Chatham County Well Program

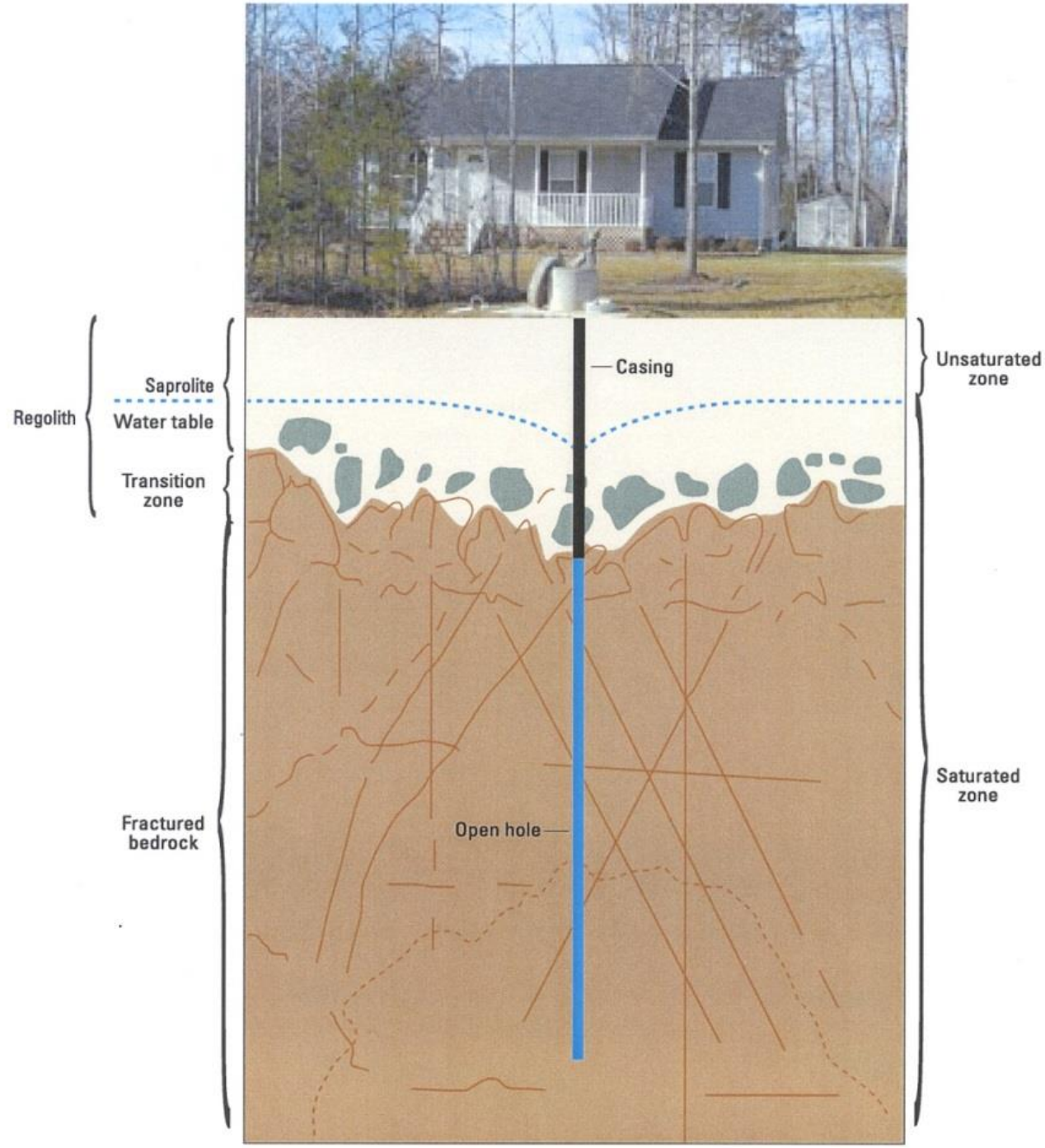
Carl Kivett, REHS, LSS
Well Program Specialist

CHATHAM COUNTY
NORTH CAROLINA
PUBLIC HEALTH

Private Wells

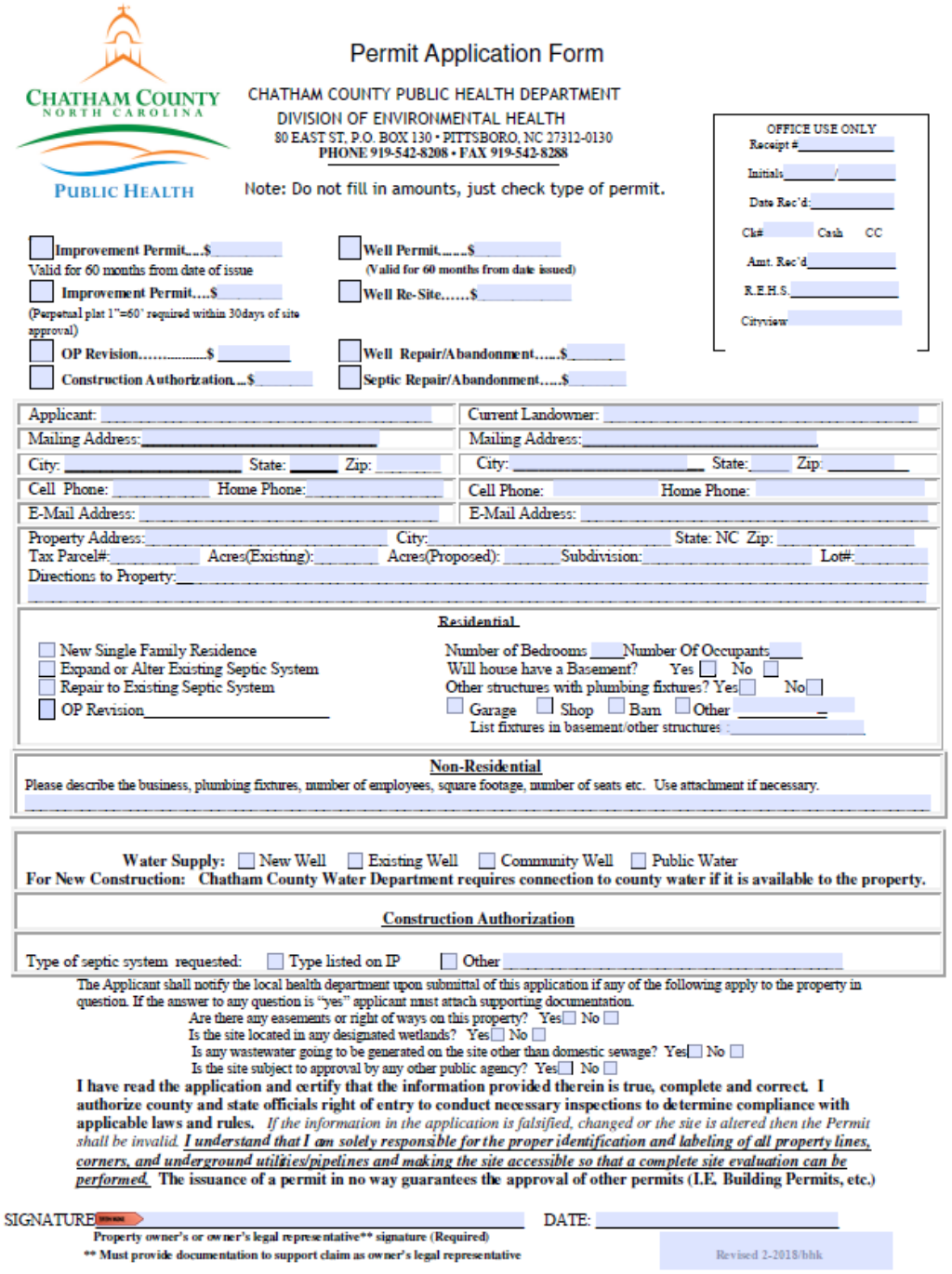
- Siting & Installing New Wells
- Inspections
- Repairing
- Abandonment
- Water Sampling
- Contaminants

Installing a New Well



Well Permit Application

- Fee currently $340



CHATHAM COUNTY
NORTH CAROLINA
PUBLIC HEALTH

Permit Application Form

CHATHAM COUNTY PUBLIC HEALTH DEPARTMENT
DIVISION OF ENVIRONMENTAL HEALTH
80 EAST ST, P.O. BOX 130 • PITTSBORO, NC 27312-0130
PHONE 919-542-8208 • FAX 919-542-8288

Note: Do not fill in amounts, just check type of permit.

OFFICE USE ONLY
Receipt #
Initials
Date Rec'd:
Ck# Cash CC
Amt. Rec'd
R.E.H.S.
Cityview

☐ Improvement Permit.....$
Valid for 60 months from date of issue
☐ Improvement Permit.....$
(Perpetual plat 1"=60' required within 30days of site approval)
☐ OP Revision.....$
☐ Construction Authorization...$
☐ Well Permit.....$
(Valid for 60 months from date issued)
☐ Well Re-Site.....$
☐ Well Repair/Abandonment.....$
☐ Septic Repair/Abandonment.....$

Applicant:
Mailing Address:
City: State: Zip:
Cell Phone: Home Phone:
E-Mail Address:

Current Landowner:
Mailing Address:
City: State: Zip:
Cell Phone: Home Phone:
E-Mail Address:

Property Address: City: State: NC Zip:
Tax Parcel#: Acres(Existing): Acres(Proposed): Subdivision: Lot#:
Directions to Property:

Residential

☐ New Single Family Residence
☐ Expand or Alter Existing Septic System
☐ Repair to Existing Septic System
☐ OP Revision

Number of Bedrooms Number Of Occupants
Will house have a Basement? Yes ☐ No ☐
Other structures with plumbing fixtures? Yes ☐ No ☐
☐ Garage ☐ Shop ☐ Barn ☐ Other
List fixtures in basement/other structures

Non-Residential

Please describe the business, plumbing fixtures, number of employees, square footage, number of seats etc. Use attachment if necessary.

Water Supply: ☐ New Well ☐ Existing Well ☐ Community Well ☐ Public Water
For New Construction: Chatham County Water Department requires connection to county water if it is available to the property.

Construction Authorization

Type of septic system requested: ☐ Type listed on IP ☐ Other

The Applicant shall notify the local health department upon submittal of this application if any of the following apply to the property in question. If the answer to any question is "yes" applicant must attach supporting documentation.

Are there any easements or right of ways on this property? Yes ☐ No ☐
Is the site located in any designated wetlands? Yes ☐ No ☐
Is any wastewater going to be generated on the site other than domestic sewage? Yes ☐ No ☐
Is the site subject to approval by any other public agency? Yes ☐ No ☐

I have read the application and certify that the information provided therein is true, complete and correct. I authorize county and state officials right of entry to conduct necessary inspections to determine compliance with applicable laws and rules. *If the information in the application is falsified, changed or the site is altered then the Permit shall be invalid.* ***I understand that I am solely responsible for the proper identification and labeling of all property lines, corners, and underground utilities/pipelines and making the site accessible so that a complete site evaluation can be performed.*** **The issuance of a permit in no way guarantees the approval of other permits (I.E. Building Permits, etc.)**

SIGNATURE DATE:
Property owner's or owner's legal representative** signature (Required)
** Must provide documentation to support claim as owner's legal representative

Revised 2-2018/bhk

Site Plan

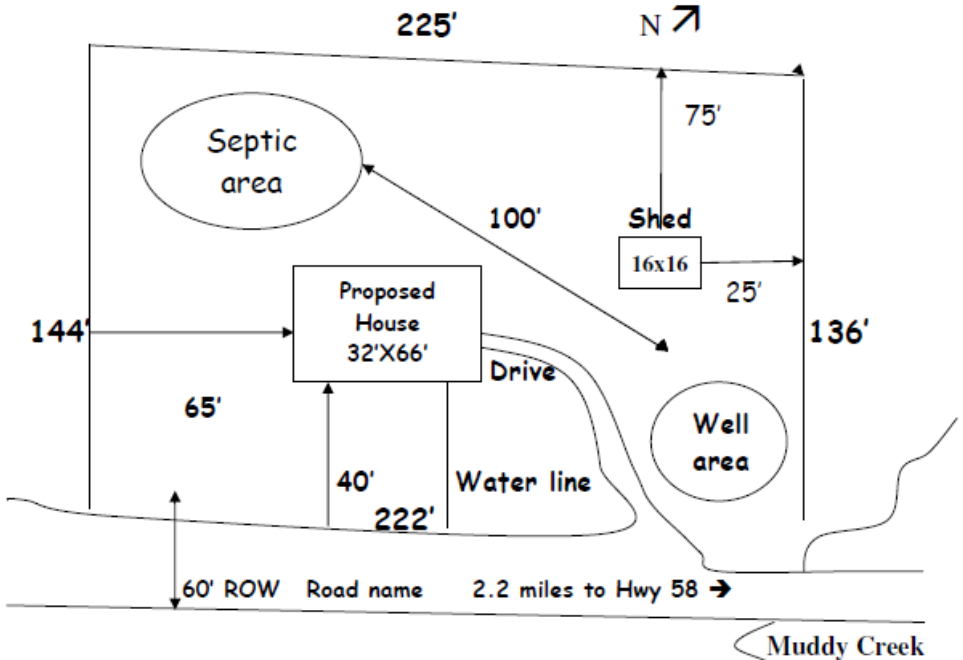
SITE PLAN WORKSHEET

Incomplete site plans will be returned to you for completion. Remember: Your Property will not be scheduled for an evaluation until we have received a completed application, site plan, and all proposed items are marked on the property. Submit a site plan on a copy of the surveyed and/or recorded plat. Tip: If you do not have a survey you can visit the Chatham County GIS website to print a copy of a property line map. (http://www.chathamgis.com/mapguide/ChathamGISWeb/).

Site plan needs to show:

- The dimensions of the property.
- The proposed location of all existing and proposed structures (e.g.: facility, wells, water lines, outbuildings, workshops, garages, pools). Show the distances from the road and the side property line to all structures. Indicate the dimensions for all the structures. If you are unsure as to the structure size, please show the dimensions of the MAXIMUM area of the lot that you anticipate the structure will cover.
- The preferred septic system area.
- The preferred driveway location and any parking area.
- The proposed well location.
- A north arrow or other sufficient directional indicator.
- The location of any existing septic tank systems and wells on your property and on the adjoining property within 100' of your property line.
- The location of any easements or rights of way on the property.
- The location of any designated wetlands on the property.
- The water line location if the water source is public water.

EXAMPLE OF A PROPERLY PREPARED SITE PLAN:

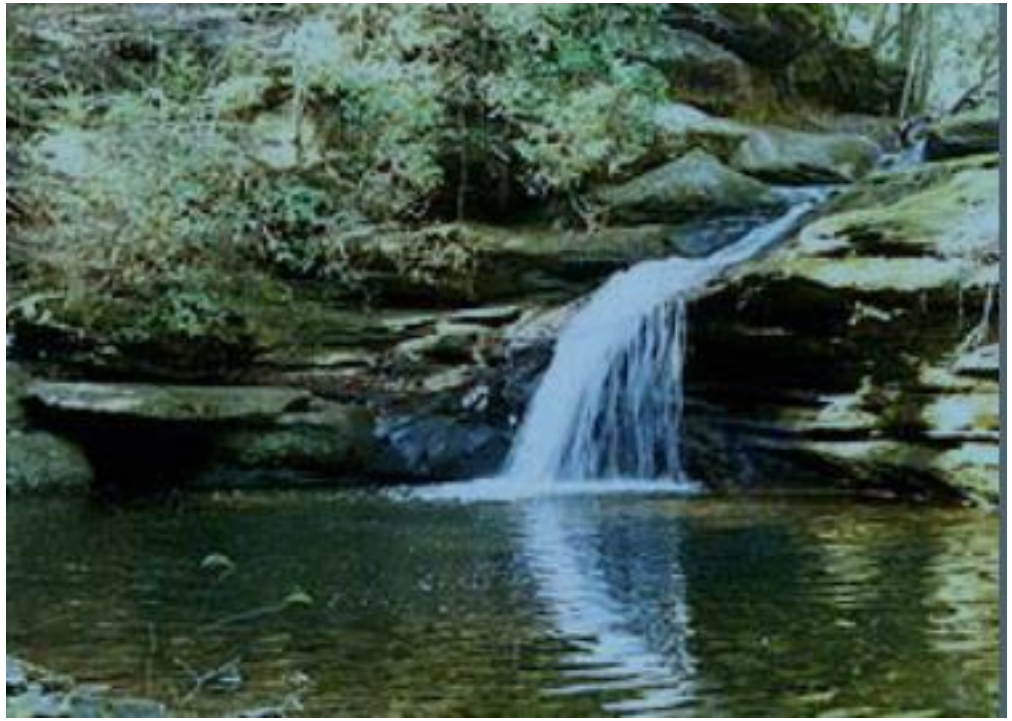


Well Site Minimum Setbacks

*50 feet from any septic system, including the septic tank and repair area

Session Law 2018-65 (HB573)

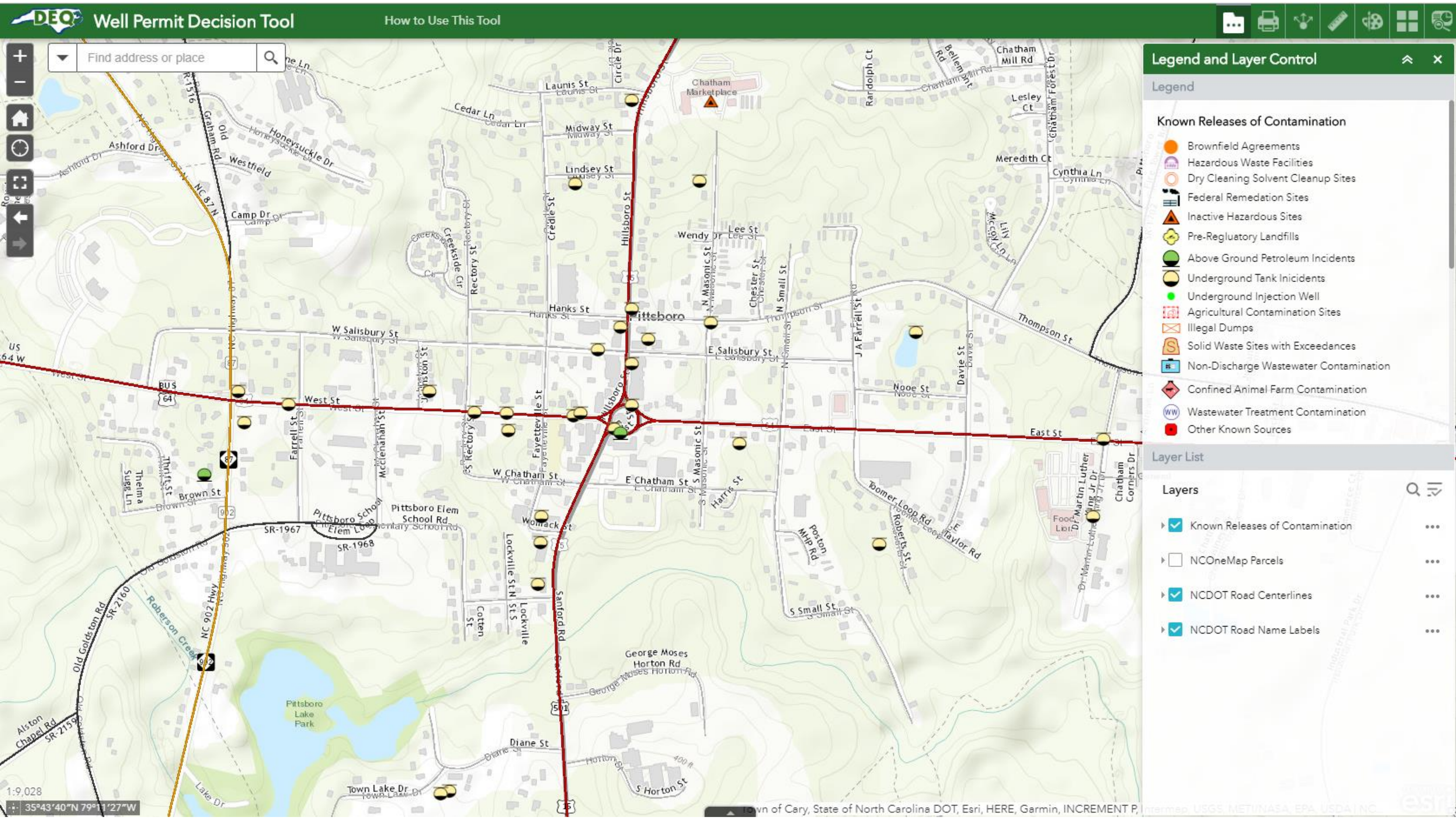
- Wells serving single-family dwellings can be permitted less than 100 feet from a septic system but shall be at least 50 feet.
- Shared wells are still required to be 100 feet from a septic system and repair area.
- Wells must still be a min. of 100 feet from a septic system installed in decayed rock material (saprolite).



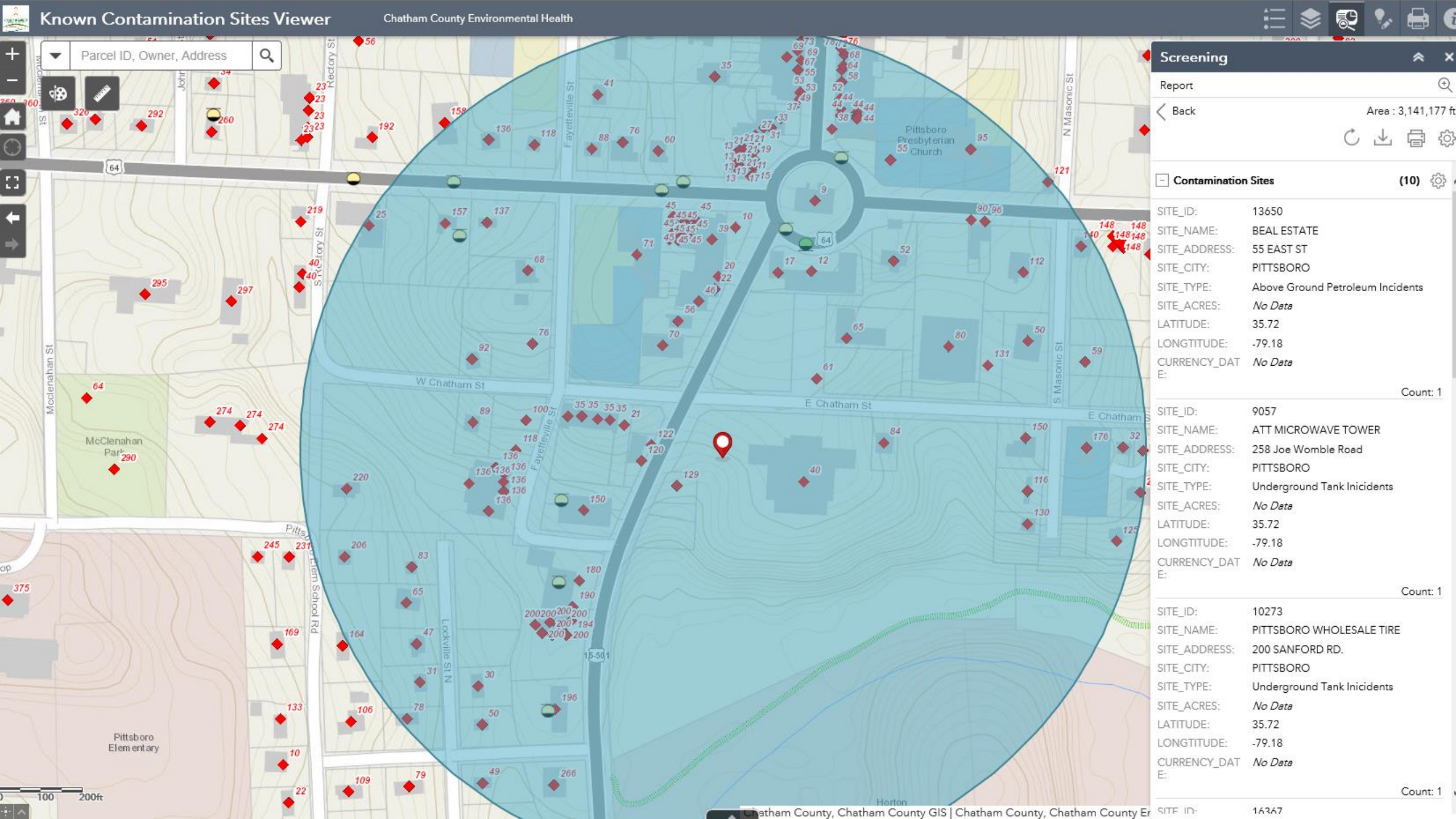
Minimum Setbacks

- 25 feet from any building foundation or structure subject to termite treatment
- 50 feet from any watertight sewer line
- 100 feet from any source of potential groundwater contamination
- 50 feet from lakes, ponds or reservoirs
- 25 feet from all other surface waters

Well Permitting Decision Tool



DEQ
Well Permit Decision Tool
How to Use This Tool
Find address or place
Legend and Layer Control
Legend
Known Releases of Contamination
Brownfield Agreements
Hazardous Waste Facilities
Dry Cleaning Solvent Cleanup Sites
Federal Remediation Sites
Inactive Hazardous Sites
Pre-Regluatory Landfills
Above Ground Petroleum Incidents
Underground Tank Inicidents
Underground Injection Well
Agricultural Contamination Sites
Illegal Dumps
Solid Waste Sites with Exceedances
Non-Discharge Wastewater Contamination
Confined Animal Farm Contamination
Wastewater Treatment Contamination
Other Known Sources
Layer List
Layers
Known Releases of Contamination
NCOneMap Parcels
NCDOT Road Centerlines
NCDOT Road Name Labels
Pittsboro
Chatham Marketplace
Pittsboro Lake Park
1:9,028
35°43'40"N 79°11'27"W

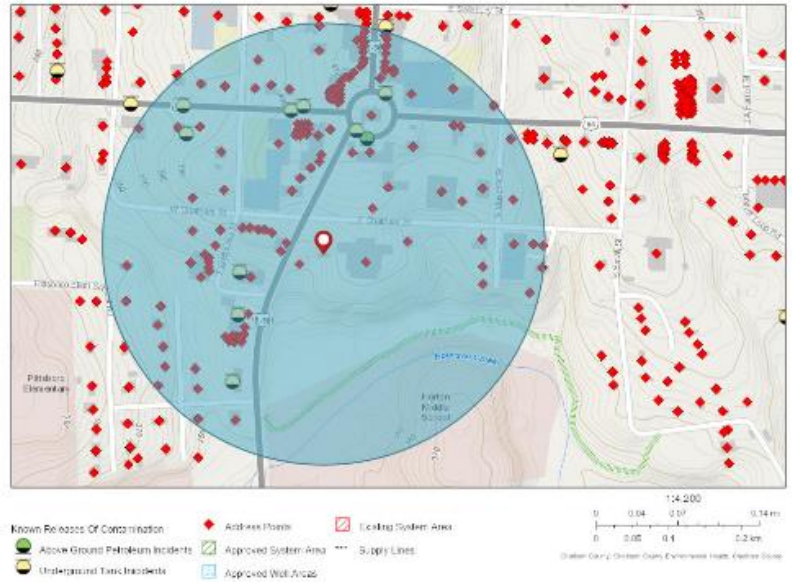

Known Contamination Sites Viewer
Chatham County Environmental Health
Parcel ID, Owner, Address
Screening
Report
Back
Area : 3,141,177 ft
Contamination Sites (10)
SITE_ID: 13650
SITE_NAME: BEAL ESTATE
SITE_ADDRESS: 55 EAST ST
SITE_CITY: PITTSBORO
SITE_TYPE: Above Ground Petroleum Incidents
SITE_ACRES: No Data
LATITUDE: 35.72
LONGTITUDE: -79.18
CURRENCY_DATE: No Data
Count: 1
SITE_ID: 9057
SITE_NAME: ATT MICROWAVE TOWER
SITE_ADDRESS: 258 Joe Womble Road
SITE_CITY: PITTSBORO
SITE_TYPE: Underground Tank Inicidents
SITE_ACRES: No Data
LATITUDE: 35.72
LONGTITUDE: -79.18
CURRENCY_DATE: No Data
Count: 1
SITE_ID: 10273
SITE_NAME: PITTSBORO WHOLESALE TIRE
SITE_ADDRESS: 200 SANFORD RD.
SITE_CITY: PITTSBORO
SITE_TYPE: Underground Tank Inicidents
SITE_ACRES: No Data
LATITUDE: 35.72
LONGTITUDE: -79.18
CURRENCY_DATE: No Data
Count: 1
SITE_ID: 16367
W Chatham St
E Chatham St
Fayetteville St
S Masonic St
N Masonic St
Pittsboro Presbyterian Church
McClenahan Park
Pittsboro Elementary
Lockville St N
Horton
100
200ft

Contamination Property Report

Area of Interest (AOI) Information

Area : 3,141,177 ft²

Oct 31 2019 15:44:36 Eastern Daylight Time



Enter comments here

Summary

Name	Count	Area(ft²)	Length(ft)
Contamination Sites	10	N/A	N/A

Contamination Sites

#	SITE_ID	SITE_NAME	SITE_ADDRESS	SITE_CITY	SITE_TYPE	SITE_ACRES	LATITUDE	LONGTITUDE	CURRENCY_DATE	Count
1	13650	BEAL ESTATE	55 EAST ST	PITTSBORO	Above Ground Petroleum Incidents	*No Data*	35.72	-79.18	*No Data*	1

CHATHAM COUNTY ENVIRONMENTAL HEALTH

80 EAST STREET • P.O. BOX 130 • PITTSBORO, NC 27312-0130
Phone 919-542-8208 • Fax 919-542-8288
www.chathamnc.org/environmentalhealth

Parcel #_____

☐ New Well

☐ Replacement Well

WELL PERMIT

WELL SAMPLING REQUIRED WITHIN 30 DAYS OF CERTIFICATE OF COMPLETION.
THIS PERMIT EXPIRES FIVE YEARS FROM DATE OF ISSUE.

OWNER_____ 911 ADDRESS_____

Directions to Site_____

Phone #_____

WELL TO SERVE Residence ☐ Irrigation ☐ Livestock ☐ Other ☐

Sketch of Well Site

☐ **No known sources of contamination identified within 1,000 ft of the well site.**

☐ **Known sources of contamination identified within 1,000 ft of the well site. See Attached.**

MAINTAIN 25' FROM ANY BUILDING FOUNDATION & 10' FROM ANY PROPERTY LINE.

Minimum of 40' casing is required.

Galvanized steel casing required: YES ☐ NO ☐

"The well owner shall not place potential sources of groundwater contamination closer to the well than the separation distances specified in 15A NCAC 02C .0107(a)(2), .0107(a)(3) or the Rules for the Construction, Repair and Abandonment of Wells in Chatham County, as applicable."

WELL CONSTRUCTION

Distance from nearest property line ..... _____
Distance from source of pollution ..... _____
Total depth of well _____ ft..... GPM _____
Water Bearing Zones: ...Depth._____ Ft. _____
Casing Depth: From _____to _____Ft. Static Water Level_____

Date Drilled_____Certification#_____
Contractor Name_____
Address_____
Phone_____
Ft._____ Ft._____ Ft._____
Diameter_____

Casing Type: PVC____Galvanized Steel_____Thickness____

Drive Shoe ☐ Coupling ☐ Height of casing above ground _____ Sampling Tap ☐ 12" Inch Clearance ☐

Problems in setting casing: Yes ☐ No ☐ Explain_____

Grout Type: Neat ☐ Sand/Cement ☐ Concrete ☐ Bentonite ☐ Annular space width _____In

Water in Annular space Yes ☐ No ☐ Method of Grout: Pump ☐ Pressured ☐ Poured ☐ Pellets ☐

No. Bags of Grout material _____ Weight of 1 bag _____lbs. Depth from _____ to _____Ft.

Well ID Plate ☐ Chlorination ☐ Pump ID Plate ☐

DEPTH		DRILLER LOG
From	To	FORMATION DESCRIPTION

I hereby certify that the above information is correct and that this well was constructed in accordance with the Chatham County Well Rules.

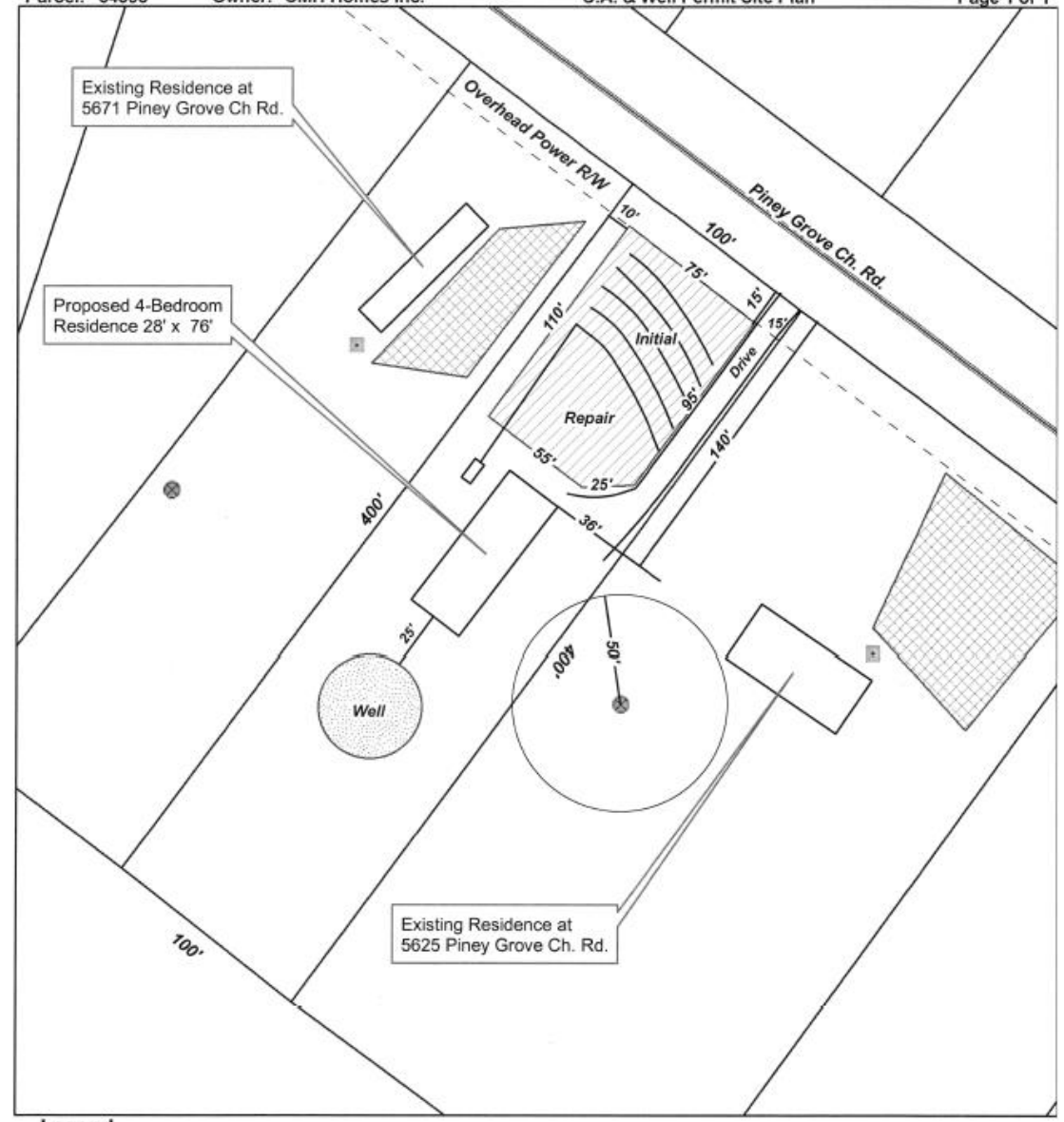
Signature of Contractor *Date*

Permit Issued by_____ *Date*_____
Well Grout Inspected by_____ *Date*_____
GW-1 Received ☐
Certificate of Completion by_____ *Date*_____
Sampled by_____ *Date*_____

911 Address

Name/Subdivision

Parcel: 64395 Owner: CMH Homes Inc. C.A. & Well Permit Site Plan Page 1 of 1



Legend

- Existing Tank
- Existing Wells
- Roads
- ExistingSystemArea
- ApprovedWellArea
- ApprovedSystemArea
- Parcels

N W E S

1 inch equals 60 feet

0 15 30 60 90 120 Feet

Author: James Carl Kirsch

Date: 10/31/19

CHATHAM COUNTY NORTH CAROLINA PUBLIC HEALTH

Known Sources of Contamination

UST Section

Description of Dataset

The Underground Storage Tank (UST) Section's data presented here is representative of two different programs within the Section; the UST program and the Aboveground Storage Tank/Non-UST (AST) program. While the UST data specifically relates to UST systems, the AST data may be related to a variety of release sources, i.e. AST systems, fuel tanker spills, illegal dumping, etc. Whereas, the UST data is specific to releases of regulated substances from USTs. All UST Section features presented in this tool represent locations where the latest reports document confirmed or assumed exceedance(s) of the NC Groundwater Quality Standard and/or the Soil-to-Groundwater Maximum Soil Contaminant Concentrations (MSCCs).

Contaminants Potentially Present

UST and AST Program Sampling Recommendations:

- Volatile Organic Compounds
- Semivolatile Organic Compounds
- Metals (Cr and Pb)

Contact Information

To request additional information from the UST Section please contact the NCDEQ Regional Office assigned to the area of interest and ask to speak with a member of the UST Section. A map of the UST Section's Regional Office coverage areas and phone numbers can be viewed by following this link. The UST Section's Regional Office contact information is also presented below.

UST Section - Regional Office Contact Information

Asheville (ARO) – 2090 US Highway 70, Swannanoa, NC 28778 **(828) 296-4500**

Fayetteville (FAY) – 225 Green Street, Suite 714, Systel Building, Fayetteville, NC 28301 **(910) 433-3300**

Mooresville (MOR) – 610 East Center Avenue, Suite 301, Mooresville, NC 28115 **(704) 663-1699**

Raleigh (RRO) – 1628 Mail Service Center, Raleigh, NC 27699 **(919) 791-4200**

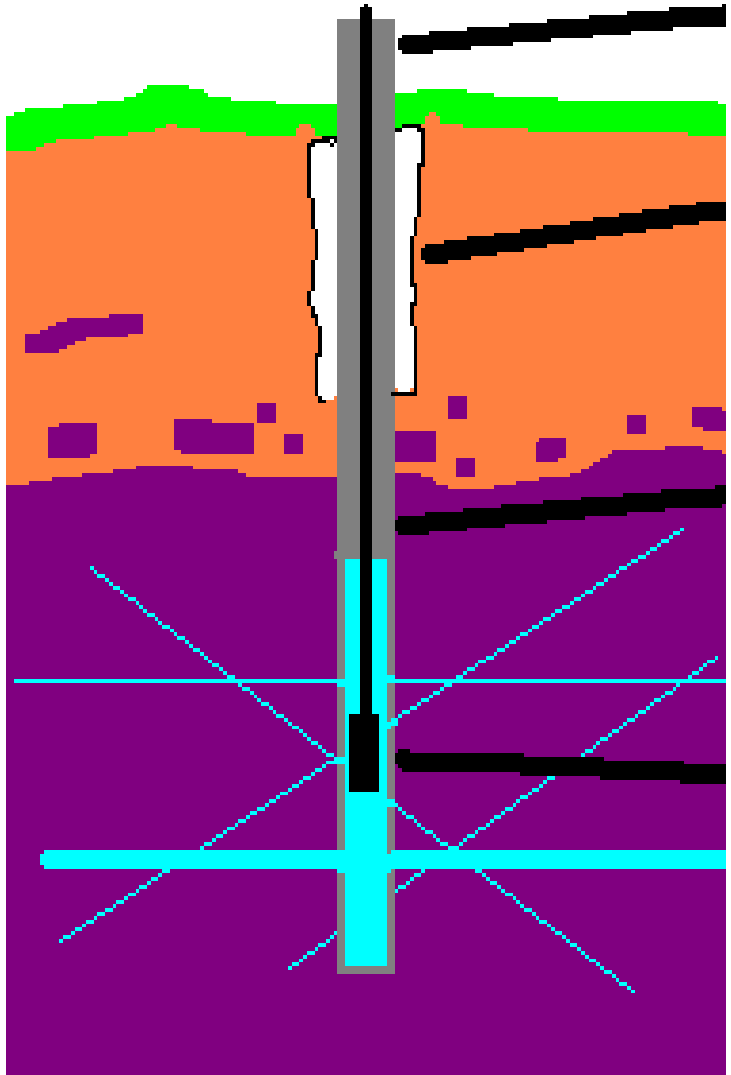
Washington (WAS) – 943 Washington Square Mall, Washington, NC 27889 **(252) 946-6481**

Wilmington (WIL) – 127 Cardinal Drive Extension, Wilmington, NC 28405 **(910) 796-7215**

Winston-Salem (WS) – 450 West Hanes Mill Road, Suite 300, Winston-Salem, NC 27105, **(336) 776-9800**

Guilford County Environmental Health, 400 West Market Street, Suite 300, Greensboro, NC 27401, **(336) 641-3771**

Drilled Well Components and Inspections



- Casing extends one foot above grade
- Grout extends to minimum depth (over 20 feet)
- Bottom of casing seated and sealed in consolidated rock
- Submersible pump moves the water out of the well

Inspections

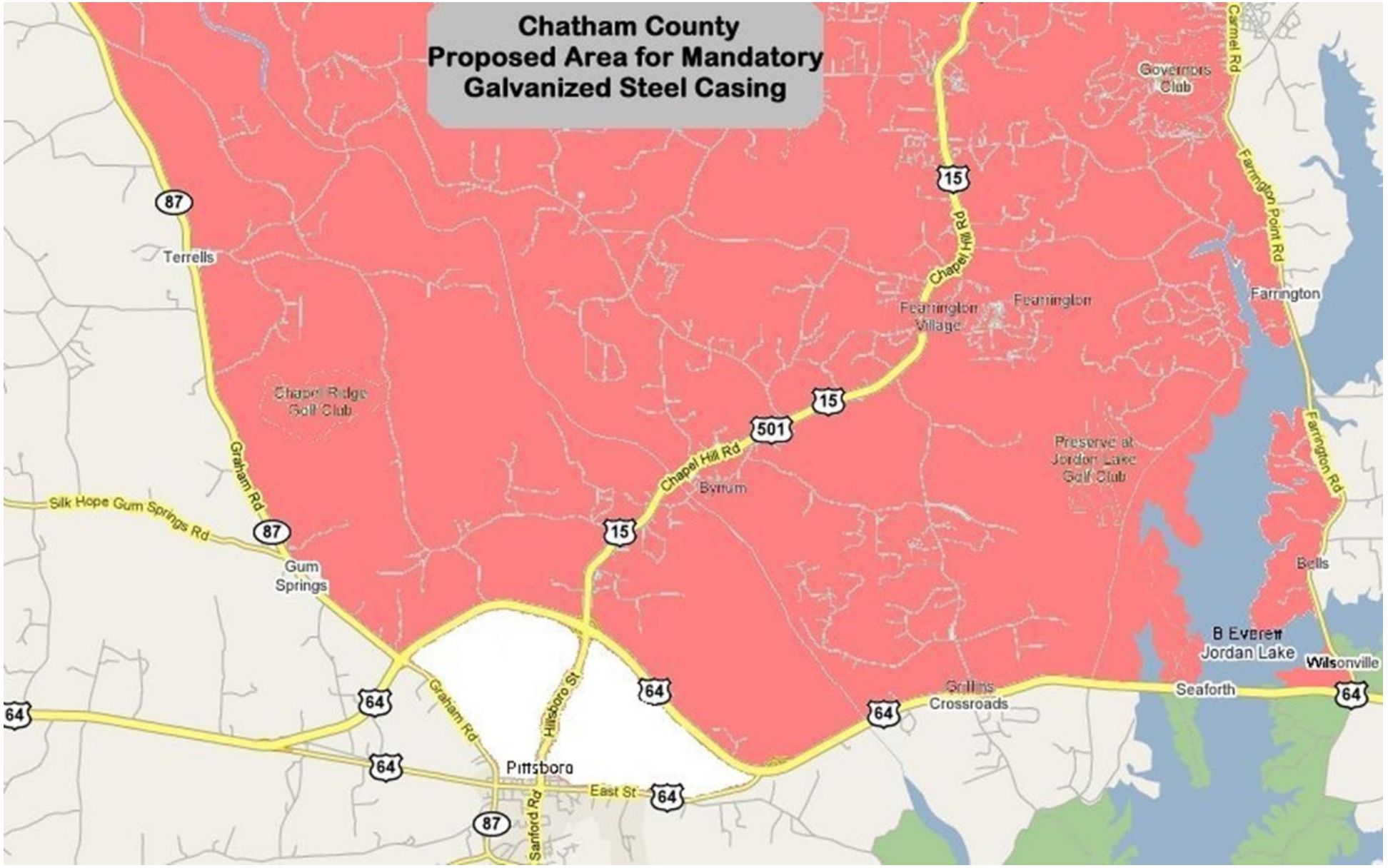
Grout Material & Placement
Well Head Completions
Repairs
Abandonments

Types of Grout

- **Neat cement grout**
- **Sand cement grout**
- **Concrete grout**
- **Bentonite Slurry**
- **Bentonite Chips or Pelletts**


GROUTMASTER

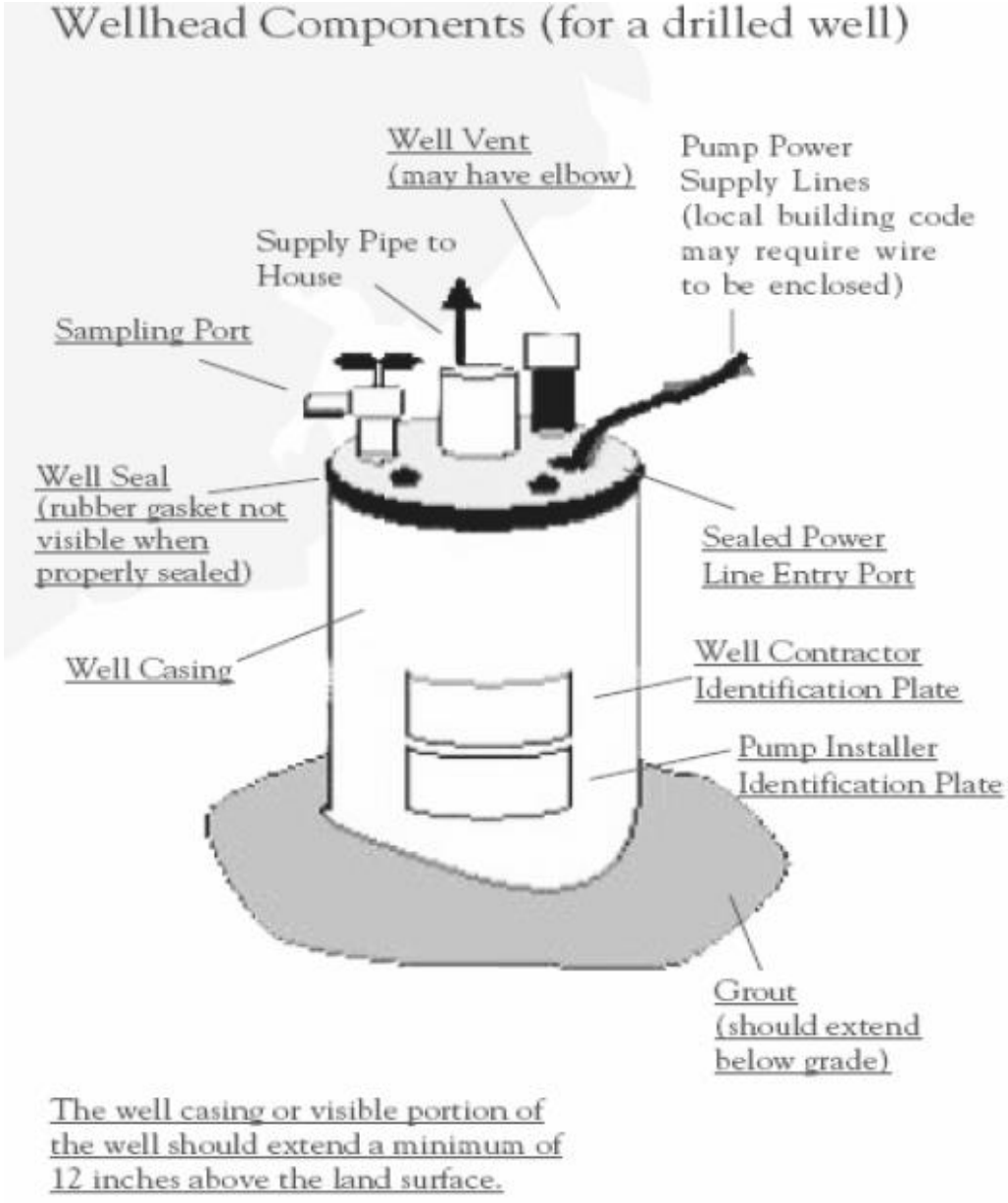
Geology Determines Well Casing




PRECHARGED TANK
CH4202

Well Head Inspections

- Adequately Sealed
- All openings for piping, wiring and vents shall be at least 12 inches above land surface.
- Sampling Tap
- Well shall be properly vented




CB 12
DE IN USA 654930
CERTIFICATION NO.
PUMP IDENTIFICATION
PUMP INSTALLERS NAME PLATE

Well Repairs

- Well repairs may be necessary if your well has muddy or discolored water or is found to have bacteria present.
- Well has low yield. (Drill the well deeper)
- Permit is required from the dept.
- Well Liners most common

Liners

- Well Camera
- Always Look Before You Line!

Pulling a Pump

Packer

Well Abandonments

- **Permanently Abandoned Well:** Well that has been filled in using approved materials and by approved means.
- Health/Saftey Hazards. Low Yield or do not meet minimum setbacks
- The local Health Department must issue a permit for any well abandonment.

- An EHS will inspect the well abandonment in order to verify the materials and methods used.

Water Sampling & Common Contaminants

Water Sampling

- Health Department
  - Environmental Health Division
  - Well owner, or their legal representative, needs to complete & submit an application

Sampling Requirements for New Wells

- 15A NCAC 18A .3802 – Samples shall be obtained by the LHD within 30 days after issuance of a well certificate of completion.
- Any residual chlorine must be flushed prior to sampling.
- Owner responsible for providing access and a source of power.

CHATHAM COUNTY PUBLIC HEALTH DEPARTMENT • *DIVISION OF ENVIRONMENTAL HEALTH*

80 EAST ST, P.O. BOX 130 • PITTSBORO, NC 27312-0130

PHONE 919-542-8208 • FAX 919-542-8288

WATER SAMPLE REQUEST

OFFICE USE ONLY
Receipt #_____
Initials_____/_____
Date Rec'd:_____
Ck#_____Cash__CC__
Amt. Rec'd_____
R.E.H.S._____
Cityview_____
☐ V

BACTERIA (COLIFORM) ☐ $70.00

INORGANIC (MINERAL) ☐ $110.00

NITRATE ☐ $70.00

Full Panel: Bacteria (Coliform only), Nitrate, & Inorganic

FULL PANEL KIT ☐ $150 (EXISTING WELL)

FULL PANEL KIT ☐ $0 (New Well-Initial Sample)

IRON BACTERIA ☐ $70.00

SULFUR BACTERIA ☐ $70.00

HEXAVALENT CHROMIUM ☐ $110.00

** Requires prior health department authorization

PESTICIDE** ☐ $150.00

PETROLEUM** ☐ $150.00

++Existing Wells-Please indicate if you would like to have sample taken from outside ☐ or inside ☐

If sample is taken inside owner must be present .We will call daytime phone number to schedule appointment.

◊ **A Bacteriological Analysis, Inorganic Analysis and Nitrate Analysis are required per State Law for all newly constructed wells within 30 days of the certificate of completion.**

IMPORTANT: Prior to requesting an appointment for new well sampling, the well head must be completed, the pump installed and provided with electricity. All chlorine disinfectant must be fully removed from the well.

Your water sample results will be sent by e-mail unless you request otherwise.

You may also check them on our webpage: http://www.chathamnc.org/index.aspx?page=650

Does home have a water treatment system? Yes ☐ No ☐ **Type of system:** _____.

Property Owner* _____

Property Owner's Mailing Address _____

City_____ State _____ Zip_____

Property Owner's Daytime Telephone _____ Cell Phone Number _____

Property Owner's Email Address _____

Street Address of Well Location _____City _____State _____Zip _____

Subdivision or Mobile Home Park Name and Lot Number _____

Parcel Number _____

Person Requesting Sample _____

Daytime Phone Number _____Cell Phone number _____

Applicant's Email Address _____

*** If applicant for service is not the property owner or tenant, a signed Legal Representation Document is required to be submitted.**

Directions to property where well is located.	Well location on property. BE SPECIFIC.

PRIVATE WATER SUPPLY ☐ COMMUNITY WATER ☐ SHARED WELL ☐ LIVESTOCK ☐ IRRIGATION WELL ☐

WELL DRILLER'S NAME _____

DRILLED WELL ☐ BORED WELL ☐ DUG WELL ☐ SPRING ☐ OTHER ☐

Before your scheduled appointment with the Environmental Health Specialist, make sure:

- Your well casing is uncovered (for inspection) and properly sealed (no openings in well seal).
- The water spigot is accessible (sample bottle must "fit" under spigot in sanitary manner).
- There is no chlorine residue in water (use pool sample kit if necessary).
- The well pump is operating properly (electricity provided).

Notify the Environmental Health Specialist before 9:00am on the scheduled appointment day if you are not ready for the sample collection. FAILURE TO COMPLY WITH THE ABOVE WILL RESULT IN FORFEITURE OF FEE PAID. A NEW FEE MUST BE PAID FOR THE ENVIRONMENTAL HEALTH SPECIALIST TO RETURN TO THE PROPERTY. I authorize county and state officials right of entry to conduct necessary inspections to determine compliance with applicable laws and rules to include mandated and requested water sampling.

SIGNATURE _____ DATE _____

(Well Owner, Tenant or Legal Representative)

CCPHD/REVISED 9-2019 EHS

www.chathamnc.org/environmentalhealth

Tests Offered By Environmental Health

- Bacteriologic (Coliform)
- Inorganic (Mineral)
- Nitrate/Nitrite
- Sulfur Bacteria
- Iron Bacteria
- Pesticide
- Petroleum
- Hexavalent Chromium

Coliform Bacteria

- Total & Fecal Coliform Bacteria

Coliform Bacteria

- **Total Coliform**
  - Ubiquitous - found in air, soil, vegetation, decaying matter, sewage, etc.
- **Fecal Coliform**
  - Subgroup of Total Coliform bacteria
  - Found in intestines and feces of warm-blooded animals, including humans

Coliform Bacteria

- **Indicator organism**
  - If present, may indicate that other potential disease causing organisms are present
  - Relatively easy & inexpensive test

Testing for Coliform Bacteria

- **Bacteriologic testing should be done if:**
  - Your well is newly drilled
  - Your well has been repaired or pump replaced
  - A flood has occurred near or around your well
  - Any household member suffers from recurring bouts of gastrointestinal illness
  - An infant lives in the home
  - A person with a chronic illness that compromises the immune system lives in the home
  - Your well has never been tested
- **Recommended to test for once a year**

Treatment for Coliform Bacteria

- Well disinfection
- Ultraviolet light or continuous chlorination
- Ozonation
- Well Repair (Liner)

Sulfur Bacteria

- This test is recommended if:
  - Your water has a “rotten eggs” odor
  - Your water has a bitter taste
  - Your plumbing has pipe corrosion problems and yellow or black stains on fixtures

Iron Bacteria

Treatment of Iron & Sulfur Bacteria

Destroy Bacteria:

- Chlorine Shock treatment of well
- Check for iron/sulfur after two week period
- If reoccurrence, continuous disinfection may be needed
- Well Repair (Liner)
- Well Aeration System

Well Disinfection

- New well
- Repaired well
- Repaired/replaced well pump
- Well tests positive for bacteria
- Well seal is opened for any reason

Inorganic Contaminants

Parameters included in inorganic testing:

- Arsenic
- Barium
- Cadmium
- Calcium
- Chloride
- Chromium
- Copper
- Fluoride
- Iron
- Lead
- Magnesium
- Manganese
- Mercury
- pH
- Selenium
- Silver
- Sodium
- Sulfate
- Alkalinity
- Hardness
- Zinc
- Vanadium

Lead

- May occur where piping material or pipe joint compound contains lead.
- Corrosion of household plumbing systems
- Naturally occurring (rare)

Treatment for Lead

- Reverse osmosis
- Ion exchange
- Distillation
- Replace Plumbing

Iron

- Ferrous Iron: soluble – a dissolved solid (clear)
- Ferric Iron: Insoluble – a suspended solid (solid particle)
- Iron Bacteria: Living non-pathogenic organism

Treatment of Iron

- Oxidation
- Ion Exchange
- Reverse Osmosis
- Well Repair (Liner)

Manganese

- Adverse health effects from long term exposure
- Treatment includes Oxidation, Ion Exchange
- Well Repair

Nitrate & Nitrites

- Nitrogen-oxygen chemical units which combine with various organic and inorganic compounds
- Can cause “Blue Baby Syndrome”
- Boiling the water can increase concentration

Nitrates & Nitrites

- Possible sources of nitrates are fertilizer, sewage, and animal waste

Treatment for Nitrate/Nitrite

- Anion exchange (water softener), distillation, or reverse osmosis
- Do NOT heat/boil the water
- Mechanical filters or chemical disinfection DO NOT remove nitrate from water

Pesticides

- This test is recommended if:
  - Your well is near areas of intensive agriculture
  - Your well is located within 25 feet of a termite-treated building foundation

Petroleum

- This test is recommended if:
  - Your well is located near an underground storage tank (UST)
  - Your well is located near a business that has an UST or is industrial in nature
  - Your well is located near a landfill

Emerging Contaminants

- Hexavalent Chromium (Cr6)
- Vanadium
- PFAS

Andrew George, UNC Institute for the Environment
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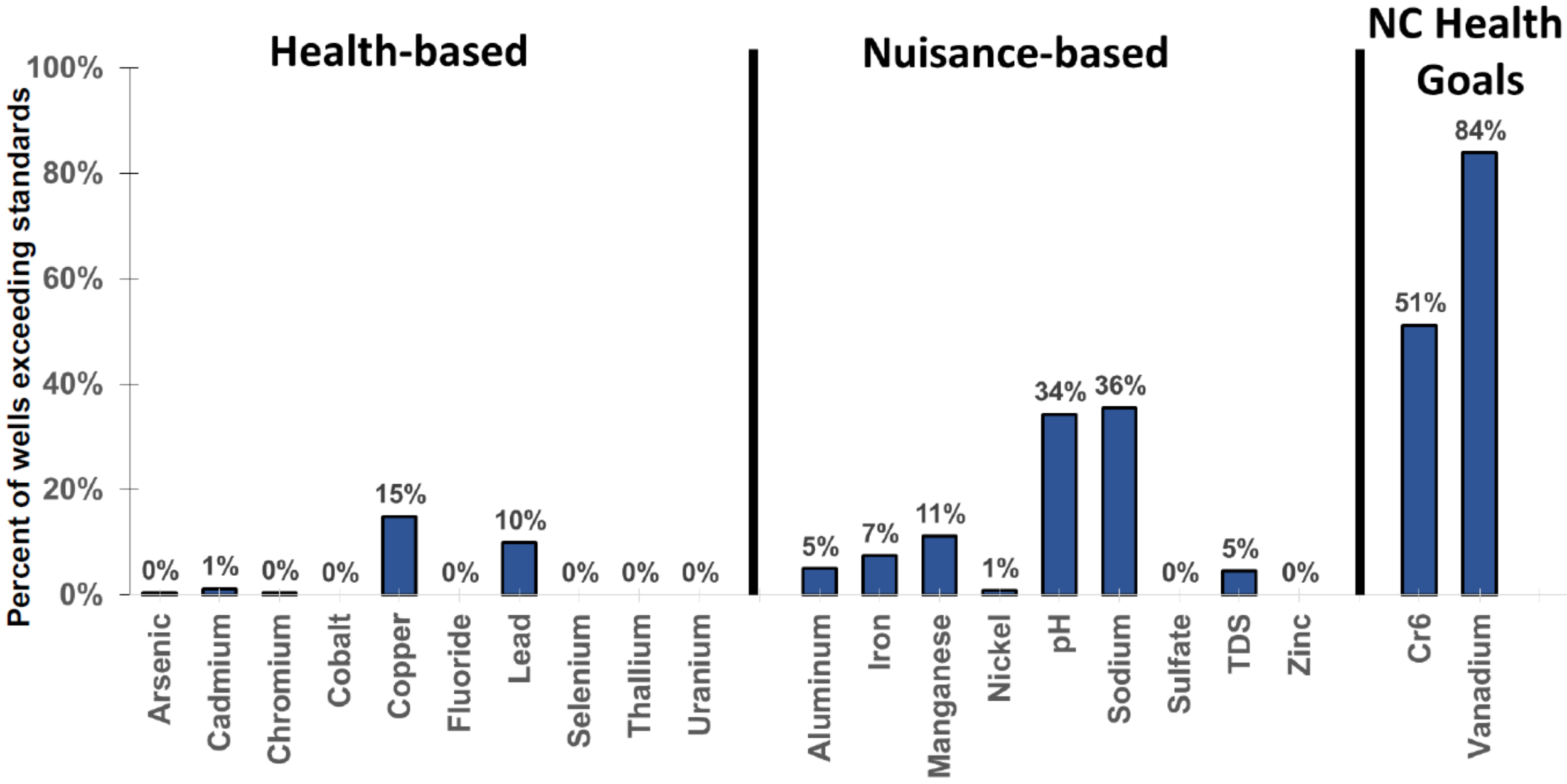
UNC | INSTITUTE FOR THE ENVIRONMENT

Virginia Tech
Invent the Future

726 water samples were collected from **242** residents

Chatham County Results



Total Chromium & Hexavalent Chromium (Cr6)

EPA

Total Chromium = 100 µg/L

Cr6 = No health based standards

NC

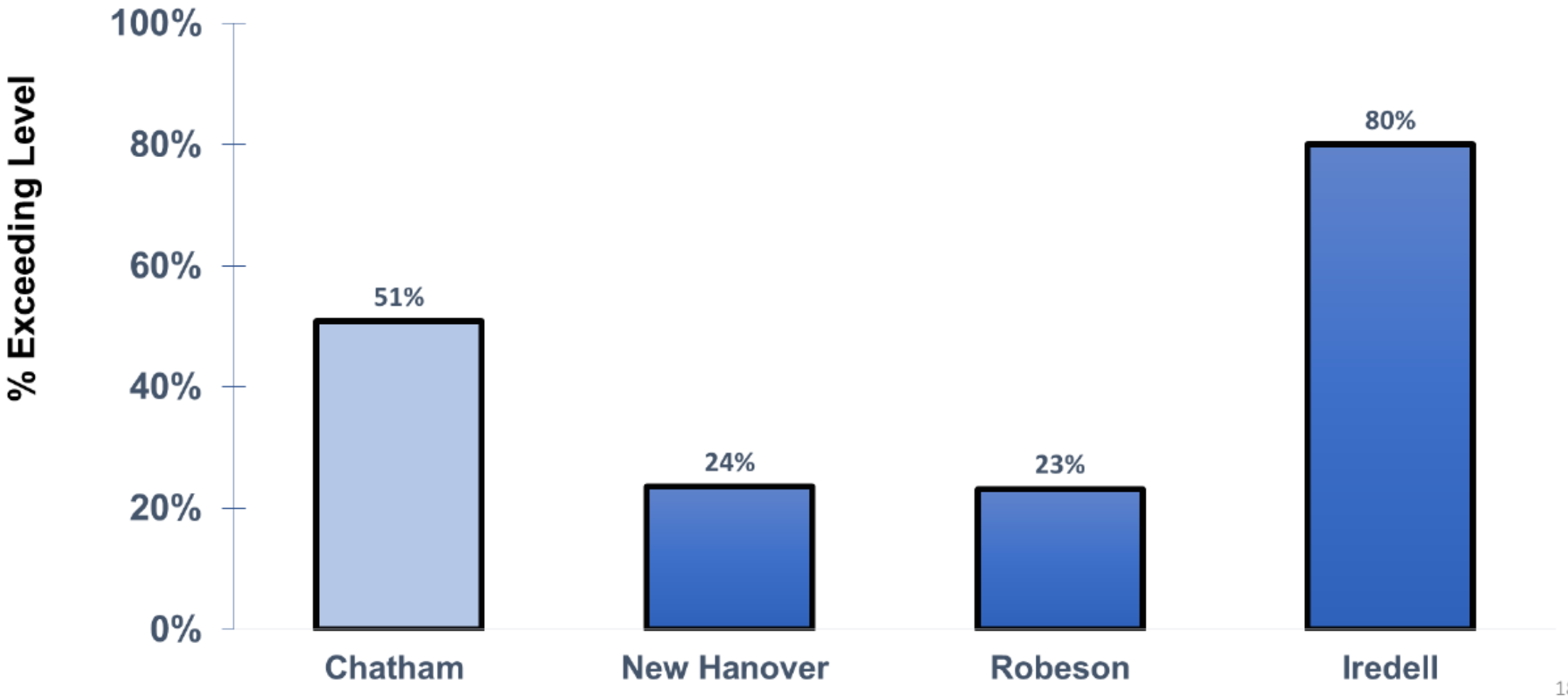
Total Chromium = 10 µg/L

Cr6 = No regulatory standards

NC

Cr6 Screening Level = 0.07 µg/L

Percent of wells with Cr6 above Health Screening Level (0.07 ppb)



Vanadium

EPA

No regulatory standard

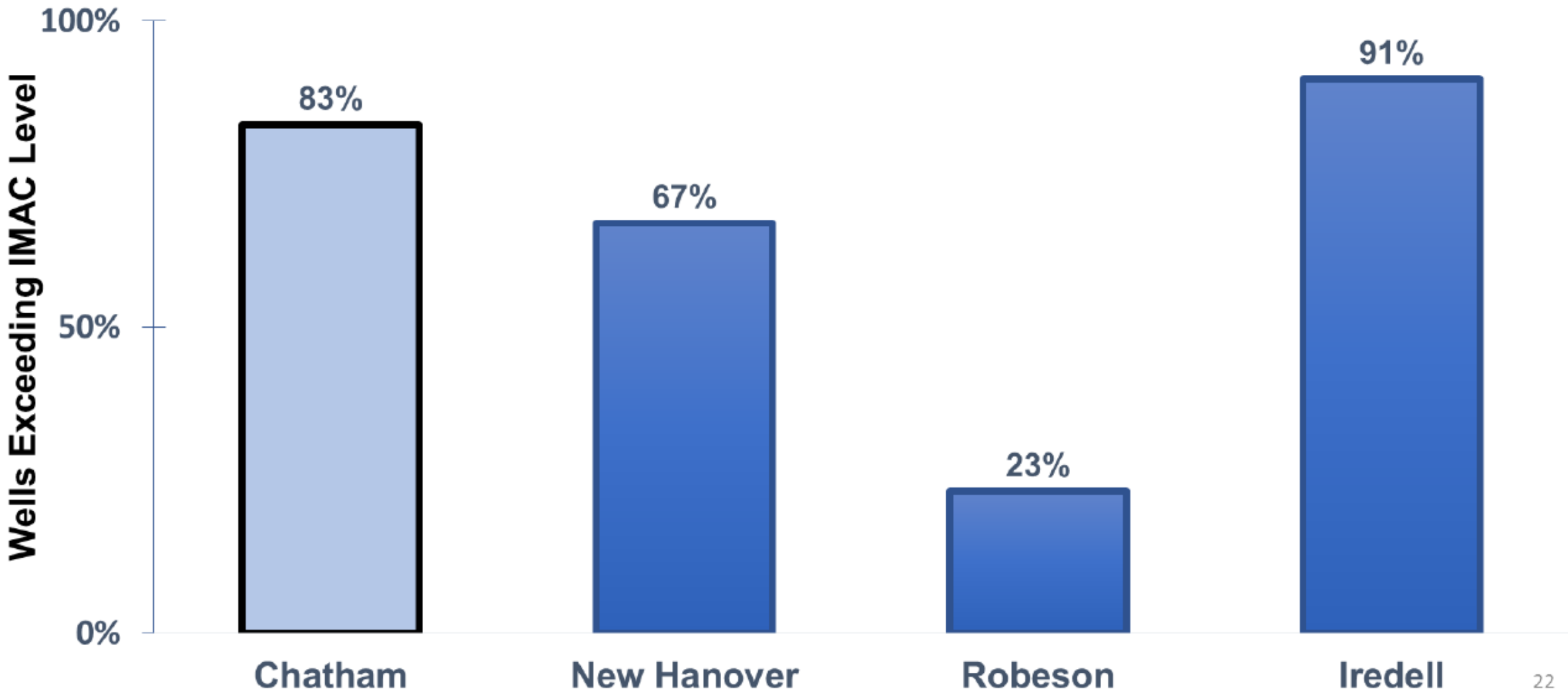
NC

No regulatory standard

NC

Interim Maximum Allowable Level = 0.3 µg/L

Percent of wells with Vanadium above State Limit (0.3 ppb)



Per- and Polyfluorinated Alkyl Substances (PFAS)

Resistant to:

- Water
- Stains
- UV radiation

Used in consumer products since the 1950s:

- Surfactants, lubricants, adhesives
- Carpet, upholstery, clothing
- Car interiors (e.g. Simoniz)
- Food packaging, nonstick cookware
- Cleaning products
- Personal care products
- Fire-fighting foam

Chemical Properties Lead to:

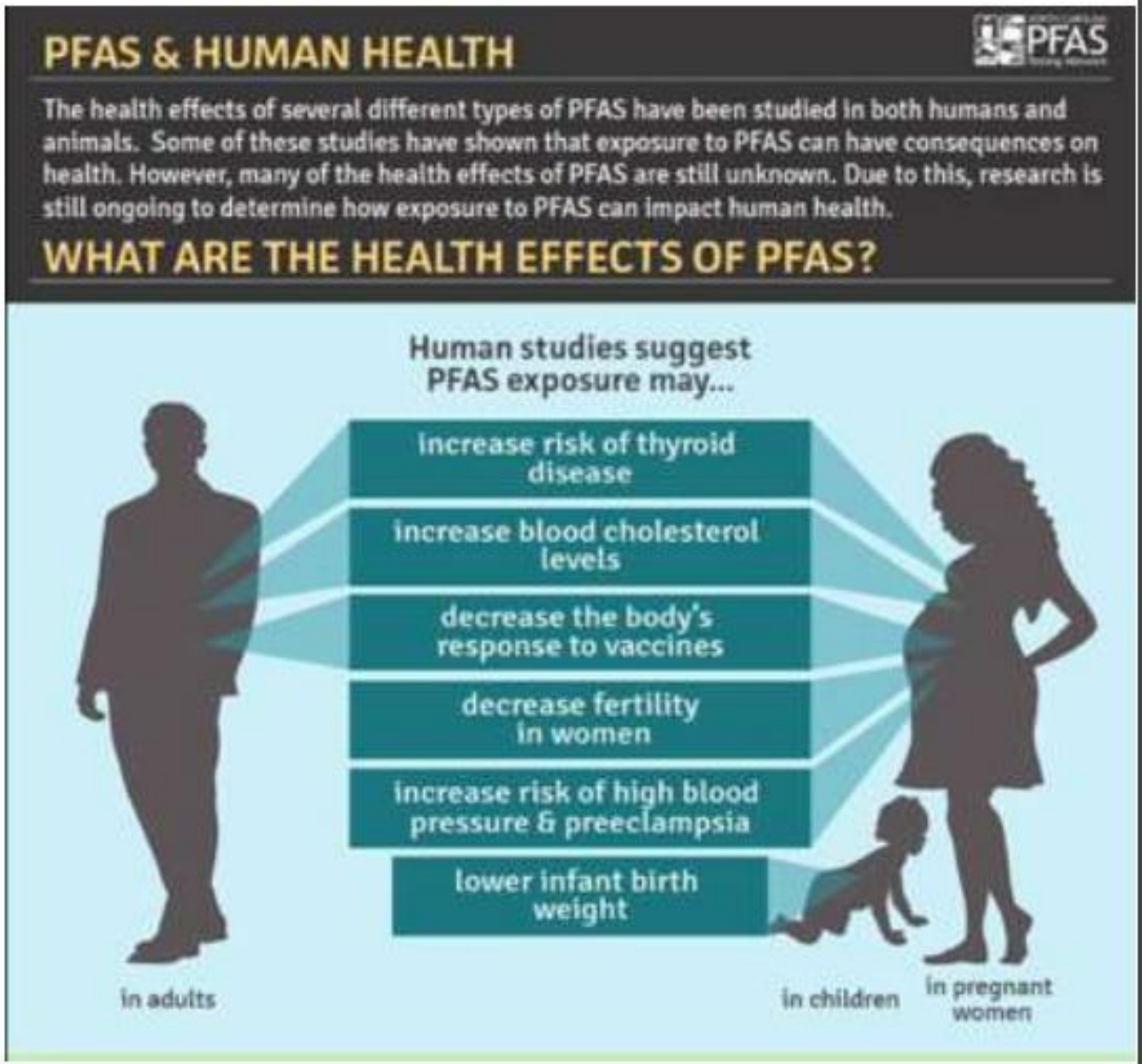
- Persistence and bioaccumulation
- Ubiquitous in indoor environment, blood, and serum (e.g. NHANES)
- Transport around globe in ocean currents and atmosphere

A Global Problem

Contamination Sites

EPA Tap Water Detection

Source: https://www.ewg.org/interactive-maps/2017_pfa/



PFAS AND DRINKING WATER: CHOOSING A FILTER

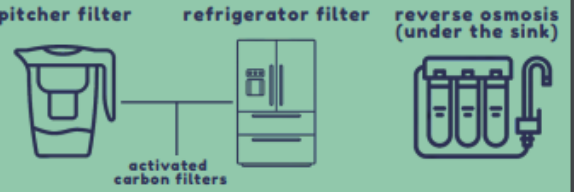
PFAS (per- and polyfluoroalkyl substances) are a group of persistent, industrial chemicals released into the environment through spills and waste products. Contaminated drinking water is one of the main ways people are exposed to PFAS.

Some PFAS can stay in people's bodies for a long time. Health effects of PFAS are not fully understood, but they have been linked to some cancers, high cholesterol, and developmental and reproductive health concerns.

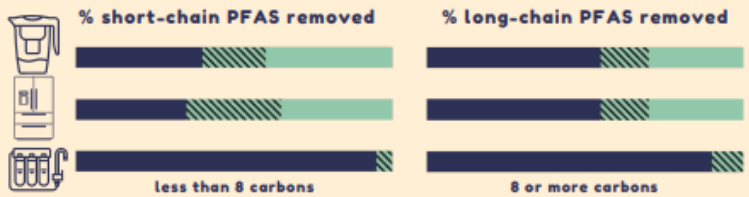
What you can do: Filter your drinking water

No filters will remove all PFAS from your water, but with regular maintenance, ANY filter will be better than no filter at all.

Contaminated drinking water poses the greatest exposure concern. Filtering water from kitchen taps and/or your refrigerator, and changing filters on the recommended schedule, can help reduce exposure.



Some filters perform better than others...



Filters are better at removing "long-chain" PFAS (larger compounds) than "short-chain" PFAS

Reverse osmosis performs better than activated carbon filters

% removed % left over

...but they cost more to buy and maintain

(approximate costs*)

Regular maintenance is important

The best way to limit PFAS exposure in your drinking water is by replacing filters and other parts using the schedule recommended by the manufacturer

Data Sources

Herkert, N., et al. 2019. Assessing the Effectiveness of Point-of-Use Residential Drinking Water Filters for Perfluoroalkyl Substances (PFAS). Environmental Science & Technology Letters, In review.

Knappe, D. 2018. "How do fluorochemicals get into our drinking water, and how can we get them out?" http://miscad.umich.edu/files/UMPFASWebinar_20180516_Knappe_HowDoFluorochemicals.pdf

* Cost assumptions: filter replacement every 6 months

Duke UNIVERSITY | SUPERFUND Research Center
early life exposures, later life consequences

NIH National Institute of Environmental Health Sciences
Superfund Research Program

NC STATE UNIVERSITY

Water filter images all from The Noun Project
Water pitcher - Ben Davis
Fridge - DAVIVONGSA PATHRPOL
Reverse Osmosis - testspark

For more information and/or treatment assistance, contact:

Kennedy Holt, MSPH

Chemical Risk Assessor at NC DHHS

Phone: 919-707-5910

Email: kennedy.holt@dhhs.nc.gov

Water Treatment

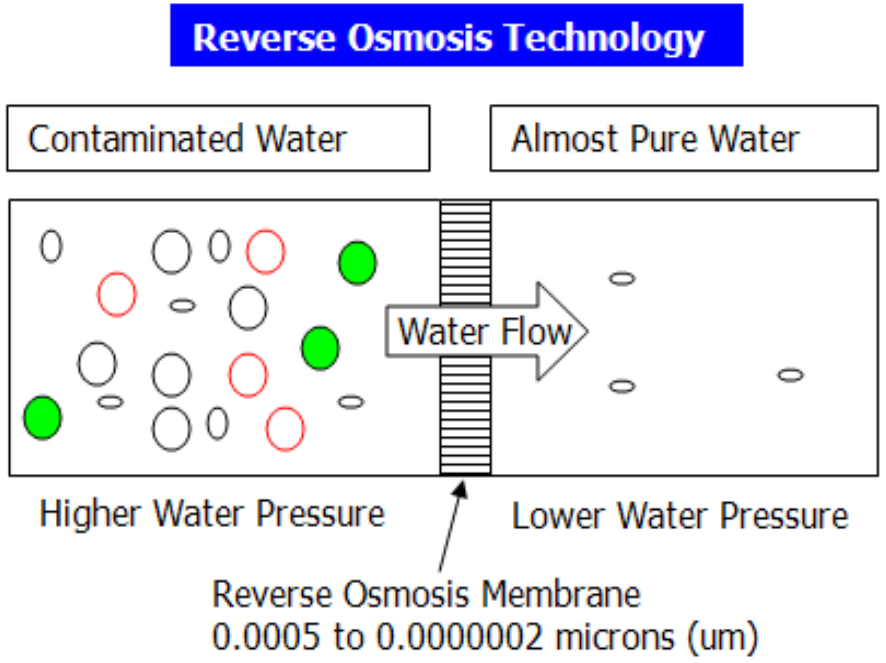
- Do Your Homework!
- Contact a minimum of 3 specialists/companies
- Provide water sample results
- www.nsf.org
- Test and certify drinking water treatment equipment

Ion Exchange

- Resins replace contaminates with ions such as sodium and potassium.
- Cost $600- $2,000+
- Treats Hard Water
- Removes: Dissolved Iron & Manganese.
- Some bad colors/tastes

Reverse Osmosis

- Microscopic openings in a membrane
- Cost: $200+ for under sink system
  $1000+ for whole house



Distillation

- Boil water into steam which is condensed back into water and collected in a purer form
- $250-$1,200+
- Removes Lead, Nitrate, Pesticides, other organic compounds

Questions?

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