



City of Camrose

Administrative Report

To: Committee of the Whole Council Date: August 3, 2021

From: Manager of Engineering – Infrastructure & Planning

Re: Overview of City's Water Shortage Response Plan

RECOMMENDATION:

THAT City Council receive this report as information, and provide direction as needed for updates to the City's Water Shortage Response Plan.

BACKGROUND:

At the February 21/2017 Regular Council meeting, City Council adopted the Water Shortage Response Plan (WSRP, or the Plan) – to be a key planning tool for preparing the City and local and regional water customers for future water shortages due to drought or other unforeseen emergencies. A copy of the administrative report from that meeting, including the approved WSRP, is attached for reference purposes (see Appendix B).

The adoption of a WSRP was required as a condition in the City's most recent water diversion license (Approval ID #00404908-00-00). The development and implementation of a WSRP would allow the City to prepare users for times of water shortage. While the original intent of the Province's requirement on the City was to address long-term water shortages (i.e. when the amount of available water within Driedmeat Lake is low), the City modified the provincial template so that the Camrose WSRP would also address situations of short-term water shortage during times of extreme weather or when the City experiences issues at the water treatment plant or other related infrastructure.

The intent of the WSRP is to build on conservation initiatives already implemented by the City, and to introduce additional restrictions to help the City to reduce system water use, in order to navigate through the short-term or long-term water shortage. The WSRP is split into four distinct water conservation "stages". Through the City's Water Conservation / Water Use Bylaw (Bylaw 2494/06), the City Manager has authority to declare which stage the City of Camrose is currently in. The WSRP provides additional guidance to help the City Manager determine which stage the City should be in, as well as the restrictions that the City would impose on its users for each stage.

A more detailed summary of the restrictions imposed by the City can be found in Appendix A to this report, or in the full version of the Water Shortage Response Plan (included as part of Appendix B to this report). Generally speaking, the four water conservation stages are summarized as follows:

- Stage 1 – "Watch" stage
 - The City is typically in this stage of the Plan at most times throughout the year, except during times of pending or current water shortage.

- There are no mandatory restrictions associated with this stage of the Plan. Instead, users are encouraged to voluntarily conserve water, using some of the measures outlined in later stages as a guide.
- There are no enforcement activities associated with this stage of the Plan.
- Water use reduction target: 0% to 5% reduction in daily water use, as compared to historical demands (which is around 285 litres of water per person per day throughout the year, but typically much higher in the summer months).
- Stage 2 – “Warning” stage
 - This is the first stage where mandatory restrictions would be implemented. Stages 3 and 4 also include mandatory water restrictions.
 - Storage trigger: between 120 and 60 days of available storage in Driedmeat Lake. City may also implement this stage during times of short-term water shortages, such as when the City experiences mechanical issues with the water supply / treatment / pumping / transmission infrastructure, or during times of extreme hot weather when the City’s infrastructure cannot keep up with water demands.
 - Notable mandatory restrictions to outdoor water use include:
 - Watering of lawns to only the early morning (between 6am and 9am) or late evening (7pm to 11pm) hours of the day.
 - Certain exceptions exist for the watering of flowerbeds, vegetable gardens or newly-laid sod – this can be done still as long as a hose with a trigger shut-off nozzle is used. Watering using stored rainwater from a rain barrel or other storage device is also permitted.
 - Private washing of vehicles can only be done with a bucket and hand-held hose. No restrictions on washing vehicles at a commercial car wash at this stage.
 - Restrictions in this stage would also apply to the City (i.e. watering of lawns and sports fields, etc.), with no notable additional restrictions imposed on municipal operations.
 - Water use reduction target: 5% to 15% reduction in daily water use, as compared to historical demands.
- Stage 3 – “Critical” stage
 - Storage trigger: between 60 and 30 days of available storage in Driedmeat Lake.
 - Additional restrictions to outdoor water use include:
 - Watering of lawns prohibited, regardless of the time of day
 - Outdoor washing of cars prohibited
 - Washing of impervious surfaces prohibited (i.e. sidewalks, driveways, exteriors of buildings, etc.)
 - Recreational use of sprinklers / water toys / filling of swimming pools prohibited. This would also require the closure of the Camrose Spray Park.
 - Stage 3 restrictions would equally apply to municipal operations. Additional water restrictions imposed on municipal operations, such as suspending the annual Uni-Directional watermain Flushing (UDF) program provided that this would not create a public health or safety concern.
 - Water use reduction target: 15% to 25% reduction in daily water use, as compared to historical demands.
- Stage 4 – “Emergency Measures” stage
 - Storage trigger: less than 30 days of available storage in Driedmeat Lake.
 - All non-essential outdoor water use is prohibited, with restrictions imposed on non-essential indoor water use.

- The City Manager can implement additional emergency measures (such as specific restrictions for individual businesses), as determined on a situational basis.
- Water use reduction target: 25% to 33% reduction in daily water use, as compared to historical demands. The 33% target also aligns with the water diversion restrictions that the Province would impose on the City of Camrose during times of extreme water shortage within Driedmeat Lake, as outlined in the City's newest license (Approval ID #00404908-00-00).

Since its adoption in February 2017, Administration has been monitoring the short-term and long-term water availability for the City, particularly during the summer months, and has been implementing the Plan within the community. Since that time, the City has generally remained at Stage 1 in the Plan, with the following exceptions:

- In 2017, water availability was decreasing to the point that the Stage 2 threshold was reached. However, as this situation happened by mid-September when temperatures were already cooling off and outdoor water use was declining, the City Manager determined that there was limited value in moving into Stage 2 of the Plan.
- In August 2018, as a result of declining water levels within Driedmeat Lake, the City Manager authorized the City to move into Stage 2 of the WSRP. This declaration remained in effect until winter freeze-up.

Thanks to significant spring runoff as well as continued rains throughout the summer, the City remained at Stage 1 of the WSRP throughout all of 2019, and again throughout all of 2020.

Once again in 2021, Administration has been monitoring the availability of water for the City. Based on current conditions within Driedmeat Lake and the Battle River, Administration does not believe that there is a significant long-term risk to water availability at this time, as the amount of calculated storage is just under 200 days. In late June / early July, hot weather conditions resulted in a short-term risk related to water availability for the City, as the water treatment plant was actually producing water at levels above its theoretical maximum capacity. At that time, Administration chose to impose water restrictions on its own operations. However, the forecasted end to the hot daily temperatures prevented the need to impose mandatory restrictions on City or regional water users (i.e. a formal transition to Stages 2, 3 or 4 in the WSRP).

One of the planned activities for 2021 is an internal review of the Water Shortage Response Plan. As the existing Plan was adopted in early 2017, Administration feels that a minor review of the Plan is warranted. Additionally, Administration participated in a workshop in late 2019 (hosted by the Alberta Water Council, in partnership with the Province of Alberta) entitled "Building Resiliency to Multi-Year Drought". Through this workshop, municipalities and other agencies were encouraged to consider multi-year droughts when reviewing their major planning documents. There were many takeaways from the workshop that the City could consider when updating its WSRP.

As Administration plans to review the WSRP later this year, it would also be helpful for City Council members to identify topics or initiatives that Administration should consider investigating further. Input from other groups such as the Camrose Green Action Committee would also be helpful through this review.

MUNICIPAL DIRECTIVES:

- One of the focus areas of the City's 2018-2022 Strategic Plan is to "ensure long-term water sustainability". The activities related to the Water Shortage Response Plan supports a number of initiatives identified under this strategic focus area.
- The development and implementation of a water shortage response plan was a requirement of the City's most recent water diversion licence from the Province.

IMPLICATIONS OF RECOMMENDATION:

- Any feedback provided by Council members will help inform the planned review of the Water Shortage Response Plan.

ATTACHMENTS:

- Appendix A – Additional information regarding water restrictions that are imposed for Stages 1 through 4 of the Water Shortage Response Plan
- Appendix B – Copy of the Administrative report from the February 21/2017 Committee of the Whole Council meeting, including a copy of the current Water Shortage Response Plan

SUBMITTED BY:

Jeremy Enarson, P.Eng.
Manager of Engineering Services

Appendix A

Additional information regarding water restrictions that are imposed for Stages 1 through 4 of the Water Shortage Response Plan

In short, the four water conservation stages are summarized as follows:

- Stage 1 – “Watch” stage
 - The City is typically in this stage of the Plan at most times throughout the year, except during times of pending or current water shortage.
 - This is the only stage in the Plan that does not impose mandatory water restrictions on the community or the City’s regional partners. Instead, this stage is generally characterized as encouraging water users to voluntarily conserve water. This is accomplished through an ongoing advertising campaign using various forms of media (print media, online social media, etc.).
 - There are no enforcement activities associated with this stage of the Plan.
 - The target for this stage is to see a reduction in water use of between 0% and 5% as compared to historical demands (which is typically around 285 litres of water per person per day).
- Stage 2 – “Warning” stage
 - This is the first stage where mandatory water restrictions would be implemented by the City. Stages 3 and 4 would include mandatory water restrictions.
 - This stage would typically be implemented when the long-term forecast for water availability is between 120 and 60 days of storage, based on volume of water within Driedmeat Lake as well as flow rates within the Battle River. The City may also implement this stage in times of short-term water constraints, such as mechanical issues at the City’s water supply / treatment / pumping / conveyance infrastructure, or during times of extreme weather when the WTP cannot keep up with demands.
 - While this stage of the Plan does include some restrictions related to indoor water use, the majority of the restrictions associated with this stage impact outdoor water use. Some of the notable restrictions to outdoor water use include:
 - Watering of lawns to only the early morning (between 6am and 9am) or late evening (7pm to 11pm) hours of the day. When developing the WSRP, Administration considered other options such as implementing “even / odd” watering days, where residents or business owners would be restricted to watering of lawns depending on the address number of their property. However, the current option was selected for a couple of reasons: consistency in monitoring and enforcement within the community, allowing outdoor water use during times of greater evaporation, as well as research that showed that water use actually increased in some locations where the “even / odd” watering method was used.
 - Certain exceptions for watering of flowerbeds, vegetable gardens or newly-laid sod – this can be done still as long as a hose with a trigger shut-off nozzle is used. Watering using stored rainwater from a rain barrel or other storage device is also permitted.
 - Private washing of vehicles (i.e. not at a commercial car wash) can only be done with a bucket and hand-held hose.
 - Restrictions in this stage would apply equally to City operations (i.e. watering of lawns and sports fields, etc.).

- The target for this stage is to see a reduction in water use of between 5% and 15% as compared to historical demands.
- Stage 3 – “Critical” stage
 - This stage would typically be implemented when the long-term forecast for water availability is between 60 and 30 days of storage remaining within Driedmeat Lake.
 - In addition to the Stage 2 restrictions, this stage would see a number of additional restrictions to outdoor water use, including:
 - Watering of lawns not permitted, regardless of time of day
 - Outdoor washing of cars prohibited
 - Washing of impervious surfaces prohibited (i.e. sidewalks, driveways, exteriors of buildings, etc.)
 - Recreational use of sprinklers / water toys / filling of swimming pools prohibited. This would also include the shutting down of the Camrose Spray Park.
 - Any decorative fountains using potable water need to be turned off.
 - As before, there are certain exceptions permitted under this stage for the watering of flowerbeds, vegetable gardens or newly-laid sod. This can still be done as long as a hose with a trigger shut-off nozzle is used. As before, watering using stored rainwater from a rain barrel or other storage device is still permitted.
 - As with Stage 2 restrictions, the Stage 3 restrictions would equally apply to municipal operations. As well, the cleaning of municipal water pipes (i.e. through the Uni-Directional watermain Flushing or UDF program) would be stopped, except in circumstances where this restriction may pose a health or safety concern.
 - The target for this stage is to see a reduction in water use of between 15% and 25% as compared to historical demands.
- Stage 4 – “Emergency Measures” stage
 - This stage would be implemented when the long-term forecast for water availability is less than 30 days of storage remaining within Driedmeat Lake.
 - At this stage, all non-essential water use is prohibited:
 - No outdoor watering permitted
 - Indoor water use may also be restricted
 - Additional restrictions / measures to be reviewed for specific groups / activities, such as:
 - Commercial car washes
 - Market gardens, greenhouses
 - Golf course
 - Watering of lawns with new sod
 - In addition to the above, the City Manager would be able to implement additional emergency measures, as determined on a situational basis.
 - The target for this stage is to see a reduction in water use of between 25% and 33% as compared to historical demands.
 - Of note, the 33% target also aligns with the water diversion restrictions that the Province would impose on the City of Camrose during times of extreme water shortage within Driedmeat Lake, as outlined in the City’s newest license (Approval ID #00404908-00-00).

Appendix B
Copy of February 21/2017 Committee of the Whole Report
(includes a full copy of current Water Shortage Response Plan)



City of Camrose

Administrative Report

To: Mayor and Council Date: February 21, 2017

From: Director of Engineering – Infrastructure & Planning

Re: Adoption of Water Shortage Response Plan

RECOMMENDATION:

THAT City Council adopts the attached Water Shortage Response Plan as a key planning tool for preparing the City and its regional partners for future water shortages due to drought or other unforeseen emergencies.

BACKGROUND:

As part of the September 12/2016 Committee of the Whole Council agenda, Administration presented a copy of the City's draft Water Shortage Response Plan (WSRP). At that time, Committee members indicated their general support for the draft WSRP. Administration also indicated its plans to engage City residents and the City's regional partners (Village of Bittern Lake, Camrose County and Cargill) to seek feedback on the plan, after which the WSRP would be updated and brought back to Council for final review and adoption.

As indicated in the September 12th Committee report, a WSRP is meant to be a planning tool to guide the City as it prepares for periods of future water shortage. These water shortages may be short-term in nature, such as during unforeseen emergencies at the City's water treatment plant or major supply lines, or it could be long-term in nature, such as during a prolonged period of drought. A WSRP will help guide the City's actions with regard to monitoring various internal or external information sources (such as potable water reservoir levels, flow rates in the Battle River, or lake levels in Driedmeat Lake), how the City will inform its regional partners and City residents and businesses of the current water situation, and how the City would react during times of water shortage.

The development of a WSRP is also a requirement of the City's newest water diversion license from the Province (provided in the form of Preliminary Certificate #00183363-00-00). Once the WSRP has been finalized and approved by the Province, all outstanding conditions of the Preliminary Certificate will be satisfied, and the Province will issue a new diversion license to the City to support the City's mid-term growth needs (to a population of ~34,100), in addition to the water needs for the Cargill canola crushing facility.

A general overview of the draft WSRP was included in the September 12th Committee report. A copy of that report (without the original draft WSRP) is included as an attachment.

Following the presentation of the draft plan to Committee in September, Administration took a number of steps to seek input on the draft WSRP:

- A copy of the draft plan was placed on the City's website, along with various news flashes on the City's homepage to direct attention to the WSRP webpage
- A letter was sent to various City stakeholders, advising them of the draft WSRP and directing them to contact City staff for further information. Specific stakeholders that were contacted include: restaurants, hotels, car washes, the pipe plants, the hospital, Bethany Group and the Camrose Regional Exhibition.
- Individual contact was made with each of larger partners connected to the City's regional water system (Village of Bittern Lake, Camrose County and Cargill).

During this consultation process, no negative feedback was raised by internal or external stakeholders regarding the draft WSRP. Additionally, no comments were received at all from City stakeholders, and the City's regional partners either had no comment, or indicated their support to the draft WSRP. The draft WSRP was also recently reviewed with the Province to ensure consistency with the Province's expectations; no major concerns were flagged at that time.

A few minor updates have also been made to the draft WSRP. Those updates were mainly administrative in nature, such as:

- Updating information related to the City's toilet rebate program to reflect the 2016 year-end summary (total number of toilets replaced, and annual water saved through program – page 8 of the final document)
- Updating information related to the City's cast iron watermain replacement program (updated to reflect planned replacement of watermain on 48 Street within 2017 – capital project #127 – pages 9-10 of the final document)
- Minor spelling and/or formatting changes, as required

Administration is presenting the updated Water Shortage Response Plan to City Council for final review and adoption at this time.

MUNICIPAL DIRECTIVES:

- Preliminary Certificate #00183363-00-00 outlines the requirement for the City to develop a water operations plan (i.e. a water shortage response plan) as a prerequisite of the Province issuing a new water diversion license to the City.

IMPLICATIONS OF RECOMMENDATION:

- Pending adoption of the final Plan, Administration will incorporate this document into the City's various work processes.

- Administration also anticipates the need to update a few other policies and/or bylaws, including the City's Water Conservation / Water Use policy & bylaw (Bylaw #2494/06). The policy & bylaw, for instance, were developed by Administration in 2006 and were approved by City Council on June 26, 2006.

ATTACHMENTS:

- Copy of the updated Water Shortage Response Plan

- Copy of the original Administrative report from the September 12, 2016 Committee of the Whole Council meeting, minus original attachments

SUBMITTED BY:

Jeremy Enarson, P.Eng.
Director of Engineering



Water Shortage Response Plan

Prepared by:
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Camrose, AB
T4V 0S8

Prepared for:
Alberta Environment & Parks
Twin Atria Building #111
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Purpose and Scope of this Document

This municipal Water Shortage Response Plan [WSRP] was developed by the City of Camrose [the City] in order to determine the risks of water shortage as a result of increasing raw water usage by the City and its regional customers, and as a result of current or potential drought conditions. Water shortages are bound to occur, but sustainability during these times can be ensured by analyzing all possible strategies to mitigate the consequences, whether or not directly caused by the proposed extra activity. This WSRP will form the foundation of an action plan in order to provide a flexible framework to guide the City on drought prevention, drought mitigation, and drought response procedures. This action plan is proposed for normal yearly operations as well as for years with lower than average water supply, and will even be helpful in instances of unforeseen emergency circumstances that would cause a water shortage.

The components of the WSRP include:

- An assessment of the risks of water shortages,
- An evaluation of a variety of options to deal with water shortages based on how much extra water would potentially be required and how much it will cost, and
- A planned implementation schedule with triggering criteria, which shall be monitored for effectiveness. This implementation schedule will help the City minimize the adverse effects of drought on public health and safety, economic activity, environmental resources, and individual lifestyles during a drought event.

This WSRP includes the substance of the Alberta Environment and Sustainable Resource Development [AESRD, now renamed to Alberta Environment & Parks or AEP] guide, “Preparing Water Shortage Response Plans” and has adapted ideas and best practices from a number of different WSRPs and/or Drought Management documents. In addition to the “Preparing Water Shortage Response Plans” guide, acknowledgements are also given to:

- “2011 Water Shortage Response Plan.” City of Vancouver. 21 Feb. 2011. Web. Accessed on 14 Oct. 2014.
- “Alberta’s Agriculture Drought Risk Management Plan.” Government of Alberta- Policy, Strategy and Intergovernmental Affairs Division, May 2010. Web. Accessed on 14 July 2014.
- AMEC Earth & Environmental. “Municipal Drought Management Plan Guidance Document.” City of Shallow Creek, Northern Colorado Water Conservancy District, Aug. 2011. Web. Accessed on 14 July 2014.

- AMEC Earth & Environmental. "Sample of a Municipal Drought Management Plan." City of Shallow Creek, Northern Colorado Water Conservancy District, June 2011. Web. Accessed on 14 July 2014.
- Bruneau, Susanna. "Drought Adaptation and Management: Implementation Guidelines." Battle River Watershed Alliance, Sept. 2013. Web. Accessed on 14 July 2014.
- Bruneau, Susanna. "Drought Adaptation and Management: Policy Advice." Battle River Watershed Alliance, Sept. 2013. Web. Accessed on 14 July 2014.
- Bruneau, Susanna. "Understanding the Policy Context for Drought Management in the Battle River and Sounding Creek Watersheds." Battle River Watershed Alliance, 29 June 2013. Web. Accessed on 14 July 2014.
- "City of Santa Monica: Water Shortage Response Plan." Department of Public Works, Water Resources Division, 2009. Web. Accessed on 14 Oct. 2014.
- "Drought- Ready Communities: A Guide to Community Drought Preparedness." National Drought Mitigation Center et al. May 2011. Web. Accessed on 14 July 2014.
- "Water Management in Southern Alberta: Key Opportunities for Water Storage, Allocation, Flood and Drought Management." Alberta Society for Sustainable Water Management and Related Technologies, 1 March 2010. Web. Accessed on 14 Oct. 2014.

Information has also been taken from:

- The City of Camrose "Water Distribution System 2006 Master Plan Update". Prepared by Associated Engineering for the City of Camrose.
- City of Camrose "Make it Your Home" Brochure
- City of Camrose Proposed 1.6 million m³ Municipal Demand Increase Driedmeat Lake Water Supply Analysis. AESRD, Terry Chamulak, 23 Nov. 2012.
- City of Camrose Water Conservation / Water Use Policy. Adopted by City Council on 26 June 2006.
- City of Camrose Water Conservation / Water Use Bylaw #2494/06. Approved by City Council on 26 June 2006.
- City of Camrose Population Projections for 2011 to 2036. Prepared by b&a Planning Group, December 31, 2012.
- Municipal Census 2014
- www.cargill.ca
- www.battleriverwatershed.ca
- Canola Council of Canada, Agriculture and Agri-Food Canada. Web. Accessed on 18 Nov. 14.
- Correspondence from Alberta Environment, dated April 17, 1990. RE: "City of Camrose Water Supply"

- Correspondence from AESRD, dated June 14, 2013. RE: “Water Act Preliminary Certificate and Licence Conditions to divert an additional 1,580,000 cubic meters of water from Driedmeat Lake for Municipal and Commercial Purposes”
- Correspondence from AESRD, dated November 23, 2012. RE: “City of Camrose Proposed 1.6 million m³ Municipal Demand Increase Driedmeat Lake Water Supply Analysis”, prepared by Terry Chamulak, regional hydrologist

Background Summary

The City of Camrose is located on Highway 13, approximately 70 kilometers southeast of Edmonton. The City is a community of approximately 18,044 people and serves as a regional center to more than 100,000 people. The region has some of the richest farmland in western Canada and a robust economy that is based on agriculture, as well as industry, manufacturing, retail, health & medical services, and education.

The City of Camrose draws its water from Driedmeat Lake, which is a part of the Battle River watershed. A dam structure was installed by the Province at the downstream end of Driedmeat Lake in 1973 to stabilize the lake levels and provides water storage. This water storage was increased in 2009 when the Province upgraded the weir to provide 600mm of additional depth. The weir upgrade replaced an existing fish ladder to better allow aquatic species to migrate into the lake from downstream sections of the Battle River. The weir upgrade also included the installation of a “riparian gate” to allow the Province to better control the flow of water to the downstream environment and to downstream users.

The City’s water intake, intake pumping station, and collector well pumping station are used to screen out fish and weeds from the raw lake water and pump water to the water treatment plant. The City of Camrose recently constructed a new raw water pumping station, replacing an existing 50+ year old intake pumping station and 30+ year old collector well pumping station. The new raw water pump station was designed to deliver water directly to the City’s WTP, and was sized to accommodate both the City’s long-term water flow needs, as well as the industrial water needs of a newly constructed canola crushing facility as outlined further below. The new facility was commissioned in February 2016, and is now currently under the operational and maintenance control of the City.

The water treatment plant [WTP] was built and commissioned in 1987/1988, and a Granular Activated Carbon contactor facility was added in 2009 to help reduce organic carbon levels in the treated water. These facilities are located within the City limits at 3701 – 50 Street. There are three potable water storage reservoirs in the City: the first is on the WTP property and the

other two are located within Rudy Swanson Park (located at 5602 – 44 Avenue). There are also two main pumping stations and one booster station that are used to push potable water from reservoirs to the City distribution system, as well as to the City's regional partners.

Alberta is one of the major contributors to the canola industry, growing a substantial amount of the crop yearly. Between 2013 and 2015, a new canola crushing facility was built by Cargill Limited a few kilometers southeast of Camrose within E ½-24-46-20-W4. This facility was designed to receive canola from farms within a ~300 km radius, and is to process an estimated 850,000 tonnes of canola per year. The canola processing facilities transform harvested seeds into canola oil and livestock meal, which are then manufactured into a wide variety of products. Canola processing requires large amounts of raw water in order to wash seeds and extract the maximum amount of oil. The nearest feasible water source for the Cargill plant was determined to be Driedmeat Lake. Other water sources including groundwater were investigated and dismissed. As a result, the Cargill canola processing facility was designed to tie into the City's raw water supply line, bypassing the need to build an entirely new water intake system in the lake. The amount of water used by the Cargill facility each year is equivalent to approximately 3,460 people, based on the City's current raw water diversion rate of 340 litres per capita per day.

Municipal growth will also increase the City's overall water demands at Driedmeat Lake in the future. Treated water is provided to all of the City's 18,000+ residents, the non-local student population at the Augustana Campus of the University of Alberta (which is typically not included in municipal census data), and a number of regional customers including the Village of Bittern Lake, Camrose County's residential subdivision of Braim, and Camrose County's Hamlet of Ohaton. The City has agreements in place with each of these regional customers. The original agreements committed the City to providing a combined total of 70 million litres (ML) of water per year. The City's agreement with the Village of Bittern Lake was amended in 2005 to allow the Village to provide water to Camrose County's "Ervick" industrial subdivision. This amendment granted an additional 16 ML of water per year, but places restrictions as to the maximum flow rate and the times when water is permitted to be drawn for this industrial subdivision.

In late 2012, the City retained Brown and Associates Planning Group to update its municipal growth projections to the year 2036. As a result of that review, the City's municipal growth is expected to continue at an average rate of 2% per year, which is equivalent to approximately 400-600 new residents per year. The City population, including the base and non-local student population but not including regional customers or the equivalent population from Cargill's operations, is estimated to grow to ~30,000 people in 2036. Should the City's population grow

at levels lower than 2% per year, the timeframe to reach the 30,000 population threshold will extend beyond 2036.

The projected municipal growth, coupled with the canola processing facility's water requirements, brought to light the City's need for additional water to meet long-term water needs. In 2012, the City reinitiated discussions with the Province regarding an outstanding application from 2002 for additional water diversion from Driedmeat Lake. In 2013, the Province issued a new license to the City (in the form of Preliminary Certificate #00183363-00-00) which would allow the City to draw an additional 1,150,000 m³ of raw water annually for municipal water supply (urban and rural), plus an additional 430,000 m³ of raw water for Cargill's industrial needs. This combined allocation of 1,580,000 m³ annually would augment the City's existing water allocation of ~3,083,800 m³ of water annually (or ~3,084 dam³). The new license also identifies that the rate of diversion from the lake cannot exceed 0.3 cubic metres per second (m³/sec).

Prior to the new license coming into effect, the Preliminary Certificate identified a number of tasks that the City was required to complete. The first major task is an upgrade to the City's water intake and pumping station to supply water to the City & its regional partners in accordance with the new license. This upgrade was commenced in late 2014 and was completed in February 2016.

One of the other major tasks is the development of a water operations plan for the City. This water operations plan is to cover at least three main items:

1. A description of water management during normal and water short operations,
2. Monitoring and reporting programs, and
3. Contact information for the City of Camrose waterworks facility.

This Water Shortage Response Plan document is intended to serve as the City's "water operations plan" in accordance with the conditions of Preliminary Certificate #00183363-00-00.

Risk Assessment

As part of the City's assessment of the risk to its water supply, the City recognizes an existing study that was completed by the Province in 2012. The "Driedmeat Lake Water Supply Analysis" study, as completed by AEP regional hydrologist Terry Chamulak, used the Battle River Water Management Model and was completed in order to analyze the potential effects on Driedmeat Lake levels and outflow resulting from a 1,600,000 m³ (or 1,600 dam³) municipal demand increase.

As part of that study, a Base Case (BCV7) was simulated using the current City license of 3,084 dam³/year. Additionally, a future scenario (C1) was simulated using a 4,684 dam³ municipal demand. The difference between the two scenarios of 1,600 dam³/year corresponds approximately to the volume of water designated in the Preliminary Certificate #00183363-00-00 (the amount stated in the preliminary certificate is actually 1,580 dam³/year).

Both scenarios were modeled under the criteria of:

- Driedmeat Lake water level at 685.20m above mean sea level (ASL), which is the new Full Supply Level (FSL) for Driedmeat Lake
- In-stream flow criteria applied between FSL and a 684.27m Minimum Operating Level (MOL). This MOL corresponds to the elevation of the bottom of the fish ladder opening in the new weir structure on Driedmeat Lake (installed by the Province in 2009), as is located ~920mm (3 feet) below the elevation of the new weir structure (300mm or ~1 foot below the elevation of the “old” weir).
- Additional / new withdrawals from the lake would be permitted between April 1 and November 30 when flow rates in the Battle River equal or exceed 1.42 m³/s, and between December 1 and March 31 when flow rates in the Battle River equal or exceed 0.7 m³/s.

Using these criteria and other data, a weekly water level duration curve for Driedmeat Lake was created. Scenarios BCV7 and C1 exhibited similar water level trends, indicating that the proposed municipal demand increase has a negligible impact on water levels. The only time that lower levels were observed in Scenario C1 was during the 2001 to 2005 drought, but the water levels still did not drop below the minimum operating level of 684.27m.

In the conclusion section of the report, Mr. Chamulak notes that these modeling results “indicate that the proposed City of Camrose 1,600 dam³ municipal water demand increase will not measurably impact Driedmeat Lake’s water levels nor will there be any appreciable impact on the downstream flow regime” (Chamulak, 11). This does not mean that a water shortage will not occur, but suggests the additional water license will be sustainable, even during water shortages.

Ultimately, this study was a key factor in the Province issuing a new water license (in the form of a Preliminary Certificate) to the City. While the City recognizes the conclusion that the new license would be sustainable during water shortages, the City also recognizes that there still is some risk to water availability.

As outlined in the terms of the draft license to divert water (as described by Preliminary Certificate #00183363-00-00; license number yet to be assigned), the City would be restricted to the amount of water that it could divert from Driedmeat Lake. The draft license notes that this would only occur when the water level in Driedmeat Lake was at or below the MOL, and when the flow in the Battle River dropped below the 1.42 m³/sec and 0.7 m³/sec flow rates noted above. Should those conditions exist, then the City's diversion from Driedmeat Lake would be restricted to that of the City's "older" licenses (i.e. a maximum of ~3,084 dam³/year). This would represent a reduction roughly equivalent to 1/3rd of the combined licenses (3,084 dam³ plus 1,580 dam³).

The City would continue to be allowed to divert water from Driedmeat Lake even during a time of imposed water restrictions. However, it is possible that the rate of diversion would also be restricted by the Province; this is not currently identified within the draft license. If a proportional diversion rate reduction of 1/3rd was imposed by the Province, for instance, the maximum diversion rate might be reduced to 0.2 m³/sec or 200 litres per second (i.e. 2/3rds of the 0.3 m³/sec maximum diversion rate outlined in the draft license). For comparison purposes, the City's maximum diversion from Driedmeat Lake over recent history was 10.01 ML/day, which occurred on July 9th, 2014. As this is equivalent to 116 litres per second or 0.116 m³/sec, the City does not anticipate any concerns with a potential reduction to the diversion rate, particularly since the implementation of a water shortage response plan will also help the City reduce its diversion rates from Driedmeat Lake.

Current Water Operations Initiatives

The City of Camrose is conscientious of the need for water conservation, and has worked hard over the past few decades to increase water efficiency. These efforts demonstrate the City's commitment to water conservation. Some examples of the City's current and/or annual projects and initiatives include:

- "Be Wise with Water" campaign: actively promoting water conservation through public and classroom education, rebate programs (water conservation kits, toilet rebates), and local advertising.
 - By way of example, since the beginning of the Toilet Rebate Program, 1084 high volume toilets have been replaced with low-flow models (to the end of 2016). The City estimates that this has led to a savings of ~41,500 cubic metres of water annually.
- Performing water audits in residential and non-residential properties

- Starting in late 2012, the City has offered a new service of conducting water audits within homes or businesses. These audits are intended to document existing water-consuming devices within a facility (such as toilets, sinks, showers, wash bays, etc.), and provides the homeowner or business owner with a summary of our findings as well as recommendations for how the owner can reduce their water consumption.
- Uni-Directional Flushing (UDF) Program
 - The City cleans the inside of municipal watermains on a regular basis to remove accumulated biofilm growth and sediment. This improves the quality of water being delivered to the customer. This program isolates individual watermains to ensure that water is flushed through only one section at a time, resulting in higher velocities and less water used than what is seen through traditional watermain flushing programs. By continuing this program on an annual basis, the City has seen that initial turbidity readings are consistently getting better each year. This has led to shorter run times and less water used as compared to what was required during the earlier years of this program.
 - Through the UDF program, City crews also exercise each water valve within the City at least once every two years. Leaky or corroded valves are thus identified and fixed on a proactive basis, resulting in less risk of watermain breaks at corroded valves and less water being wasted.
- Water Treatment Plant Backwash Water re-use system
 - The rapid sand filters at the City's water treatment plant are backwashed on a regular basis to remove trapped contaminants and to ensure proper operation of the filters. This backwash water is non-potable and is held in a storage tank before being pumped directly to the sanitary sewer system. In 2010, the City installed transfer pumps in the backwash water holding tank to allow City crews to divert this non-potable water to City water trucks. This water can then be used by City departments for various non-potable purposes, including the watering of trees, flushing of sanitary sewers, dust control on roadways, etc. This initiative has greatly reduced the use of potable water for non-potable municipal purposes.
 - The City is currently investigating the potential benefits and liabilities associated with allowing private users to also access this non-potable water source.
- Cast iron watermain replacement program
 - Over the past 40 years, cast iron watermains have been systematically replaced with newer materials, drastically reducing the number of watermain breaks each year (from over 2,000 per year to less than 30 per year). As of the end of 2017,

the City anticipates that it will have only one block of cast iron watermain remaining within the City.

- Water metering
 - 100% of all businesses and residences in Camrose are metered. Studies have shown that municipalities with a high proportion of water meters have a lower water consumption rate per capita than municipalities with lower proportions of metered properties.
 - In 2015, the City completed a 7-year program to replace the existing water meters with modern “radio read” meters. By replacing the older water meters, the City has drastically reduced the risk of leaks within the water meter, which would result in unaccounted for (and unbilled) water usage.
 - The City has previously approved the purchase and installation of a truck-mounted meter reading system which will allow the City to measure flows on a more frequent basis. In the future, the new meters will be able to also allow the City to identify leaks within a home or business immediately.
- Consumption-based water & wastewater utility rates
 - Utility charges for water and wastewater are proportionate to the amount of water used, in addition to a flat charge per month for each account. Studies have shown that municipalities and private utility companies which charge for water on a per unit basis have a lower water consumption rate per capita than municipalities and utilities which charge their utility rate payers solely on a flat rate basis.
 - The water supply agreement between the City and Cargill establishes that water meters for the Cargill facility will be based on an “increasing block rate” structure, which charges higher rates for higher levels of water consumption.
 - In 2015, the City undertook a review of municipal water rates from across the Province to see what other rate structures are currently being used. In future years, the City is hoping to further investigate options for encouraging additional water conservation through a reworking of the City’s water rate structure. City Administration anticipates that this review will investigate other rate structure options such as “increasing block rates” or “seasonal block rates”, which are more effective at encouraging water conservation than even the existing water rate structure.
- Aquatic Center practices
 - At the City-owned and operated Aquatic Centre, the City uses older pre-treated and recycled pool water to maintain water levels in the hot tub instead of using new water.

- Water is recycled and treated in the facility to reduce the amount of wastewater produced and to reduce the amount of new water needed.
- In 2017, the City of Camrose initiated work related to the expansion of the Aquatic Centre. As part of this work, the existing Aquatic Centre will see an extensive upgrade which will also reduce water consumption within the facility.
- Watering of municipal sports fields
 - Wherever possible, the City's parks department restricts the watering of municipal sports fields to the early morning hours to reduce evaporative losses.
- Use of mulch for landscaped areas
 - The City's parks department uses recycled wood chippings as mulch within various planting beds and around the "wells" of newly planted trees to help retain moisture and reduce watering requirements.
 - The City is currently investigating the potential benefits and liabilities associated with allowing private users to also access the City's supply of mulch material for their own properties.
- Golf course irrigation
 - The City-owned & operated Camrose Golf Course currently uses only non-potable water for the irrigation of all of its fairways, tee boxes and greens. This is done through use of water stored within Mirror Lake (which is part of the Camrose Creek system running through the middle of the City), under license #00247786-00-01.
- Inspections
 - For all new property developments, the City installs or oversees the installation of new water and sewer services. This ensures that new services are properly installed, and reduces the possibility of water leaks and/or unwanted infiltration into the sanitary and storm systems.
 - The City also monitors the installation of new utilities and services by private contractors in all new subdivisions. This monitoring includes the review of 3rd party leakage testing on all installed infrastructure. Similar to what was noted above, this reduces the possibility of leaky or faulty infrastructure.
- Partnerships with organizations such as the Battle River Watershed Alliance (BWRA)
 - The BRWA is a community partnership working to sustain and improve the health of the Battle River Watershed. The BWRA runs multiple education and outreach activities, including educational workshops, field trips, and various contests for students of all ages. Recent research done by the BWRA includes drought management, source water protection, and water quality with respect to non-point source pollution management. They are also largely involved in

many riparian restoration projects. The City of Camrose is a founding member of the BRWA and continues to support the activities of the BRWA in various ways.

In addition to the initiatives noted above, there are two main governing documents that the City uses to help guide the City's efforts to water conservation. The "Water Conservation / Water Use Policy" and the "Water Conservation / Water Use Bylaw" were developed by City Administration and adopted by City Council in 2006. These documents outline the City's approach to dealing with water shortages, whether those shortages occur as a result of drought, infrastructure failures, unexpected failures of a major water system component resulting in a sudden shortage of water supply capabilities, or any other unpredictable event. In general terms, the bylaw & policy are set up on the basis of four distinct water conservation stages, and identify the restrictions imposed at each stage (with Stage 4 being the most restrictive).

The above water conservation programs and strategies establish a strong foundation for dealing with water shortages. This foundation allows the City to prepare for water shortages and minimize the adverse effects. In this WSRP, the City has further researched the improvement and/or addition of options for dealing with a water shortage.

Options that are being researched further for possible implementation include:

- Seek technical and financial assistance
- Water rights and cooperative agreements
- Enhancement of existing public education programs in proportional response to water shortages being experienced
- Reducing the frequency of hydrant flushing as water shortage stages progress, until the City's UDF program is stopped altogether.
- Restriction to water usage in restaurants, cafeterias, and other food-related businesses, as well as in hotels and other lodging services.
- Restrictions to ornamental non-recirculating fountains and outdoor watering
- Private and/or municipal swimming pool restrictions
- Expanding water audit program to commercial/industrial and residential users.
- Expanding restrictions to bulk water users and expanding use of filter backwash water at the City's water treatment plant.
- Encourage residents to utilize rain barrels to reduce outdoor water demand
- Encouraging the use of low-impact stormwater management techniques for new or existing developments, including xeriscaping and the use of hardy and native landscaping materials.
- Reuse of treated wastewater from the City's storage lagoons for non-potable purposes (watering trees, sanitary sewer flushing, etc.)

- Temporarily reducing the base output pressure set points of the City’s potable water pumping stations to reduce the overall operating pressure of the water distribution system. This would potentially reduce the volume of water used by City residents and businesses for any time-based uses such as showering, washing food or washing vehicles, as opposed to volume-based uses such as filling pots for cooking or filling batch reactors.
- Provide opportunities for community and stakeholder engagement regarding input and feedback on plans, and incorporating this input into future versions of this water shortage response plan and related plans.

Through each of the existing and proposed initiatives listed above, the City recognizes its corporate responsibility of “leading by example” to the citizens and businesses within Camrose, and seeks to be a model through its early and voluntary implementation of these initiatives.

Monitoring and Triggering

The City of Camrose recognizes that water shortages may exist for a number of reasons. While the most likely reason would be a water shortage due to extended periods of drought, operational emergencies such as mechanical failures at the City treatment or pumping facilities could result in immediate water shortages. While much of the following discussion is related to drought-related triggers, many of the same triggers can also assist the City with responding to sudden and/or short-term water shortages due to mechanical issues.

Through the use of monitoring programs, early warning signs of drought can be recognized in order to possibly reduce the negative effects of severe weather. The earlier severe weather can be predicted, the more time there is to prepare.

The City currently uses a variety of existing programs in order to monitor “water availability” within Driedmeat Lake and to predict severe weather that would drastically affect water supply. (The City has loosely defined “water availability” as the amount of remaining water that is stored in the lake, being situated above the pre-determined “minimum operating level” of the new weir of 684.28m ASL. Once the level of Driedmeat Lake drops to 684.27m or lower, the City’s permitted diversion from Driedmeat Lake may be restricted by the Province.)

The following are a few of the key monitoring programs that are currently being used by the City:

- Alberta Environment & Parks (AEP) records the elevation of Driedmeat Lake at the outfall of the lake (Water Survey of Canada Station #05FA020) every 15 minutes. This information is posted on the AEP website.
- AEP also records the flows of the Battle River at the Highway 21 crossing near Duhamel, just upstream of Driedmeat Lake (Water Survey of Canada Station #05FA011) every 15 minutes. This information is also available on the AEP website.
- AEP Water Supply Outlook provides monthly summaries for a variety of parameters, such as snowpack and precipitation
- The City monitors and records daily precipitation (rain and snow) at two locations within the City
- The City also monitors long-term weather forecasts for Camrose and the surrounding area
- The City measures how much raw water is pumped out of Driedmeat Lake
- The City continuously monitors the quality of raw water that is being pumped out of Driedmeat Lake, as well as the quality of potable water that is produced by the WTP
- The City continuously monitors the volume of potable water that is being stored in its various water reservoirs, as well as the condition / status of its various potable water pumping stations throughout the City.
- The City also monitors the amount of water used by its various regional customers (Village of Bittern Lake, Camrose County, and Cargill Limited)

The City uses the above monitoring programs, in part, to predict future water availability within Driedmeat Lake (as well as for various other municipal purposes). The City has used this information to develop specific triggering criteria which can be used to implement advanced conservation measures, depending on the anticipated water shortage that is occurring or that is expected to occur. By doing so, the City hopes to proactively reduce water consumption system-wide in order to stretch the remaining available water in Driedmeat Lake for as long as possible before provincially-imposed restrictions would be imposed (such as those identified in the Risk Assessment section above).

To assist with the City's decision-making process, City Administration has developed a MS Excel-based model to estimate the timeframe to when there will be no more "available water" within Driedmeat Lake. The model has been developed to account for a variety of "inputs" (mainly average precipitation in the area and the flows seen in the Battle River, upstream of the lake) and "outputs" (including City water diversion from the lake, average evaporative losses, and losses from the lake through both the fish ladder and the riparian gate, both located in the Driedmeat Lake weir structure). While this model is fairly simple in its structure, the model has proven to still be a valuable tool to estimate the number of days of available storage remaining in the lake.

The City’s model has been set up to identify a number of specific water storage scenarios. Listed in order from lowest risk to highest risk for the City, the scenarios are:

1. Where the amount of storage in the lake is predicted to increase
2. Where there is more than 120 days (4 months) of available storage remaining.
3. Where there is between 60 and 120 days (2 to 4 months) of available storage remaining.
4. Where there is between 30 and 60 days (1 to 2 months) of available storage remaining.
5. Where there is less than 30 days (1 month) of available storage remaining.

Since the spring of 2015 and on a weekly basis during non-winter months, City Administration reviews available data through the identified monitoring programs to estimate the current length and severity of potential water shortage conditions. These estimates are used by the City to identify what needs to be done in order to reduce the consequences of a current or potential water shortage. Specifically, the City can use this information to implement any of the four “stages” that were identified in the City’s Water Conservation / Water Use bylaw and policy. The following table identifies the current triggers being used by the City.

Table 1: Current Triggers and Management Actions

Trigger Point: Reservoir Storage (Days until “Available Storage” reaches zero)	Water Shortage Stage	Response Target: Water Use Reduction Goal (as %)
> 120 days	Stage 1 – Watch	0 to 5%
60 – 120 days	Stage 2 – Warning	5 to 15%
30 – 60 days	Stage 3 – Critical	15 to 25%
< 30 days*	Stage 4 – Emergency Measures	25 to 33%

*Note: once the amount of “available storage” drops reaches zero (0) days, the City’s diversion of water from Driedmeat Lake would be restricted. Whether the City’s diversion from the lake is actually restricted will depend primarily on the flow within the Battle River, as measured at the Water Survey of Canada Station #05FA011.

The water use reduction goals or target noted above would increase with each water shortage stage. The 33% water use reduction goal listed for Stage 4 (Emergency Measures) would allow the City to quickly adapt to any water diversion restrictions imposed by the Province (in accordance with the new license), as described in the Risk Assessment section above.

While the triggers noted in the above table focus on the anticipated number of days of available water storage in Driedmeat Lake, the more advanced management action “stages” may also be implemented in response to emergency operational issues that may arise from time to time.

Plan Implementation Schedule

For each of the four drought stages previously described, actions must be taken in order to reach the targeted percentage of water use reduction. The water use reduction and response strategies in Stage 1 through Stage 4 vary in scope and intensity. A variety of actions could be implemented by the City to help meet the targeted water use reductions. The following is a summary of the actions that are currently being considered by the City of Camrose. The following list is by no means meant to be exhaustive or conclusive, as it is the City's intent to monitor the plan for effectiveness, as will be explained later in this document.

Stage 1 Water Shortage - Watch

Storage Trigger: Greater than 120 days

Water Use Reduction Target: 0 to 5%

Anticipated Responses:

- Public water conservation education
 - The City will maintain an advertisement campaign in relation to methods for residences and businesses to conserve water. A public awareness campaign may include advisory of potential water shortage by news release, and education programs regarding water conservation measures.
- Continue with and develop/implement new incentive-based programs to encourage conservation of water
- Residents and businesses will be asked to voluntarily reduce outdoor water use
 - Only water lawns between the hours of 6 am to 9 am, and 7 pm to 11 pm
 - Do not wash impervious surfaces with pressurized water
 - Wash vehicles with buckets and sponges
- Request that businesses voluntarily reduce their water use including:
 - Restaurants and catering businesses will be asked to voluntarily restrict serving water with meals except at the customer's request
 - Lodging establishments will be asked to voluntarily reduce the frequency of changing of linens for guests staying more than one night, except for health and safety reasons.
- No specific restrictions imposed at the City's bulk water filling stations
- Regional customers will be notified of these measures and will be asked to participate on a voluntary basis or as required by their respective service agreements

Stage 2 Water Shortage - Warning

Storage Trigger: 60 to 120 days

Water Use Reduction Target: 5 to 15%

Anticipated Responses:

- Continue with public water conservation education

- Advertisements in the local newspapers, announcements on local radio stations and television.
- Outdoor water restrictions
 - Residents and businesses must restrict watering of lawns between 6 am to 9 am and from 7 pm to 11 pm.
 - Flowerbeds, vegetable gardens, and newly-laid sod may be watered at any time by hand provided that the water used has been drawn from a rain barrel or other storage device which has been filled solely from rain water, or a hose with a nozzle fitted with a trigger shut-off to restrict water flow.
 - Sprinklers and water toys may be used for recreational purposes by children as long as children are actively playing; includes pools of a capacity not more than 1,000 litres.
- Restaurants and catering businesses are asked to not automatically serve water with meals, but rather serve water when a customer requests it
- Lodging establishments are asked to not change sheets more often than every four days for the same guests, except for health and safety reasons. They will also be encouraged to place visible information in bathrooms regarding water conservation
- Vehicles can only be washed with bucket and hand held hose or at a commercial car wash
- Implementation and enforcement of fines for violating these restrictions
 - All consumers or persons are prohibited from wasting water. The Bylaw Officer or designate may take action under the Water Conservation / Water Use Bylaw if a consumer or person is found to be wasting water. In determining if an activity constitutes wasting water, consideration will be given to the following:
 - The volume of water reasonable required to perform the activity undertaken
 - The length of time that water has been allowed to run
 - The degree of control exercised over the flow of water
 - The purpose to which the water is being put
 - The stage of conservation on water consumption presently in place
 - The existence of any other factors reasonably suggesting that the wasting of water is occurring or has occurred
 - Special circumstances where the consumer or person can show to the satisfaction of the City that the use of water was necessary.
- Regional customers will be notified of these measures and will be required to participate as required by their respective service agreements.
- The City may also look at more extreme options such as lowering the normal operating pressure of the water distribution system to indirectly reduce the amount of water being used within homes and businesses.
- Contact the Province to advise them of the current water supply situation

Stage 3 Water Shortage - Critical

Storage Trigger: 30 to 60 days

Water Use Reduction Target: 15 to 25%

Anticipated Responses:

- Continue with public water conservation education
 - Advertisements in the local newspapers, announcements on local radio stations and television, and road signs placed in high traffic areas.
- Outdoor water restrictions
 - All outdoor and non-essential water use is prohibited. This includes:
 - Watering of lawns
 - Washing of cars
 - Washing of impervious surfaces (sidewalks, pads, exteriors of buildings, etc.)
 - Recreational use of sprinklers and water toys, as well as the filling of swimming pools. This includes the City of Camrose Spray Park.
 - Fountains using potable water
 - Cleaning of municipal water pipes (i.e. the Uni-Directional Flushing program), except in circumstances where this restriction would pose a health or safety concern.
 - Flowerbeds, vegetable gardens, and newly-laid sod may only be watered by hand, provided that the water used has been drawn from a rain barrel or other storage device which has been filled solely from rain water, or from a hose with a nozzle fitted with a trigger shut-off to restrict water flow. Unsupervised watering will not be permitted under any circumstance.
- Restaurants and catering businesses shall not automatically serve water with meals but may serve water when a customer requests it.
- Lodging establishments shall not change sheets more often than every four days for the same guests, except for health and safety reasons.
- Implementation and enforcement of fines for violating these restrictions
- Regional customers will be notified of these measures and will be required to participate as required by their respective service agreements.
- The City may also look at more extreme options such as lowering the normal operating pressure of the water distribution system to indirectly reduce the amount of water being used within homes and businesses.
- Contact the Province to advise them of the current water supply situation, and to start investigating options for potential technical and/or financial assistance

Stage 4 Water Shortage – Emergency Measures

Storage Trigger: Less than 30 days

Water Use Reduction Target: 25 to 33%

- Conditions that would lead to a Stage 4 Drought are highly unlikely. If this occurs, the City will implement a rationing program to ensure that consumers receive water for essential uses. Emergency measures will be required, to be determined on a situational basis by the City Manager.

Anticipated Responses:

- Continue with public water conservation education
 - Advertisements in the local newspapers, announcements on local radio stations and television, road signs placed in high traffic areas, and door to door campaigns.
- All non-essential water use is prohibited
 - No outdoor watering will be allowed, and indoor water use will be restricted.
- Bulk water sales will be allowed for residential use only.
- Implementation and enforcement of fines for violating these restrictions
- The policy measures will be reviewed in this stage for the following groups:
 - Businesses that depend on water to deliver a product or service, for example
 - Commercial car washes
 - Market gardens
 - Greenhouses
 - Commercial farm contractors
 - Golf course greens
 - Residential water necessities including lawns with new sod
- Regional customers will be notified of these measures and will be required to participate as required by their respective service agreements.
- The City may also look at more extreme options such as lowering the normal operating pressure of the water distribution system to indirectly reduce the amount of water being used within homes and businesses.
- Contact the Province to advise them of the current water supply situation, and to finalize options for potential technical and/or financial assistance

As part of the management actions for the more critical stages of drought, the City also recognizes that cooperation must occur between users of the Battle River watershed. The Province of Alberta uses a “First in Time, First in Right” system for the priority of water use. This system allocates water to a licensed users based on the user’s priority (or seniority): the earlier a license was granted, the greater its priority.

The City currently has three licenses with priorities of 1958, 1978, and 1982. Once the City has satisfied all conditions of the Preliminary Certificate #00183363-00-00, the City understands that its new license will have a priority of 2002. There are two major water users on the Battle River that have priorities more senior than the City’s original 1958 license. These belong to the Department of National Defense and Alberta Power (2000) Ltd., both of whom draw water directly from the Battle River. During periods of extreme water shortage, the City could consider entering into water sharing agreements with these and other users (in accordance

with Section 33 of the *Water Act*) to ensure the continued availability of water for Camrose and its regional customers.

- City of Camrose water licenses, drawing from Driedmeat Lake:
 - 1958-05-14-001 for 1,233,480 m³.
 - 1978-06-26-001 for 863,440 m³.
 - 1982-02-22-001 for 986,780 m³.
 - Preliminary Certificate #00183363-00-00 for 1,580,000 m³ (which would ultimately lead to a new license with priority 2002-02-20-002).
- Major notable water licenses along the Battle River or its tributaries include:
 - 1951-09-12-00 Department of National Defense (Municipal), which draws from the Battle River for 5,017,077 m³.
 - 1955-03-24-001 Alberta Power (2000) Ltd. (Commercial), which draws from the Battle River for 456,388,310 m³.
 - 1963-05-14-005 City of Wetaskiwin (Municipal), which draws from Coal Lake for 2,468,000 m³.
 - 1972-06-02-001 Enerplus Corporation (Industrial), which draws from the Battle River for 2,466,960 m³.
 - 1973-04-10-003 Alberta Environment and Sustainable Resource Development (Dewatering), which draws from Ribstone Creek for 1,019,691 m³.
 - 1976-08-27-001 Alberta Power Ltd. (Commercial), which draws from the Battle River for 234,373,900 m³.
 - 1979-11-60-01 Enerplus Corporation (Industrial), which draws from Coal Lake for 1,275,420 m³.
 - 1981-11-09-001 City of Wetaskiwin (Municipal), which draws from Coal Lake for 1,850,230 m³.
 - 1983-02-08-011 Ducks Unlimited Canada, Edmonton (Enhancement), which draws from Iron Creek for 1,255,194 m³.
 - 1985-02-22-006 Town of Wainwright (Municipal), which draws from the Battle River for 1,728,400 m³.
 - 1988-09-08-003 Ducks Unlimited Canada, Edmonton (Management), which draws from Nelson Creek for 1,253,218 m³.
 - 1993-04-28-001 Ducks Unlimited Canada, Edmonton (Enhancement), which draws from the Battle River for 1,596,735 m³.
 - 1993-05-12-001 Big Hay Lake Drainage District (Management), which draws from Big Hay Lake for 1,808,280 m³.
 - 2005-04-13-002 Alberta Environment and Sustainable Resource Development (Management), which draws from Driedmeat Lake for 1,150,000 m³.

Monitoring of Plan Effectiveness

This Water Shortage Response Plan is not a fully comprehensive document – it does not include every situation that could ever occur, nor does it include every possible drought mitigation measure or response. As time progresses and the needs of the Camrose water system grow and evolve, the current WSRP should be reviewed and updated to ensure that remains effective.

The following are some suggestions that the City might consider using to help with future evaluations of the WSRP:

- The conditions of the water supply system should be recorded.
 - This may include the drought indicator data such as reservoir levels, river flow rates, precipitation, etc., as well as demand side data such as water treatment plant production, water obtained from direct flow rights, storage amounts, etc.
- Document any key issues, challenges, and concerns that arose during:
 - Drought monitoring
 - Drought mitigation activities
 - Status of the mitigation related activities to date and other relevant factors (i.e. budget)
 - Implementation of each stage of the drought response program
 - The level of effort expended by the City on public education measures
 - Number of incentives distributed
 - Number of citations delivered to customers
 - Input from local health authority and other key stakeholders
 - Public perceptions and response to the drought
 - This may include documenting comments provided at public meetings or City Council meetings and any e-mails or letters sent to the City regarding the drought response.
 - Formal public surveys may also be used to gather public input depending on the magnitude of the drought and City budget available for the survey.
 - Track how favorably the public reacted to the selected mitigation or response strategy
 - Consider a review process of alternative means to engage the public
- Other items that may be of note:
 - Technical feasibility

- Is the selected mitigation or response strategy still technically feasible and will that mitigation or response strategy continue to work as intended?
- Are there any new mitigations or response strategies that could or should be added?
- Did implementation occur in a timely manner during each stage? How can it be improved for the next water shortage?
- Did the City have sufficient staffing resources available to implement each action?
- Perceived benefits
 - Did the selected mitigation or response strategy result in the desired reduction to water usage system-wide? Were there certain sectors of the community (i.e. residential, certain industries, etc.) which responded more effectively to the selected mitigation or response strategy?
 - How might the City amend the mitigation or response strategies based on the noted response?
- Cost effectiveness
 - What was the cost of implementing the selected mitigation or response strategy? This will require a consideration of all factors, including staff time, advertising, etc.
 - How do the implementation costs compare with the real or perceived benefits?
- Environmental sensitivity and other impacts
 - What were the environmental benefits/costs to implementing the mitigation and/or response strategy? The City will need to consider the benefits/costs for any new additions as well.
 - Are there any environmental issues or other impacts that should be further considered?

These suggestions provide a foundation to assess the effectiveness and practicality of the WSRP. The City shall continually assess and develop the WSRP to improve its effectiveness.

Finally, the City should schedule reviews of the WSRP on a regular basis. As a minimum, the current recommendation is that the WSRP would be reviewed after any major water shortage event (where the City initiates Stage 3 or Stage 4 of this plan) or every 5 years, whichever comes first.

Contact Information

As part of the requirements of Preliminary Certificate #00183363-00-00, a water operations plan (i.e. this Water Shortage Response Plan) is to include contact information for the City of Camrose waterworks facility. As there are a number of internal stakeholders affected by the WSRP document, the following is a list of all affected stakeholders.

- Engineering Services (author of this plan)
 - Key contact: Jeremy Enarson, Director of Engineering
 - Mailing address: 5204 – 50 Avenue, Camrose, AB, T4V 0S8
 - Physical address: 5204 – 50 Avenue, Camrose
 - Phone: 780-672-4428 (office)
 - E-mail: engineer@camrose.ca
- Public Works
 - Key contact: Sean Mascaluk, Superintendent of Utilities
 - Mailing address: as above
 - Physical address: 4204 – 51 Avenue, Camrose
 - Phone: 780-672-5513 (office)
 - E-mail: utilities@camrose.ca
- City of Camrose Water Treatment Plant
 - Key contact: Allan Baier, Senior Operator
 - Mailing address: as above
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City of Camrose

Administrative Report

To: Committee of the Whole Council Date: September 12, 2016
From: Director of Engineering – Infrastructure & Planning
Re: Review of Draft Water Shortage Response Plan

RECOMMENDATION:

THAT Committee provide initial feedback on the draft Water Shortage Response Plan.

BACKGROUND:

As part of the City's process of supplying raw water to Cargill for use in their canola crushing facility, the City needed to secure an additional water allocation from Driedmeat Lake (DML) from the Province. Working off of an older water diversion application from 2002, the City and Province resumed discussions in 2012 regarding the allocation of additional water from the lake.

In June 2013, these discussions resulted in the Province issuing a document known as a Preliminary Certificate. Somewhat akin to a promissory note, this Preliminary Certificate outlined a number of conditions that would need to be satisfied by the City, after which the Province would grant a new license to the City.

Currently, the City of Camrose is granted the authority to divert & use raw water from DML through three separate licenses. The total allocation of these three licenses is approximately 3,083,000 cubic metres per year. At current raw water diversion rates of 340 litres per capita per day (L/cap/day), the City's existing raw water licenses would support a combined municipal population (City and regional partners, but not including Cargill) of approximately 24,850 people. By comparison, Cargill's annual water needs are equal to an "equivalent population" of ~3,460 people based on the same consumption rates.

It should be noted that the City's efforts toward water conservation over the past number of years has resulted in an overall decrease to the City's average per capita diversion rates from DML. While the City's total water diversion from the lake has generally increased with municipal growth, the "per capita" diversion rate has generally remained constant over the past 20 years, and has actually decreased over the past 10 years. For example, after reaching a recent high point of ~375 L/cap/day in 2009, the City's raw water diversion from the lake has generally decreased each year and is currently sitting at ~340 L/cap/day based on 2015 records. Continued efforts toward water conservation are likely to result in a continued downward trend in per capita diversion rates, which would extend the population that can be supported by the City's existing (or expanded) licenses.

Municipal water consumption rates can vary significantly from one municipality to the next. One of the main differences between municipal per capita consumption rates is the amount and type of non-residential uses that might exist within a community. As non-residential uses (and

especially high-volume industrial or institutional uses) increase, the per capita water use generally increases. By way of example, Administration has attached an excerpt from a Metro Vancouver study reviewing water use for each of the municipalities in the greater Vancouver area. For the purpose of this report, however, the more pressing issue is not how Camrose compares to other municipalities, but rather how the City would reduce its overall water use during times of water shortage.

Once the City has satisfied the various conditions of the Preliminary Certificate, the Province will grant the City with a new (4th) license to divert raw water from DML. The total allocation of the new license would be 1,580,000 cubic metres per year, of which 430,000 cubic metres is specifically identified for use at the Cargill facility. (Up until now, Cargill's water use has been coming out of the City's existing licenses.) This would bring the City's total allocation up to 4,663,800 cubic metres per year, of which 4,233,800 cubic metres would be available for municipal (i.e. non-Cargill) uses. Based on current raw water diversion rates (340 L/cap/day), this additional allocation should allow the Camrose water system to support a municipal population of ~34,100 people (City and regional population), in addition to Cargill's raw water needs. The City's current and future water allocation are summarized in the following table:

	Total allocation	Municipal component	Cargill's component	Maximum supported population (based on 340 L / cap / day)
Current situation (existing 3 licences)	3,083,800 m3 per year	3,083,800 m3 per year	N/A (their water use comes out of the City's current allocation)	Approx. 24,850 people <u>less</u> ~3,460 people due to Cargill's water needs
Future situation (with 4 license in effect)	4,663,800 m3 per year	4,233,800 m3 per year	430,000 m3 per year	Approx. 34,100 people <u>in addition to</u> Cargill's water needs

One of the main conditions outlined in the Preliminary Certificate is for the City to provide the Province with a "Water Operations Plan" (also known as a "Water Shortage Response Plan"). This Plan can take on a variety of forms, but according to the Preliminary Certificate it must address at least three main items:

1. A description of water management during normal and water short operations,
2. Monitoring and reporting programs, and
3. Contact information for the City of Camrose waterworks facility.

To assist the City with developing this Plan, the Province provided the City with a guiding document called “Preparing Water Shortage Response Plans”. Administration used this guiding document and also implemented various ideas and best practices from a number of other water shortage response plans or similar reference materials from across North America.

As a result of the work of a number of City departments over the past three years, Administration is now providing Committee with a copy of the draft “Water Shortage Response Plan” for its review and input. A copy of this draft document has already been circulated to the Province to allow them to start their review process. Drafts have not yet been circulated to the City’s regional partners (Cargill, as well as the Village of Bittern Lake and Camrose County), although components of the document were developed in consultation with Cargill’s staff and engineers during the initial design stages of their canola crushing facility.

The following is a brief overview of the draft Plan. As noted above, the format follows the general direction outlined in the Provincial “Preparing Water Shortage Response Plan” document.

- Purpose and Scope, as well as Background Summary
 - These sections expand significantly on the information outlined above.
- Risk Assessment
 - This work was actually completed by the Province on the City’s behalf back in 2012. The Province’s work concluded that water shortages for the City may exist in the future, but that the additional water license would still be sustainable during those water shortages.
 - Under the terms of the draft license (outlined as part of the Preliminary Certificate), there is a possibility that restrictions would be applied to the newest water diversion license. The City’s older three licenses were issued by the Province in 1958, 1978 and 1982, and do not contain any provisions to restrict the rate or volume of water that the City could divert from DML.
- Current Water Operations Initiatives
 - This section provides an overview of a number of the City’s current projects and initiatives that support water conservation measures within the community.
 - This section also identifies the City’s work in 2006 to develop a water conservation / water use bylaw and policy. The later sections of the Plan build on the general outline of this bylaw & policy in that the Plan uses a 4-stage approach to water restrictions, with Stage 1 involving voluntary conservation and Stages 2 through 4 involving increasing levels of mandatory conservation measures.
 - This section concludes by confirming the City’s role to “lead by example” when it comes to water use and water conservation.
- Monitoring and Triggering
 - This section outlines how the City will monitor various internal and external resources to determine the level of risk that currently exists to the City’s newest license (once in effect). These resources include such things as monitoring short- and long-term weather forecasts, City and regional water usage, water quality within DML, etc.
 - However, the two main resources that are monitored by the City are those which would most directly trigger the higher implementation stages of the plan. Those resources include the water elevation in DML (as measured at a monitoring station located near the outfall of the lake), and the flow rate of the Battle River (as measured at a monitoring station located at the Highway 21 crossing near Duhamel). If the water level in DML reaches a certain elevation, and if the flow

rate in the Battle River drops below certain thresholds (those thresholds vary depending on the time of the year), then the City's newest license would effectively be "cut off".

- In the short term, restrictions on the newest license will likely not pose any significant risk to the City. But as the Camrose water system's service area continues to grow, it is anticipated that the frequency and impact of these mandatory water restrictions will become greater. Ultimately, as the total diversion from DML approaches the new allocation amount of 4,663,800 cubic metres per year, the restrictions would only allow the Camrose water system to withdraw water from DML equivalent to that which is permitted under the older three licenses (i.e. 3,083,000 cubic metres per year, which represents a water use reduction of as much as 33% once the newest license is in effect).
- To help the City estimate the risk of water availability and prepare for possible water restrictions from the Province, Administration has developed an in-house model to calculate the approximate length of time remaining before the Province would cut off the newest water license. Since the spring of 2015, and on a weekly basis during the non-winter months, Administration has been reviewing available data through the various monitoring programs to estimate the current length and severity of potential water shortage conditions. Weekly updates are provided to the City Manager, along with any recommendations to potentially move from Stage 1 to one of the higher stages of water conservation measures.
- It should be noted that while the Plan was largely developed to prepare for longer-term water shortages such as those seen during prolonged drought, the Plan can also be implemented in the event of an acute water emergency such as a major mechanical failure at the water treatment plant or one of the City's reservoirs or pump stations.
- Plan Implementation Schedule
 - This section outlines the various actions which may be implemented by the City at each stage in the Plan. Actions would range from voluntary water conservation measures in Stage 1, to various mandatory restrictions at the higher stages of the Plan.
 - This section also identifies that partnerships and/or agreements with other major water users within the Battle River watershed may be considered during periods of prolonged water shortage. This may include options such as entering into water sharing agreements with upstream or downstream users to ensure the continued availability of water for the Camrose water system.
- Monitoring for Plan Effectiveness
 - This section identifies the review process that should be followed to periodically update this document. As a minimum, this plan should be reviewed every 5 years, or after any major water shortage event.
- Contact information
 - This section provides the Province with contact information for various departments within the City.

As this is the first time that Committee members or the public has seen this document, Administration is only looking for initial feedback from Committee members at this time. Over the next few months, Administration is planning to invite feedback on the proposed Plan from affected stakeholders (mainly the City's regional partners, plus certain higher volume water users) as well as from the general public. This will involve a combination of general information posted on the City's website, as well as some individual contact with key stakeholders.

Administration currently hopes to bring the Water Shortage Response Plan with any required revisions back to City Council for final review and adoption before the end of 2016.

MUNICIPAL DIRECTIVES:

- Preliminary Certificate #00183363-00-00 outlines the requirement for the City to develop a water operations plan (i.e. a water shortage response plan) as a prerequisite of the Province issuing a new water diversion license to the City.

IMPLICATIONS OF RECOMMENDATION:

- Administration would welcome feedback on the attached draft Plan. Copies will also be circulated to the various regional partners for their input and feedback, and will be posted on the City's website for public review and input. Administration hopes to bring a finalized Plan back to a future Regular Council meeting sometime later this year for final review and adoption.

- Pending adoption of the final Plan, Administration anticipates the need to update a few other policies and/or bylaws, including the City's Water Conservation / Water Use policy & bylaw (Bylaw #2494/06). The policy & bylaw, for instance, were developed by Administration in 2006 and were approved by City Council on June 26, 2006.

ATTACHMENTS:

- Copy of the draft Water Shortage Response Plan
- Graph showing total vs. per capita water diversion from Driedmeat Lake, 1990 to 2015
- Excerpt from Metro Vancouver study, "2013 Water Consumption Statistics Report"

SUBMITTED BY:

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