

Checklist: Groundwater Under Direct Influence (GUDI)

Manitoba



The Drinking Water Safety Act
Self Assessment or Qualified Person
Checklist

Sustainable Development

Revised: September 18, 2018

Section 1: Owner Information

Owner Water System	<input type="text"/>				
Operator Water System	<input type="text"/>				
Owner Mailing Address	<input type="text"/>				
Town/ City	<input type="text"/>	Province	<input type="text"/>	Postal Code	<input type="text"/>
Email	<input type="text"/>		Phone/ Cell	<input type="text"/>	

Section 2: Water System Information

Public Water System (PWS)	<input type="checkbox"/>	PWS Code # (i.e. 123.00)	<input type="text"/>
Semi-Public Water System (SPWS)	<input type="checkbox"/>	SPWS Code # (i.e. 1000.00)	<input type="text"/>
Operating License #	<input type="text"/>	Seasonal?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A

Section 3: Assessor Information *(please fill this out even if Self Assessment)*

Name	<input type="text"/>		
Company	<input type="text"/>		
Email	<input type="text"/>	Phone/ Cell	<input type="text"/>

Section 4: Certification

The information contained in this report is complete and accurate to the best of my knowledge.

Signature of Owner or Owner's Representative

Date

Personal information is collected under the authority of The Drinking Water Safety Act and its pursuant regulations, and is used to issue permits and licenses, and for enforcement purposes. Information collected is protected by the privacy provisions of The Freedom of Information and Protection of Privacy Act. If you have any questions, contact the Access & Privacy Coordinator, 200 Saulteaux Crescent, Box 85, Winnipeg MB, R3J 3W3.

Checklist: Groundwater Under Direct Influence (GUDI) Attachments

Section 5: Suggestions or Recommendations for Improvements *(please don't leave blank)*

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Checklist: Groundwater Under Direct Influence (GUDI)

Section 6: GWX System - Description

Type of Water System Connections: Hospital/ Health Care Centre Apartments/ Condos
 Year-round Residential Restaurant/ Food Establish. Day Care Facility
 Seasonal Cottages School Rec./ Community Centre
 RV Hook-ups Personal Care Home Other:
 Open Campsites/ Standpipes Seniors Manor/ Apartments

Average # People Served per Day

Peak # People Served per Day

Building or Service Connections (include standpipes)

WATER USE: PROVIDE UNITS! (volume water/ time) i.e. Liters, cubic meters, US or Imperial gallons.

Average Day Demand
 Metered Estimated

Peak/ Max Day Demand
 Metered Estimated

Peak Hourly Flow
 Metered Estimated

Don't just write "gallons".
1 US gallon = 3.785 L
1 Imp gallon = 4.546 L

Note:
This is not the same information sent to the Groundwater section for the Manitoba Government for annual water usage.

Additional comments:

Schematic or Flow Diagram: Attachment/s

Please attach a schematic or flow diagram of your water system, only for the water treatment plant or pumphouse.

Distribution system maps are not required.

If you are physically mailing a hand-drawn hardcopy to the Office of Drinking Water, please keep a copy for your own records.

Checklist: Groundwater Under Direct Influence (GUDI)

Section 7: GWX System - General Information

Is your system currently under a drinking water advisory? Yes No N/A

If yes, what type of advisory? (i.e. Boil Water, Water Quality - Arsenic). Type:

If yes, when was it issued? Date:

If the system is under an advisory, are water users notified and public areas posted with the advisory notice? Yes No N/A

Are all water system components (wells, water treatment plant, storage tanks, pumps, etc...) adequately protected from vandalism? Yes No N/A

Is the water treatment plant locked? Yes No N/A

Has the water treatment plant site ever been flooded? Yes No N/A

Can water supply be maintained during power outages? Yes No N/A

Yes, standby generator (genset) Yes, fuel-driven pump
How many electrical power outages per year or per season?

Standby generator (genset) or fuel-driven pump located above the reservoir? Yes No N/A

If yes, is it in a metal or epoxy coated box to protect the reservoir from spills? Yes No N/A

Does the system experience frequent water outages due to equipment failures or water supply capacity issues? Yes No N/A

System experienced failures in the past of treatment/ disinfection equipment? Yes No N/A

Is the water system equipped with flow meters to monitor water use? Yes No N/A

Raw water Treated water Blended water Backwash water
 Rural distribution water Town distribution water Bulk/ truck/ pail fill water

Are water service connections metered? Yes No N/A

System able to meet peak water demands with adequate at-tap pressures? Yes No N/A

What is the rated treatment or design capacity of the water treatment system? Units.

What is the peak or maximum day demand on the water system? Units.

Is the water treatment plant or pumphouse equipped with an alarm system?

Yes, local alarm/ exterior light only Yes, sent to operator No N/A

What alarm conditions are monitored?

Distribution pump failure Low reservoir level Power failure UV failure

Chlorination pump failure High reservoir level Building flood

Low chlorine residual Low incoming pressure Intrusion

High turbidity Low distribution pressure Other:

Checklist: Groundwater Under Direct Influence (GUDI)

Section 7: GWX System - General Information

-
- | | | | | | | |
|---|--------------------------|-----|--------------------------|----|--------------------------|-----|
| Is the water system equipped with a suitable <u>raw</u> water sampling tap? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | N/A |
| Is the water system equipped with a suitable <u>treated</u> water sampling tap? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | N/A |
| Is the water system equipped with other sampling taps between treatment units? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | N/A |
-
- | | | | | | | |
|--|--------------------------|-----|--------------------------|----|--------------------------|-----|
| Are there any obvious cross-connections within the piping between raw, partially treated, treated, or distributed water? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | N/A |
| Are there any by-passes around critical treatment equipment or treatment processes such as a cartridge filter, or a UV unit? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | N/A |
| Are these by-passes tagged or labelled? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | N/A |
| Are there procedures for activating by-passes including DWO notification? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | N/A |
-
- | | | | | | | |
|---|--------------------------|-----|--------------------------|----|--------------------------|-----|
| Does the system provide appropriate water treatment given the type of raw water source and the raw water quality? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | N/A |
| Does the system receive frequent or repeated complaints from water users about water quality? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | N/A |
- Describe redundancy level in the water supply, treatment, storage and pumping systems. (i.e. 2 wells)

- | | | | | | | |
|---|--------------------------|-----|--------------------------|----|--------------------------|-----|
| Was the system designed by a Professional Engineer? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | N/A |
| Was the system approved by the Office of Drinking Water? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | N/A |
| Owner/ operator aware of the need to obtain approval (i.e. permit) before starting treatment upgrades or significant alterations to the system? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | N/A |
- This includes watermain extensions.
- | | | | | | | |
|--|--------------------------|-----|--------------------------|----|--------------------------|-----|
| Is the installation of treatment equipment or disinfection equipment required by the Office of Drinking Water as noted in an advisory letter or inspection letter? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | N/A |
| Adequate space in the building to install additional treatment equipment? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | N/A |
-
- | | | | | | | |
|--|--------------------------|-----|--------------------------|----|--------------------------|-----|
| Are key water pipes, valves, taps, and components labelled to assist with O&M? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | N/A |
| Is the equipment accessible for O&M and inspection? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | N/A |
| Is there adequate space around equipment to perform O&M? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | N/A |
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Checklist: Groundwater Under Direct Influence (GUDI)

Section 7: GWX System - General Information

Any changes, upgrades, or expansions to the system since the last assessment? Yes No N/A

If yes, explain:

What is the average age (years) of the following components of the system?

Supply (i.e. well)

Treatment

Storage

Distribution

At inspection time, were all water system components in good working order? Yes No N/A

If no, explain:

What is the general condition of the buildings?

- Good
- Fair - nearing end of useful life
- Poor - replacement required

Additional comments:

Checklist: Groundwater Under Direct Influence (GUDI)

Section 8: GWX System - Wells (complete one checklist for each well)

Attachment: well driller's report (well log) Not Available

Well Name: (if applicable)

Well Identification Tag Number:

Type of well: Small diameter drilled well Large diameter dug well

Large diameter drilled well Sand point (driven) well

How is the well being used? Primary Alternating Back-up/ emergency

Does the well have a watertight casing to a depth of at least 15 m (50 feet)? Yes No N/A

Is there at least 3 m (10 feet) of low permeability soil (i.e. clay or till) above the casing depth to protect the water bearing zone from contamination? Yes No N/A

Is the annular space between the casing and the ground sealed with grout, clay, or bentonite? Yes No N/A

Does the well casing extend at least 0.45 m (18 inches) above the ground or 0.30 m (12 inches) above the pumphouse floor? Yes No N/A

Does well bacteria history suggest it is secure from contamination? Yes No N/A

Are there periodic changes in water quality? Yes No N/A

Is the wellhead accessible for inspection and maintenance? Yes No N/A

Is the well constructed with a pitless adapter? (i.e. no well pit) Yes No N/A

If the well is located in a pit, does it appear to provide a watertight boundary complete with a sanitary seal? Yes No N/A

Is the wellhead fitted with a secure, watertight lid/cap with all openings sealed? Yes No N/A

Is the wellhead protected from damage from vehicles, animal access, etc.? Yes No N/A

Does the ground slope away from the well? Yes No N/A

Are there any trees, bushes, or tall grass that may impact the wellhead? Yes No N/A

What is the nature of surrounding land use within approximately 100 m (300 feet) of the well?

Urban/ Residential Cottages/ Recreational Agricultural/ Crop Production

Commercial Natural/ Undeveloped Agricultural/ Livestock

How close is the nearest natural water body or water course? Within 30 m (100 feet)

(i.e. lake, river, stream, creek)

30 m to 100 m (100 - 300 feet)

101 m to 200 m (300 - 600 feet)

over 200 m (600 feet)

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Section 8: GWX - Wells (complete one checklist for each well)

Any potential sources of contamination within 30 m (100 feet) of the wellhead? Yes No N/A

- | | | |
|--|---|---|
| <input type="checkbox"/> Sewage/ septic holding tank | <input type="checkbox"/> Landfill site | <input type="checkbox"/> Abandoned/ unsealed wells |
| <input type="checkbox"/> Septic field | <input type="checkbox"/> Petroleum storage area | <input type="checkbox"/> Local overland flooding area |
| <input type="checkbox"/> Sewer main/ pipe | <input type="checkbox"/> Chemical storage area | <input type="checkbox"/> Overtopped well in past |
| <input type="checkbox"/> Greywater field or pit | <input type="checkbox"/> Feed/ grain storage area | <input type="checkbox"/> Other: |
| <input type="checkbox"/> Livestock area | <input type="checkbox"/> Herbicide/ fertilizer apply area | <input type="checkbox"/> Other: |
| <input type="checkbox"/> Manure storage area | <input type="checkbox"/> Excavations or gravel pits | <input type="checkbox"/> Other: |
| <input type="checkbox"/> Manure application area | <input type="checkbox"/> Dugouts | |
| <input type="checkbox"/> Composting site | <input type="checkbox"/> Drainage ditches | |

Does the well have adequate capacity to meet demands? Yes No N/A

What is the capacity of the well pumping system? Units.

What is the peak or maximum day demand on the water system? Units.

How is the well pump controlled?

- Distribution pressure switch Storage tank level Other:

Is there ASME pressure tank/s to reduce pump cycling? Yes No N/A

What is the average age (years) of the raw water supply?

Supply (i.e. well)

- What is the general condition of the raw water supply? Good
 Fair - nearing end of useful life
 Poor - replacement required

Additional comments:

- Attachment/s:
Please attach a sketch or map showing well(s) and approximate distances to any potential sources of contamination, and to the water treatment plant or pumphouse.

Checklist: Groundwater Under Direct Influence (GUDI)

Section 9: GWX - Iron/ Manganese Filter

Section is Not Applicable to this System.

Is an aerator used to oxidize iron, manganese, or arsenic? Yes No N/A

Is a chemical oxidant applied to assist with iron, manganese, or arsenic removal? Yes No N/A

If yes, which chemical? (i.e. chlorine, potassium permanganate, ozone)

If yes, what is the target dosage? (mg/L)

Is the rated capacity of the filters able to meet peak or maximum day demands? Yes No N/A

What is the capacity of the filters? Units.

What is the peak or maximum day demand on the water system? Units.

What type(s) of media are in the filter? (layers)

Other:

Anthracite Carbon Sand Greensand Gravel

Can the filters be visually inspected for maintenance and repair?

Yes No N/A

Are the filters regularly inspected?

Yes No N/A

Inspection frequency for the filters?

Has the filter media ever been replaced or topped up?

Yes No N/A

If yes, how long ago?

Can head loss be determined for the filters?

Yes No N/A

Are the filters regularly backwashed?

Yes No N/A

Backwash frequency for the filters?

What is the trigger to initiate a backwash? (time, pressure loss, turbidity)

Is the backwash flow rate adequate?

Yes No N/A

What is the source of backwash water? Filtered and chlorinated water

Filtered and unchlorinated water Raw water

How is the backwash disposed of?

Municipal sewer system Holding tank or septic system Other:

Discharged to environment

If the backwash disposal is to sewer or drain, is there an air gap?
(i.e. there is no direct connection to avoid backflow)

Yes No N/A

Checklist: Groundwater Under Direct Influence (GUDI)

Section 9: GWX - Iron/ Manganese Filter

Section is Not Applicable to this System.

Does the filter system have an air release valve, pressure relief valve, or both? Yes No N/A

Is there a suitable sample tap for water leaving the filters? Yes No N/A

Are iron and/or manganese levels regularly monitored? Yes No N/A

If being used for arsenic removal, are arsenic levels regularly monitored? Yes No N/A

What were the iron and manganese levels (mg/L) in the raw and filter water at time of the inspection?

Iron - raw Manganese - raw

Iron - filtered Manganese - filtered

What was the arsenic (mg/L) level in the raw and treated water in the most recent chemistry report?

Arsenic - raw Arsenic - treated

What is the removal rate (%) for arsenic?

What is the average age (years) of the filtration equipment?

Filtration

What is the general condition of the filtration equipment? Good
 Fair - nearing end of useful life
 Poor - replacement required

Additional comments:

Checklist: Groundwater Under Direct Influence (GUDI)

Section 10: GWX System - Water Softener

Section is Not Applicable to this System.

Is there a bypass to allow blending of softened and un-softened water? Yes No N/A

SPWS: is there a separate un-softened water tap provided for drinking water? Yes No N/A

How often (frequency) is the softener regenerated? Units.

How is the regeneration frequency set? Based on volume of water treated Timed

Other

What is used to regenerate the resin? Sodium chloride Other

Is the salt used for regeneration food grade and NSF 60 certified? Yes No N/A

Has the resin ever undergone a chemical clean with an acid solution? Yes No N/A

Where is the waste brine discharged after regeneration?

Municipal sewer Holding tank or septic system Discharged to environment

If the brine disposal is to sewer or drain, is there an air gap? Yes No N/A
(i.e. there is no direct connection to avoid backflow)

What is the average age (years) of the softening equipment?

Softener

What is the general condition of the softening equipment? Good

Fair - nearing end of useful life

Poor - replacement required

Additional comments:

Checklist: Groundwater Under Direct Influence (GUDI)

Section 11: GWX System - Cartridge Filters (single or bank of micron filters)

Section is Not Applicable to this System.

How is the filtration equipment being used? Turbidity control Pre-treatment filter
 UV Pre-treatment filter

Are the filter housings and cartridge filters NSF certified? Yes No N/A

If yes, to which NSF standards? (i.e. 53, 60, 61)

Is the rated capacity of the filters able to meet peak or maximum day demands? Yes No N/A

What is the capacity of the filters? Units.

What is the peak or maximum day demand on the water system? Units.

Can pressure loss across individual filters be monitored? Yes No N/A

Are spare cartridges kept on-hand? Yes No N/A

Are cartridges changed as per manufacturer's requirements? (i.e. pressure loss) Yes No N/A

LIST ALL CARTRIDGE FILTERS IN THEIR ORDER IN THE TREATMENT PROCESS.

	Size (microns)	Manufacturer's listed max. pressure loss (psi)	Trigger and trigger value to change filter (pressure loss, time, turbidity)	Change out frequency (days)
Cartridge #1	<input style="width: 80px; height: 20px;" type="text"/>	<input style="width: 80px; height: 20px;" type="text"/>	<input style="width: 150px; height: 20px;" type="text"/>	<input style="width: 80px; height: 20px;" type="text"/>
Cartridge #2	<input style="width: 80px; height: 20px;" type="text"/>	<input style="width: 80px; height: 20px;" type="text"/>	<input style="width: 150px; height: 20px;" type="text"/>	<input style="width: 80px; height: 20px;" type="text"/>
Cartridge #3	<input style="width: 80px; height: 20px;" type="text"/>	<input style="width: 80px; height: 20px;" type="text"/>	<input style="width: 150px; height: 20px;" type="text"/>	<input style="width: 80px; height: 20px;" type="text"/>
Cartridge #4	<input style="width: 80px; height: 20px;" type="text"/>	<input style="width: 80px; height: 20px;" type="text"/>	<input style="width: 150px; height: 20px;" type="text"/>	<input style="width: 80px; height: 20px;" type="text"/>

Is there a suitable sampling tap for water leaving each filter? Yes No N/A

Is there a suitable sampling tap for the final filter effluent? Yes No N/A

Are the filters equipped with an air release valve, pressure relief valve, or vent? Yes No N/A

What were the turbidity levels (NTU) in the raw and filtered water at time of the inspection?

Turbidity - raw Turbidity - filtered

Does the system use pre-coagulation? Yes No N/A

If yes, which chemical?

If yes, what is the target dosage? (mg/L)

Checklist: Groundwater Under Direct Influence (GUDI)

Section 11: GWX System - Cartridge Filters (single or bank of micron filters)

Section is Not Applicable to this System.

Are cartridge filters used as a primary barrier?
i.e. turbidity standard applied Yes No N/A

Is the final stage cartridge filter rated at 1 micron absolute? Yes No N/A

Does the 1 micron absolute filter carry certification to NSF Standard 53 for
removal of *Cryptosporidium* and *Giardia*? Yes No N/A

Is the final stage cartridge filter flushed after changing out the filter and
before returning the filter to service? Yes No N/A

What is the average age (years) of the filtration equipment?

Filtration

What is the general condition of the filtration equipment? Good
 Fair - nearing end of useful life
 Poor - replacement required

Additional comments:

Checklist: Groundwater Under Direct Influence (GUDI)

Section 12: GWX System - Nanofiltration (NF) or Reverse Osmosis (RO) Membrane

Section is Not Applicable to this System.

What type(s) of membranes are used? Nanofiltration (NF) Reverse Osmosis (RO) Both

Membrane model #

What is the recovery rate (%)? What is the reject rate (%)?

How many sealed vessels/ modules?

How many membrane elements in each vessel/ module?

Is there an isolation valve for each vessel/ module? Yes No N/A

Are there pressure gauges on influent & effluent piping for each vessel/ module? Yes No N/A

Does the concentrate/ reject piping rise after the final stage to prevent air locking and draining after the shutdown flush? Yes No N/A

Are there sampling taps for: permeate Yes No N/A

Are there sampling taps for: concentrate/ reject Yes No N/A

Are there sampling taps for: blended water Yes No N/A

Are there sampling taps for: individual vessels Yes No N/A

Are the permeate, concentrate/ reject, by-pass metered? permeate concentrate by-pass

Is there online conductivity monitoring? feed permeate

Is there online turbidity monitoring? feed permeate

Is there online pH monitoring? Yes No N/A

Is an antiscalant added to the influent water to reduce fouling? Yes No N/A

If yes, list chemical and dosage.

Is an acid solution added to reduce pH prior to the membrane? Yes No N/A

If yes, which type of acid solution is used? hydrochloric sulphuric Other:

What method is used to stabilize the permeate water?

blending

pH adjustment using sodium hydroxide (caustic soda)

alkalinity & pH adjustment using sodium carbonate (soda ash)

limestone contactor

degasification or air stripping to remove carbon dioxide

Checklist: Groundwater Under Direct Influence (GUDI)

Section 12: GWX System - Nanofiltration (NF) or Reverse Osmosis (RO) Membrane

Section is Not Applicable to this System.

Are the alkalinity and pH levels of the finished water suitable for distribution to limit corrosion? Yes No N/A

Is a permeate flush done after each shut-down? Yes No N/A

Is there a Clean-In-Place (CIP) unit for cleaning the membrane to limit fouling and scaling? Yes No N/A

If yes, list the cleaning chemicals.

Are all treatment and cleaning chemicals certified to NSF Standard 60? Yes No N/A

Is the CIP unit equipped with a heater to heat the cleaning water? Yes No N/A

Have rules been established for initiating a membrane cleaning? Yes No N/A

What triggers a chemical CIP membrane cleaning?

Run Time Transmembrane Pressure (TMP) Flow reduction Initiated manually Operator

Approximately how often is a CIP performed?

How is the concentrate/ reject or CIP waste disposed? Municipal sewer system Holding tank or septic system N/A Discharged to environment Other:

If the concentrate or CIP waste disposal is to sewer or drain, is there an air gap? (i.e. there is no direct connection to avoid backflow) Yes No N/A

Is there a pre-filter? Yes No N/A

If yes, specify pore size in microns.

Are there pressure gauges on the inlet and outlet of the pre-filter? Yes No N/A

Is there redundancy to ensure water demands can be met during shut-downs such as cleanings? (i.e. dual trains, extra modules, treated water storage) Yes No N/A

What types of monitors or indicators are provided for the membrane unit?

Run Time Transmembrane Pressure (TMP) Pressure Temperature

What alarms are provided for the membrane unit?

Low feed pressure High feed pressure Low feed flow rate

Other: Other:

Checklist: Groundwater Under Direct Influence (GUDI)

Section 12: GWX System - Nanofiltration (NF) or Reverse Osmosis (RO) Membrane

Section is Not Applicable to this System.

Was the membrane system installed to achieve compliance with specific water quality standard(s) or guideline(s)? Yes No N/A

What was the level (i.e. mg/L) in the raw and treated water in the most recent chemistry report for the parameter required to achieve compliance with a water quality standard(s)?

parameter: raw: treated:

What is the removal rate (%) for the parameter?

Is the expected removal rate (%) being achieved? Yes No N/A

parameter: raw: treated:

What is the removal rate (%) for the parameter?

Is the expected removal rate (%) being achieved? Yes No N/A

parameter: raw: treated:

What is the removal rate (%) for the parameter?

Is the expected removal rate (%) being achieved? Yes No N/A

parameter: raw: treated:

What is the removal rate (%) for the parameter?

Is the expected removal rate (%) being achieved? Yes No N/A

What is the average age (years) of the filtration equipment?

Filtration

What is the general condition of the filtration equipment? Good
 Fair - nearing end of useful life
 Poor - replacement required

Additional comments:

Checklist: Groundwater Under Direct Influence (GUDI)

Section 13: GWX System - Slow Sand/ Biological Filtration

Section is Not Applicable to this System.

Is the rated capacity of the filters able to meet peak or maximum day demands? Yes No N/A

What is the capacity of the filters? Units.

What is the peak or maximum day demand on the water system? Units.

Are there two filter beds each with independent biological layers to allow for cleaning and repairing? Yes No N/A

Is the biological layer scraped? Yes No N/A

If yes, what is the frequency?

Can the filters be visually inspected for maintenance and repair? Yes No N/A

Are the filters regularly inspected? Yes No N/A

Inspection frequency for the filters?

Is there an ozone generator? Yes No N/A

If yes, what is the source gas for the ozone generator?

Compressed air Concentrated oxygen Liquid oxygen (LOX)

What is the applied dosage range for the ozone (mg/L)?

Is the ozone feed rate or dosage adjusted seasonally? Yes No N/A

If yes, what are the adjustments based on? Turbidity changes UVT changes Other

Is the ozone injected in a sidestream using a venturi? Yes No N/A

Is an ozone contactor tank provided immediately after ozone injection? Yes No N/A

Is the ozone contactor equipped with an ozone destruction unit vented to the atmosphere? Yes No N/A

Is an ambient ozone monitor/ sensor located near the ozone equipment? Yes No N/A

Were all ozone systems functional at the time of the inspection? Yes No N/A

Is there a gravel roughing filter provided ahead of the slow sand filter? Yes No N/A

How often (frequency) is the roughing filter backwashed?

What is the trigger and trigger value to initiate a backwash?
(time, head loss, turbidity)

Do the slow sand filters have at least 750 mm (30 inches) of sand? Yes No N/A

Has the slow sand filter media ever been replaced or topped up? Yes No N/A

Can head loss be determined for each slow sand filter/s? Yes No N/A

Checklist: Groundwater Under Direct Influence (GUDI)

Section 13: GWX System - Slow Sand/ Biological Filtration

Section is Not Applicable to this System.

Are the slow sand filters backwashed? Yes No N/A

If yes, what is the frequency?

What is the trigger and trigger value to initiate a backwash?
(time, head loss, turbidity)

Is the backwash source treated & unchlorinated water? Yes No N/A

Is the filter equipped with filter-to-waste following backwash? Yes No N/A

Is the filter-to-waste period automatically controlled based on turbidity levels? Yes No N/A

If manually controlled, explain the trigger and trigger value for stopping the filter-to-waste?
i.e. turbidity levels, timed, etc...

Trigger to stop filter-to-waste:

Are there Biological Activated Carbon (BAC) filters after the slow sand filters? Yes No N/A

Are the BAC filters backwashed? Yes No N/A

If yes, what is the frequency?

Is the backwash source treated & unchlorinated water? Yes No N/A

How is the backwash water from the biological filters disposed? N/A
 Municipal sewer system Holding tank or septic system Other:
 Discharged to environment

If the backwash disposal is to sewer or drain, is there an air gap?
(i.e. there is no direct connection to avoid backflow) Yes No N/A

Is there a suitable sample tap for water leaving each of the filters? Yes No N/A

What is the average age (years) of the filtration equipment?
Filtration

What is the general condition of the filtration equipment? Good
 Fair - nearing end of useful life
 Poor - replacement required

Additional comments:

Checklist: Groundwater Under Direct Influence (GUDI)

Section 14: GWX System - Chlorination

Section is Not Applicable to this System.

What type of chlorine solution is used? Sodium hypochlorite fed directly from container
 Diluted sodium hypochlorite
 Solution from calcium hypochlorite powders or tablets
 Unscented household bleach
 On-site sodium hypochlorite generation ("analyte")

What is the make-model-brand name of the chlorine or generator used? (i.e. supplier label)

Does the chlorine solution, or powder/ tablets, or salt carry NSF 60 certification? Yes No N/A

Does the on-site sodium hypochlorite generator carry NSF 60 certification? Yes No N/A

Does the on-site sodium hypochlorite generator carry NSF 61 certification? Yes No N/A

Is an adequate amount of chlorine chemical kept on-hand at all times? (i.e. 30 days minimum) Yes No N/A

Is the chlorine solution stored away from sunlight? Yes No N/A

Is the sodium hypochlorite solution used within 3 months of purchase? Yes No N/A

Are chlorine tanks stored over a spill tray? Yes No N/A

Is the chlorine stored in a separate chemical storage room? Yes No N/A

Is the system equipped with duty-standby chlorine pumps with automatic switchover in the case of pump failure? Yes No N/A

Is there only a single feed chlorine pump? Yes No N/A

Is there a spare feed chlorine pump? (i.e. "shelf spare") Yes No N/A

Are critical spare parts kept on-hand to maintain the feed pump? Yes No N/A

What triggers operation of the chlorine feed? (i.e. raw water pump, reservoir level, etc...)

Is operation of the feed pump controlled by the raw water pump (fixed injection rate) or by a flow meter (flow-paced injection rate)?

N/A Raw water pump Flow meter Other

Do feed pump settings suggest a properly sized feed pump? Yes No N/A

Checklist: Groundwater Under Direct Influence (GUDI)

Section 14: GWX System - Chlorination

Section is Not Applicable to this System.

What type of chlorine residual test kit is used?

N/A Digital DPD colorimeter Colour wheel Unapproved unit (i.e. pool kit)

When was the equipment last calibrated?

Is the system equipped with an online chlorine residual analyzer?

Yes No N/A

Explain where the analyzer sample draw water goes:

Normally, what is the free chlorine residual (mg/L) of the outgoing water?

Is chlorine gas (Cl₂) used for chlorination?

Yes No N/A

If yes, what type of chlorine gas addition is used?

100# 150# cylinders ton cylinders N/A

Is there automatic changeover equipment to switch from one cylinder or bank of cylinders to another cylinder or bank of cylinders, to ensure that unchlorinated water is not allowed into the distribution system?

Yes No N/A

Does gas chlorinator provide discharge at a point of positive pressure?

Yes No N/A

Is the chemical feed equipment located in a separate room to reduce hazards and vapors?

Yes No N/A

What is the average age (years) of the chlorination equipment?

Chlorination

What is the general condition of the chlorination equipment? Good

Fair - nearing end of useful life

Poor - replacement required

Additional comments:

Checklist: Groundwater Under Direct Influence (GUDI)

Section 15: GWX System - Chlorine Dioxide

Section is Not Applicable to this System.

What type of chlorine dioxide feed system is used?

Generator: sodium chlorite & hydrochloric acid Powder/s Tablets Other

What is the make-model-brand name of the chlorine dioxide feed system?

Is an adequate amount of chlorine dioxide chemicals kept on-hand at all times? (i.e. 30 days minimum) Yes No N/A

Are the chemicals stored in accordance with the supplier's instructions? Yes No N/A

Are chemicals stored over a spill tray? Yes No N/A

Is the chlorine dioxide stored in a separate chemical storage room? Yes No N/A

Is the system equipped with duty-standby chlorine dioxide pumps with automatic switchover in the case of pump failure? Yes No N/A

Is there only a single feed chlorine dioxide pump? Yes No N/A

Is there a spare feed chlorine dioxide pump? (i.e. "shelf spare") Yes No N/A

Are critical spare parts kept on-hand to maintain the feed pump? Yes No N/A

What triggers operation of the chlorine dioxide feed? (i.e. raw water pump, reservoir level, etc...)

Is operation of the feed pump controlled by the raw water pump (fixed injection rate) or by a flow meter (flow-paced injection rate)?

N/A Raw water pump Flow meter Other

Do feed pump settings suggest a properly sized feed pump? Yes No N/A

What type of chlorine dioxide test kit is used?

chlorine dioxide probe spectrophotometric: lissamine green B

How often are chlorine dioxide levels monitored in the treated water?

How often are chlorite levels monitored in the treated water?

How often are chlorate levels monitored in the treated water?

Are chlorite samples done on-site or at the laboratory? on-site laboratory

Are chlorate samples done on-site or at the laboratory? on-site laboratory

Are chlorite and chlorate levels below the health-based standards of 1 mg/L? Yes No N/A

Checklist: Groundwater Under Direct Influence (GUDI)

Section 15: GWX System - Chlorine Dioxide

Section is Not Applicable to this System.

What is the average age (years) of the chlorine dioxide equipment?

Chlorine Dioxide

What is the general condition of the chlorine dio. equipment? Good

Fair - nearing end of useful life

Poor - replacement required

Additional comments:

Checklist: Groundwater Under Direct Influence (GUDI)

Section 16: GWX System - Other Treatment Chemicals (excluding chlorine/ dioxide)

Section is Not Applicable to this System.

	Chemical Name/s	Dosage (mg/L)
Chemical #1	<input type="text"/>	<input type="text"/>
Chemical #2	<input type="text"/>	<input type="text"/>
Chemical #3	<input type="text"/>	<input type="text"/>
Chemical #4	<input type="text"/>	<input type="text"/>
Chemical #5	<input type="text"/>	<input type="text"/>

Are all chemicals that may come into contact with the potable water certified to NSF Standard 60? Yes No N/A

Is an adequate amount of treatment chemicals kept on-hand at all times? (i.e. 30 days minimum) Yes No N/A

Are the chemicals stored in accordance with the supplier's instructions? Yes No N/A

Are chemical tanks stored over a spill tray? Yes No N/A

Is the chemicals stored in a separate chemical storage room? Yes No N/A

Is the system equipped with duty-standby chemical pumps with automatic switchover in the case of pump failure? Yes No N/A

Is there only a single feed chemical pump? Yes No N/A

Is there a spare feed chemical pump? (i.e. "shelf spare") Yes No N/A

Are critical spare parts kept on-hand to maintain the feed pump? Yes No N/A

What triggers operation of the chemical feeds? (i.e. raw water pump, reservoir level, etc...)

Is operation of the chemical pumps controlled by the raw water pump (fixed injection rate) or by a flow meter (flow-paced injection rate)?

N/A Raw water pump Flow meter Other

Do feed pump settings suggest properly sized feed pumps? Yes No N/A

Checklist: Groundwater Under Direct Influence (GUDI)

Section 16: GWX System - Other Treatment Chemicals (excluding chlorine/ dioxide)

Section is Not Applicable to this System.

What is the average age (years) of the chemical equipment?

Chemicals

What is the general condition of the chemical equipment?

Good

Fair - nearing end of useful life

Poor - replacement required

Additional comments:

Checklist: Groundwater Under Direct Influence (GUDI)

Section 17: GWX System - UV Disinfection

Section is Not Applicable to this System.

Are the UV units certified to NSF Standard 55 Class A? Yes No N/A

Does the unit provide a minimum dosage of 40 mJ/cm²? Yes No N/A

What is the make-model-brand name of the UV units?

How many UV units are used?

Is the UV disinfection system equipped with Uninterruptible Power Supply (UPS) for low power events like brown-outs? Yes No N/A

Is the system equipped with a minimum 5 micron cartridge pre-filter or another type of pre-filter, such as iron filter? Yes No N/A

Have the units been installed in the right orientation (horizontal or vertical) based on the manufacturer's specifications? Yes No N/A

Is there a by-pass around the UV disinfection system that could allow un-disinfected water to be sent to distribution or taps? Yes No N/A

Are these by-passes tagged or labelled? Yes No N/A

Are there procedures for activating by-passes including DWO notification? Yes No N/A

Are there isolation valves before or after the UV units? Yes No N/A

Are proper procedures being followed to clean the sleeve and sensor? Yes No N/A

How often are the sleeves cleaned?

Are UV bulbs being changed at least annually? Yes No N/A

Is there a spare UV bulb available? (i.e. "shelf spare") Yes No N/A

Are the UV sensors being calibrated once per year, or as per manufacturer's requirements, or when an unresolved alarm occurs? Yes No N/A

UV system or sensor checked by the equipment supplier in the last year? Yes No N/A

Has Operator or supplier had to replace sensors? Yes No N/A

What is the usual UVT level (%), or at the time of the inspection?

Have the UV units experienced ongoing or frequent alarms suggesting an issue with the water quality (UVT level) or the sensor? Yes No N/A

Does the UV unit have an automatic shut-off (i.e. solenoid valve) that shuts off the water supply if there is a UV alarm? Yes No N/A

How frequent are UV alarms? no alarms (haven't had any) infrequent (i.e. bulb change only)

frequently (i.e. weekly) - need to clean sleeve or sensor issues

constantly (i.e. daily or anytime UV runs) - cleaning only resolves issues for a short period of time

What kind of alarms? N/A visual audible sent to computer sent to cellphone
Check all that apply. other

Checklist: Groundwater Under Direct Influence (GUDI)

Section 17: GWX System - UV Disinfection

Section is Not Applicable to this System.

What is the average age (years) of the UV equipment?

UV

What is the general condition of the UV equipment?

Good

Fair - nearing end of useful life

Poor - replacement required

Additional comments:

Checklist: Groundwater Under Direct Influence (GUDI)

Section 18: GWX System - Treated Water Storage in Aboveground Tank(s)

Section is Not Applicable to this System.

What type of tank is used to store treated water before it is distributed?

(Note: Pressure or hydropneumatic tanks with a single inlet/outlet pipe meant to reduce pump cycling are not considered storage tanks.)

flow-through pressurized tank/s atmospheric tank/s (poly) other:

What is the total volume of the tank/s? Units.

How many tanks? List # and each volume.

For atmospheric tanks:
What is the total volume of the tank/s based on the lowest operating level? Units.

Are the tanks in series (flow through one to another) or parallel (separate flows)?

single (1) tank multiple tanks tanks in series tanks in parallel N/A

What is the tank material? polyethylene (PE) fibreglass (FRP)
 epoxy-coated steel other:

Is the tank material or interior tank coating certified or approved for use in a potable water system? (i.e. NSF 61 or FDA approved) Yes No N/A

What is the purpose of the water storage? to meet peak demands chlorine contact time
Check all that apply. fire protection other

Storage tanks sized to meet peak demands? Yes No N/A

Storage tanks sized for at least 20 minutes chlorine contact time? Yes No N/A
 don't know

Storage tanks sized for fire protection? Yes No N/A

If no for fire protection, do the tanks provide at least 1 Average Day Demand (ADD) and less than 3 ADD of storage? Yes No N/A

What is the peak hourly flow rate? Units.

What is the hydraulic retention time at the estimated peak hourly flow rate when the tanks are at their lowest operating level (atmospheric tanks) or at their normal full volume (pressurized tanks)?
(Divide the volume from above by the peak hourly flow rate from above. Convert to same units.)

Retention time: (i.e. 2.50 hours or 150 minutes)

Checklist: Groundwater Under Direct Influence (GUDI)

Section 18: GWX System - Treated Water Storage in Aboveground Tank(s)

Section is Not Applicable to this System.

The following table is taken from the "Filtration and Disinfection Log Reduction Credits" document from the Office of Drinking Water. This document is available online.

Table 1: Baffling Factors for Water Storage Systems.

<u>Storage System Configuration:</u>	<u>Baffling Factor:</u>	<u>(This System)</u>
Hydropneumatic tank with single inlet and outlet	no contact time	<input type="checkbox"/> Yes <input type="checkbox"/> No
Single unbaffled retention tank; or multiple tanks in parallel	0.1	<input type="checkbox"/> Yes <input type="checkbox"/> No
Two storage tanks in series	0.2	<input type="checkbox"/> Yes <input type="checkbox"/> No
Three or more storage tanks in series	0.3 - 0.4	<input type="checkbox"/> Yes <input type="checkbox"/> No
Baffled tank or baffled reservoir cell	0.3 - 0.6	<input type="checkbox"/> Yes <input type="checkbox"/> No

Based on the above table, what is the baffle factor for this system:

What is the effective chlorine contact time?
(Multiply the retention time from previous page by the baffle factor from above.)

Effective chlorine contact time: (i.e. 25 minutes)

Storage tanks sized for at least 20 minutes effective chlorine contact time? Yes No N/A
 don't know

For atmospheric tanks, are the tanks equipped with level sensors for pump operation? Yes No N/A
 floats pressure sensors ultrasonic sensing system other (contact probes)

Are the tanks accessible for visual inspection? Yes No N/A

Are the tanks equipped with access or inspection hatches? Yes No N/A

Are the tanks regularly inspected? Yes No N/A

Last inspected or inspection frequency:

Are the tanks regularly cleaned and disinfected? Yes No N/A

Last cleaned or cleaning frequency:

Checklist: Groundwater Under Direct Influence (GUDI)

Section 18: GWX System - Treated Water Storage in Aboveground Tank(s)

Section is Not Applicable to this System.

Are the inlet and outlet pipes located to minimize the chance of water short-circuiting through the tanks and leading to water stagnation? Yes No N/A

Is the pump intake line properly sealed and located at least 150 mm (6 inches) above the bottom of the tank? Yes No N/A

Can individual tanks be isolated for inspection or maintenance?; without interrupting water service or interrupting chlorine contact time. Yes No N/A

Are pumps connected to multiple tanks to allow for isolation? Yes No N/A

Are all openings sealed watertight? Yes No N/A

Are all vents, overflows, and drain lines equipped with screens? Yes No N/A

Are all vents, overflows, and drain lines located to avoid backflow or run-off? Yes No N/A

If the tanks are located outside the building:

Are the tanks protected from vandalism (fenced area or locked hatches)? Yes No N/A

Are the tanks protected from direct sunlight (opaque or covered?) Yes No N/A

What is the average age (years) of the storage equipment?

Storage

What is the general condition of the storage equipment? Good
 Fair - nearing end of useful life
 Poor - replacement required

Additional comments:

Checklist: Groundwater Under Direct Influence (GUDI)

Section 19: GWX System - Treated Water Storage Inground Reservoir or Buried Tank(s)

Section is Not Applicable to this System.

What type of storage system is used to store treated water before it is distributed?

inground concrete reservoir buried tank/s other:

What is the total volume of the reservoir/s or tank/s? Units.

How many reservoir cells or tanks? List # and each volume.

What is the total storage volume based on the lowest operating level? Units.

Are the cells or tanks in series (flow through one to another) or parallel (separate flows)?

single (1) cell multiple cells cells in series cells in parallel N/A

What is the reservoir or tank material? concrete fibreglass (FRP)
 polyethylene (PE) other:

Is the reservoir or interior tank coating certified or approved for use in a potable water system? (i.e. NSF 61 or FDA approved) Yes No N/A

What is the purpose of the water storage? to meet peak demands chlorine contact time
Check all that apply. fire protection other

Reservoir or tanks sized to meet peak demands? Yes No N/A

Reservoir or tanks sized for at least 20 minutes chlorine contact time? Yes No N/A
 don't know

Reservoir or tanks sized for fire protection? Yes No N/A

If no for fire protection, does it provide at least 1 Average Day Demand (ADD) and less than 3 ADD of storage? Yes No N/A

What is the peak hourly flow rate? Units.

What is the hydraulic retention time at the estimated peak hourly flow rate when the cells/ tanks are at their lowest operating level?
(Divide the volume from above by the peak hourly flow rate from above. Convert to same units.)

Retention time: (i.e. 2.50 hours or 150 minutes)

Checklist: Groundwater Under Direct Influence (GUDI)

Section 19: GWX System - Treated Water Storage Inground Reservoir or Buried Tank(s)

Section is Not Applicable to this System.

The following table is taken from the "Filtration and Disinfection Log Reduction Credits" document from the Office of Drinking Water. This document is available online.

Table 1: Baffling Factors for Water Storage Systems.

Storage System Configuration:	Baffling Factor:	(This System)
Hydropneumatic tank with single inlet and outlet	no contact time	<input type="checkbox"/> Yes <input type="checkbox"/> No
Single unbaffled retention tank; or multiple tanks in parallel	0.1	<input type="checkbox"/> Yes <input type="checkbox"/> No
Single unbaffled cell reservoir, inlet and outlet at opposite ends	0.2	<input type="checkbox"/> Yes <input type="checkbox"/> No
Two storage tanks in series	0.2	<input type="checkbox"/> Yes <input type="checkbox"/> No
Two cell reservoir, inlet and outlet in same cell	0.2	<input type="checkbox"/> Yes <input type="checkbox"/> No
Two cell reservoir, inlet and outlet at opposite ends of separate cells	0.3	<input type="checkbox"/> Yes <input type="checkbox"/> No
Three or more storage tanks in series	0.3 - 0.4	<input type="checkbox"/> Yes <input type="checkbox"/> No
Baffled tank or baffled reservoir cell	0.3 - 0.6	<input type="checkbox"/> Yes <input type="checkbox"/> No

Based on the above table, what is the baffle factor for this system:

What is the effective chlorine contact time?
(Multiply the retention time from previous page by the baffle factor from above.)

Effective chlorine contact time: (i.e. 25 minutes)

Reservoir or tanks sized for at least 20 minutes effective chlorine contact time? Yes No N/A
 don't know

Is the reservoir or tanks equipped with level sensors for pump operation? Yes No N/A
 floats pressure sensors ultrasonic sensing system other (contact probes)

Are the cells or tanks accessible for visual inspection? Yes No N/A

Are the cells or tanks equipped with access or inspection hatches? Yes No N/A

Are the cells or tanks regularly inspected? Yes No N/A

Last inspected or inspection frequency:

Are the cells or tanks regularly cleaned and disinfected? Yes No N/A

Last cleaned or cleaning frequency:

Checklist: Groundwater Under Direct Influence (GUDI)

Section 19: GWX System - Treated Water Storage Inground Reservoir or Buried Tank(s)

Section is Not Applicable to this System.

Are the inlet and outlet pipes located to minimize the chance of water short-circuiting through the cells or tanks and leading to water stagnation? Yes No N/A

Are there at least two isolatable cells or tanks with a valved interconnection? Yes No N/A

Can individual cells or tanks be isolated for inspection or maintenance?; without interrupting water service or interrupting chlorine contact time. Yes No N/A

Is pumping capacity available in at least two cells or tanks to allow water supply to be maintained when cleaning the reservoir cells or tanks? Yes No N/A

Are access hatches curbed and sealed watertight? Yes No N/A

Are all openings sealed watertight? Yes No N/A

Are pipe entries into the reservoir or tanks sealed watertight to prevent contamination? (i.e. LinkSeal or cast-in-place sleeve) Yes No N/A

Do any floor drains or wastewater pipes pass over or through the reservoir? Yes No N/A

Yes - floor drain Yes - wastewater Yes - other

If yes, are these pipes encased in concrete? Yes No N/A

Are pipes through walls protected from differential settling? (i.e. flexible joints/ ball-and-socket joints) Yes No N/A

Are all vents, overflows, and drain lines equipped with screens? Yes No N/A

Is the reservoir or tank equipped with a screened air vent? (i.e. gooseneck or inverted J-pipe) Yes No N/A

Is the reservoir or tank equipped with an adequately sized screened overflow that discharges to the ground? Yes No N/A

Are all vents, overflows, and drain lines located to avoid backflow or run-off? Yes No N/A

Is the reservoir or tank protected from contamination from run-off or spills into the water treatment plant? Yes No N/A

Is the reservoir or tank located at least 15 m away from sewer system components such as sewer lines or holding tanks? Yes No N/A

If the reservoir extends beyond the footprint of the water treatment plant building, is the reservoir roof adequately sloped and drained? Yes No N/A

Is the reservoir or tank site graded to drain away? Yes No N/A

If the cells or tanks are located outside the building:

Are the cells or tanks protected from vandalism (fenced area or locked hatches)? Yes No N/A

Please attach a schematic of reservoir cells or tanks showing the inlet, outlet, pump locations, baffles. Attachment/s

Checklist: Groundwater Under Direct Influence (GUDI)

Section 19: GWX System - Treated Water Storage Inground Reservoir or Buried Tank(s)

Section is Not Applicable to this System.

What is the average age (years) of the storage equipment?

Storage

What is the general condition of the storage equipment?

Good

Fair - nearing end of useful life

Poor - replacement required

Additional comments:

Checklist: Groundwater Under Direct Influence (GUDI)

Section 20: GWX System - Distribution Pumping (if not relying on well pump)

Section is Not Applicable to this System.

**Pump sizes and flow rates (capacities) can be estimated; units can be given in HP.
If unknown, fill out what information is available.**

LIST ALL PUMPS IN THE SYSTEM: (write Units)

	Pump Name or Description:	Size: (HP)	Output Pressure: (psi or kPa)	Size: Total Dynamic Head TDH (feet or meters)	Size: Flow Rate (L/s or USGPM)
Pump #1	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Pump #2	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Pump #3	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Pump #4	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Pump #5	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Pump #6	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Are the distribution pumps controlled by the distribution system pressure? Yes No N/A

What is the pressure set-point (psi) for the distribution header?

System able to meet peak water demands with adequate at-tap pressures? Yes No N/A

Does the pumping system have adequate capacity to meet demands? Yes No N/A

What is the total capacity of the pumping system? Units.

What is the peak or maximum day demand on the water system? Units.

Are there any engine-driven pumps with fuel? Yes No N/A

If yes, is there proper containment for the fuel to prevent contamination? Yes No N/A

Is the distribution pumping system equipped with appropriate check valves, shut-off valves, pressure gauges, pressure relief or air/ vacuum relief valves? Yes No N/A

Are taps or connections to mechanical equipment, where there is potential backflow of hazardous substances, protected with an air gap or appropriate backflow prevention device? Yes No N/A
(i.e. devices such as washdown sink, hose bib, boiler, heat exchanger, etc.)

Checklist: Groundwater Under Direct Influence (GUDI)

Section 20: GWX System - Distribution Pumping (if not relying on well pump)

Section is Not Applicable to this System.

What is the average age (years) of the pumping equipment?

Pumping

What is the general condition of the pumping equipment?

Good

Fair - nearing end of useful life

Poor - replacement required

Additional comments:

Checklist: Groundwater Under Direct Influence (GUDI)

Section 21: GWX System - Distribution System (not intended for a building plumbing system)

Section is Not Applicable to this System.

Are there up-to-date maps of the distribution system indicating locations of:
service connections, valves, flush-outs, hydrants, etc... Yes No N/A

What types of watermain materials exist in the distribution system? Check all that apply.

PVC (polyvinyl chloride) AC (asbestos cement) iron - cast
 HDPE (high-density polyethylene) other iron - ductile

Are watermains adequately sized?
(i.e. 50 mm (2 inch) if no fire protection, 150 mm (6 inch) if fire protection) Yes No N/A

Are watermains adequate pressure rating?
(i.e. minimum 100 psi or 690 kPa) Yes No N/A

Is adequate at-tap pressure of 30-to-60 psi (200-to-400 kPa) maintained
in the distribution system at all times? Yes No N/A

Does the system have a watermain replacement or renewal strategy? Yes No N/A

Are a set of standards available for new construction?;
reference to Manitoba Water Services Board (MWSB) or
City of Winnipeg standard construction specifications or similar,
to ensure proper materials and construction procedures are followed? Yes No N/A

Have minimum design and construction standards been established for
new service connections? Yes No N/A

Is all new construction inspected to meet these requirements? Yes No N/A

Are all new watermains, service lines, and related equipment CSA or NSF
certified for use in potable water systems? Yes No N/A

Are all new watermains and water lines disinfected as per AWWA, MWSB,
or City of Winnipeg disinfection standards including
confirmatory bacterial testing before placed into service? Yes No N/A

If piped sewer is present, is there at least 3 m (10 feet) horizontal distance
separation between watermains and sewer mains, where they run parallel? Yes No N/A

If watermains are closer than 3 m (10 feet) from sewer mains
are the watermains vertically above the sewer mains? Yes No N/A

If yes, do the watermains have a vertical distance separation at least
0.45 m (18 inches)? Yes No N/A

If watermains cross: sewer mains, raw or other non-potable water lines,
oil or gas pipelines, etc... is the watermain above at least 0.45 m (18 inches)? Yes No N/A

Are watermains protected from damage by being buried with at least
2.4 m (8 feet) cover for year-round systems or 0.45 m (18 inches) for seasonal? Yes No N/A

Has the distribution system had any issues with frozen service lines? Yes No N/A

Are "bleeder" lines or valves used to prevent frozen service lines?
(These are used in some northern communities.) Yes No N/A

Checklist: Groundwater Under Direct Influence (GUDI)

Section 21: GWX System - Distribution System (not intended for a building plumbing system)

Section is Not Applicable to this System.

Are water service connections metered? Yes No N/A

some connections

Are water losses kept under 15% to reduce water production requirements? Yes No N/A

don't know

What is the estimated % of water loss for this water system? % don't know

Are dead ends supplied with hydrants or flush-outs? Yes No N/A

Are valves and hydrants regularly inspected and exercised? Yes No N/A

Are there adequate number of valves, hydrants, and flush-outs to isolate and flush the system? Drain the system if seasonal. Yes No N/A

Are watermains and distribution lines flushed at least annually? Yes No N/A

Flushing frequency:

Are there any known lead service lines present in the system? Yes No N/A

don't know

If found, has a strategy been developed to remove lead service lines? Yes No N/A

Is there a cross connection and backflow prevention program? Yes No N/A

Are connections where there is potential for backflow of hazardous materials protected by backflow prevention assembly or air gap? (i.e. potential locations include agricultural operations, wastewater treatment plants, etc.) Yes No N/A

Are connections from heat exchangers prohibited from being connected to the water supply? (i.e. prohibited from returning water to the potable water line) Yes No N/A

Is there equipment within the distribution system with a high water table or potential to be flooded? Yes No N/A

Includes: manholes with potable water equipment, underground meter/ valve pits

Are all manholes with potable water equipment or underground meter/ valve pits or similar installations, watertight and free from non-potable water intrusion? Yes No N/A

Are air relief valves within the distribution system located aboveground? Yes No N/A

Checklist: Groundwater Under Direct Influence (GUDI)

Section 21: GWX System - Distribution System (not intended for a building plumbing system)

Section is Not Applicable to this System.

Are there periodic changes in treated water quality in the distribution system? Yes No N/A

Do the distribution system bacterial records suggest it is well operated and well maintained? Yes No N/A

Do the distribution system chlorine residual records suggest it is well operated and well maintained? Yes No N/A

Do the records suggest any specific water quality issues? Yes No N/A

If yes, please explain:

What is the average age (years) of the distribution system?

Distribution

What is the general condition of the distribution system? Good
 Fair - nearing end of useful life
 Poor - replacement required

Additional comments:

Checklist: Groundwater Under Direct Influence (GUDI)

Section 22: GWX System - Bulk Fill/ Truck Fill/ Pail Fill

Section is Not Applicable to this System.

Does the bulk/ truck/ pail fill have appropriate backflow prevention? Yes No N/A

If yes, what type of backflow prevention is used? Check all that apply. other:

backflow prevention assembly: double check valve plus siphon break

backflow prevention assembly: reduced pressure principle

hose bib vacuum breaker (only allowed on pail fill)

air gap

Is the station equipped with appropriate signage indicating that only drinking water containers are allowed to be filled? Yes No N/A

Is access to the fill station limited? (i.e. locked, FOB electronic key, card swipe) Yes No N/A

Is there a flow meter that monitors water usage (volumes) at the fill station? Yes No N/A

Is there a separate or dedicated pump for the fill station? Yes No N/A

No - combo pump

Is the hose length such that it is off the ground at least 1 m (3 feet)? Yes No N/A

What is the average age (years) of the fill station equipment?

Fill Station

What is the general condition of the fill station?

Good

Fair - nearing end of useful life

Poor - replacement required

Additional comments:

Checklist: Groundwater Under Direct Influence (GUDI)

Section 23: GWX System - Operation and Maintenance (O&M)

Is the water system checked on a daily basis when it is operating?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
How many hours per day does the water treatment system run?	<input style="width: 100%; height: 20px;" type="text"/>
How many hours per day does the pump/s run?	<input style="width: 100%; height: 20px;" type="text"/>
How many hours per day does the operator spend on the water system?	<input style="width: 100%; height: 20px;" type="text"/>

Is there a back-up operator for the water system?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Has the water treatment facility and/or water distribution system been classified under the operator certification program?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
water treatment facility: <input type="checkbox"/> small system <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
water distribution system: <input type="checkbox"/> small system <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
Have any operators been classified under the operator certification program?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A

Is there an up-to-date emergency contact list?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Is there a list of critical water users (i.e. hospitals, personal care homes, schools) to be contacted during an emergency?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Is there a procedure for emergency notification of water users if a water quality issue occurs or there is an advisory?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Is there a plan for obtaining water on an emergency basis?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A

If the system is operated on a seasonal basis, are Office of Drinking Water procedures followed for start-up and shut-down of the water system?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Have written procedures been developed for key activities such as: backwashing filters, watermain repairs, etc?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Is there an up-to-date process schematic or water system drawing available?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Is there an up-to-date O&M manual available with equipment specifications, product sheets, supplier information, O&M instructions, troubleshooting?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Has the operator received training from the equipment supplier on O&M of critical water system components such as treatment equipment, controls, etc?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Is there a maintenance log for recording preventive maintenance, repairs, etc?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Are water system records kept for a minimum of 2 years?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A

Are instruments regularly calibrated, in particular, water testing equipment to ensure reliable test results?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Are extra bacterial sample bottles kept on-hand for emergency purposes?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Is the system in compliance with the sampling parameters and frequency listed in the Operating Licence?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A

Checklist: Groundwater Under Direct Influence (GUDI)

Section 23: GWX System - Operation and Maintenance (O&M)

Additional comments:

Checklist: Groundwater Under Direct Influence (GUDI)

Section 24: GWX - Arsenic Removal by Filtration Using Disposable Media

Section is Not Applicable to this System.

Is the rated capacity of the filters able to meet peak or maximum day demands? Yes No N/A

What is the treatment capacity of the filters? Units.

What is the peak or maximum day demand on the water system? Units.

What type(s) of disposable media is used for arsenic removal?

Other:

Granular Ferric Hydroxide (i.e. Bayoxide, AdEdge)

Titanium Oxide (i.e. MetSorb)

Activated Alumina

Does the disposable media carry NSF certification?

Yes No N/A

Can the filters be visually inspected for maintenance and repair?

Yes No N/A

Are the filters regularly inspected?

Yes No N/A

Inspection frequency for the filters?

What is the trigger to replace the media? (time, pressure loss, turbidity)

What is the expected life of the media according to the supplier?

Has the filter media ever been replaced or topped up?

Yes No N/A

If yes, how long ago?

Are there pressure gauges on the inlet and outlet of the filter?

Yes No N/A

Are the filters regularly backwashed?

Yes No N/A

Backwash frequency for the filters?

What is the trigger to initiate a backwash? (time, pressure loss, turbidity)

What is the source of backwash water? Filtered and chlorinated water

Filtered and unchlorinated water Raw water

How is the backwash disposed of?

Municipal sewer system Holding tank or septic system Other:

Discharged to environment

If the backwash disposal is to sewer or drain, is there an air gap?
(i.e. there is no direct connection to avoid backflow)

Yes No N/A

Checklist: Groundwater Under Direct Influence (GUDI)

Section 24: GWX - Arsenic Removal by Filtration Using Disposable Media

Section is Not Applicable to this System.

Is there a suitable sample tap for water leaving the filters? Yes No N/A

Are arsenic levels regularly monitored? Yes No N/A

What was the arsenic (mg/L) level in the raw and treated water in the most recent chemistry report?

Arsenic - raw Arsenic - treated

What is the removal rate (%) for arsenic?

Is the filtration system achieving the expected removal of arsenic? Yes No N/A

What is the average age (years) of the filtration equipment?

Filtration

What is the general condition of the filtration equipment? Good
 Fair - nearing end of useful life
 Poor - replacement required

Additional comments: