SOURCE WATER PROTECTION PLAN

for

Sherman, Connecticut

November 2016

Prepared for:

The Town of Sherman

by

Atlantic States Rural Water & Wastewater Association

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1. Introduction

In March 2015, the Sherman Health Department (SHD) became aware of Sodium Chloride in several of the water supply wells in the center of Town. The SHD contacted the Connecticut Department of Health (CT DPH) for guidance. On May 1, 2015, CT DPH and the Connecticut Department of Energy and Environmental Protection (CT DEEP) personnel inspected the site and requested sampling of a number of wells in the center of Town. SHD sampled twenty-four (24) wells in mid-May 2015 and the results, along with a fact sheet on Sodium Chloride and Health Effects (**Appendix I**) were mailed to each property owner. The CT DPH requested the SHD continue sampling on a quarterly basis for the remainder of 2015 and on a monthly basis during the winter of 2016. That sampling schedule is continuing.

This Source Water Protection Plan was prepared along with the Town of Sherman to evaluate the source of the Sodium Chloride contamination and develop strategies to protect public and private wells within the Sherman town center. Protection of these areas is critical to insuring there will be adequate clean groundwater sources in the future.

This Source Water Protection Plan includes a **Management Plan** in **Section 5**, which outlines specific actions available to protect these wells.

1.1 Source Water Protection

The ideal drinking water supply would have excellent natural water quality and no potential contaminant sources (PCSs). There would be no development in the watershed or recharge areas. We are fortunate to have good natural water quality in most of Connecticut's drinking water supplies, however PCSs exist for every water supply and development continues to increase the possible threats.

Atlantic States Rural Water & Wastewater Association (ASRWWA) believes that threats from many PCSs can be mitigated by proper construction, applying best management practices (BMPs) and the responsible use of water resources. Therefore education, outreach and the ability to develop and maintain working relationships in the community are important factors in source water protection.

This plan is prepared by the ASRWWA in cooperation with the National Rural Water Association. Program funding is provided by the United States Department of Agriculture's (USDA) Source Water Protection Program. The purpose of the program is to provide technical assistance to rural and small communities for the development of Source Water Protection Plans (SWPPs).

1.2 Background

To insure the safety of drivers during the winter requires the best winter maintenance practices and materials available. At this point in time, that means using chloride-based chemicals (salt) to control ice and snow. These chemicals

are currently the most efficient and cost effective deicers and work by lowering the freezing point of water. However, the safety benefits come with a cost as these materials accumulate in the environment. There are many adverse effects to the environment from using salt. These include negative impacts on concrete and steel structures, plants, animals and soil health and the contamination of ground and surface waters.

The Connecticut Department of Transportation (CT DOT) uses sodium chloride as the primary deicer. At lower temperatures they use magnesium chloride. CT DOT also pre-wets roadways with salt solutions to achieve faster melting of snow and to keep more of the salt on the roadway. Sodium chloride solution is typically used at the beginning and end of the season and magnesium chloride solution is used during the coldest months.

According to a 2015 study by the Connecticut Academy of Science and Engineering, the use of Sodium Chloride and Magnesium Chloride is increasing in Connecticut. Their data indicates that the CT DOT and town public works departments used an average of 503,397 tons (over 1 billion pounds) of road salt per year from 2010 to 2014.

The United States Environmental Protection Agency (US EPA) does not consider road salt a contaminant and does not regulate its application. Therefore there is no federal policy regarding the amount of road salt that can be used. There is a US EPA secondary drinking water standard of 250 mg/l for Chloride. This secondary standard is not enforceable by the US EPA and indicates the level at which the aesthetic quality of the water may be impacted – in this case it is the level at which the water would taste salty.

The Connecticut Department of Public Health (CT DPH) has adopted the US EPA secondary standard of 250 mg/l for Chloride as its Maximum Contaminant Level (MCL), which is enforceable. There is no CT MCL for Sodium, but DPH requires public water systems to notify customers if Sodium levels exceed 28 mg/l. CT DPH also suggests that Sodium in drinking water should be below 20 mg/l for people on "low salt" diets. In addition, CT DPH guidelines (not enforceable) for private wells suggest that Sodium not exceed 100 mg/l.

2 Sherman, Connecticut

2.1 Description

The Town of Sherman is located in western Connecticut, between the Housatonic River and the New York border. Before European settlement, this area was home to the Native American Schaghticoke tribe. The land was purchased from the Schagkticokes in 1729 as part of the Town of New Fairfield. In1802 the northern section of New Fairfield was incorporated as the Town of Sherman.

Sherman is hilly and mostly forested. It developed as a farming community. In 1926 Lake Candlewood was created to produce hydroelectric power. The lake flooded roughly 800 acres of land in town.

2.2 Water Quality

Only a few of Sherman's surface water resources have been assessed to see whether they meet designated Surface Water Quality. The Housatonic River, Candlewood Lake and Squantz Pond are rated B and are meeting that criteria (see below) for both aquatic life and recreation. Morrissey Brook, Quaker Brook, Sawmill Brook and Tenmile River are designated A and are meeting the criteria for aquatic life. They have not been assessed for recreation.

Surface Water Quality Classes and Designated Uses
From CT DEEP 2011 Connecticut Water Quality Standards

Class **AA** surface waters are designated for use as: existing or proposed drinking water supplies; habitat for fish and other aquatic life and wildlife; recreation; and water supply for industry and agriculture.

Class **A** surface waters are designated for use as: habitat for fish and other aquatic life and wildlife; potential drinking water supplies; recreation; navigation; and water supply for industry and agriculture.

Class **B** surface waters are designated for use as: habitat for fish and other aquatic life and wildlife; recreation; navigation; and industrial and agricultural water supply.

Groundwater within the town is designated GAA, or GA. One former public wellhead protection area at south of the town garage is listed as impaired.

Ground Water Quality Classes and Designated Uses
From CT DEEP 2011 Connecticut Water Quality Standards

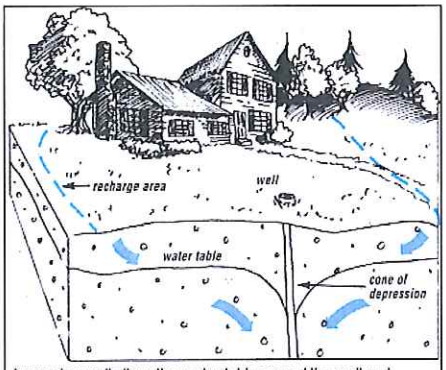
Class **GAA** is ground water used or which may be used for public supplies of water suitable for drinking without treatment; ground water in the area that contributes to a public drinking water supply well; and ground water in areas that have been designated as a future public water supply in an individual water utility supply plan or in the Area wide Supplement prepared by a Water Utility Coordinating Committee pursuant to Title 25 of the General Statutes.

Class **GAA_S** is ground water tributary to a public water supply reservoir.

Class **GA** is ground water within the area of existing private water supply wells or an area with the potential to provide water to public or private water supply wells.

For more detailed information on water classification, see the DEEP *Water Quality Standards* at http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325618.

2.3 Source Water Protection Areas



A pumping well alters the water table around the well and diverts flow to the well

The Source Water Protection Areas (SWPA) for systems that draw water from wells are known as Wellhead Protection Areas (WHPAs). These are the land areas from which groundwater and surface water will flow to the well under pumping conditions. This is also referred to as the recharge area. As such, these land areas are the critical ones for source water protection. The WHPAs for all of the bedrock well systems have been delineated by the State of Connecticut Department Public Health (DPH). These are calculated fixed-radius circles, the radius of which is determined by the volume of withdrawal of the source. A table of CT Bedrock Well Source Area Delineations is included as **Appendix II**.

2.4 Existing Source Water Inventory

There are nine (9) public drinking water systems (totaling 11 wells) that have sources within the Sherman town center. Of those nine (9) systems, seven (7) have been severely impacted by salt contamination. One is somewhat impacted and one system appears not to have been impacted. These systems are listed in **Table 1** below. All of these systems are supplied by bedrock wells.

Public drinking water systems are classified into three categories

Community Water Systems (CWS) serve at least 25 residents throughout the year.

Non-transient, Non-Community Systems (NTNC) are not community systems and regularly serve at least 25 of the same people over six months of the year at places like schools and office buildings.

Transient Non-Community Systems (TNC) do not meet the definition of a non-transient, non-community water system such as restaurants, parks, etc.

Of the nine (9) public water systems in the town center, there are two (2) Non-transient, Non-Community Systems and seven (7) Transient Non-Community Systems in the town center. There are no Community Systems. Single family residences in the town center have private wells that also draw from the bedrock aquifer.

Table 1. Town Center Public Water Systems

PWSID	SYSTEM NAME	LOCATION	POP	CONN
	Non-Transient/Non-Community			
CT1270132	SHERMAN ELEMENTARY SCHOOL	2 Rte 37 East	430	1
CT1270214	SHERMAN GREEN MARKETPLACE - WELL #2	15 Rte 39 North	79	4
	Transient/Non-Community			
CT1270014	AMERICAN PIE COMPANY	29 Rte 37 Center	25	1
CT1270074	HOLY TRINITY CHURCH	17 Rte 37 Center	25	1
CT1270094	MALLORY TOWN HALL	9 Rte 39 North	112	1
CT1270124	SHERMAN GREEN MARKETPLACE - WELL #1	3 Rte 39 North	25	2
CT1270244	SHERMAN LIBRARY	1 Rte 37 Center	25	1
CT1270234	SHERMAN SENIOR CENTER	8 Rte 37 Center	25	1
CT1270134	SHERMAN VOLUNTEER FIRE DEPARTMENT	1 Rte 39 North	25	1

3 CT DPH Source Water Assessments

In 2003, the Connecticut Department of Public Health Drinking Water Section completed a state-wide survey of drinking water supplies under the Source Water Assessment Program (SWAP). This program was mandated with the 1996 reauthorization of the Safe Drinking Water Act. The purpose of the program was to evaluate the susceptibility to contamination of each public drinking water source in Connecticut and communicate the results to the public.

The following information was used to assess vulnerability under the Source Water Assessment Program:

- Sanitary conditions in the source water area
- The presence of potential or historic sources of contamination
- Existing land use coverages
- The need for additional source protection measures within the source water area

Of the nine (9) public drinking water systems with sources in the Sherman town center, six (6) have Source Water Assessments. Of those assessed sources, one (1) was designated with **high** susceptibility to potential contaminate sources, two (2) with **moderate** susceptibility, three (3) with **low** susceptibility. No Source Water Assessments were available for three of the systems.

A copy of the Source Water Assessment for the Mallory Town Hall Well is included as **Appendix III** as an example.

4 Assessment of Threats

4.1 Previous Contaminant Detects of Concern in Source Water

DPH Source Water Assessments reported on contaminants detected in the source water of each system. While this data is dated (2003), it provides an idea of the scope of contamination within the source water area. This data indicates that nitrates were found to be present above the level of 1 mg/l in the sources of two (2) of the public systems. Total coliform counts where high in three (3) wells. A survey of violations for the past five years indicates that nitrates and/or total coliform counts have been high, at times, in three of the town center public water sources.

Typical sources of nitrates are septic systems, lawn care and agriculture. Coliforms may be from septic systems or wildlife. Detection of nitrate and coliforms in public wells indicates that they have been released to surface and ground waters and are a potential contamination concern. They also are indicative of a well's vulnerability to other contaminants that might be released to surface and ground waters, such as the current salt contamination problems.

The connection between Town center septic systems and public well sources was borne out by Dr. Robbins finding of caffeine in November 2016 samples from the Town Hall and 15 Route 39 North wells.

4.2 Road Salt Contamination

Eleven (11) public drinking water wells (representing 9 systems) and fourteen (14) private wells in the town center have been sampled since May of 2015. Sampling was done each month in the winter and every three months for the remainder of the year. Testing was done for Chloride, Calcium, Magnesium, Potassium, Sodium, Calcium Hardness, Total Hardness and Alkalinity. This discussion will focus Chloride and Sodium.

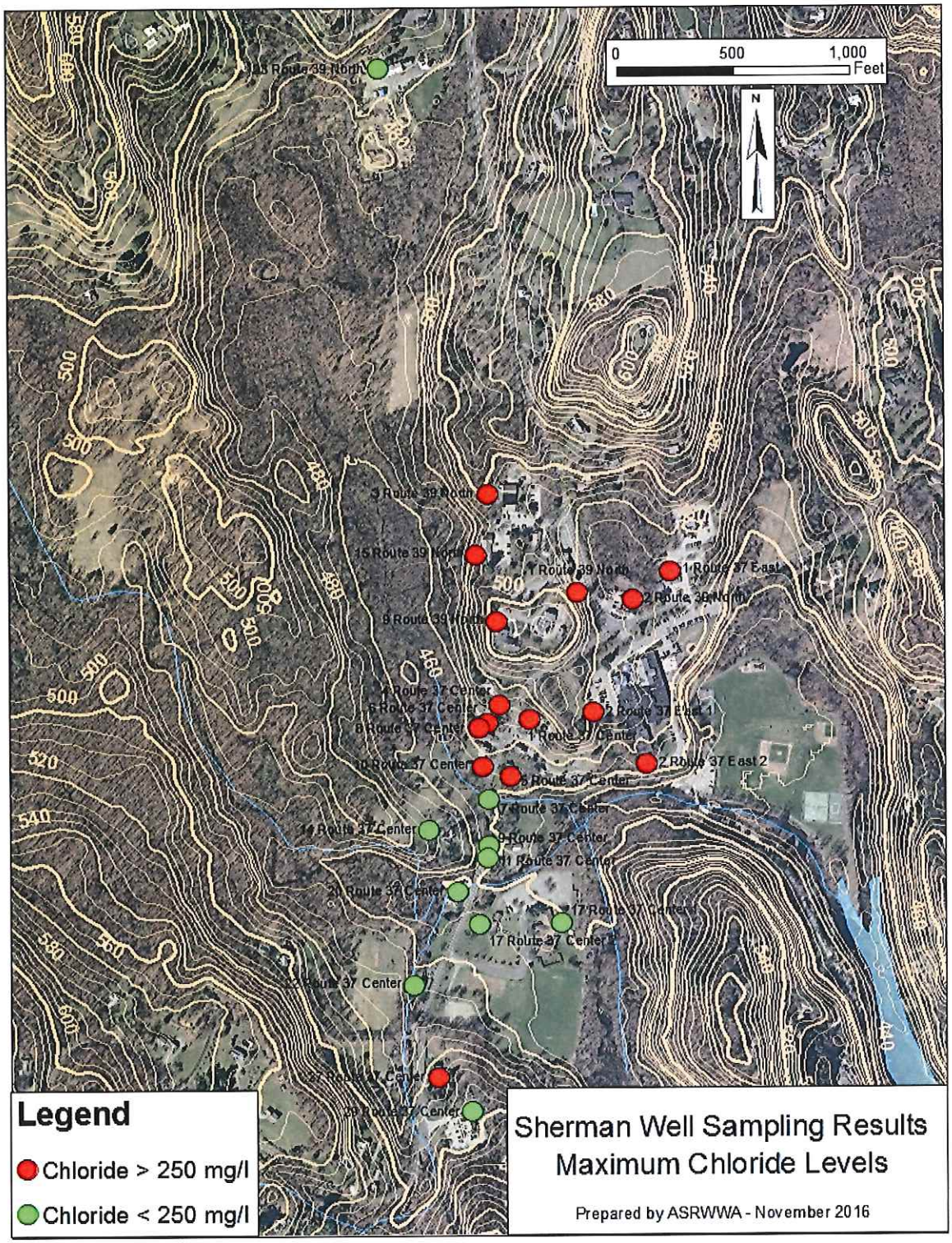
As stated earlier, CT DPH has a Maximum Contaminant Level (MCL) of 250 mg/l for Chloride. There is no MCL for Sodium but CT DPH:

- requires public water systems to notify customers if Sodium exceeds 28 mg/l,
- suggests Sodium should be below 20 mg/l for people on "low salt" diets, and
- suggests that Sodium not exceed 100 mg/l in private wells.

Fifteen (15) of the twenty-five (25) town center wells that have been tested exceeded the 250 mg/l MCL for Chloride at least once since testing began. Most of those have been consistently above 250 mg/l. The wells include eight (8) public water supply wells and seven (7) private wells. They are shown on **Map 1** with levels graphed in **Figure 1.**

Twelve (12) wells have seen Sodium levels above 100 mg/l. Seven (7) wells have Sodium Levels between 20 mg/l and 100 mg/l. Six (6) wells have Sodium

levels below 20 mg/l (Seven (7) are below 28 mg/l). These are shown on **Map 2** with levels graphed in Figures **2a, 2b & 2c.**



Map 1

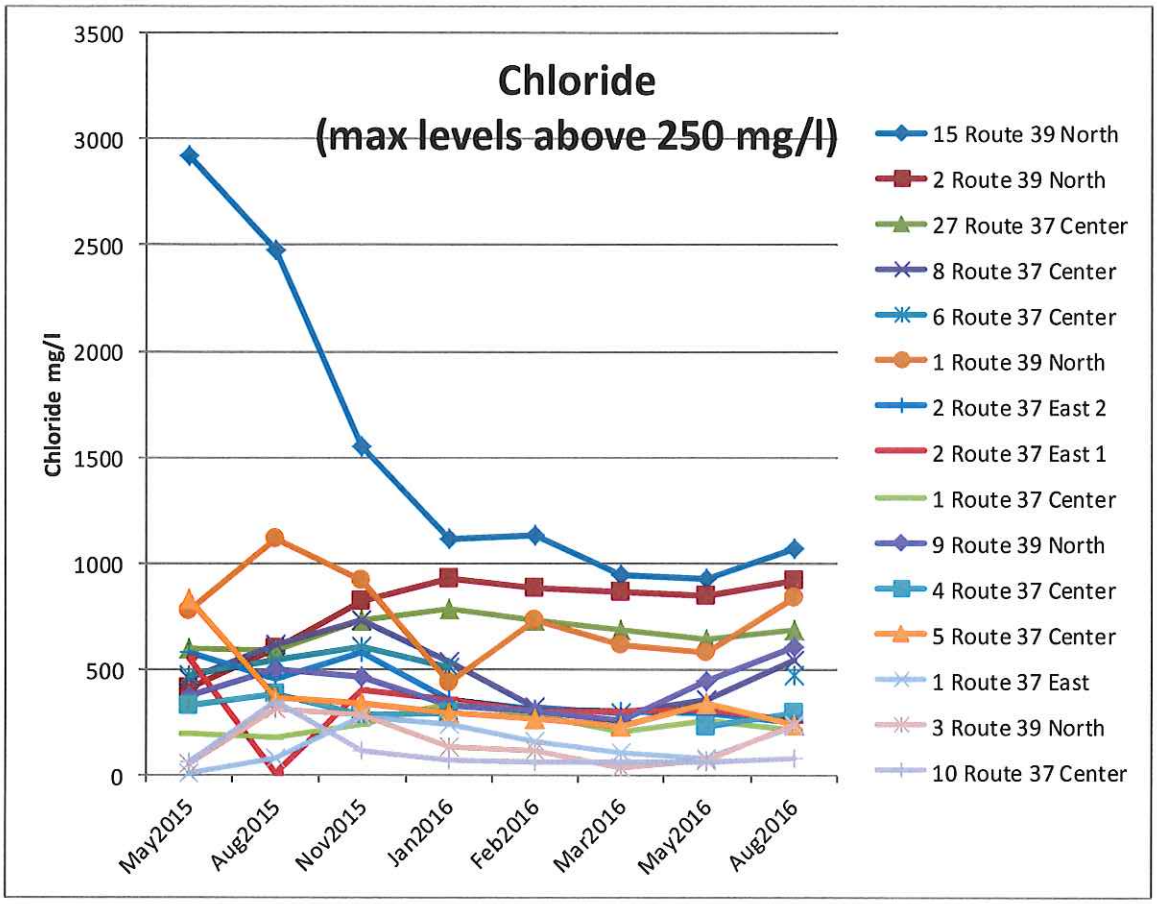
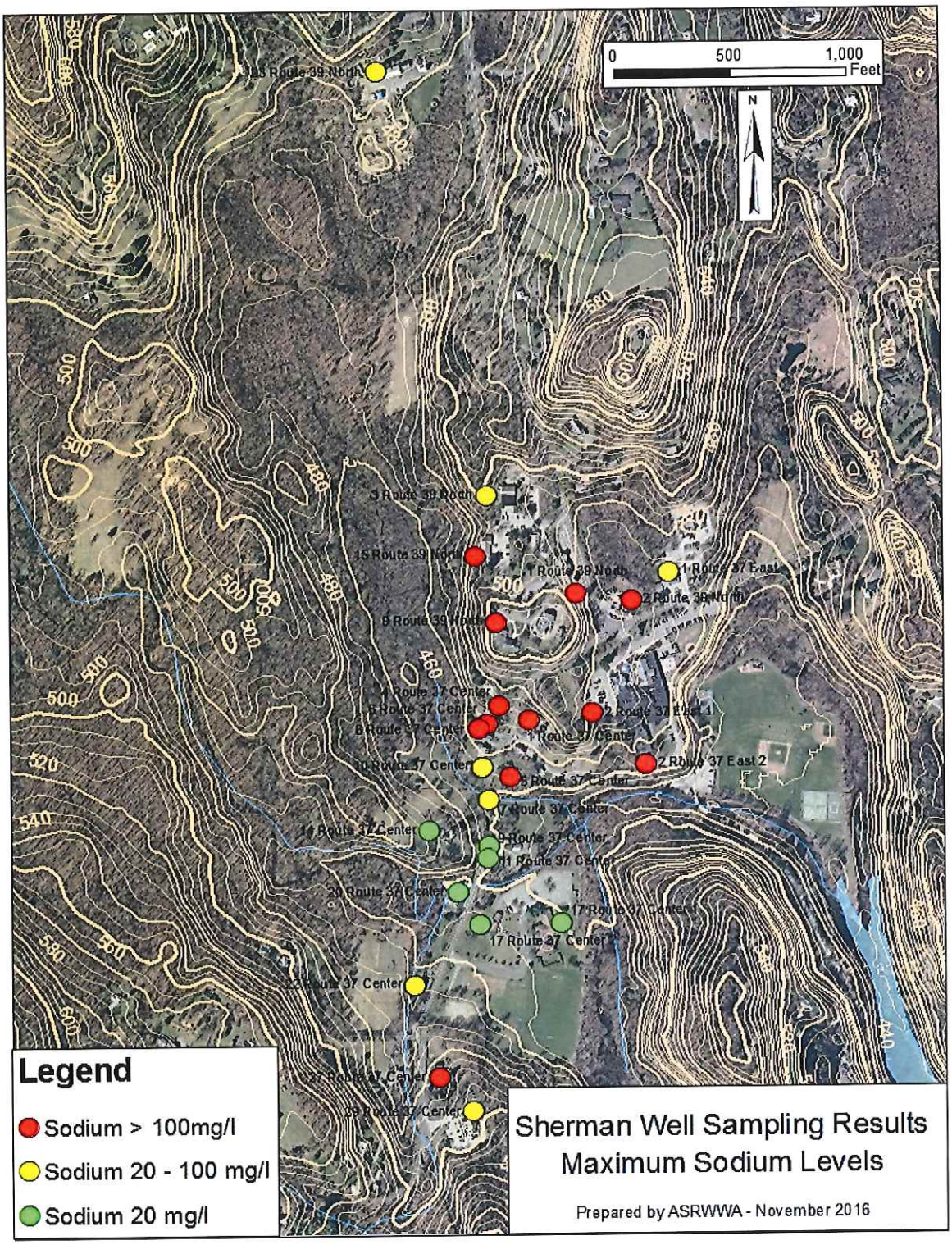


Figure 1

Graphs of Chloride levels (**Figure 1**, above) and Sodium levels (**Figures 2a, 2b & 2c** below) show very little yearly variation. That would indicate these contaminants have accumulated over a span of many years and are being held in the glacial till at the surface and within the bedrock aquifer below. They are not being "flushed" out by precipitation in the spring, summer or fall.

Another concern is that the wastewater in the town center is treated by on-site septic systems, which do not remove Chloride or Sodium ions. These contaminants are constantly being recycled back into the groundwater. As stated in **Section 4.1**, there is a hydraulic connection between at least two public wells and area septic systems.

Also, the Chloride in salt mobilizes minerals responsible for hardness from bedrock adding to water quality issues. Chloride also has the potential to mobilize naturally occurring carcinogens such as lead, radium and radon. No testing has been done for those elements.


0
500
1,000
Feet
N
Legend
Sodium > 100mg/l
Sodium 20 - 100 mg/l
Sodium 20 mg/l
Sherman Well Sampling Results
Maximum Sodium Levels
Prepared by ASRWWA - November 2016

Map 2

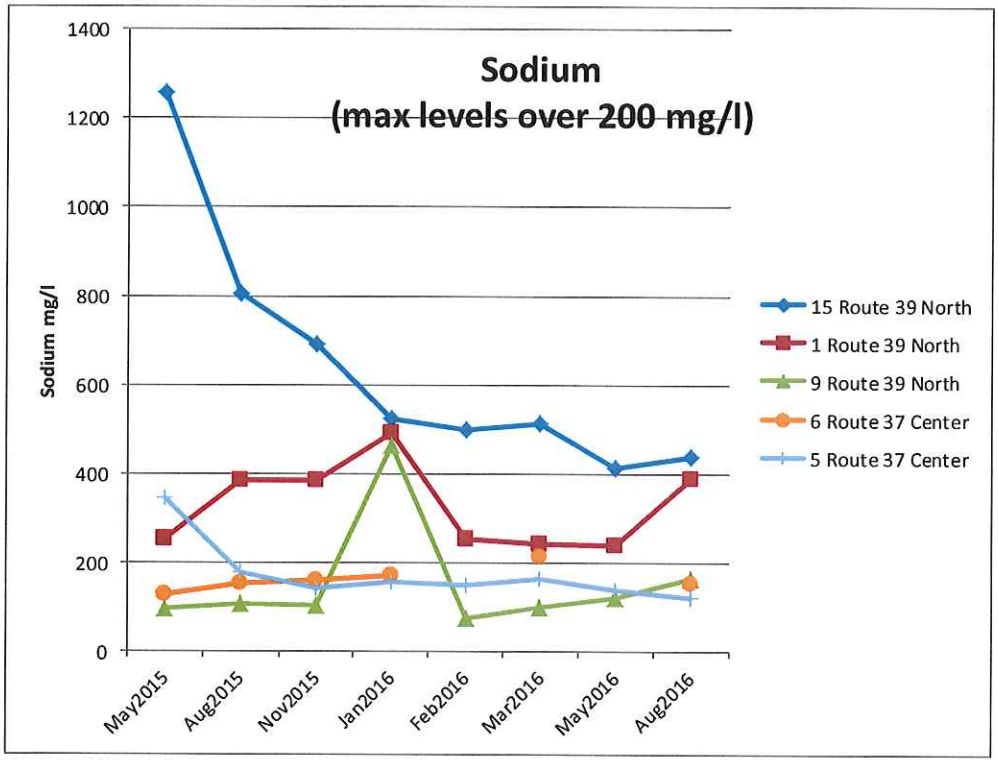


Figure 2a (max levels above 100 mg/l split into two graphs for clarity)

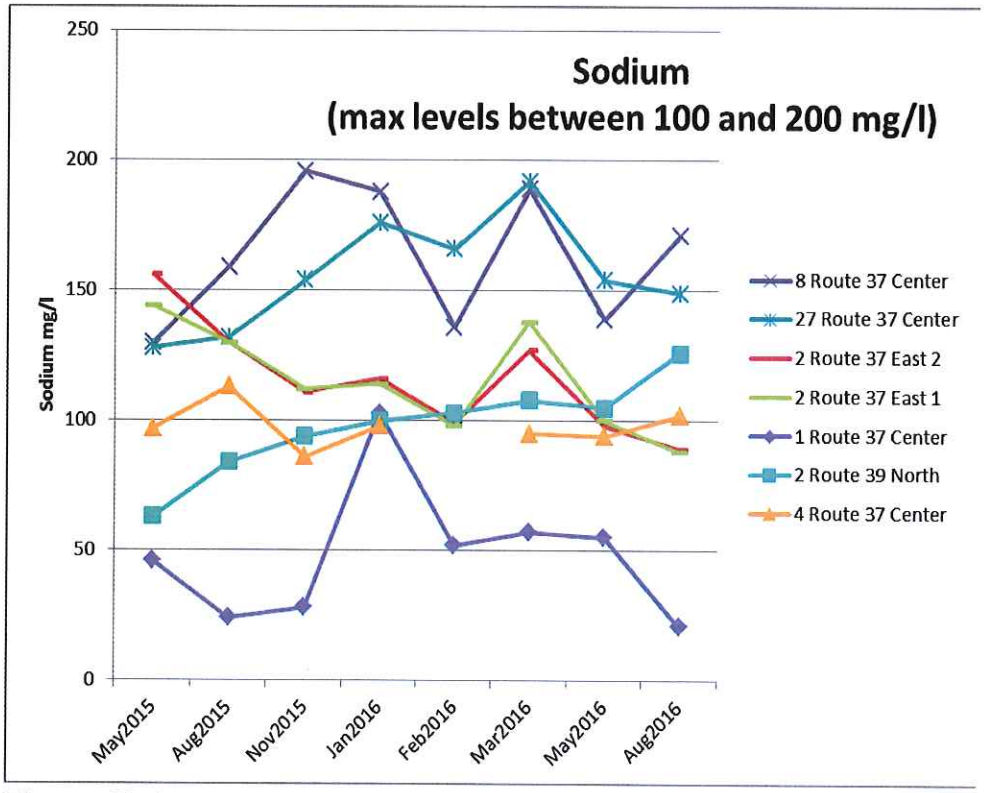


Figure 2b (max levels above 100 mg/l split into two graphs for clarity)

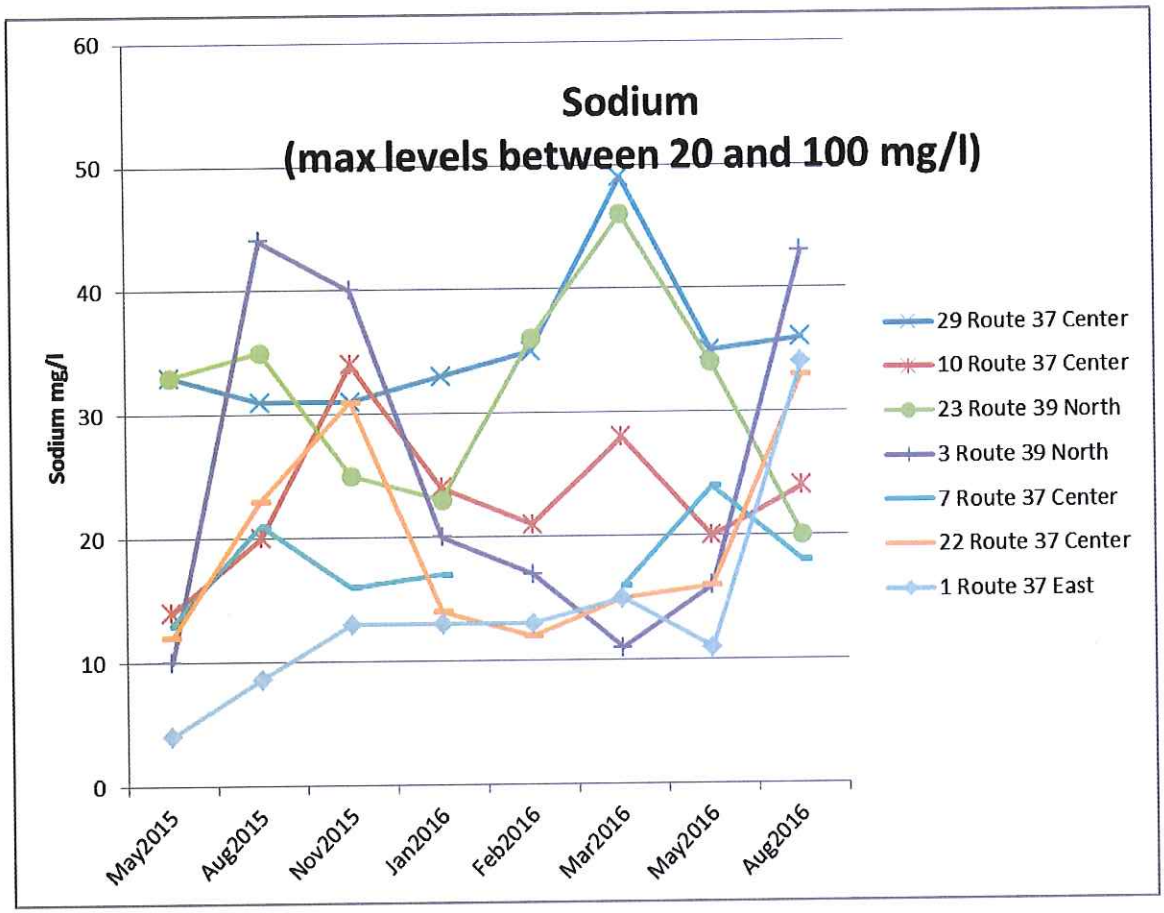


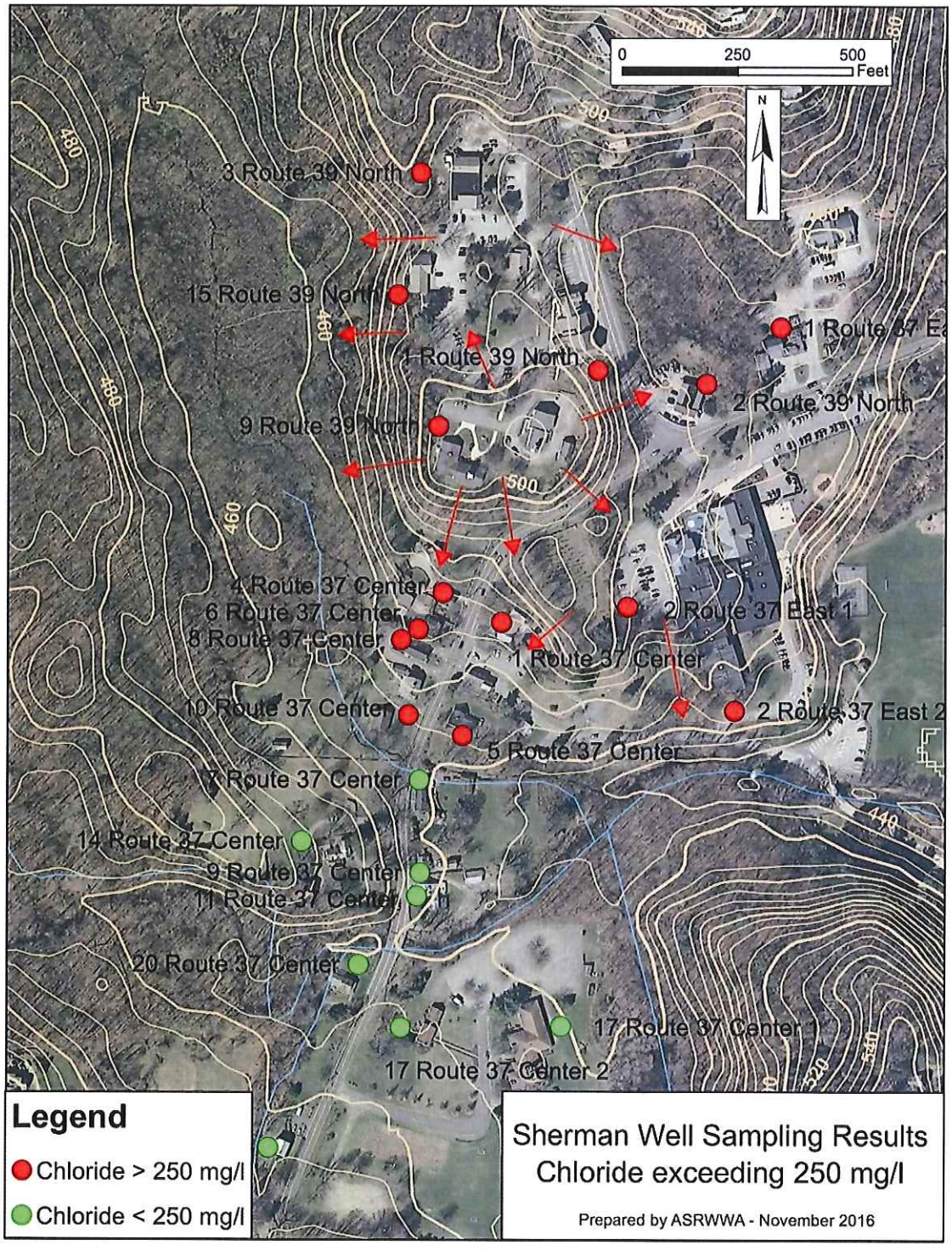
Figure 2c

The bedrock aquifers which supply drinking water to public and private wells in Connecticut are assumed to be recharged by precipitation that falls relatively near the wells. These Well Head Protection Areas (WHPAs) are described in **Section 2.3**. Typically the radii of these WPHAs range from a few hundred feet to about one thousand (1,000) feet for wells with the capacity of those in Sherman's town center (**Appendix II**).

Maps 1 & 2 clearly show a cluster of higher contaminant levels in the vicinity of the hill which overlooks the town center and is the site of the Town Hall and Playhouse. On-site investigation for potential sources of salt contamination within the WHPAs of those wells suggest that salt used to clear parking lots, driveways and state roadways in that area are most likely the causes of contamination. That conclusion is borne out by the examining surface water flow in the area. **Map 3** is a closer view of the town center and shows how the surface water flow (red arrows) would impact wells down gradient of driveways, parking lots and roadways. The groundwater flow in those areas typically parallels the surface water flow.

Another striking feature of **Map 3** is that, with one exception, all of the contaminated wells are north of the brook that runs west to east across the map.

This is because surface and groundwater to the south of the brook flow generally north and east and meet the contaminated surface and ground water flow from the north at the brook. This creates a hydraulic "dam" at the brook, preventing the contaminated surface and groundwater from moving further south.



Map 3

Other potential contaminant pathways in the in area are shown in the pictures below:

A series of catch basins (above) in the parking lot of 15 Route 39 North empty through the culvert pictured into a wet area just to the west of the site. The discharge from the culvert is 44 feet from the well that serves the site. That well had the highest levels of Chloride and Sodium found during sampling.

The catch basin pictured above flows into an infiltration gallery in the parking lot in front (to the left) of the Fire Station where salt contaminated runoff is injected into the ground water. Also, snow is plowed off Route 39 and from in front of the fire station and piled on the slope pictured where the fire station well is (under arrow). This well had the second highest levels of Sodium and the well across the street had the second highest levels of Chloride.

It should be noted that two sites outside the cluster of contaminated wells in the town center are not addressed in the above analysis. One is the somewhat elevated levels of Sodium and Chloride at 23 Route 39 North where the contamination source is likely to be from salt storage on site. The second area is 27 Route 37 Center where contamination appears to be the result of salt use on

the abutting 29 Route Center commercial area. Run-off from the commercial property runs northward and down a slope directly toward the well at 27 Route 37 Center.

5 Management Plan

We have been putting salt down for some 50 years and if we stopped using it today, it could take a similar amount of time to flush out all the accumulated salt. Currently, public safety requires salt applications to keep roadways, parking lots and walkways clear. Therefore, it is difficult to effect a change in how road salt is used – despite the potential health impacts, infrastructure damage and environmental impacts. The actions outlined here have the potential to mitigate the use of road salt in the Sherman town center. They include some short term measures and other, long term solutions, which will require further investigation and planning.

5.1 CT Department of Public Health Regulations

RCSA 19-13-B106 defines the MCL or Chloride as 250 mg/l and gives guidance on Sodium levels. RCSA 19-13-B32 (h) states:

> *Where sodium occurs in excess of 15 mg/l in a public drinking water supply, no sodium chlorine* [sic] *shall be used for maintenance of roads, driveways, or parking areas draining to that water supply except under the application rates approved by the commissioner of health, designated to prevent the sodium content of the public drinking water from exceeding 20 mg/l.*

The CT DPH has been, and should continue to be, an active partner of the Town of Sherman in pursuing a solution to Sherman's road salt contamination. That is particularly important when dealing with private commercial property managers and the CT DOT regarding plowing and salting practices.

5.2 Parking Areas and Driveways

The Town of Sherman Department Public Works (DPW) and managers of the commercial property at 1 through 15 Route 39 North should alter their plowing and salting regimen before, during and after snow events to minimize the amount of salt used. Consideration should also be given to remove snow from the area instead of piling it on site. Snowmelt must be kept out of the fire house infiltration gallery and consideration should be given to replacing or extending the storm drain outfall at 15 Route 39 North so it does not empty so close to the site's well.

5.3 Route 39 North

The Sherman DPW should not pile snow on the bank south of the fire station where the fire station well is. Following the guidance of the CT DPH, the CT DOT should reduce salt use in the area of Route 39 North in the vicinity of the fire house and abutting commercial property.

5.4 Install Filtration Systems on Affected Water Systems

The Town and CT DPH should work with affected private residents to install point-of-use (POU) or whole house filter systems in private homes, where

appropriate. Public systems should also consider filtration systems to remove Sodium and Chloride. Disposal of backwash water from these systems is regulated by the CT DPH and is an important concern when considering their use.

5.5 Collect and Treat Winter Snowmelt

Consideration should be given to collect and treat winter snowmelt. This would involve building infrastructure to contain and direct snowmelt to an area where it could be stored and treated, perhaps through evaporation, to remove salt and keep it from entering the environment.

5.6 Alternative Water Source

It is very important to minimize the amount of Sodium and Chloride that is entering the groundwater because it cannot be removed once it is there. If that is done and subsequent dilution from rain events in spring, summer and fall does not dilute the contamination to acceptable levels, it will be necessary to find an alternate drinking water source. This would require locating a new well and developing a town center water system. The Town could explore creating a municipal system or work with a commercial water company to service the area. The process to determine what water company has Exclusive Service Area rights within Sherman is currently in progress. This alternative would cost tens of millions of dollars. Some part of that may be available from USDA Rural Development in the form of low interest loans. It would also require connection fees and ongoing water costs for homeowners and businesses that would need to connect to that system.

5.7 Conduct Education and Outreach Campaign

Public education and awareness is a key part of this Source Water Protection Plan because everyone in town poses a risk to ground and surface water. Most homeowners will work to protect their local ground and surface water if they know how to minimize contamination risks. Outreach to Sherman residents should be done through mailings, media and/or public meetings to increase awareness of the link between road salt use and drinking water quality and to involve the public in source water protection activities. The Town of Sherman should consider instituting an ad hoc Groundwater Protection Committee to assist in implementing the strategies here and investigating others.

5.8 Implementation/Action Table

Action Item	Responsibility
5.1 Use existing drinking water regulations to encourage best practices to reduce road salt use in the affected area.	DPH
5.2 Reduce use of road salt on parking lots, driveways and sidewalks and consider alternatives to snow storage and storm drainage.	DPW Commercial
5.3 Reduce use of road salt on Route 39 and stop plowing snow against slope next to fire house well.	DOT DPW
5.4 Install filtration systems in homes and public water systems	DPH Homeowners Town PWS
5.5 Redesign stormwater infrastructure to collect and treat winter snow melt	Town Commercial
5.6. Develop an alternative drinking water source and create a town center water system	Town Commercial PWS
5.7 Do outreach and education regarding the impact or road salt contamination in the town center	Town ASRWWA

ASRWWA	Atlantic States Rural Water & Wastewater Association
Commercial	Commercial property owners at 3 & 15 Route 39 North
DOH	RI Department of Health
DPH	CT Department of Public Health
DPW	Sherman Department of Public Works
Homeowners	Homeowners with impacted private wells
PWS	Public Water Systems with impacted wells
Town	Town of Sherman

Appendix I – DPH Sodium & Chloride Health Considerations Fact Sheet

Sodium & Chloride in Well Water:

Health Considerations

Connecticut Department of Public Health

Environmental & Occupational Health Assessment Program • August 2015

Introduction

Sodium and chloride are elements that are not highly toxic and comprise the basic components of common table salt. However, they can create concerns when they appear at elevated levels in drinking water. This fact sheet describes the potential sources, health risks and target levels of sodium and chloride in drinking water.

There are no enforceable federal or state standards for the level of sodium in drinking water. However there is a CT DPH guidance level of 100 mg/L for sodium that reflects current scientific and medical opinion on sodium dietary restrictions in those at risk for high blood pressure. The amount of sodium in a normal diet is 10 to 20 times higher than this guidance level. Adhering to this level ensures that drinking water does not become a substantial source of daily sodium, even for those on a sodium-restricted diet.

The Connecticut Maximum Contaminant Level (MCL) for chloride in public water system and private wells is 250 milligrams per liter (mg/L). Aside from the potential health concerns with sodium and high blood pressure, these sodium and chloride limits are intended to keep the water from tasting salty and from having a corrosive effect on plumbing.

How Does Sodium & Chloride Get Into Wells?

Sodium and chloride are elements that are very common in nature and in the human diet. They occur naturally in groundwater, typically at low concentration. However, sources such as road salt, both its storage and application to roads in winter, can be a significant source to groundwater. Other potential sources include industrial waste, sewage, fertilizers, water softener discharge, and living in coastal areas where sea water can influence the quality of groundwater.

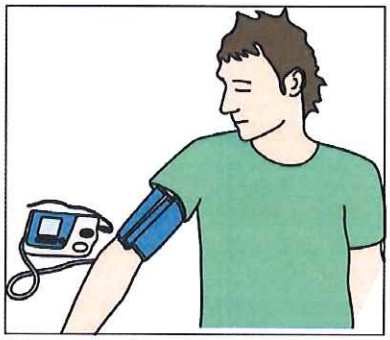
In certain cases, the elevated sodium may come from a water softener as most softeners allow some sodium to enter the filtered water. The CT DPH guidance level of 100 mg/L applies to that case and any other reasons why sodium becomes high in a water supply well. Some water softeners use potassium chloride as the exchange agent to remove water hardness instead of sodium chloride. If this is the case, it is also important to monitor for potassium in tap water and inform your physician of the result.

Connecticut Department of Public Health
PO Box 340308, Hartford, CT 06134-0308
http://www.ct.gov/dph

Appendix I (Cont'd)

What Health Effects Are Caused by Drinking Sodium & Chloride Every Day in Tap Water?

There have been many studies on the potential effect of dietary sodium on blood pressure. Epidemiology studies show that in some cases lowering sodium intake to the official American Heart Association goal of 1500 mg per day can have a beneficial effect on blood pressure. In many cases the typical diet delivers greater amounts of sodium than this goal. For most people sodium in a water supply well does not present a substantial or unique health risk because the level obtained from water is much less than from the diet. However, certain individuals may be placed on low sodium diets (<1500 mg/d) due to heart, kidney or blood pressure conditions. Such individuals should test their water for sodium to make sure that it doesn't make a substantial contribution to the overall intake level. They should notify their physician if it is above 100 mg/L. This guidance value is primarily for private wells. For public supplies, CT DPH has a notification level of 28 mg/L that requires supplies to notify their customers at that and higher levels. However, that value is dated and the new 100 mg/L target can be used in discussion with your doctor regarding sodium levels in your drinking water.



As noted above, adults at risk for high blood pressure and related conditions are the sensitive group. We have no evidence that exposures to children at a school or day care center would lead to a health risk. Further, workplace exposures may tend to be of less concern than sodium in a residential supply given that most people consume more tap water at home than at work.

Chloride has a state MCL of 250 mg/L due to increasing conductivity, corrosivity and saline taste of the water at this and higher concentrations. While the chloride MCL does not have a health basis it is often elevated in concert with sodium.

Elevated levels of sodium and chloride can also impart a salty taste, interfere with the watering of certain plants, and increase the corrosivity of water, which in turn can affect household plumbing.

Testing for Sodium Chloride in Well Water

To determine if sodium and/or chloride are present in your well water, arrange to test your water with a state certified laboratory. Follow the laboratory's instructions carefully to avoid contamination and to obtain a good sample. Take precaution to not cross contaminate the samples during collection and consider proper transportation and handling of the samples once they've been collected. Home test kits may not provide accurate results.

Connecticut Department of Public Health
Environmental & Occupational Health Assessment Program
860-509-7740 • http://www.ct.gov/dph/eoha

Appendix I (Cont'd)

Corrective Action

If chloride is present in well water at concentrations above the state MCL of 250 mg/L, it is advisable to stop drinking the water and take steps to find out and eliminate the source. The same is true for sodium concentrations in well water above the state guideline of 100 mg/L. However, it's important to keep in mind that for most people this is a small amount of sodium compared to what is ingested from the diet and so the sodium guideline pertains primarily to those who have a medical reason to restrict sodium from their diet. The local health department and the state Department of Energy and Environmental Protection (DEEP) can help you determine where the sodium or chloride contamination may be coming from.

If the source cannot be identified or cannot be resolved, you may need to consider using bottled water, installation of treatment, connecting to a public water system, if available, or drilling a new well over the long term. If using bottle water, read the label to determine the water's sodium content.

Treatment methods for sodium and chloride include reverse osmosis and distillation. If sodium levels in your well water are moderately high (over 100 mg/L) small distillation or reverse osmosis treatment units are available that will produce three to ten gallons of water per day (enough for drinking and cooking needs for a household).

Protecting Your Private Well Water

You can protect your well by paying careful attention to the land use activities that occur in the area near your well. Regular testing and adopting practices to prevent contamination can help ensure that your well supplies you with good quality water.

For More Information:

Treatment Questions:
Public Water Wells: CT DPH Drinking Water Section: 860-509-7333
Private Wells: CT DPH, Private Well Program, 860-509-7296.

Health Questions:
CT DPH, Environmental & Occupational Health Assessment Program, (860) 509-7740

Source Investigation: CT DEEP, contact the District Manager for your region, go to
http://www.ct.gov/deep/cwp/view.asp?a=2715&q=324994&deepNav_GID=1626

Connecticut Department of Public Health
Environmental & Occupational Health Assessment Program
860-509-7740 • http://www.ct.gov/dph/eoha

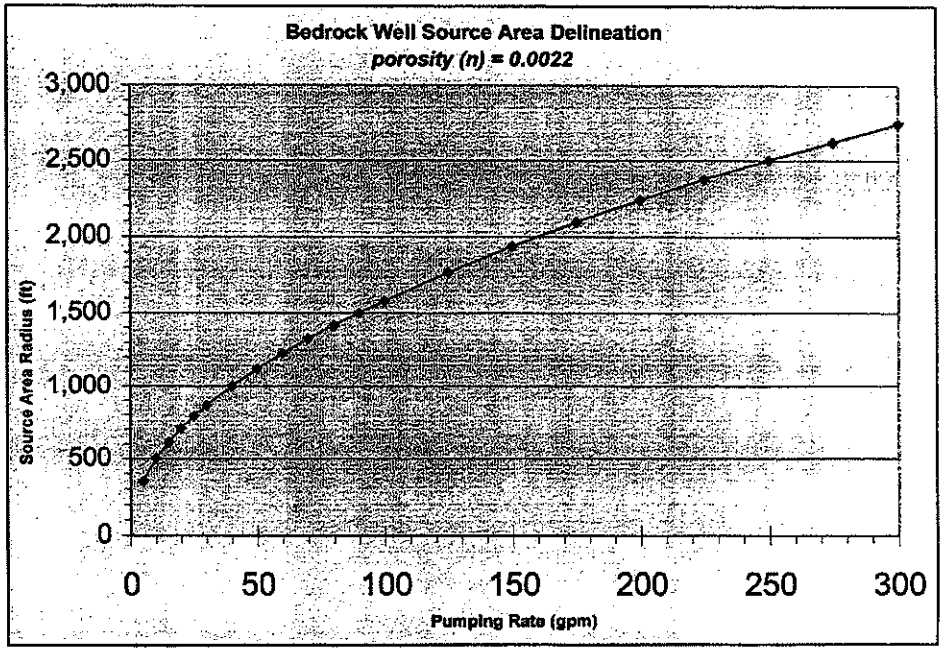
DPH
Connecticut Department of Public Health

CHART 1

CONNECTICUT'S SWAP - BEDROCK WELL SOURCE AREA DELINEATION

Phase I - Calculated Fixed Radius Approach

PUMPING RATE	VOLUME	WELL RADIUS
(gpm)	(cfd)	(feet)
5	963	354
10	1,925	501
15	2,888	613
20	3,851	708
25	4,813	792
30	5,776	867
40	7,701	1,001
50	9,626	1,120
60	11,552	1,227
70	13,477	1,325
80	15,402	1,416
90	17,328	1,502
100	19,253	1,583
125	24,066	1,770
150	28,879	1,939
175	33,692	2,095
200	38,506	2,239
225	43,319	2,375
250	48,132	2,504
275	52,945	2,626
300	57,758	2,743
325	62,572	2,855



Appendix III – Mallory Town Hall Source Water Assessment

CT1270094

SOURCE WATER ASSESSMENT SUMMARY

Mallory Town Hall Well

Well Location	Town	Well Type	Source Water Area (acres)
Route 39 South	Sherman	Drilled	18

Factor	Source Water Assessment Ratings For This Well	Rating
I	Environmental Sensitivity	High
II	Potential Risk Factors	Low
Overall Susceptibility to Potential Sources of Contamination		**Moderate**

This rating is intended to indicate susceptibility to potential sources of contamination that may be in the wellfield source water area and does not necessarily imply poor water quality.

Assessment Factors		Initial Assessment Findings	Recommendations for Enhanced Source Protection
I	Contaminants Detected in Source Water	Nitrate >5mg/L, Total coliform rule violation	Maintain monitoring levels specified in the Connecticut Public Health Code Section 19-13-B102
I	General condition of well and related equipment	Present condition of well and well site unknown at this time	Public water system should verify that the well is constructed and maintained according to State of CT Public Health Code Sections 19-13-B51c through j and notify the State Dept. of Public Health if improvements are needed
II	Number of DEP-inventoried Contaminant Release Points in Source Water Area	None	
II	Number of Potential Sources of Contamination in Source Water Area	None	
II	Land Use/Land Cover on the Well's Source Water Area *(Based on Satellite Imagery developed by University of Conn.)*	Commercial/Industrial 44.54% Residential 24.37% Agricultural 1.44% Open or Undeveloped 29.65%	Proactively work with local officials and developers to insure that only low risk development occurs within the source water area. Support and encourage the acquisition of open space land within the source water area.

General Recommendations For All Non-community Public Water Systems

Land Area Around Wellhead	Water system owner should provide information about the amount of land it owns or controls within a 200 foot radius around this well
Water System Source Protection Initiatives	Water system owner should provide information about basic practices employed to protect its drinking water sources
Local Government Source Protection Initiatives	Water system owner should support the development of local zoning or aquifer protection regulations to enhance the protection of public drinking water sources

CONNECTICUT DEPARTMENT OF PUBLIC HEALTH

Keeping Connecticut Healthy

State of Connecticut Department of Public Health
Drinking Water Division
410 Capitol Avenue – MS# 51WAT
P.O. Box 340308 Hartford, CT 06134
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