

## 11.0 Benchmark Information

The following section provides an overview of benchmark communities' use of offsite levies in the financing of water and wastewater infrastructure. Benchmark communities include:

Lakeland County  
Parkland County  
Yellowhead County

Leduc County  
Red Deer County  
Municipality of Wood Buffalo

All benchmark communities contacted have used or continue to use offsite levies to finance water and/or wastewater infrastructure requirements. Of the communities contacted, two were using levies that had not been updated since levy inception in 1979 or prior; two had recently created or updated offsite levy bylaws and two were establishing or updating an offsite levy bylaw.

The methodology each municipality uses to calculate offsite levies varies. Of the five communities that have active offsite levy bylaws, four calculate rates on a modified net area basis while the remaining community calculates rates on a per lot basis. Of those communities using the modified net area calculation basis, it was most usual that area calculations included allowances for environmental reserves, municipal reserves and road right of way.

In many of the contacted communities, the development area targeted by the offsite levy contained only a single land use type which resulted development of in a single uniform offsite levy rate. In other communities where multiple land uses existed within the targeted development area, offsite levy rates were created for each land use type or equivalency factors (e.g. 1,500 sq. ft. of commercial development is equal to single family residence) are used to account for differences of cost impact between different land uses.

While many contacted communities summarized all development area improvements into a single offsite levy rate, other communities had a specific rate for each service element. This granular rate schedule allows these municipalities to choose between services where multiple service options might exist.

For those communities that recently updated offsite levy bylaws, it was evident that the municipality clearly understood the infrastructure costs that were being recovered through the offsite levy rate. Furthermore, offsite levy rates most often recovered the full cost of providing water and sewer infrastructure to the development area. For one community however, their existing offsite levy bylaw provided a rate exemption for schools and the community was considering a further rate exemption to non-for-profit organizations like churches.

The types of infrastructure recovered through offsite levies also varied. In most instances local servicing and trunk requirements below specified diameters were held outside of offsite levy rate calculations. In these instances this infrastructure cost was to be borne directly by the developer of the area. With regard to recovery of water and wastewater treatment costs one community's offsite levies were specific created to recovery a portion of treatment plant infrastructure costs. In a further case water and wastewater treatment costs were excluded from offsite levy rate calculations because both the water and wastewater treatment functions were performed outside of the municipality.

The following are details related each benchmarked communities' offsite levies.

### 11.1 Municipality of Wood Buffalo

Question	Wood Buffalo Response
<i>Contact Information</i>	Wayne MacIntosh, Engineering Technologist
<i>Does your municipality use offsite levies to support the construction of water and wastewater services?</i>	Yes, offsite levies have been used to recover infrastructure costs related to water and sewer treatment.
<i>In what areas within you municipality do you collect offsite levies for water and sewer infrastructure?</i>	<p>Wood Buffalo currently has four offsite levy bylaws, all of which relate to water and sewer treatment in Fort McMurray. Three of the bylaws relate to new subdivision developments and the fourth bylaw relates to redevelopment of an area.</p> <p>The municipality is in the process of developing a new offsite levy that would be aimed at development elsewhere in the municipality (rural areas).</p>
<i>In calculating offsite levy fees do you base fees on gross or net development areas?</i>	<p>Existing levies are based upon net development area. Net development area is based upon deductions from gross area for environmental reserves and municipal reserves.</p> <p>The new offsite levy being developed will make deductions for public utility lands and for road right of way in addition to environmental and municipal reserves.</p>
<i>Is land use considered in your offsite levy calculations? What land use categories are considered?</i>	<p>The existing levies are aimed at servicing primarily residential areas within the community however single family, multi-family and commercial land uses exist within development areas. Existing levies also consider school and municipal lands. Both of these land uses are currently exempt from offsite levies.</p> <p>The new offsite levy bylaw is further considering additional rates that would relate to industrial and institutional land uses. In this later regard an exemption from levies is also being considered for all not-for-profit organizations (e. g. such as churches).</p>
<i>Are development densities used in development of offsite levy rates?</i>	<p>The existing bylaws charge fees to single and multi-family land uses on a residential unit basis. Both single and multi-family units are considered equivalent and have occupant densities of three persons per unit. Commercial land uses are equated to single family units by using a conversion factor of 1,500 ft<sup>2</sup> of commercial development being equal to a single family unit.</p>

Question	Wood Buffalo Response
	In the new bylaw floor area ratio equivalencies will be created for industrial and institutional land uses. This will permit a single rate structure to be applied across land uses.
<i>Are demand factors considered in offsite levy calculations?</i>	All land uses are equated back to a single family equivalent.
<i>When are offsite levies charged? (subdivision or development permit)</i>	Water and sewer offsite levies are collected at the time of development permit application. However it should be noted that Wood Buffalo has offsite levies for roads and stormwater facilities that it collects at the time of subdivision.
<i>What are the current rates for water and sewer offsite levies?</i>	Water offsite levies are \$956.49 per single-family unit or equivalent.  Sewer offsite levies are \$126.94 per single-family unit or equivalent.
<i>When were offsite levy rates last updated?</i>	There is a new offsite levy bylaw that is currently under development that is aimed at development outside of Fort McMurray.  The existing bylaw was last reviewed in 2000 when major upgrades of water and sewer plant infrastructure was being considered.
<i>What is the value of water and sewer infrastructure being recovered through offsite levies?</i>	The existing bylaws recover water, sewer, stormwater and road infrastructure costs. The water and sewer levies relate to water and sewer treatment facilities only but exclude upgrades of the sewer treatment plant for tertiary treatment. The total dollar value of infrastructure recovery anticipated from the offsite levies is approximately \$20M however there is no breakdown on how much of the \$20M relates only to water and sewer infrastructure costs as opposed to stormwater and road costs.  The new offsite levy bylaw is intended to recover approximately \$100M in infrastructure costs.
<i>Do offsite levies recover the full cost of infrastructure or only part of infrastructure costs?</i>	Existing bylaws are intended to recover all infrastructure costs however in the new bylaw some infrastructure costs will be recovered from conditional grants.

Question	Wood Buffalo Response
<i>Does the municipality offset or subsidize the cost of levies to developers or any land use type?</i>	<p>Yes, the existing bylaw exempts schools for offsite levy charges.</p> <p>The new bylaw will also consider exemptions for not-for-profit land uses (e. g. churches).</p>
<i>What water infrastructure is included in the development of offsite levy rates?</i>	<p>The existing bylaw only considers water treatment infrastructure.</p> <p>The new bylaw will consider all types of water infrastructure including treatment, transmission, reservoirs, pumping stations etc.</p>
<i>What sewer infrastructure is included in the development of offsite levy rates?</i>	<p>The existing bylaw only considers sanitary treatment infrastructure (excluding tertiary treatment).</p> <p>The new bylaw will consider all types of sewer infrastructure including treatment, transmission, lift stations, storage etc.</p>

## 11.2 Lakeland County

Question	Lakeland Response
<i>Contact Information</i>	Terry Colosimo, Manager of Public Works
<i>Does your municipality use offsite levies to support the construction of water and wastewater services?</i>	Not presently.
<i>In what areas within your municipality do you collect offsite levies for water and sewer infrastructure?</i>	<p>Offsite levies were used to collect water and wastewater infrastructure costs in the Village of Plamondon. The levy was \$1,500 per lot which did not recover the full cost of providing water and sewer servicing. In 2002, Plamondon reverted to a Hamlet and a connection fee through development agreement was introduced to replace the offsite levy.</p> <p>In the Beaver Lake area, just outside of the Town of Lac La Biche, water and sewer extensions are provided for new residential development also through a service connection fee of \$2,600.</p> <p>Lakeland is presently developing an offsite levy bylaw to deal with requests from developers who wish to tie into the new water supply line to Plamondon.</p>

### 11.3 Yellowhead County

Question	Yellowhead Response
<i>Contact Information</i>	Brent Shepherd
<i>Does your municipality use offsite levies to support the construction of water and wastewater services?</i>	Yes. Offsite levy bylaws were first adopted in 1979. The intent of the bylaw was to receive development contributions toward water supply, treatment and storage facilities, sewage treatment and disposal facilities. The offsite levies were developed when Yellowhead County was an improvement district of the Province and have not been changed or updated since inception.
<i>In what areas within your municipality do you collect offsite levies for water and sewer infrastructure?</i>	The offsite levy is collected on new residential subdivisions within the County. Collected funds are pooled to assist servicing requirements in Hamlets.  There currently are no industrial subdivisions within Yellowhead County.
<i>In calculating offsite levy fees do you base fees on gross or net development areas?</i>	Offsite levy fees are charged on a lot basis.
<i>Is land use considered in your offsite levy calculations? What land use categories are considered?</i>	Development in hamlets is primarily residential in nature and as such no land use categories are considered in the development of offsite levy charges.
<i>Are development densities used in development of offsite levy rates?</i>	No. Offsite levies are charged on a lot basis.
<i>Are demand factors considered in offsite levy calculations?</i>	No. Development is primarily residential in nature and so a uniform rate per lot is established.
<i>When are offsite levies charged? (subdivision or development permit)</i>	Offsite levies are charged at the time of subdivision.
<i>What are the current rates for water and sewer offsite levies?</i>	Rates were established in 1979 when Yellowhead County was an improvement district of the Province. Charges are follows:  Water systems per lot - \$300.00  Water and sewer systems per lot - \$500.00  Adjacent to subdivision without sewage disposal - \$200.00  Adjacent to subdivision with sewage disposal - \$100.00

<b>Question</b>	<b>Yellowhead Response</b>
<i>When were offsite levy rates last updated?</i>	The rates have not been updated since they were created in 1979.
<i>What is the value of water and sewer infrastructure being recovered through offsite levies?</i>	Unknown as the funding is for anticipated infrastructure development.
<i>Do offsite levies recover the full cost of infrastructure or only part of infrastructure costs?</i>	No.
<i>Does the municipality offset or subsidize the cost of levies to developers or any land use type?</i>	Yes, the general tax levy of the municipality is used to pay for infrastructure costs that are in excess of offsite levies contributions.
<i>What water infrastructure is included in the development of offsite levy rates?</i>	The offsite levy is intended to pay for water supply, treatment and storage facilities.
<i>What sewer infrastructure is included in the development of offsite levy rates?</i>	The offsite levy is intended to pay for sewage treatment and disposal facilities.

#### **11.4 Red Deer County**

<b>Question</b>	<b>Red Deer Response</b>
<i>Contact Information</i>	Ken Enion, Assistant County Manager
<i>Does your municipality use offsite levies to support the construction of water and wastewater services?</i>	Yes, offsite levies are used to support the construction of water, wastewater services as well as transportation system development and upgrades.
<i>In what areas within your municipality do you collect offsite levies for water and sewer infrastructure?</i>	Offsite levies are used for land areas adjacent to the primary highway corridors and for growth hamlets.  The <b>South Hills Area</b> is bounded on the east by Highway 2; on the south by Mackenzie Road; and on the north and west by Highway 2A and is adjacent to the southwest boundary of the City of Red Deer. Planning and development in this area is governed by The South Hills Area Structure Plan, dated June 1997.

Question	Red Deer Response
	<p>The planning area accommodates institutional, industrial/business, residential, highway commercial, industrial uses and protects Waskasoo Creek. This area contains new development such as Costco and Staples as well as all of the gasoline service stations, restaurants and fast food outlets on the highway commercial strip known as “Gasoline Alley”. Water and sanitary sewage services were handled on a piece-meal basis prior to the adoption of the area structure plan in 1997.</p> <p><b>Springbrook</b> is a new hamlet community created on the decommissioned lands of the CFB Penhold Airbase. The Town of Penhold is located immediately to the south. In 1996, the County of Red Deer recognized the military housing portion of the Penhold base area as a hamlet. An area redevelopment plan was completed in April 1999 which includes the original hamlet and additional lands to provide for long range growth of the community. The Department of National Defense constructed a piped and treated water system for the base and residential area. In 1975, a new water main was constructed. This system was turned over to the County. A sewage collection system operated by the Waskasoo Regional Services Board collects sewage from the Town of Penhold, the Hamlet of Springbrook and a County commercial area known as Gasoline Alley and transfers it to the City of Red Deer sewage treatment facility. After the County completed an infrastructure study and regained control of the water source, the capital costs were clarified and modified. From these revised costs, off site levies were assessed on new development.</p> <p>Redevelopment off site levies for the Hamlet of Springbrook is based on a developable area of 654 acres out of a total area of 1218 acres. The levies are formalized in Schedule E of Bylaw No. 17/96 and were amended by resolution on February 1, 2000.</p>
<p><i>In calculating offsite levy fees do you base fees on gross or net development areas?</i></p>	<p>Calculations are based upon a net area basis with reductions from gross area for environmental reserves, municipal reserves and road right of way.</p>
<p><i>Is land use considered in your offsite levy calculations? What land use categories are considered?</i></p>	<p>Land use is considered in calculations. Land use categories include single family, multi-family, commercial, industrial and institutional land uses.</p>

Question	Red Deer Response
<i>Are development densities used in development of offsite levy rates?</i>	Yes
<i>Are demand factors considered in offsite levy calculations?</i>	Yes water consumption per land use type.
<i>When are offsite levies charged? (subdivision or development permit)</i>	Levies are charged at the time of subdivision.
<i>What are the current rates for water and sewer offsite levies?</i>	Red Deer County current rates (per acre) South Hills: Water Supply Phase 1           \$ 805 Water Supply Phase 2           \$2,350 Trunk Water Main               \$1,120 Local Water Distribution       \$4,690 Trunk Sanitary                   \$ 470 Local Sanitary Sewer System   \$3,520 Storm Water Management       \$ 950 Regional Sewer System         \$6,000  Springbrook: Water Storage Reservoirs (2)   \$1,380 Water Well and Pump House     \$ 225 Regional Sewer System         \$6,000
<i>When were offsite levy rates last updated?</i>	Offsite levy rates are currently under review. The last time that rates were revised was in 2001.
<i>What is the value of water and sewer infrastructure being recovered through offsite levies?</i>	The value of water and sewer infrastructure costs is approximately \$20M.
<i>Do offsite levies recover the full cost of infrastructure or only part of infrastructure costs?</i>	Levies recover the full cost of infrastructure.

<b>Question</b>	<b>Red Deer Response</b>
<i>Does the municipality offset or subsidize the cost of levies to developers or any land use type?</i>	No contributions or subsidies are provided by the municipality. Offsite levies recover the full cost of providing water and sewer infrastructure.
<i>What water infrastructure is included in the development of offsite levy rates?</i>	Offsite levies recover the cost of all types of water infrastructure including treatment, transmission, reservoirs, pumping stations etc.
<i>What sewer infrastructure is included in the development of offsite levy rates?</i>	Offsite levies recover the cost of all types of sewer infrastructure including treatment, transmission, lift stations, storage etc.

### 11.5 Parkland County

<b>Question</b>	<b>Parkland Response</b>
<i>Contact Information</i>	Bill Sommer, Technical Services Supervisor
<i>Does your municipality use offsite levies to support the construction of water and wastewater services?</i>	<p>Yes, in 1995 the County began to front end the construction of sewer and water trunk lines to accommodate demand for serviced industrial and industrial-commercial developments. The County uses offsite levies to reimburse construction front ending.</p> <p>Offsite levy information can be found in By-Law No. 52-2003 Imposition And Collection of Off-Site Levies.</p>
<i>In what areas within your municipality do you collect offsite levies for water and sewer infrastructure?</i>	<p>The original Acheson Industrial Area consisted of the Ellis and Sherwin Industrial parks with development commencing in 1975. The developers paid for and installed a water distribution line that connected to the regional water line from Edmonton. Parkland County purchased the water line from the developer in the 1990's.</p> <p>This initial phase of the Acheson Industrial Area consisted of portions of three quarter sections of land bounded by the old Hwy. 16 (16X) to the south, Hwy. 60 to the east, and the CN Rail line to the north. Acheson now consists of a number of new areas north of the CN Rail line up to Hwy. 16, east of Hwy. 60 and south of Hwy. 16X.</p> <p>The County, starting in 1995 began to fund and construct sewer and water trunk lines to accommodate increased</p>

Question	Parkland Response
	demand for serviced industrial and industrial-commercial development using contingencies reserve funds. The trunk lines were built using cost-shared grants from the federal and provincial governments. The County used their contingency reserves to pay their 33% share. The front end funding by the County was to be paid back through the use of off site levies.
<i>In calculating offsite levy fees do you base fees on gross or net development areas?</i>	<p>Calculations are based upon a modified net development area. This modified area calculation is based on the gross titled area of the subdivision or development including roads, easements, public utility lots, municipal reserve dedication and storm ponds but excluding</p> <ul style="list-style-type: none"> <li>- Existing rights of way not included in the title of the developer.</li> <li>- Environmental reserves.</li> <li>- The county may also exclude treed areas, natural habitat or parks and natural areas (municipal reserves plus any areas above the MGA requirement).</li> </ul> <p>Land dedication for provincial highways.</p>
<i>Is land use considered in your offsite levy calculations? What land use categories are considered?</i>	Yes, as the areas where offsite levies exist are industrial parks calculations consider commercial land use and industrial land use.
<i>Are development densities used in development of offsite levy rates?</i>	No.
<i>Are demand factors considered in offsite levy calculations?</i>	No.
<i>When are offsite levies charged? (subdivision or development permit)</i>	Levies may be charged at the time of subdivision or at time of development permit. The timing of these requirements is determined upon development application.
<i>What are the current rates for water and sewer offsite levies?</i>	<p>Acheson Sewer Trunk System, 1995, base levy \$358.21/ha, levy starts Jan. 1, 1996, interest rate: 2.5%, 10 increments.</p> <p>Hunters' Sewer Trunk System, 1997, base levy \$1,995.27/ha, levy starts Jan. 1, 1998, interest rate: 3.0%, 10 increments.</p>

Question	Parkland Response
	<p>Acheson Sewer Collection System, 1995, base levy \$2,800 to \$4,700/ha, levy starts Jan. 1, 1996, interest rate: 2.5%, 10 increments.</p> <p>Acheson Water Connection, future, estimated cost after inflation \$128,000, base levy \$275.33/ha, levy starts Jan. 1, 1998.</p> <p>Hunter' Water Main, 1997, base levy \$4,561, levy starts Jan. 1, 1998, interest rate \$2.5%, 10 increments.</p> <p>Acheson Reservoir/Pump House, future, estimated cost after inflation \$3,578,812, base levy \$2,344/ha, levy starts Jan. 1, 1998.</p>
<i>When were offsite levy rates last updated?</i>	The present offsite levy bylaw was created in 2003.
<i>What is the value of water and sewer infrastructure being recovered through offsite levies?</i>	<p>Acheson Sewer Trunk System \$323K.  Hunters' Sewer Trunk System \$202K.  Acheson Sewer Collection System \$359K.  Acheson Water Connection \$128K.  Hunter' Water Main \$273K.  Acheson Reservoir/Pump House \$3,840K.</p>
<i>Do offsite levies recover the full cost of infrastructure or only part of infrastructure costs?</i>	The offsite levies are slated to recover the County portion of front ended infrastructure costs.
<i>Does the municipality offset or subsidize the cost of levies to developers or any land use type?</i>	When an exceptional circumstance exists the municipality has deferred collection from some developers. This deferment however has not reduced or eliminated the developer's requirement to pay offsite levy amounts.
<i>What water infrastructure is included in the development of offsite levy rates?</i>	<p>Treated water is supplied through a regional water line from Edmonton and is therefore not included in offsite levy calculations.</p> <p>New transmission lines up to 300mm are the direct responsibility of the developer. Larger trunks are the responsibility of the County with reimbursement of cost achieved through offsite levies.</p> <p>Reservoirs, pumping stations are also infrastructure that is considered in offsite levy calculations.</p>
<i>What sewer infrastructure is included in the development of offsite levy rates?</i>	Sewage Treatment is provided through a regional sewage line to the Alberta Capital Region Wastewater Commission and is therefore not included in offsite levy calculations.

Question	Parkland Response
	<p>New transmission lines up to 300 mm are the direct responsibility of the developer. Larger trunks are the responsibility of the County (Acheson trunk 1/3 county share) with reimbursement of cost achieved through offsite levies.</p> <p>There are no lift stations, storage or other facilities including within existing offsite levy rates.</p>

### 11.6 Leduc County

Question	Leduc Response
<i>Contact Information</i>	D'Anne O'Keefe, Development Officer
<i>Does your municipality use offsite levies to support the construction of water and wastewater services?</i>	Yes, offsite levies are applied to developments to support water supply infrastructure in the Nisku Industrial Business Park and North Vistas Country Residential Area.
<i>In what areas within your municipality do you collect offsite levies for water and sewer infrastructure?</i>	See Above.
<i>In calculating offsite levy fees do you base fees on gross or net development areas?</i>	A modified net development area is used which considers deductions from gross area for municipal reserves and road rights of way.
<i>Is land use considered in your offsite levy calculations? What land use categories are considered?</i>	The Nisku Industrial Park is zoned as light industrial and therefore there is no need to differentiate between land uses. Likewise the North Vistas Area is country residential development and therefore there is no need to differentiate between land uses.
<i>Are development densities used in development of offsite levy rates?</i>	No, levies are charged on an area basis.
<i>Are demand factors considered in offsite levy calculations?</i>	No.
<i>When are offsite levies charged? (subdivision or development permit)</i>	While offsite levies may be collected at either the time of subdivision or develop permit the County prefers to apply levies at the time of subdivision.

<b>Question</b>	<b>Leduc Response</b>
<i>What are the current rates for water and sewer offsite levies?</i>	Nisku Industrial Park - \$3,000 per gross acre.  North Vista Country Residential Area - \$800 per gross acre
<i>When were offsite levy rates last updated?</i>	The Nisku Industrial Park offsite levy was established in 1979. The North Vista Country Residential Area offsite levy was established prior to 1979.
<i>What is the value of water and sewer infrastructure being recovered through offsite levies?</i>	Answer declined
<i>Do offsite levies recover the full cost of infrastructure or only part of infrastructure costs?</i>	Answer declined
<i>Does the municipality offset or subsidize the cost of levies to developers or any land use type?</i>	Answer declined
<i>What water infrastructure is included in the development of offsite levy rates?</i>	Offsite levy rates include provisions for all water infrastructure including treatment, transmission, reservoirs, pumping stations and distribution network.
<i>What sewer infrastructure is included in the development of offsite levy rates?</i>	Some wastewater collection is being provided in the Nisku Industrial Park however these infrastructure requirements are being funded through local improvement charges.

## 12.0 Funding Mechanism

### 12.1 Government Grants

The following section provides an overview of grant programs that maybe used to finance water and sewer servicing of the Clairmont Corridor.

There are three funding programs that provide assistance to rural municipal water and wastewater infrastructure. These include: New Deal for Cities and Communities (NDCC), Alberta Municipal Infrastructure Program (AMIP), and the Alberta Municipal Water/Wastewater Partnership. Each program is discussed more fully below.

#### 12.1.1 New Deal for Cities and Communities (NDCC)

The New Deal for Cities and Communities is a federal initiative introduced as acknowledgement of the increasing infrastructure pressures facing municipalities and in particular their current infrastructure debt (the backlog of capital infrastructure projects that are integral to a sustainable community plan) and longer term infrastructure requirements. It is anticipated that the program will provide municipalities with approximately \$477 million over the five-year period of the program. The program will ramp up over the five-year period with \$57 million allocated in the first year of the program while \$191 million will be provided in the final year of the program. Distribution of funding is based upon the population of each municipality with the first three years of the program allocated based upon the population estimate for 2006. Distribution of the last two years of the program will be based upon census numbers that will be available in 2007.

The program is supported through the allocation of the federal gasoline tax. The funding will be provided over a five-year period beginning in federal/provincial fiscal 2005/2006. Funding will be provided in annual or semi-annual increments and can be spent over the life of the program according to local planning needs and priorities. While it is intended that all projects should be completed within the five-year period, allowances for completion of projects in progress at the end of the period will be considered.

Funding under this program is intended to support the development of public transit systems, road rehabilitation, water and wastewater systems, storm drainage, solid waste management, community energy systems and community capacity building. There is no municipal cost sharing required on this program; however municipalities are expected to maintain their current level of spending on infrastructure before accessing NDCC funding. Further NDCC funding may not be used as the municipal share of funding projects on any other grant program. In special cases, NDCC funds may be used to top-up the funding source of a project when all other funding sources have been exhausted.

There are both Federal and Provincial reporting requirements associated with the NDCC program. Federal reporting requirements include submissions by the municipality of an "Integrated Community Sustainability Plan", a detailed multi-year capital plan, project applications as well as descriptions and details regarding the outcomes achieved under the program. Provincial reporting requirements are similar to those being introduced for the new Alberta Municipal Infrastructure Program (AMIP), see below.

### **12.1.2 Alberta Municipal Infrastructure Program (AMIP)**

Like NDCC the Alberta Municipal Infrastructure Program (AMIP) was introduced to as acknowledgement of the increasing infrastructure pressures facing municipalities. This program will provide a total of three billion dollars over a five-year period and is supported by Alberta's current level of prosperity. Grants totalling \$600 million have been allocated to municipalities as of April 2005.

Funding will be advanced to municipalities following the signing of trust agreements and can be spent by municipality over the next ten years according to local planning needs and priorities. Distribution of funding is essentially on a per capita basis again with funding in the first three years of the program based upon 2006 population estimates and funding in the last two years of the program based upon census information available in 2007.

Funding will be provided over a five-year period beginning in the provincial 2005/2006 fiscal year. The program provides funding for "core infrastructure" and "other infrastructure" projects. Core infrastructure projects include roadways, bridges, public transit, water supply and treatment systems, wastewater treatment and collection systems, storm sewer drainage systems and facilities, emergency service facilities and vehicles etc. Other infrastructure projects include environmental energy improvements, solid waste management, other municipal buildings, other municipal infrastructure. The funding program permits projects already in progress to be eligible for AMIP funding. Funding can also be used as the municipal share of new projects under other Alberta Infrastructure and Transportation municipal support programs with the exception of ICAP program funding. Funding also does not require any cost sharing on the part of municipalities however municipalities are expected to maintain their current level of spending on infrastructure. Projects should be carried out by the private sector and furthermore justification must be provided and approval received to use funds on project awards that are other than lowest price. Where municipalities wish to undertake a project using their own forces a economic analysis is to be provided that substantiates a lower more cost effect project.

There are unique provincial reporting requirements associated with AMIP funding that include: the development of an infrastructure management plan that provides an assessment of all municipally owned infrastructure, submission of a project profile containing general project information, submission of an application for program acceptance, provision of a multi-year capital infrastructure plan, a statement of funding and actual grant expenditures each year.

### **12.1.3 Alberta Municipal Water / Wastewater Partnership**

This continuing program ensures that Albertans have access to safe water supplies and adequate wastewater treatment. Funding is provided to cities under 45,000 population, towns, villages, summer villages, regional commissions and eligible hamlets within rural municipalities.

Project eligibility includes construction of high-priority water supply and treatment and wastewater treatment and disposal facilities. Water projects may include planning and/or design studies, general municipal infrastructure planning studies, raw-water intakes and wells, raw-water supply lines to storage facilities, raw-water storage facilities, raw-water supply lines to treatment facilities, water treatment facilities, treated-water supply lines to the distribution system and treated-water storage facilities. Wastewater

project may include planning and/or design studies, general municipal infrastructure planning studies, sewer outfalls and, wastewater treatment facilities.

Projects not eligible for assistance include water distribution and/or sewage collection systems. All services, material and equipment engaged on projects must be from the private sector. Projects must also be assigned on the basis of lowest tender price. Project costs not eligible for funding include municipal labour, equipment and administrative costs.

Funding is allocated as a percentage of eligible approved project costs. For those municipalities under 1,000 population, projects are cost shared on a 75% Government/25% municipality basis. For communities over 1,000 population (to a maximum of 45,000 population), grant percentage ratios are calculated by a formula. The percentage ratio declines as the population increases.

Municipalities apply for funding on a project-by-project basis. In some cases, funding can be provided for regional facilities (serving more than one municipality) where a regional concept is more cost-effective and environmentally sound than a stand-alone system. Regional water systems receive 10 percent more funding. Funding approval may also be allocated on a priority basis. Priorities ranked from highest to lowest include: health related improvements involving water treatment or water supply; environmental protection improvements related to wastewater treatment; system improvements related to safety, fire protection and operational improvements.

After approval of projects municipalities may be provided with an advance payment representing a portion of the estimated grant. The final payment on grants will be provided upon completion and verification of final project costs. Transportation and Infrastructure must be kept informed of project progress and must receive written notification by the municipality when the project is nearing approximately 80% of completion.

Regional water projects approved for funding in 2004, as of December 31, 2004, include the Clairmont Regional Water Line-Preliminary Engineering and Location Study and the Clairmont Regional Water Line.

## **12.2 Infrastructure Charge Fees**

### **12.2.1 Introduction**

Aquatera and the County of Grande Prairie No. 1 is considering charging a development levy to fund growth related water and sewer infrastructure for the development area surrounding Clairmont. The development infrastructure charges would be charged to all developments that require new or expanded water or sewer services. The development levy would be charged to the developer at the time that the development connects to an Aquatera water or sewer service. As a result Aquatera/County of Grande Prairie No. 1 would be required to front-end construction of water and sewer infrastructure facilities in the new growth area in anticipation of future development.

This section of the report considers the development of development infrastructure charge used to recover water and sewer infrastructure constructed by Aquatera/County of Grande Prairie No. 1 to support service growth. This report describes future growth areas, the infrastructure required to service these areas, the development levy required

to recover infrastructure investments as well as the impact of infrastructure front-ending on Aquatera/County of Grande Prairie No. 1.

### 12.2.2 New Growth Service Area

The development areas that benefit from new water and sewer infrastructure are 3,460.00 net ha. for the water development area and 3,351.78 net ha. for sewer development area.

Water infrastructure (distribution system and reservoir) will serve the water development area equally - all water infrastructure costs will be applied in equal fashion over entire water development area. Though we have identified 18 sub-areas all water development charges will be the same for each area. Sewer infrastructure (sanitary trunks, forcemains, and lift stations) provides differential benefit to various sub areas within the sewer development area - some sewer infrastructure will be applied to some development areas and not to others. For purpose of identifying this differential benefit we have divided the sewer development area into 24 sub-areas.

### 12.2.3 New Growth Service Area Land Use

Development within the new grow service areas can take various forms which will directly impact the demand for water and sewer services. The estimated future development will categorize all new grow service areas into residential, general industrial/commercial, heavy industrial, highway industrial/commercial and school site land use classifications. The following summarizes the land use classification for the water development areas. Land use classification of the water development area is summarized in Table B-1 in Appendix B attached.

<b>Classification</b>	<b>Water Development Area (ha.)</b>
Residential	1,338.90
School	5.11
General Industrial/Commercial	1,593.43
Heavy Industrial	118.00
Highway Industrial/Commercial	404.56
<b>Total</b>	<b>3,460.00</b>

### 12.2.4 Water Demand Factors

As previously stated differences in land use will results in variations in demand for water services. That is, a hectare of residential development will require different water and sewer service support than a hectare of highway industrial/commercial development. The following table outlines water and sewer demand factors for each land use classification defined earlier. The table considers water service demand based upon developments relationship to residential development water service demands. For example a hectare of residential development is provided with a water r demand factor of 1, while a hector of general industrial/commercial land development is considered equivalent residential development demand and a hectare of highway industrial/commercial development is considered to have 2.6 times the water service as a hectare of residential development.

<b>Classification</b>	<b>Water Demand Factor</b>
Residential	1.0
School	1.0
General Industrial/Commercial	1.0
Heavy Industrial	2.0
Highway Industrial/Commercial	2.6

### 12.2.5 New Growth Area Water Infrastructure

Table B-2 in Appendix B outlines water related infrastructure required to support growth in the new growth service area. Water infrastructure totalling \$42.2 M includes transmission lines, pump stations, and reservoir. As previously described all water infrastructure components have been treated as development area wide improvements.

### 12.2.6 New Growth Area Water Service Development Infrastructure Charges

Based upon the water development areas as defined, projected land uses, related service demand factors for water we have developed water development levies to recover growth area water infrastructure costs. The infrastructure charge rates have been developed assuming that all growth area water related infrastructure is recovered through the application of costs over a single collection basin - a single water infrastructure rate for each land use within the new growth area. Furthermore the water development infrastructure estimates assume that all areas as defined will be fully developed - that is no new growth area will remain undeveloped. Table B-3 in Appendix B outlines the water development infrastructure charges that are applicable for each development area. The rates for each land use are summarized as follows:

<b>Classification</b>	<b>Water Development Infrastructure Charges per Net ha.</b>
Residential	9,985.10
School	9,985.10
General Industrial/Commercial	9,985.10
Heavy Industrial	19,970.20
Highway Industrial/Commercial	25,961.26

It should be noted that the above rates are based upon immediate construction and full development of the area. If construction or development is staged over a number of future years front ending carrying costs will further add to the rates. In order to deal with front ending impacts we believe that water developments Infrastructure charges should be increased as follows:

<b>Classification</b>	<b>Water Development Infrastructure Charges per Net ha.</b>
Residential	12,500.00
School	12,500.00
General Industrial/Commercial	12,500.00
Heavy Industrial	25,000.00
Highway Industrial/Commercial	32,500.00

We will discuss the impact of variations in the timing of construction and development further in our

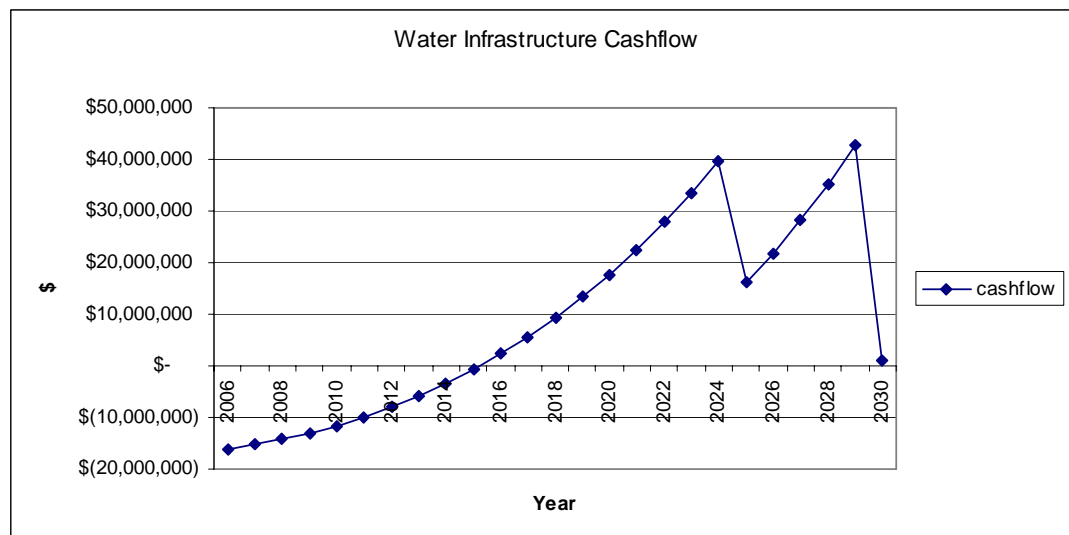
**12.2.7 Impact of Service Connection Rates on Aquatera**

We have considered the impact of front-ending construction and subsequently collecting service connection fees on Aquatera/County of Grande Prairie No. 1 finances. Front-ending growth related infrastructure can be onerous to a utility/municipality particularly when significant infrastructure must be front-ended and when related development recovery is slated to occur over a lengthy period. These circumstances appear to exist for the development areas in our study. In order to permit area growth significant infrastructure investment is required near immediately. Over a 5-year period, from 2006 to 2011, Aquatera/County of Grande Prairie No. 1 will make over \$16.6 M in water related infrastructure disbursements and \$35.5 M in sewer infrastructure disbursements (total \$52.1 M in water and sewer investments) to serve development in the new growth area.

In our analysis we have assumed that growth in the service area will be accomplished over a 30 -year period or approximately 115 ha. of development each year. Our analysis assumes that both water and sewer development infrastructure charges will be increased (inflated) by 5% per annum in order to keep pace with inflation on construction costs which are also projected to increase by 5% per annum.

Table B-4 in Appendix B provides a cash flow analysis of water related development charge receipts and infrastructure disbursements. The cash flow model also considers interest on cash / debt balances over the review period. Interest on fund balances is earned at 5% whereas interest on debt balances is paid at 7%.

As indicated in Table B-4, the early need to construction infrastructure results in an immediate fund deficit that must be front ended by Aquatera/County of Grande Prairie No. 1. As shown in the table, given assumed development rates this deficit should be recovered by 2016. After 2016 a surplus fund balance will be maintained, however, the outstanding balance is significantly depleted in 2030 due to construction of Zone 1 to Zone 3 watermain and other expansions related to Zone 3. At the conclusion of water infrastructure full buildout in 2030 a positive fund balance of \$1.2 M will result.



We have also considered the financial impact of water and sewer proceeds and disbursements jointly. The timing of expenditures of the two funds are at time complementary and reduce front ending impacts. Table B-5 shows the financial impacts of receipts and disbursements on a combined water/sewer basis. The largest magnitude of the overall front ending deficit occurs in 2010 at \$38.8 M.

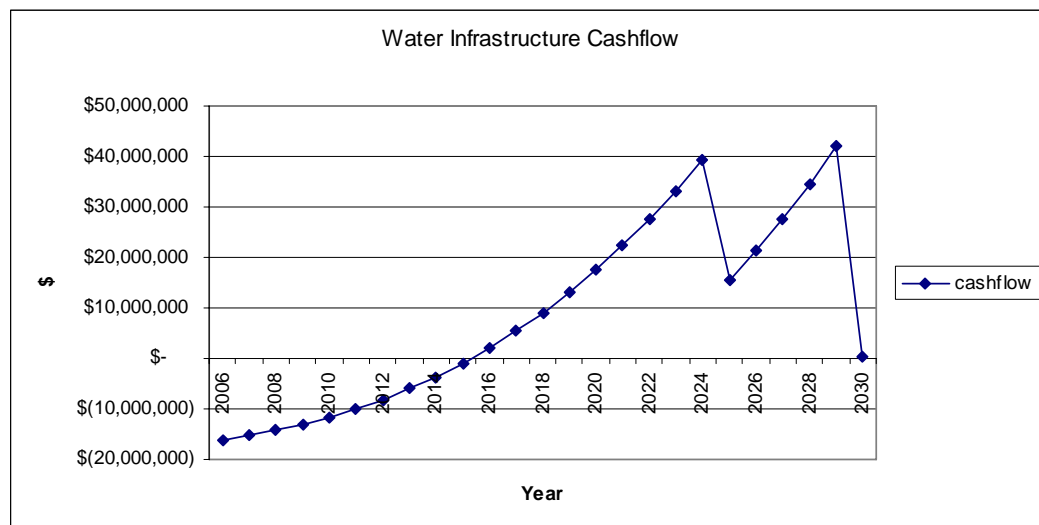
By the time development of the area has concluded in 2030, the fund will have amassed a surplus of \$59.1 M.

**12.2.8 Sensitivity Analysis of Development Infrastructure Charges**

During the course of our review we considered changes to various factors which might influence financial impacts on Aquatera/County of Grande Prairie No. 1. In this regard considered the impact of maintaining the timing of infrastructure construction and residential development but lengthening the time to fully development industrial sites from 2035 to 2045. The impact on water development charges is outlined in the table below.

Classification	Water Development Infrastructure Charges per Net ha.
Residential	15,000.00
School	15,000.00
General Industrial/Commercial	15,000.00
Heavy Industrial	30,000.00
Highway Industrial/Commercial	39,000.00

The following graph outlines the resulting front ending impact on Aquatera/County of Grande Prairie No. 1.



On a combined water and sewer basis the impact is very similar to that presented for a 30-year development horizon.

The year of breakeven was also further investigated for sensitivity. As illustrated in Table B-6 varying the breakeven year from 2015 - 2035 results in residential sewer

infrastructure charges from \$10,600/ha to \$13,000/ha respectively. Choosing a breakeven year requires balancing financial impacts by Aquatera/County of Grande Prairie No. 1 while providing affordable rates to accelerate future development.

### 12.2.9 Development Infrastructure Charges Rate Conclusion

As indicated earlier, front-ending development infrastructure can be onerous to a utility particularly where front-end investments are large and when infrastructure recovery is slated to occur over an extended period. It is our opinion that given regular rate increases to offset rising construction costs, the respective infrastructure charges presented in the below table will fully recover water infrastructure investments within the year 2016.

Breakeven in 2016 is based on water infrastructure buildout completion in 2030 and full residential and industrial development by 2035.

<b>Classification</b>	<b>Water Development Infrastructure Charges per Net ha.</b>
Residential	12,500.00
School	12,500.00
General Industrial/Commercial	12,500.00
Heavy Industrial	25,000.00
Highway Industrial/Commercial	32,500.00

It should be noted that the most significant infrastructure investments will occur in the 2030 time frame. This timing provides an opportunity to review development needs and the strength of development and determined whether these major investments should be incurred or deferred.

## 13.0 Best Practices Investigation

The purpose of this section is to provide Aquatera a summary of water system best practices obtained from a literature review to assist Aquatera in the formulation of the policy for the water system. A review of Aquatera's current practice is beyond the scope of work for this assignment.

### 13.1 Leading Utility Practices

Most efficient and effective organizations have adopted a continuous improvement strategy around their operations. A critical element of this improvement strategy is to gain traction from the experiences of other industry partners to identify and adopt leading industry practices.

Aquatera wants to ensure at the outset of its operation that the leading practices of other water and wastewater utilities have been considered. This section of the report outlines a number of leading practices that have been gathered through review of various Canadian and U.S. utilities, as well as management studies of utilities and similar industries. Topics include:

- Good Governance in Water Utilities
- Reducing the Impact of Variations in Financial Plans
- Adoption of Strategic Planning Framework
- Best Practices in Minimizing Water Loss
- Creating a Water Smart Community
- Lessons Learned from Walkerton
- Strategies for competitive advantage
- Best Practices for Maintenance Work Orders.

Each topic area is discussed more fully below.

### 13.2 Good Governance in Water Utilities

Good governance is about achieving the desired results in the right way. The importance of good governance is widely accepted yet in many utilities the principles of governance are not clearly articulated and the relationship between utility stakeholders is unclear. Good governance is characterized by a set of ranked principles that guide decision-making processes and management practices. Principles of good governance and the prioritization of each principle may vary between organizations and jurisdictions. As part of the Walkerton Inquiry, Justice O'Connor offered the following governance principles:

- Public safety is the paramount principle.
- Public accountability for decisions related to the water system.
- Effective exercise of owner's oversight responsibilities.
- Competence and effectiveness in the management and operation of the system.
- Full transparency in decision-making.

Some of the most frequently occurring good governance principles in water management include:

- Protection of public health and safety.
- Environmental protection.
- Accountability for stewardship and performance.
- Transparency.
- User participation.
- Balancing equity, efficiency and effectiveness in performance.
- Financial sustainability.

### **13.3 Reducing the Impact of Variations in Financial Plans**

The financial planning process for utilities, particularly water and wastewater utilities, can vary significantly from the actual results:

- Extremes in wet or dry weather can have a dramatic impact on residential and some commercial customers water consumption habits and utility revenues.
- Over heated development growth can expedite capital infrastructure plans.
- Regulatory changes can result in new infrastructure, rehabilitation or operational requirements.
- Capital project variances can result in unforeseen demands or surpluses.

The development and maintenance of various reserve funds can provide the continuity for these unpredicted events. Several reserve funds that should be considered by a Utility include:

- **Rate Stabilization Fund** – The rate stabilization fund is used to minimize the rate impact of extraordinary cost increases such as large increases in debt borrowings or related interest rates. Normally the rate stabilization fund is drawn upon when rate increase requirements exceed defined hurdle rate percentage. Typically rate stabilization funds are replenished, up to a defined limit, through an allocation of a part of any annual operating surpluses. Aggressive management and utilization of the fund permits development and adoption of long-range rate strategies and avoids the political tension associated with short range rate planning.
- **Operating Reserve Fund** – The operating reserve fund is used as a point of fall back for any years operating losses that may occur as a result of temporary customer consumption drops and the like. The fund is established and replenished when operating surpluses arise. The fund typically is set marginally greater than the largest history loss position providing support for a single catastrophic operating year and multiple years where operations are marginally below predictions.
- **Insurance Reserve Fund** – Most utilities are self-insured. This fund is used to pay for ordinary losses incurred through operations etc. that are a result of accident, theft and usual liability claims (Note extra-ordinary claims are usually covered through insurance held with private insurance companies). This fund is created and replenished through self applied insurance premiums levied annually as part of operating budgets. The fund is typically set according to long term claims history with reserve adjustments made through period review of the asset base being insured.
- **Renewal and Replacement Reserve** – This fund is established to replace and rehabilitate existing infrastructure when the asset has reached the end of its

useful life. The reserve is established and replenished through depreciation charges in the annual operating budget and through special requisitions to budget that recognize that replacement assets may have escalated from the time they were originally booked. Reserve funds are usually earmarked for use through the annual capital budget process. The creation and use of these funds are also important to the development and adoption of long range financial plans and rate strategies.

### 13.4 Adoption of a Strategic Planning Framework

A strategic planning framework involves establishing a set of linked cyclical management processes, which together form a planning, implementing and measurement tool set to satisfy both long term as well as short term needs. The following illustration shows typical strategic plan elements:



A strategic planning framework involves establishing a set of linked cyclical management processes, which together form a planning, implementing and measurement tool set to satisfy both long term as well as short term needs. The following illustration shows typical strategic plan elements.

### 13.5 Best Practices in Minimizing Water Loss

Water use and loss from the potable, water distribution systems are significant factors impacting the ultimate cost of water for a Utility. Best practices include concepts

developed by the International Water Association and the American Water Works Association regarding strategic elements required to allow for the proper creation of a water audit. The following are strategies to identify and help reduce water loss:

- Metering.
- Leak detection and repair.
- Water efficiency and conservation programs.
- Valve maintenance programs.
- Pressure management.
- Infrastructure renewal programs.
- Effective water rate pricing.
- Bylaw enforcement and system inspection programs.
- Establishing zone metering and district metered areas.
- Designing standards for construction methods and materials.
- A supervisory control and data acquisition system (SCADA).
- Night-time flow analysis.
- Distribution system modeling.
- Speed and quality of repairs.

### **13.6 Creating a Water Smart Community**

Community prosperity and well-being are directly dependent upon a sufficient supply of clean water. Management of freshwater resources to accommodate growing communities has traditionally focused on supply side projects. However the costs of obtaining and treating new sources of water have steadily risen making demand side option economically attractive. The following are some examples of best management practice strategies to utilize in striving for water efficiency:

- Introduction of conservation/efficiency rate structures.
- Reduction of system leaks.
- Wasting water bylaws.
- Landscape water use audits.
- Home and business audits and retrofit.
- Public education programs.
- Water efficient landscaping.

### **13.7 Lessons Learned from Walkerton**

This section is to apprise Aquatera of evolving drinking water safety standards, methods, policies and regulations and to reflect on how Aquatera might best position itself for potential future changes.

In the aftermath of the water-borne outbreak in Walkerton, the Government of Ontario established a public inquiry that was in part directed to recommend changes that would ensure the safety of drinking water in Ontario. In Ontario over 80% of residents are served by municipally owned water systems. The provision of water in Alberta is similar to that of Ontario. The most significant recommendations of the Walkerton report therefore are directed at municipal water system management and operation. The following is a synopsis of significant recommendations:

- **Promote Accountability** - One of the principle recommendations of the Walkerton report focuses the accountability for water system management and operation

within municipalities. In this regard it is recommended that the persons charged with management and operations of municipal water systems be held to a “statutory standard of care” for the safety of water, similar to the duty of a director of a corporation. In these instances the conduct or operation of the corporation is inseparable from its directors—and directors are liable for the actions or inaction of their corporation.

- **Mandatory Accreditation** - To address the need for quality management, the Walkerton report recommends mandatory accreditation. Accreditation will be designed to insure that municipalities have in place systems that will enable them to deliver safe water.

As a minimum all accredited municipal water providers in Ontario must have continuous inline monitoring of turbidity, disinfectant residual and pressure treatment at the treatment plant, together with alarms that signal immediately when any regulatory parameter is exceeded. In addition the disinfection residual should be continuously or frequently measured in the distribution system and where needed, automatic shutoff mechanisms should accompany alarms:

- **Operational Plans** - As part of the water quality management approach each municipality will be required to have an operational plan for its water system. As part of its operational plan, every municipal water provider would be responsible for developing an adequate sampling and continuous measurement plan. Sampling plans will provide sampling under conditions that are most challenging to the water system such as after heavy rainfalls or spring floods.
- **Emergency Response Plan** - A further essential element of operational planning will be the development of a generic emergency response plan including associated procedures, training and periodic testing of the emergency response plan.
- **Assessment of Management and Operating Staff Abilities** - Municipalities will be required to formally review the management and operating structure of their water system to ensure it is capable of providing safe drinking water. Mandatory certification will be required for individual operators, who must demonstrate their knowledge and experience by passing an examination. In Ontario the Minister of Environment has been charged with the development of an appropriate curriculum for operator training that specifically emphasizes water quality and safety issues.
- **Financial Plan** - The cost of regulatory compliance will be addressed before accreditation approvals will be granted. Municipalities will be required to submit a financial plan for their water systems as a condition of license for their water systems. As a general principle municipality’s plans must demonstrate that adequate financial resources for water systems can be derived from local revenue sources. Provincial agents will be required to refuse operating approval of water systems that are not economically viable to ensure water safety.
- **Customer Reports** – Water providers should also consider provision of customer reports on minimum, maximum and average value tests of E.coli, Cryptosporidium and Giardia in delivered water together with any exceedances of regulatory values specified by regulation in a reporting period. In this regard

bi-annual bill stuffers and public web sites are considered as appropriate information forums.

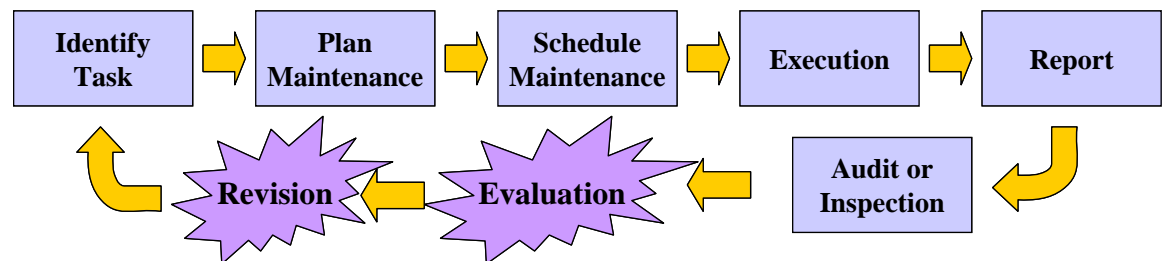
In light of the magnitude of changes that are required to take place it is envisioned that many municipal water system operations, particularly those in smaller or remote centers, will be unable to garner either the management and/or operational expertise, the water infrastructure and facilities and or the financial resources to support these. In this regard the Ontario government is advocating that municipalities consider different approaches to managing and operating water systems including rationalization or consolidation with other municipalities and contracting with external operating agencies.

### 13.8 Strategies for Competitive Advantage

Deregulation of the utility environment and with it the added pressures of opened market competition places greater and greater emphasis on those actions that can have immediate positive impact on the bottom line. The maintenance and reliability of utility operations is coming under minute scrutiny. Modern tools and systems have created maintenance and operational opportunities that were not possible in the past. The following is a listing and explanation of some of the identified maintenance “best practices” being used in the utility industry:

- **Benchmarking** – One tool used effectively today by many utilities is that of benchmarking. The process of benchmarking can take many forms. One method of benchmarking is to compare oneself to a single leading utility. Using indicative data from operations and maintenance differences are highlighted for potential opportunity. This approach also has the appeal of allowing key management and staff to visit the maintenance and operations of the benchmark utility to understand first hand cultural and environmental factors that play a vital role in achieving a highly efficient operation. Another approach is to use an outside firm to provide comparison data across many utility operations so that standards can be developed and anomalies from these standards highlight. This approach has the advantage of quickly highlighting quickly potential target areas:
  - **Work Flow Control** – Workflow control involves flow-charting, measurement, analysis and assessment and standardization of the steps involved in typical maintenance and operational activities. These activities might include what transpires in maintenance callouts for emergency items or routine maintenance activities like sewer flushing or hydrant testing.

A controlled maintenance work stream should involve the:



- Preventive Maintenance – Everyone has a preventative maintenance program however most programs are over burdened with wants versus needs. The result is that the preventative program may not be applied to the “right” facilities and infrastructure, preventative maintenance routines are not being fulfilled because of “higher priority” needs, preventative strategies have not be kept current and scheduled down time is viewed as intrusive rather than a planned outage. In most instances preventive maintenance routines have to be pared and non-effective tasks removed and other tasks added.
- Operations Responsibilities – Maintenance of operating equipment in a treatment plant etc. is an operating responsibility. The degree to which equipment or a facility is maintained is determined and approved by operations. The expertise and capabilities of the maintenance force and its management determine the quality and quantity of work performed. In many cases in today’s competitive market operators are used to perform basic maintenance tasks where skill is not a factor.
- Materials Management – The most efficient plants recognize that management of the materials used in the performance of maintenance is a definite best practice. Practice considerations include locating maintenance inventory relative to the work areas, spare part delivery schemes, vendor managed inventories etc.
- Diagnostics – Establish the use of diagnostics with follow-up corrective actions associated with prior notification of failure leads to improved reliability and bottom line performance.
- Training – Aging workforces, unaccustomed to change are finding their skills are deficient in providing the level of repair and diagnostics needed for today’s plant equipment.

### **13.9 Best Practices for Maintenance Work Orders**

There is an aversion to developing and using standard procedures for maintenance tasks. Arguments are presented that the workforce is mature, performing the same tasks for an number of years “successfully” and as such there is no compelling reason to have detailed procedures. However the inefficiencies that existing within and surrounding the every day maintenance work order offer many improvement opportunities. The following are some best practices surrounding maintenance work orders:

- The Risks and Benefits of an Aging Workforce – Most utility organizations have a very experienced maintenance workforce. This experience workforce does not required maintenance procedures or protocols to handle many of the utilities critical infrastructure, plant systems and equipment maintenance requirements. Because of this ready availability of experience and knowledge it is important that maintenance procedures and protocols be document and preserved now. Human resource studies have shown that a large knowledge drain will occur in the work place as baby boomers exit the workforce. Utilities are not immune from the experience drain and as such establishing robust maintenance procedures and methods now will lessen the impact of the loss of knowledge and experience that is occurring.

- Safety Considered On Every Work Order – Primary information required for every maintenance task or work order is the safety issues associated with completion of the task. Safety worksheets should be provided and linked to every work order to ensure that maintenance staff, regardless of experience level, fully understands how to accomplish the maintenance task in a safe manner.
- Linkage of Tools, Materials and Equipment on Every Work Order – Studies have shown that a typical maintenance worker only spends 24% of their workday performing maintenance work. A good portion residual time is spent waiting for or lost due as tools, materials and equipment is not readily available for the task at hand. Discussions with maintenance workers will highlight simple tasks that can be undertaken to dramatically improve productivity.
- Acceptance Criteria – Many work order procedures already define how and inspection should be performed as well as how to perform it safely the most commonly missing information however is an acceptable range of results that advises a maintenance worker when a task may not be required or when the job is functionally complete.
- Mean-time-to-repair – Maintenance work order descriptions should also include the standard hours the task typically requires to complete. This information is not only essential for effective task planning and scheduling but can assist workers to maintain pace or to document situations where abnormal maintenance efforts may be required.

## 14.0 Conclusions

The study has the following conclusions:

- Design criteria for three new types of land use including heavy industrial, general commercial and school were proposed. These new design criteria will enhance the design of the water distribution system and facilities. Other proposed new design criteria are for a trickle water system and population density.
- The water model developed for the study area was calibrated with hydrant flow tests and the results are within acceptable accuracy.
- The water demand calculated based on the design criteria is very high and unrealistic for the short term. The reduced water demand calculated using the assumptions as stated in Section 7.3.1 appears to be quite similar to the current water demand in the study area. Using the reduced water demand to determine the required volume of the reservoir and pumping facilities is therefore a more realistic approach for the short term.
- The existing water system will require improvements to accommodate future developments in the study area. Option 2B has the lowest construction cost. This option is to service the area north of Highway 43 from a new reservoir to be constructed in the reserve site in the West Clairmont subdivision and the area south of Highway 43 from the Zone 3 reservoir. The estimated implementation cost is \$42.2 million.
- The proposed improvements for the five year growth scenario for Option 2B consist of the following components:
  - Protect the right-of-way to allow construction of the transmission line from the regional waterline to the new reservoir in West Clairmont.
  - Construct a 4.5 ML reservoir in West Clairmont for the 10 year growth scenario.
  - Construct a 450 mm diameter water transmission line from the regional water transmission line to the new reservoir.
  - Install a new distribution pump with a capacity of 38 L/s and a head of 55 m in the new reservoir to service the Clairmont Heights subdivision through a 350 mm diameter water main.
  - Install a new distribution pump with a capacity of 376 L/s and a head of 33 m at the new reservoir to service the study area through a 400 mm diameter trunk water main.
  - Install water distribution mains as shown in Figure 10.2.1.
  - Install a new standby pump with a capacity of 95 L/s and a head of 55 m at the new reservoir.
  - Expand the existing Zone 3 reservoir with an additional capacity of 3.5 ML for the 10 year growth scenario.
  - Install 2,200 m of 450 mm diameter transmission line from the intersection of the regional transmission line to the new reservoir.
  - Install 400 m of 400 mm diameter water transmission line out from each of the Zone 3 and the new reservoir.

- Option 2A is only \$2.3 million higher than Option 2B and therefore Option 2A is also a viable option. The implementation of either Option 2A or 2B is at the discretion of Aquatera/County of Grande Prairie No. 1.
- Protect land and right-of-way for future infrastructure via the development process.
- The proposed system will provide a longer service to the study area if the actual demand is less than the projected demand. If the projected water demand is larger than the actual demand, upgrading of the proposed system will be required sooner. Monitoring of the water demand in the study area should be carried out to assess the schedule for future upgrading of the proposed water system.
- The construction of a 450 mm diameter transmission line from the Zone 2 reservoir to the Zone 3 reservoir is a viable interim servicing option. The transmission line can meet the water demand till 2014 based on the reduced water demand calculated on the assumptions stated in Section 7.3.1.
- The recently constructed 450 mm diameter regional water transmission line from the Zone 3 reservoir to the Hamlet of Clairmont reservoir can meet the water demand until 2016 based on the proposed pumping capacity of 243 L/s and the reduced water demand calculated on the assumptions stated in Section 7.3.1.
- The estimated implementation costs in the report were estimated based on normal ground condition and profiles obtained from a contour plan derived from aerial photographs. These cost estimates should be considered for budgeting purposes only. If a more accurate cost estimate is required, a preliminary design for the improvements should be carried out.
- The Master Plan is conceptual in nature and based on the best information available at the time of the study in 2005. As a result, a more detailed study may be required prior to the implementation of the recommendations.
- This Master Plan should be updated every 5 years in accordance with the new information and growth potential.

## **15.0 Recommendations**

The study has the following recommendations:

- Incorporate the recommended design criteria in the County's design standards.
- Determine the capacities of reservoirs for the next five years on the basis of a reduced water demand calculated on the assumption as stated in Section 7.3.1.
- Carry out further investigation on the feasibility of Option 2A to provide service beyond the study area prior to implementing either Option 2A or 2B.
- Construct a 450 mm diameter water transmission line from the Zone 2 reservoir to the Zone 3 reservoir as an interim water supply measure.
- Monitor the water demand for the study area to determine the schedule for upgrading of the proposed water system.
- Carry out a preliminary design for the proposed improvements to refine the cost estimates.