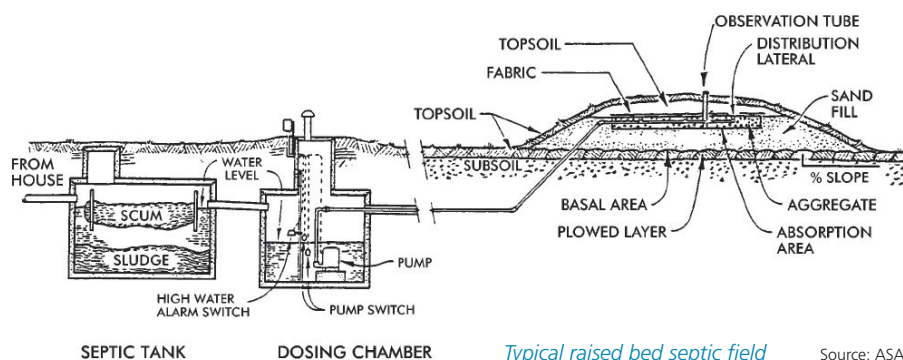


# Raised Bed Septic Field Retrofit

## SOUTHERN LAKES ENHANCED STORAGE CONCEPT • FACT SHEET 1



*Typical raised bed septic field*

Source: ASAE, Converse and Tyler, 1998b

### How could groundwater rise affect my septic system?

The proposed concept would involve holding back (storing) more water in the Southern Lakes during the fall, which may result in a slightly longer duration of seasonal high groundwater levels in some areas around the lakes. On some properties this could cause groundwater to move up into existing septic fields and negatively affect their function for a short period of time in the fall and early winter. The concept may also reduce the space between the bottom of the field and seasonal high water level making the septic field non-compliant with territorial regulations (the vertical separation must be >1.2 m).

### Mitigation Solution – Raised Bed Septic Field Retrofit

A raised bed septic field retrofit is a mitigation measure for properties that may experience septic field flooding and/or properties that would not comply with the territorial regulation either presently or under the proposed concept. A typical raised bed septic field involves the pumping of blackwater to a raised septic bed. In most cases, the raised septic bed can be built over an existing septic field; the height of the raised bed will depend on the property elevation with respect to the concept.

#### Benefits

Increased property value through improvements (up to \$35,000)

Increased performance of septic system

Regulatory compliance

#### Drawbacks

May require some site clearing (e.g., tree removal)

Modification to property (raised septic bed mound)

Electrical and maintenance costs for the pump

### Will a raised bed septic field retrofit work for you and your property?

Will it fit on your property with appropriate setbacks?

Can it be installed over the existing septic field?

Can the septic bed be built high enough above the seasonal high water table? \*

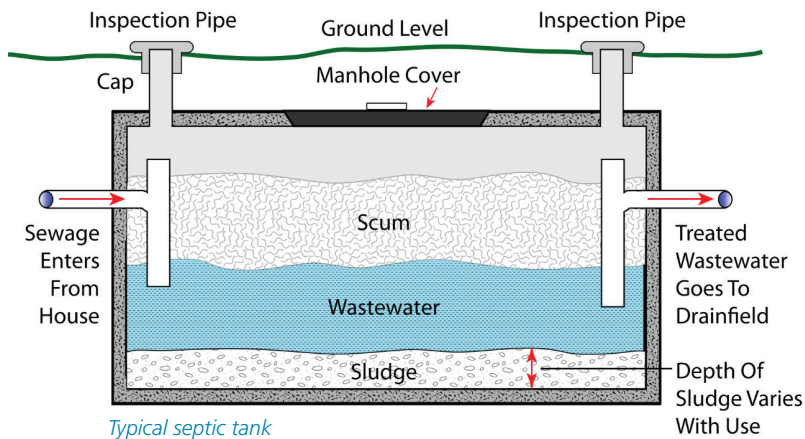
Would the retrofit septic bed need to be larger than the existing septic field?

How would the retrofit (the septic bed mound) alter your current and future property use?

*\*Only legally compliant fields would be built. If a compliant field cannot be constructed there are alternatives available.*



*Example of a raised septic field*



## How could groundwater rise affect my septic system?

The proposed concept would involve holding back (storing) more water in the Southern Lakes during the fall, which may result in a slightly longer duration of seasonal high groundwater levels in some areas around the lakes. On some properties this could cause groundwater to move up into existing septic fields and negatively affect their function for a short period of time in the fall and early winter. The concept may also reduce the space between the bottom of the field and seasonal high water level making the septic field non-compliant with territorial regulations (the vertical separation must be >1.2 m).

## Mitigation Solution – Septic Tank Pump-Out

A septic tank pump-out is a mitigation measure for a properties that may experience septic field flooding and/or properties that would not comply with the territorial regulation either presently, or under the proposed concept. Tank pump-outs would need to be done by a commercial operator on an as-needed basis (i.e., when the tank is full) and the blackwater from the tank would be disposed at a licensed facility.

## Will septic tank pump-out work for you and your property?

Is the existing septic tank large enough to meet your needs between pump outs?

Will the existing tank require anchoring to avoid tank floating?

## Benefits

- No septic system retrofit
- Regulatory compliance
- No modification to property or decrease in performance over time

## Drawback

- Requires regular pump-out service, frequency depends on usage and tank volume (approx. \$180/per pump out, every two months for an average family of 4)
- Requires tank volume monitoring



Septic tank pump out examples



## How could groundwater rise affect my underground storage tanks?

The proposed concept would involve holding back (storing) more water in the Southern Lakes during the fall, which may result in a slightly longer duration of seasonal high groundwater levels in some areas around the lakes. On some properties this could cause underground tanks such as septic tanks and water tanks to float, resulting in cracks or breakage to the tanks and connecting pipes. Damaged tanks and piping could result in contamination of nearby ground and surface water from unintentional releases of blackwater.

## Mitigation Solution – Anchoring of Underground Tanks

Anchoring underground tanks to keep them from floating is an effective mitigation measure to prevent damage from potential groundwater rise. Anchoring of underground tanks involves using cables attached to reinforced concrete or other suitable anchor to stabilize the tank.

### Benefits

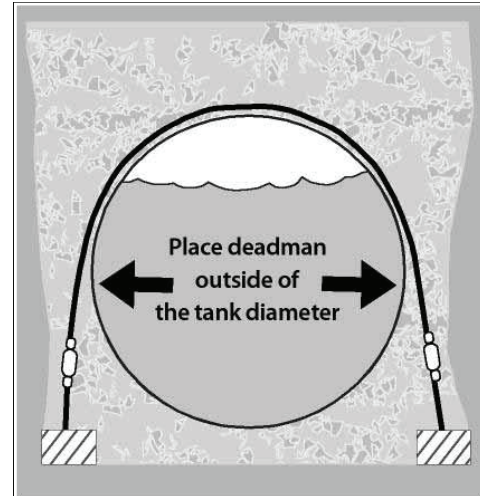
Increased property value though improvements (up to \$4,000)

Reduce damage to property (e.g., damage to tanks and piping from floating)

### Drawback

May require some site clearing (e.g. tree removal)

Modification to property



*Typical underground storage tank anchor installation*

## Will anchoring of underground tanks work for you and your property?

Is the existing tank accessible with conventional excavation equipment?

What's the condition of the existing underground tank?

Can the existing tank be safely and effectively anchored?

*\*Note, septic system retrofits (Fast Sheet #1) will include anchoring of the septic tanks.*



*Underground tank anchoring examples*





**YUKON  
ENERGY**

## Sump Pump Installation

**SOUTHERN LAKES ENHANCED STORAGE CONCEPT • FACT SHEET 4**

### How could groundwater rise affect my home?

The proposed concept would involve holding back (storing) more water in the Southern Lakes during the fall, which may result in a slightly longer duration of seasonal high groundwater levels in some areas around the lakes. On some properties this could exacerbate flooding or dampness already experienced in some basements/crawlspaces during seasonal high water levels, or it could cause flooding or dampness in a few basements/crawlspaces that have not previously experienced such groundwater effects.

### Mitigation Solution – Sump Pump Installation

A sump pump is an effective mitigation measure to control basement flooding and reduce dampness in basements/crawlspaces from potential groundwater rise. A sump pump is designed to remove groundwater from the vicinity of a home's foundation by pumping the water out as it accumulates in a sump (a small pit). Sump pumps are usually installed in the basement or crawlspace of a home below the finished grade of the basement or crawlspace.

#### Benefits

Increased property value through improvements (up to \$5,500)

Reduces and controls flooding and dampness in basement/crawlspace

Reduces existing and potential damage to property (e.g., flood damage)

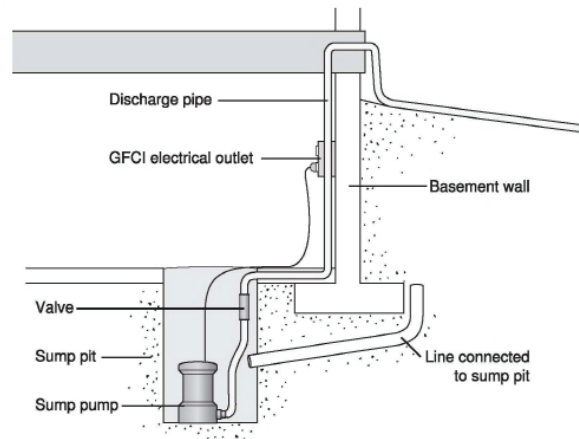
Discourages mold in basements/crawlspaces

#### Drawbacks

Modification to the basement/crawlspace

Electrical and maintenance costs for the pump

Discharge of groundwater at property surface



*Typical sump pump installation*

### Will a sump pump installation work for you and your property?

Can it be installed in your basement/crawlspace?

- Is there good access?
- Is there an available electrical circuit for the pump installation?

Can it operate in the late fall and early winter months? Is the basement/crawlspace heated?

Can the water from the pump be effectively discharged away from the house?



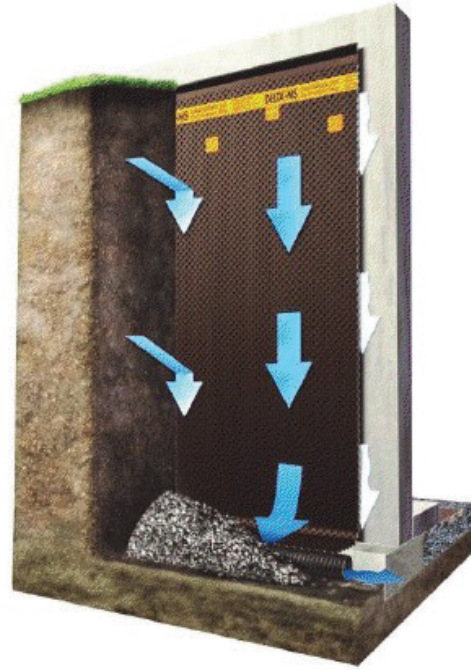
*Sump pump installation example*

### How could groundwater rise affect my home?

The proposed concept would involve holding back (storing) more water in the Southern Lakes during the fall, which may result in a slightly longer duration of seasonal high groundwater levels in some areas around the lakes. On some properties this could exacerbate flooding or dampness already experienced in some basements/crawlspaces during seasonal high water levels, or it could cause flooding or dampness in a few basements/crawlspaces that have not previously experienced such groundwater effects.

### Mitigation Solution – Basement/Crawlspace Waterproofing

Basement and crawlspace waterproofing is a mitigation option to manage the potential impacts of groundwater rise, such as flooding and dampness. A typical waterproofing installation involves excavating down to the foundation around the perimeter of the home, cleaning and repairing cracks in the foundation walls, and installing a waterproofing membrane, a weeping tile and drainage gravel.



*Typical basement/crawlspace waterproofing installation*

#### Benefits

Increased property value though improvements (up to \$21,000)

Reduces damage to property (e.g. flood damage)

Discourages mold in basements/crawlspaces

#### Drawback

Requires access around building foundation (e.g., tree removal)

Significant temporary modification to property during installation

#### Will basement/crawlspace waterproofing work for you and your property?

Can it be installed around your basement/crawlspace?

Is there good access?

Is the site accessible with conventional excavation equipment?



*Basement/crawlspace waterproofing examples*







#### Introduction

Over the last several years, Yukon Energy has engaged regularly with Yukoners and done significant research on the idea of increased water storage in the lakes south of Whitehorse. The Corporation has worked hard understand the potential environmental and socio-economic impacts that could occur as a result of the concept.

Over the next few months, this research will be reviewed and used to decide whether to move the concept forward to the YESAA environmental and socio-economic assessment phase.

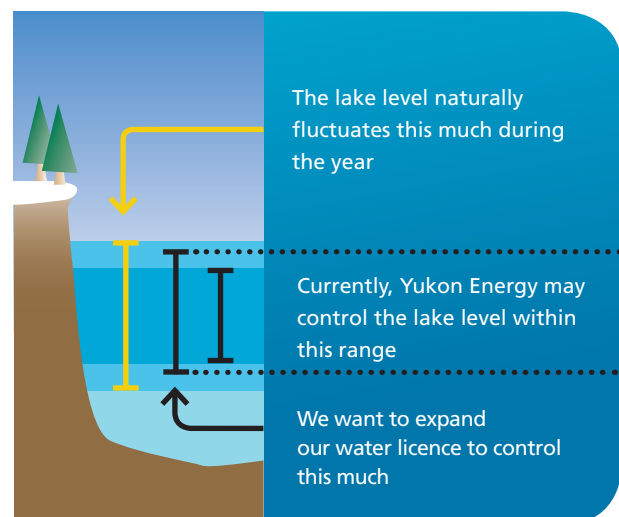
#### Summary of the Concept

Electricity demand in Yukon is highest during the cold, dark winter months, which is also the time of year when water levels in our lakes and rivers are naturally low. In order for Yukon Energy to produce enough hydroelectricity for Yukoners during the winter the Corporation must hold back (or store) water in Marsh, Tagish and Bennett Lakes during the fall, when water levels are higher.

Right now, the amount of water Yukon Energy is allowed to store (Full Supply Level) is not always enough to meet energy demands in winter, so fossil fuels are burned to make up the difference.

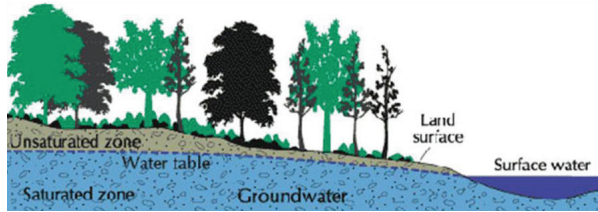
The Southern Lakes Enhanced Storage Concept would involve changing Yukon Energy's water license so the Corporation could store up to 30 centimeters more water in the fall and early winter and use up to an additional 10 cm of water below the current level in the spring.

This water would be available for winter energy production when it's needed the most, and would provide cost-effective and environmentally responsible energy. No new infrastructure would be needed, and water levels would be managed within their natural range.



## Potential Effects Related to Rise in Groundwater Level

### SOUTHERN LAKES ENHANCED STORAGE CONCEPT



*Conceptual model of groundwater flow*

Yukon Energy's proposed change to the Full Supply Level (FSL) of up to 30 cm would temporarily increase shoreline groundwater levels by about the same amount, with an expected time lag. This time lag would depend on the distance from the lakeshore as well as the types of sediment beneath the property.

Through the Corporation's previous groundwater studies it has identified a few properties in low-lying shoreline areas of the Southern Lakes that are

already affected by seasonal high water levels, as well as additional properties that could potentially be affected by temporary groundwater rise as a result of the concept. Some of these properties were surveyed during a 2011 study.

Properties with sub-surface infrastructure, such as basements, septic fields, crawl spaces, wells, etc. might be affected by the concept in the following ways:

- Property damage from water entering basements & crawlspaces
- Flooding and/or failure of septic fields
- Damage to underground septic or water tanks from floating
- Contamination of lake water used for drinking and recreation

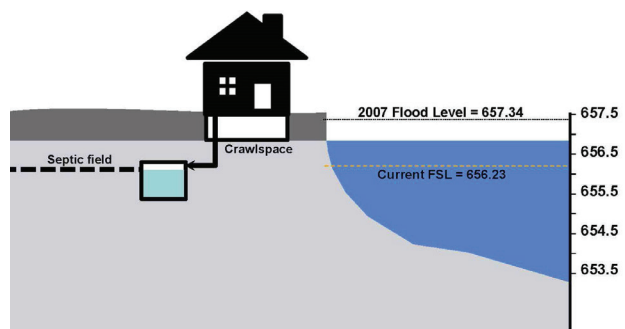


### Landowner Engagement Process

An important part of this process is engaging with landowners in low-lying shoreline areas who are experiencing or may experience groundwater issues related to the sub-surface infrastructure on their properties as a result of the concept.

Yukon Energy will use your input to develop a mitigation plan specific to your property, which would provide a long term benefit should the concept move forward.

It is not necessary for you to support the Southern Lakes Enhanced Storage Concept to participate in this engagement process.



*House with groundwater interacting with below ground infrastructure*





Areas that may experience groundwater issues as a result of the concept

## SOUTHERN LAKES ENHANCED STORAGE CONCEPT

