

Options for Groundwater Protection

ISSUE

There are gaps in the regulation of groundwater wells within city limits that contribute to risk of aquifer contamination, drinking water cross-contamination, public health issues, and associated liabilities. There are two types of wells that are of concern: residential pumping wells used as a source of domestic water; and monitoring wells that are used to measure, test, or sample groundwater.

BACKGROUND

History

Bylaw No. 9700, The Official Community Plan Bylaw, supports water protection initiatives that include the protection of ground and surface water. The City of Saskatoon (City) has implemented several initiatives to protect surface water, however there is no current policy to protect groundwater.

Current Status

The City's Water Supply

Since 1906, water has been pumped from the South Saskatchewan River to provide a safe and reliable source of fresh drinking water for Saskatoon. City water is routinely treated and tested and consistently meets or exceeds all federal-provincial drinking water quality objectives. With a reliable and high-quality surface water source, there is no current municipal need to use groundwater. However, some residents and businesses within city limits do have wells for various uses, and wells are routinely used for monitoring groundwater during development and construction.

Groundwater Background

Groundwater is an important natural resource that requires protection to ensure its viability is sustained for present and future users. Appendix 1 - Groundwater Information contains background information about local groundwater resources, risks of using groundwater, regulation of groundwater wells, and key terms.

The Water Security Agency (WSA) regulates the use of groundwater for non-domestic (industrial and commercial) purposes in Saskatchewan. The use of groundwater for domestic purposes, which includes residential pumping wells, is not regulated by WSA. Monitoring wells are also not regulated by the province.

Pumping Wells

Domestic purpose pumping wells are typically installed to extract groundwater for household, sanitary and irrigation use. The Administration receives an average of five inquiries about residential pumping wells each year. Based on provincial records there could be 350 pumping wells within Saskatoon city limits; however, their precise location and status (active/inactive) is not documented.

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Monitoring Wells

Monitoring wells are used to measure groundwater levels or groundwater quality. They are typically used during land development and construction or for environmental monitoring.

Public Engagement

The Administration engaged subject matter experts, consultants that design wells, well drillers and installers, and land developers. A total of 85 participants took part in the engagement activities, including stakeholder meetings and public surveys, held from August 2021 to October 2021.

Approaches in Other Jurisdictions

Provincial governments in Canada have the primary role in regulating and protecting groundwater. Some provinces, including Saskatchewan, exempt domestic purpose wells from regulation.

Calgary, Kamloops, Langley, and Lloydminster have bylaws prohibiting private water connections when a property is connected to municipal service. Yorkton, which relies solely on groundwater for its municipal supply, prohibits groundwater pumping wells within its city limits.

Alberta, British Columbia, Manitoba, and Ontario have guidelines, standard operating procedures, and technical bulletins for well decommissioning. Saskatchewan has guidelines for installing, operating, and decommissioning wells, but does not regulate or require reporting on decommissioning.

OPTIONS

The Administration has developed three policy options for pumping wells and two policy options for monitoring wells to address gaps in regulation and protect groundwater.

Pumping Wells

The following options were investigated for domestic purpose pumping wells:

A1: Do not regulate domestic purpose pumping wells (maintain status quo)

The installation, operation, and decommissioning of pumping wells for domestic purposes would remain unregulated in Saskatoon.

A2: Allow new domestic purpose pumping wells for irrigation only

The Administration would create a bylaw for City Council consideration to regulate the installation, operation, and decommissioning of new domestic purpose pumping wells for the sole purpose of irrigation for private residences. The use of groundwater for drinking or washing would be prohibited. Existing domestic purpose pumping wells would be unaffected until they are no longer in use, at which time proper decommissioning would be required.

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A3: Prohibit new domestic purpose pumping wells

No resident would be allowed to install or operate a new domestic purpose pumping well within city limits where municipal water service is available. Existing domestic purpose pumping wells would be unaffected until they are no longer in use, at which time proper decommissioning would be required.

The Administration also investigated the potential for a bylaw to allow and fully regulate all domestic purpose pumping wells. However, full regulation would require the development of specialized skill sets, processes, and risk/liability management measures within the municipality that would overlap those already present within the provincial WSA. Implementation would be expensive and impractical in relation to the number of requests received. This option is therefore not being presented for consideration in this report.

Monitoring Wells

Several policy options were investigated for monitoring wells. The Administration is committed to creating internal guidelines and processes for the maintenance and decommissioning of monitoring wells on City property and rights-of-way. In addition, the Administration could pursue the following options for wells on private property:

B1: New Development Standards

New standards and specifications would be created for monitoring wells installed, maintained, or decommissioned during the land development process. These standards would also apply to abandoned wells.

B2: New City-wide Standard

New standards and specifications would be created for all monitoring wells installed, maintained, or decommissioned within city limits.

RECOMMENDATION

That the Standing Policy Committee on Environment, Utilities and Corporate Services recommend to City Council that:

1. A bylaw be created to prohibit new domestic-purpose pumping wells within city limits (Option A3); and
2. A new development standard be created for monitoring wells installed, maintained, and decommissioned during the land development process (Option B1).

RATIONALE

Appendix 2 - Options Analysis, contains a full analysis and comparison of the options presented in this report. The proposed options were compared based on:

- addressing risk to groundwater and public safety;
- feedback from stakeholder engagement;
- Triple Bottom Line (TBL) implications;

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- budget and time requirements; and
- ease of implementation.

Pumping Wells

The recommended option (A3) to prohibit new domestic-purpose pumping wells, achieves greatest management of risks to groundwater quality and quantity as well as risks to public safety. Option A3 was also the most supported during stakeholder engagement and by TBL implications. This option requires the least amount of time and budget to implement.

Monitoring Wells

The recommended option (B1) to create new development standards for monitoring wells during land development, partially achieves management of risks to groundwater quality as well as risks to public safety. Option B2: Create a New City-wide Standard was the most supported during engagement and the TBL analysis and achieves greatest management of risks. However, additional engagement would be required to fully evaluate Option B2 with the general public, and additional budget would be required for implementation. The Administration is therefore recommending Option B1: New Development Standards for monitoring wells during land development as an initial step with the potential to revisit Option B2 in future.

Appendix 3 contains the Stakeholder Engagement summary. Appendix 4 contains a summary of the Triple Bottom Line implications identified for these options.

FINANCIAL IMPLICATIONS

For the recommended Options A3 and B1, no additional resources or budgets are required for implementation.

COMMUNICATION IMPLICATIONS

All stakeholders that the City consulted with will be informed of the outcome of this report and information will be posted to the City's website.

ADDITIONAL IMPLICATIONS/CONSIDERATIONS

The recommended options have been selected considering existing conditions and demand. Should future demand for groundwater use change due to impacts such as climate change, the City's approach can be amended or updated.

NEXT STEPS

If the recommended options are supported, development of a bylaw for pumping wells and new development standards/specifications for monitoring wells will take approximately one year. Development of programs and process to support implementation can occur in parallel within the same time frame. It is anticipated that an approval report with a recommended effective date for the bylaw and standards/specifications can be brought forward in Q4 2022.

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If City Council chooses options other than those recommended, budget requests for implementation of these options will be submitted for the 2024-2025 budget cycle with work planned to proceed in 2024.

APPENDICES

1. Appendix 1: Groundwater Information
2. Appendix 2: Options Analysis
3. Appendix 3: Engagement Summary
4. Appendix 4: Triple Bottom Line Implications

Report Approval

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Groundwater Resources in the Saskatoon Area

Groundwater resources in the Saskatoon area have been mapped at a regional scale by the Water Security Agency (WSA) and include both shallow and deep aquifers. Significant groundwater resources, listed from deepest to shallowest, include the Tyner Valley Aquifer, Forestry Farm/Dalmeny Aquifers, and surficial aquifers. Groundwater from these aquifers is used currently for domestic and other purposes, including municipal supply for communities outside of Saskatoon.

Shallow aquifers tend to provide the freshest water and are most targeted for groundwater use. These wells are also the most vulnerable to contamination from surface sources and fluctuations in water availability linked to climate and water use. Deeper aquifers tend to have greater water availability, but the water tends to be mineralized and is costly to access.

Risks of Using Groundwater in Saskatoon*Water quality*

Untreated groundwater from private wells is not always safe for drinking water purposes. Testing is required to guarantee its safety and treatment is sometimes also needed to meet federal-provincial drinking water quality objectives. The City of Saskatoon (City) provides safe drinking water sourced from the South Saskatchewan River and is not responsible for ensuring that groundwater from private wells is tested or treated.

Groundwater can be used for irrigation without treatment if it is not too saline, however minerals dissolved in groundwater can accumulate in irrigation equipment over time necessitating more frequent maintenance. Irrigation with saline groundwater can negatively impact soil quality and plant health.

In addition, bacteria from sanitary sewer line leaks, nitrates from lawn fertilizers or agricultural sources, and chemicals from spills are all contamination risks to groundwater. The number of potential contaminant sources are greater in Saskatoon when compared to rural areas due to the higher population density and more variable land use within city limits. Contaminants can reach aquifers either by infiltrating through soil and migrating through groundwater or by entering poorly maintained or abandoned groundwater wells.

Cross Contamination

The provision of two separate water sources to a property creates the risk of untreated and unregulated groundwater entering the municipal supply, potentially contaminating and impacting city supply and infrastructure.

Pumping Wells

Pumping wells can be up to 0.6 meters (2 feet) in diameter as indicated in the picture below.



Fig. 1: Large diameter pumping well (source: Water Security Agency)

Regulation of Pumping Wells

The WSA regulates the use of groundwater for non-domestic (industrial and commercial) purposes in Saskatchewan through the issuance of water rights licenses. The agency monitors groundwater levels, allocations, and use from aquifers in the southern half of the province, thereby administering and managing groundwater resources at a regional scale.

Domestic purpose groundwater pumping wells on residential property are not regulated by the WSA. There are currently an estimated 350 pumping wells within Saskatoon city limits, however their location and status (active/inactive) are not precisely known. The City's current bylaws do not address the installation nor operation of groundwater pumping wells in Saskatoon.

The Ministry of Energy and Resources regulates oil and gas wells, geothermal wells, and disposal wells within Saskatchewan. These activities require a licence obtained through an application and review process.

Monitoring Wells

Monitoring wells are used to inform development or redevelopment of property or for environmental monitoring. They can have flush mounts, no protective casing or metal protective casings as indicated in the photos below. However, they are sometimes installed and neither maintained nor decommissioned properly which presents groundwater quality, public safety, and liability risks to the property owner.



Fig. 2: Flush mounted well



Fig. 3: Well with no protective casing



Fig. 4 Well with metal casing and lock

Regulation of Monitoring Wells

Monitoring wells are not regulated by the province. The City's current bylaws do not address the installation, maintenance nor decommissioning of groundwater monitoring wells in Saskatoon.

Key Terms

Abandoned well: a well that is no longer used¹.

Aquifer: any geological formation from which groundwater can be withdrawn in usable quantities to suit a given need².

City water: water supplied from the City of Saskatoon water works system.

City water works system: any City of Saskatoon asset or facility for the collection, transmission and treatment of water including the main lines of the system³.

Decommissioned well: a well that has been properly sealed to prevent the vertical movement of water within it².

Domestic purpose: household and sanitary purposes, the watering of stock, the spraying of crops, the watering of noncommercial lawns and gardens adjoining private residences. Does not include the sale or barter of water for such purposes²

Groundwater: water beneath the surface of land².

Industrial purposes: any purposes for which water is used in the production of goods and services and includes the use of water for cooling purposes².

Irrigation purposes: the controlled application of water to soil for the purpose of supplying moisture essential to plant growth².

Monitoring well: a well used for measuring, testing, or sampling groundwater.

Municipal purposes: household and sanitary purposes, the watering of streets, walks, paths, boulevards, lawns and gardens, fire protection and the flushing of sewers, and includes the construction of buildings and of civic works, and other purposes usually served by water within a city, town, or village and such other purposes².

Pumping well: a well used for withdrawing groundwater for domestic or non-domestic purposes other than testing or sampling.

Well: an opening made by drilling into the ground for the purpose of obtaining groundwater or scientific data on groundwater, whether water is obtained or not⁴.

¹ [Decommissioning Abandoned Water Wells Fact Sheet](#) FS-309. 2013. Water Security Agency.

² [The Ground Water Regulations](#). Saskatchewan Regulation 172/66. Last amended 2006.

³ *Bylaw 8880, Private Sewer and Water Service Connection Bylaw*, City of Saskatoon, 2010.

⁴ [The Water Security Agency Act](#). Chapter W-8.1 of the Statutes of Saskatchewan. Last amended 2019.

Pumping Well Options

The Administration examined three options for pumping wells as a means of improving groundwater protection in Saskatoon. They address resident-owned domestic wells only. Other types of groundwater wells such as non-domestic wells or geothermal wells have been excluded since there are existing provincial regulatory mechanisms for these.

Table 1: Analysis summary for domestic purpose pumping well options

Comparison	A1 Do not regulate domestic purpose pumping wells	A2 Allow new domestic purpose pumping wells for irrigation only	A3 Prohibit new domestic purpose pumping wells
Addresses groundwater quality risks	Does not address	Partially addresses	Fully addresses (moving forward)
Addresses public safety risks	Does not address	Partially addresses	Fully addresses (moving forward)
Engagement support	Least supported	Partially supported	Most supported
Triple Bottom Line support	Least supported	Partially supported	Most supported
Additional budget requirements	Not required	Required	Not required
Implementation time	Not required	~9 months	~6 months
Implementation ease	Not required	Hardest	Easiest

A1: Do not regulate domestic-purpose pumping wells (maintain status quo)

The installation and operation of pumping wells for domestic purposes would remain unaddressed in Saskatoon.

Advantages of this option are:

- Requires no additional resources or funding to implement.
- Least restrictive for residents who wish to install a well.

Disadvantages of this option are:

- Does not address water protection objectives of the Official Community Plan.
- Does not address risk of aquifer contamination, drinking water cross-contamination, public health issues, and liabilities associated with unregulated domestic purpose wells.
- Least supported by engagement and Triple Bottom Line results.

The greatest risk to public safety would arise where a domestic purpose pumping well has been installed for a private residence and at the same time the residence is connected to the City's potable water supply. If the resident created a secondary or backup connection between their well and the City's potable water supply, there would be a risk of cross-contamination that could impact a large portion of the public distribution system.

A2: Allow new domestic purpose pumping wells for irrigation only

The Administration would create a bylaw to regulate the installation, operation, and decommissioning of new domestic purpose pumping wells for the sole purpose of irrigation for private residences. The use of groundwater for drinking or washing would be prohibited.

Advantages of this option are:

- Provides residents access to groundwater for irrigation only, if desired.
- Partially addresses water protection objectives of the Official Community Plan.
- Partially addresses risk of aquifer contamination, drinking water cross-contamination, public health issues, and liabilities associated with unregulated domestic purpose wells.

Disadvantages of this option are:

- Greater time and funding required for implementation.
- Compliance and enforcement resources and budgets will increase with the number of wells installed. May eventually impact water utility revenue.
- Increased risk to overuse of groundwater with greater public use over time.
- Increases the City's exposure to financial and public safety risk over time.
- Partially supported by engagement and Triple Bottom Line results.

This option reduces risks to human health and improves groundwater protection but does not eliminate risks. Groundwater could still become contaminated, be overused, or residents could still consume it, which could result in the City being liable due to approving the use of groundwater.

Implementation of this option would require the creation of an administration process for applications, approvals and enforcement, a records database, and education material for well owners and installers.

Initial uptake is expected to be low therefore compliance inspections and enforcement could likely be managed with existing staff and budgets. Additional resources and budgets could be required if there is greater demand than expected for irrigation-only wells, or as the number of wells increases over time.

A3: Prohibit new domestic-purpose pumping wells

No resident would be permitted to install or operate a new domestic purpose pumping well within city limits where municipal water service is available.

Advantages of this option are:

- Requires no additional resources or funding to implement.
- Addresses water protection objectives of the Official Community Plan.
- Addresses risk of aquifer contamination, drinking water cross-contamination, public health issues, and liabilities associated with unregulated domestic purpose wells.
- Highest support from engagement and Triple Bottom Line results.

Disadvantages of this option are:

- Most restrictive for residents who wish to install a well.

Enforcement would be complaint driven. With the anticipated low number of residents wishing to install a well, can be implemented utilizing existing staff and budgets. Education would be created for well drillers and consultants to inform them of the bylaw and a city webpage with bylaw details would be developed. Existing domestic purpose wells would not be affected but education and supporting rationale will be created for property owners with existing wells to encourage decommissioning.

Option A3 is the most effective at protecting groundwater, public health and safety, and security of the City's water system from risks associated with domestic wells. However, it prevents access to groundwater by residents. Residents would still have access to other water sources for irrigation such as City-water, rainwater collection, or by reducing their watering needs through conservation measures being explored in the [Water Conservation Strategy](#).

Other Options Considered

Allowing and fully regulating all domestic uses of groundwater by residents was initially considered as an option. However, to properly implement this option, the City would have to develop significant management and enforcement capacity similar to the Water Security Agency, which is considered infeasible and costly in relation to the few residents that are currently expected to want wells. This option could be revisited if the demand for wells increases in future.

Monitoring Well Options

The Administration examined two options for monitoring wells as a means of improving groundwater protection in Saskatoon.

Table 2: Analysis summary for monitoring well options

Comparison	B1 New Development Standards	B2 New City-wide Standards
Addresses groundwater quality risks	Partially addresses	Fully addresses
Addresses public safety risks	Partially addresses	Fully addresses
Engagement support	Partially supported	Most supported
Triple Bottom Line support	Partially supported	Most supported
Additional budget requirements	Not required	Required
Implementation time	~12 months	>12 months
Implementation ease	Easiest	Hardest

B1: New Development Standard

The [Design & Development Standards Manual](#) would be updated to include standards and specifications for monitoring wells that are installed during land development. Development proponents would also be required to properly decommission any abandoned wells within the proposed development. Non-compliance could result in the delay of development plan approvals.

Advantages of this option are:

- Partially addresses water protection objectives of the Official Community Plan.
- Partially addresses risk of aquifer contamination associated with unregulated monitoring wells.
- Requires no additional resources or funding to implement.

Disadvantages of this option are:

- Monitoring wells installed on private property that are not part of a large-scale development would remain unaddressed.
- Additional expenses will be incurred by developers installing monitoring wells.
- Partially supported by engagement results.

This option, together with Administrative action on monitoring wells located on City property and rights-of-way, will provide an effective strategy for reducing the risks of contamination to groundwater within city limits. The creation of standards and specifications will require additional internal and external engagement with stakeholders and development proponents to achieve full implementation.

B2: New City-wide Standard

Creation of a Bylaw or amendment of existing Bylaws would be necessary to require adherence to a City-wide Standard detailing the construction, maintenance and decommissioning of monitoring well installations and the decommissioning of abandoned pumping wells.

Advantages of this option are:

- Addresses water protection objectives of the Official Community Plan.
- Addresses risk of aquifer contamination associated with unregulated monitoring wells.
- Highest support from engagement and Triple Bottom Line analysis.

Disadvantages of this option are:

- Requires additional funding to implement.
- Engagement did not include landowners that might be impacted by a City-wide approach.
- Additional expense would be incurred by landowners installing monitoring wells.

Implementation of this option would capture all monitoring wells installed within City limits and therefore provides the most effective strategy to reduce risks of contamination to groundwater from monitoring wells.

Although this option received the highest support from engagement and the Triple Bottom Line analysis, it would be the most expensive and controversial option to implement. It must be remembered that engagement for this project was targeted to subject matter experts, consultants, well drillers/installers, and land developers. Additional engagement would be desirable to gauge the acceptability of this option to other landowners who might be impacted by City-wide standards.

Additional resources would be needed for additional public engagement, to create new bylaw(s) and to enforce the bylaw and standards on private property.

Other Options Considered

Creation of an administrative policy and associated guidelines for the maintenance and decommissioning of monitoring wells on City property and rights-of-way was initially considered as an option. However, it was determined that this work could be undertaken with existing resources as a continuous improvement initiative and did not require City Council direction for implementation.

Engagement Summary

The City of Saskatoon (City) is developing methods to protect groundwater and groundwater users within its jurisdiction, since the installation and operation of private groundwater wells for domestic purposes is not addressed by current bylaws.

Therefore, City Administration is putting forward a proposal to regulate or prohibit private groundwater wells for domestic purposes within City limits. This would be conducted through the development of a new bylaw and methods to encourage or require the decommissioning of monitoring and non-active groundwater wells on City and private properties within City limits.

The Administration engaged stakeholders on relevant components of the Options for Groundwater Protection through two phases:

Phase 1: Options Identification

- The engagement goals for this phase were to develop options based on stakeholder feedback and ensure concerns/priorities were understood.

Phase 2: Close the Loop

- This phase included sharing considerations for the options with stakeholders to obtain feedback and provide the opportunity to identify red flags.

This engagement summary includes the activities and results that informed the engagement goals for the project. A total of 85 participants took part in the engagement activities, including stakeholder meetings and surveys, from August 2021 – October 2021.

Engagement goals, intended audience, activities, dates, participation rates and detailed engagement results are provided in the Options for Groundwater Protection Comprehensive Engagement Report that follows this summary, as well as the [Phase 1 What We Heard Report](#) on the project [Engage Page](#).

Engagement results from all activities that informed each goal are summarized below.

Importance of Groundwater Protection

When asked how important it is for the City to protect groundwater quality in Saskatoon, most participants felt it was either important (37%) or very important (54%). Similar results were found for protecting groundwater from depletion in Saskatoon, which most participants felt was either important (24%) or strongly important (54%). The following themes emerged from the comments that were provided by participants:

Contamination: is a major concern for many participants; contamination has the potential to limit the use of local aquifers by a variety of users and not protecting it now could greatly impact its future potability.

Importance: many respondents feel water security and scarcity will become larger issues in the near future, therefore protecting groundwater reserves is vitally important.

Jurisdictional responsibility: some respondents identified that regulating/protecting groundwater is the responsibility of the Water Security Agency and the City should not be involved.

Safety: centrally treated, regulated, and distributed source water is significantly safer than unregulated supplies which require homeowners to protect and maintain the source, as well as monitor and treat the water to ensure safety standards are met.

Ranking Options for Groundwater Protection

In the first stakeholder survey, most respondents supported prohibiting domestic wells (50%), with some respondents supporting regulating domestic wells (37%) or implementing no changes (13%). When asked for their level of support with the inclusion of domestic wells for irrigation-only as a fourth option, prohibiting new domestic-purpose pumping wells received the strongest support (65%) by participants. Allowing new domestic purpose pumping wells for irrigation-only received an equal amount of support and opposition, while allowing new domestic-purpose pumping wells for all domestic users and not regulating domestic-purpose pumping wells were not supported overall.

Out of the comments provided by respondents for their reasoning, the following themes emerged:

Costs and funding: how will the regulation and enforcement of wells be resourced and funded.

Health risks: centrally treated, regulated, and distributed source water is significantly safer than unregulated supplies that require the homeowner to maintain the source and monitor/treat the water to ensure safe drinking conditions.

Monitoring needed: it was suggested that water wells, their installation, and water withdrawal should be regulated and monitored if domestic wells are to be allowed; there should be sound rules to follow, or else domestic-use wells should not be allowed.

Source water protection: proper source water protection, maintenance, monitoring, and treatment is a large responsibility to place on the average private well owner; ineffective well management can result in numerous risks to human health and the potential for groundwater contamination.

Using groundwater for irrigation: many respondents indicated that water quality from Saskatchewan aquifers is rarely good for irrigation purposes.

When asked whether prohibiting or regulating domestic wells within Saskatoon would impact their work, most respondents stated it would not (51%), followed by those stating it would (36%). Furthermore, 32% felt it would positively or somewhat positively effect their work, while 24% stated it would negatively or somewhat negatively effect their work.

Decommissioning of Non-Active Groundwater Wells

The majority of participants either supported or strongly supported the proposed actions for decommissioning non-active groundwater wells on City properties (83%), on private properties for large-scale development (78%), and on single property lots (75%).

Participants were asked to rank the proposed options for well maintenance and decommissioning, which resulted in the following ranking:



1. Create an administrative policy for monitoring wells on City land.
2. Create a bylaw with a city-wide standard applicable to all monitoring wells.
3. Amend the development standards for large-scale development.
4. Promote voluntary use of the guidelines for wells on private land.

Many respondents provided suggestions for the proper decommissioning and maintenance of groundwater wells, including:

- Using pre-treated water for all drilling purposes.
- Following more modern standards and best practises for decommissioning.
- Decommissioning being completed by a registered driller with the Water Security Agency or Saskatchewan Ground Water Association.

Final Thoughts and Common Themes

When asked what other options the City should consider to protect groundwater in Saskatoon, respondents suggested:

- Mapping and assessing the vulnerability of aquifers within City limits.
- Considering what changes in land-use could take place in areas of greater risk to aquifers.
- Establishing an awareness program that demonstrates safe maintenance of wells and responsible use of groundwater.

Common themes shared throughout the engagement activities included the following themes:

Education is important: knowledge and education about groundwater is the first step towards better protection.

Enforcement and monitoring: are critical for not only the success of the project, but also the protection of local groundwater resources.

Limited information: many respondents identified that currently there is little information on the viability of groundwater resources, as well as groundwater quality and quantity in Saskatoon.

Support: many respondents extended their support for the initiatives being described and for the City in being proactive in the protection of groundwater resources within Saskatoon.

Updates to legislation: stakeholders expressed the need for provincial legislation and regulations surrounding groundwater protection to be updated.

Consideration of Results

Results from all engagement activities were considered alongside internal (City) stakeholders' feedback and best practice research to develop the options for groundwater protection in Saskatoon. Further topics that were explored can be found [in this resource](#) that was provided to stakeholders and participants. Options that were supported by all participants and by best practice research were incorporated into the recommendations or will be considered in future implementation. Examples include the following:

Aquifer protection: we acknowledge more detailed mapping of aquifers within Saskatoon city limits may be required to fully understand their viability and vulnerability at a local scale.

Exploring irrigation-only wells: in response to the feedback we heard, we explored options for including irrigation-only wells.

Importance: it is important for the City to protect both groundwater quality and groundwater from depletion.

Maintenance and decommissioning: the proposed actions for maintenance and decommissioning of monitoring wells and abandoned pumping wells on City and private property were supported, including creating an administrative policy for monitoring wells on City land.

Prohibiting domestic-purpose wells: more participants felt that domestic-purpose pumping wells should be prohibited.

Communications and education campaigns will be explored following approval of the recommended options by City Council to ensure all residents are aware of the opportunities for groundwater protection and City expectations.

Process and Methodology

The Administration used the City of Saskatoon's Triple Bottom Line (TBL) Decision Making Tool to comply with *Council Policy C08-001 - Triple Bottom Line*.

When conducting a Triple Bottom Line (TBL) analysis, it is appropriate to compare and/or evaluate multiple options.

The following options were reviewed for domestic pumping wells:

- A1: Do not regulate domestic purpose pumping wells (maintain status quo).
- A2: Allow new domestic purpose pumping wells for irrigation only.
- A3: Prohibit new domestic purpose pumping wells.

The following options were reviewed for monitoring wells:

- Administrative Policy and guideline for wells on City property and rights-of-way.
- B1: New Development Standards.
- B2: New City-wide Standard.

In conducting the analysis, the Administration relied on the expertise of the Project Team and Subject Matter Experts from Bylaw Compliance, Finance, Saskatoon Water, Sustainability, Saskatoon Land, and the City Solicitor's Office. Subject Matter Experts consulted the following information: provincial and federal regulations, regulations of other municipalities, and engagement results that informed the TBL review.

This review is meant as a high-level assessment to identify the environmental, social, economic, and governance outcomes of each option, as well as to identify opportunities to achieve even greater sustainability benefits. The results are meant to support ongoing decision making, rather than be relied upon as a fixed sustainability evaluation.

Caveats and Limitations

- Some TBL areas were considered out of scope, including items that were not contingent on and/or influenced by the initiative: renewable energy, green buildings and sustainable land use, waste reduction and diversion, storm water management, sustainable food system, self sufficiency and living with dignity, sustainable procurement and skills and training.
- Assessment of domestic pumping well options were completed assuming access to either groundwater or city water as water supply but not both.

Results & Findings**Pumping Well Options**

Overall, the results of the Administration's TBL review indicate that Option A3, prohibit domestic pumping wells, would achieve greater TBL benefits than the other proposed options. Table 1 provides a summary of the TBL comparison.

Table 1: Summary of TBL implications for pumping well options

Categories	A1	A2	A3
Environmental Health	Not meeting expectations	On track	Exceeding expectations
Social Equity	Not meeting expectations	Meeting expectations	Meeting expectations
Economic	Meeting expectations	On track	On track
Good Governance	Not meeting expectations	On track	Meeting expectations

Key considerations for the implications of Option A3 include:

Environmental Health and Integrity: Conserves groundwater for future use as a potential water source and benefit to the whole community. Enhances groundwater-reliant ecosystems by restricting water use and reducing contamination risk. Eliminates pollution risk associated with domestic purpose wells.

Social Equity and Cultural Well-Being: Addresses domestic well risks for the benefit of the entire community, improves protection of City water supply.

Economic Benefits: Low implementation costs and low estimated operating resources. Well prohibition eliminates the potential for hidden costs. No additional assets need to be managed. City service is available to all residents, prohibition unlikely to change costs of service (utility rates).

Good Governance: Fully addresses all groundwater risks associated with domestic wells (moving forward). Least data to maintain/monitor, minimal enforcement requirements and no requirement for procedures.

Monitoring Well Options

Overall, the results of the Administration's TBL review indicate that Option B2, City-wide standard, would achieve greater TBL benefits than the other proposed options. Table 2 provides a summary of the TBL comparison.

Table 2: Summary of TBL implications for monitoring well options

Categories	Administrative Policy	B1	B2
Environmental Health	Meeting expectations	Exceeding expectations	Leading the way
Social Equity	Meeting expectations	On track	Exceeding expectations
Economic	On track	On track	On track
Good Governance	Meeting expectations	Meeting expectations	Exceeding expectations

Key considerations for the implications of Option B2 include:

Environmental Health and Integrity: Protects groundwater by reducing pollution risks from all wells within city limits. Protects ecosystems reliant on groundwater.

Social Equity and Cultural Well-Being: The same standard is applied to all monitoring wells within city limits. Addresses health and well-being risks linked to aquifer contamination most significantly.

Economic Benefits: Does the most to support labor rights and employment by ensuring wells are properly constructed, maintained, and decommissioned. Creates the most opportunity for well-related businesses.

Good Governance: Addresses risks on all lands within City limits. Most difficult to regulate and monitor.