Your Drinking Water

The journey water takes to your tap

Protecting our water
Saving you money

Sylvan Lake

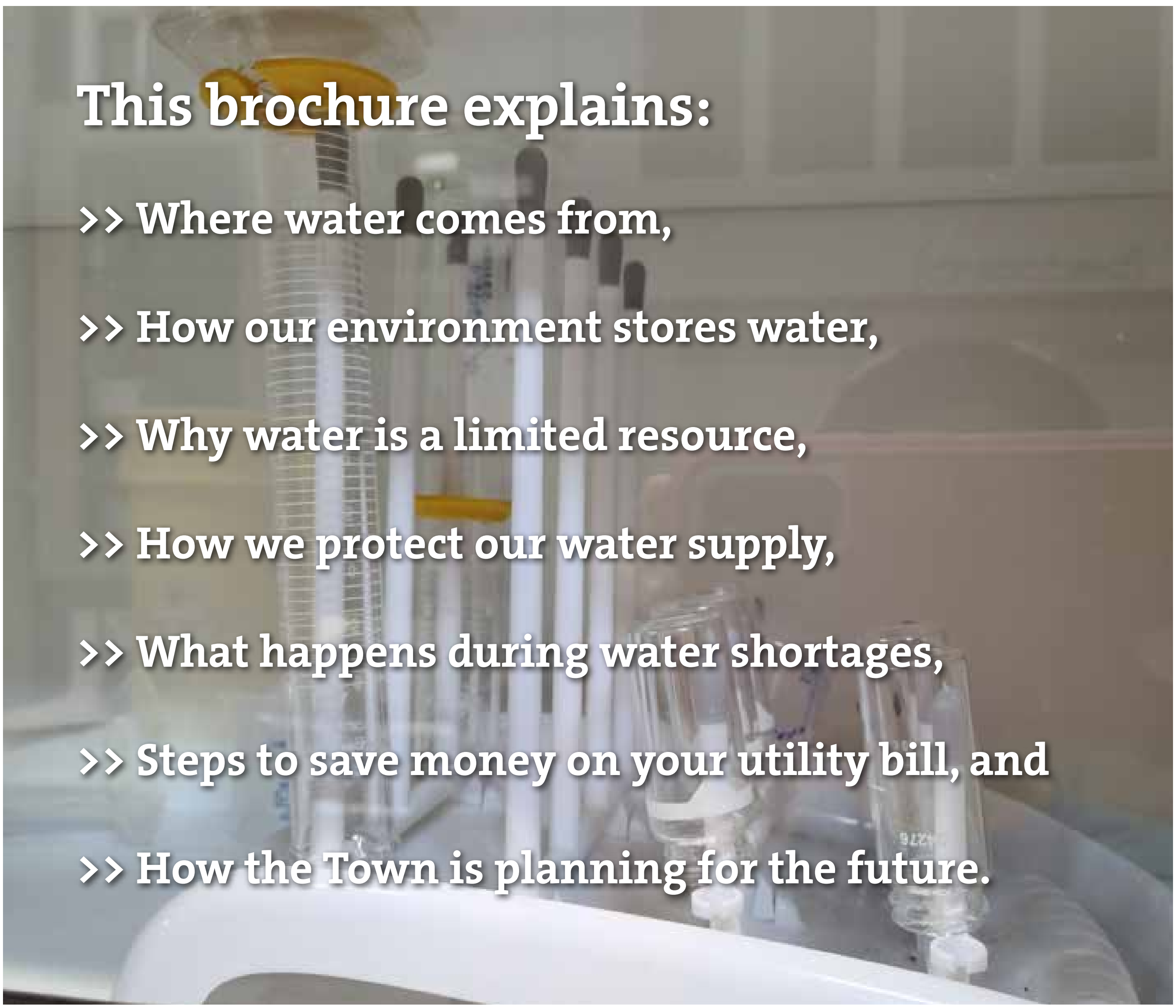
Contents

Lakers are asking questions about water!

Lakers ask questions about where our water comes from, why we need conservation or restrictions, and why we can't just add more wells. Lakers also want to know what the Town is doing to provide water in the future.

To understand the answers, you must first understand little bit about our local geology and the water cycle. We promise, it's easy!

Please enjoy learning about the journey water takes to your tap.



This brochure explains:

>> Where water comes from,

>> How our environment stores water,

>> Why water is a limited resource,

>> How we protect our water supply,

>> What happens during water shortages,

>> Steps to save money on your utility bill, and

>> How the Town is planning for the future.

Where does our drinking water come from?

OUR DRINKING WATER

We pump drinking water from wells which are fed by aquifers. That means that our drinking water comes from groundwater. Groundwater is underground, stored in the earth.

TREATING SURFACE VS. GROUND

Groundwater

- **Source:** Underground aquifers
- **Contaminants:** Often cleaner than surface water, but can contain minerals, iron, and bacteria
- **Treatment Process:** Usually less complex, often involving disinfection
- **Complexity:** Generally requires less complex treatment due to the natural filtering process of the underground aquifer

Surface Water

- **Source:** Lakes, rivers
- **Contaminants:** More prone to pollution from runoff, industrial waste, and farming
- **Treatment Process:** Multiple steps, including coagulation, flocculation, sedimentation, filtration, and disinfection (often with chlorine or ultraviolet light)
- **Complexity:** More extensive treatment due to the higher potential for contamination
- **Example:** City of Red Deer drinking water comes from the Red Deer River

Key Differences

- **Contamination:** Surface water is more susceptible to external pollutants, while groundwater is often shielded by underground layers
- **Treatment Steps:** Surface water treatment typically involves more steps due to the higher potential for contamination, while groundwater treatment is often simpler
- **Disinfection:** Both methods typically require disinfection, but the specific method may vary based on the type of water source and contaminant levels

Sylvan Lake is an example of surface water. We do not get drinking water from the lake or any other surface water.

We get our drinking water from groundwater. This is one of the wells that supply our reservoirs with drinking water. It draws water from an aquifer, which is groundwater.

Where does water come from?

PRECIPITATION PROVIDES WATER

Precipitation fills aquifers in the Paskapoo Formation with:

- Glacier run off
- Snow pack run off
- Rain, sleet, hail

WHERE DOES PRECIPITATION COME FROM?

Precipitation comes from water that has evaporated from the earth's surface.

"Most of the moisture in the atmosphere (about 90%) came from water evaporating from oceans, seas, lakes, and rivers. And because over 70% of Earth's surface is covered by oceans, they contribute a lot to the overall volume of water evaporating into the atmosphere. The rest of the moisture in the atmosphere came from plant transpiration and a very small amount from sublimation."[6] Transpiration is when plants exhale water vapour. Sublimation is when snow and ice changes into water vapour in the air without first melting into water.

Evaporation patterns are different depending on location. "Evaporation is more prevalent over the oceans than precipitation, while over the land, precipitation routinely exceeds evaporation. Most of the water that evaporates from the oceans falls back into the oceans as precipitation. Only about 10 percent of the water evaporated from the oceans is transported over land and falls as precipitation."[6]

Droughts and heat waves impact how much water evaporates, and in turn how much and how often we receive precipitation.

MOUNTAIN RUNOFF

Mountain run off is created by precipitation. Our water comes from wells fed by mountain runoff.[1] Our wells draw water out of aquifers in the Paskapoo formation. Since we don't control precipitation, we have no direct control over how much water ends up in our wells.

SURFACE AND GROUNDWATER

Some water is stored above ground (lakes, rivers), and some is underground (soil, aquifers).

1, 6: See page 28

The Water Cycle

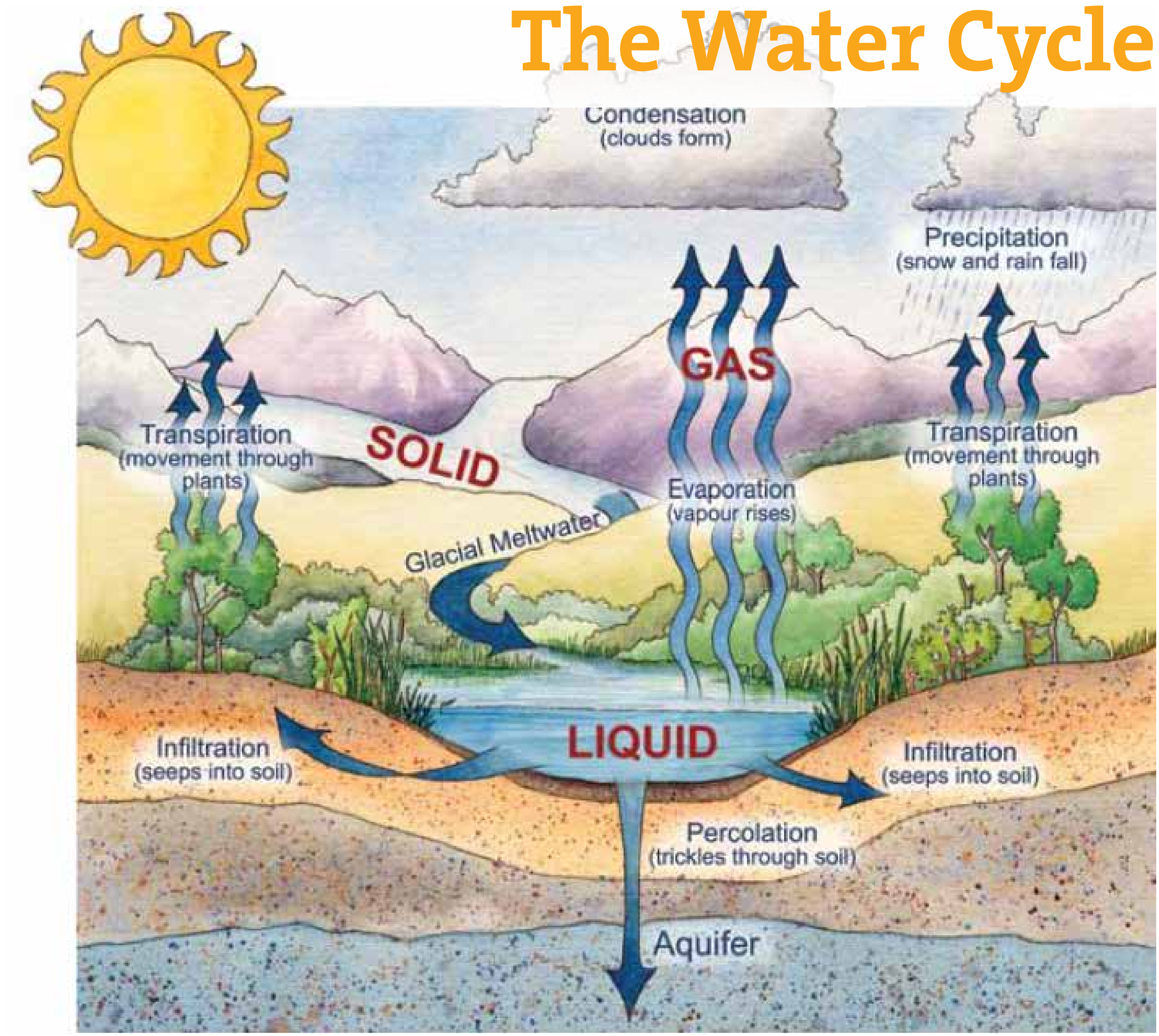


Illustration from Facts About Water in Alberta (pg 5)[1]

Sylvan Lake is growing… how do we get more water?

We can't make water

We borrow it from the water cycle

Our natural reservoirs

OUR ENVIRONMENT STORES WATER

The water cycle includes natural reservoirs that make healthy lives and economies possible. Earth's water is in the air, clouds, rivers, oceans, ice, plants, living organisms, in the top few miles of the ground, and in aquifers.[7]

THE PASKAPOO FORMATION

The Paskapoo Formation is a layer of sedimentary rock that is mostly made of shale and sandstone.[5] It covers over 66,000 km^2 of southwestern Alberta.[5]

AQUIFERS ARE NOT UNDERGROUND RIVERS

"Groundwater in Alberta is not found in underground rivers or massive open spaces. Groundwater is found beneath the earth's surface in gaps and pore spaces between material that may be loose, such as sand and gravel, or hardened such as sandstone and conglomerate. These underground water bearing materials are called aquifers." [2]

WHAT REFILLS AQUIFERS?

Precipitation refills aquifers. "Aquifers are recharged when water from the surface percolates in to the ground."[2]

HOW FAST CAN AQUIFERS REFILL?

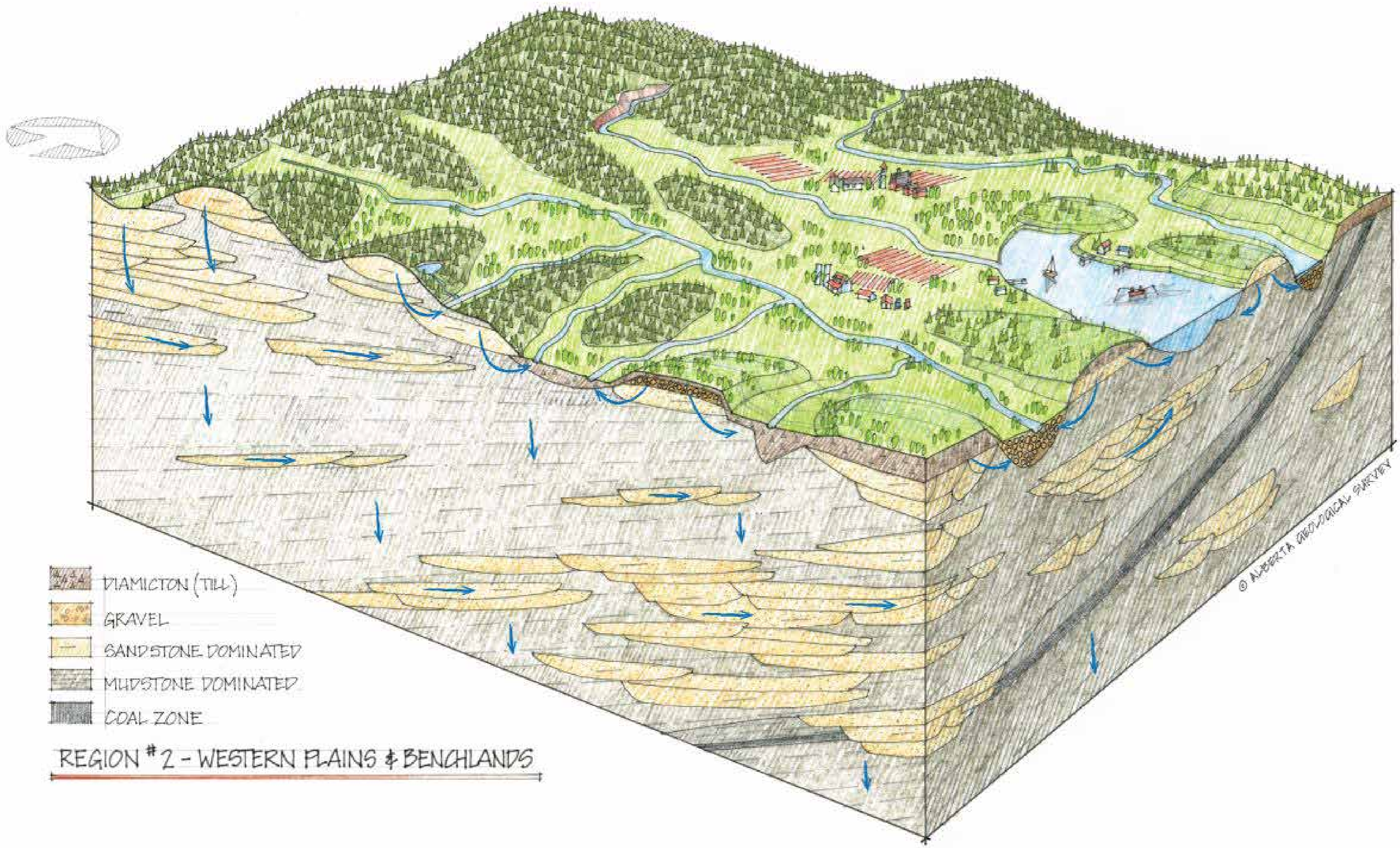
How fast the water soaks down depends on if the ground is more like a sponge, or more like a rock. Sand and gravel aquifers refill more easily. Sandstone and rock take a lot longer. Shallow aquifers take less time to refill. Deep aquifers (up to 2,000 m) take a long time to refill because the water has farther to go. "Some deep aquifers may take thousands of years to replenish."[3] Our aquifers are 30 - 50 m deep and take decades to recharge.

AQUIFERS CAN GET STRESSED

Extreme weather like droughts or intense storms make it harder for aquifers to refill or recharge. For example, during an extreme rainstorm, most of the water runs off before it gets a chance to soak through the ground and refill the aquifer. Too many users using water too quickly can also stress aquifers.

2, 3, 4, 5, 7: See page 28

Aquifers in the Paskapoo Formation[4]



Why use water carefully?

WE CAN STRESS AQUIFERS

"Stressors that can deplete aquifers include:

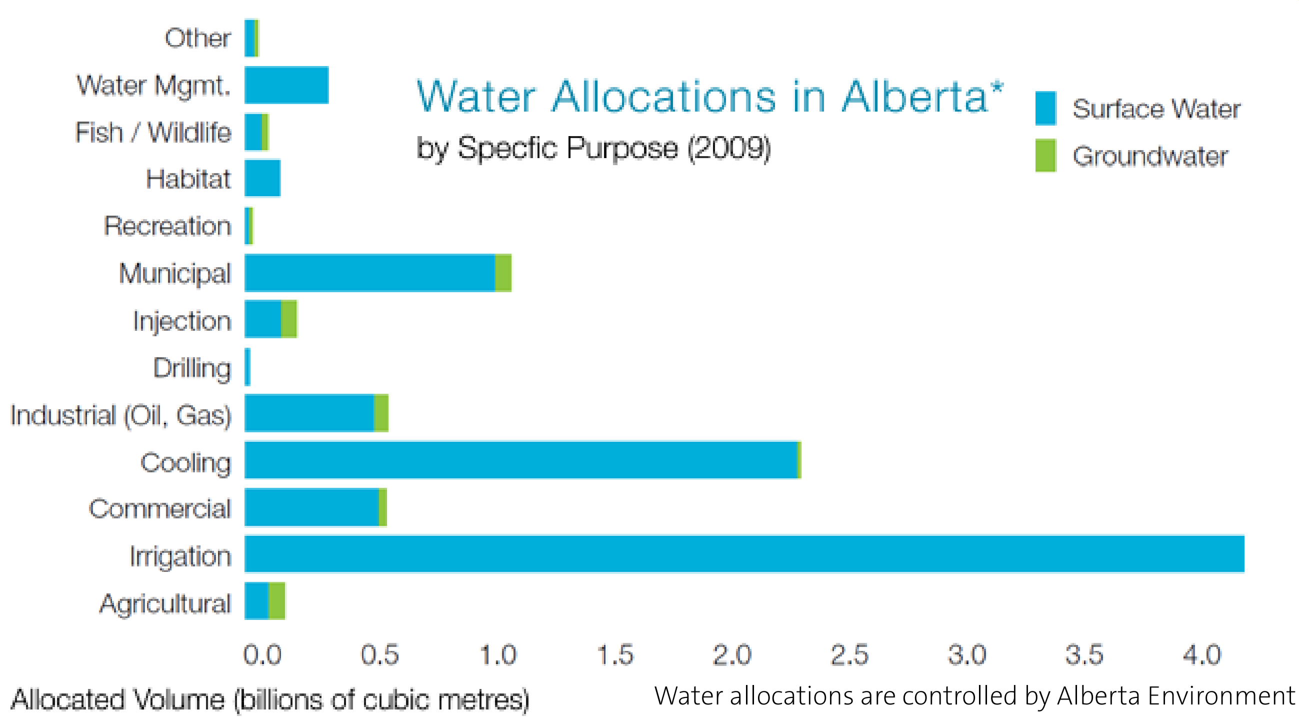
- Changes in precipitation and snowmelt patterns
- Withdrawal of groundwater for drinking, irrigation, and other human uses, and
- Impervious paved surfaces that prevent precipitation from recharging groundwater."[3]

WE ARE NOT THE ONLY USERS

The Town of Sylvan Lake must share local aquifers. There are many different users who depend on water in the Paskapoo formation.

"Of the over 320,000 groundwater wells drilled in the Prairie Provinces, over 100,000 are in the Paskapoo Formation, making it the largest single source of groundwater in the Canadian Prairies. Of these Paskapoo wells, approximately 85% occur between Calgary and Red Deer, making it one of the most intensive groundwater use regions in the country."[5]

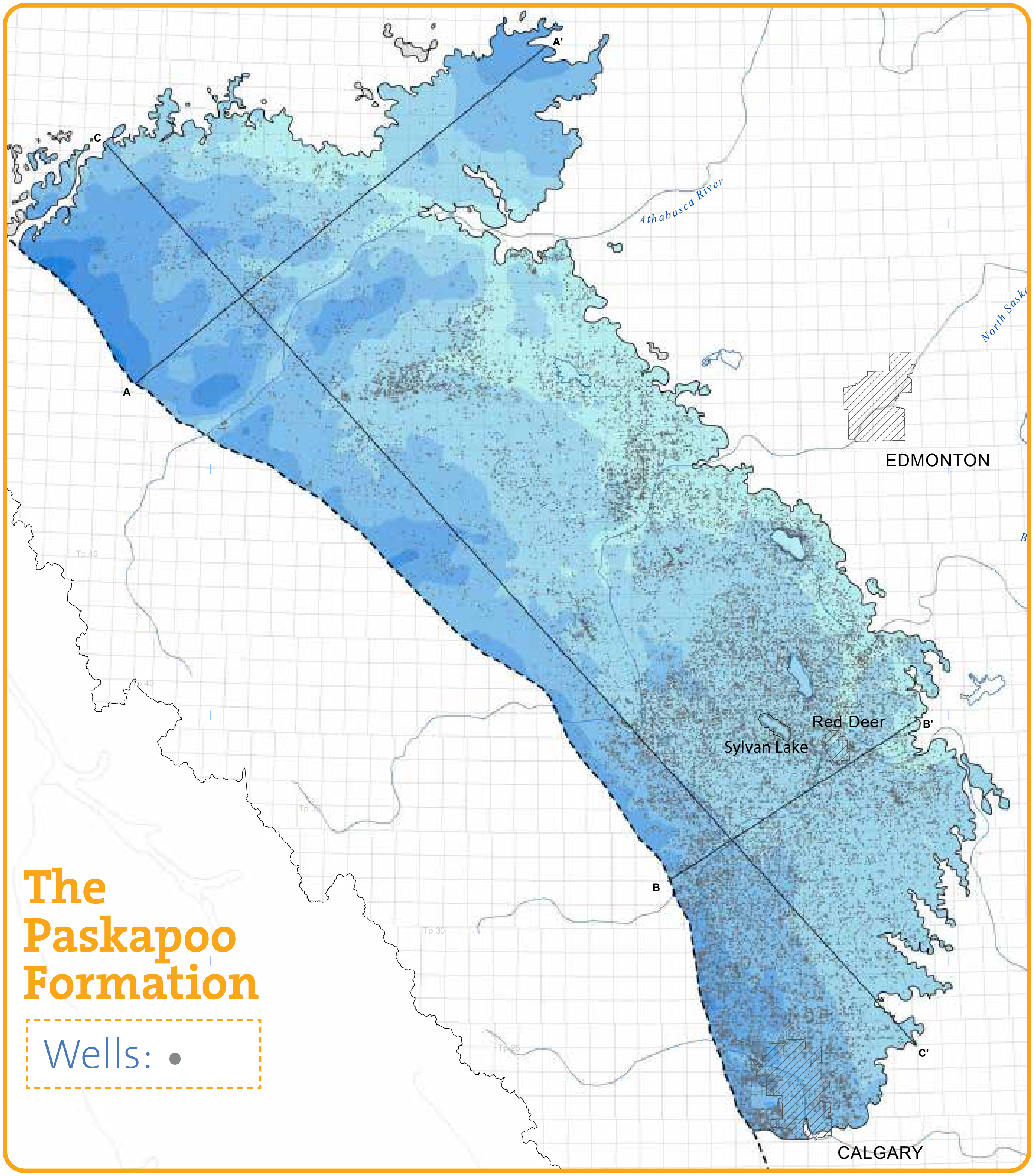
"Currently, this region is also showing some of the most rapid population growth in the country and concurrent rapid growth in groundwater usage. At the same time, the province has suffered from extreme drought conditions over the last four years, which has lead to the realization that most of the surface water supplies are fully allocated in southern Alberta."[5]



Water allocations are controlled by Alberta Environment

From: Facts About Water in Alberta (pg 35)[1]

1, 2, 3, 5: See page 28



From: Alberta Energy Regulator / Alberta Geological Survey[2]

WHAT IMPACTS AVAILABLE WATER?

- The number of wells (see map above)
- Short term dry spells
- Long term droughts
- High water usage
- Natural aquifer drainage into water bodies

Only 4% of rain makes it into our aquifer

REFILLING OUR AQUIFER TAKES DECADES[8, 9, 10, 11]

Our aquifer is a giant sponge made of sandstone. When it rains, the water soaks into the ground and starts filling up the sponge. It takes decades for the water to seep from the surface all the way down to the bottom of the sponge. Here's why:

- **Depth:** Aquifers can be very deep. It takes a lot of time for water to travel through the upper layers of soil and rock to reach the bottom layers and aquifer. Our wells go down 30 - 50m
- **Soil (till):** The soil on top of the aquifer is like a layer of protection. It can absorb some of the rainwater, but it also slows down how quickly the water can travel deeper. Drought makes the soil hydrophobic, which means it repels water, and so rain runs off and away instead of soaking into the ground
- **Rocks (sand/lime stone, shale, coal seams):** Underneath the soil are layers of rocks. Some rocks are like sponges and can absorb water and let it travel through, while others are more like bricks and don't let water pass through easily
- **Waterproof surfaces:** Buildings and paving don't let water to filter down into the ground
- **Amount of Rain:** It takes a lot of rain to recharge an aquifer. Just a little bit of rain might not even make a dent in the sponge. So, even though rain might fall quickly, it takes a long time for that water to make its way down to the aquifer and recharge it.

ONLY 4% OF RAIN MAKES IT TO SYLVAN LAKE'S AQUIFERS

Soil, rocks, depth, and amount of rain mean that only 4% of rain makes it into our aquifer. How do we know that? Since around 2014, the Town of Sylvan Lake has worked with a Hydrogeologist. This contractor has helped us study the geology and hydrology around Sylvan Lake. Based on these studies, we've learned how fast our aquifer refills, and how long it takes for rain to soak through the earth and reach the aquifer. Studies include well capacity, groundwater monitoring, and capture zone assessment.

8, 9, 10, 11, 12: See page 28

DROUGHT AND AQUIFERS[12]

Time is important to understand why aquifers take so long to recharge. We have daily weather as well as weather trends that happen across decades, or tens of years. Droughts and wet periods usually happen in central Alberta on a ten year cycle. Most droughts or wet periods don't last longer than ten years.

So, if we use water carefully, during the next years of wet weather our aquifer will recharge again and be ready for another dry period.

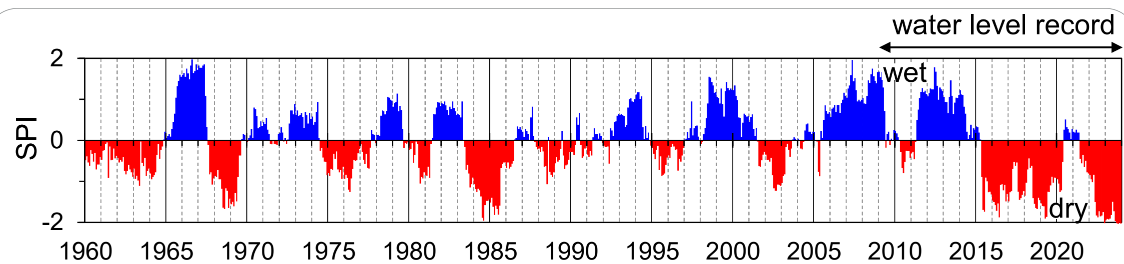


Figure 2. Standard precipitation index (SPI) for Calgary indicating wetter (blue) and drier (red) conditions compared to the long-term average

From: Groundwater Connections[12]

"We can always count on our aquifers for stable water supply as long as we do not overuse it by pumping too much water"[12] and our weather patterns remain stable.

We can hurt our aquifers

OUR AQUIFER IS VULNERABLE

We studied what materials make up our aquifer. It is made out of a mixture of sandstone, and coal seams. The part of the aquifer that stores water is made of fractured sandstone. This makes it vulnerable to damage.

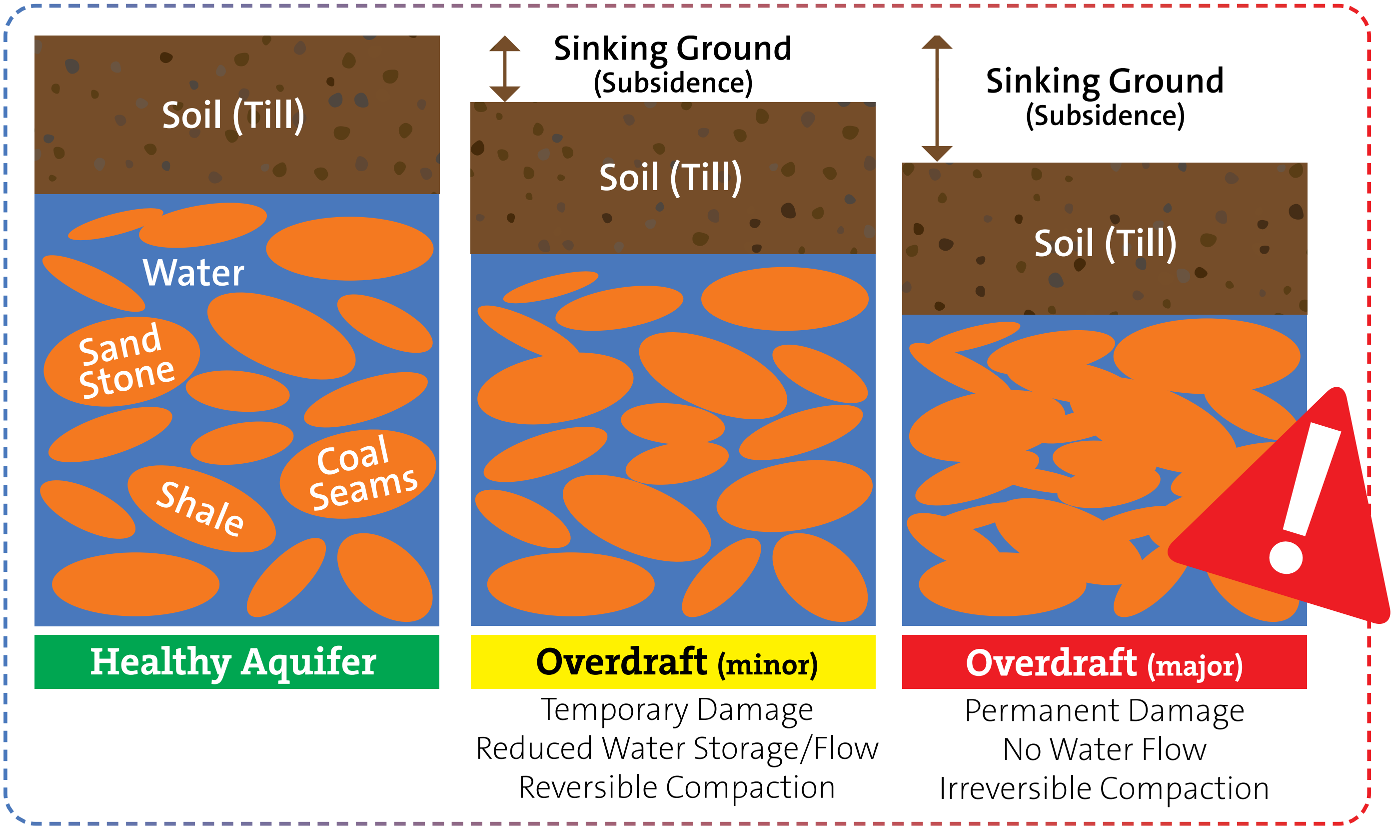
Again, imagine the aquifer as a giant sponge. When you squeeze the sponge too hard, the water comes out, but the sponge gets crushed. The spaces that hold the water become smaller and less able to hold water in the future. This is called overdraft.

OVERDRAFTS

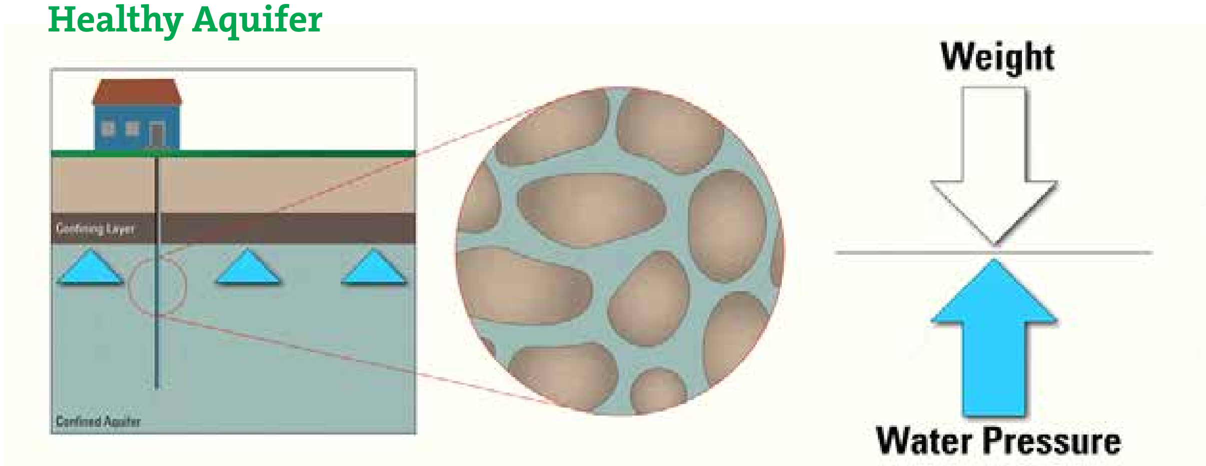
Pumping too much water too fast out of an aquifer can permanently damage it, causing:

- **Less Water:** When you pump out more water than the aquifer can naturally replenish, the water level in the aquifer goes down. This means there's less water available for plants, animals, and people
- **Reduced water quality:** Pumping too much water can also reduce the quality of the water that remains in the aquifer. This can happen because contaminants from the soil or other sources can enter the aquifer more easily when the water level is low.
- **Compaction:** As the water is drained from the spaces in our aquifer, the spaces collapse. If it collapses a little, it may be able to recover if given enough time and stable weather patterns. If it collapses too much, the aquifer may never produce water again because the spaces that hold water are gone
- **Subsidence/sink holes:** As compaction becomes more severe, both the ground above and the aquifers themselves can start to compact under the weight of the overlying sediments. This causes subsidence at the surface[14]

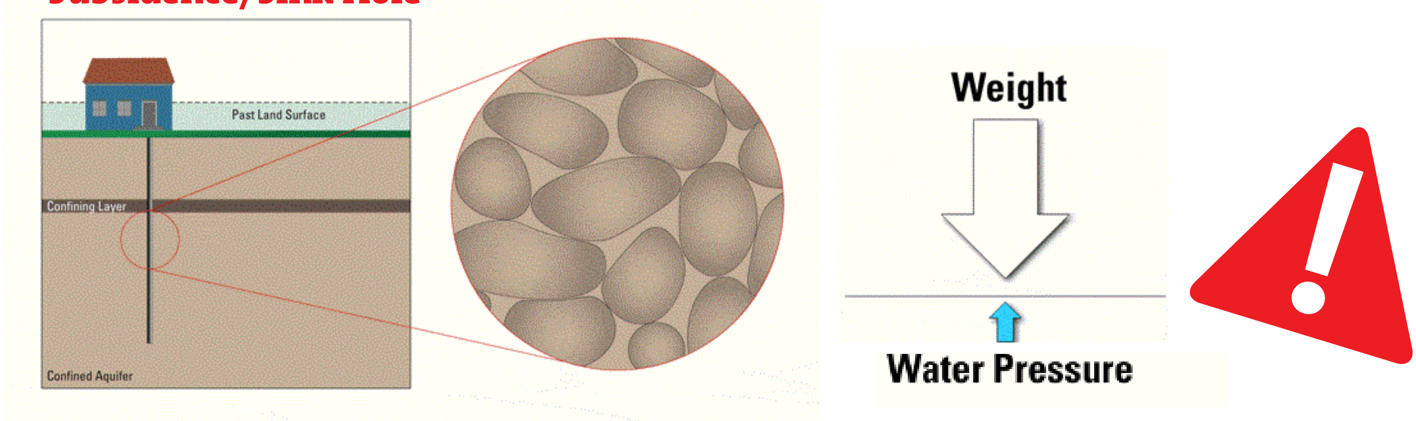
14: See page 28



Healthy Aquifer



Subsidence/Sink Hole



Water Restrictions

WHAT ARE RESTRICTIONS

Restrictions happen when we use more water than our wells can produce. In 2024, we used water faster than our wells could produce. That meant that we had to ask Lakers and businesses to eliminate wasteful usage and to conserve more water. If we continued to use water too fast, for too long, our aquifer could be permanently damaged. The Town must also follow rules during restrictions. View the rules here: sylvanlake.ca/townsaveswater.

OUR USAGE

Our wells produce enough water to use, but not enough water to waste. The charts on the next page shows actual Sylvan Lake data for:

- How much water our wells produced
- How much water the Town used from our reservoirs

You can see that in 2024 our water usage spiked in July. This led to water restrictions because the aquifer and wells could not keep up with how much and how fast water was being used.

SEE WASTEFUL WATER PRACTICE?

If you see wasteful water practices during water restrictions, what should you do?

- Be polite. Be kind
- Talk to the person or business, they may be unaware of the restrictions
- While you are free to discuss online and in social media, online discussions do not produce change
- The Town cannot respond to complaints unless they are formally submitted
- If you see wasteful water practice, please submit a complaint online sylvanlake.ca/contact or call 403 887 2800

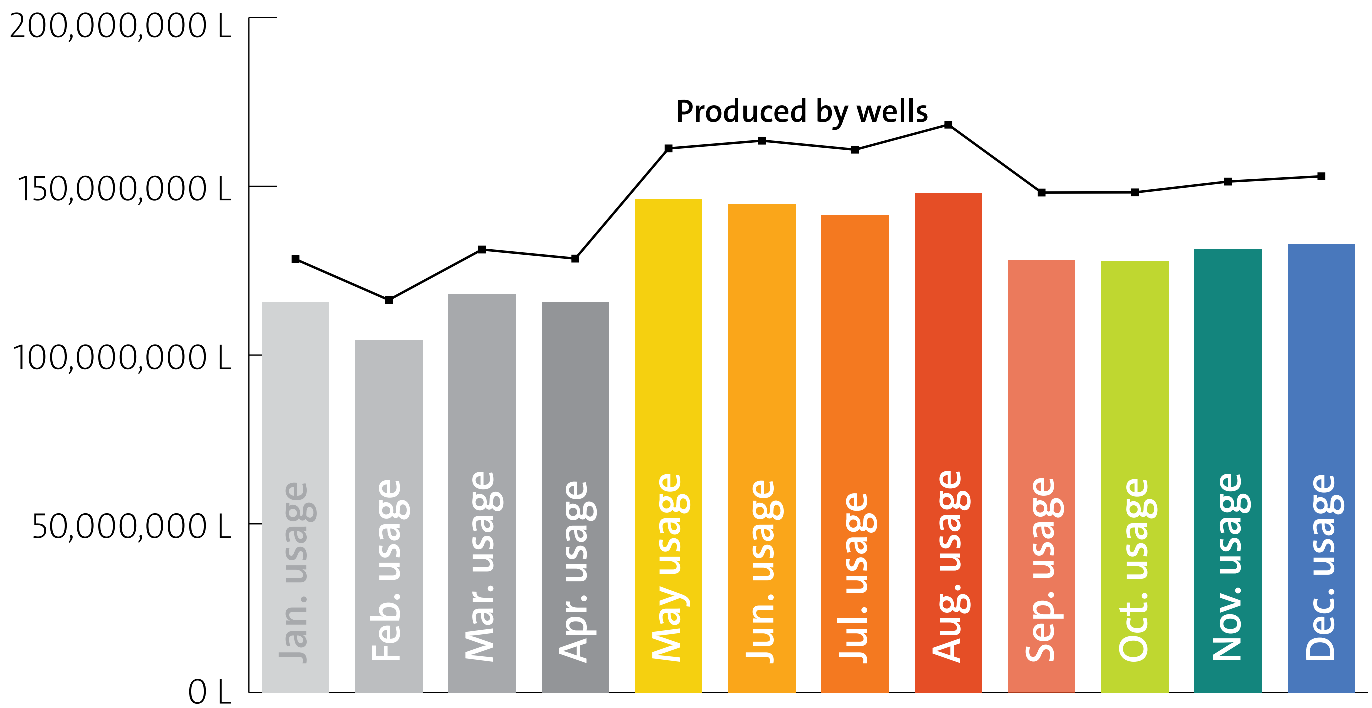
SEE WATER WHERE IT SHOULDN'T BE?

Help us find water main breaks! If you see:

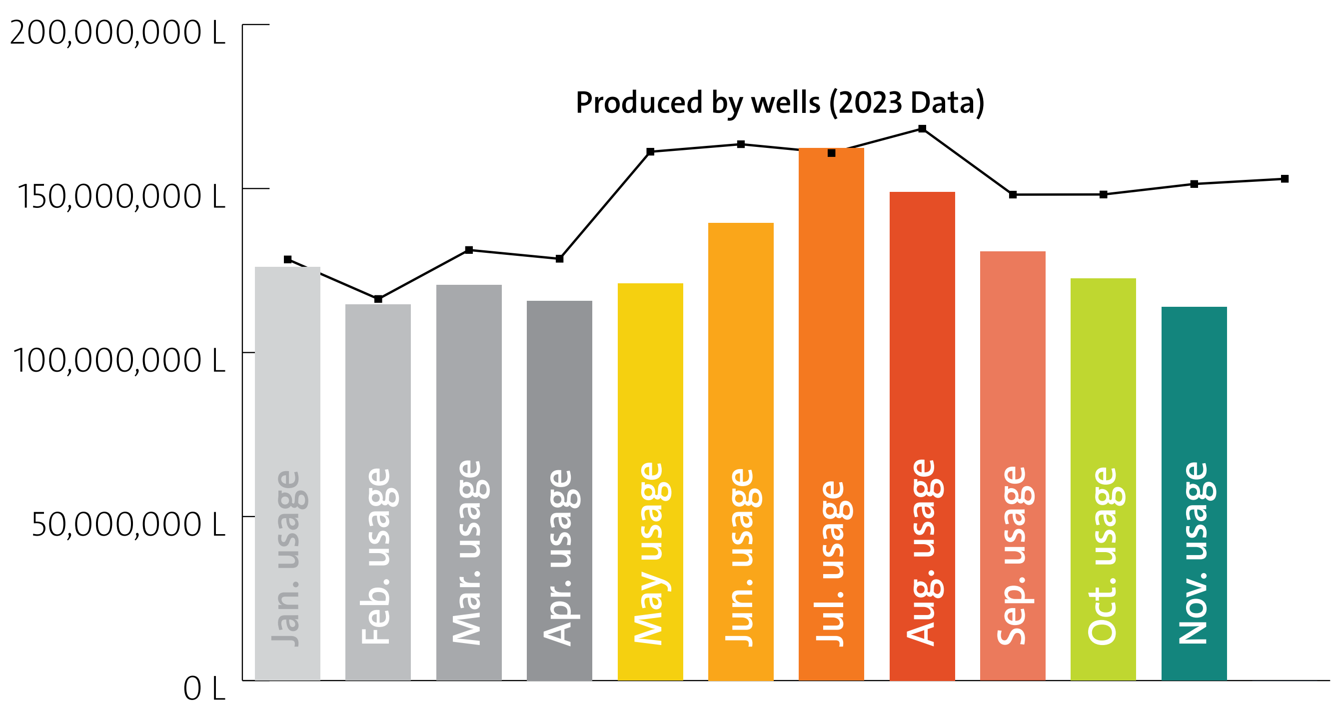
- Water bubbling up from the ground, or
- Big puddles that are growing quickly

Call 403 887 2800. Outside business hours follow the prompts for the 24 hour emergency line.

2023 Water Usage and Production - Town of Sylvan Lake
Total: 1,554,177,000 Litres Jan - Dec



2024 Water Usage and 2023 Production - Town of Sylvan Lake
Total: 1,416,311,860 Litres Jan - Nov



Water Conservation

WHAT IS CONSERVATION?

Conservation is an annual water saving program that started in 1996. This program started to get Lakers into the habit of using water wisely during the spring, summer, and fall. Conservation is not restriction.

WHY CONSERVE WATER?

With careful water use and planning, we can protect our water today and have enough for the future. Still, there are many reasons why we have to be careful with our water supply:

- Our water supply is not endless
- We can hurt our aquifer
- Adding wells does not increase how much water is in the aquifer

DROUGHT RESPONSE

In 2023, the Town of Sylvan Lake received a letter from the Government of Alberta requesting action on drought. In response, the Town of Sylvan Lake expanded conservation rules in 2024. Learn more here: www.alberta.ca/drought

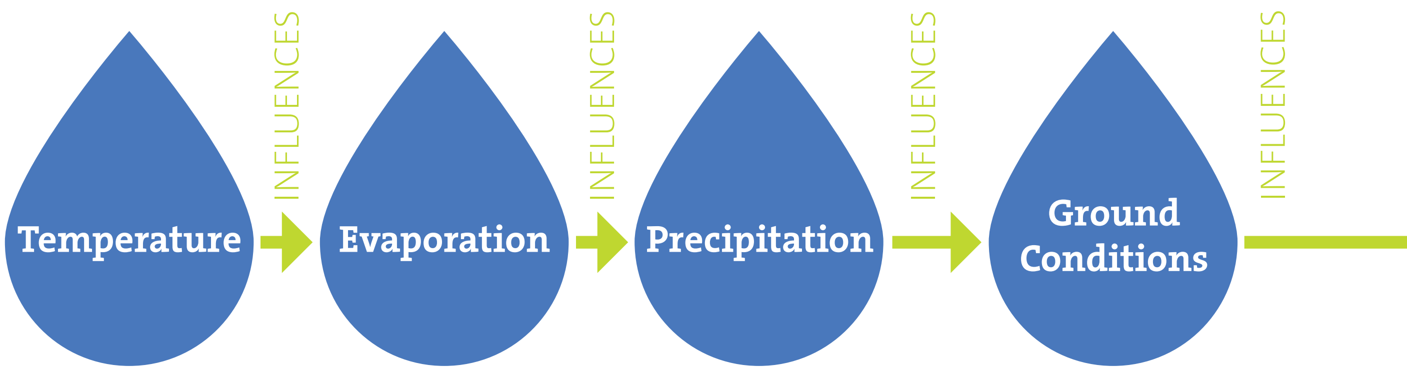
CONSERVATION RULES

- April 1 - October 31
- ALL homes watering ban everyday 10:00 AM - 7:00 PM
- All homes, anytime: Turn off your water if it is running into the street or sewer system.
- Odd numbered homes: water lawn, garden, or yard ONLY on odd numbered days
- Even numbered homes: water lawn, garden, or yard ONLY on even numbered days
- Hand watering: Any home may water by hand with a water jug on any day of the week, any time of day
- New sod or seed: water on any day of the week, any time of day
- Fines for not following mandatory water conservation rules

How it all works together

Anything that reduces the amount of available water is passed on and magnified at the next stage.

What we can't control directly

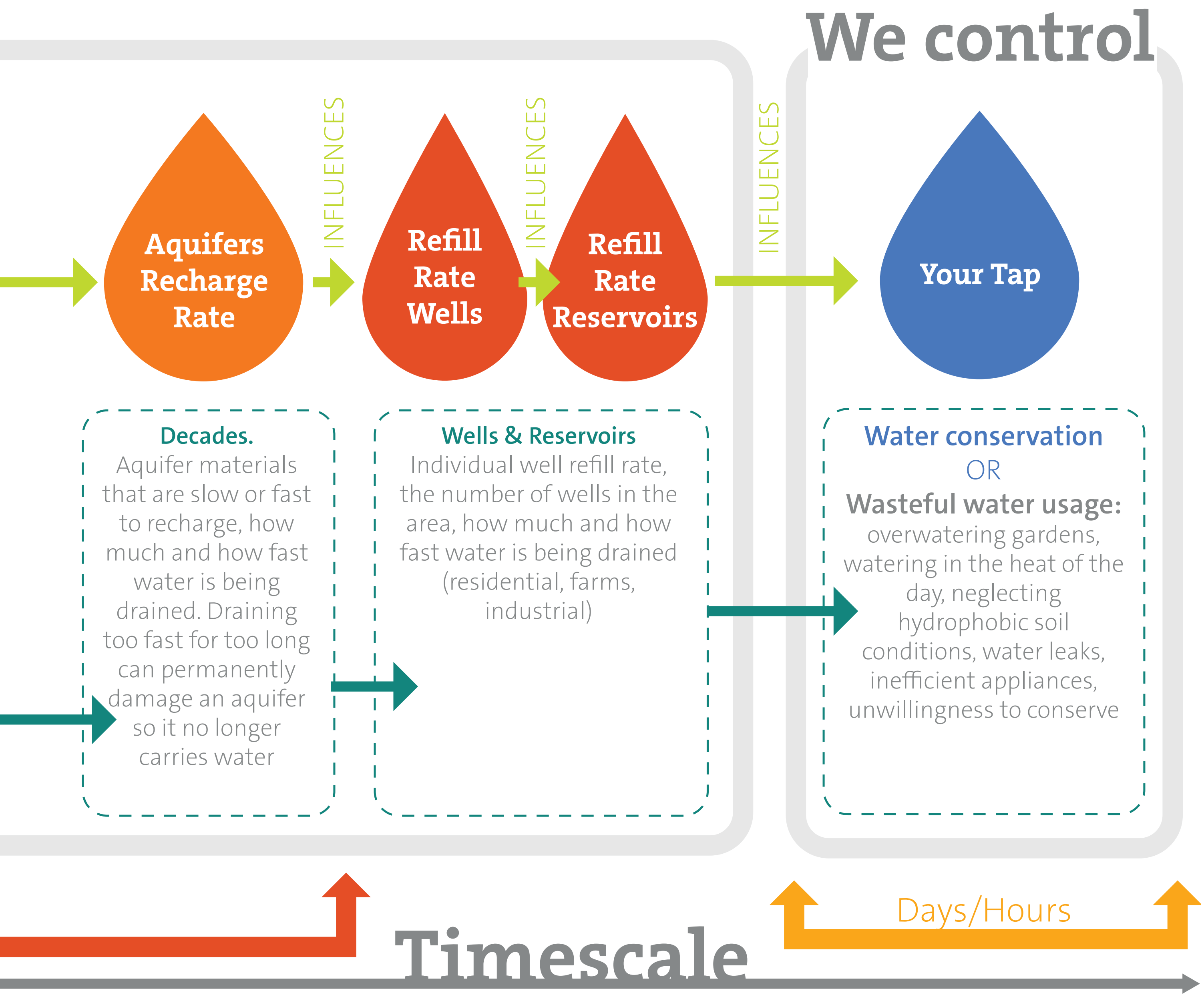


Weather patterns, dry spells, droughts, extreme weather, ice pack conditions

The amount of water on earth is fixed. No matter how many wells or reservoirs we build, we cannot make more precipitation. It can take decades, hundreds, or thousands of years to recharge our natural reservoirs like ice packs and aquifers. Based on hydrology studies, the aquifers in and around Sylvan Lake take decades to recharge under ideal conditions.

Only 4% of precipitation reaches our aquifer. Water must filter through layers of soil/rock/till. Paving and buildings are block water, hydrophobic soil caused by drought does not absorb water well and causes more runoff

Our Aquifers Take Decades to Recharge Under Normal Weather Patterns


We control
Aquifers Recharge Rate
INFLUENCES
Refill Rate Wells
INFLUENCES
Refill Rate Reservoirs
INFLUENCES
Your Tap
Decades.
Aquifer materials that are slow or fast to recharge, how much and how fast water is being drained. Draining too fast for too long can permanently damage an aquifer so it no longer carries water
Wells & Reservoirs
Individual well refill rate, the number of wells in the area, how much and how fast water is being drained (residential, farms, industrial)
Water conservation
OR
Wasteful water usage:
overwatering gardens, watering in the heat of the day, neglecting hydrophobic soil conditions, water leaks, inefficient appliances, unwillingness to conserve
Days/Hours
Timescale

Planning

PLANNING FOR UPGRADES

Our path is set out by master plans. These plans identify areas of needs and concerns by using data from our water system and water modelling software.

2020 WATER MASTER PLAN

sylvanlake.ca/watermasterplan

Our 2020 Water Master Plan has identified several areas for improvement. The plan looks at our water system to estimate what we need in the future, including:

- **Fire Flow Conditions:** During a fire, how much water pressure we need to keep supplying Lakers and fight the fire at the same time.
- **Peak Hour Demand Conditions:** Total water used during the busiest hour of the year
- **Residential Per Capita Consumption Rates:** How much water Lakers use
- **Maintenance:** Reviews the condition of our water infrastructure, like valves, pipes and pumps. The plan outlines future repairs so we have less unplanned urgent repairs

Based on what we learned in the plan, the Town is updating our water system standards, and creating a plan to upgrade the system. Upcoming projects are in our 5 Year- Capital Plans. As of 2025, some of the projects include:

- Building the Northeast gateway water supply main to transport water from the north, with ample supply to the south, where it is less plentiful
- South reservoir upgrades and looping water mains to ensure better water flow and reliability throughout town
- Water main replacement program: Replacing aging water pipes to improve water quality and prevent costly water main break repairs
- Exploring alternatives to watermain replacements such as relining
- Planning to draw more water from the aquifer with new and renewed wells

KEEPING OUR AQUIFER SAFE - RULES AND REGULATIONS

The Town of Sylvan Lake must follow Alberta Environment and Protected Areas rules, which make sure:

- We carefully study our water use and future plans
- Protect water quality and the environment
- The Town doesn't use too much water
- The Town does not damage the water supply of surrounding areas

Water regulations protect our natural environment, like Sylvan Lake

CONNECTING TO REGIONAL WATER

In 2024, we considered the pros and cons of connecting to regional water systems. We did not move forward with this option at this time due to the complexity and high cost. We are planning to study this option in the future.

NEW WELLS

In 2023, we started a project to look for new wells. We are testing for new wells. The new wells will supply the north reservoir. The project includes careful testing before any wells are built. Testing makes sure the new wells:

- Don't hurt the aquifer by drawing too much water too fast
- Don't hurt the water supply of nearby wells

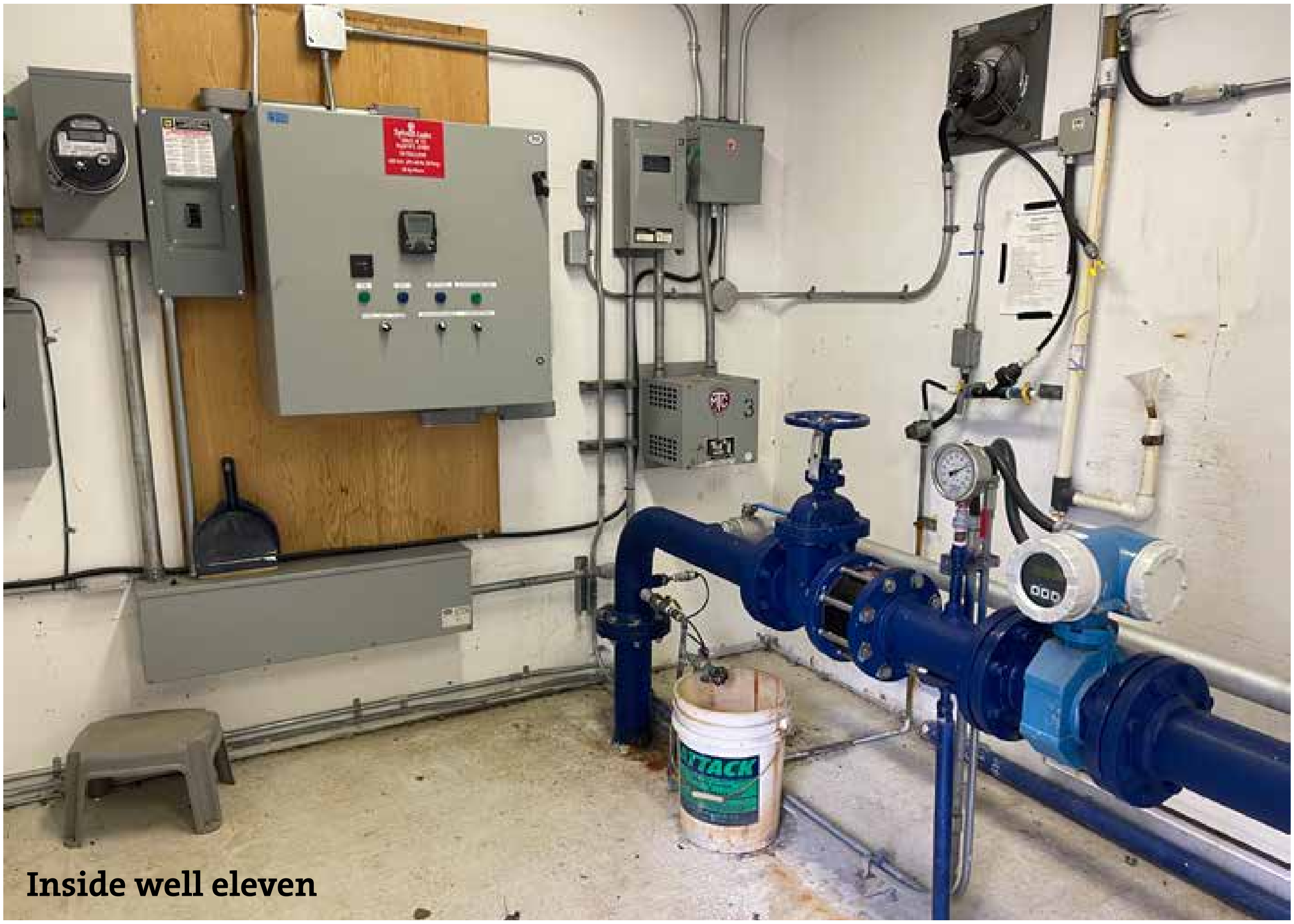
BALANCING LOADS ON WELLS

How do we add wells without hurting our water supply?

- Adding new wells does not change the amount of water in the aquifer, but it does help prevent overdraft
- For example, instead of drawing 1000 litres across 7 wells, we could draw 1000 litres across 9 wells
  - With 7 wells, we'd draw 134 gallons from each
  - With 9 wells, we'd draw 111 gallons from each
- We draw the same amount of water, but spread it out across different areas of the aquifer:
  - That makes the aquifer less susceptible to overdraft
  - Better protects the surrounding enviroment that also depends on aquifers, such as the lake

CAN WE JUST KEEP ADDING WELLS TO GET MORE WATER?

- No. Why? Adding wells does not change how much water the aquifer holds
- Remember, if we draw too much water too fast, we can permanently damage the aquifer. That means we could have less water, or no water coming from our aquifer
- That said, we should have enough water for everyone now and in the future, but not enough water to waste. Both the Town and Lakers must use water carefully. The Town must space the wells out properly, carefully study the aquifer, and closely monitor the aquifer. Lakers must conserve water and stop wasteful water practices
- Remember, as population, industry, and agriculture grows, the demand on water also grows
- It's best to use water wisely by eliminating wasteful water use
- If we all use water wisely, and weather patterns remain stable, there will be enough water for future generations



Inside well eleven

RENEW WELL THREE

In October 2024, we tested well 3 to measure its withdrawal limits. This testing helps us make sure that upgrading the equipment to pump more water won't damage our aquifer. The test results showed the aquifer could handle the increased usage. Soon, we'll make a request to Alberta Environment to draw more water.

All water usage is closely monitored by Alberta Environment. They coordinate different water users to make sure the aquifer stays healthy. The Town must get permission to use more water from Alberta Environment.

CONSIDERING OPENING WELL TWO

Well 2 was shut down in the early 2000s because we didn't need the extra water at that time. We are exploring if this well could be used again.

Testing at well three in 2024

Ways to save water

SAVE MONEY, ELIMINATE WASTE

Prevent water restrictions by eliminating wasteful water usage. It's as easy as:

- Cutting your shower time by one to two minutes could save 2,600 L of water/month
- Turning off the water when you aren't using it. For example, while brushing your teeth or rinsing food. This could save 12 L/minute
- Only run full loads of dishes and laundry
- Replace older appliances and fixtures with water efficient ones such as efficient washing machines, low/dual flush toilets, and faucets
- If it's yellow, let it mellow. Don't worry, we aren't asking you to have an indoor outhouse and we understand some people are squeamish about pee. But even saving one flush a day adds up to a major water savings if we are all doing it
- Using a rain barrel for watering plants because they don't like the chlorine in tap water
- Taking advantage of our toilet and rain barrel rebates here: sylvanlake.ca/gogreen
- Following water conservation Apr 1 - Oct 30
- Replacing water intensive landscaping with drought resistant plants and trees
- Watering in the early morning or late evening so that most of the water is absorbed into the ground, rather than evaporated
- Using drip irrigation to reduce evaporation
- Using a soil moisture meter to tell if watering is needed or if it can wait
- Hand watering
- Regularly checking your taps, pipes, and toilets for leaks and fixing leaks you find. A medium toilet leak could waste 500 L/day and cost an extra $58.50 on your monnthly bill

DROUGHTS AND HYDROPHOBIC SOIL

During droughts, soil can become hydrophobic. Water runs off hydrophobic soil because it can no longer absorb water easily. We've all seen sprinklers going and the water running off down the street and into storm drains. This wasteful practice costs you money, doesn't fix hydrophobic soil, and doesn't allow water to reach plant roots.

Marigolds are drought tolerant once established

REPAIRING HYDROPHOBIC SOIL

To re-wet soil, water slowly in small amounts over a longer period of time. This gives the soil a chance to absorb the water, instead of the water running off.

PREVENTING HYDROPHOBIC SOIL

- Add organic materials like compost to soil. Regular, sandy or clay soil types will all absorb and hold more water with more compost
- Add mulch over exposed soil

Your Drinking Water

Register today to be part of the conversation
engage.sylvanlake.ca/your-water

Get updates, ask questions, and give feedback on water projects!

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Thanks to Soren Poschmann, Professional Geoscientist (Manager, Hydrogeology ISL Engineering and Land Services Ltd) for fact checking this document. Thanks to Dr. Masaki Hayashi, University of Calgary, for providing local intel on the drought and water status in Alberta.

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Land Acknowledgement:

The Town of Sylvan Lake acknowledges that we are located on Treaty 6 territory, the traditional and ancestral territory of the Cree, Dene, Blackfoot, Saulteaux, and Nakota Sioux. We acknowledge that this territory is home to the Métis Settlements and the Métis Nation of Alberta, Region 3.

We are grateful for the Traditional Knowledge Keepers and Elders who are still with us today and those who have gone before us. We make this acknowledgment as an act of reconciliation and gratitude to those whose territory we reside on or are visiting.

Sylvan Lake
BRILLIANT ALL YEAR

January 2025