. natural cutbanks along the mainstem of the Kiskatinaw.
- Forest development should be consistent with the strategies presented in the Dawson Creek LRMP (refer to Appendix IV).
- Long-term forest development plans should be prepared by each licensee that include access plans for the licensed lands as well as total chance harvest plans. (A "total chance plan" is an office engineering and mapping exercise that illustrates all the potential roads required to permit harvesting of all the timber in a watershed.)
- Access Management Plans (i.e. a cooperative access strategy) should be prepared for all roads with the intent that only the minimum amount of road is open for industrial use, i.e. active, at any time and that all inactive road, i.e. road not required for industrial use, is left in a stable condition to limit erosion to streams.
- Access planning should be coordinated with the oil and gas licensees to minimize unnecessary roads and the amount of active road.
- Current development is planned and carried out consistent with the Forest Practices Code.
- Ministry of Forests should conduct regular scheduled inspections of active forest development activities to determine potential impacts on the water resource. Results of inspections should be reviewed with forest licensee and the City.

- When the province revises the legislation to move to a results-based forest management process, that the licensees should adopt guidelines that will minimize disturbances that might degrade water quality.
- Forest development plans should be reviewed annually by all other affected stakeholders.

Tasks:

- Forest licensees to ensure that forest development activities are being conducted consistent with the recommendations in the LRMP and with the Forest Practices Code.
- Forest licensees should develop long-term Total Chance Plans (i.e. access and harvesting) for their operating areas in cooperation with adjacent licensees.
- Forest licensees and Oil and Gas licensees should consult on access planning to avoid unnecessary disturbance.
- Ministry of Forests should maintain current records on proposed and actual forest development.
- Forest licensees and MOF should conduct regular inspections of active forest development activities with specific focus on the protection of the water resource, and provide summary of inspection results to the City. At least once a year there should be a joint inspection involving the MOF, forest licensee and a representative from the City of forestry activities in the watershed.
- The City should review the forest development plans with the licensees annually.

Oil and Gas Development:

- Development should be consistent with the recommendations provided in the Dawson Creek LRMP (refer to Appendix IV).
- Activities that result in soil disturbance, e.g. access roads, drill pads, drilling, seismic lines and pipelines should be designed, constructed and maintained so that sediment delivery to streams is minimized.
- The Oil and Gas Commission should develop a policy (with an appropriate monitoring period) to conduct inspections of active development sites as well as deactivated sites to confirm that the water resource is adequately protected. Results of the inspections should be reviewed with the licensee and the City.

Tasks:

- Oil and gas permittees to ensure that development activities are being conducted consistent with the recommendations in the LRMP and with associated permits.
- Oil and gas permittees and forest licensees should consult on access planning to avoid unnecessary disturbance.
- Oil and Gas Commission should maintain current records on proposed and actual forest development.
- Oil and Gas permittees and inspectors from the Oil and Gas Commission should conduct regular inspections of active development sites with specific focus on the protection of the water resource, and provide summary of inspection results to the City. At least once a year there should be a joint inspection involving the oil and gas permittee, an inspector from the Commission and a representative from the City of active development activities in the watershed.
- The City should review the exploration and development plans with the permittees annually.

Cattle Grazing:

- Strategies associated with cattle grazing are intended to avoid increased sedimentation and elevated fecal coliform levels resulting from cattle disturbance in and adjacent to streams.
- Range use should be consistent with the recommendations provided in the Dawson Creek LRMP (refer to Appendix IV).
- Cattle management around watercourses should be consistent with conditions of grazing leases and good range management practices.
- The Range Officer, Ministry of Forests should conduct regular field inspections to review impacts from cattle on water quality and advise grazing licensee and City of results. If site degradation is identified, Range Officer and licensee should develop and implement remedial plans and adjust practices to avoid future incidents.

Tasks:

- Grazing licensee to ensure that range activities are being conducted consistent with the recommendations in the LRMP and with associated permits.
- Ministry of Forests should maintain current records on proposed and actual grazing leases and permits.
- Grazing licensee and the Range Officer should conduct regular inspections to review impacts from cattle on water quality and provide summary of inspections results to the City. At least once a year there should be a joint inspection involving the grazing licensee, the Range Officer and a representative from the City of grazing license areas/community pastures in the watershed.
- The City should review the grazing plans with the licensees annually.

Agricultural Practices:

- Strategies associated with agricultural practices are intended to address these activities that might result in increased sedimentation to streams or water contamination by runoff or chemicals.
- Agricultural/animal husbandry practices that could impact water quality should be conducted consistent with the recommendations of the Dawson Creek LRMP and related policies (refer to Appendix IV).
- Agricultural land situated upstream of the Arras intake should be inspected annually to confirm that the water resource is being adequately protected. Results of inspection should be reviewed with the landowner and with the City.

Tasks:

- Landowners to ensure that agricultural practices are being conducted consistent with the recommendations in the LRMP and with associated regulations.
- Staff from the Ministry of Agriculture, Food and Fisheries should conduct regular inspections of agricultural land situated upstream of the Arras intake to confirm that the water resource is being adequately protected. Results of inspection should be reviewed with the landowner and with the City.

Action #4: Achieve healthy properly functioning watershed

Objective: *Notwithstanding the natural sediment load in the Kiskatinaw River, the objective of this plan is to maintain what is referred to as a 'properly functioning' healthy watershed. This term refers primarily to the water resource and is achieved by ensuring that the water quality and quantity is maintained within the natural range. The flow regime can be determined from the hydrometric records collected at the Water Survey of Canada gauging station Kiskatinaw River at Farmington [WSC stn no. 07FD001]. Data on turbidity is available from records maintained by the City. At the resource development level this means controlling sediment delivery to streams and ensuring that the cumulative impact of timber harvesting does not modify the natural flow regime. The key indicator of watershed health is the measure of the current water quality as compared to an estimate of the natural water quality prior to any development.*

Strategies:

- The strategies to ensure that the watershed is healthy and functioning properly must address both the impacts from past development as well as those for future development.
- The impacts on water from past development, resulting from any licensed activity, should be a low hazard.
- Maintain or reduce the sediment delivery hazard to low from all proposed and future development.
- Maintain a moderate peak flow hazard from all proposed and future development.
- Ensure that there is a functioning riparian zone along all S1, S2 and S3 streams, and a functioning riparian management area along any S4, S5 and S6 streams. (Refer to Forest Practices Code Riparian Management Guidebook for definitions of stream classes.)

Tasks:

- Assess the watershed to identify impacts on water from past development, in all forms, and to recommend appropriate restoration as required.
- All proposed and future development should be reviewed to ensure that sedimentation to streams is controlled.
- Determine the impact from past forest development on water yield, at the sub-basin and watershed level.
- Determine what is an appropriate level of development so that peak flows will remain the range of natural fluctuation.
- Using the current hydrologic state of the watershed, previously determined, as a base, determine the potential impacts of proposed development on peak flows. Modify development plans as required so that the peak flow hazard for any sub-basin and the watershed does not exceed a moderate level.
- Identify locations where the riparian zone has been impacted by past development and assess the condition and the risk to water quality. If the riparian area at a site is not functioning and is determined to be a moderate or high risk, determine potential restoration plan and sources of possible funding.

Action #5: Meet the economic needs of the community

Objective: *The Kiskatinaw River watershed is the only available water supply for the City. Recognizing the importance of the supply, the City has made, and will continue to make, major investments in advanced water treatment and upgrading the supply system. The City places a high priority on the protection of its supply. The City also recognizes that the watershed provides an economic benefit to a variety of stakeholders. The intent of this plan is to develop and implement a process that all stakeholders are party to that will protect the watershed so that multiple resource use can continue. It is in the best interest of all stakeholders that all activities are planned and implemented in a sustainable manner.*

Strategies:

- All activities in the watershed are undertaken in a manner that will protect the water resource
- Determine benefits to the community of other resource uses in the watershed
- Determine extraordinary costs to resource users to protect water resources as recommended in the plan
- Cost to the community of protecting the water resource weighed against the benefit to the community of other resource development
- Develop a partnership with the Peace River Regional District

Tasks:

- Each stakeholder responsible for the planning and implementation of their resource development so that it is consistent with the goal of the plan.
- Complete a cost/benefit analysis of water resource protection.
- Complete a cost/benefit analysis of extraordinary protection recommendations in the plan.

Action #6: Develop and manage water supplies to meet current and future demands

Objective: *As part of the management plan the City should determine the limits on the supply side, i.e. the watershed, and opportunities to effectively control the demand side, i.e. water use. Options range from the development of storage reservoirs in the upper watershed to placing limits on growth.*

Strategies:

- The City needs to know what the long-term water requirements are based on growth projections.
- The City needs to know the limits of the current source and supply system, the estimated costs to provide additional water, and plan growth accordingly.
- The City should develop a clear understanding of the profile of current water use in the community. This profile should look at both seasonal (ie. summer versus other seasons) and land use (ie. residential, various commercial, industrial and other users) variations in water use. The fact that water meters are in-place provides an excellent opportunity for water consumption data collection and analysis.
- In developing a water conservation program, there are various approaches available to the City. First, the City could examine its user fee structure and apply consumption data available from reading water meters as a means to levy higher rates on large water consumers. Second, the City could encourage the installation of

low water use fixtures, particularly toilets, in buildings. Third, the City could develop an education program focussed on approaches to and benefits of efficient water use and disseminate this program in various ways through the community. Any of these approaches could be tailored to the specific needs of the community arising from a clear understanding of the water use profile.

Tasks:

- The City prepares a water supply report that identifies the constraints and opportunities in the present system.
- The City initiates a study to determine the existing water use profile, and long-term water requirements.
- The City develops a water conservation program tailored to the profile of current water use in the community in order to achieve the most benefit for resources expended. For example, if the water use profile points to high summer season demands by residential land uses, outdoor water use for lawn and garden irrigation and other activities should be the focus of the program.

Action #7: Implement watershed monitoring

Objective: *In order to evaluate the effectiveness of the management plan it will be necessary to monitor both water quality and watershed activities. Results from the monitoring would also be used to revise the plan as required.*

Strategies:

- Monitor raw water quality in the river at the Arras intake.
- Monitor water quality at selected points in each sub-basin or downstream of selected active development to identify point sources of pollution.
- Stakeholders and agencies to provide monitoring data as part of ongoing resource management.
- Coordinate monitoring activities with the LRMP.

Tasks:

- The City should continue to operate its continuous turbidity recorder at the Arras intake.
- The City, in cooperation with the various stakeholders and agencies, should identify suitable sites in each sub-basin and elsewhere in the watershed to collect routine turbidity data and other selected water quality parameters necessary to evaluate watershed conditions.
- The City should schedule an annual meeting of all stakeholders that could include a field trip to review the state of the watershed.
- The City should review the proposed monitoring plan with the relevant agencies involved in the LRMP.

Action#8: Water education program

Objective: To increase the knowledge and awareness in all stakeholders, and the public, of the value of water and the sensitivity of the watershed area.

Strategies:

- Stakeholders are aware of the importance of the watershed and the water supply to the City.
- The public is aware of the value of the water supply and the sensitivity of the water supply area.
- The City develops a partnership program with stakeholders and the public to promote water and watershed education.
- Raise awareness of responsibility towards water beyond the watershed including recognition of downstream users.

Tasks:

- The City should schedule an open house for all the watershed stakeholders to show them the water supply and treatment system.
- The City and the stakeholders should schedule an annual watershed field day designed to inform all parties about what watershed management is and how it works. Stakeholders would be encouraged to show others how they protect the water resource.
- The City should consider opportunities to develop a "water smart" or "water awareness program" with the local schools.
- Consider creating a "watershed improvement day" where local groups e.g. wolf cubs, scouts, guides, etc. would be invited to spend a day helping improve the watershed in some way. This might involve cleaning up refuse in a popular recreation area, planting trees and shrubs along a sensitive stream, etc.

Action#9: Security of water supply

Objective: To review and improve the security of the water supply.

Strategies:

- City staff and the public are made aware of the need for a secure water supply system
- Implement a signage program to address active development, watershed boundaries, roads, etc
- Develop a facility monitoring program to limit the likelihood of vandalism and tampering with works
- Stakeholders and public are aware of "observe, record and report" program.

Tasks:

- City should initiate a staff awareness program for water supply security.
- City should initiate a public awareness program for water supply security.
- City should commission an independent audit of the current security of its supply system.
- Implement a security monitoring program to reduce risks of vandalism and tampering.
- Review wildfire suppression program with Ministry of Forests and forest licensees

Action#10: Partnership with Peace River Regional District

Objective: To develop a partnership with the PRRD to improve watershed management

Strategies:

- City to enter into discussions with PRRD to promote a partnership agreement

Tasks:

- City arrange initial meeting with the PRRD to explore partnership opportunities

Action#11: Enhanced Watershed Protection

Objective: To enhance the protection of the water resource.

Strategies:

- Investigate opportunities to improve bank stability along the river
- Develop partnerships with grazing licensees and MOF to limit cattle impacts around streams through strategic use of fencing, off stream water sources, etc.

Tasks:

- Initiate discussions with WLAP to assess natural sediment sources along the river and determine opportunities to implement bank stabilization projects
- Work with grazing licensees and MOF to implement strategies to limit cattle impacts around streams.

Action#12: Recreation Use

Objective: To reduce impacts on water quality from recreation use.

Strategies:

- In consultation with off-road vehicle clubs, develop education program for four-wheel drive vehicles, all-terrain vehicles and motorcycles regarding environmental protection and responsible vehicle use.
- Develop partnerships with organized recreation clubs and MOF for a backcountry - education program to limit water quality impacts, e.g. "pack-in, pack-out" .

Tasks:

- Initiate discussions with local off-road clubs.
- Continue to develop partnerships with MOF and local recreation clubs.

Action#13: Future Work

Objective: Keeping the Plan current

Strategies:

- Plan reviews will be the responsibility of the City to initiate.
- The results of the watershed monitoring will be essential in understanding current watershed condition
- Research may be required to understand specific issues in the watershed

Tasks:

- Specific tasks that the City may consider are summarized in Section 7.

5.0 ADAPTIVE MANAGEMENT

1. PLAN APPROVAL – STAGE 4

Since the preparation of this Plan is an initiative undertaken by the City of Dawson Creek, it is the City that has the authority to approve the Plan. It is also the City that has the responsibility to implement the Plan. As stated in Section 1.1 this Plan is the first step as part of a long-term process, being undertaken by the City of Dawson Creek, to actively involve other licensed stakeholders in the Kiskatinaw River watershed in a coordinated watershed management plan to protect the water resource that is vital to the City. The goal was to establish a set of objectives and policies for the protection of the water resource and to improve communications between the City and the other licensees. Section 3 sets out both short and long-term objectives as well as a desired future condition. Section 4 presents a process for implementing the Plan as well as developing a monitoring plan. It was clear from the comments received at the stakeholder meetings that building “partnerships” with the stakeholders will take time. The Plan provides a forum to establish improved communications with the various stakeholder groups and, that as a result, these partnerships will gradually evolve.

2. ADAPTIVE MANAGEMENT – STAGE 5

In order that the management plan remain effective, it will be necessary to review it on an annual basis. The City has the responsibility to initiate the review, but the actual review itself involves all of the stakeholders/partners. Questions that need to be asked and addressed may be; Do we still need this? Have conditions changed? What else can we do to improve the plan? What further research needs to be done? It is through the answers to these questions that the plan evolves and adapts to new issues and concerns. If the participants are prepared, a one-day workshop may be all that is required to provide direction. The involvement of the City will likely be much more since it will be responsible to update and revise the plan.

5.1 Progress Reports

As the proponent of the plan, the City should prepare an annual report on the “State of the Watershed”. As background to the report, stakeholders would be expected to provide the City with a summary of activities over the year. The City would include a summary of the results of monitoring activities. Progress on specific issues would be included as well as the identification of new or emerging issues. The report would be provided to the stakeholders prior to the annual meeting.

5.2 Annual Meetings

The City should schedule and organize an annual meeting to review the “state of the watershed” report and the plan with all the partners. Consideration should be given to combining the meeting with a watershed activity such as a field trip.

The intent of the meeting is to recognize the successes that have been achieved over the previous year and to identify opportunities to improve the plan. This is also the opportunity for partners to recommend revisions/updates to the plan so that it continues to be effective in achieving City plus stakeholder goals.

5.3 Revising the Plan

The City should consider the results and recommendations received from the annual meeting and revise the plan as required. Drafts of the updated plan should be distributed to all partners/stakeholders/agencies for review. A revised plan should be provided to all partners.

5.4 Public input

In order to keep the public informed and to provide a means to solicit input, the City should consider posting the plan on a website. This site could also be used to provide the public with regular water reports. There would also be an obligation for the City to recognize any recommendations and ideas provided and indicate how they may have been addressed in the management plan.

6.0 REFERENCES

Ministry of Sustainable Resource Management, *Dawson Creek Land and Resource Management Plan*, 1999. <http://srmwww.gov.bc.ca/rmd/lrmp/dawson/>

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<http://www.for.gov.bc.ca/hfp/range/manual/TablCont.htm>

Ministry of Forests, *Forest Practices Code Act*
<http://www.for.gov.bc.ca/tasb/legsregs/fpc/fpcact/confpc.htm>

Ministry of Forests, *Forests Act*
<http://www.for.gov.bc.ca/tasb/legsregs/forest/foract/confa.htm>

Ministry of Water, Land and Air Protection, *Water Act*
<http://srmwww.gov.bc.ca/wat/wrs/wateract/wtrconsl.htm>

Ministry of Water, Land and Air Protection, *Land Act*

Ministry of Water, Land and Air Protection, *Waste Management Act*

Ministry of Energy, Mines and Petroleum Resources, *Petroleum and Natural Gas Act*
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Ministry of Transportation, *Highways Act*
<http://srmwww.gov.bc.ca/wat/wrs/wateract/wtrconsl.htm>

Ministry of Agriculture, Food and Fisheries, *Agriculture Land Commission Act*
<http://www.agf.gov.bc.ca/ministry/legsum/lrco.stm>

McConnel M., Ministry of Forests, Personal Communication, facsimile to Piero Galvagno, December 12, 2001.

Stevenson, John, Ministry of Forests, Personal Communication, e-mail to Piero Galvagno, January 7, 2002.

APPENDIX I - STAKEHOLDER MEETING MINUTES

**Initial Stakeholder Meeting
November 21, 2001**

Meeting Date: November 21, 2001 **Page:** 1 of 9
Project: City of Dawson Creek **File #:** 1071446.1
 Kiskatinaw Watershed Management Plan
 Update
Location: Peace River Regional District

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Edward Stanford, Peace-Liard Watershed Council	785-9691	785-9697
Piero Galvagno, Urban Systems Ltd.	763-5266	762-2517

SPEAKER DISCUSSION

- Attendees:
As listed
above and
- Chris Baker, Canadian Hunter Exploration Ltd.
 - Shannon Anderson, Peace River Regional District
 - Debbie Kunz, Peace River Regional District
 - Bruce Simard, Peace River Regional District
 - Brian Haddon, Agriculture And Agri-Food Canada – Prairie Farm Rehabilitation Administration (PFRA)
 - Brett Henchel, Agriculture And Agri-Food Canada – Prairie Farm Rehabilitation Administration (PFRA)
 - Gord Humphrey, Oil & Gas Commission
 - John Frank, Public At Large
 - Wayne Hiebert, Dawson Creek & District Chamber of Commerce
 - Rob Bressette, BC Parks, Fort St. John
 - Ted Henderson, Bear Mountain Grazing Association (BMGA)
 - Rod Kronlachner, Ministry of Forests (MOF)
 - John Stevenson, Ministry of Forests (MOF)
 - Mike McConnell, Ministry of Forests (MOF)
 - Darryl Melnyk, Ministry of Sustainable Resource Management (MSRM)
 - Nick Baccante, Ministry of Water, Land & Air Protection (MWLAP)
 - Mark Phinney, Louisiana Pacific Canada, FRD (LP)
 - Rod Brooks, Louisiana Pacific Canada, FRD (LP)
 - Two members of the public at large.

Don Dobson **Introductions**

Gave introduction and purpose of the study.

Rod Harmon **Results of the 1991 Watershed Plan**

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City of
Dawson
Creek

The 1991 Kiskatinaw Watershed Plan was basically an inventory of watershed resources and activities, however, not many people know about the 1991 Plan. In 1992, the plan was superceded by the Forest Practices Code and many of the recommendations in the Plan were not implemented.

SPEAKER

DISCUSSION

Don Dobson The 1991 Plan was developed between 1986-1991. The current plan is being done much faster due to funding constraints. The 1991 Plan will be used as a starting point.

The process of the current plan will have four components:

- Phase 1 – stakeholder consultation
Plans and maps presented and feedback solicited.
- Phase 2 – determine current watershed condition, and future desired condition, and establishment of priorities and policies, and development of a draft management plan.
- Phase 3 – follow-up meeting in February
The draft plan will be presented and feedback solicited.
- Phase 4 – finalize plan.

Rod Harmon
City of
Dawson
Creek

Current Issues of Water Quality and City's Concerns

The 1991 Kiskatinaw Watershed Plan summarized the City's concerns, many of which have been confirmed.

Turbidity – The Kiskatinaw has a high natural sediment load, at times during the year the river water quality is not suitable for treating for domestic use. The issue of turbidity is one about perception: the water looks dirty whether it is at 500 NTU or 2000 NTU. The City's system can handle raw water at 500 NTU. At higher turbidity levels problems in pumping are encountered. During periods of high turbidity, stored reserves must be used. A graph was presented which showed measured trends in turbidity levels. Prior to 1992 the City used to test twice a week, now it records turbidity levels continuously. Average monthly turbidity readings for 5-year intervals were graphed. The graph shows a definite increase in turbidity between the 1999-1995 and 1996-2001 intervals. City's turbidity meter can only read 2,000 NTUs but levels may be up to 12,000 NTUs;

Agricultural Activity - Water sample analyses indicate high levels of fecal coliform counts in the river. The events in Walkerton underscore the danger of coliform in domestic water. The City's treatment system has been designed to deal with coliform. The main concern is that if for some reason the treatment system fails, high levels of coliform could enter the distribution system.

Giardia and cryptosporidium are also pathogens of concern. Due to their small size the treatment system has not been designed to remove them. Chlorination can inactivate Giardia but is not as affective against cryptosporidium.

The total carbon load is also a source of concern for the City. The organic and carbon load in the water affects the taste, visual and aesthetic qualities of the water. There is also a health risk as a result of the interaction of chlorine, which is used as a disinfectant and total carbon.

Oil and Gas Exploration/Development - The potential for spills could cause serious disruption of the water supply system. A principal transmission pipeline crosses the Kiskatinaw River upstream of Dawson Creek's water intake. Unlike Chetwynd that was able to turn to a groundwater source after the oil spill in Pembina/Pine River, Dawson Creek has no other source of water to rely on.

The network of roads built as a result of oil and gas exploration development may be having

SPEAKER

DISCUSSION

an impact on the water quality. The roads are wide and built with effective drainage ditches. The roads may be problematic because they speed up runoff within the watershed.

Quantity - Water quantity became an issue after very low flows in the Kiskatinaw River in 1992. Although it was the first time the City has experienced such low-flow conditions, anecdotal evidence suggests it has happened before, and could happen again.

Stakeholder Input

- | | |
|--|---|
| Mark
Phinney &
Rod Brooks,
LP Canada | LP's priority is to have continued access to timber resource in watershed. LP is the largest timber licensee in watershed and harvests deciduous trees. LP operates under the Forest Practices Code and has internal environmental guidelines in-place.

<i>Question:</i> How many monitoring sites does the City have (i.e. are they able to narrow down where the sediment originates)? |
| Rod Harmon | <i>Response:</i> The City has a turbidity sensor at the river intake that is the only source of data. The City applied and initially received funding to implement additional monitoring but this was lost. |
| Mark
Phinney &
Rod Brooks,
LP Canada. | LP does its best to maintain water quality by avoiding unstable terrain, etc. LP would like to continue harvesting timber in the watershed. |
| Nick
Baccante,
MWLAP | The Kiskatinaw River watershed is highly susceptible to erosion and shows signs of damage from development.

The watershed contains unique species of fish. The Kiskatinaw River is on the edge of the range for walleye, and contains the western-most spawning population of walleye in BC.

Roads can cause fish passage issues which is a concern. The fish passage structure at the weir for the City's water intake, has not been assessed on how effective it is in allowing fish to move through the weir. There was work planned under Fisheries Renewal BC but with its recent demise, other avenues will need to be explored.

Funding is the biggest obstacle for restoring habitat. A concerted effort will be required to secure funding.

Agricultural activities have a significant impact on the watershed. In particular, livestock crossing streams are a concern. There are creative ways of getting cattle to the water. High coliform counts suggest cattle are too close to the water. |
| Darryl
Melnyk,
MSRM | The Kiskatinaw River is "Fully Recorded", meaning no new large water licenses will be considered without detailed study in support of the application. However, small domestic users will not be rejected. |
| Don Dobson | <i>Question:</i> How will the new drinking water act tie into the water licensing? |
| Darryl
Melnyk,
MSRM | <i>Response:</i> It is unclear how the new act will affect licensing. |

SPEAKER

DISCUSSION

- Mike McConnell, Range Officer, MOF
- Currently, there are 25 grazing tenures in the watershed but ranching operations have been present for years. The BC Cattlemen's Association has similar concerns as LP, and would like to have continued access to these areas as tenures.
- MOF strongly supports obtaining monitoring data to try to localize areas of concern.
- Since the Forest Practices Code has been in-place, practices have been implemented to minimize time cattle spend in creeks - including fencing off creeks, bridges, etc.
- The Ministry of Environment and Ministry of Forests did an audit in August. No report is available yet, but MOF would be pleased to provide a copy when it is complete.
- Some statements in the 1991 plan need to be updated and the MOF can help with this.
- Don Dobson
- There is a clear need for data; we need to proceed on facts. There are too many misconceptions. The report will address how can this can be done.
- John Stevenson & Rod Kronlachne, MOF
- There needs to be a balance between competing land uses. Range access and timber extraction are important issues in the watershed. The watershed is a major timber supply area –major licenses are issued (LP, West Fraser, Canfor). Access to timber and range tenures need to be secured. MOF recognizes that there are water quality issues that need to be addressed. However, to do this data is required to sort out the facts and pinpoint problem areas in the watershed.
- Don Dobson
- There is a need to balance competing interests. In order to do this, we need to get an accurate picture of how much of the watershed has been developed. The 1991 watershed plan indicated that approximately 1.5% of the watershed had been harvested to the end of 1989. What was the level of development in 2001? How is development occurring? We also need to clearly define the watershed boundary.
- Ted Henderson, BMGA
- The group feels a lack of communication exists between the City and Bear Mountain Grazing Association. Although invited, no City representative has ever attended a BMGA meeting. The members of BMGA use the same water as everyone else and therefore are interested in maintaining good quality. If the City felt there was a problem, it would be beneficial to have discussions with BMGA.
- BMGA has spent significant money to keep cattle out of creeks, including building fences, bridges, dugouts, etc. A total of 800 cattle crossings have been eliminated.
- In the Bear Mountain Pasture, before cattle go into pasture, it is common to have motorized recreational activities in the area. On any given Friday night in May there are bonfires, horse trailers, ATV, motorbikes at "river road". People recreate in the river and on the banks causing mud and silt to run into the river. Subsequently the BMGA is blamed for the poor runoff quality.
- Recreational activities that increase erosion need to be monitored and perhaps even restricted.
- Don Dobson
- Unfortunately, the watershed area is Crown land and controlling access is difficult. The issue of destructive recreational practices is a common problem in many watersheds. Attempts have been made to produce an Off-Road Vehicle Act, but there is no effective

SPEAKER

DISCUSSION

means to enforce such legislation. Managing recreational activities by involving clubs has been attempted in other areas. Ideally, local recreational groups/clubs should be part of this process.

Further to the Walkerton incident, a researcher in Oregon has developed a process by which it is possible to determine the origin of a coliform in a water sample (i.e., if the coliform originates in cattle, humans, or wildlife). Last summer MELP collected and tested coliform contaminated water samples from a watershed near Vernon. The results of the test indicated a roughly equal split of coliform originating in cattle, humans and wildlife. This is the sort of data that is needed for the Kiskatinaw River. We need to begin to address the problem.

- | | |
|---|--|
| Ted
Henderson,
BMGA | A drug company is testing a vaccine to kill coliform in cattle. Conceivably, such a vaccination could be incorporated into existing cattle vaccination programs.

<i>Question:</i> Are there any theories for the high turbidity readings recorded this year? |
| Rod Harmon | <i>Response:</i> City has no data to be able to say why turbidity was so high this year. |
| Ted
Henderson,
BMGA | The river was higher in 1990 but caused less damage than this year. The creek cut a new channel near the Henderson house. |
| Rob
Bresette,
BC Parks | The Bear Hole Lake Provincial Park is a Class A park, encompassing an area of 18,000 Ha. The park is the headwaters for the Kiskatinaw River and the lakes provide good canoeing. The park provides good winter range for caribou and trumpeter swan habitat. The park has a forest recreation site but sees few visitors. Parks has no future plans for the park site.

BC Parks would like to see the existing park value retained |
| Wayne
Hiebert,
Chamber of
Commerce | WH's role is as an observer and he has seen a change in the watershed over the years. |
| John Frank,
Member of
the Public | City should look for a different supply of water. The problems of water quality and quantity are not going to be solved in the Kiskatinaw watershed. JF has experienced the difficulty of relying on an uncertain water source in another community. |
| Don Dobson | The City recognizes the problem and is exploring alternate sources. The cost of developing alternate sources is an obstacle. The reality is that at this point we must address the Kiskatinaw River watershed. Even if another source were found, similar watershed management issues would arise. |
| John Frank
Public | <i>Question:</i> What if 30% of watershed burned down? What is the City going to do? Where is the water going to come from? |
| Don Dobson | <i>Response:</i> That is certainly an issue – fire is always a concern. At present, there is no alternate or emergency source, but we will try address this. |
| Gord | The Oil and Gas Commission represents many stakeholders (agriculture, forestry, etc.) in |

SPEAKER**DISCUSSION**

- Humphrey,
OGC decisions surrounding oil and gas development. The Oil and Gas commission is interested in the outcome of the current Plan and is open to comments. A lot of direction is taken from documents such as the Dawson Creek LRMP, *Water Act*, and *Land Act*. Historically, the Kiskatinaw River watershed has undergone moderate oil and gas development.
- Don Dobson *Question:* What is the long-term oil and gas potential in the watershed? Do you have an idea of oil and gas development in this sector?
- Gord
Humphrey *Response:* The watershed contains gas, but development will depend on market conditions.
- Brett
Henshel,
PFRA Agriculture Canada sees itself as a resource to other stakeholders. Education is an important component of watershed management. People need to know that they live and work in a watershed. There are large amounts of private land in the Kiskatinaw River watershed. Buy-in for initiatives is needed from private landholders. Do not develop a plan and shelve it.
- Agriculture Canada works with watershed groups in Alberta. For a reference plan, see “Friends of Belly River, Alberta”.
- Don Dobson We are going through a period when there is not a lot of money available and we need to look to user groups for assistance. We need to build commitment and look for new ways of doing this. Those around the table can make a difference in making this plan work.
- Brett
Henshel,
PFRA The plan needs to look at watershed protection in general.
- Don Dobson There is a need to work towards a protection plan.
- Nick
Baccante
(MWLAP) It is important to develop partnerships to go after funding. Ducks Unlimited is an example of a group that could be approached as a partner, for example, to help get money for development of wetlands for increased storage.
- Buy-in is required from the stakeholders for implementation. The watershed needs to be tackled as a whole.
- Don Dobson Water quantity is a concern and options are being explored.
- Education and communication are key to the success of watershed plan. The goal is not to get a document that lies on the shelf.
- Brian
Haddow
PFRA/AAF
C There are two issues that need to be addressed: water quality requirements for those that live in Dawson Creek and the environmental/social needs of those that live in the watershed.
- Both quality and quantity need to be addressed. The river is known to have gone dry. Quality does not matter if there is insufficient quantity in the river. Has the City looked at other sources of water – the Peace River, groundwater? If there is sufficient water then we can move to the next stage in the process. The difficulty is that we are dealing with non-point source pollution. Both buy-in from the stakeholders and expertise need to be present for implementation of any plan.

SPEAKER

DISCUSSION

Too often there is finger pointing at farmers for water quality problems.

PFRA may be able to help fund some remediation efforts. PFRA can also be used as a resource to do the statistics gathering.

Don Dobson The issue of quantity is a huge concern and alternatives are being explored.

This meeting is a good starting point. There is a tremendous amount of expertise around this table that can be drawn from and it is important to hear that there could be sources of funding. We need a good plan and commitment from all stakeholders to move forward. A sound foundation is also needed to request investment.

Bruce Simard, PRRD The jurisdiction of the Regional District is limited to private land and is charged with defining land use. Protection of the rights of private landowners must be considered. In developing any land use policy, the rights of private landowners must be considered. There is need to consider the impacts on farmers, but to avoid getting in their way. Commitment from local farmers is needed.

The Regional District has limited resources but can assist in policy writing.

The City's lack of data is a concern. If no data is present, then we are working on assumptions. Good strategic decisions require data.

Don Dobson The 1991 Watershed Plan has some data but it needs to be updated. Where we are able, we will update the data. If resources are not available to do the updating, we will give direction. We may include costs of obtaining the data, explore feasible ways of collection, and suggest who may be the best group to collect the data. There is no question that data is essential for developing sound policy.

Shannon Anderson, PRRD There is a need for buy-in from all parties. The river is getting dirtier. The City has to produce the drinking water and can empathize with both the City residents and users of the watershed.

The challenge to the stakeholders in the room is to find alternative sources.

We are all in this together – we all drink this water. We need to get together and make it work.

Don Dobson One of the essential issues is access: whether it is a forest license, or oil and gas, the ability to access the watershed is paramount. The intent is not to produce a report that does not work.

Chris Bakker, Canadian Hunter Access to the resources is a high priority for Canadian Hunter. Canadian Hunter answers to the Oil and Gas Commission and Ministry of Forests. However, in some cases imposed requirements may be in conflict with good watershed practices. For example, wide ditches are preferable from a water quality perspective because they slow the water down and allow more opportunity for infiltration; but they require more clear-cutting, which MOF tries to minimize.

Currently, the Smoky Wapiti Forest Service Roads are quite busy. The Noel area may become busier in the future.

SPEAKER**DISCUSSION**

Canadian-Hunter has been bought by Burlington Resources. They see new opportunities in this area that Canadian Hunter did not. The area could soon become very busy.

Don Dobson The mapping indicates that a fair amount of seismic activity has occurred in the area. This would mean an extensive network of roads.

Question: Is there a standard for road building? Is there communication between oil and gas companies and forestry?

Ministry of Forests *Response:* The need to access timber drives road development. The MOF does provide review and comment. Road design standards under the Forest Practices Code are followed.

Don Dobson *Question:* Any coordination between Forestry and OGC? Is there an excess of roads?

Ministry of Forests *Response:* Don't know if there is an excess of roads – how much road should there be out there? Roads are shared where possible. The time frame for development varies between different users. Forestry could take years to plan a road. Oil and gas developers plan in a week.

Seismic lines present good opportunities for deciduous extraction.

MOF is trying to adaptively manage the road network in the watershed.

Don Dobson *Question:* Where does MOF stand on development of a road plan?

Ministry of Forests *Response:* Coordinated access management planning has been undertaken in some areas but not region-wide.

Oil & Gas Commission *Response:* Coordination is being done for all oil and gas exploration. The biggest priority is to have different companies come together to share access routes, and to use existing roads.

Don Howard
City of Dawson Creek The purpose of undertaking this process is to try and stop what the City sees as a deteriorating watershed. The City has no interest in finger pointing or assessing blame. The City wants clean water for the residents of Dawson Creek. Significant capital has been spent over the last decade to try to keep up with changing conditions and increasing demand. Approximately \$4 to \$5 million has been spent to improve treatment, add more storage, and increase pumping capacity. Another \$1 to \$2 million will be spent in the next year. The system is not in bad shape, but the City would like to keep it from deteriorating.

BMGA *Question:* Has the City looked into extra reservoir capacity so it doesn't have to pump all the time?

Don Howard *Response:* The City has had system storage for 20 years. Existing storage can provide 2-3 months water supply for Dawson Creek. At the moment the City feels it has sufficient storage but plans are in-place to upgrade the storage capacity. The City is not in a crisis mode, and is trying to be proactive so it does not get into one.

Don Dobson *Question:* Where do we go from here? No surprises were heard this morning. Two clear points emerged from today's meeting: there is a need to identify the priority issues, and required data. There is a clear expressed need for an assured water supply, as well as for access to the resources in the watershed.

SPEAKER**DISCUSSION**

We will now take this information and build a plan. This report is just the beginning of a larger process. Communication will be an essential component. The focus will be directed at maintaining supply and quality of water for the City while not ignoring other values within the watershed.

Don Dobson A follow-up meeting is planned for February. The draft plan will be presented and an attempt will be made to get commitment.

We all recognize the uncertainty of the process, but looking beyond, there is huge potential for the City, and other stakeholders in the watershed.

The preceding is the writer's interpretation of the proceedings and any discrepancies and/or omissions should be reported to the writer.

URBAN SYSTEMS LTD.

Piero Galvagno, EIT

/tdl

**Second Stakeholder Meeting
February 26, 2002**

Meeting Date: February 26, 2002

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Project: City of Dawson Creek
Kiskatinaw Watershed Management Plan
Update

File #: 1071446.1

Location: Peace River Regional District Office

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SPEAKER DISCUSSION

Attendees:
As listed
above and

- Bruce Simard, Peace River Regional District
- Brian Haddow, Agriculture And Agri-Food Canada – Prairie Farm Rehabilitation Administration (PFRA)
- Gord Humphrey, Oil & Gas Commission
- Ted Henderson, Bear Mountain Grazing Association (BMGA)
- Rod Kronlachner, Ministry of Forests (MOF)
- John Stevenson, Ministry of Forests (MOF)
- Darryl Melnyk, Ministry of Sustainable Resource Management (MSRM)
- Mark Phinney, Louisiana Pacific Canada, FRD (LP)
- Brendan Anderson, Ministry of Water, Land & Air Protection
- Jesse Bassett, Bear Mountain Grazing Association
- Graham Suther, Ministry of Sustainable Resource Management
- Brian Pate, West Fraser Mills Chetwynd
- Jim Gigger, Rancher
- Jim Scafe, Rancher
- Emil Heinrich, Rancher
- Ed Hennon, Rancher
- Jimmy Yee, Northern Health Authority
- Brett Henschel, Agriculture and Agri-Food Canada - Prairie Farm Rehabilitation Administration (PFRA)
- Murray Clark, Ducks Unlimited
- Allan Blair, Ministry of Agriculture, Food and Fisheries

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- Pamela Laron, Northern Health Authority
 - Romona Blackwell, Ministry of Sustainable Resource Management
 - Mac and Jackie Leask, Ranchers
 - Alex and Evelyn Allan, Ranchers
 - Bruce Keech, Rancher
 - Dale Basset, Rancher
 - R. Wilson, Rancher
 - Gerald Feschuk, Devon Canada Corporation
 - Darren Rosie, El Paso Oil & Gas Canada Inc.
 - Doug Russell, Louisiana Pacific Canada
 - Mike Mulvahill, Rancher
-

SPEAKER**DISCUSSION**

- Don
Dobson
- Introduction and review agenda items 1 through 6 (Agenda Attached)
 - Item 4 – Review and Discussion of Draft Plan will be the bulk of the meeting
 - The goal of the plan is the protection of the water
 - This is a multi-use watershed
 - How do we get to a plan?
 - Most people in the room have a stake in the watershed, and so there is a need to develop partnerships
 - To understand the watershed it is divided into five areas, four main subdivisions and the mainstream. The four subs and the main stream are all above the intake
 - The thrust of the plan is to identify issues and concerns regarding water quality and future demand
 - Estimated 20 years of supply at the City’s current growth – water conservation will extend this
 - Water quality – turbidity is the chief concern
 - City has a high quality water treatment plant, however it does not remove petroleum and/or chemicals.

Rod
Harmon
City of
Dawson
Creek

Turbidity readings used to be taken at the reservoir, since Rod Harmon took over in the 1990’s, the readings are now taken from the river.

Don
Dobson

The City does not have a backup source of water. It is looking at other supplies, opportunities and costs.

The Kiskatinaw Watershed Management Plan is an office-based exercise. There are not the finances or time to spend in the watershed. The process of upgrading the plan is:

1. Gather Current Information: forest development, grazing, private land above the intake, recreational, oil & gas exploration and extraction, etc.
2. Develop a plan and make recommendations.
3. Implementation.

Action and implementation is today’s topic. We are well aware of natural actions and turbidity in the watershed. All of us around the table need to be a part of the plan. Do we all agree that we are the future of the protection of the watershed?

Strategies:

- City has a role as lead and facilitator
-

SPEAKER**DISCUSSION**

- City is involved in preparation of this draft plan

A copy of the plan is available to those without e-mail – it can be sent to you, if requested.

Question Can you define a “licensed stakeholder”?

Don Dobson Grazing licenses, oil and gas permits, forest licenses – those activities that have a signed agreement with the Province.

Question What about private land owners?

Don Dobson That is a tough one. Do you have an organization? We need to talk to you about this. Private landowners are a major component above the intake.

Question Is this plan a co-operative venture? Is it not legislated in anyway?

Don Dobson The government has embarked on drinking water legislation. The review panel has tabled its report. If the government chooses to implement changes, things will go from where they are today (cooperative) to a Chief Medical Health Officer doing the assessments of drinking water. The Health Officer will have significant powers and a leading role in drinking water protection.

In the future there may well be a legislated mandate for these plans. Action items are existing policies and gaps in management.

1. Recognition by stakeholders of responsibility for protection of the watershed. Legally, what are your responsibilities? Communication is essential for the plan.
2. Do you have a process to contact the City if something goes wrong in the watershed?
3. Requirement for stakeholders to have a plan for emergencies. Nothing – standard operating procedures or emergency plans.

Contact process – City needs to maintain a directory. City should maintain a set of standard operating procedures put together by stakeholders. They need to be complete the necessary contact information at the City. These plans may need to be developed if they are not already in place.

Question Brendan Anderson - No federal agencies listed?

Don Dobson The omission was not purposeful. There may be gaps that need filling, for example the Department of Fisheries and Oceans. There are some deficiencies which need to

SPEAKER**DISCUSSION**

be addressed. The Plan is in draft form and we need your input.

Question Brendan Anderson – What about the Department of Fisheries and Oceans or Department of Environment?

Don Dobson We have not contacted DFO yet. Protection of water quality is most significant. There is an oil pipeline that crosses 15 km upstream of the intake that needed to be addressed. The pipeline upstream is a concern. The City's water treatment plant can not deal with a petroleum spill. Strategies include: automatic shut-off; hydrocarbon sensor at Arras; knowing where all stream crossings and keeping them in good repair. We are not trying to point finger at Burlington for there are many others as well. The flexibility of automatic shut-off and detection systems are not inexpensive. Could cost \$40,000.

Question Have alternate sources of water supply for the City been looked at, such as the Peace River?

Don Dobson It is a matter cost. The Peace River is at a substantially lower elevation than the City reservoirs.

Question With respect to contamination of the Pine: does the City have capacity for three months of water?

Rod Harmon It would depend on the time of year. When the reservoir is full, there is at least two months storage at current use, however the City can not pump when turbidity is high.

Don Dobson City is looking at alternate sources.

Don Howard Alternatives are not in the foreseeable future as they would cost in excess of \$30 million. Not a serious alternative.

Don Dobson City has looked into the costs recently. For now they are focusing on protection of the existing system.

Question Have the contamination levels in the river been any worse?

Rod Harmon A major analysis is done twice a year. Who knows what we may have missed? Chemicals have not been a problem. Currently, the City has the ability to monitor turbidity at 15-min intervals. Prior to this, the City used to check once per week. Sharp increases in turbidity may have been missed.

Question Dale Basset - What is turbidity?

SPEAKER**DISCUSSION**

- Rod Harmon It is a situation with a cutbank river and always being dirty. The turbidity level is generally approximately 200 NTU. The pump station quits pumping at 600 NTU. Most people do not know the difference – it simply looks dirty.
- Question Dale Basset – What chemicals are out there? The river is always sliding and you can see oil coming out of the banks when you walk along them.
- Rod Harmon We only check twice a year.
- Question Dale Basset – It was known as the “Muddy River” before Kiskatinaw.
- Rod Harmon The turbidity level was over 2000 for four months in a row.
- Question Dale Basset – East branch is good water. West branch is always sliding – it never stops sliding.
- Question Do terrible rains and weather affect it?
- Don Howard It is a dirty river. A huge rain will increase turbidity to 5000 or 6000. You cannot tell the difference by looking at it.
- Question Five inches of rain in two days – does this have a big effect?
- Rod Harmon Measurements indicate that turbidity is increasing.
- Question Why is it happening?
- Don Dobson Changes in the climate may be an explanation (Section 2.3.1). We are starting to see peaks occurring in the fall. Therefore there are two peaks now, whereas before there was only one. There is still not enough information yet but this kind of phenomenon is occurring throughout BC.
- Question We can not control the weather.
- Don Dobson The intent of the plan is not to turn the river into sparkling clean water. The City has a responsibility to provide water. Natural processes have the greatest impact on water quality, however there are a variety of other activities in the watershed that have an impact. We do not want to wait for a problem to occur. Are these other activities adding extra load to the system? The objective is not to add to the problems the City is faced as a result of natural processes.
- Question Dale Basset – has a grazing license from the Ministry of Forests. You have to go by
-

SPEAKER**DISCUSSION**

- the rules.
- Don Dobson If you are carrying out your activities, then you should be doing everything you are supposed to do. We are not asking you to do any more. You are not obliged to go beyond the rules in your grazing permit and forest permit.
- Question Dale Basset – We already have these rules. What more can we do. We have our dugout and no salting within 300 m of the stream.
- Don Dobson We need to hear from you about what you are doing. You need to be involved in what we are doing.
- Question Dale Basset – what about private land? They do not have the same rules as us.
- Don Dobson There are a lot of big sticks out there, i.e., regulations that dictate agriculture practices on private land, Fisheries Act, etc. There are interesting changes within the government sector. Are we going to have enough people in the government to do the checks? We need to work with private landowners to understand what people are doing.
- Question Some of these turbidity spikes are mother nature.
- Don Dobson We do not have information on rainstorms 25 years ago – and there was less development in the watershed 25 years ago.
- Question There needs to be many more studies.
- Don Dobson It is the responsibility of the City to determine the number of issues.
- Question Why are we doing this if the studies have not been done?
- Question Is there anyway of knowing where the turbidity is coming from? We need to concentrate where the problems are. We have dirt at the intake. Do we have dirt anywhere else?
- Don Dobson We do not have data now for either the west or the east Kiskatinaw. Problem of natural oil getting into the river. Forest development – do not make it any dirtier. Clear requirements out there. Need more information. Need to know how much development has occurred in the watershed.
- Question Roads are the main issues – not cut blocks.
- Question Brendan Anderson - Fires need to be addressed.
-

SPEAKER**DISCUSSION**

- Don Dobson Was there a big fire 150 years ago? We know the water supply is dirty. We do not want to add to this.
- Question Brendan Anderson – Fire – as a significant threat.
- Don Dobson Watershed has a fire history. This has been removed by the Ministry of Forests through suppressant. Unlikely for new large fire.
- Question Everybody pointing fingers at development – trapping, beaver dams.
- Don Dobson No sense of the significance of beaver activity in the watershed.
- Question Is the turbidity constant over the past 10 years – except with the last years.
- Don Howard Constantly increasing over the past 20 years.
- Question No basis for turbidity if you were not testing.
- Don Howard Not agreeing – shows a trend.
- Don Dobson See 1965 to 2001 – Appendix III of the Draft Plan.
- Question How can you use this in the same table?
- Don Howard The river does not get to 5000 NTU overnight, builds up over days and decreases over a few days.
- Don Dobson Any resource activity with better data today. Cannot disregard data that is 25 years old. River has a high turbidity load in 10 years from now, we will have much better data. We have a continuous record keeping now. If it is climate change.
- Question Is the sheet pile dam affecting the turbidity?
- Don Dobson Meter is monitoring flowing water. Dam is there to bring water up so flow meter is covered. Turbidity really is lower because of the dam.
- Question PFRA – Lack of information. Concern of stakeholders. Must be careful. There is less snowfall. We do not know if there is a direct correlation. Until we have correlation with snow/rain fall then we do not know the impacts we are having on these turbidity readings.
-

SPEAKER**DISCUSSION**

- Don
Dobson One of the action items is monitoring. Need to understand where does the sediment come from. Need to understand sub-drainage, economics. This plan is not asking anyone to do anything that is not expected at present under current provincial lease agreements.
- Question To engender the buy-in background data is permanent. Need a chart of past snow/rain fall. Then we can relate it together.
- Don
Dobson Opportunities in meeting. Equipment upstream and downstream of an activity so we can show. Establish a cycle of sites. Water level information. We are hampered by not having enough data. Intent of the plan. In five years we will have substantially more data.
- Question Dale Basset – Why were not many at the first meeting.
- Don
Dobson First meeting was to find out who had interests.
- Question If we sign this, and turbidity increases, what stops the City from stopping us operating in the watershed?
- Don
Dobson Perception that cattle are a problem in the watershed. Okanagan – example e-coli sample. Organism. Reservoir – DNA tagging. Opportunity to do this sort of information in the Kiskatinaw river. Need the analysis. Need scientific information.
- Question Economics – Oil & gas and Forestry. It may be cheaper for City to go somewhere else and let industry continue.
- Don
Dobson Going to another source is a problem at present. \$30 million just for construction – not annual operating costs. Economics of the whole scheme. Water in BC is valueless. What is the economic value of the water?
- Question Need five years to get enough data.
- Don
Dobson There may well be enough economic data out there today.
- Question Many were not at the first meeting, we have come on the defensive.
- Don
Dobson Funding from Fisheries Renewal. Funding runs out in March 2002. This is not a call for sign off today. It is a draft plan at present. Rules are changing. Need to be cooperative – better way.
- Question Dale Basset – In the late 1950's one could catch a handful of fish in 10 minutes. All mudbanks now. Nobody talks to Mr. Beaver!
-

SPEAKER**DISCUSSION**

Question Lots more beaver out there now.

Break

Don Dobson Objective 3.2 Other activities in watershed – timber and forest development, oil and gas, LRMP, cattle grazing, agricultural practices – private land. Contamination – fertilizers, sediment, concern for that area upstream of the intake.

Action 4

Achieve a healthy and properly functioning watershed. There is a high natural sediment load in the river. Afraid of cumulative impacts from industry. Maintain watershed in state as close as can be to a natural state.

What is the natural condition of the watershed? Issues of riparian vegetation – bank stability, water temperature. What is current condition? Looking to the future – what is proposed for the watershed?

Action 5

Meet economic needs of the community. Provides economic benefit for all of us in the room. What can be done individually and collectively? City will continue to draw from Kiskatinaw. City has spent a lot of money on its water system. It is in the best interest of all of us to do work in the watershed in a sustainable manner. The Kiskatinaw Watershed is not a single use watershed and there is not the intent to turn it into one.

Action 6

Now have enough for 20 (or possibly 40) years. It is a finite supply. Can control the demand side. What additional things could the City do to address storage options? Limits our growth. For example – Vernon – water conservation measures, community initiatives.

Question Do residents have meters in Dawson Creek?

Don Howard Had them for 40 years. Works well. One of the first communities to have this.

Don Dobson Is the price of water accurately reflected?

Action 7: Collection of Data. Use this data to modify the plan.

SPEAKER**DISCUSSION**

Action 8: Education

Action 9: Security

Nine action items that we have suggested in the draft report. Are there any additional concerns?

Question Security question. Walkerton, ON, Nobody pointed fingers at the City/municipality that was supposed to be doing the checking. Is there a system in Dawson Creek?

Don
Dobson Is there an audit at the City?

Rod
Harmon Water protection plan calls for unannounced inspection. Is independent sampling.

Question Page 24. (* The figures are wrong in the report and need to be amended – the calculation method is wrong),

Question How do we get input by March? Need data collected on the river.

Don
Dobson Organize a way – cooperation. Search for funding. If we do not start – we will never get there. Intent of the plan is to allow all of us in a position of where we are trying to go. It is not the intent of the City to put a chainlink fence around the watershed and gate. We will continue to collect data and more information to understand natural conditions. The City has agreed to do this as a water licensee, as their responsibility toward residents. City will deal with natural conditions. It does not want to tackle non-natural conditions affecting the watershed.

Question Are you really going to listen to my concerns? Am I going to get some input?

Don
Howard Signing off is just the start of this process. No rules written in stone here.

Don
Dobson City does not have the ability to affect you in the watershed.

Don
Howard City has no jurisdiction in the watershed. Actions may have been taken by forestry regarding the watershed.

Question Mailing address available?

Question Brendan Anderson – Community watershed – is this a dead issue?

Don Designated as a community water supply in LRMP like the Pine. Too big for a

SPEAKER**DISCUSSION**

- Dobson community watershed. Period of transition in government. Licensed community water supply. Drinking water protection act. City would need to meet the terms of that act – whatever the outcome.
- Question If this act goes ahead – it will go over and above stakeholders and Cities.
- Don
Dobson Will be the responsibility of Chief Medical Health Officer. Plan is of value to the City.
- Question Jimmy Yee – Water security – we inspect water plant once per year. Provincial lab does sample testing. There is a secure system in place to prevent Walkerton here. Bioterrorism is a new threat and major concern for all municipalities – 1. Vigilance, 2. Prevention and 3. Response. Need a plan.
- Don
Dobson Standard operating procedures and a security plan needs to be repeated in the security section of the report. City needs a plan.
- Question Jimmy Yee – apologized for not being here in November.
- Question PFRA – this document is a jump-start for the City and stakeholders. Needs buy-in from ground zero. All others are going to wonder if they have buy-in. Need to develop some of these ideas in that plan to get buy-in from others. Funding gone end of March. Timberline club? Where are they? There are many others that should be participating. Paradise Valley Snowmobile Club? (*many of these may just have interest below the Arras intake).
- Question Lots of drilling upstream of the intake. Anybody from Burlington here? No response. Have an issue with impoundment lagoons of drilling mud. Burlington is pumping some sort of chemicals into the lagoons – these will eventually leach out into the water supply!
- Question Gerald Feschuk - Drilling fluid in certain applications. Hydrocarbon. Hydrocarbon contained in tanks. Sump in dirt. Liquids and solids that come out of the hole. Challenge is what to do with this. Canola meal mix. Bio remediation. Four to five years down to critical levels. Grass will grow on it. Test too slow. Oil does not run off the leases. Accepted industry practices. Leachability is so low, seeded-oil run off then OGC needs to intervene.
- Question Oil breaks down in four to five years?
- Question Gerald Feschuk - Could do. We just were audited in Alberta on this.
- Don
Dobson What we heard today. Lots to digest. What is a reasonable time to get comments back? First week in March – March 8th? Need to get it back to the City. USL and DE are responsible – send responses to us.
-

SPEAKER**DISCUSSION**

Question Next step to our responses - is you will give the City the Plan.

Don
Dobson Result will be summarized – plan will be revised and submitted to the City. If the City agrees with the Plan, then it will go out to all of you. This is just the start. If the City agrees to move on the issues in this plan – and gets approval from Council then actions will be taken. Nothing new here.

Question Part of the plan is Ministry. Annual inspecting. Not anybody left with MOF to do the level of inspection you are proposing. Have to look after tenures in the Yukon!

Question Resource restrictions. Twice as much area. Same level of compliance and enforcement. Same level of risk rating. Opportunities for range management for improvement. MOF will not be there on every tenure. MOF concerns with this and maintaining. What rather process that is mutually workable and defensible by both parties. Sample Set. Zero ability to do the whole thing.

Don
Dobson Does not eliminate the need to do the work. Same presence – same time.

City does not have the resources to look at all tenures, oil & gas and forestry. But a little bit of each does not eliminate need for due diligence.

The preceding is the writer's interpretation of the proceedings and any discrepancies and/or omissions should be reported to the writer.

URBAN SYSTEMS LTD.

Edward Stanford, MRAC BLA

/tdl

APPENDIX II - MINERAL ASSESSMENT REPORT

093P 021

[Inventory Report](#)

Name	WAPITI	Mining Division	Liard
Status	Developed Prospect	NTS	093P02E ^{NAD 27}
Latitude Longitude	55 08 30 N 120 34 30 W	UTM	10 6113025 654566
Commodities	Coal	Deposit Types	A04 : Bituminous coal.
Tectonic Belt	Foreland	Terranes	Overlap Assemblage.
Capsule Geology	<p>Three coal seams, seams No. 1, 2 and 3, occur in the Upper Cretaceous Wapiti Group which is up to 460 metres thick and consists of interbedded sandstone, siltstone, mudstone and conglomerate, deposited in a deltaic environment.</p> <p>Seam No. 1, the most persistent coal seam, lies directly above the "Chungo Member" sandstone at the base of the Wapiti Group. Its maximum thickness is slightly over 2.0 metres in the northwest part of the Kiskatinaw block and it thins to the east, north and south, while being eroded away updip to the west. The seam contains a clastic parting in the upper middle part and varies in thickness from 0.10 metres to 1.7 metres. The average ash content of the seam is high (29.0 per cent dried basis). The coal rank is high volatile bituminous "C" and decreases to sub-bituminous "A" in oxidized samples.</p> <p>Clean coal of +100 mesh floats at specific gravity of 1.50 from adit 1 and contains 11.4 per cent ash, 33.9 per cent volatile matter, 54.7 per cent fixed carbon and 0.53 per cent sulphur with a calorific content of 11,674 BTU per pound. Seams No. 2 and 3 are discontinuous and thin, maximum thickness 0.42 metres and 1.19 metres respectively.</p> <p>The structure consists of a series of northwest trending, southeast plunging open folds with some associated small scale subsidiary folding. The overall regional dip is to the northeast. Two high angle thrust faults occur in the Kiskatinaw block with throws approximately 100 metres and 500 metres respectively.</p> <p>In-place coal determined at an overall surface mineable ratio of 11.5:1 totals 45,418,973 tonnes. Area No.6 immediately north of the proposed mining area has 1.9 million tonnes inferred; area No.9 to the south of the proposed mining area has 10 million tonnes inferred (Coal Assessment Report 685).</p>		
Bibliography	<p>EMPR COAL ASS RPT 683, 684, 685 EMPR EXPL 1979-359; 1980-568 EMPR Coal in British Columbia (1976) EMPR BULL 52 EMPR P *1981-3; 1986-3, pp. 18,19 EMPR FIELDWORK 1977, p. 60; 1978, p. 86; 1981, pp. 244-258; 1984, pp. 251-277; 1986, pp. 369-372,379-382; 1987, pp. 451-470; 1988, pp. 565-576 EMPR COALFILE EMPR PF (093P General - Mathews, W.H. (1950,1952,1954,1955): Various reports on the Peace River District; Map of Dawson Creek area showing leases, wells and seismic surveys; General surficial and bedrock geology maps) GSC OF 286 GSC P 60-16; 61-10; 69-1A, pp. 244,245; 70-1A, pp. 238,239; *89-4, pp. 1-29,50,51,58-63 GSC BULL 132; 152; 219; 250; 259; 328 GSC MAP 19-1961; 2669</p>		

Database last posted: January 08, 2002

APPENDIX III - TURBIDITY DATA



KISKATINAW RIVER TURBIDITY
Maximum Monthly Reading (NTU)

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1965	10	10	10	375	205	140	55	40	36	36	15	14
1966		5		160		42				14		8
1967	10	8	4	16	185	130		15	5	14	11	10
1968	9	11	14	133	175	108	25	10	9	24	28	27
1969	13	9	9	208	215	37	23	10	41	55	25	23
1970	19	16	45	106	148	140	17	17	13	7	11	14
1971	9	10	12	120	194	255	260	35	5	36	28	18
1972	14	8	51	70	450	275	170	47	22	65	55	38
1973	20	14	18	203	265	65	37	37	23	26	38	15
1974	10	13	10	360	275	60	75	55	43	23	25	17
1975	14	9	7	155	245	71	50	30	17	12	18	15
1976	12	13	23	255	295	80	95	185	77	21	51	13
1977	12	10	14	420	320	140	65	28	38	46	27	20
1978	12	11	55	70							20	
1979	5	5	5	1020								
1980	5	5	4	320								
1981		5	7									
1982		5										
1983												
1984		7								44		
1985	8											
1986		8	12									
1987				512				900	55	18		14
1988												
1989												6
1990	6											18
1991	16	22	254	1860	600	180	26	6	9	9	13	13
1992	19	16	255	641	140	17	8	17	12	14	11	8
1993	7	36	40	2000	2000	420	162	42	24	22	41	20
1994	25	17	172	2000	690	2000	150	75	66	41	32	25
1995	16	13	17	2000	1000	125	2000	37	12	21	25	20
1996	19	20	115	2000	1800	1400	1400	2000	2000	340	91	33
1997	16	16	25	2000	1770	2000	2000	300	86	158	86	29
1998	18	12	77	2000	800	212	2000	13	12	78	48	29
1999	17	17	14	2000	355	550	60	11	9	31	38	17
2000	17	15	34	987	340	2000	992	82	2000	57	69	31
2001	18	17	22	2000	2000	2000	2000	400	22	35	39	28

NOTE: The Turbidity readings from 1965 to 1977 were done once a week. Spikes in turbidity could have been missed. Turbidity readings from 1978 to 1990 were very sporadic due to the fact trail reservoirs were on line and less attention was given to the river. From 1991 to the present, turbidity readings have been taken every day. (The City's Turbidity meter only reads to 2000 NTU, and many readings of 2000 were actually much higher)

APPENDIX IV – DAWSON CREEK LRMP GUIDELINES



LRMP Guidelines

3.11 Water

There are several major river systems in the planning area including the Pine, Sukunka, Murray, Wapiti, Moberly and Kiskatinaw Rivers, all of which drain directly or indirectly into the Peace River. Noteworthy lakes include: Wapiti and Monkman Lakes in the Rocky Mountains; Moberly Lake; Dinosaur Lake; the Peace Arm of Williston Lake in the Hart Foothills, and; Boudreau, One Island, Bearhole and Swan Lakes on the Alberta Plateau. Both Dinosaur and Williston Lakes are man-made reservoirs created by hydro-electric projects.

Although water is used from many surface and groundwater sources throughout the planning area, the three major surface sources of supply are the Kiskatinaw River (supplying the communities of Dawson Creek, Rolla and Pouce Coupe), the Pine River (supplying the District of Chetwynd) and Moberly Lake (supplying the First Nation communities and rural community at Moberly Lake). The District of Tumbler Ridge uses groundwater from six aquifers supplying Flatbed Creek, and one emergency pump located in Flatbed Creek. Hudson's Hope uses water directly from the Peace River. In addition, the Peace and Wapiti Rivers supply water to communities outside of the planning area.

The Pine, Kiskatinaw and Moberly River watersheds have been identified as significant sources of water for the use of residents in the planning area. Some communities using water from these rivers believe that water quality and quantity within these three rivers have been negatively impacted by human activity. As these communities have made significant investments (e.g., storage and water diversion structures, water treatment facilities, etc.) to divert and treat water for use by their residents, they desire a higher level of management to ensure that land and resource activities on Crown lands within the Pine, Kiskatinaw and Moberly River watersheds do not negatively impact their sources of water supply.

At this time, official 'community watersheds' have not been designated within the planning area under the *FPC*. It is unlikely that licensed surface water diversion from small watersheds with high intensities of forest resource development and use will increase to the point that official designation would be necessary or appropriate within the time frame of this plan. Large sources of supply such as the major watersheds listed above, do not meet the intent of official community watershed designation under the *FPC*.

The Dawson Creek LRMP has designated the three major watersheds previously listed as '*community domestic water supply areas*' (refer to Appendix E for a map showing community domestic water supply areas within the planning area).

Specific land and resource management objectives and strategies have been developed within appropriate portions of RMZ's to provide a higher level of management to sustain water resources in these areas.

The following GMD applies to all watersheds including the three major community domestic water supply areas described above.

General Management Direction (GMD) #11 - Water

Objective

- Sustain and manage water supplies for domestic water users and community waterworks licensees
- Sustain and manage, where possible and appropriate, the natural stream flow regime (timing of flow, water quality and quantity) for identified watercourses, recognizing that natural hydrologic processes are beyond the control of resource managers
- Manage land and resource developments within community domestic water supply areas to sustain water quality and quantity

Strategies

- Establish and maintain instream flow requirements and hydrologic regimes on a priority basis (*Intent: Government to undertake*)
 - Determine the equivalent clearcut area (ECA) thresholds for specific watersheds on a priority basis (*Intent: Government to undertake*)
 - Identify high priority watersheds and use the appropriate levels of watershed assessment to determine impacts, potential impacts, prescriptions and rehabilitation measures (*Intent: MELP to undertake*)
 - Identify and establish water quality monitoring sites. Parameters to be monitored may include, but are not limited to: Turbidity, stream flow, water temperature, conductivity, faecal and total coliforms. (*Intent: MELP and local government to coordinate planning, and program implementation and monitoring*)
 - Identify and, where appropriate, consider designating smaller watersheds in settled areas with licensed water use and a high intensity of present or future forest resource development as community watersheds under the FPC. (*Intent: Government to undertake*)
 - Consider "community domestic water supply areas" in landscape unit planning (*Intent: Government to undertake*)
 - Include the intent of the *Kiskatinaw Integrated Watershed Management Plan (IWMP)* into landscape unit level and operational planning to sustain and manage water quality and quantity within the Kiskatinaw River Community Domestic Water Supply Area
-

3.12 Agriculture & Range

Agriculture in the planning area dates back to the late 1800's and has played a key role in the development of the area. It has provided a stabilizing effect on the population and provided a labour pool for other industries in the area. There are more than 1,000 farmers on over 400,000 hectares, or 13.5% of the planning area. ALR covers 19% of the planning area (565 000 ha of ALR, 57.6% private, 42.4% Crown). The South Peace area is similar to the prairie agricultural regions to the east. Cereal crops, beef cattle, specialty crops such as oilseeds, turf-seeds and honey are the primary agricultural products of the area. Bison and reindeer game farms are gaining popularity as viable alternatives to ranching conventional livestock.

Agriculture is dependent on lands with suitable soils and climate. The Provincial Agriculture Land Reserve (ALR) was created in 1972-73 through the *Agriculture Land Commission Act (ALC Act)* to preserve agricultural land for the establishment and maintenance of farms. The ALR captures the majority of lands suited for agriculture; five percent of the province is designated as ALR.

Although the *ALC Act* provides for permitted uses other than agriculture, its primary purpose is to preserve agricultural land for the establishment and maintenance of farms, not for continuing permitted uses. Consequently, that portion of the Provincial Forest that coincides with the ALR may be withdrawn from timber production over time, as the demand for agricultural land arises. Consideration of this in the planning and management of permitted uses will aid in minimizing the risks to non-agricultural investments associated with these uses.

The range resources in the Peace River area are utilized by domestic stock and wildlife. Domestic stock use of Crown range resources is approved under a grazing tenure system. Tenure is in the form of a grazing license or permit, haycutting license or permit, or a grazing lease. Crown grazing tenures cover approximately 10% of the planning area. Ranchers utilize Crown range to sustain livestock during the summer, for a period of approximately four months. Private land holdings are the primary source of hay for livestock feed for the remainder of the year.

3.12.1 Agriculture

Over one-sixth (16.5%) of the province's ALR lands are located within the planning area. There are few larger tracts of higher agricultural capability lands that have not yet been developed and are likely to become important for agriculture in the future. The majority of these areas include arable ALR lands in

the Plateau, Foothills, South Peace, and Major River Corridors RMZ's. A significant portion of the ALR Crown land tends to be of lower agricultural capability which is more suited to growing forage crops than cereal crops.

Agriculture is subject to wide swings in profitability due to global commodity supply and demand. Improvements in agricultural commodity prices and the loss of agricultural land outside the planning area may create a demand for more land in agricultural production within the planning area. The Dawson Creek LRMP recognizes the need for agricultural expansion on ALR lands, particularly on arable land adjacent to existing operations. The existing '*Extensive Agriculture Policy*' accommodates this broad objective as it has a proximity requirement which defers the alienation of some ALR lands due to location and access.

3.12.2 Range

Within the planning area, the most productive native range sites occur at low elevations, in deciduous and mixedwood forest types. Forage demand on Crown range has increased over the past few years and will likely continue to increase, largely as a result of considerable growth in the ranching sector and in some wildlife (i.e., ungulate) populations. Local First Nations have also expressed concern regarding increasing domestic range use within their traditional hunting areas.

Resource management objectives and strategies have been developed to address potential conflicts and/or competition for range resources by native wildlife species and domestic livestock. This issue is addressed as a GMD (refer to GMD #3) and more specifically, through objectives and strategies applied to RMZ's and subzones where conflict occurs, or where the potential for conflict has been identified.

General Management Direction (GMD) #12 - Agriculture and Range

Objectives

- Plan and manage for potential agricultural growth on arable lands within the ALR
- Sustain or enhance existing grazing tenures, and provide new grazing opportunities where appropriate

Strategies

- Provide opportunities for the conversion of Crown ALR lands with suitable agricultural capability to private tenure where there is demonstrated demand
-

- Manage and utilize resources on Crown ALR lands in a manner that will allow the land to be used for agricultural purposes in the future, as outlined in the *ALC Act*
 - Minimize the risk to investment of permitted uses on Crown ALR lands through appropriate planning of those uses and the use of referral processes
 - Provide for new grazing opportunities in appropriate areas by utilizing range management techniques that include, but are not limited to, prescribed burning, range clearing, and livestock grazing in forested areas. Other resource values will be considered through the referral process
 - Coordinate resource use with other users to minimize loss of forage within grazing tenures
 - Consider local First Nations traditional hunting areas and critical community use areas in the designation of new grazing tenures
-

3.14 Energy

The planning area contains a rich endowment of energy resources including oil and natural gas, coal bed methane, hydro-electric and geothermal potential.

Northeastern BC is the only part of the province that currently produces oil and gas resources. The planning area, as with the other LRMP's in Northeastern BC (Fort St. John and Fort Nelson) is within the Western Canada Sedimentary Basin. Discoveries of large gas deposits in the Foothills have stimulated considerable interest in the natural gas potential of the planning area. The outlook for the energy sector is for steady growth over the next two decades.

Oil and gas exploration and development is a large economic sector in the planning area, directly employing 4% of the working population and generating jobs in the service industry. It supports businesses involved in supplying goods and services for exploration and development, for natural gas processing and pipeline utilities. Natural gas and oil are transported by pipeline from the planning area to southern BC via the Pine Pass, and also into Alberta.

Coal bed methane resources exist in the planning area mainly within the Gething formation of the Peace River Coalfield. Exploration drilling to prove out these extensive reserves as a future energy source has been conducted recently near Tumbler Ridge.

The W.A.C. Bennett Dam on the Peace River creates Williston Lake, BC Hydro's largest storage reservoir. There are two generating stations on the Peace River, the G.M. Shrum and the Peace Canyon, having an operating labour force of approximately 150. Energy developments on the Peace River produce approximately one third BC Hydro's electrical energy. There remains undeveloped hydro-electric potential on the Peace River (i.e., BC Hydro's Site C proposal, in abeyance since 1981).

General Management Direction (GMD) #14 - Energy

Objectives

- Provide opportunities and access for oil and gas exploration, development and transportation
- Honour existing oil and gas tenures
- Provide opportunities and access for hydro-electric development and transmission
- Provide opportunities for the development of alternative energy sources (e.g., ethanol)

Strategies

- Integrate oil and gas exploration and development activities with other resource use activities where feasible
-

- Permit exploration and development of oil and gas resources using the appropriate regulatory framework that promotes environmentally responsible development of subsurface resources
 - Consider potential infrastructure requirements for development when exploring for oil and gas resources
 - Within local level planning processes, encourage low impact exploration methods where appropriate
 - Consider the hidden nature of subsurface resources in landscape unit level and operational planning
-

3.16 Forestry

Approximately 70% of the 2.9 million hectare planning area is forested and approximately 37% of the area is currently classified as operable for sustainable forest production. A range of forest cover exists in the planning area including: high elevation spruce and subalpine fir; lodgepole pine and spruce stands in Foothill areas; and, on the lower elevation plateaus aspen/cottonwood and aspen/spruce mixedwood forests. The December 1996 combined Timber Supply Area (TSA) and Tree Farm License (TFL) allowable annual cut (AAC) is 1,306,533 m³ for coniferous species and 940,500 m³ for deciduous species.

Provincial forests in the planning area are managed under the TSA (approximately 2.3 million hectares) and under TFL No. 48 (approximately 630,000 hectares) managed by Canadian Forest Products Ltd. (Canfor). Canfor and Chetwynd Forest Industries Limited (a division of West Fraser Mills Ltd.) both have volume-based forest licenses in the TSA and milling operations in Chetwynd. The planning area also includes three Pulpwood Agreement Areas (PA 10 and PA 13 held by Louisiana Pacific Canada Limited; and PA 7 held by Canfor). Aspen and cottonwood timber from within PA 10 and PA 13 supplies an oriented strand board (OSB) plant located in Dawson Creek and a pulpmill located at East Pine.

There are eight small milling operators that provide products such as specialty woods, custom milling and log homes. MoF's Small Business Forest Enterprise Program provides small business harvesting operators access to Crown forests. There are currently 109 small business registrants within the planning area. There are also 21 woodlot licenses located generally near settled areas; this figure is expected to increase to 30 by 1998. The timber harvesting, milling and the supporting silviculture industry contributes significantly to the local and regional economy providing 14% of the employment and 12% of the income to the planning area. The Dawson Creek LRMP recognizes that forestry within the Dawson Creek TSA and TFL No. 48 is both socially and economically important.

ALR lands within the planning area comprise 14.6 % of the producing Forest Land Base and operable Timber Harvesting Land Base. The LRMP Working Group recognizes that portions of the Crown land designated as ALR lands are important components of the working forest (both TSA and TFL) and contribute to the regional and local forest economy.

The Dawson Creek LRMP recognizes that the economic stability of the forest sector and forestry-dependent communities depends on sustaining the timber harvesting land base and forest production. Forest management planning and harvesting are guided primarily by the *Forest Act* and the *FPC*. Other federal and

provincial legislation and regulations may also apply to forest management activities.

The objectives and strategies recommended for the planning area provide important strategic direction to landscape unit and subsequent operational planning activities through the use of ecologically suitable silviculture systems and forest management practices which intend to emulate natural disturbances. Applying forest practices that mimic natural disturbances at both the stand and landscape unit levels can provide biodiversity and habitat for a wide variety of plant and animal species. At the same time, the forest products industry can be sustained while providing opportunities for other important resources such as recreation, water quality and scenic values.

General Management Direction (GMD) #16 - Forestry

Objectives

- Sustain or enhance existing forest management, and provide new opportunities for forest management activities
- Manage for a sustainable forest resource (*Intent: To maintain a sustainable level of timber harvest over the long term, recognizing that the AAC is subject to the Chief Forester's consideration of the social and economic objectives of the Crown*)
- Where feasible, increase the area of the operable forest land base
- Where feasible, increase the productivity of the operable forest land base
- Minimize risk to proposed and existing forestry investments while recognizing agricultural investment and potential on Crown ALR land
- Ensure the availability of the short-term timber supply without compromising future sustainability and other resource values

Strategies

- Minimize the risk to proposed and existing forestry investments on Crown ALR land through appropriate planning and referral processes which take into consideration agricultural investment and demand
 - Minimize timber losses through the use of silviculture systems; prompt reforestation; forest fire protection; pest management; salvage of damaged or dead timber, and; stand management regimes
 - Manage forest resource values at the landscape unit level using a variety of harvesting patterns and cut block sizes which emulate natural disturbances
 - Evaluate and utilize a range of silviculture systems and treatment regimes across the planning area where ecologically and economically feasible
 - Increase the area of the operable forest land base through, but not limited to, conversion of noncommercial brush areas to productive forest where ecologically and economically feasible, and reforestation of marginal ALR lands where appropriate
-

- Enhance the productivity of the operable forest land base through the development and use of innovative technology, and application of incremental forestry where ecologically and economically feasible
- Recognize that the hidden nature of subsurface resources may require adaptive management techniques to accommodate seasonal and temporary access
- Plan for five years of AAC approved in the Forest Development Plan as follows:
 - Two years of AAC under approved cutting and road permits referred to as Standing Timber Inventory (STI) (years 1 and 2)
 - One year of AAC submitted (year 3)
 - Two years of AAC being prepared for submission (years 4 and 5)

3.16.1 Application of Forestry Objectives and Strategies to Resource Management Zones

Within RMZ's, specific objectives and strategies that are based on Natural Disturbance Types (NDT's) will be applied to provide strategic direction for forest resource management. These objectives and strategies are described in the following text. For each RMZ (refer to *Section 5.0 Resource Management Zones*), the collective set of objectives and strategies that pertains to a specific NDT is referenced under the Forestry subheading using the respective NDT number (e.g., NDT 1, NDT 2, and/or NDT 3). More than one NDT may be represented within a given RMZ.

Natural Disturbance Type: 1

Biogeoclimatic Zone: ESSF

Subzone variant: ESSF Misinchinka Wet Cool (wk2)

This NDT is characterized by rare stand-initiating events and forest patch sizes ranging from less than 40 ha up to 250 ha.

Objectives

- Sustain and manage for structural diversity within landscape units
- Sustain and manage for mature forest attributes in landscape units
- Sustain and manage rare forest stand types over the rotation
- Sustain and manage a range of areas of similarly aged forest patches while avoiding fragmentation at the landscape unit level
- Recognize seral and climax* species in the application of silviculture systems (*including, but not limited to, edaphic-, fire-, and climatic-climax species)
- Recognize natural succession in the regeneration of seral species

Strategies

- Consider seral species naturally regenerating after disturbance (e.g., aspen, birch, cottonwood) as acceptable species for meeting regeneration delay and free/well-growing requirements at the stand level, as in a nurse cover for the preferred conifer crop within the conifer timber harvesting land base
 - Manage for a range of small to large similarly aged forest patches at the landscape unit level using a combination of small clearcuts and partial cutting (e.g., selection systems)
 - Manage for mature forest attributes using even-aged or partial cutting (e.g., selection) silviculture systems, where ecologically and economically feasible
 - Manage for a variety of canopy layers and spatial patchiness in multi-storied conifer stands using appropriate silviculture systems
-

Natural Disturbance Type: 2

Biogeoclimatic Zones: ESSF & SBS

Subzone variants: ESSF Bullmoose Moist Very Cold (mv2)

SBS Finlay-Peace Wet Cool (wk2)

This NDT is characterized by infrequent stand-initiating events and forest patch sizes ranging from less than 40 ha up to 250 ha.

Objectives

- Sustain and manage seral stage distribution in a variety of patch sizes within landscape units
- Manage forest activities to simulate natural disturbances while avoiding fragmentation at the landscape unit level
- Sustain and manage for mature forest attributes in landscape units
- Sustain and manage rare forest types over the rotation
- Recognize seral and climax* species in the application of silviculture systems (*including, but not limited to, edaphic-, fire-, and climatic-climax species)
- Recognize natural succession in the regeneration of seral species

Strategies

- Manage seral stage distribution in a variety of patch sizes within landscape units using a combination of clearcutting, partial cutting, aggregated group reserves and harvest units, and some mature and old seral stage forests in a connected network
 - Consider seral species naturally regenerating after disturbance (e.g., deciduous) as acceptable species for meeting regeneration delay and free-/well-growing requirements at the stand level, as in a nurse cover for the preferred conifer crop within the conifer timber harvesting land base
 - Aggregate small-scale disturbances using clearcutting with group reserves in a contiguous network to simulate natural disturbances
 - Manage for mature forest attributes using even-aged silviculture systems with group reserves; partial cutting (e.g., selection) systems; incremental silviculture, and/or; retention of coarse woody debris and veteran trees without compromising silviculture objectives at the stand level, where ecologically and economically feasible
 - Manage for a variety of canopy layers and spatial patchiness in multi-storied conifer stands using appropriate silviculture systems
 - Manage rare forest types over the rotation
 - Sustain and manage seral stage distribution in a mosaic of even-aged stands of different ages within landscape units
-

- Recognize seral and climax* species in the application of silviculture systems (*including, but not limited to, edaphic-, fire-, and climatic-climax species)
 - Recognize natural succession in the regeneration of seral species
 - Sustain and manage mixed species stands within landscape units
 - Recognize the contribution of mixed species stands to the respective timber harvesting land base
-

Natural Disturbance Type: 3

Biogeoclimatic Zones: BWBS

Subzone variants: BWBS Peace Moist Warm (mw1)

BWBS Murray Wet Cool (wk1)

This NDT is characterized by frequent stand-initiating events and forest patch sizes ranging from less than 40 ha up to 1 000 ha.

Objectives

- Sustain and manage seral stage distribution in a mosaic of even-aged stands of different ages within landscape units
- Recognize seral and climax* species in the application of silviculture systems (*including, but not limited to, edaphic-, fire-, and climatic-climax species)
- Recognize natural succession in the regeneration of seral species
- Sustain and manage mixed species stands within landscape units
- Recognize the contribution of mixed species stands to the respective timber harvesting land base
- Sustain or enhance the harvest profile within mixed species stands
- Sustain and manage rare forest stand types over the rotation

Strategies

- Manage for a mosaic of even-aged stands of different ages with reserves of forest or single trees, in a clustered harvest pattern of large aggregate units using clearcutting for pure stands, and partial cutting systems (e.g., strip- or uniform-shelterwood) for mixed species stands, where ecologically and economically feasible
 - Identify and map (i.e., inventory) mixed species stands for deciduous leading, and coniferous leading types (*Intent: inventory to be sensitive to tiered, even-aged and multi-layered, uneven-aged stands, and; intended for regular updating*)
 - Acceptable species of regeneration to reflect natural succession (i.e., seral species) of mixed species stands
 - Manage for a variety of canopy layers and spatial patchiness in multi-storied conifer stands using appropriate silviculture systems
 - Consider seral species naturally regenerating after disturbance as acceptable species for meeting regeneration delay and free-/well-growing requirements at the stand level as in a nurse tree shelterwood for mixedwood management (applied to both the coniferous and deciduous timber harvesting land base), or; as in a nurse cover for the preferred conifer crop within the coniferous timber harvesting land base
-

4.2 Protected Areas

Prior to the onset of the LRMP process there were nine existing Class A provincial parks that encompassed about 49,000 hectares or roughly 1.6% of the planning area. Eight of the parks, although small in area, are significant recreational features offering a variety of outdoor recreation experiences for local residents and tourists passing through the area. These parks include Swan Lake, Sukunka Falls, One Island Lake, Moberly Lake, East Pine, Sudetean, and Kiskatinaw and Taylor Landing. The planning area also included a provincial recreation area located on Williston Lake known as the Dunlevy Provincial Recreation Area.

The largest pre-existing park is Monkman Provincial Park located in the Rocky Mountains approximately 63 km south of the District of Tumbler Ridge. It encompasses nearly 40,000 hectares of land and is accessible via the Murray Forest Service Road. It was established in July 1981 to protect many unique natural features including Kinuseo Falls on the Murray River, numerous step falls on Monkman Creek, subterranean drainage features, fossil beds, caves and grizzly bear habitat.

Gwillim Lake Provincial Park is located in the Rocky Mountain Foothills approximately 43 kilometres northwest of the District of Tumbler Ridge. It encompasses nearly 9,000 hectares and is accessible via Highway 29. The park was established in February 1971 to protect Gwillim Lake and the surrounding area for recreational opportunities including camping, fishing, picnicking, canoeing and swimming. The lake contains several game fish including rainbow, bull and lake trout, northern pike and burbot. A unique feature of this park is that it incorporates an outdoor education training centre established by the Peace River South School District.

4.2.1 Protected Areas

4.2.1.1 Introduction

In 1993, the B.C. Government adopted the Protected Areas Strategy (PAS). The strategy's objective was to protect approximately 12% of the province by the year 2000. For the Dawson Creek planning area, the target was set at 6.75% of which 1.6% represented existing Class A provincial parks. The PAS links the efforts of various ministries to protect specific lands for special values such as wildlife, wilderness, recreation, culture and heritage. These areas will be established in addition to existing Protected Areas including ecological reserves and existing provincial parks and recreation areas.

Early in the implementation of the PAS process it was determined that LRMP's would provide a mechanism for the public, industry and

government agencies to work together, and through consensus agreement, recommend areas for protection. Two broad goals were considered in the selection of Protected Areas:

Goal 1: To protect viable, representative examples of natural diversity in the province. These are large areas (generally 3,000 hectares in size and larger) which are representative of: the major terrestrial, marine and freshwater ecosystems; characteristic habitats, hydrology and landforms; and, the characteristic recreational and cultural heritage values of each ecosection.

Goal 2: To protect special natural, cultural, heritage and recreational features of the province including: rare and endangered species and critical habitats; outstanding or unique botanical, zoological, geological and paleontological features; outstanding or fragile cultural heritage features; and, outstanding outdoor recreational features such as trails. Most of these areas are generally less than 1,000 hectares in size.

Initially, a number of potential Protected Areas were identified by the public and government in the planning area. These Areas of Interest (AOI's) were evaluated by an inter-agency Regional Protected Areas Team (RPAT) using PAS criteria. Preliminary resource and tenure information was also incorporated into the evaluation process. This information on the AOI's was reviewed by the Dawson Creek District LRMP Table. In addition to the natural and cultural elements required for Protected Areas designation, the Table took into consideration the need to ensure continued economic stability for communities in the planning area. The LRMP is recommending the following areas for protection:

The **Goal 1** Protected Areas are:

- Butler Ridge
- Peace River/Boudreau Lake
- Kakwa North
- Pine/LeM oray
- Bearhole Lake
- Elephant Ridge
- Wapiti Lake

The **Goal 2** Protected Areas are:

- Kiskatinaw River - ERR354
 - Peace Corridor River Sites
 - Hole-in-the-Wall
 - Pine River Breaks
 - Bocock Peak
 - Monkman Connector
 - Klin-se-za
 - Dunlevy Recreation Site
 - Rolla Site
-

Existing and proposed Protected Areas (e.g., both Goal 1 and 2 areas) together contain 6.75% of the planning area, approximately 195,000 ha (LUCO 1996).

4.2.1.2 Resource and Recreation Use Guidelines for Protected Areas

The PAS provides a broad framework to guide LRMP planning tables in recommending areas for protection. However, the PAS does not explicitly address existing and appropriate resource use issues that occur within Protected Areas. LRMP Tables, with guidance from the PAS, recommend acceptable uses within Protected Areas.

Guidelines have been developed to assist LRMP Tables with this task. The guidelines are summarized in the document: '*Resource and Recreation Use Guidelines for Protected Areas*', August 1995. This document provides supporting information, lists '*Protected Area Management Principles*', and summarizes in tabular form a '*Compatibility of Selected Activities, Services and Use in Protected Areas*' (Appendix F).

The information is intended to provide overall management guidance to LRMP Tables when developing their recommendations for allowable uses within Protected Areas. The major principles in the document can be summarized as follows:

Protected Area Management Principles Summary

- Some allowable uses are not appropriate within every Protected Area
 - Active management/habitat manipulation may be allowed to enhance or rehabilitate seriously altered ecosystems or restore ecological integrity
 - Use of Protected Areas is encouraged, where appropriate and consistent with the principle of maintaining ecological integrity
 - Allowable activities and developments should be fully compatible and complement the natural and cultural resource values identified within the Protected Area
 - Land use activities and traditional cultural uses that may have changed a landscape and/or have acquired significance in their own right, should be recognized and respected
 - First Nations peoples may continue to use Protected Areas for sustenance activities, traditional ceremonial and spiritual practices, subject to conservation objectives
 - Recognition and special consideration will be given to existing tenures, licenses, authorizations and public use where these uses are compatible with the resource values and management objectives for which the Protected Area was established
 - Protected Areas are a public trust and opportunities will be
-

provided for the public to have input into the planning and management of Protected Areas

Based on the above principles, the Dawson Creek LRMP has recommended a set of acceptable uses for the Protected Areas. The table entitled the '*Compatibility of Selected Activities, Services and Use in Protected Areas*' is considered the "baseline" for recommended allowable activities within all Protected Areas and is included in Appendix F. In addition to the table indicated above, additions, changes or modifications to this table are summarized for each Protected Area and serve as specific allowable activity recommendations. For example, there is consensus at the Table that trapping is an acceptable activity in Protected Areas. Recommendations for directional drilling under Protected Areas in the Dawson Creek planning area are found in Appendix G.

4.2.2.5 Bearhole Lake (17,812 ha)

Located on the Alberta Plateau, this proposed Protected Area comprises a portion of the wet, cool Boreal White and Black Spruce biogeoclimatic zone within the Kiskatinaw Plateau ecosection. The area also captures the plains/foothills mixedwood transition as well as pine, black spruce and larch forest types. The headwaters of the Kiskatinaw River are within the boundaries of this area.

The area contains critical habitat for trumpeter swans. The undisturbed forests and wetlands provide winter range for low elevation caribou and moose. Recreational activities such as fishing, canoeing, camping, hiking, and wildlife viewing are supported within the Protected Area.

Acceptable Uses

- Endorse the '*Compatibility of Selected Activities, Services and Use in Protected Areas*' Table of acceptable activities with the noted exceptions:
- Grandparent existing oil and gas tenures (refer to Implementation Section 5.2.7)
- Allow trapping as an acceptable use (refer to Implementation Section 5.2.10)

Comments

- Some types of motorized recreational vehicles and boats may be restricted either by type of vehicle, time of year, or areas designated for use. Specific restrictions will be developed through the Protected Area Management planning process which is a public process
 - Allow ATV access to the current Forest Service Recreation Site along the existing route
-

4.2.3 Goal 2 Protected Areas

The following table lists the application of acceptable uses for the Goal 2 Protected Areas:

Acceptable Uses	Comments
<ul style="list-style-type: none">• Endorse the <i>'Compatibility of Selected Activities, Services and Use in Protected Areas'</i> Table of acceptable activities with the noted exceptions:• Allow trapping as an acceptable use (refer to Implementation Section 5.2.10)• Klin-se-za: Refer to the <i>Twin Sisters Special Management Committee Recommendations</i> (Oct. 1997) (Appendix J)• Grandparent existing oil and gas tenures (refer to Implementation Section 5.2.7 and Appendix J)• Allow for directional drilling from outside of the Protected Area (refer to Implementation Section 5.2.8 and Appendices G & J)	

4.2.3.3 Kiskatinaw River (166 ha)

This site is located at the confluence of the Kiskatinaw and Peace Rivers in the Peace Lowlands ecosection (see inset). PAS values:

- benchmark area of rare grassland vegetation
 - surrounding plant and animal communities representative of the Boreal White and Black Spruce biogeoclimatic zone
-

4.10 Grazing Reserves Resource Management Zone

(Enhanced Resource Management)

4.10.1 Resource Management Subzones

Farrell	Creek	8DOne	Island	8D
Bear	Mountain	8DGroundbirch		8D
Wartenbe 8D		Sunset 8D		

4.10.2 Area Description

Grazing Reserves are located throughout the north half of the planning area, predominantly within the Peace Lowlands ecosection and the Boreal White and Black Spruce biogeoclimatic zone.

4.10.3 Resource Values

Fish and Wildlife

Most wildlife common to the upland deciduous and coniferous forests are found in this RMZ. Predominant species include furbearers, black bear, songbirds, moose, elk, white-tailed and mule deer. Ungulates and livestock share available forage.

Some critical moose and elk habitat is found along river breaks and in riparian areas. A number of sport fish and non-sport fish species live in the streams running through the Grazing Reserves.

Recreation

Recreational activities within this RMZ include cross-country skiing, hiking, horseback riding, hunting, ATV use, four wheel driving and snowmobiling.

Hunting within the pastures is a subject of some concern to the ranchers operating within the Grazing Reserves and is subject to special regulations. Community Pasture Associations within this RMZ provide input into hunting regulations and the subsequent management of wildlife populations.

Visual Quality

Scenic areas within this RMZ exist in areas visible from major travel corridors and recreation trails. Viewing sensitivity ratings are generally low with the exception of the northern portion of the Wartenbe Grazing Reserve which is visible from Highway 97 near Chetwynd. VQO's have been identified for scenic areas within this RMZ, the most

common being 'modification'.

Cultural and Heritage

Significant cultural and heritage values have not, to date, been identified within the RMZ.

Trapping

The entire RMZ is under tenure to trappers. The maintenance of furbearers and furbearer habitat is important to the continuation of these trapping tenures.

Water

Water developments are predominantly dugouts constructed to capture surface runoff. Livestock are watered directly from streams subject to *The Water Act*, Range Use plans under the *Forest Practices Code* and the Agricultural Code of Practice under the *Provincial Waste Management Act*. One of the Grazing Reserves (Bear Mountain) is located within the Kiskatinaw River community domestic water supply area.

Agriculture

This RMZ contains approximately 10% of the ALR lands in the planning area. These are Crown lands that are managed for the primary purpose of grazing livestock. The CLI ratings in this RMZ are generally a mix of classes 3, 4, and 5.

Range

Grazing Reserves are generally large parcels of Crown land that are reserved from alienation for the purpose of grazing livestock. The above RMZ's contain numerous range developments such as tame seeded pasture, corrals, fencing and water developments. Other resource-based activities occur within the Grazing Reserves. These activities are recognized as complementary land uses. A coordinated resource management plan (CRMP) process is utilized to address resource management issues and manage resource development activities of all users in this RMZ.

Coal and Other Mineral Resources

The potential for coal and minerals in this RMZ is not currently known. No mineral nor coal tenures are present.

Energy

Natural gas and oil development including access routes exist within all six grazing reserves. The RMZ supports a number of active petroleum tenures, natural gas pipelines and related infrastructure. The area is important for future oil and gas exploration and

development as the potential reserves within the RMZ are moderate to high.

Forestry

A wide variety of timber types grow in the Grazing Reserve including conifers, deciduous mixed woods and non-commercial brush. Grazing forage within these stands is concentrated mainly in the deciduous and non-commercial brush areas. Timber values are generally high due to good to medium site productivity and good existing road access.

4.10.4 Management Direction

The Management Direction within this RMZ is resource development and use, particularly range, timber and oil and gas. These resource values are to incorporate the maintenance of other resource values in lower level planning.

The Grazing Reserves RMZ has been designated Enhanced Resource Development and is identified on the LRMP map. Resource values, objectives to sustain or enhance those values, and strategies to achieve the resource management objectives within the RMZ are provided on the following pages.

Grazing Reserves RMZ

1 Biodiversity

Objectives

- General Management Direction
- Sustain healthy functioning ecosystems in the Resource Management Zone

Strategies

- General Management Direction
- *The general biodiversity is low recognizing that the full spectrum from low to high may be represented in the landscape units contained in this RMZ*

2 Soil Conservation

Objectives

- General Management Direction

Strategies

- General Management Direction

3 Fish and Wildlife

Objectives

- General Management Direction
- Manage critical ungulate habitat to assist in sustaining viable, healthy ungulate populations
- Manage critical habitat for red- and blue- listed migratory songbirds to assist in sustaining viable, healthy migratory songbird populations
- Manage critical habitat for furbearers (lynx, marten, fisher) to assist in sustaining viable, healthy furbearer populations
- Manage populations and distributions of regionally important wildlife species to reduce conflicts with range use and/or agriculture

Strategies

- General Management Direction
 - Identify and map critical ungulate habitat, and incorporate into landscape unit level and operational planning (*Intent: Government to undertake*)
 - Apply a proactive, consultative approach to develop wildlife harvest strategies that will assist in preventing or reducing wildlife-agriculture/range conflicts
 - Develop guidelines for mixedwood forest management to assist in sustaining critical habitat for red- and blue- listed migratory songbirds (*Intent: Government to undertake*)
 - Incorporate identified wildlife habitat features and known furbearer refuge areas into resource development, landscape unit level and operational planning processes to mitigate negative impacts to trapping and trapping improvements (*Intent: Government to undertake*)
 - In consultation with resource users, retain coarse woody debris at volumes acceptable for range and livestock management within grazing reserves
-