CITY OF WINKLER
DROUGHT MANAGEMENT & WATER SUPPLY PLAN

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Contents

1 Drought Plan Review 4
1.1 Introduction 4
1.2 Background 4
1.3 Purpose 4
1.4 Scope 5
1.5 Living Document 6
1.6 Plan Structure 7
1.7 PVWC Membership and Structure 7
1.8 Drought Plan Elements 7
1.8.1 Provincial Drought Management Strategy 7
1.8.2 Drought Management Plan Study 7
1.8.3 Engagement Process 7
1.9 Key Principles of the PVWC Drought Preparedness Plan 9
2 Drought Planning Considerations 10
2.1 Types of Drought 10
2.2 Climate Change 11
2.3 Winkler Characteristics 12
2.3.1 Population Growth 12
2.4 Water Licensing 13
2.4.1 Sources of Water 14
2.4.2 Infrastructure 14
3 Winkler Drought Plan 15
3.1 Drought Stages 15
3.1.1 Normal (Green) Stage 15
3.1.2 Moderate (Blue) Stage 15
3.1.3 Severe (Yellow) Stage 16
3.1.4 Extreme (Red) Stage 16
3.1.5 Water Shortages 16
3.1.6 Drought Stages and Level of Preparedness 16
3.2 Monitoring 18
3.2.1 Provincial Monitoring 18
3.2.2 Winkler Monitoring 20
3.2.3 PVWC Raw Water Source 20

3.2.4 Potable Supply & Storage Capacity 21
3.2.5 Consumption 22
3.2.6 Improved Data & Statistics 22
3.2.7 Collect and Analyze Detailed Data 23
3.2.8 Perform Water Audit to Identify System Weakness and Losses 24
3.3 Mitigation 24
3.3.1 Education 24
3.3.2 Monitoring Improvements 25
3.3.3 Conservation and Use Reduction 25
3.3.4 Infrastructure 26
3.3.5 Additional Water Sources 26
3.4 Preparedness 27
3.4.1 Emergency Plan Up to Date 27
3.4.2 Hazard Analysis 27
3.4.3 Water Conservation 27
3.4.4 Identify Emergency Sources of Water 28
3.4.5 Training and Development 28
3.4.6 Establish Criteria for Evaluating Proposed New Users and Uses 29
3.4.7 Participate in PVWC Drought Committee 29
3.5 Response 31
3.5.1 Overview 31
3.5.2 Drought Response 31
3.6 Recovery 40
4 Reference 40
4.1 List of Figures 40
4.2 List of Tables 41

1 Drought Plan Review

1.1 Introduction

Drought and water shortages are a concern for the City of Winkler, as it is for the Pembina Valley Water Co-Op (PVWC). As PVWC was developed due to water supply stressors in the 1980's and early 1990`s, it is reasonable for drought to be expected and planned for. Not only is a drought possible, added pressure on water supplies from continued development in the region will continue to amplify these pressures, along with a changing climate (World Resource Institute: Current climate models predict that summers will be longer and hotter, with less precipitation occurring during the summer and more during the fall, winter, and spring. Overall annual precipitation levels are not expected to change significantly over the 2020-2050s and 2050-2080s time periods ([1] Canadian Climate Atlas Report: Morden).

Drought conditions develop slowly, over weeks, months and even years. This is quite different from other "emergency events" such as flooding and severe weather. Drought is a natural hazard caused by a shortage of water resulting in the direct effects of both human and environmental wellbeing, for a given period, for any location where natural or managed water systems fail to meet the typical water demand for human and environmental uses. ([2] Manitoba's Drought Management Strategy)

1.2 Background

The City of Winkler developed a public water system, commissioning the original water treatment plant in 1963, with an expansion completed in 1981. A new reverse osmosis plant was constructed and commissioned in 2011, replacing the previous lime/soda ash treatment plant. Winkler joined the PVWC as a founding member in 1998 along with thirteen (13) other members, communities, and municipalities. The City of Winkler obtains raw water from the Winkler Aquifer via 10 active production wells. The wells were developed from 1981 to 2016 and range in depth from 19.8 to 76.2 meters. The Winkler Aquifer provides approximately 65-70% of Winkler's potable water.

The City of Winkler provides potable water to over 14,000 (13,745 2021 Census) customers through more than 4600 service connections. Bulk water service is provided at 275 George Avenue Reservoir. The city provides potable water to Rosebrook Trailer Park in the R.M. of Stanley and at times, Boundary Trails Health Centre, Schanzenfeld, and other parts of the R.M. of Stanley and the R.M. of Rhineland when called on by PVWC for support.

1.3 Purpose

The ultimate objective of the Drought Management & Water Supply Plan (Plan) is to provide Winkler with direction prior to and during drought conditions and to provide longer term guidance to mitigate the impacts of drought (Figure 1). Working closely with PVWC the Plan will address drought events both in proactive and reactive approaches offering direction for all aspects of drought planning throughout the following drought stages:

Like the PVWC Drought Plan, the following five elements are essential to Winkler's Drought Plan:

- **Drought Monitoring** involves utilizing primary and secondary data regarding water supply levels, treatment capacity, and Winkler Aquifer information. Monitoring and collecting data happen through all stages of drought planning.
- **Drought Mitigation** involves proactive action and planning to reduce the long-term risks and potential impacts of drought events by identifying principal activities and possible susceptibilities and developing mitigation actions and programs to reduce these vulnerabilities to drought.
- **Drought Preparedness** refers to the directed policies, plans, and actions which must be implemented prior to a drought event occurring to increase forecasting accuracy, ensure the Plan is fully implementable, and fully prepared to respond during a drought event.
- **Drought Response** encompasses the actions taken during a drought event to reduce its immediate impacts on environment or society through enactive temporary adjustments to normal practices until normal climatic conditions return. Drought response also includes the communication process used to convey information internally and externally.
- **Drought Recovery** is the process of returning operations to a normal state when a drought event has dissipated to restore or improve pre-drought conditions and working to further mitigate the impacts of any future drought events.

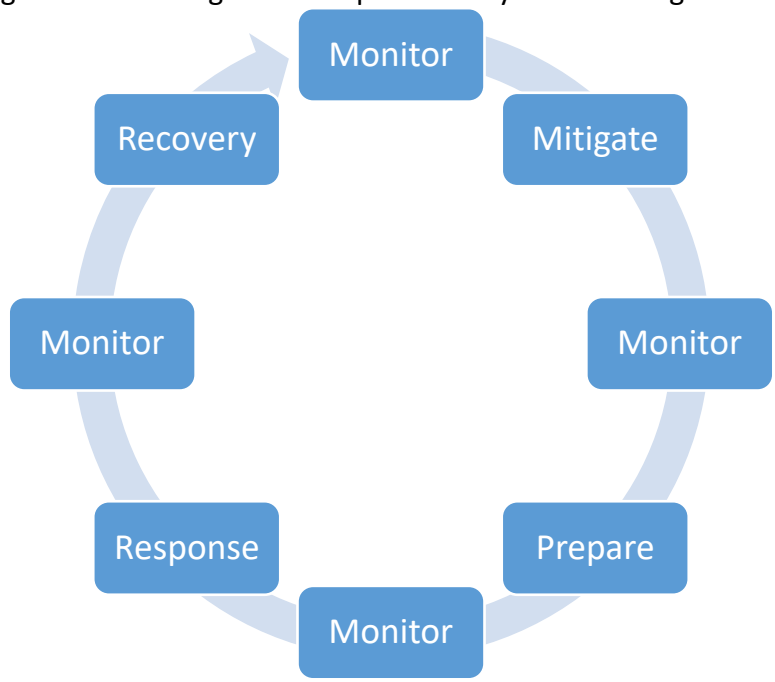


Figure 1 Drought Management

1.4 Scope

The scope of the Plan applies to Winkler as a water utility and its intention is to set the framework of the five (5) key components to the Plan mentioned in Section 1.3.

The intension of the Plan is to adhere to and complement PVWC's Drought Plan and all relevant Provincial Acts and Policies. Winkler's Plan will govern itself, though Winkler as a member of PVWC will collaborate and cooperate in all drought planning efforts. Winkler

will have a representative participate on the PVWC Drought Committee who will work closely with PVWC on joint mitigation and preparedness items.

Winkler's Plan implementation is to complement and accompany the municipal emergency plan as adopted by the Southern Emergency Response Committee (SERC), relevant Provincial Acts, and Regulations.

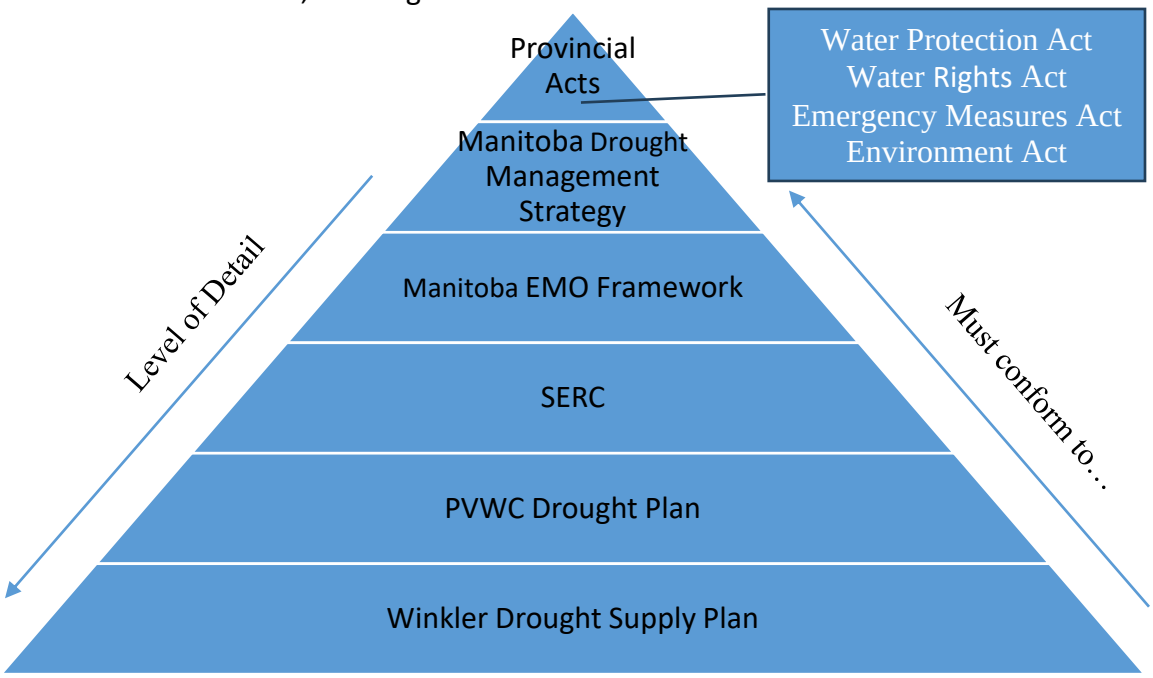


Figure 2: Hierarchy of Drought-Related Policies/Guidelines

The Winkler Drought Supply Plan is intended to compliment and accompany the municipal emergency plans which are adopted by all municipalities in Manitoba and this plan contains several recommended updates to the emergency plans that should be considered for adoption (Figure 2). This Plan, however, does not govern the province, or other members of the PVWC, and the stated roles and responsibilities for the departments contained within this Plan could change.

1.5 Living Document

Winkler's Plan is a living document and as such, the City of Winkler will review and update in collaboration and cooperation with PVWC's Drought Pan. Additionally, the city, after each drought event will check the Plan for effectiveness and performance which should include at a minimum the following:

1. What lessons learned during the drought event.
2. Were reduction targets achievable?
3. Were reduction measures sufficient?
4. What parts of the Plan were effective & successful?
5. What parts of the Plan were missing, or need further attention?
6. What parts of the Plan do the City & PVWC need to add?
7. What parts of the Plan do the City & PVWC need to remove?

Based on a debriefing of post drought conditions, City & PVWC will communicate updates or improvements to plan and to the SERC.

1.6 Plan Structure

This plan is structured in a manner that provides the background to the planning and general drought planning elements in Section 1 Drought Plan Overview, and Section 2 Drought Planning Considerations.

Section 3 serves as the action and response plan for consultation in preparation for and during declared drought events.

1.7 PVWC Membership and Structure

The Winkler Aquifer provides approximately 65-70% of Winkler's potable water and PVWC provides the remaining 30-35%. Winkler purchases about 10% of PVWC's total supply for distribution and as a member of PVWC has an agreement to purchase 338,700 m^3 annually until December 2028. One of the key factors leading to the formation of the PVWC was the risk of drought in the Pembina Valley region. Winkler has identified drought as a concern which may pose a threat and as a result has continually encouraged conservation and sought efficiencies throughout the system. Winkler continues to pursue infrastructure improvements and explore alternative water sources as a means of building system resilience.

1.8 Drought Plan Elements

1.8.1 Provincial Drought Management Strategy

The Province of Manitoba's Drought Management Strategy sets the framework and action strategies for an integrated approach to minimize the impacts of drought on Manitoba's people, economy, and environmental resources. The strategy provides historical background on droughts in Manitoba, measuring and declaring droughts, committee formation, response actions and mitigation strategies. The Strategy's formal process for declaring and responding to a drought event which is carried through to the PVWC Drought Management Plan Study and is largely adopted within this Plan.

1.8.2 Drought Management Plan Study

The origins of the Winkler Drought Supply Plan lie with the PVWC Drought Management Plan Study. The Study was completed by Associated Engineering (AE) in May 2018 and serves as a background study to this Plan. The Study contains a detailed engineering analysis of PVWC infrastructure, drought vulnerability and summary of the Province of Manitoba's Drought Management Study.

1.8.3 Engagement Process

On November 1, 2017, as part of the PVWC master planning process, AE hosted a stakeholder workshop for PVWC members. As part of this workshop members were provided with an update on the Province's Drought Management Strategy and a group exercise was conducted to raise awareness of drought issues and identify current gaps in drought response. This background exercise established that Winkler and PVWC's Customers have identified drought as a potential threat to their water security that must be planned for, both in terms of preparedness and mitigation.

In summer of 2018 Landmark Planning & Design began working with the PVWC and their Customers to build off the PVWC Drought Management Plan Study, which was prepared by AE, and roll it forward into an implementable plan.

Landmark Planning & Design undertook a comprehensive approach to crafting the PVWC Drought Plan grounded in thorough review of resources and a robust member engagement program. Crafting this Plan involved working with PVWC Customer representatives to find common interests and goals in how to prepare for, mitigate the impacts of, and respond to drought events in southern Manitoba. A key component of the project was to find shared interests to help identify priorities which to help safeguard Winkler's and the PVWC's water system and ensure needs are met in drought situations. The Winkler Drought Supply Plan is ultimately informed by, and fits within, the Province's Manitoba Drought Management Strategy to provide guidance for Winkler at the local level. Furthermore, the M60 Manual of Water Supply Practices: Drought Preparedness and Response will help frame the process and eventual Plan to be adopted by the Winkler.[1]

To facilitate the transition from "Study" to "Plan" in an organized fashion, Landmark Planning and the PVWC established a Drought Plan Working Group consisting of 7 representatives from the PVWC membership consisting of a mix of elected officials and operations-based representatives including public works officials, CAOs and others whose roles include a working knowledge of relevant issues. Key representatives from Provincial departments including Manitoba Sustainable Development and Manitoba Emergency Measures Organization (EMO) were consulted at the beginning of the project and participated in the Working Group.

Landmark Planning & Design facilitated three Drought Plan Working Group sessions to refine the content of the PVWC Drought Management Plan Study into an action plan. The dates and summaries of the sessions were:

- August 28th, 2018 – Introduction and project implementation
- September 18th, 2018 – Drought planning and response workshop
- October 15th, 2018 – Draft plan workshop

Finally, an event was conducted on November 19th with representatives (elected and administrative) from PVWC Customers. The November 19th event served as an opportunity for the PVWC Management to present their draft Plan and had three key goals:

1. To receive input into the Plan from PVWC Customers (members and non-members).
2. To gain joint involvement in the PVWC Drought Committee and Drought Plan Working Group to pursue the preparedness, mitigation, and implementation of the Plan; and
3. To ensure Customers have a local drought plan in place by 2020 to align with the Local Authorities Emergency Planning and Preparedness Regulation for continuity requirements.

The Drought Plan Working Group is intended to play a key role in the implementation component of this Plan, working with PVWC on preparedness (see Section 3.4) in the first 6-12 months after the Plan is adopted.

[1] American Water Works Association. 2011. Drought Preparedness and Response: Manual of Water Supply Practices (M60).

1.9 Key Principles of the PVWC Drought Preparedness Plan

The following Key Principles for the Plan were proposed within the PVWC Drought Management Plan Study (see Section 1.8.2) and were refined and adopted during the Working Group sessions (see Section 1.8.3). The Key Principles guiding this Plan are as follows:

1. The Plan must be fair and equitable to members and customers:
    - PVWC water allocation when demand exceeds supply shall be by percentage based on past usage (average of highest three (3) to 5-years, based on yearly billings)
    - There is no seniority or priority for the PVWC Members versus non-member customers.
    - There is no geographic seniority for the PVWC Members: being closer to supply does not have precedence over farther from supply.
2. Winkler will act to manage demands based on the percent of water used:
    - Implement programs to reduce demand or eliminate demand activities.
    - Conserve and manage demand of water on an ongoing basis.
    - New customers or additional demand from existing customers considered in consultation with PVWC.
3. The success of the Plan is based on cooperation, common goals, and communication:
    - Cooperation with Provincial and Municipal Governments.
    - Active participation in PVWC Drought Committee.
    - Preparation and implementation of the Winkler Drought Supply Plan compatible with the PVWC Drought Plan.
    - Regional system focus:
        - Share infrastructure operations, maintenance, and optimization.
        - Share information on system status.
        - Share information on plant treatment components including the following:
            - Treatment plant capacity and production
            - Reservoir capacity and levels
            - Distribution pressures (average and minimum).
            - Free chlorine residuals (average, maximum, and minimum)
4. Prudent investment and management
    - Strive to invest, operate, and plan so the complete system is in ‘High’ drought preparedness.
    - The system is currently a combination of ‘Low’ to ‘Medium’ preparedness. Section 2.1
    - Keep water rates competitive.
    - Pursue grants and funding from higher levels of government for upgrades and capital projects.
    - Prioritize demand management.
    - Improve and maintain system resiliency.
    - Manage system with asset-management based best practices.

- Seek system-wide optimization.
- Provide reliable water service.

5. Education and Awareness
   - Educate customers on the importance of water conservation, drought planning and the role of PVWC and Winkler as the water provider.
6. Comply with Acts and Regulations
   - Provide potable water that meets or is better than the Guidelines for Canadian Drinking Water Quality.

2 Drought Planning Considerations

Drought is a potential threat in most geographic areas of the world. Water is the source of life and prosperity, and droughts present risks to communities in three ways:

- **Economic** – Impacts on industry, recreation and tourism, agricultural production, energy production, reduced cash-flow for water utilities.
- **Ecological** – loss of wetland, impact on fisheries and wildlife, drawdown of wells and aquifers, reduced soil quality, dust, and fire risk; and
- **Social** – health implications, quality of life, community aesthetics, and in some cases, conflict.

There are several key characteristics which make planning for drought a vital exercise for Winkler, including a changing climate, the historic and projected growth of the community, and available water sources. In addition to the droughts mentioned below, other events, such as a treatment plant or distribution failure could create a water shortage in which this Plan may need to be implemented. This Section provides insight into these factors.

2.1 Type of Drought

Droughts begin due in large part to a lack of precipitation over an extended period. The severity of a drought is determined by the geography, duration, and intensity of the drought conditions. There are different classifications of drought based on the observed hydro-meteorological conditions as well as impacts to society, and the environment. The *Manitoba Drought Management Strategy* defines the types of droughts as follows.[2]

Meteorological Drought is generally defined by comparing the rainfall in a particular place and at a particular time with the average rainfall for that place. Meteorological drought leads to a depletion of soil moisture, and this almost always has an impact on agricultural production. Meteorological drought only refers to the reduction in precipitation amount and does not consider the effects of the lack of precipitation on water levels and flows, human needs, or agriculture. A meteorological drought can occur without immediately impacting streamflow, groundwater, or human needs. If a meteorological drought continues, it will eventually begin to affect water resources.

Agricultural Drought occurs when there is not enough water available for a particular crop to grow at a particular time. Agricultural drought depends on the amount of rainfall, prevailing soil moisture conditions, evaporation, and transpiration, among other factors.

[2] Province of Manitoba, 2016, Manitoba Drought Management Strategy

An important aspect of agricultural drought is the changing vulnerability of crops to moisture shortages during the different stages of their development. Agricultural droughts are typically detected after meteorological drought but before a hydrological drought.

Hydrological Drought is associated with the effect of low rainfall on water levels in rivers, reservoirs, lakes, and aquifers. Hydrological droughts are usually noticed some time after meteorological droughts. First, precipitation decreases and after some time, water levels in rivers and lakes drop. Hydrological drought affects uses that depend on water levels. Changes in water levels affect ecosystems, hydroelectric power generation, and recreational, industrial, and urban water use. A minor drought may affect small streams causing low stream-flows or drying. A major drought could affect surface storage, lakes and reservoirs thereby affecting water quality and causing municipal and agricultural water supply problems.

Rainfall recharges aquifers through infiltration and contributes run-off into streams and rivers. Once groundwater and surface waters are significantly affected by lack of precipitation, a hydrologic drought occurs. Aquifer declines occur naturally and the effects of a lack of recharge can be rapid in shallow aquifers or may extend over several years if recharge is lacking. A decline in water levels may impact shallow wells and farm dugouts and contribute to changes to ground water quality.

Socioeconomic Drought occurs when the supply fails to meet the demand for an economic good(s) such as domestic water supplies, hay/forage, food grains, fish, and hydroelectric power, due to weather related water supply shortages from one or both of natural and/or managed water systems. At any time during hydrological or agricultural droughts, a socioeconomic drought can occur.

2.2 Climate Change

The Intergovernmental Panel on Climate Change (IPCC) recently published their fifth assessment report (IPCC, 2014), indicating with very high confidence that global warming is very likely to lead to more frequent heat events, low-snow years, and daily precipitation extremes over most of North America. These climate stresses may result in more frequent and intense droughts, which will compound with the natural multi-decadal wet-dry cycle observed in historical records. Several studies assessing how climate change will affect the occurrence of drought events across the Canadian Prairies echo the findings of the IPCC, suggesting there is strong potential for the occurrence of more regular and persistent droughts, with greater severity than those observed over the 20th century (Bonsal et al., 2012).

As a part of the Prairie Regional Adaption Collaborative, Manitoba Conservation and Water Stewardship in collaboration with Manitoba Agriculture, Food and Rural Development and Manitoba Infrastructure and Transportation undertook two preliminary studies on the Assiniboine River and the Icelandic River watersheds in southern Manitoba.

The study on the Assiniboine River Basin assessed the impact on water supply and demand with and without climate change (Manitoba Conservation and Water Stewardship and GENIVAR, 2012). Temperature and precipitation data from a regional climate model were analyzed for the time horizons of the 2020s, 2050s and 2080s. Due

to scope limitations, multiple combinations of climate models and emission scenarios were not able to be assessed and as such, the results do not account for the range in climate change related uncertainties. Results from this study projected increased temperature and seasonal variations in precipitation changes. Reduced summer precipitation, coupled with increased temperatures resulted in the potential for increased summer droughts. The water demand portion of the study indicated increases in water demand, with greater uncertainty further into the future. The study demonstrates the need for continued water supply and demand management on the Assiniboine River and the importance of long-term planning to account for future uncertainty.

The anticipated impacts of climate change on future drought events further reinforce the need for a drought management strategy for Manitoba. To account for uncertainty in projections and spatial variation of impacts throughout Manitoba, more comprehensive studies on the long-term impacts of climate change on water supply and demand are required. These studies should not be constrained within the provincial boundary of Manitoba but should also consider the upstream jurisdictions which contribute waters to Manitoba.[3]

2.3 Winkler Characteristics

2.3.1 Population Growth

Population projections for the City of Winkler are based on historical records, and Statistics Canada – 2021 Census. The population projection for the city is based on the 2021 census population of 13,745 (Statistics Canada, 2021) and an estimated annual growth rate of 2.5% with an expected population projection in 2046 of 25,480 (Figure 3). This continued robust growth requires planning, not only for drought events, but also for continued supply into the future.

To supply a population of 25,000, Winkler continues to explore supply options, technology advancements, and per capita consumption reductions. Average daily residential per capita use for 2019 in Canada is 215 L/p/d (Statistics Canada 2021-08-17), in comparison; Winkler's average residential per capital use is extremely low at 134 L/p/d in 2019, 127 L/p/d in 2022. The actions and principles these are also key to the planning and implementation of an effective drought plan.

[3] Province of Manitoba, 2016, Manitoba Drought Management Strategy

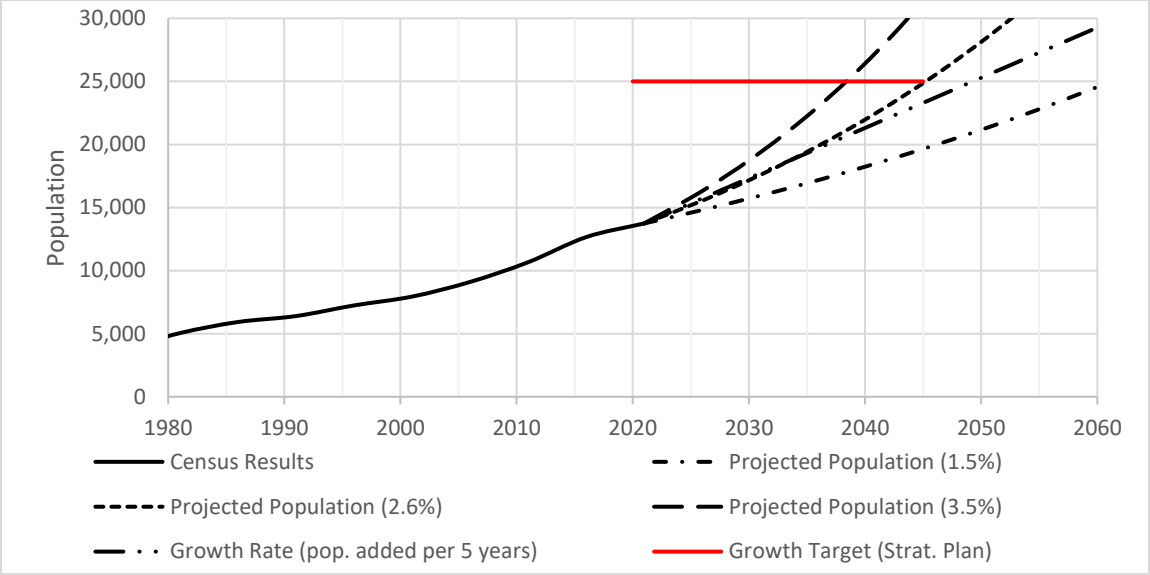


Figure 3 Winkler Historical and Projected Population Growth

2.4 Water Licensing

The City of Winkler holds a water use licence to withdraw water from the Winkler Aquifer for municipal purposes in accordance with the provisions of *The Water Rights Act* and Regulations. The licence permits an annual withdrawal of fresh water up to 493.4 cubic decameters and an annual withdrawal of brackish water up to 863.3 cubic decameters. A total withdrawal of 1356.7 cubic decameters annually (Figure 4), the current licence will be renewed in 2027.

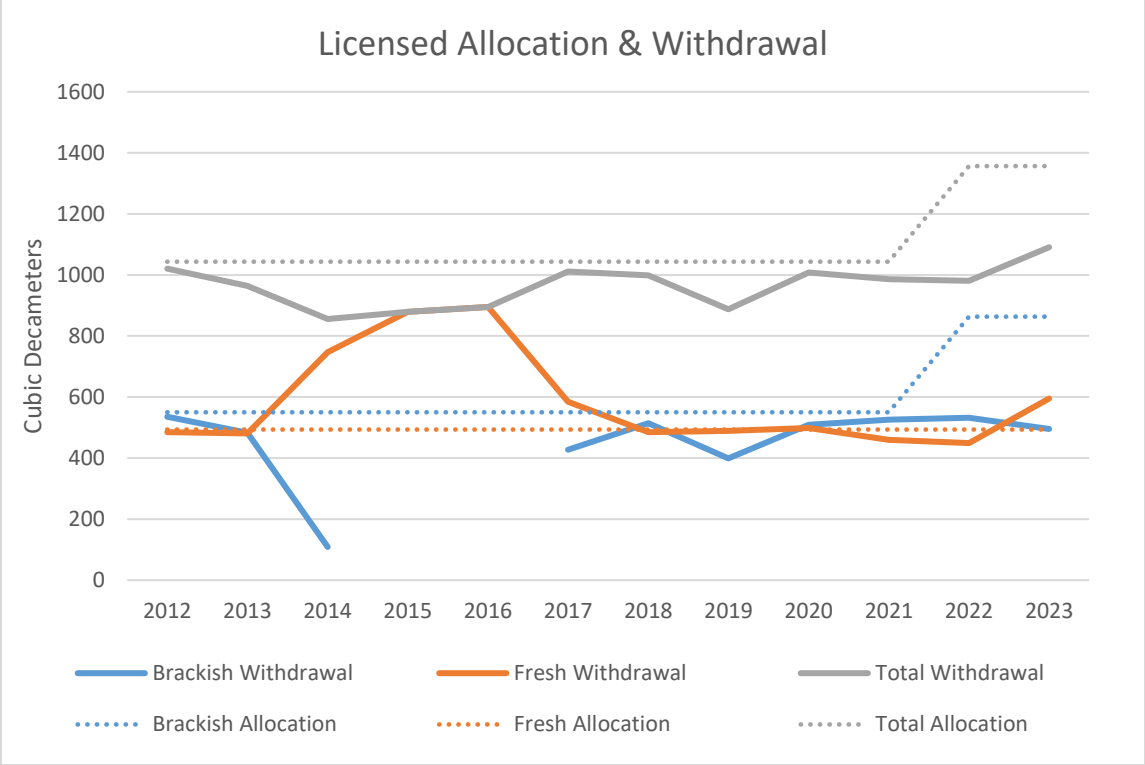


Figure 4 Winkler Aquifer Licensed Allocation and Withdrawal

2.4.1 Sources of Water

Winkler has two (2) sources of water, the Winkler Aquifer supplies 65-70% of Winkler's potable needs and PVWC provides the remaining 30-35%. Winkler's raw water comes from the Winkler Aquifer, PVWC's raw water is supplied from the Red River and Stephenfield Lake and treated at their water plants in Morris, Letellier, and Stephenfield. The Winkler Aquifer, Red River, and Stephenfield Lake have all been identified as being vulnerable to drought events.

2.4.2 Infrastructure

The PVWC Drought Management Plan Study provides an analysis of the PVWC infrastructure and grades each main component according to a level of preparedness. The analysis by Associated Engineering found that, as of 2017, the key components of PVWC infrastructure have preparedness levels ranging between "Low" and "Medium". Winkler has done a similar analysis and found its preparedness levels also between "Low" and "Medium". More information on preparedness levels is discussed in Section 3.1.6.

Infrastructure Preparedness Levels		
Facility	**Preparedness Level**	**Comments**
Winkler WTP/ Distribution	**Medium**	• Water source vulnerable to drought • Brackish allocation increased 2022 • Emergency power available at wells 9, 10, 12, & 16, WTP, George Ave reservoir, and lift stations. • Plant capacity does not meet current/future peak demands until plant expansion is complete. • Limited plant redundancy until plant expansion is complete. • Aging & undersized equipment until plant expansion is complete. • Four to five days of potable water storage in peak months • Distribution system low water loss
Letellier WTP/ Distribution	**Low**	• Water Source vulnerable to drought • Minimal off channel storage • Plant capacity does not meet current/future peak demands. • Limited plant redundancy • Aging Equipment • Process not resilient to water quality changes during drought events
Morris WTP/ Distribution	**Medium**	• Water source vulnerable to drought • Off channel storage mitigates drought impacts • Plant capacity exceeds supply. • Process resilient to water quality changes during drought events
Stephenfield WTP/ Distribution	**Medium**	• Water source vulnerable to drought • Off channel storage mitigates drought impacts • Plant capacity exceeds supply. • Process resilient to water quality changes during drought events

Table 1 Infrastructure Preparedness Levels

3 Winkler Drought Plan

3.1 Drought Stages

There are four Drought Stages used in this Plan which were established as part of the *Manitoba Drought Management Strategy* and were incorporated into the *Winkler Drought Supply Management Plan.* Each Drought Stage is a factor of the severity and duration of a drought event, coupled with the level of preparedness.

Section 3.5 of this Plan contains a detailed description of the responses and actions associated with each Drought Stage. To declare a particular Drought Stage, Winkler as part of the PVWC Drought Committee will work with the PVWC Board and relevant Provincial departments and set a date to declare the appropriate drought stage. The declaration of a Drought Stage will be communicated to Customers and the public as detailed in Section 3.5.2 of this Plan. The water reductions and actions of this Plan are intended to prevent shortage scenarios, by gradually reducing water supply in a planned, predictable manner.

Winkler Drought Supply Stage				
Daily Water Level Indicator	**Preparedness Level**			
	None	**Low**	**Medium**	**High**
Normal Aquifer 25th – 75th percentile (Normal)	**Normal**	**Normal**	**Normal**	**Normal**
Moderate Aquifer 25th – 10th percentile Canada Drought Monitor ≥D2 (Below Normal)	**Moderate**	**Moderate**	**Moderate**	**Normal**
Severe Aquifer <10th percentile Canada Drought Monitor ≥D3 (Much Below Normal)	**Severe**	**Severe**	**Severe**	**Moderate**
Extreme Aquifer <10th percentile for 3 months; or water supply shortage Canada Drought Monitor ≥D4	**Extreme**	**Extreme**	**Severe**	**Moderate**

Table 2 Winkler Drought Supply Stage

3.1.1 Normal (Green) Stage

The normal (Green) Stage indicates there are no anticipated water supply shortages or problems and that all functions of the Winkler Aquifer and PVWC network work properly for water management. Monthly updates on water availability and drought indicators are recommended to assist to identify emerging droughts, continue conservation efforts, education, and managing potential impacts.

3.1.2 Moderate (Blue) Stage

The moderate (blue) stage indicates a mild or modest drought and is the first indication of a potential water supply shortage in the Winkler Aquifer and the PVWC source. Monthly updates on water availability and drought indicators are recommended to

provide ongoing information on drought status with more frequent updates when necessary. Water reductions, voluntary and mandatory, will be introduced at this time.

3.1.3 Severe (Yellow) Stage

The severe (yellow) stage indicates a severe or serious drought and a potentially serious water supply shortage in the Winkler Aquifer and the PVWC source. Updates on water availability and drought conditions every two weeks are recommended to provide ongoing information on drought status with more frequent updates when necessary. At this stage some water restrictions and mandatory reductions will be issued.

3.1.4 Extreme (Red) Stage

The extreme (red) stage indicates an extreme or intense drought and indicates a major water supply shortage in the Winkler Aquifer and the PVWC source. In an extreme drought, water supplies will fail to meet demand causing increasingly more serious and widespread socioeconomic effects. In this stage, a serious water shortage may be declared. Weekly updates on water availability and drought conditions are recommended to provide ongoing information on drought status with more frequent updates when necessary. The most extreme water restrictions and water reductions will be enacted at this stage. Local and Provincial "state of emergency" may be issued.

3.1.5 Water Shortages

In the case of an extreme prolonged drought or failure of critical infrastructure, demand of potable water may be greater than available supply creating a water shortage. Reductions and restrictions during the moderate, severe, and extreme stages are intended to mitigate the possibility of a shortage, though a water shortage could occur at any time.

Should a water shortage occur, water from PVWC will be allocated to Winkler on a pre-determined basis and will be shared proportionally according to the average of the highest three (3) years of Winkler's purchases from the last five (5) years. At this point a Provincial State of Emergency may be declared and the Minister may declare a "serious water shortage" under the *"Water Protection Act"*.

3.1.6 Drought Stages and Level of Preparedness

Drought Preparedness refers to the directed policies, plans and actions which must be implemented prior to a drought event occurring to increase forecasting accuracy and ensure the Plan is fully implementable and effective during a Drought Event. The Manitoba Drought Management Strategy linked the Drought Stages detailed in Sections 3.1.1 through 3.1.4 and coupled these with the preparedness-levels presented in Section 2.4.2 of this plan. Table 3 (below) demonstrates the impact the level of drought preparedness can have on the potential impact of a drought event. Increased preparedness, achieved through mitigation efforts, can decrease the potential impact of a drought event in each Drought Stage.

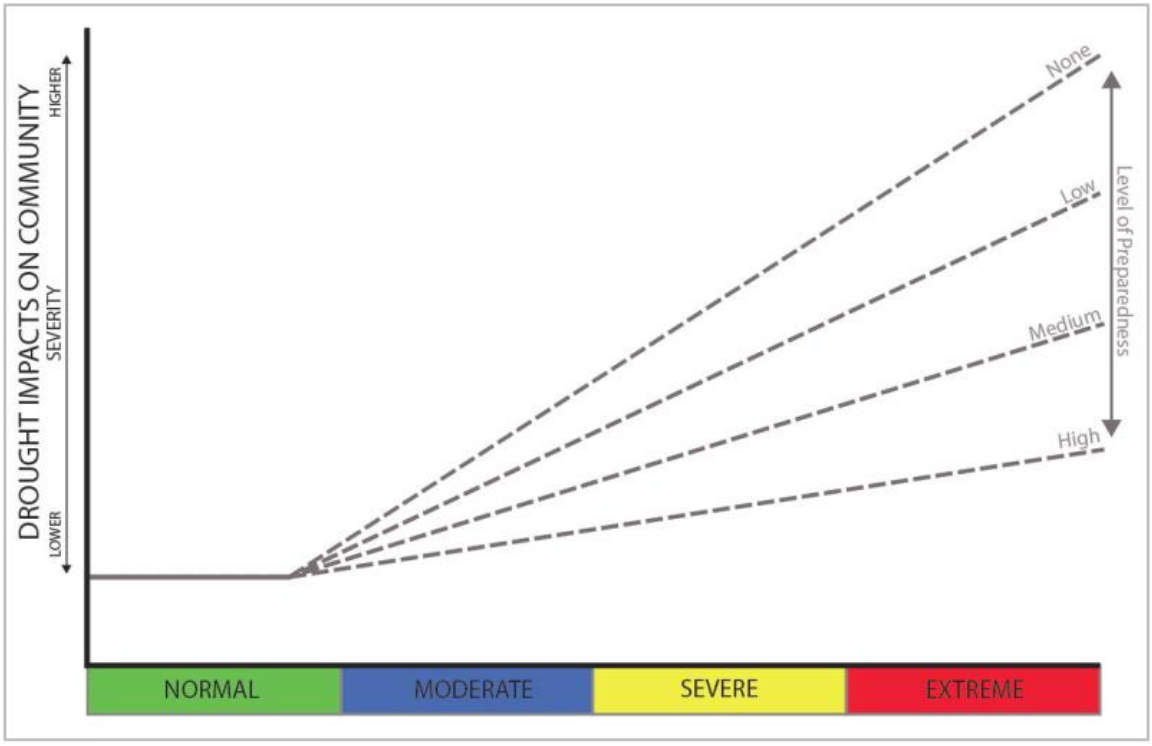


Figure 5 Drought Impacts on Community

As displayed on Figure 5 (Section 2.4.2), Associated Engineering's analysis of PVWC and the City's own analysis of infrastructure was found to range between "Low" and "Medium" in terms of drought preparedness. While there is not an established quantitative means of measuring the drought preparedness level of the entire PVWC system or specific infrastructure components of Winkler, this Plan includes a matrix of factors to consider when evaluating preparedness levels (Table 3). Factors can be included or excluded according to the specific traits of the entity being evaluated. A weighted measure can be applied to each evaluation component to help determine the level of preparedness. Below is the drought level and preparedness matrix used by the City of Winkler.

Using the Drought Level of Preparedness Matrix, the Winkler Aquifer as a water source has a medium vulnerability to drought, its level has gone as low as 268.38 meters above sea level though it has not been determined what the lowest acceptable level of the aquifer is. The City of Winkler has no excess treatment capacity to meet peak day demand or average daily demand should PVWC be unable to supply water for an extended period. The City of Winkler has low treatment redundancy, the reverse osmosis design is a single pass. Should the RO fail, the city could still treat a limited quantity of water through the green sand filters, the water would be very hard and near the aesthetic objective for total dissolved solids (TDS). Mitigation and monitoring are yet to be implemented. Therefore, the Drought Preparedness level for the City of Winkler has been set at Low to Medium.

Drought Level of Preparedness Matrix				
Factors	**Evaluation**			
Water Source Vulnerable to Drought	Low	Medium	High	
Availability of Additional Water Source (PVWC)	No	Yes		
PVWC Vulnerable to Drought	No	Yes		
Excess Treatment Capacity	None	Low	Medium	High
Treatment Plant Redundancy	None	Low	Medium	High
Age/State of Treatment Plant Equipment	Poor	Moderate	Good	
Treatment Process' Drought Resilience	Low	Medium	High	
Distribution System Condition - Leaks, etc.	Poor	Moderate	Good	
Potable Storage Capacity	Low	Medium	High	
Potable Storage Age/state	Poor	Moderate	Good	
Mitigation Programs Implemented	No	Yes		
Refined Monitoring System Implemented	No	Yes		

Table 3 Drought Level of Preparedness Matrix

3.2 Monitoring

Monitoring involves utilizing primary and secondary data regarding Winkler's water supply in conjunction with PVWC's primary and secondary data regarding their water supply. Winkler obtains 65-70% of its potable water through treatment of groundwater from the Winkler Aquifer and the remaining 30-35% comes from PVWC. Winkler's monitoring will include monitoring of the following:

3.2.1 Provincial Monitoring

The Groundwater Section of Manitoba Environment and Climate Change provides updates to the Winkler Aquifer Management Board on the results of water level and water quality monitoring undertaken in provincial observation wells installed into the Winkler Aquifer. The Section also provides information to the Board on any other groundwater programs which they have undertaken or are in the process of undertaking to gain additional knowledge or understanding of aquifer conditions.

The groundwater level recorded in provincial observation well G05OB005 (OB005) provides a long-term water level record and is representative of general aquifer conditions. The observation well OB005 is in the northern part of the Winkler Aquifer, at the parking lot of the Winkler Bible Camp. The complete water level record, 1963 to 2024, for OB005 is shown in *Figure 6*.

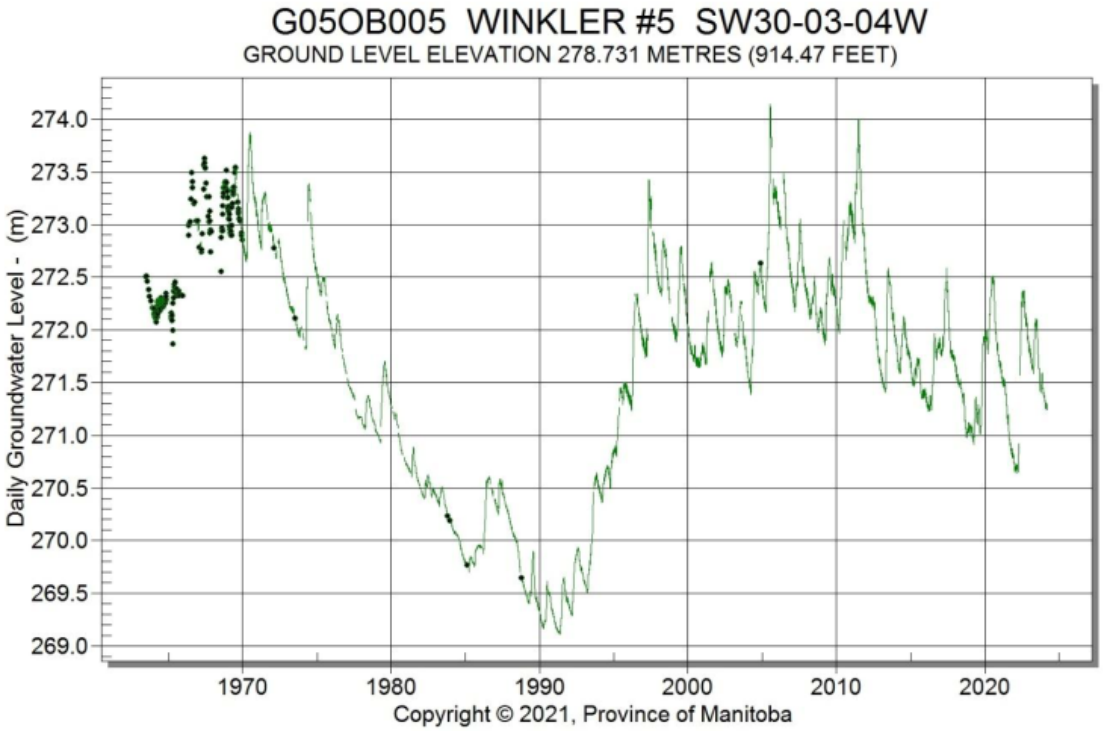


Figure 6 Winkler Aquifer Complete Period of Record 1963-2023

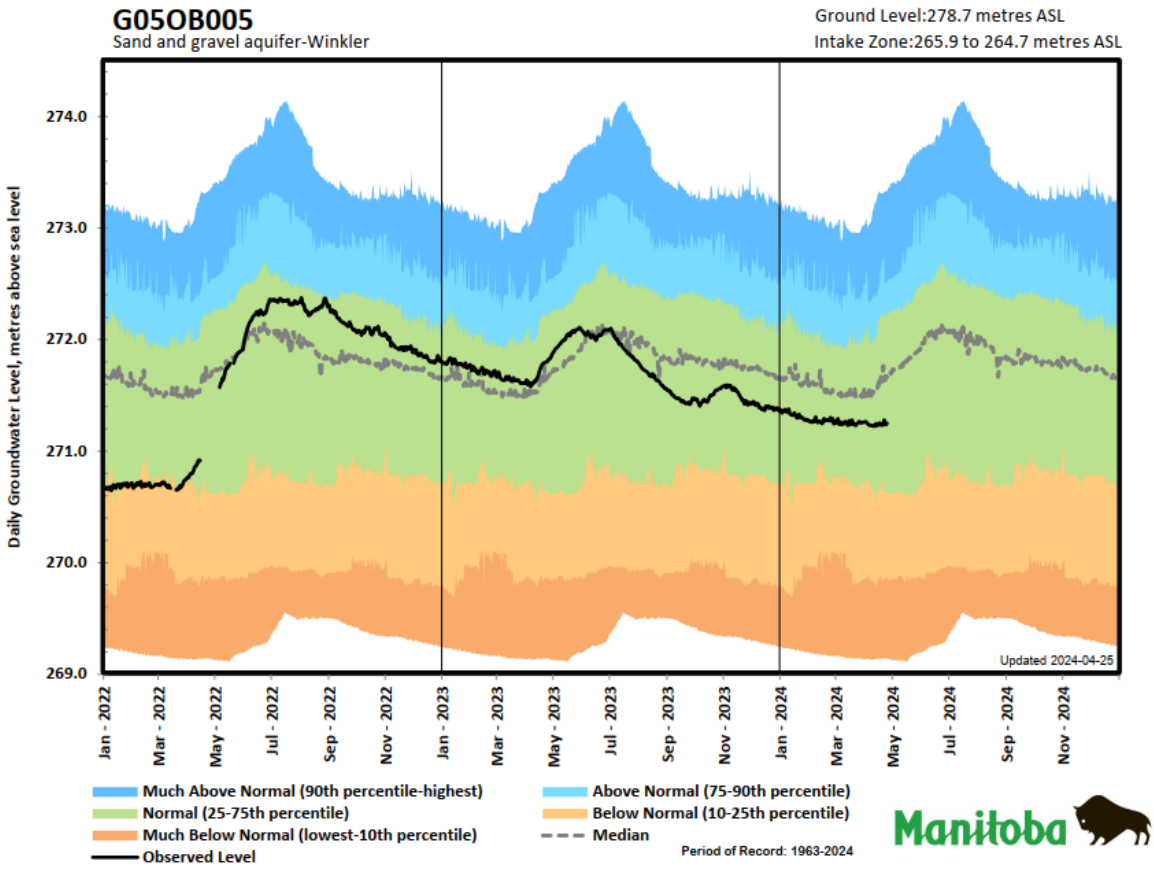


Figure 7 Provincial Observation Well G05OB005 2022-2024

The Manitoba Drought Monitor website updates the most recent three years of Winkler Aquifer data, Observation Well G05OB005 (*Figure 7)*.
https://www.gov.mb.ca/sd/water/drought_condition/index.html
The website has a precipitation indicator page shown as a 1-Month Precipitation Indicator, like the Canadian Drought Monitor.
The Canadian Drought Monitor (CDM) is Canada's official source for the monitoring and reporting of drought in Canada. From this page you can access a variety of products and information about current drought conditions across the country. https://agriculture.canada.ca/en/agricultural-production/weather/canadian-drought-monitor
Precipitation data is gathered from The Government of Canada Environment and Natural Resources website for the nearby weather station, Morden CDA CS Manitoba in the form of total precipitation which may include total rain and/or total snow.
https://climate.weather.gc.ca/historical_data/search_historic_data_e.html
PVWC uses the website below to monitor stream flows and levels for Red River at Emerson, which has been collecting data since 1912 and recorded the record low flows of the 1930's, comparing current values to the historical record. The Red River is the source of water for the Letellier and Morris Water Treatment Plants.
PVWC uses the website below to monitor stream flows and levels for Stephenfield Reservoir (Boyne River), the source of the Stephenfield Water Treatment Plant. The reservoir was constructed in 1963 with a full level of 296.3 meters. Water users of Stephenfield Reservoir issued licenses from either the firm flow or the surplus flow (March-May). A rule curve is used to manage license allocations in a drought event.
https://www.gov.mb.ca/sd/water/drought_condition/index.html

3.2.2 Winkler Monitoring

Water quality is analyzed 'in-house' at least once a month from any of the City's production wells which are pumping water to the RO plant on the day of sampling. Water quality from the wells is analyzed by an accredited laboratory on a rotating basis, ensuring all wells are sampled every 3-4 years.
Water withdrawn from the aquifer is recorded daily from each production well and an *"Annual Water Use Report"* is submitted to Water Use Licensing Manitoba Environment and Climate.
Groundwater levels from eight observation wells located within the City's domestic well field in the Winkler Aquifer are recorded monthly. The following observation wells water levels are recorded:

G05OB012	G05OB010	G05OB020	G05OB021
G05OB045	G05OB054	G05OB055	G05OB079

Days recorded when water is discharged from the Morden Water Resource Recovery Facility (WRRF) to the Deadhorse Creek.

3.2.3 PVWC Raw Water Source

The City of Winkler will rely on PVWC to supply data as per the PVWC Drought Plan as it may impact the City of Winkler regarding storage levels, flow rates and water quality. The PVWC can incorporate additional monitoring sources to ensure the effects of a drought are fully understood, supplement the Red River and Stephenfield data, and to assist

forecasting of future drought events. The following monitoring elements will therefore be incorporated into the PVWC's monitoring practices.

Upstream Monitoring

While the Emerson monitoring station has been selected as the point of measurement for the Plan it is imperative that other upstream sources be consulted including:

- Roseau River at Dominion City, Manitoba
- The Pembina River at Neche, North Dakota
- Precipitation levels via the Manitoba Agriculture weather station data and North Dakota/Minnesota resources
- Soil moisture indicators
- Water levels of upstream sources (e.g., Devil's Lake and Lake Traverse)
- Off-stream raw water impoundments

Incorporating additional upstream points of measurement into drought assessments for the PVWC will help provide advance warning of stream flows and prolonged periods without precipitation upstream in the Red River Basin.

Morris and Letellier Raw Water Reservoirs

The PVWC's two impoundment ponds at Morris and Letellier will be monitored to ensure adequate storage is available. A formal system for monitoring and drought triggering levels will need to be established.

3.2.4 Potable Supply & Storage Capacity

Knowing the limits of potable treatment and the quantity of potable water in storage will give a clear picture of the ability of supply to keep up with demand or not. If supply cannot keep up with demand, more mitigation efforts will be required.

Winkler RO Plant

The City of Winkler RO plant has a design capacity of 2740 m^3/day with a permeate recovery up to 80%. The Office of Drinking Water has approved a bypass permeate of the green sand filter around the RO treatment with continual monitoring to maintain drinking water quality. With this approved bypass flow the City of Winkler can achieve potable production of 3600 m^3/day.

Park Street Reservoir

The City of Winkler Park Street Reservoir has a total capacity of 1400 m^3. The Park Street Reservoir is supplied 100% from the Winkler RO Plant and the Winkler Aquifer.

George Street Reservoir

The City of Winkler George Avenue Reservoir has a total capacity of 13,600 m^3 and an average pump flow of 2800 m^3/day. The George Avenue Reservoir is supplied by the PVWC Red River Regional Plant-Letellier at 0-1500 m^3day the rest is provided though the City of Winkler Distribution system from the Winkler RO Plant.

Roland Reservoir

The PVWC Roland Reservoir has a capacity of 1000 m^3. The Roland Reservoir is filled primarily from the Morris Regional Plant but can also get water from PVWC Stephenfield Regional Plant and provides potable water directly into Winkler's distribution system at 0-1000 m^3/day.

RM of Stanley

The City of Winkler supplies water to the RM of Stanley indirectly by providing water back to PVWC. Daily, Winkler provides water to Rosebrook Place at 56 m^3/day. When PVWC is unable to meet demands south, east & west of Winkler, the City of Winkler has in the past been able to supply 55-800 m^3/day to the RM of Stanley including Boundary Trails Health Centre.

3.2.5 Consumption

Once raw water has been treated and put into storage, knowing where, how, and when it is used will help to manage water during drought conditions. All service connections are metered, and the sale of water is broken into six main user groups (Figure 8):

1. Residential 66%
2. Commercial 17%
3. Public 2%
4. Institutional 4%
5. Manufacturing 10%
6. Bulk Water Sales < 1%

A small percentage of potable water is unbilled, about 5%.

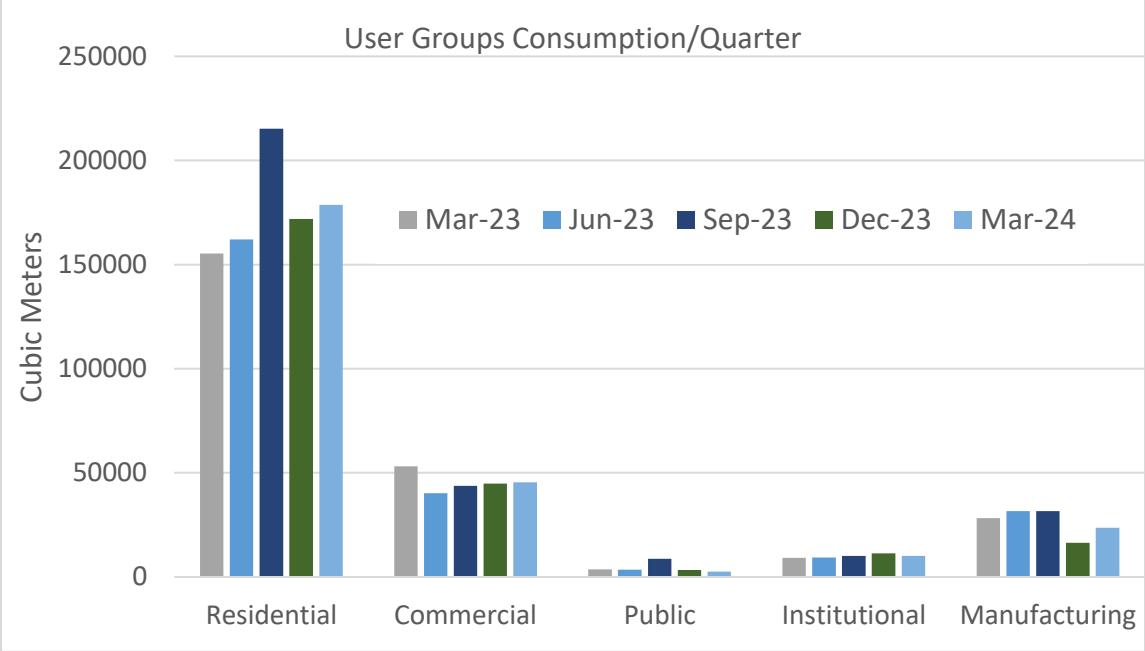


Figure 8 Winkler Consumption by Category

3.2.6 Improved Data & Statistics

Winkler has developed and maintains detailed water consumption and raw/treated reservoir storage to gain a better understanding of water consumption and potential conservation within the city. Collecting and interpreting a wide range of data including per capita water consumption both domestic and total provides Winkler with better decision-making capacity. The ability to determine robust consumption data and track the success of any conservation measures or use restrictions is imperative to drought mitigation and response measures.

3.2.7 Collect and Analyze Detailed Data

Detailed analysis of per capita and total water use by sector can provide great insight to water use, reduction, and drought mitigation in the following table:

Water Production and Usage Data*	2019	2020	2021	2022	2023
Water Customers (Residential Year End)	4,291	4,397	4,526	4,618	4,672
Water Customers (All Customers Year End)	4,780	4,903	5,040	5,151	5,228
Population	13,311	13,528	13,745	14,089	14,441
Occupancy/Residential	3.10	3.08	3.04	3.05	3.09
Occupancy/Connection	2.78	2.76	2.73	2.74	2.76
Liters/Capita/Day (Residential)	133.6	141.4	137.0	126.5	133.7
Liters/Capita/Day (All Customers)	208.5	206.5	194.6	189.3	204.7
Liters/Capita/Day (All Customers + Losses)	218.8	219.3	207.6	201.3	212.0
Winkler WTP Water Pumped	720,304	747,575	688,469	698,057	785,767
PVWC (net) Water Pumped	342,781	335,161	353,179	336,927	331,632
PVWC (net) Water Pumped - %	32.2%	31.0%	33.9%	32.6%	29.7%
Total Water Pumped	1,063,085	1,082,736	1,041,648	1,034,984	1,117,398
Water Metered (Residential)	649,153	698,352	687,455	650,518	704,595
Water Metered (All Customers)	1,013,210	1,019,551	976,341	973,454	1,079,083
Water Billed % (All Customers)	95.3%	94.2%	93.7%	94.1%	96.6%
Annual Billed Water/Customer (Residential)	151.28	158.82	151.89	140.87	150.81
Annual Billed Water/ (All Customers)	211.97	207.94	193.72	188.98	206.40
Average Daily Water Demand	2910.6	2964.4	2851.9	2833.6	3059.3
Peak day	**4-Jun**	**24-Oct**	**3-Jun**	**30-Aug**	**30-Sep**
Peak Day Demand	4,567.9	4,900.4	4,574.2	4,187.8	5,283.6
Minimum Day	**18-Feb**	**19-Oct**	**18-Oct**	**21-Nov**	**4-Dec**
Minimum Day Demand	1,770.3	1,651.1	1,923.4	1,928.0	1,789.2
Minimum Day Factor	0.61	0.56	0.67	0.68	0.58
Minimum Week Demand	17,605	17,706	17,397	17,298	2,580.6
Minimum Week Daily Peak Factor	0.86	0.85	0.87	0.87	0.84
Peak Week Ending	**8-Jun**	**6-Jun**	**5-Jun**	**16-Jul**	**10-Jun**
Peak Week Demand	25838.1	25490.2	26511.2	23468.4	28537.1
Peak Week Daily Average	3,691	3,641	3,787	3,353	4,077
Peak Day Factor	1.57	1.65	1.60	1.48	1.73
Peak Week Daily Average Factor	1.27	1.23	1.33	1.18	1.33
Raw Water Withdrawal (#2022-063 - Lic: 863,300)	398,748	509,323	525,967	531,549	495,616.0
Raw Water Withdrawal (#2022-063 - Lic: 493,400)	489,017	498,317	460,014	449,097	595,187.0
Raw Water Withdrawal (Total - Lic: 1,356,700)	887,765	1,007,640	985,981	980,646	1,090,803
WTP Efficiency	81.14%	74.19%	69.83%	71.18%	72.04%

Table 4 Winkler Water Production & Usage Data

3.2.8 Perform Water Audit to Identify System Weakness and Losses

The City of Winkler attempts to be both accountable and efficient in its operations by compiling water system audits on a routine basis. Water audits provide a systematic accounting of water uses conducted to identify opportunities for improved efficiency.

"Unbilled water is now widely accepted as the preferred terminology to use instead of the term unaccounted for water, which is too imprecise and had become a poorly defined catch all term."M-52 AWWA Manual

Unbilled water in the Winkler Utility system can be identified as the following:

1) Water Plant uses - used to pre-mix chemicals in the process of potable water production (measured loss).
2) Fire Department use - water used in fire department training and fire suppression (unbilled).
3) Water distribution losses - leakage occurring between the city's point of delivery and the water customer's meter (unbilled).
4) Water distribution hydrant flushing and flow testing (unbilled).
5) Meter losses - water lost due to inaccurate readings of water meters (unbilled).
6) Theft - water which intentionally bypasses the customer meter (unbilled).

The City of Winkler Utilities Department have reduced water losses for in plant uses to a minimum required to achieve a potable water production where quality standards meet or exceed the guidelines of Canadian Drinking Water Standards.

The department, water distribution and water meter unbilled water have been reduced to among the lowest levels in public utility systems. AWWA defines a 'tight" or excellent system as <5% loss, Water breaks/leaks are never ignored but repaired immediately by utility staff. Water loss monitoring equipment is used to identify suspect or potential points of water loss.

3.3 Mitigation

Mitigation involves proactive action and planning to reduce the long-term risks and potential impacts of drought events by identifying principal activities, possible susceptibilities, developing mitigation actions and programs to reduce these vulnerabilities to drought.

3.3.1 Education

Education is an essential aspect of drought mitigation and response. The following are some of the educational approaches used or considered in Winkler.

Water Bills and Inserts

The City of Winkler attempts to educate the consumer about their water consumption on quarterly water bills. Utility bills are sent out and several items are identified:

- Name & address of service,
- Account number,
- Billing period,
- Service size,

- Previous reading,
- Current reading,
- Consumption current quarter,
- Water charge,
- Sewer charge,
- Service charge,
- Arrears (if any),
- Total amount due,
- Water usage history of the previous 8 quarters,
- Inserts.

PVWC's Role

Winkler in cooperation with PVWC, will attempt to increase the public profile and engage residential, commercial, and industrial customers of the importance of the PVWC to Winkler, where their water comes from, and water conservation.

Presentations and Tours

Winkler has for years encouraged schools in the area to take advantage of Water Treatment Plant tours offered by the Staff. Presentations to classrooms, organizations, peers in the water and wastewater industry, and other interested groups & individuals have also been provided covering several topics including the Winkler Aquifer, reverse osmosis water treatment, greensand filter operations, conservation and more.

Drought Stages and Water Conservation

This plan includes water reduction ranges for each drought stage and identifies overall water conservation practices as being central to drought mitigation and resilience. Prior to and during drought events, Winkler & PVWC should work with customers to educate the public on the drought stages and municipal response measures, which will be of vital importance as water use reduction actions are employed. This is imperative in ensuring reduction measures are met and the public understand the importance of these actions. To mitigate the impacts of drought events encouraging water conservation, educating the public on the importance of water conservation, and tactics to achieve water conservation should be implemented.

3.3.2 Monitoring Improvements

This plan established monitoring points and drought triggers, as well as additional measures to supplement data and improve forecasting. As part of ongoing mitigation efforts, additional points for water source monitoring and system capabilities should be pursued and official triggering levels for drought stage indicators should be established.

3.3.3 Conservation and Use Reduction

While the drought response actions within this plan outline the potential supply reduction from Winkler and PVWC for each drought stage, to increase resiliency, increase sustainability, and accommodate projected growth it is imperative customers incorporate on going and future conservation measures. To provide a tangible goal for water conservation, a target annual per-capita for overall water reduction should be set. Winkler has achieved an impressive per capita consumption level through its Conservation Plan which will mitigate impacts and allow the ability to serve a larger

population and growing economy. "According to the World Health Organization (WHO) between 50 and 100 liters of water per person per day are needed to ensure that most basic needs are met, and few health concerns arise."[4] Winkler's consumption is already very low for residential and all water users, a 2.0% reduction per annum is a reasonable goal to reach 100 L/capita/day for residential consumption.

Area	Total Water Use (L/capita/day)	Residential Water Use (L/capita/day)
Winkler (2023)	205	134
Winnipeg (2021)[1]	221	
Manitoba (2019)[2]	282	158
Canada (2019)[2]	411	215

Table 5 Winkler Consumption Comparisons

[1] https://legacy.winnipeg.ca/waterandwaste/water/conservation/consumptionReport.stm

[2] https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3810027101

3.3.4 Infrastructure

Ensuring both Winkler's and PVWC's water treatment and delivery infrastructure operates efficiently and provides adequate capacity is a core component of drought mitigation. Winkler continues to identify current infrastructure needs and target specific projects. The overall goal of infrastructure improvements will be to upgrade the preparedness level to "high" for all components of Winkler's system.

- More potable water from the concentrate stream of the RO treatment
- Increased allocation of the Winkler Aquifer (fresh/brackish)
- Aquifer Storage and Recovery, Water Reuse and Recovery
- Distribution modeling to ensure adequate flows and pressures in the system.
- Increase water treatment capacity.

3.3.5 Additional Water Sources

Winkler has two key sources of water, PVWC (Red River) and the Winkler Aquifer. Incorporating additional water sources is a means of increasing resilience and drought resistance. It is worth noting, however, in a prolonged drought water sources from the same geographic area will likely be impacted by the same drought event. For example, a surface water source may be impacted by drought almost immediately during a drought event, but as a drought is prolonged a complementary groundwater source may also be depleted as it is relied upon more heavily as recharge decreases. Increasing the variety of water sources available is a means of drought mitigation and increasing resilience but will not necessarily result in being resistant to the risks of drought events. Additional sources currently identified and in Winkler's 2007 "Integrated Water Sourcing Plan" included the following:

- Winkler Aquifer increased withdrawal of fresh & brackish water
- Treatment optimization and efficiency
- PVWC
- Water Reuse

[4] The Human Right to Water and Sanitation Media Brief

- Enhanced aquifer recharge and ASR
- Other “Co-op” (Portage, Steinbach, Cartier, Winnipeg)

The Winkler Water Supply Solutions Study (2021) further identified and prioritized the following solutions:

1. Continued water treatment plant optimization and water conservation.
2. Install new saline wells in the brackish portion of the Winkler Aquifer.
3. Participate in the shelter belt program over the primary aquifer recharge area.
4. Construct weirs on Shannon Creek and/or Deadhorse Creek to enhance recharge.
5. Introduce water conservation and utility rate pricing.
6. Redirect treated wastewater upstream in the Deadhorse Creek receiving stream.
7. Construct infiltration galleries to promote recharge to the Winkler Aquifer
8. Purchase more water from PVWC.

3.4 Preparedness

Preparedness refers to the directed policies, plans and actions which must be implemented prior to a drought event occurring to increase forecasting accuracy, ensure the Plan is fully implementable and Winkler is fully prepared to respond during a drought event.

3.4.1 Emergency Plan Up to Date

“The Emergency Planning for the City of Winkler Water Services” document shall be reviewed annually by the City of Winkler and in consultation with the City of Morden and the PVWC with whom the City of Winkler have an understanding to help if able. A copy of the document is kept in the Water Treatment Plant and at City Hall in the office of the Planning & Infrastructure Departments.”
(Section 6.1.6 Emergency Planning for the City of Winkler Water Services)

3.4.2 Hazard Analysis

The City of Winkler will undertake a Hazard Analysis for each Drought Stage to predict potential impacts for each stage on infrastructure, quality of life and other considerations. Winkler should ensure the hazard analysis is included in the SERC guidance documents. Refer to Manitoba EMO.

3.4.3 Water Conservation

Demand reduction is the most straightforward way to address water shortages. Curtailment of water demand is directed to customer uses that are inefficient, wasteful, or able to be temporarily reduced or suspended. Winkler mandates certain demand reduction actions, enforcement mechanisms are included for the maximum effectiveness of these actions. Demand reduction programs vary by the severity of shortage and by stage.

- Normal Stage I is voluntary and relies on a public information campaign and enforcement of water waste ordinance or policy and the new or existing yard watering restrictions found in the bylaw.
- Moderate Stage II is managed with a more intensive public information campaign and mandatory restrictions found in the bylaw.
- Severe & Extreme Stage III & IV most often require customer allocations and/or severe landscape irrigation restrictions found in the bylaw.

Restrictions

The sump pump bylaw (1653-99) requires that drain tile water be disposed of on-site rather than to the sanitary sewer. Many residential dwelling units can provide adequate year-round lawn irrigation using this reclaimed water.

The existing City Waterworks Bylaw (1674-99) prohibits the wasteful use of water and provides the City with the authority to restrict the use of water.

The Water Conservation bylaw (2268-21) describes the four stages of conservation, what triggers each stage, and what is expected of water users during these conservation stages.

3.4.4 Identify Emergency Sources of Water

During severe and extreme drought stages it may be imperative to use emergency sources of water for temporary use. Evaluation of potential sources for temporary/permanent use during such events may include the following:

- Alternate potable sources
  - Greater RO recovery though the RO treatment process.
  - Increase RO treatment plant capacity.
  - Purchase more water from PVWC.
  - Hauled or Trucked water from other jurisdictions.
  - Temporary pipelines from Morden, Headingly, Haywood, etc.
  - Water Resource Recovery Facility (WRRF) advanced treatment.
- Alternate “raw” untreated sources.
  - Winkler Aquifer bulk fill stations
  - Increase Aquifer allocation.
  - Land drainage systems.
  - Snow capture over the aquifer recharge areas (shelter belts)
  - Separate RO concentrate from the wastewater, so wastewater is easier to treat.
  - Increase infiltration by slowing stream flows over the recharge areas.
  - Redirect treated WRRF flows over the primary recharge areas.
  - Redirect treated WRRF flows to infiltration ponds/galleries on the aquifer.
  - Redirect treated WRRF flows to aquifer injection wells.

3.4.5 Training and Development

The City of Winkler shall ensure staff are adequately trained in disaster response and management, such as incident command system (ICS) training and others offered by Manitoba EMO training programs.

Winkler will strive to have all operators trained & certified to the same or one level above the facility classification being operated as per the *Water and Wastewater Facility Operators Regulation 77/2003* (Table 6). The facilities and operator classifications are as follows:

- Water Treatment (WT) Facility Class II
- Water Distribution (WD) System Class II
- Wastewater Treatment (WWT) Facility Class I
- Wastewater Collection (WWC) System Class II

Position	**Name**	**Certification**

		WT	WD	WWT	WWC
Water Resources Manager	Travis Duff	III	III	II	III
Water Treatment Supervisor	Kevin Oestreicher	III	III	II	II
Utilities Supervisor	Jake Wiens	I	II	II	II
WTP Operator	Dave Bueckert	II	II	II	II
WTP Operator	Shane Bend	I	I	-	-
Utilities Operator	Derrick Thiessen	I	II	II	II
Utilities Operator	Micheal Buhler	-	I	I	I
Utilities Operator	James Fehr	-	-	-	-
Utilities Operator	Jonathan Sterkel	OIT	I	OIT	I
Public Works Operator	Klass Neufeld	-	I	I	I

Table 6 Winkler Operator Certifications

3.4.6 Establish Criteria for Evaluating Proposed New Users and Uses

'Dry' industry development is encouraged in Winkler over 'wet' industries. Where wet industries developed in Winkler, they began as small businesses with low water consumption but due to strong economic positioning have grown beyond those early water demands. When such businesses decide to move on, others are not encouraged to take their place. A recommendation for wet industry applicants be a conditional use, allowing municipal restrictions to be implemented on the approval for a maximum use and wastewater quality requirements.

Further, a recommendation of approved water fixtures to be added to encourage water conservation beyond that of The Manitoba building plumbing code.

3.4.7 Participate in PVWC Drought Committee

The PVWC Drought Committee will play a crucial role implementing the Drought Plan and undertaking preparedness items of which Winkler will participate. The City of Winkler will strive to provide data to the PVWC Drought Committee in a format which is compatible with all “customers” of the PVWC for ease of interpretation and analysis. The Group will meet to participate in Key preparedness tasks.

The PVWC Drought committee:

- Chairperson – PVWC CEO
- Members (23) which may include:
  - PVWC Staff (2) – administrative, plant, operations, etc.
  - Member Representatives (14), one (1) from each – CAO, Public Works, etc.
  - Non-Member Representatives (4), one (1) from each
  - Province of Manitoba representatives including:
    - Manitoba Sustainable Development (1)
    - Manitoba Emergency Measures Organization (1)
  - Professional facilitator/planner (Member municipality or consultant) (1)

Mandate: The PVWC Drought Committee will serve an advisory role providing a broad range of expertise to make Drought Stage declaration recommendations to the PVWC Board, and to facilitate the continued implementation of the Drought Plan.

Activities may include:

- Review Monitoring date and recommend Drought Stage declarations to the Board.

- Coordinate with the Province, PVWC, Local Government, Manitoba EMO.
- Coordinate Drought Response according to each Drought Stage
- Implement a communication process.
- Pursue joint mitigation efforts.
- Maintaining and updating the Drought Status Report
- Coordinating local drought plans
- Undertaking “table-top” scenario exercises
- Establish consistent approach to communication, outreach, and education.
- Reviewing “state of emergency” conditions
- Coordinate with Basin Drought Assessment Groups thorough the PVWC CEO
- Review/revise the plan every four (4) years and after each drought event/

3.4.7.1 Drought Status Report

A Drought Status Report will provide a summary of monitoring information during drought stages and a detailed summary of when a Drought Stage is declared, when and what actions are implemented and other pertinent data and information. The Drought Status Report will be maintained and completed by the PVWC Drought Committee. Drought Status Reports will inform regular plan reviews and post drought reviews.
Winkler will provide daily water updates of water use and production along with the most available data for the Winkler Aquifer as provided by the Manitoba Drought Monitor from *Manitoba Environment and Climate*.

3.4.7.2 Procure Communication Software/Hardware for Internal Communication

To facilitate effective, private communication between PVWC and other members an established communication model will be required, including hardware and software for fast, efficient, confidential internal communication, prior to public releases.

3.4.7.3 Provincial Responsibilities

- Review and update monitoring and triggering elements.
- Calculate storage capacity, establish monitoring regimen and triggering levels of PVWC’s raw water reservoirs.
- Refine monitoring process for upstream conditions and supplemental data.
- Work with Public Utilities Board (PUB) on Rate Structures.
- Establish Drought Funding Approach.
- Establish Demand Management Strategy.

3.5 Response

3.5.1 Overview

Response encompasses the actions taken during a drought event to reduce the immediate impacts on the environment or society through enactive temporary adjustments to normal practices until normal climatic conditions return. Response includes the communication process used to convey information internally and externally.

Mitigation and Preparedness are fundamental during "normal" conditions to build resilience and lessen the impacts of a drought event as discussed in Section 3.1.6. However, when a drought event does occur response measures need to be implemented to ensure the supply of water continues and to limit the negative health, social, and economic impacts of the drought. The following table demonstrate actions included in Winkler's Water Conservation Bylaw #2268-21 for the stages:

Stage	Winkler Aquifer Level	Canada Drought Monitor	Reduction
Normal Stage I Conditions	>25th Percentile	D0 – D1	0-5%
Moderate Stage II Conditions	≤25th Percentile	≥D2	10%
Severe Stage III Conditions	≤10th Percentile	≥D3	25%
Extreme Stage IV Conditions	≤10th Percentile	≥D4	40%

Table 7 Drought Stage Indicators and Reduction

3.5.2 Drought Response

When monitoring measures indicate conditions are leading to a drought event, the following response actions may be implemented:

1. Should the City of Winkler Designated Officer (Mayor, City Manager, or Director of Planning & Infrastructure) believe there is a reason to restrict water usage based on the Canada Drought Monitor Indicator, Winkler Aquifer levels, or Water Service capacity limits, they may declare a water use restriction for,
   - The entire City of Winkler
   - A specific zone, of geographic area of the City of Winkler
   - Other specific locations as defined by the Designated Officer.
2. Manitoba Sustainable Development (MSD) will alert PVWC when monitoring data comes within 15% of triggering a drought stage:
   - MSD, Winkler, and PVWC will review additional upstream data and monitor relevant monitoring data and triggers.
   - Winkler or PVWC will alert the PVWC Drought Committee of conditions.
3. The PVWC Drought Committee will convene and review data, and when conditions warrant, will make recommendations to make a drought stage declaration.
4. When a drought stage is declared, PVWC will initiate the formation of a Drought Command Centre (DCC) and the City of Winkler will participate. The DCC will…
   - …be in the PVWC Altona office.
   - …be the communication hub during the drought.
   - …facilitate internal and external communications.

5. Winkler will continue or increase monitoring as per Section 3.2.
6. Winkler water reductions and restrictions will be implemented as outlined in Tables 9 – 12 listed below.

Normal Stage I Conditions	
Targeted Water Use Reduction:	**0-5%**
Component	**Action**
City Decision Indicators	**Aquifer Levels > 25 percentile**
Residential	No Restrictions
Commercial/Industrial (indoor use)	No Restrictions Water Recycling Systems Encouraged
New or Existing Yard Watering (Hose connected sprinkler)	Permitted: Odd property number – Monday, Wednesday, Saturday Even property number – Tuesday, Thursday, Sunday (Suggested time 19:00 to 07:00, 2 hours maximum) Rain/Reuse Water Catchment Encouraged
Landscaping (i.e., tree/shrubs/flowers)	No Restriction Rain/Reuse Water Catchment Encouraged
Vegetable Garden Watering	No Restriction Rain/Reuse Water Catchment Encouraged
Outdoor Leisure Uses	No Restriction
Vehicle Washing	No Restriction
Agriculture	No Restriction
Construction	Metered Use of potable water (City Authorized) (No restriction of non-potable)
City Operations (Utilities, Public Works, Fire, Community Services)	No Restriction
Lodging/Restaurant	No Restriction

Table 8 Normal Stage I Conditions

Moderate Stage II Conditions	
Targeted Water Use Reduction:	**10%**
Component	**Action**
City Decision Indicators	**Canada Drought Monitor ≥ D2; or Winkler Aquifer Level ≤ 25 percentile**
Residential	Voluntary reduction
Commercial/Industrial (indoor use)	Voluntary reduction
New of Existing Yard Watering (Hose connected sprinkler)	Mandatory: Odd property number – Saturday Even property number – Sunday Institutional Zones – Thursday
Landscaping (i.e., tree/shrubs/flowers)	Mandatory: Odd property number – Monday, Wednesday, Saturday Even property number – Tuesday, Thursday, Sunday Rain/Reuse Water Catchment Encouraged
Vegetable Garden Watering	No Restriction Rain/Reuse Water Catchment Encouraged
Outdoor Leisure Uses	Voluntary Reduction Pool Covers recommended
Vehicle Washing	No vehicle washing resulting in water draining or splashing onto city streets or ROW
Agriculture	Voluntary Reduction
Construction	Metered Use of Potable Water (City Authorized) (No restriction of non-potable)
City Operations (Utilities, Public Works, Fire, Community Services)	General: Scheduled & Essential Uses Permitted Restrictions: All sport fields & Facility Lawn Watering: One Day per Week Watering New Trees/Shrub Plantings: Monday, Wednesday, Friday Community Services: Alternate spray park operation
Lodging/Restaurant	Voluntary Signage of Drought Stage and Ideas to Conserve Water

Table 9 Moderate Stage II Conditions

Severe Stage III Conditions	
Targeted Water Use Reduction:	**25%**
Component	**Action**
City Decision Indicators	**Canada Drought Monitor ≥ D3; or Aquifer Levels ≤ 10 percentile; or Water Supply Service Disruption**
Residential	Voluntary Indoor Reductions No spraying/pressure washing driveways, decks, or buildings
Commercial/Industrial (indoor use)	Essential Operations Only
New of Existing Yard Watering (Hose connected sprinkler)	Not Permitted with City Supply
Landscaping (i.e., tree/shrubs/flowers)	Mandatory: Odd Property number – Saturday Even Property number – Sunday Institutional Zones – Thursday Rain/Reuse Water Catchment Encouraged
Vegetable Garden Watering	Mandatory: Odd Property number – Wednesday, Saturday Even Property number – Thursday, Sunday No Restrictions on non-potable supplies
Outdoor Leisure Uses	No pool filling, No activities resulting in spraying water
Vehicle Washing	Not permitted at private residence Commercial car washes only
Agriculture	Mandatory use of non-potable
Construction	Metered use of potable water (City Authorized) No restrictions of non-potable
City Operations (Utilities, Public Works, Fire, Community Services)	General: Essential uses permitted Restrictions: All Sport Fields & Facility Lawn Watering: not Permitted with City Potable Supply, Watering New Trees/Shrub Plantings: non potable only. Utilities: Hydrant flushing, as required by Regulations. Potable water fill station: reduced hours of operation Monday, Wednesday, Friday 07:00-16:00 Fire: no fire drills with City potable supply Community Services: No spray park operations
Lodging/Restaurant	Signage of Drought Stage and Ideas to Conserve Water Restaurants: Only serve water when asked

Table 10 Severe Stage III Conditions

Extreme Stage IV Conditions	
Targeted Water Use Reduction	**40%**
Component	**Action**
City Decision Indicators	**Canada Drought Monitor ≥ D4; or Aquifer Levels ≤ 10 percentile for 3 months; or Water Supply Shortage**
Residential	Voluntary Indoor Reductions No spraying/pressure washing driveways, decks, or buildings
Commercial/Industrial (Indoor Uses)	Essential Operations Only Mandatory Restriction to 80% of past water consumption
New or Existing Yard Watering (Hose connected sprinkler)	Not permitted with City Supply or non-potable.
Landscaping (I.e. tree/shrubs/flowers)	Not permitted with City Supply Rain/Reuse Water Catchment Encouraged
Vegetable Garden Watering	Mandatory: Odd property - Saturday Even Property - Sunday
Outdoor Leisure Uses	No Pool Filling No activities resulting in spraying water
Vehicle Washing	Not permitted as private residence Commercial car washes with water recycling systems only to 20% reduction in use from past consumption
Agriculture	Mandatory/use non-potable if available
Construction	Not permitted with City potable supply
City Operations (Utilities, Public Works, Fire, Community Services)	General Essential Uses Only Restrictions: All sport fields & facility lawn watering; not permitted with City supply. Watering new tree/shrub plantings; not permitted with City supply (potable or non-potable). Utilities: No hydrant flushing, unless required by Regulations. Potable water fill station operated by appointment only. Fire: no fire drills with City potable supply. Community Services: no spray park operations, no pool filling
Lodging/Restaurant	Signage of Drought Stage and Ideas to Conserve Water. Restaurants: Only serve water when asked

Table 11 Extreme Stage IV Conditions

7. Winkler will communicate with the PVWC operations team and/or the PVWC Drought Committee, group, or responsible authority as may be required, and the frequency of this communication may be adjusted at the discretion of the Group, Committee, or responsible authority. The following (Tables 13-16) demonstrate potential actions required of the City of Winkler and PVWC at different Drought Stages.

Normal Stage I Conditions		
Peak Water Use reduction Target: 5%		
Entity	**Action**	**Frequency**
City of Winkler	Communicate water demands needs to PVWC, new connections, infrastructure changes, shutdowns, peak daily demands.	Quarterly
City of Winkler	Share system information on storage levels, flows, pressures, and other pertinent information at the RO Water Plant and George Street Reservoir	Quarterly
City of Winkler	Inserts to Water Bill, social media, media updates to correspond with PVWC, if any.	Quarterly
PVWC	Communicate water supplies available to the City of Winkler, new connections, infrastructure changes, shutdowns, peak daily demands.	Quarterly
PVWC	Share system information on storage levels, flows, pressures, and other pertinent information at Morris (MWTP), Letellier (LWTP), Roland Reservoir, Winkler North Booster Station, Reinfeld Booster Station, & Stanley Booster Station.	Quarterly

Table 12 Normal Stage I Communications

Moderate Stage II Conditions		
Peak Water Use reduction Target: ten%		
Entity	**Action**	**Frequency**
City of Winkler	Communicate water demands needs to PVWC, new connections, infrastructure changes, shutdowns, peak daily demands.	Monthly
City of Winkler	Share system information on storage levels, flows, pressures, and other pertinent information at the RO Water Plant and George Street Reservoir.	Monthly
City of Winkler	Inserts to Water Bill, social media, media updates to correspond with PVWC, if any.	As Required
PVWC	Communicate water supplies available to the City of Winkler, new connections, infrastructure changes, shutdowns, peak daily demands.	Monthly
PVWC	Share system information on storage levels, flows, pressures, and other pertinent information at Morris (MWTP), Letellier (LWTP), Roland Reservoir, Winkler North Booster Station, Reinfeld Booster Station, & Stanley Booster Station.	Monthly
PVWC	Social media and media updates to correspond with the City of Winkler's.	As Required

Table 13 Moderate Stage II Communications

Severe Stage III Conditions		
Peak Water Use reduction Target: 20%		
Entity	**Action**	**Frequency**
City of Winkler	Communicate water demands needs to PVWC, new connections, infrastructure changes, shutdowns, peak daily demands.	Bi-Weekly
City of Winkler	Share system information on storage levels, flows, pressures, and other pertinent information at the RO Water Plant and George Street Reservoir	Bi-Weekly
City of Winkler	Inserts to Water Bill, social media, media updates to correspond with PVWC's	Bi-Weekly
PVWC	Communicate water supplies available to the City of Winkler, new connections, infrastructure changes, shutdowns, peak daily demands.	Bi-Weekly
PVWC	Share system information on storage levels, flows, pressures, and other pertinent information. at Morris (MWTP), Letellier (LWTP), Roland Reservoir, Winkler North Booster Station, Reinfeld Booster Station, & Stanley Booster Station.	Bi-Weekly
PVWC	Social media and media updates to correspond with the City of Winkler's.	Bi-Weekly

Table 14 Severe Stage III Communications

Extreme Stage IV Conditions		
Peak Water Use reduction Target: 30% or more		
Entity	**Action**	**Frequency**
City of Winkler	Communicate water demands needs to PVWC, new connections, infrastructure changes, shutdowns, peak daily demands.	Weekly
City of Winkler	Share system information on storage levels, flows, pressures, and other pertinent information at the RO Water Plant and George Street Reservoir	Weekly
City of Winkler	Inserts to Water Bill, social media, media updates to correspond with PVWC's	Weekly
PVWC	Communicate water supplies available to the City of Winkler, new connections, infrastructure changes, shutdowns, peak daily demands.	Weekly
PVWC	Share system information on storage levels, flows, pressures, and other pertinent information at Morris (MWTP), Letellier (LWTP), Roland Reservoir, Winkler North Booster Station, Reinfeld Booster Station, & Stanley Booster Station.	Weekly
PVWC	Social media and media updates to correspond with the City of Winkler's.	Weekly

Table 15 Extreme Stage IV Communications

3.6 Recovery

The recovery process will begin by returning to Normal Stage I Conditions or receding to the Moderate Stage II conditions after a Severe Drought Stage. As a drought event dissipates to restore to, or improve to pre-drought conditions, recovery will work to further mitigate impacts of any future drought events. A review, as detailed in Section 1.5, should be undertaken. During post-drought The City of Winkler will ensure infrastructure is in suitable shape to effectively return to normal operations. Temporary measures may need to be cleaned up or removed. This plan is circular in nature, as a drought ends learning and preparing for the next drought begins.

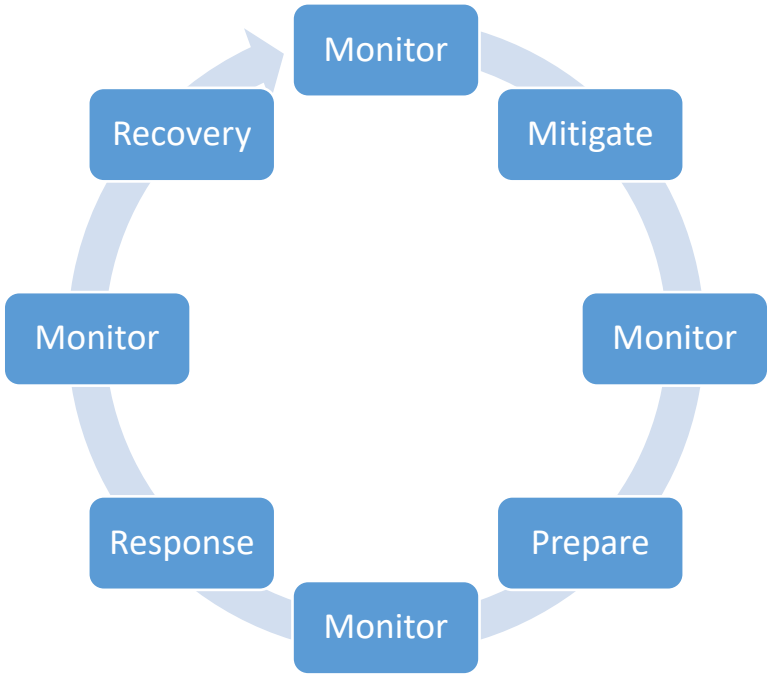


Figure 9 Drought Management

4 Reference

4.1 List of Figures

Figure 1 Drought Management 5
Figure 2: Hierarchy of Drought-Related Policies/Guidelines 6
Figure 3 Winkler Historical and Projected Population Growth 13
Figure 4 Winkler Aquifer Licensed Allocation and Withdrawal 13
Figure 5 Drought Impacts on Community 17
Figure 6 Winkler Aquifer Complete Period of Record 1963-2023 19
Figure 7 Provincial Observation Well G05OB005 2021-2023 19
Figure 8 Winkler Consumption by Category 22
Figure 9 Drought Management 40

4.2 List of Tables

Table 1 Infrastructure Preparedness Levels 14
Table 2 Winkler Drought Supply Stage 15
Table 3 Drought Level of Preparedness Matrix 18
Table 4 Winkler Water Production & Usage Data 23
Table 5 Winkler Consumption Comparisons 26
Table 6 Winkler Operator Certifications 29
Table 7 Drought Stage Indicators and Reduction 31
Table 8 Normal Stage I Conditions 32
Table 9 Moderate Stage II Conditions 33
Table 10 Severe Stage III Conditions 34
Table 11 Extreme Stage IV Conditions 35
Table 12 Normal Stage I Communications 36
Table 13 Moderate Stage II Communications 37
Table 14 Severe Stage III Communications 38
Table 15 Extreme Stage IV Communications 39

Revision Schedule:

Date	Change	Location
May 3, 2024	Spelling and Grammer Figures updated. Tables updated	Throughout List of Figures List of Tables