SOURCE WATER PROTECTION PLAN

For

TOWN OF WALES
ERIE COUNTY, NEW YORK

Prepared by:

New York Rural Water Association

In cooperation with the:

TOWN of WALES
New York - Est. 1818

2020

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1.0 INTRODUCTION

1.1 Goals and Objectives

The term source water refers to all sources of drinking water. In Wales, all residents and businesses rely upon groundwater for drinking water. Most of the groundwater used for drinking water in the Town of Wales is not regulated and serves individual homes and smaller businesses and farms. However, some groundwater is supplied to the public through privately-owned systems regulated by the Erie County Health Department and the New York State Department of Health (NYSDOH) (see Section 3.0).

Unfortunately, groundwater contamination can and does occur as a consequence of a variety of land use activities. In addition, groundwater resources are not uniformly distributed. In order to better develop and at the same time preserve the drinking water resources of Wales for today and the future, the following Source Water Protection Plan has been prepared by the New York Rural Water Association (NYRWA) with the cooperation of officials of the Town of Wales. This plan inventories and maps the drinking water resources of Wales, discusses sources of drinking water, identifies potential threats to drinking water resources, and outlines previous and future protection planning strategies.

1.2 Scope and Methods

NYRWA Source Water Protection Specialist, Steven Winkley, began meeting with an Aquifer Protection Committee consisting of a team of citizens lead by a Town Board member in May 2014 in order to develop a Source Water Protection Plan. New York Rural Water Association utilized a variety of data sources for this plan. All data were inputted into a Geographical Information System (GIS). This is a computer system that allows one to visualize, manipulate, analyze, and display geographic (spatial) data.

Data on drinking water resources and potential sources of contamination was collected from a variety sources, including the United States Geological Survey (USGS), the New York State Department of Environmental Conservation (NYSDEC), the New York State Department of Health, and the United States Environmental Protection Agency (USEPA).

NYRWA analyzed responses to a 2014 survey that was made available to Wales residents online and mailed individually to households. Results from the 417 responses are discussed in Section 3.0. Although NYRWA mapped the location of the survey respondents for informative purposes, the addresses of survey respondents has been kept confidential.

A digital version of the Erie County Soil Survey and the New York State Geologic Map were utilized for analyses and mapping. Unpublished, open-file surficial geologic mapping was obtained from the New York State Geological Survey and digitized by NYRWA. In addition, elevation data for Wales were taken from digital elevation models (DEMs). A parcel boundary dataset developed by Erie County was obtained from the Erie County Environment & Planning. Other digital data on wetlands, floodplains, surface waters, roads, regulated facilities, aerial photography, etc. were downloaded from the New York State Department of Environmental

Protection (NYSDEC), New York State GIS Clearinghouse, http://data.ny.gov/, and the Cornell University Geospatial Information Repository (CUGIR). NYRWA also obtained water well data from the NYSDEC Water Well Contractor Program for 215 water wells drilled in Wales from 2001 to 2018. The locations of as many of these wells as possible were confirmed using real property records. This data is plotted on Figure 1.

Finally, New York Rural Water Association conducted on-site activities in Wales, driving all roads, to map the surficial geology and unconsolidated aquifers, and to also document the location of public water supply wells, land uses, etc. A global positioning system (GPS) device was used to capture the geospatial coordinates of such features.

2.0 SETTING

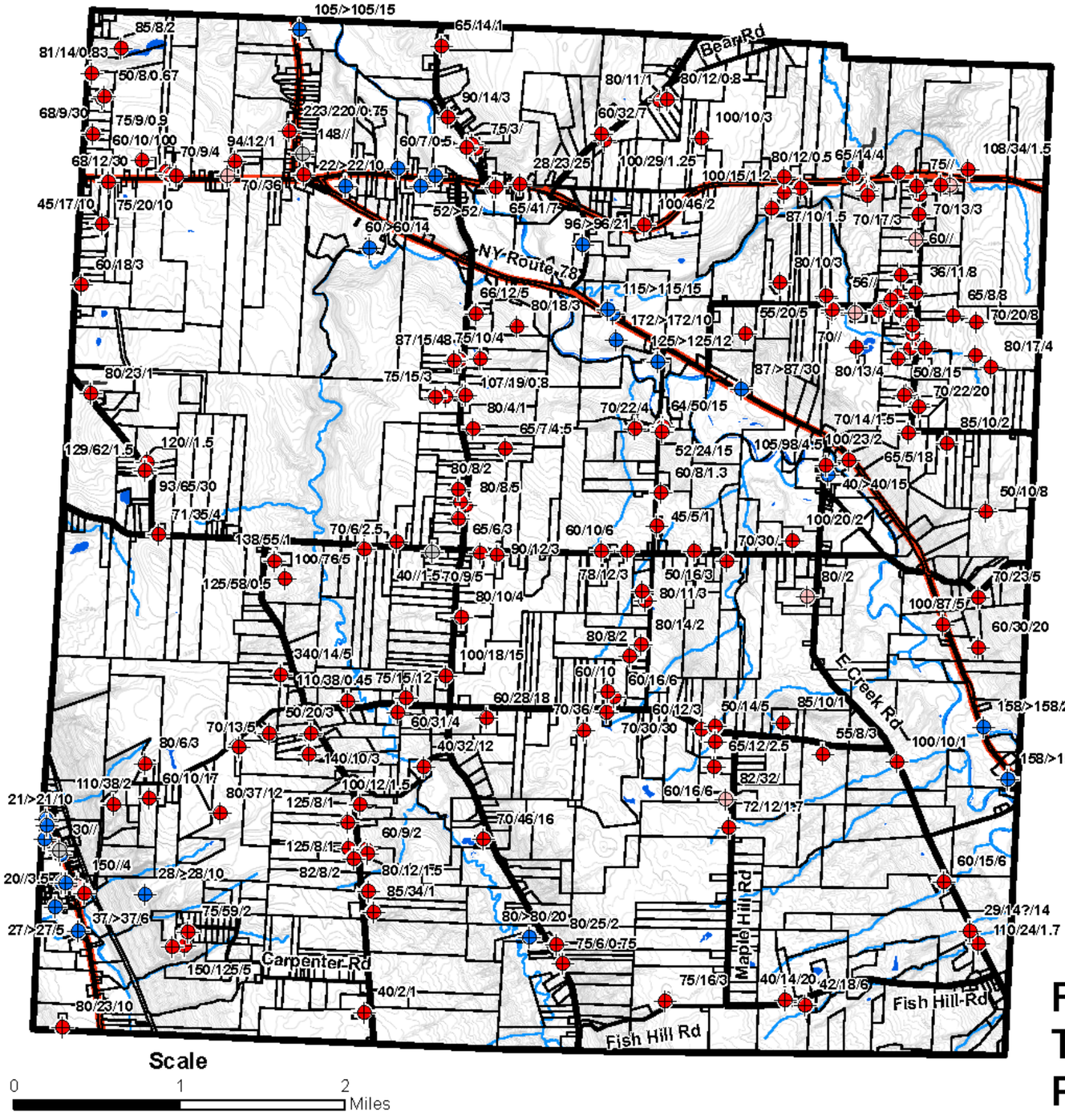
2.1 Topography and Drainage

Wales lies within the Appalachian Plateau physiographic region. In Wales, the Appalachian Plateau consists of glacially-scoured valleys and adjacent rounded hills with total elevations ranging from 860 to 1,530 feet above sea-level. Figure 2 is a shaded relief map displaying the elevation variation. The generally northwest-southeast oriented valleys of Buffalo Creek and the East Branch of Cazenovia Creek (and to a lesser extent the Hunters Creek valley) were deeply glacially eroded, are generally U-shaped in profile, and are known as *troughs*. Eighty-five percent of the land area of the Town of Wales eventually drains to Buffalo Creek directly or through its tributaries of Hunter Creek or Stony Bottom Creek (Figure 2). The remaining land area drains to the East Branch of Cazenovia Creek.

2.2 Bedrock Lithology and Structure

The distribution of bedrock formations that underlie Wales are presented on Figure 3. This mapping is from the Geologic Map of New York – Niagara Sheet by Rickard and Fisher (1970). The bedrock underlying Wales was formed in a period of geologic time that is known as the Devonian Period (416–359 million years ago). These rocks were formed in a marine environment, but were subsequently uplifted due to tectonic forces. The oldest rocks exposed in Wales are those of the Angola Shale (Figure 3). This is a gray to greenish-gray shale. Shale is a rock formed from the consolidation of mud or clay. Overlying the Angola Shale is the Hanover Shale. It is green-gray, thinly bedded shale with some silty beds. Finally, above the Hanover Shale, in highest elevations of Wales is the Machias Formation. This formation consists of interbedded gray shales, siltstones and thin sandstones.

The bedrock formations in Wales dip very gently toward the south at less than a degree. Fractures (cracks) in the bedrock are often concentrated in zones marked by linear topographic depressions or tonal anomalies visible on aerial or satellite imagery. These features are known as lineaments (see Figure 3). Many valleys locally follow these lineaments (see Figure 3).



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Legend

Water Well Data from NYSDEC

Aquifer

- ?
- Bedrock
- Bedrock?
- Unconsolidated
- Unconsolidated?

Parcel Boundary

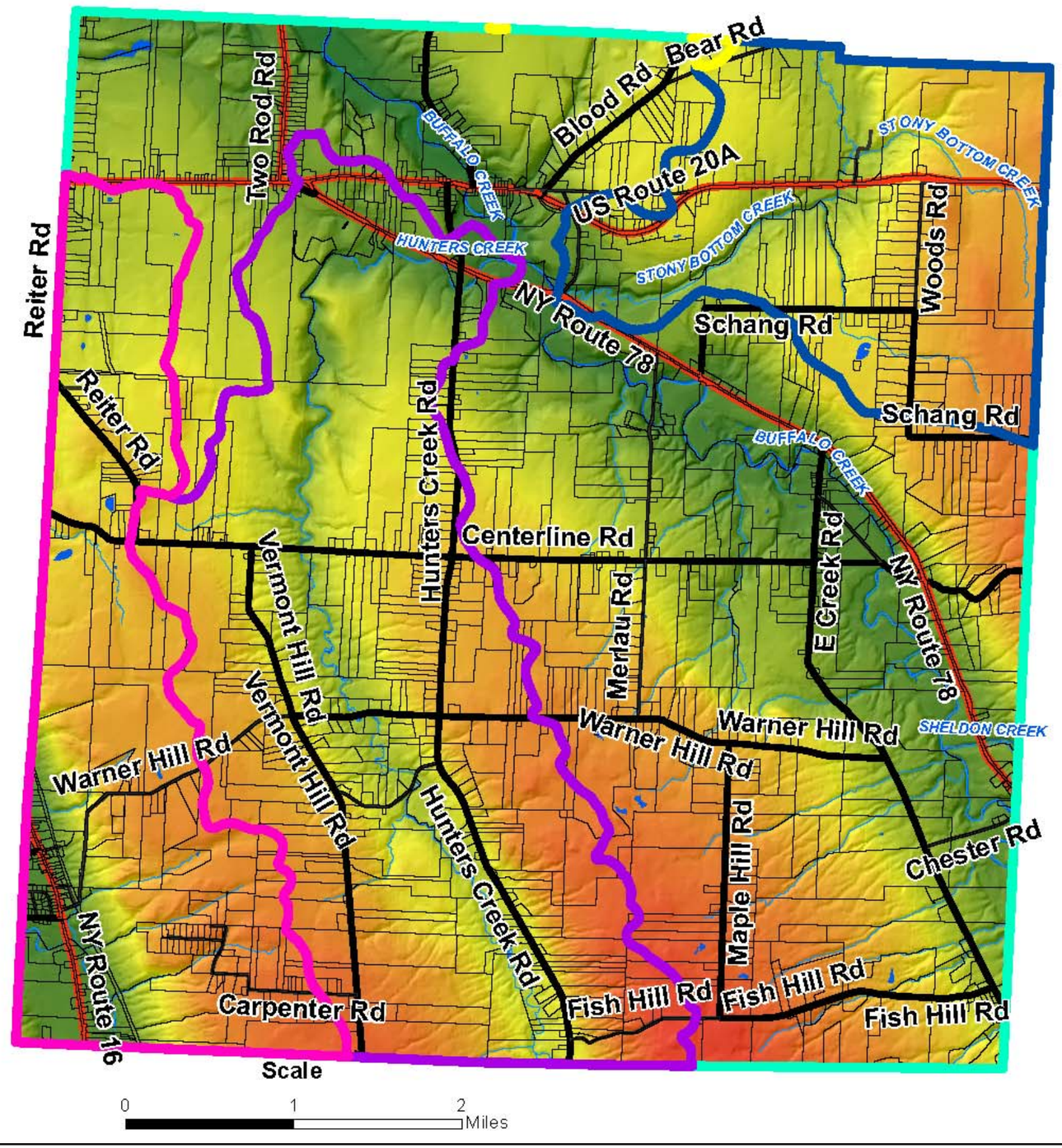
What This Map Shows:

Water well data is publicly available from the New York State Department of Environmental Conservation (NYSDEC) Water Well Contractor Program. This program requires a water well contractor to file a Water Well Completion Report with NYSDEC upon completion of a water well. A copy of this report must also be provided to the owner of the water well.

New York Rural Water Association (NYRWA) compiled water well completion data from NYSDEC from April 2001 to July 2018. Unfortunately, not every water well was located by the contractor. NYRWA attempted to locate approximate well locations based upon land ownership records.

The map label for each well consists of its reported well depth/depth to bedrock/yield in gallons per minute (e.g. 130/20/6).

Figure 1
Town of Wales
Publicly Available Water Well Data



Legend

Watershed Boundary

- Little Buffalo Creek - Cayuga Creek
- East Branch Cazenovia Creek
- Hunter Creek - Buffalo Creek
- Stony Bottom Creek - Buffalo Creek
- Buffalo Creek

Elevation

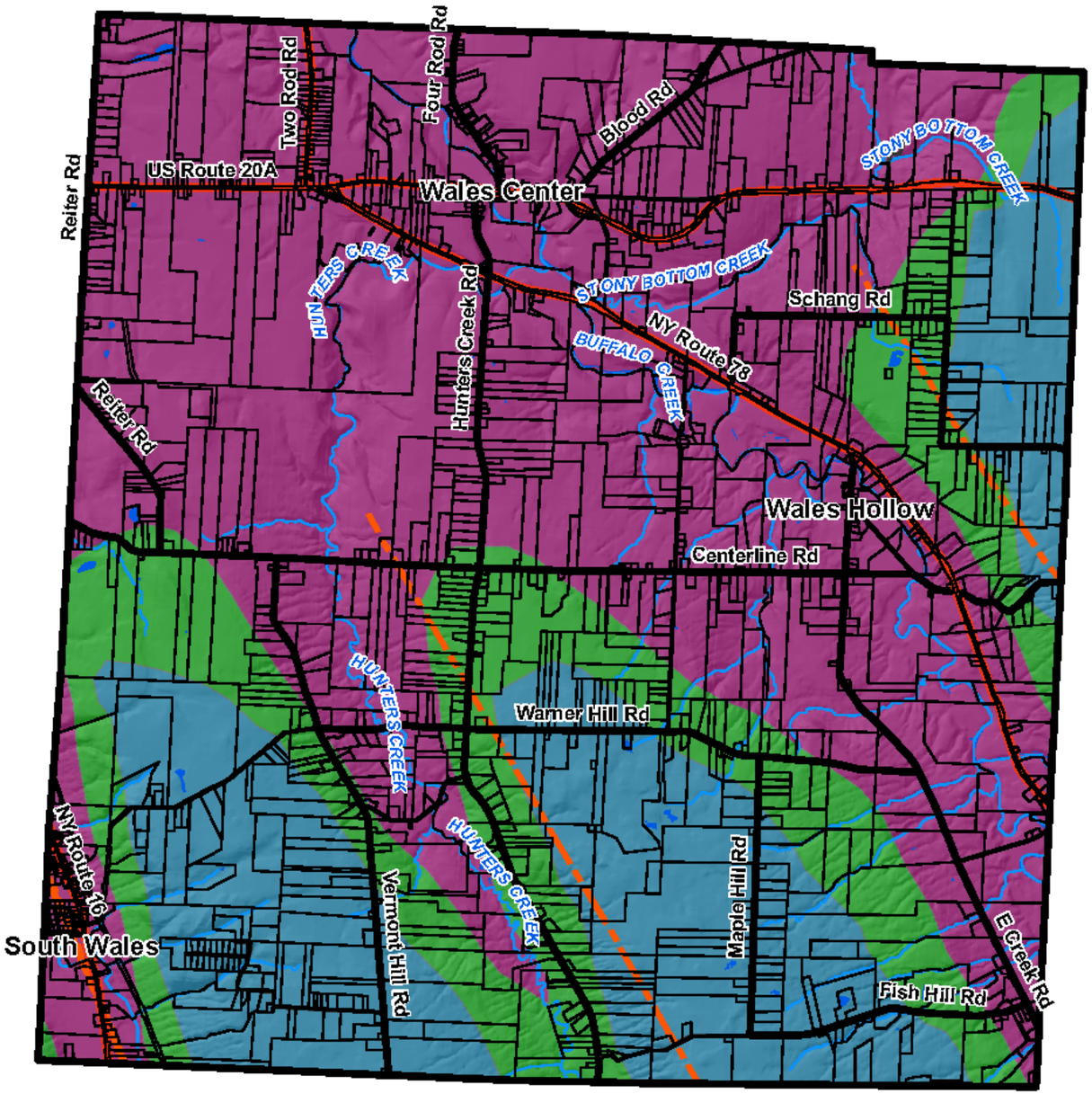
Feet

High : 1534

Low : 858

Parcel Boundary

Figure 2
Town of Wales Elevation and Watershed Boundaries



Legend

Lineament (from Isachsen and McKendree (1977)

Bedrock Geology

Machias Formation

Shale with interbedded limestone, siltstone, and/or sandstone

Hanover Shale

Shale

Angola Shale

Shale

Parcel Boundary

Bedrock geology from New York State Geological Survey 1:250,000 Statewide Bedrock Geology dataset. Parcel boundaries from Erie Couty Environment & Planning.

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Figure 3
Town of Wales
Bedrock Geology

2.3 Surficial Geologic Materials

Surficial geologic deposits are loose (unconsolidated) geologic materials that are found at or near the land surface. These unconsolidated deposits above the bedrock originated within the past 20,000 years.

The principal material left by the advancing glacial ice sheet was glacial till, a relatively dense poorly-sorted mixture of boulders, gravel, sand, silt and clay. Till, also referred to as unstratified glacial drift or hardpan, is found at the land surface in upland areas above the valleys (Figure 4). The thickness of till in upland areas is highly variable. Available water well logs from the NYSDEC Water Well Contractor Program indicate that the depth to bedrock in upland areas above the valleys in Wales ranges from 0 to 151 feet, with a median[1] thickness of 13 feet. Areas that are believed to be underlain by less than 10 feet of till are indicated on Figure 4 as thin till. In valleys, till frequently underlies other unconsolidated deposits. ([1]note: median is the middle value of a data set)

Till moraine is found across some upland areas above the valleys (Figure 4). It is a mixture of unsorted to poorly sorted clay, silt, sand, to boulders. It was deposited adjacent to glacial ice, sometimes in distinct moraine ridges. Till moraine is less compact than the material mapped as till, and frequently less clayey. Some dug wells have been constructed in such material.

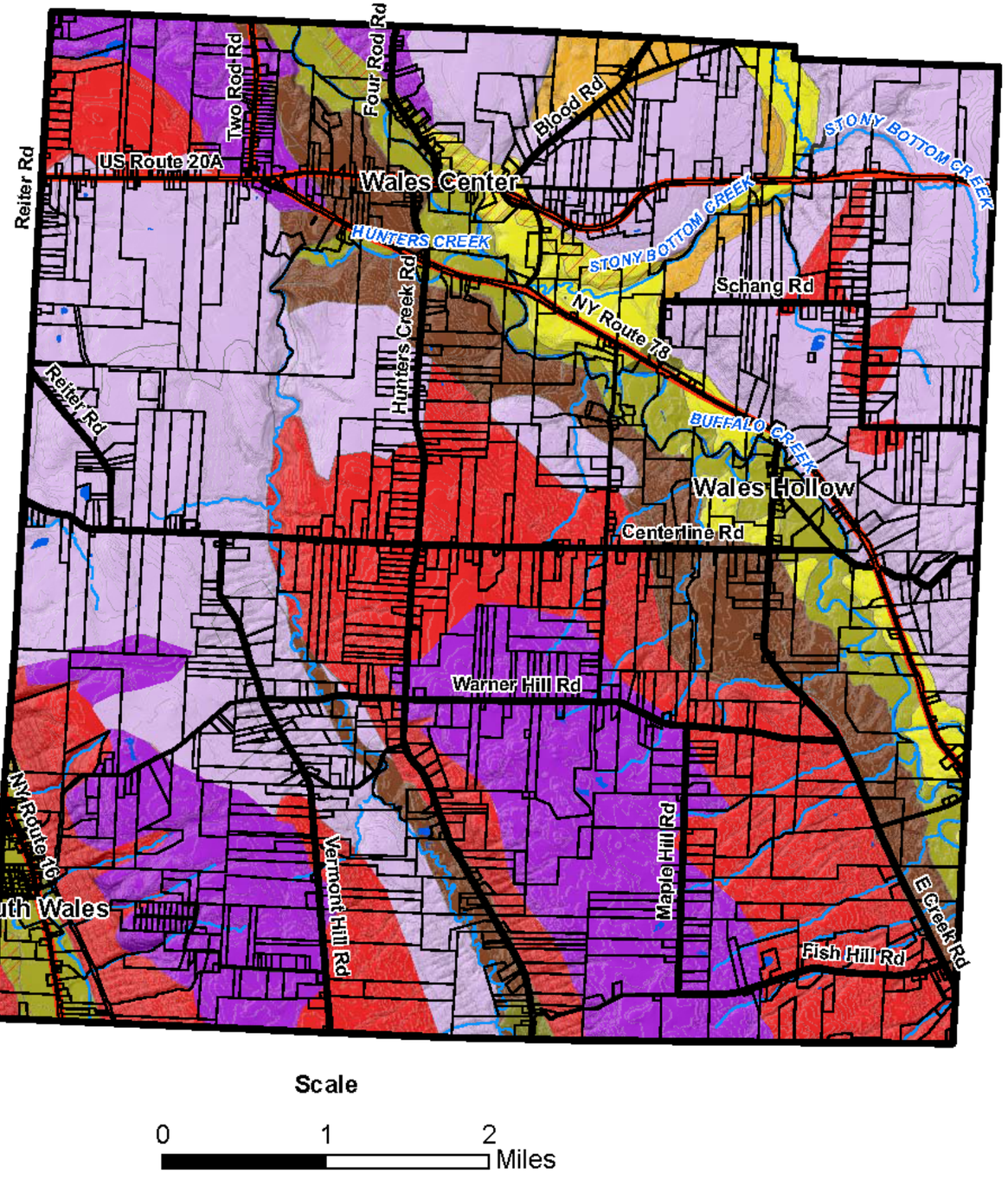
Once the glacial ice in the region began to melt, a number of different water-laid sediments were deposited, chiefly in the valleys (Figure 4). These unconsolidated deposits include kame sand and gravel, outwash sand and gravel, and lacustrine silt and clay. Kame sand and gravel deposits are coarse to fine gravel and/or sand that was deposited in contact with melting, disintegrating glacial ice. These are principally found along the northeastern wall of the Buffalo Creek valley. The thickness of these surficial kame sand and gravel deposits is relatively thin and are not mapped as forming sand and gravel aquifers (Figure 5). However, some kame sand and gravel deposits may be found at depth in the valleys, buried by relatively impermeable lacustrine silt and clay. Buried deposits form the confined, deeper aquifers mapped on Figure 5.

Outwash sand and gravel consists of sand and gravel (frequently mixed with silt) that was deposited by glacial meltwater streams in valleys away from the melting ice. Outwash deltas and outwash deltaic terraces are prevalent in the Buffalo Creek valley (Figure 4). This material has been overlain in some locales by alluvial fan deposits and/or alluvium. Alluvial fan deposits are cone-shaped accumulations of silty sand, gravel, and even boulders that have been deposited by post-glacial streams as they spill out onto the valley floor. The thickness of alluvial deposits typically ranges from 5-25 feet thick. Alluvium, silty fine sand to gravel deposited by modern streams, is prevalent in the Buffalo Creek and East Branch Cazenovia Creek valleys. Here such deposits form relatively shallow aquifers (Figure 5).

3.0 WATER SUPPLY SOURCES

3.1 Public Water Supply Wells

Approximately ten percent of Wales receives its drinking water from a public water system. These systems are regulated by the Erie County Health Department in conjunction with



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The surficial geologic materials of the Town of Wales, NY, were mapped by Steven Winkley, P.G. of the NY Rural Water Association. Parcel boundaries from Erie County Environment & Planning.

Legend

Surficial Geologic Materials

- Alluvium
- Thin alluvium
- Alluvial fan deposits
- Lacustrine silt and clay
- Outwash sand and gravel
- Thin outwash sand and gravel
- Kame sand and gravel
- Thin till
- Till
- Till moraine
- Parcel Boundary

Scale

0 1 2 Miles

Figure 4
Town of Wales
Surficial Geologic Materials

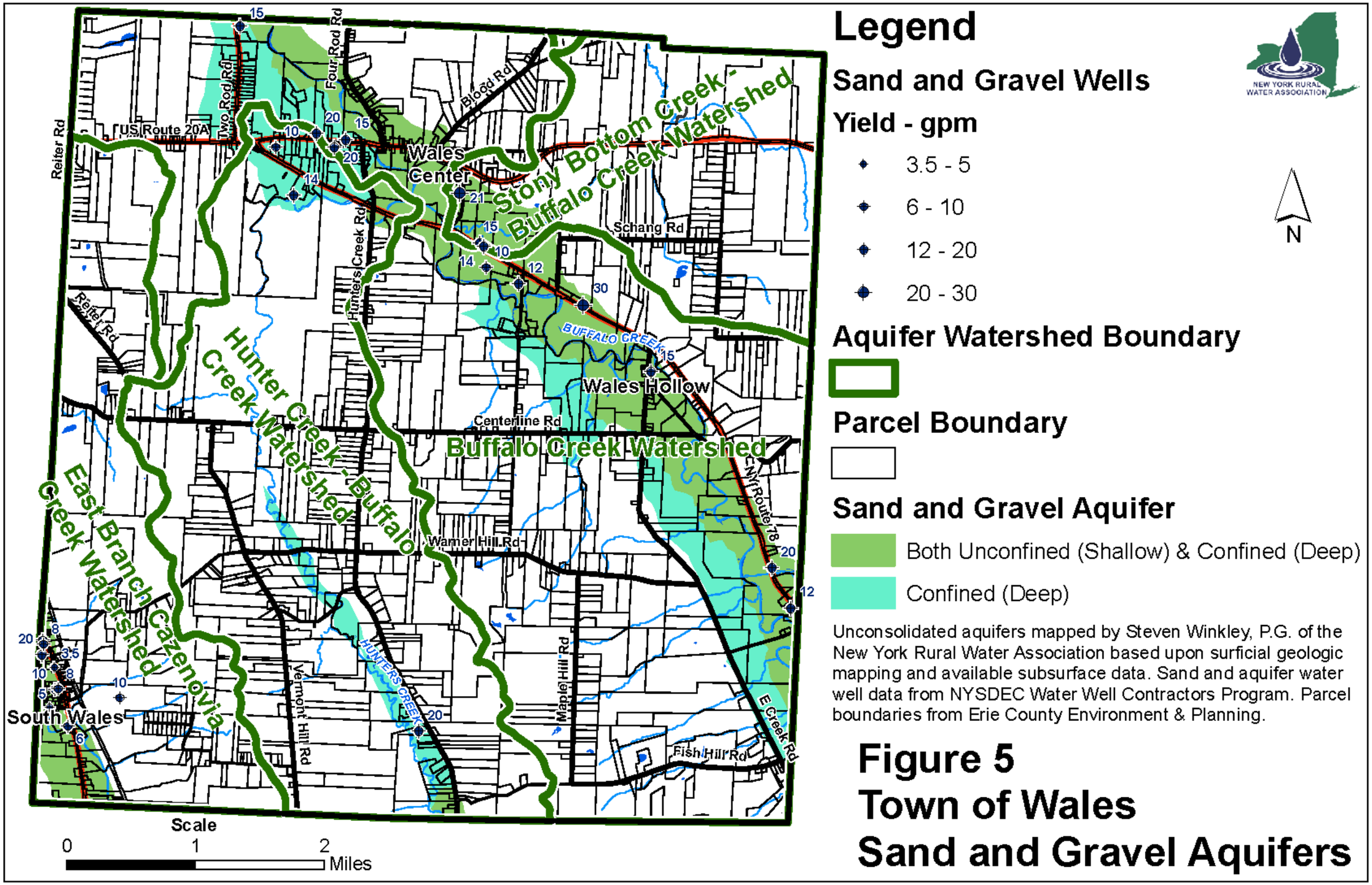


Figure 5
Town of Wales
Sand and Gravel Aquifers

the NYSDOH. All public water systems in Wales rely upon groundwater wells for their source of supply.

A public water system is an entity that provides water to the public for human consumption through pipes or other constructed conveyances. Any system having at least 5 service connections or that regularly serves an average of at least 25 people daily for at least 60 days out of the year is considered a public water system. In Wales, there is a total of nine public water systems as indicated in Table 1. There are three types of public water systems: community, non-transient non-community, and transient non-community. A community water system is a public water system that serves the same people year-round. It has the most regulatory requirements of the system types, including the need for a certified operator and more extensive monitoring. A non-transient, non-community water system regularly serves at least 25 of the same people, four hours or more per day, for four or more days per week, for 26 or more weeks per year. A transient non-community water system does not regularly serve at least 25 of the same people over six months per year. This type of system requires an annual nitrate test and a quarterly to monthly coliform bacteria test.

The public water systems in Wales are plotted on Figure 6. Based upon the relative small population served and the lack of available source water information for these systems, a 500-foot fixed radius protection area has been mapped around each of the public water systems as shown on Figure 6.

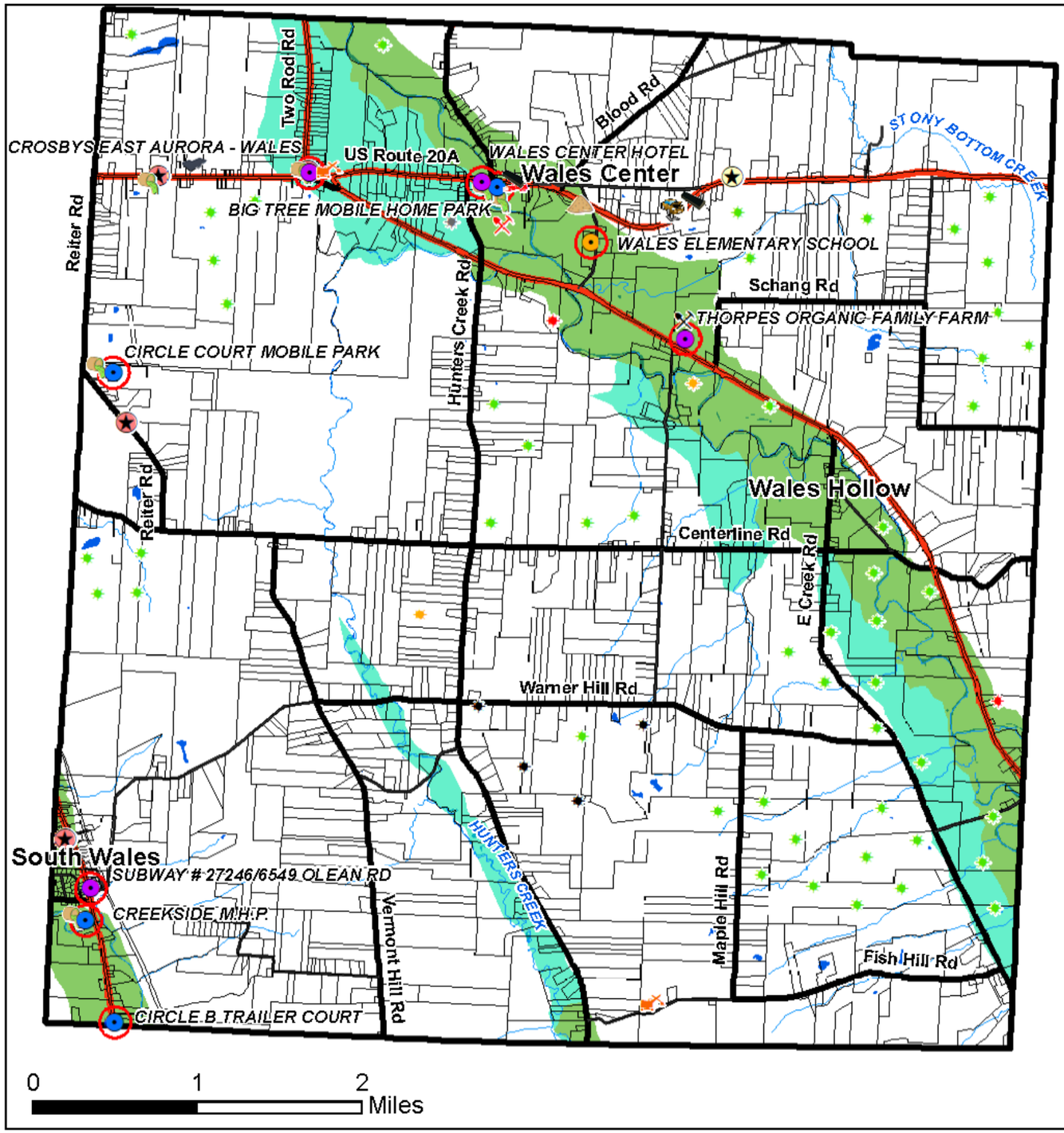
SYSTEM NAME	POPULATION SERVED	SYSTEM TYPE
CREEKSIDE M.H.P.	120	COMMUNITY
CIRCLE B TRAILER COURT	35	COMMUNITY
CIRCLE COURT MOBILE PARK	90	COMMUNITY
BIG TREE MOBILE HOME PARK	99	COMMUNITY
WALES CENTER HOTEL	40	TRANSIENT NON-COMMUNITY
WALES ELEMENTARY SCHOOL	250	NON-TRANSIENT NON-COMMUNITY
SUBWAY # 27246/6549 OLEAN RD	25	TRANSIENT NON-COMMUNITY
CROSBYS EAST AURORA - WALES	26	TRANSIENT NON-COMMUNITY
THORPES ORGANIC FAMILY FARM	25	TRANSIENT NON-COMMUNITY

Note: Population served figures are from the New York State Department of Health (NYSDOH)
Table 1: Public Water Systems in Wales

3.2 Household Wells

Aside from the residents of the four mobile home parks indicated in Table 1, the remaining citizens of Wales receive their drinking water from individual domestic wells (household wells). Since 2000, a Well Completion Report must be completed by the well contractor and filed with NYSDEC and the well owner for each water well drilled. Eighty-eight percent (88%) of water wells drilled in Wales during this period are completed in bedrock, with the overwhelming number of these in the upland areas above the valleys. The median depth of wells drilled in the upland areas of Wales is 75 feet deep, with a similar well depth reported in the valley areas.

The Erie County Department of Health completes water well inspections for all house property transfers and for all new house construction. This includes a visual inspection of the well casing,



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Legend

Manufacturing Facility

Auto-Related Business
- Auto body shop
- Auto dealer

Salt Storage Facility

Remediation Site

Highway Garage

Public Water Systems
- Community
- Non-Transient Non-Community
- Transient Non-Community

Wastewater Treatment Discharge Site

Unplugged Gas Wells
- Active Well
- Inactive Well
- Not Reported
- Transferred Permit
- Unknown (Abandoned)

Mines
- Never permitted
- Expired - Not reclaimed

Petroleum Bulk Storage Facility
- ACTIVE
- UNREGULATED USE
- INACTIVE

500-Ft Public Water System Buffer

Sand and Gravel Aquifer

Type
- Both Unconfined (Shallow) & Confined (Deep)
- Confined (Deep)

Figure 6
Town of Wales
Public Water Systems and Potential Sources of Contamination

well cap, and the area surrounding the well for any potential sources of contamination, including adequate separation from sewage disposal systems. Table 2 contains the required minimum separation distances to protect water wells from contamination.

Required Minimum Separation Distances to Protect Public Water Supply Wells From Contamination

Contaminant Source	Distance (Feet)[1]
Chemical storage sites not protected from the elements (e.g., salt and sand/salt storage)[2]	300
Landfill waste disposal area, or hazardous or radiological waste disposal area[2]	300
Land surface application or subsurface injection of effluent or digested sludge from a Municipal or public wastewater treatment facility	300
Land surface application or subsurface injection of septage waste	300
Land surface spreading or subsurface injection of liquid or solid manure	200
Storage Areas for Manure piles [3]	200
Barnyard, silo, barn gutters and animal pens [3]	200
Cesspools (i.e. pits with no septic tank pretreatment)	200
Wastewater treatment absorption systems located in coarse gravel or in the direct path of drainage to a well	200
Fertilizer and/or pesticide mixing and/or clean up areas	200
Seepage pit (following septic tank)	200
Underground single walled chemical or petroleum storage vessels	200
Absorption field or bed	200
Contained chemical storage sites protected from the elements (e.g., salt and sand/salt storage within covered structures)[4]	200
Septic system components (non-watertight)	200
Intermittent sand filter without a watertight liner	200
Sanitary Privy pit	200
Surface wastewater recharge absorption system for storm water from parking lots, roadways or driveways	200
Cemeteries	200
Sanitary privy with a watertight vault	200
Septic tank, aerobic unit, watertight effluent line to distribution box	100
Sanitary sewer or combined sewer	50
Surface water recharge absorption system with no automotive-related Wastes (e.g., clear-water basin, clear-water dry well)	None[5]
Stream, lake, watercourse, drainage ditch, or wetland	None[5]
All known sources of contamination otherwise not shown above	200

Table 2. Required Minimum Separation Distances to Protect Water Wells from Contamination (from NYSDOH Part 5, Subpart 5-1 Standards for Water Wells - Appendix 5B)

Note that if a home is served by a dug well, the homeowner will have to either install a filtration and disinfection system or install a new drilled well. The Erie County Department of Health will also take a bacteriological sample as part of their inspection. If coliform bacteria are found, a resample and retest is permitted. The presence of coliform bacteria upon resampling will necessitate permanent disinfection or the correcting of the problem by a certified well driller.

3.2.1 Well Survey

In order to learn more about the types and distribution of existing individual water supplies in Wales, determine the relative quality and quantity of water supply sources, cause residents to

think about their own individual water supply, and identify if there are specific water resource concerns among residents, the Town of Wales, in conjunction with the New York Rural Water Association, conducted a well survey in summer 2014. A total of 358 responses were received from a mailing the Town sent out. An additional 58 responses were received online. The total response represented approximately one-third of the total number of households in Wales and was very evenly distributed in terms of the Town's geography.

86 percent of respondents indicated that they had drilled wells. The six percent of respondents with dug wells or springs were largely located along Two Rod and Four Rod Roads. This is largely due to the topography and geology of these two areas.

Figure 7 displays the answer(s) to the following question: *Have you ever had any of the following problems with your well water?*

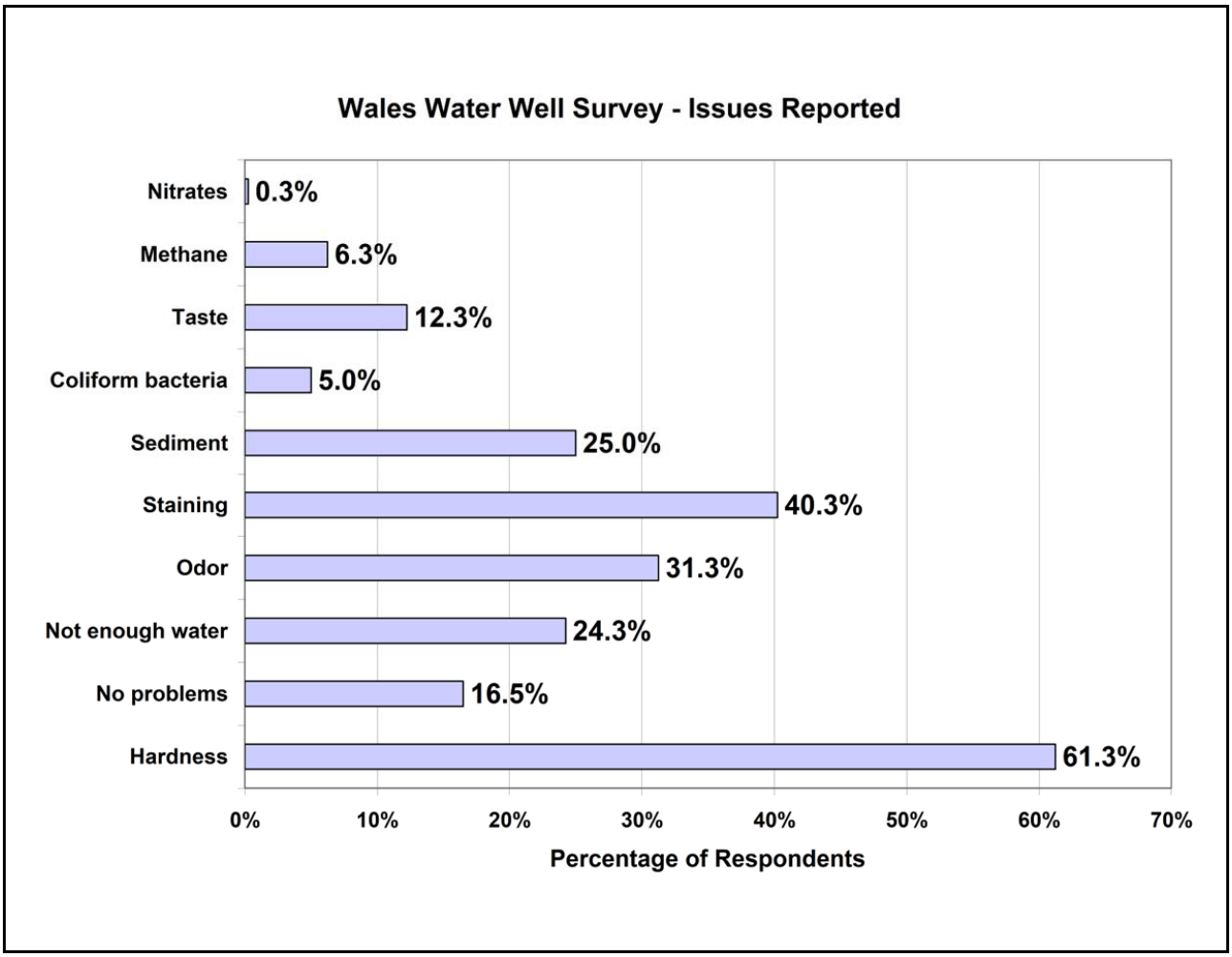


Figure 7. Self-Reported Water Issues

Areas with better water in terms of quantity and quality tended to be located more in valley areas. This is likely due to the presence of higher-yielding sand and gravel aquifers and the tendency for concentrations of bedrock fractures here. Respondents indicating that they didn't have enough water tended to be located on the ridges (interfluves) between the 3 main valleys.

However, there are local variations of quantity/quality along individual roads and neighborhoods in these upland settings. This suggests that many factors are responsible for the perception of groundwater availability here (fracture density, bedrock lithology, experience having a well, etc.).

As shown in Figure 8, the majority of residents in Wales have some type of water treatment device installed. This can range from simply the use of a softener to reduce hardness to a system to control iron, manganese and odors. Such a system commonly can utilize: (1) potassium permanganate or chlorine injection installed in front of a greensand filter; or (2) hydrogen peroxide injection coupled with a carbon or other filter.

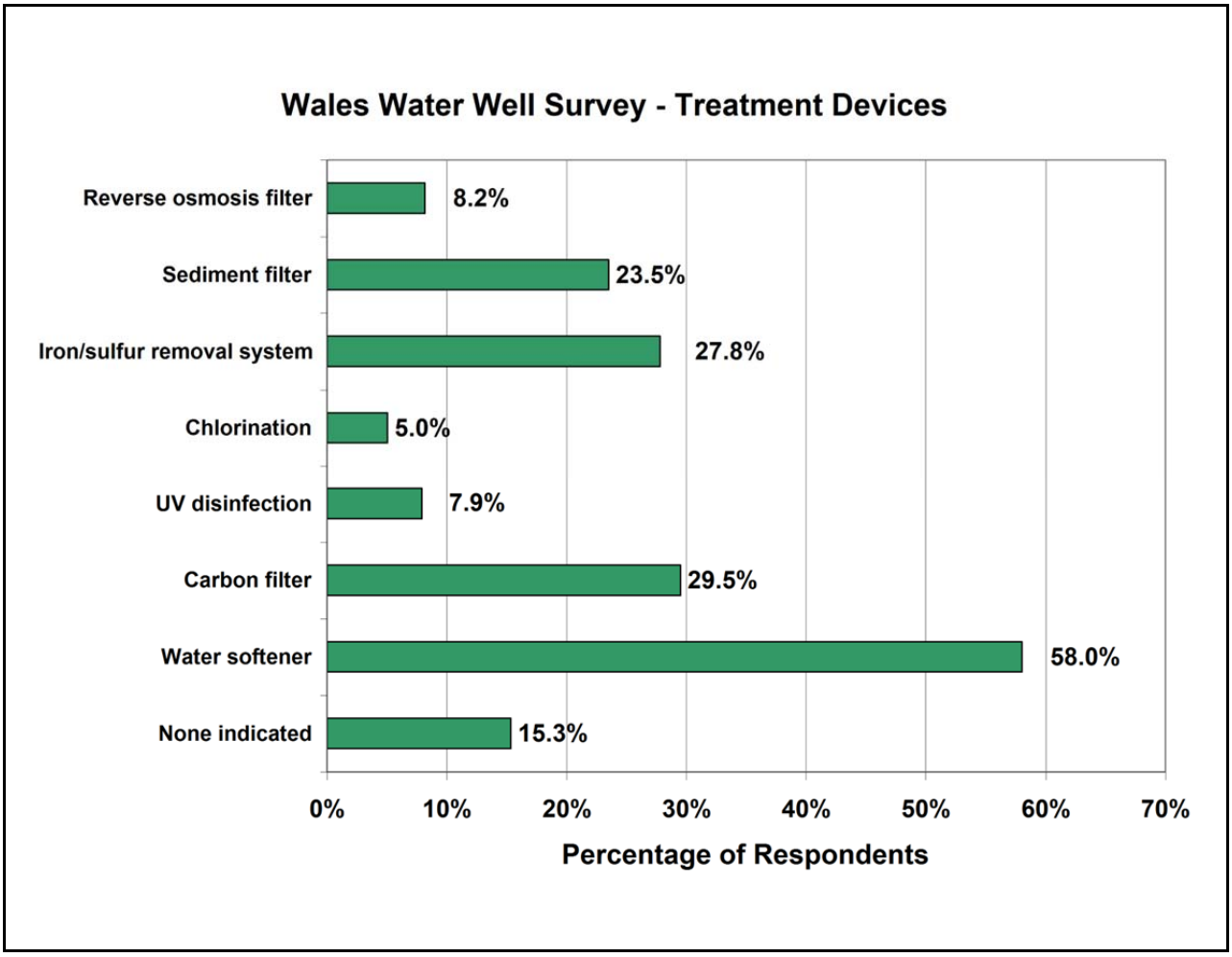


Figure 8. Self-Reported Water Treatment Devices.

In general, as the survey response attests, the availability of water is an important issue in Wales. Some residents have made large investments in their individual water supplies. For many this involves the use of treatment systems that are expensive to install and maintain. Others have installed larger diameter wells or additional storage tanks to meet peak demand. Some individuals have even had to extend the depth of existing wells due to declining water levels.

In terms of concerns and comments expressed in the survey, several individuals expressed concerns about fracking, the use of agrichemicals, sludge spreading, etc. Some would like to learn more about their well and/or having it tested.

4.0 WATER-BEARING FORMATIONS

4.1 Bedrock

Bedrock in the Town of Wales is the source of groundwater for the majority of residents and businesses. In bedrock, steel casing is set through the overburden (unconsolidated deposits) and into the first few feet of sound rock. The remainder of the well is left as an open borehole in the rock. The overwhelming depth of bedrock wells is in the range of 51 to 100 feet (see Figure 9). A majority of these wells are relatively large diameter (10- or 12-inch) (see Figure 10). The advantage of using larger diameter casing is that such wells provide storage for lower-yielding wells. If well yields are less than 5 gpm, the NYSDOH recommends 100 to 300 gallons of supplemental storage to meet peak water demand periods, such as in the morning and evening. This supplemental storage can be met by the available storage in the well casing or by water stored in a tank. Table 3 indicates the available storage in an average bedrock well in Wales (depth of 75 feet, water level 18 feet) of various casing diameters.

Well Diameter	Gallons Per Foot	Amount of Storage in Average Well (gallons)
6"	1.469	83.7
8"	2.611	148.8
10"	4.08	232.6
12"	5.875	334.9

Table 3. Water Well Casing Storage for Average Bedrock Well Conditions in Wales

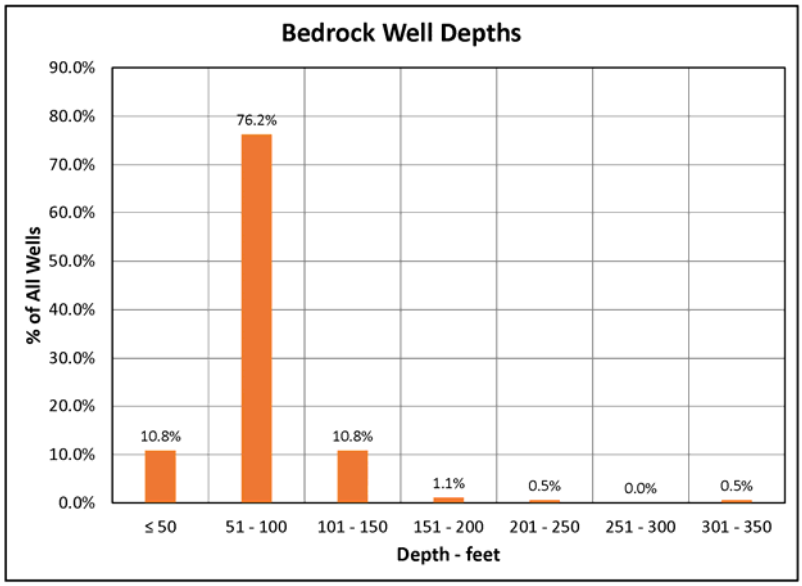


Figure 9. Bedrock Well Depths in Wales

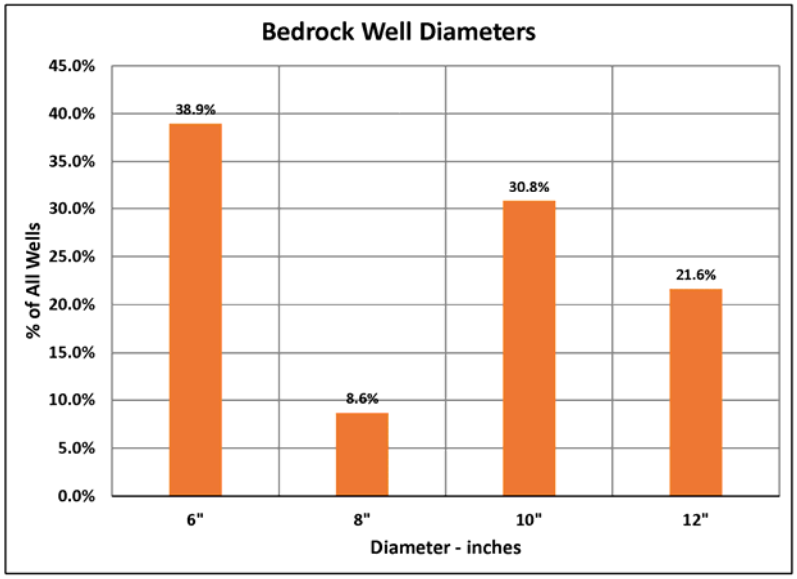


Figure 10. Bedrock Well Diameters in Wales

4.1.1 Water Quantity

Reported bedrock well yields from the publicly available NYSDEC data are shown on Figure 1. Statistically, the distribution of bedrock well yields in Wales is displayed in Figure 11 below. The median yield of bedrock wells in Wales is 3 gallons per minute (gpm). NYSDOH does not recommend the use of wells with yields of 1 gallon per minute or less for any homes with four or more bedrooms. A majority of wells yield 3 gpm or less, thus likely requiring supplemental storage tanks or larger diameter casings as discussed above depending upon the number of bedrooms planned.

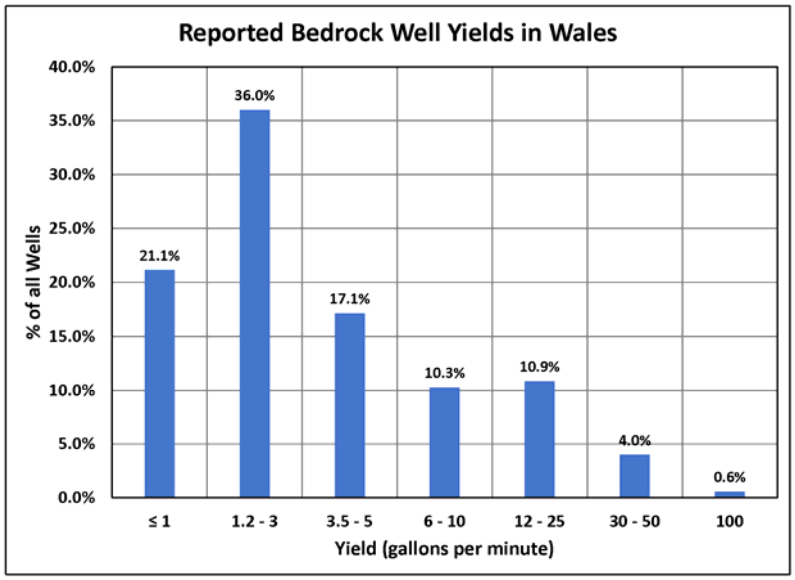


Figure 11. Bedrock Well Yields in Wales

As indicated before, there are local variations in bedrock well yields. One factor is bedrock type. Well yields in the Machias Formation are consistently higher than the other two bedrock formations that are largely shale. The Machias Formation has beds of limestone, siltstone, and sandstone in it that are likely to be more water-bearing. The median well yield in the Machias Formation is 5 gpm, consistently larger than that found in the Hanover and Angola Shale (3 gpm). The Machias Formation occurs across higher elevation areas of Wales (see Figure 3).

4.1.2 Water Quality

Unfortunately, Well Completion Reports completed by the well contractor and filed with NYSDEC do not contain any water quality data. As indicated above, Erie County Department of Health does require a bacteriological test at the time of property transfer or for new construction. Data from these tests was not collected. However, the well survey indicated that 13 percent of respondents have chlorinators or UV disinfection systems. Many of these are likely the result of required bacteriological testing by Erie County. There are no other regulations that require water quality testing for private wells.

Of the public water systems indicated in Table 1, the only system that has had any health based violations based upon a review of U.S. EPA's Safe Drinking Water Information System (SDWIS) is Circle Court Mobile Park off Reiter Road. This system had an exceedance for iron in 2018, and exceedances for disinfection byproducts in 2010-2012. The system is now classified as groundwater under the direct influence of surface water.

4.2 Sand and Gravel Aquifers

Figure 5 shows the distribution of the sand and gravel aquifers in Town. NYRWA mapped these at an actual 1:24,000-scale that would be useful for planning purposes. A larger map can be produced upon request. The median well yield of wells producing from sand and gravel aquifers is 14 gpm. Local wells that are completed in sand and gravel aquifers for private, residential use are typically left as open ended casing. The median depth of such wells is 70 feet deep. Some sand and gravel wells are completed in relatively shallow unconfined aquifers and these wells are in the 20-50 foot deep range. Deeper aquifers that are confined by clay and silt are intersected by wells in the 60 to 200 foot deep range.

Sand and gravel deposits are capable of producing very high yields if wells are finished with a properly sized and developed screen. A well screen is a filtering device that permits water to enter the well but prevents the unconsolidated material (sand, etc.) from entering the well. Screening is placed in the well and the casing is generally pulled back to expose the screen to the unconsolidated material.

Based upon studies of sand and gravel aquifers by the USGS, iron and manganese has been found to be above secondary maximum contaminant levels in some wells. In deeper, confined aquifers, arsenic is sometimes found above the maximum contaminant level. Similar to bedrock, groundwater from wells utilizing sand and gravel aquifers is typically hard. Due to its shallower nature and high permeability, some sand and gravel aquifers are more susceptible to sources of

contamination such as spills, etc. or from on-site sewage disposal in situations where there may be too high a density of septic systems.

5.0 POTENTIAL SOURCES OF CONTAMINATION

Groundwater resources are susceptible to contamination from a variety of sources. These include various industrial, commercial, residential, and agricultural uses and activities. Practices involving the handling, use, storage, and/or disposal of petroleum and other hazardous substances have a higher potential to contaminate groundwater. Once contaminated, groundwater is very difficult and costly to cleanup. It is best to reduce the likelihood of contamination through the use of environmentally-sound best management practices and/or structural methods.

5.1 Regulated Facilities

NYRWA has conducted an inventory of facilities regulated by state and federal agencies following information from the recently released document entitled "*A Framework for Creating a Drinking Water Source Protection Program Plan*" that was principally produced by NYSDEC and NYSDOH. Results of this inventory are presented on Figure 6 and summarized in Appendix A.

Spills are not indicated on Figure 6 because there presently are no active spill sites in Wales and spills are not geo-located by NYSDEC. On average, there have been 1 or 2 spills per year reported to the NYSDEC in Wales. A common source of spills in Wales has been from traffic accidents. Three major transportation corridors occur across Town (U.S. Route 20A, NYS Route 78, and NYS Route 16).

5.2 Higher Risk Land Uses

Also shown on Figure 6 are higher risk land uses as identified from property tax assessment data. These higher-risk uses include an auto body shop, a dealership, two manufacturing facilities, the town highway garage, and salt shed. Note that inclusion on Figure 6 does not mean that a particular property or use has resulted in groundwater contamination.

5.3 Non-Point Sources of Pollution

The above mentioned regulated facilities and higher risk land uses are potential point sources since they are single identifiable potential sources of contamination. In contrast, non- point source pollution is caused by rainfall or snowmelt moving over and through the ground as runoff. This runoff sometimes carries away pollutants that are eventually deposited into surface water, wetlands, or recharged into groundwater. Sources of non-point source pollution locally can include: (1) nitrogen, phosphorus, pesticides, etc. from agricultural lands and residential areas; (2) sediment from construction, crop lands, forestry activities (silviculture), and stream bank erosion; (3) pathogens and nutrients from improperly managed livestock and/or pet wastes, poorly maintained, faulty, or densely located septic systems; and (4) oil, grease, toxic chemicals, and salts from roads and other paved areas.

Figure 12 is a map of land cover data using data from the 2016 National Land Cover Dataset. Table 4 is a summary of land cover in Wales based upon this data.

Land Cover	% of Town
Agriculture	32.6%
Developed	4.2%
Forest	58.8%
Shrub/Grassland	0.8%
Water	0.3%
Wetlands	3.4%

Table 4: Land Cover in Wales (based upon the 2016 NLCD).

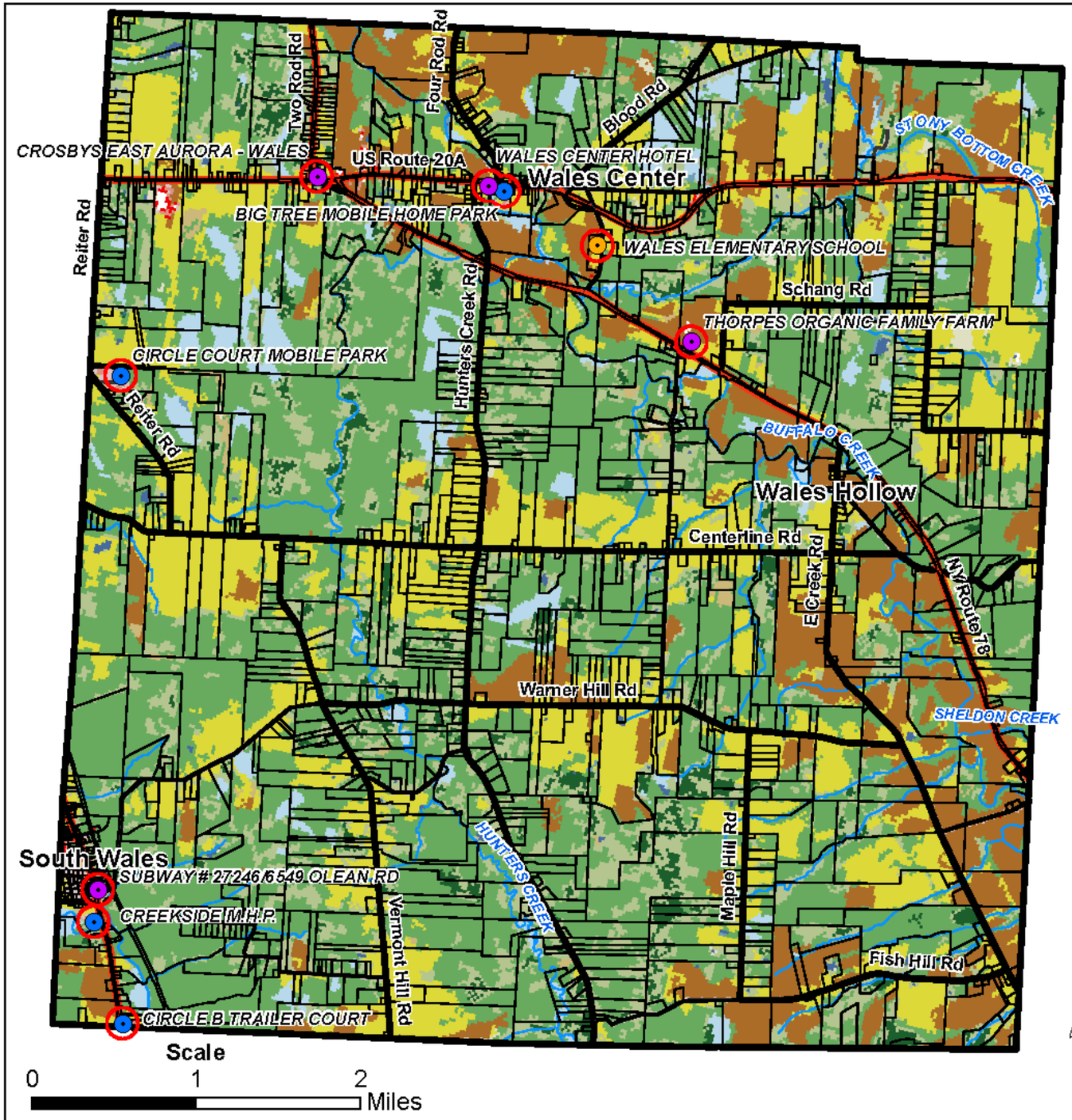
5.3.1 Forest Cover

Forests comprise the vast majority of land cover in Wales and thus silviculture activities (logging) impacts are important to review. Sediment is generally regarded as the primary pollutant from logging. This is acerbated by logging on steeper slopes. Other potential pollutants from silviculture activities include petroleum products, organic matter, and pesticides. Given the local reliance upon groundwater, the latter potential pollutants would have more direct impact upon drinking water sources in Wales.

5.3.2 Agriculture

The 2016 National Land Cover Dataset estimated that nearly one-third of the land area of Wales was in agricultural cover. Based upon real property land classification codes, approximately 19 percent of Wales consists of active agricultural land and 83 percent of the Town is within an agricultural district (see Figure 13). The areas of the Town within this district are under the protection of New York State Agricultural District Law, administered by the New York State Department of Agriculture and Markets. The Agricultural Districts Law allows reduced property tax bills for land in agricultural production and affords Right to Farm protections.

Farms are sometimes identified as potential sources of contamination for both groundwater and surface water resources. This was evident from some of the comments received from the 2014 water well survey. In New York a program to identify environmental risks on farms and address any issues is the Agricultural Environmental Management (AEM) Program. AEM is a voluntary, incentive-based program that links farmers with local Soil and Water Conservation District staff to identify existing environmental stewardship, address natural resource concerns, and enhance farm viability. Farmers work with local AEM resource professionals to develop comprehensive farm plans using a tiered process. The AEM process (a state-funded program) as well as other programs such as the United States Department of Agriculture (USDA)-funded Environmental Quality Incentives Program (EQIP) can address higher priority water resource concerns such as manure runoff, pathogen contamination, nutrient runoff, etc.



Legend

Public Water Systems

- Community
- Non-Transient Non-Community
- Transient Non-Community

NLCD 2016 Land Cover

Class (with % of Town)

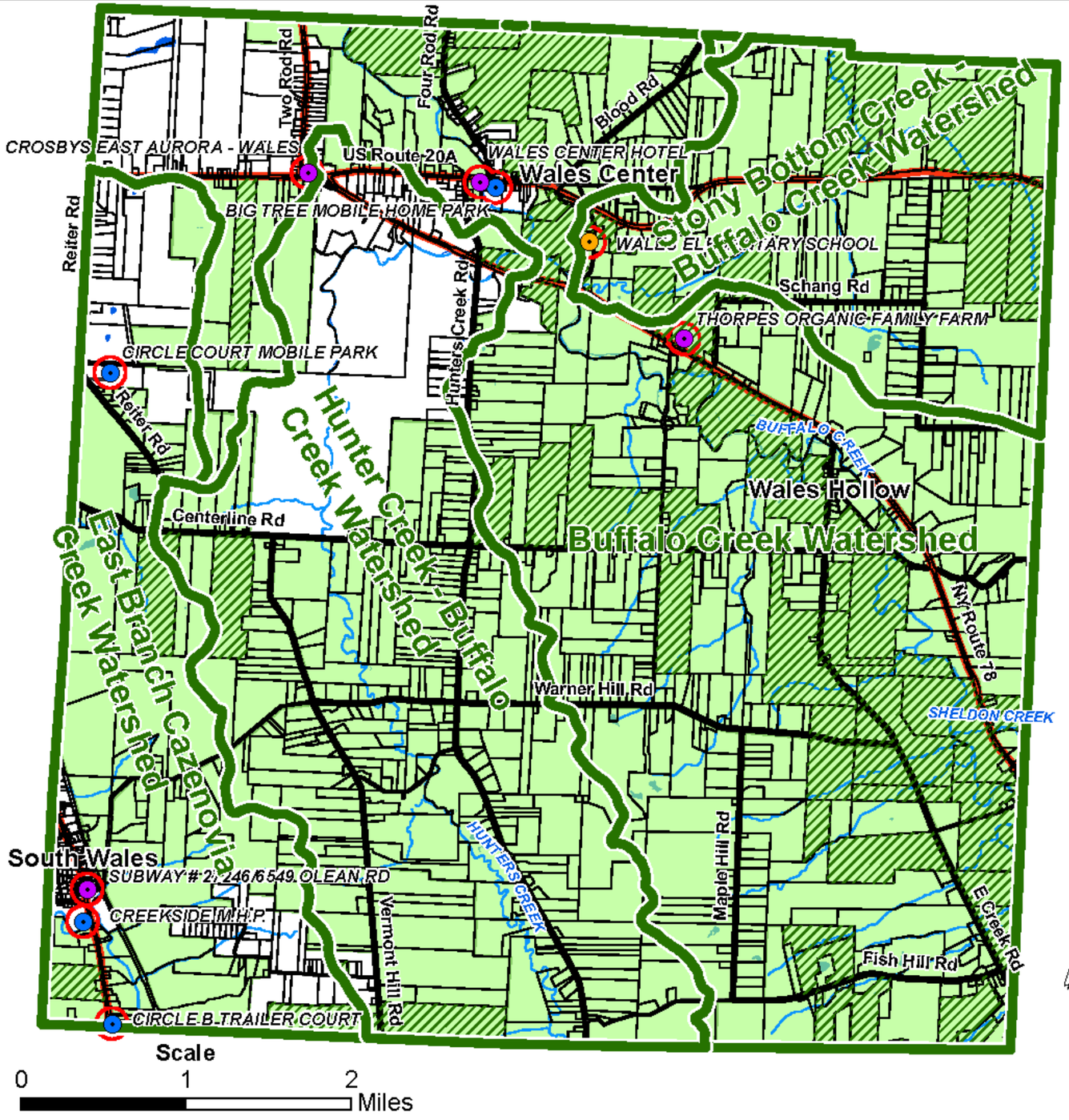
- Cultivated Crops (12.6%)
- Deciduous Forest (43.3%)
- Developed, Low Intensity (0.7%)
- Developed, Medium Intensity (0.1%)
- Developed, Open Space (3.4%)
- Emergent Herbaceous Wetlands (0.1%)
- Evergreen Forest (2.5%)
- Hay/Pasture (20.0%)
- Herbaceous (0.2%)
- Mixed Forest (13.0%)
- Open Water (0.3%)
- Shrub/Scrub (0.6%)
- Woody Wetlands (3.3%)

500-Ft Public Water System Buffer

Parcel boundaries from Erie County Environment & Planning.
The 2016 National Land Cover Database (NLCD) land cover data is based on the analysis of Landsat data and is published by the U.S. Geological Survey in partnership with several federal agencies.

N

Figure 12
Town of Wales, New York
Public Water Systems and Land Cover



Legend

Public Water Systems

- Community
- Non-Transient Non-Community
- Transient Non-Community

Aquifer Watershed Boundary

500-Ft Public Water System Buffer

New York State Agricultural District

Active Agricultual Land (2019)

Parcel boundaries from Erie County Environment & Planning. Agricultural district boundaries downloaded from the Cornell University Geospatial Information Repository (CUGIR). Active agricultural land from 2019 real property tax data.

N

Figure 13
Town of Wales
Public Water Systems and Agriculture

5.3.3 Developed Land Cover

Developed land cover comprises a very low percent of the land area of Town of Wales (Table 4 above). Much of this developed cover is concentrated within the hamlets of Wales Center and South Wales. Non-point pollution in residential areas can arise from a variety of sources. A problematic issue can sometimes be the density of onsite wastewater treatment systems and co-occurrence of relatively shallow wells. In South Wales, the majority of the water wells are shallow sand and gravel wells completed in alluvium. Conversely, most of the wells in Wales Center are deeper, often in sand and gravel confined by a thick layer of clay. Such water supplies would be less susceptible to the impacts of developed land cover than those in the hamlet of South Wales.

6.0 DRINKING WATER PROTECTION AND MANAGEMENT STRATEGIES

The Town of Wales is considering various methods in order to preserve the quality and quantity of drinking water resources for today and the future. These methods can minimize risks posed by existing and future potential contaminant sources. A summary of these strategies and a tentative implementation schedule is presented in Appendix B.

6.1 Non-Regulatory Strategies

6.1.1 Promote Public Education

The aim of public education is to increase the awareness of local landowners, residents, and officials of the importance of protecting drinking water resources. One public education step that has already been implemented was the well survey and two subsequent public informational sessions held by the Town and NYRWA. This survey began to get residents to think about their individual water supply and issues that may impact it. Additional steps are proposed below as part of a well testing program.

6.1.2 Well Testing and Workshop for Well Owners

The NYSDOH Bureau of Water Supply Protection is looking to work with a few communities that have concerns about their water quality of private wells. In these cases, the NYSDOH would typically collect samples from 15 to 20 wells distributed over the community. Samples would be tested for free for at least the following parameters: E. coli & coliform bacteria, arsenic, sodium, iron, manganese, turbidity, pH, hardness, and alkalinity. All information is kept confidential. This program is funded by the CDC Safe Water for Community Health (Safe WATCH) initiative, which works to improve the health and safety of private water systems. NYSDOH requests that the primary caretakers of their well are willing to participate in a brief interview and give a short tour of the well system prior to sampling by NYSDOH staff.

If the Town of Wales is interested in participation in this program for 2020, contact Steven Winkley of NYRWA and he will put the Town in touch with the appropriate NYSDOH personnel. The Town will likely be asked to assist NYSDOH with publicizing the well testing event to residents. Following the sampling, NYSDOH would brief Town officials on the results of the testing in general terms, not disclosing sampling locations.

Following the well testing program, a workshop for well owners would be conducted in Wales by RCAP Solutions, Inc., a non-profit organization involved with the Individual Well Program (IWP) funded by the US Environmental Protection Agency (EPA). Officials from NYRWA and possibly the NYSDOH and local health department would be involved as well. This workshop would be open to any homeowners in Town. The objective is to help residents better understand how to properly care for their water well, ensuring that their water remains safe to drink. It will provide a homeowner the tools needed to ensure a safe water supply and help extend the life of the well. Sampling and interpreting results will be covered as well.

6.1.3 Outreach Regarding Agricultural Issues

With concerns expressed by some citizens regarding runoff from agricultural fields impacting local groundwater supplies, the Town of Wales could consider contacting the Erie County Soil and Water Conservation District to determine if they had any recommendations for possible local farm conservation projects or agricultural outreach efforts.

6.1.4 Abandoned and Orphan Gas Well Plugging

Abandoned wells are unplugged petroleum wells that have not been operated and maintained in accordance with prevailing statutes and regulations. There are two abandoned gas wells in Wales that have been mapped on Figure 6. Both occur in the Buffalo Creek aquifer watershed. These wells have no known owners and are thus considered "orphan" wells. Such wells pose the most significant threats to public safety and the environment. NYSDEC has a well plugging program to address abandoned and orphan wells. To prioritize orphan and abandoned well plugging, NYSDEC utilizes a scoring system in relation to the risk to public safety and the environment. Factors considered include location, construction, proximity to sensitive resources, etc.

It may be useful for the Town of Wales to petition the NYSDEC Region 9 Minerals Manager in the Allegany sub-office to prioritize the plugging of the two orphan wells in Wales under the New York Works Well Plugging Initiative (NYWWPI). The position of these two wells in the Buffalo Creek aquifer watershed in close proximity to the aquifer and the creek could be noted in such a request.

6.2 Regulatory Strategies

6.2.1 Amendment of Special Use Permit Regulations

A special use permit is required for any use other than the listed permitted uses in the zoning districts. To reduce the likelihood of contamination or substantial depletion of groundwater resources, § 200-36 B. of the Town's Zoning Code regarding general standards for special use permits could be amended to include another subsection (8) that reads: *Impact on the quantity or quality of groundwater available to private water supply wells and/or public water supply wells.*

6.2.2 Building Permits and Water Wells

The New York State Residential Code subsection 2.47 2015 IRC Section P2602 P2602.1.1 (part of the Uniform Code) requires that individual water supply wells be located and constructed according to NYSDOH 10NYCRR Appendix 5-B standards to reduce the risk of contamination and maintain a long term water supply for homeowners. Given the high number of wells in Town with yields at or below 1 gpm, the Town of Wales should consider requesting well information for new home construction before the processing of a Building Permit. This could include a NYSDEC Well Completion Report and documentation that there is a sufficient well yield or planned storage to meet peak water use demand.

7.0 FUTURE PLANNING

7.1 Emergencies

Unfortunately, emergency situations affecting groundwater do sometimes occur. One conceivable scenario involves petroleum/hazardous material spills and/or the discovery of contamination. As indicated before, with the busy NYS Route 16, NYS Route 78, and U.S. Route 20A corridors in the Town, accidents have and will continue to occur.

Under state law, all petroleum and most hazardous material spills must be reported to the NYSDEC Hotline (1-800-457-7362). NYSDEC then informs other response agencies such as the local fire department if the spill poses a potential explosion and/or fire hazard and the health department if a drinking water supply is threatened as result of a spill. However, in most instances, the local municipality is not required to be notified. Nevertheless, it is important that the Town be notified if a spill is discovered.

During periods of severe to extreme drought, wells with marginal yields may fail. Several wells in Town have had to be deepened in fact. The Town of Wales may wish to work with local water suppliers to have a plan in place in order to assist households or water systems in such difficulty.

7.2 Plan Review

This plan should be periodically reviewed by the Town of Wales. Proposed protection strategies and measures should be evaluated for their effectiveness upon implementation. If necessary, the plan should be updated with new data collected through water well completion reports and hydrogeologic studies.

APPENDIX A

TABLE OF
POTENTIAL CONTAMINANT SOURCES

Potential Source	Potential Contaminants of Concern	PWS Protection Area?	Information	Data Source
West Falls Machine Co. 11692 Big Tree Rd	Chromium, hexavalent chromium	Yes	In 2003 NYSDEC concluded West Falls Machine had satisfactorily completed its obligation under an Order on Consent and no further work was required.	NYSDEC Environmental Site Remediation Database
Wales Town Landfill Fish Hill Road	?	No	Site previously used for municipal solid waste. Properly closed in accordance with an Order on Consent. Location ??	NYSDEC Environmental Site Remediation Database
Auctions International 11167 Big Tree Rd.	Nitrate, nitrite, bacteria	No	Private/Commercial/Institutional (PCI) General Permit Discharge to groundwater (septic system)	Wastewater Treatment Discharge Site (SPDES Discharge) NYSDEC dataset downloaded from NYS GIS Clearinghouse
Big Tree Mobile Park 12297 Big Tree Rd	Nitrate, nitrite, bacteria	Yes	Private/Commercial/Institutional (PCI) General Permit Discharge to surface water	Wastewater Treatment Discharge Site (SPDES Discharge) NYSDEC dataset downloaded from NYS GIS Clearinghouse
Circle Courts Mobile Home Park 5079 Reiter Rd	Nitrate, nitrite, bacteria	Yes	Private/Commercial/Institutional (PCI) General Permit Discharge to surface water	Wastewater Treatment Discharge Site (SPDES Discharge) NYSDEC dataset downloaded from NYS GIS Clearinghouse
Creekside Mobile Home Park 6650 Olean Rd	Nitrate, nitrite, bacteria	Yes	Private/Commercial/Institutional (PCI) General Permit Discharge to groundwater (septic system)	Wastewater Treatment Discharge Site (SPDES Discharge) NYSDEC dataset downloaded from NYS GIS Clearinghouse
Wales Center Hotel 12243 Big Tree Rd	Nitrate, nitrite, bacteria	Yes	Private/Commercial/Institutional (PCI) General Permit Discharge to groundwater (septic system)	Wastewater Treatment Discharge Site (SPDES Discharge) NYSDEC dataset downloaded from NYS GIS Clearinghouse
Buffalo Creek Landscaping Inc 11878 Route 20A	Petroleum hydrocarbons	No	NYSDEC Mined Land Reclamation Site	NYSDEC Mined Land Reclamation Database
Thorpe's Hillside Gravel 12866 Strykersville Road	Petroleum hydrocarbons	Yes	NYSDEC Mined Land Reclamation Site	NYSDEC Mined Land Reclamation Database
7-Eleven Inc #35106 6444 Olean Rd.	Petroleum hydrocarbons	No	Active Petroleum Bulk Storage Site Three underground storage tanks in use	NYSDEC Bulk Storage Program Database
Crosby's Wales 11566 Big Tree Rd	Petroleum hydrocarbons	Yes	Active Petroleum Bulk Storage Site Five underground storage tanks in use	NYSDEC Bulk Storage Program Database

Potential Source	Potential Contaminants of Concern	PWS Protection Area?	Information	Data Source
Mike Lina Paving Inc. 11166 East Main St	Petroleum hydrocarbons	No	Active Petroleum Bulk Storage Site Three aboveground storage tanks in use	NYSDEC Bulk Storage Program Database
National Fuel Gas - East Aurora Compressor Station 5241 Reiter Road	Petroleum hydrocarbons	No	Active Petroleum Bulk Storage Site	NYSDEC Bulk Storage Program Database
API Well# 31029000000000 East of NYS Rt. 79	Petroleum hydrocarbons, brine	No	Abandoned and unplugged gas well drilled in 1923	NYSDEC Oil & Gas Searchable Database
API Well# 31029100000000 Between Hunters Ck Rd & NYS Rt.79	Petroleum hydrocarbons, brine	No	Abandoned and unplugged gas well	NYSDEC Oil & Gas Searchable Database
Auto Body Shop 12860 Big Tree Rd	Hazardous substances	No		2019 Real Property Database
Auto Dealer 11270 Big Tree Rd	Petroleum hydrocarbons	No		2019 Real Property Database
Manufacturing Facility 12318 Big Tree Rd	Hazardous substances	Yes		2019 Real Property Database
Manufacturing Facility 12928 Big Tree Rd	Hazardous substances	No		2019 Real Property Database
Salt Storage Facility Woodchuck Rd	Sodium, chloride	No		2019 Real Property Database
Highway Garage 12345 Big Tree Rd	Petroleum hydrocarbons and hazardous substances	Yes		2019 Real Property Database

APPENDIX B

IMPLEMENTATION STRATEGY TIMELINE

Issue	Targeted Potential Contaminant Source(s)	Goal	Protection Methods	Partnerships Needed	Implementation Timing
High reliance on individual wells and septic systems	Septic systems, fertilizers, household chemicals	To help residents understand how to properly care for their water well	Public Education: Well Survey and Public Education Meetings	NYRWA	2014-2015
			Well Testing	NYSDOH, Town of Wales	Summer 2020 (?)
			Well Workshop	RCAP Solutions, Town of Wales, NYRWA, NYSDOH ?	Fall 2020 (?)
Brine, gas, and materials leaking from abandoned and orphan wells impacting the quality of groundwater and surface water	Abandoned and orphan gas wells near Buffalo Creek	To prioritize the plugging of these 2 wells under the New York Works Well Plugging Initiative (NYWWPI)	Petition NYSDEC Regional Mineral Manager	Town of Wales	2020 ?
Agricultural runoff	Nutrients, bacteria, agrichemicals	To improve mutual understanding/awareness of residents, Town officials, and farmers regarding water resource concerns. Possibly prioritize future conservation areas for funding	Public education and awareness meeting(s)	Erie County Soil & Water Conservation District, Town of Wales, NYRWA, local farmers	2020 ?
Potential contamination or depletion of groundwater resources	Sewage, process wastes, aqueous-carried wastes, petroleum, hazardous substances, hazardous waste, solid waste, radioactive material, and/or incidental wastes	To give Town Board members clearer guidance on approval or disapproval of uses that are of higher-risk to water supplies	Amend special use permit general standards	Town of Wales Town Board, Town Attorney, County Planning Board, NYRWA	2020?
Inadequate consideration of water supply aspects prior to construction		Ensure that the well supply and provided storage are adequate for peak water demands	Request a NYSDEC Well Completion Report and documentation that there is a sufficient well yield or planned storage prior to issuance of a building permit	Wales Town Board, Wales Building Inspector & Code Enforcement Officer	2020 ?