North Carolina
Division of Water Resources
Ground Water Management Branch
2020 Annual Report

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C 16S, Merchants Millpond State Park, Gates County

TABLE OF CONTENTS

1.0 Introduction 1
2.0 Purpose and Scope 2
3.0 Background 2
4.0 DWR Statewide Monitoring Well Network Overview 3
4.1 ..... Description 3
4.2 ..... Monitoring 4
4.3 ..... Chloride Sampling 5
5.0 Well Network Statistics 6
5.1 ..... Ground Water Data Collection 6
5.2 ..... Chloride Sampling 6
5.3 ..... Well Installation and Development 8
5.4 ..... Well Maintenance 11
5.5 ..... Acquired Network Wells 11
5.6 ..... Automatic Water Level Recorders 12
5.7 ..... Site Surveys 12
6.0 Local Monitoring Well Network Information 13
6.1 ..... Orange County Monitoring Well Network 13
6.2 ..... Guilford County Monitoring Well Network 13
6.3 ..... Western Carolina Hydrological Research Station Cooperative Network 14
7.0 Planned Activities 15
7.1 ..... New Well Installation 15
7.2 ..... Well Abandonment/Station Removal 15
8.0 Water Quality 15
9.0 Central Coastal Plain Capacity Use Area 18
10.0 Summary and Conclusions 21

FIGURES

Figure 1 NCDWR-GWMB Monitoring Well Station Locations
Figure 2 NCDWR-GWMB Drought Indicator Well Network
Figure 3 Water Level Data Collected From 1967-2020
Figure 4 Chloride Levels in the Cretaceous Black Creek Aquifer
Figure 5 Chloride Levels in the Cretaceous Upper Cape Fear Aquifer
Figure 6 Chloride Levels in the Cretaceous Lower Cape Fear Aquifer
Figure 7 Orange Well Net Orange County
Figure 8 Monitoring Well Network Guilford County
Figure 9 Western Carolina Hydrological Research Station Jackson County

TABLES

Table 1 Site Susceptibility Rating
Table 2 Site and Recorder Distribution by Region as of 06/30/2020
Table 3 Solinst Telemetry System (STS) Distribution by Region as of 06/30/2020

TABLES (continued)

Table 4 Monitoring well Network Statistics (01/01/2005 through 06/30/2020)
Table 5 Well Construction Information for New Well Installation in the FY 2020
Table 6 Well Development Information for FY 2020
Table 7 Automatic Water Level Recorders as of 06/30/2020
Table 8 Orange Well Net Monitoring Well Information
Table 9 Orange Well Net Network Statistics
Table 10 Guilford County Monitoring Well Information
Table 11 Guilford County Monitoring Well Network Statistics
Table 12 Western Carolina Hydrological Research Station Monitoring Well Information
Table 13 Western Carolina Hydrological Research Station Network Statistics
Table 14 Network Expansions FY 2021
Table 15 Well Removal and Abandonment Information FY 2020
Table 16 Summary of Field Parameters FY 2020

APPENDICES

Appendix A Well Construction Records
Appendix B Ground Water Sampling Protocol
Appendix C Central Coastal Plain Capacity Use Area 2019 Water Withdrawal Summary Tables

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1.0 Introduction

The State of North Carolina (the State) relies on ground water for approximately 50 percent of its drinking (potable) water use. In addition, the State has thousands of agricultural and industrial ground water users. The North Carolina Department of Environmental Quality (DEQ), Division of Water Resources (DWR), and preceding agencies have operated, installed, and monitored a statewide monitoring well network from the 1960s to the present. The operation of this monitoring well network is an essential part of DWR's mission to ensure that the State has an adequate water supply for its citizens. Information collected quarterly from this well network include the following:

- Evaluating climatic influences on the State's ground water supply, including effects of drought and recharge-discharge relationships;
- Monitoring human-induced impacts on the State's ground water supply, particularly in the regional aquifer systems of the Coastal Plain physiographic province. These effects include local and regional water level declines as well as migration of the fresh water-salt water interface within various aquifers;
- Providing supporting data for enforcement and creation of current and future ground water usage regulations, such as the Central Coastal Plain Capacity Use Area rules;
- Periodic sampling of the monitoring well network to establish background levels for constituents (e.g. nitrates, etc.); and
- Providing high quality ground water data to local governments, ground water professionals, and the public to use in making informed decisions in ground water related issues.

Palmetto Swamp Station
P 22U, Craven County

Data collected from the network are available to the public through DWR's internet website https://www.ncwater.org/GWMB. These data include ground water levels, water quality

measurements, well construction information, borehole log construction (lithological and geophysical), ground water monitoring station locations, and geophysical/lithological data collection from non-DWR well sites.

2.0 Purpose and Scope

The 2020 Annual Report summarizes field activities and conclusions derived from activities performed or associated with the Ground Water Management Branch during the July 1, 2019 through June 30, 2020 fiscal year (FY 2020). These activities include the ground water monitoring well network water level and water quality data statistics, monitoring well installations, including new installations and acquired wells, monitoring equipment usage and evaluations, site surveys, local monitoring well network information, and a summary of the Central Coastal Plain Capacity Use Area FY 2020 activities.

3.0 Background

DWR and its predecessor agencies have operated the statewide Ground Water Resource Monitoring Program from the 1960s to the present. The active monitoring well network has expanded by approximately forty-five percent (309 monitoring wells) by either installation or acquisition of new monitoring wells since 1998.

The U.S. Geological Survey (USGS) has also contributed to the monitoring of the State's ground water resources under a cooperative agreement between the State of North Carolina and the Federal government. The USGS cooperative well network consists of 13 monitoring wells, seven of which are also part of the DWR statewide network.

Three local cooperative networks whose water level data are currently being uploaded to the DWR database and contribute to both the

Boardman Station
AA 43Q, Robeson County

Cedar Creek Fire Tower Station
U 40Y, Cumberland County

St John Station
E 21S, Hertford County

Cove City Station
R 23X, Craven County

statewide monitoring well network and the drought network are the Orange Well Network (OWN) in Orange County, the Guilford County network, and the Western Carolina Hydrological Research Station (WCHRS) in Jackson County. The water level data can be viewed by the public on the DWR website https://www.ncwater.org/GWMB.

4.0 DWR Statewide Monitoring Well Network Overview

4.1 Description

The monitoring well network currently consists of 687 wells at 229 monitoring stations (sites), divided into six regions, comprising 67 counties (Figure 1). There are 52 wells located in the Piedmont and Mountain physiographic provinces (Piedmont and Mountain) and 635 wells located in the Coastal Plain physiographic province (Coastal Plain). The Coastal Plain relies more heavily on ground water supplies than either the Piedmont or Mountains. Consequently, ground water monitoring and research have been more concentrated in the Coastal Plain.

In the past few years, more resources have been invested in monitoring the Piedmont and Mountain ground water conditions to better understand the impact of drought cycles on ground

water supplies and their contribution to surface water flow. There are 49 DWR wells within the monitoring well network used to assess drought conditions in the FY 2020 (Figure 2).

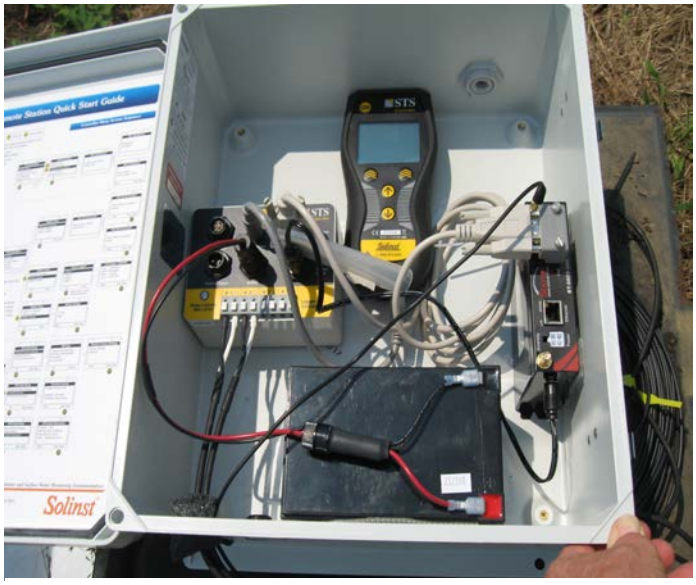
Of the 229 monitoring stations, 85 are on State or Federal property, 59 are located on property owned by local governments, 81 are located on private property through agreements with landowners, and 4 stations are located on properties where the landowner indicates that the land property ownership may change. In the past, some wells have been abandoned at the landowner's request due to changes in land use or ownership. Due to the high cost of well construction, combined with the fact that the wells are most valuable when they are monitored continuously over a period of decades, every attempt is made to put new stations in secure, stable locations. A scale has been developed to rank new and existing well sites for potential well abandonment due to land-use issues in the future (Table 1). It is preferred that new wells be installed at sites with a susceptibility rating of 1 or 2.

Video Camera, Stillwell Building, Q94J, Jackson County

4.2 Monitoring

The statewide monitoring network is divided into six regions (Figure 1). One staff member is responsible for each region. Staff member responsibilities include visiting the wells quarterly to collect water level data, collecting data from drought wells monthly if needed, performing routine site maintenance, keeping automatic data recorders in working order, and keeping sites accessible and aesthetically pleasing. Additional site activities (i.e. recorder removal/replacement, site maintenance, video-logging, etc.) are conducted on an as needed basis.

Depth to ground water level measurements are collected from the network in two different ways. Manual water levels are measured using electronic water level indicators. Hourly water level



STS Equipment
Lewiston Station, H 22I, Bertie County

measurements are collected using unvented pressure transducers. Hourly water level data are extremely valuable in assessing aquifer recharge, impacts of large storms on ground water conditions, and delineation of aquifer boundaries. Manual water level readings and daily automatic recorder water level data are typically published on the DWR website. However, hourly data is available upon request for specific wells. Table 2 summarizes site and recorder distribution by region.

STS Equipment,
Wilkesboro Station. G 69J
Wilkes County

In addition to the recorders mentioned above, Solinst Telemetry System (STS) recording units have been installed in sixteen wells that are included in the Drought Indicator Well network. They consist of one pressure transducer, one barometer (corrects for air pressure), and are powered by a twelve-volt battery. Data is collected by a controller unit that stores hourly readings. The readings are sent to the home station (DWR web page server) every reporting interval (currently 3 hours) via a cell phone modem. DWR uses the STS system on the Drought Indicator Well network to take the place of monthly visits. They are serviced every quarter or semi-annually depending on battery life. The STS data is especially helpful in keeping the Drought Indicator well water levels up to date (https://www.ncwater.org/?page=345). Table 3 summarizes STS system information.

Hobo Datalogger
Bear Grass Station, K 21R
Martin County

4.3 Chloride Sampling

Chloride samples were collected from select wells in the Coastal Plain during the FY 2020. The samples were analyzed using the Quantab® field method. Field results were used to monitor the migration of the fresh water-salt water interfaces in the Coastal Plain aquifers.

Additional chloride samples are collected for field analyses when new monitoring wells are installed and as needed for special projects. The next chloride sampling event will occur in September-October 2021 to track salt water encroachment conditions. Section 5.2 summarizes the FY 2020 chloride sampling event.

Depth to Water Level Measurement
Dublin Station, Y 40G
Bladen County

5.0 Well Network Statistics

5.1 Ground Water Data Collection

Depth to ground water was measured in 700 wells in the FY 2020. Table 4 contains DWR monitoring well network statistics from January 1, 2005 through June 30, 2020. Statistics may vary in comparison to previous years due to additional data entry in the DWR database as older field books are scanned and unrecorded data entered. Figure 3 compares the number of wells monitored to the water level data collected from the network from 1967 to present. Hourly water level data is not included in this graph. Calendar year 2019 represents the most water level data collected in any single year since starting the monitoring well network operation. The FY 2020 data was collected from January 1 through June 30, 2020.

Archived water level recorder charts obtained from DWR and its predecessor agencies, with records dating from the 1960s through 1980s, continue to be digitized and data recorded into the DWR online database. Additional digitized information recorded in the database includes, but is not limited to, well construction records, well development information, chloride sampling events, memorandums of agreement, and field notes.

Chloride Sampling, Cove City Station, R 23X, Craven County

5.2 Chloride Sampling

In 2019, a chloride sampling event was conducted at 413 DWR monitoring wells. Samples were collected from September 18, 2019 through October 25, 2019,

except for one site, Four Mile Desert, which was sampled on November 20, 2019. During the event, ground water was analyzed using Quantab® chloride test strips, and conductivity, salinity, and pH were measured using YSI® portable probes.

The purpose of chloride sampling is to monitor salinity levels and trends at the fresh water-salt water interface within each of the major coastal plain aquifers. Salinity levels and the location of the interface can change as a result of sea level rise, storm surges during hurricanes, ground water pumping, and mine dewatering. Chloride levels are used to determine if ground water is fresh (< 250 ppm chloride) or salty (≥ 250 ppm chloride). Chloride sampling is also used to identify the transition zone between the fresh and salty zones. This transition zone is characterized by a vertical salinity gradient within the aquifer in which salinity increases with depth, from fresh to salty. Salinity zones and chloride results for three of the state's major aquifers, the Black Creek and the Upper and Lower Cape Fear, are summarized in Figures 4, 5, and 6, respectively.

Figure 4 shows sample results from selected Black Creek aquifer wells sampled in 2019. Increasing chloride trends continued at Lee Creek and Aurora II, both of which are located near open-pit mines where large-scale dewatering is occurring. Increasing chloride was also observed at Long Creek. Chloride continues to decrease at Folkstone as a result of regional water level rebound attributed to reductions in Cretaceous aquifer pumping in accordance with CCPCUA mandates. A chloride decline was also seen at Holly Shelter, however, this likely is the result of fresh water entering the well during flooding of the Northeast Cape Fear River. During the 2019 sampling event, a total of 45 Black Creek wells were sampled. Of these, 8 wells showed chloride increases from the previous sampling event in 2017 and 9 wells had chloride levels exceeding 250 mg/l.

Figure 5 shows sample results from selected Upper Cape Fear aquifer wells sampled in 2019. In the northeastern part of the state, chloride levels continued to decrease at Moyock, Morgans Corner, Windsor well H 20T3, Gold Point, Bear Grass, Old Sparta, and North Pitt High School. These reductions are potentially attributable to CCPCUA pumping reductions. Chloride levels at Windsor well H 20T4, Clarks, West Research Campus, La Grange and Comfort increased by up to 167 mg/l since the 2017 sampling event. Holly Shelter showed a dramatic decrease in chloride, however as in the Black Creek well, this is attributed to inundation during flooding. In DWR's other Upper Cape Fear wells, chloride was either below 250 mg/l or not detected. During the 2019 sampling event, a total of 52 Upper Cape Fear wells were sampled. Of these, 5 wells showed chloride increases from the previous sampling event in 2017 and 11 wells had chloride levels exceeding 250 mg/l.

Figure 6 shows sample results from selected Lower Cape Fear aquifer wells sampled in 2019. With the exception of Morgans Corner, chloride levels in the northern coastal plain aquifer remained the same or decreased since the 2017 sampling event. The increase at Morgans Corner of 291 mg/l was unexpected since chloride levels had been decreasing since 2010. Within the central and southern coastal plain, chloride increased at North Pitt High School, Falkland and West Research Campus by up to 106 mg/l since the 2017 sampling event. South of West Research Campus, chloride levels decreased below 2017 levels in all wells except Kelly, which showed a chloride increase of 95 mg/l. The chloride decrease of over 4,000 mg/l at Jones

Middle School is attributed to fresh water entering the well during flooding. During the 2019 sampling event, a total of 27 Lower Cape Fear wells were sampled. Of these, 5 wells showed chloride increases from the previous sampling event in 2017 and 12 wells had chloride levels exceeding 250 mg/l.

Additional information on chlorides is available from the Ground Water Management Branch map interface and water quality data page at https://www.ncwater.org/?page=20.

5.3 Well Installation and Development

From June 2019 through September 2019 the following monitoring wells were installed using the mud rotary drilling method:

- Merchants Millpond State Park Monitoring Station, Gates County, six wells installed (C 16S1, C 16S2, C 16S3, C 16S4, C 16S5, C 16S6); this station was mentioned in the 2019 Annual Report, but was not completed until FY 2020 so it is fully documented in this report.

From July 2019 through October 2019, three new stations were installed at Camp LeJeune, Onslow County. In addition, one new well was installed at the existing Paradise Point Station and one well was installed at the existing Montford Point Station. All wells

Drilling (above)
Constructed Mudpit (below)
Chinquapin Elementary School Station, W 29D
Duplin County

in each station were installed using mud rotary drilling. The wells were installed on behalf of Camp LeJeune in a joint effort with the Onslow Water Resources Group, the primary organization. Once the wells were installed, they were added to the statewide monitoring well network. These stations include:

- Verona Loop Monitoring Station, four wells installed (X 25W1, X 25W2, X 25W3, X 25W4)
- Marines Road Monitoring Station, five wells installed (Y 24T1, Y 24T2, Y 24T3, Y 24T3, Y 24T5)
- Hwy 172, four wells Installed (Z 23C1, Z 23C2, Z 23C3, Z 23C4
- Paradise Point, one well installed (X 24G3)
- Montford Point, one well installed (X 24E3)

Geophysical Logging Equipment
Chinquapin Elementary School Station
W 29D, Duplin County

From April 2020 through June 2020, the following monitoring wells were installed using the mud rotary drilling method:

- Chinquapin Elementary School Monitoring Station, Duplin County, six wells (W 29D10, W 29D11, W 29D12, W 29D13, W 29D14, W 29D15).

A pilot hole was previously advanced at the newly installed Merchants Millpond State Park by Toano Well and Pump Service, Inc. from Toano, Virginia. A pilot hole was previously advanced at the newly installed Chinquapin Elementary School Station by AC Schultes of North Carolina from Rocky Point, NC. Both pilot holes were installed using the mud rotary drilling method. The boreholes were used to construct monitoring wells C 16S1, C 16S6, and W 29D10. DWR staff collected samples of the drill cuttings at ten-foot intervals in order to assess the borehole lithology. In addition, a borehole geophysical log was obtained by lowering a probe

Describing Sample Cuttings
Merchants Millpond State Park
C 16S, Gates County

into the borehole once the borehole was completed. The geophysical log makes a detailed record of the geologic formations in the borehole. Geophysical and lithologic log interpretation enabled the DWR staff to identify aquifers and confining units and optimize screen intervals. The wells were installed using 4-inch PVC riser and 10 to 20 feet of 4 to 4.5-inch stainless steel continuous wire wrap V-slot screen. The wells were constructed of a gravel pack extending from the bottom of the screen to a minimum of five feet, but no more than ten feet, above the screen. A minimum of ten feet of bentonite overlays the top of the gravel pack to provide a sufficient bentonite seal in the well. Table 5 summarizes the monitoring well construction information. The FY 2020 completed monitoring station wells are included in Figure 1. Well construction records for the FY 2020 completed wells are included in Appendix A.

Development removes fine-grained sediments from the vicinity of the well screen and ensures proper hydraulic connection with the aquifer. During development, field data were collected for pH, conductivity, salinity, and temperature in thirty minute or hourly intervals. Field data exhibiting overall consistency was used to assist in the decision to stop well development. DWR staff developed the Merchants Millpond State Park monitoring well station in the FY 2020 (Table 6).

Sample Cuttings
Chinquapin Elementary School Station
W 29D, Gates County

Well Development
Chinquapin Elementary School Station
W 29D, Gates County

5.4 Well Maintenance

The well network requires continual maintenance to keep active monitoring stations usable. Many of the wells exceed 30 years in age and are constructed of materials that are susceptible to corrosion, especially in acidic or saline ground water conditions. Some older wells were constructed with outdated, less than desirable construction practices including backfilling boreholes with cuttings instead of neat cement or bentonite grout. Boreholes backfilled with cuttings form an inadequate seal and allow other aquifers to influence the water level and water quality in that well. Another outdated practice included well construction using telescoped casing. Telescoped casing uses a reducer to trim the well to a smaller diameter casing at depth apparently to save money during well construction. Telescoped wells are very susceptible to blockage at the depth of the reducer. Approximately 152 wells in the network were constructed with reducers. DWR has implemented a long-term program for replacing damaged or unsuitably constructed wells with new, properly constructed wells.

Well Development
Merchants Millpond State Park, C16S, Gates

5.5 Acquired Network Wells

DWR acquired two existing wells, Bean Shoals Well, E 61P1, Pilot Mountain State Park, Surry County, and Ivy Bluffs Well, E 62U1, Pilot Mountain State Park, Yadkin County, during the FY2020.

Pump Removal
Ivy Bluffs Access Station, E 62U, Yadkin County

Details of the monitoring station are included in Table 5.

5.6 Automatic Water Level Recorders

Automatic water level recorders play an integral role in the DWR monitoring program. Hourly water level measurements are collected using unvented submersible pressure transducers. They allow for economical collection of near-continuous data at remote well stations. Two primary recorders (Onset Computer's Hobo U20 series and Solinst Telemetry System or STS) were utilized in the FY 2020 and are included in Table 2. Table 7 lists the recorders present on network wells as of June 30, 2020.

5.7 Site Surveys

Concrete survey monuments have been installed at each of the 229 active monitoring well stations within the network. Five of those stations have more than one monument.

Each of the installed monuments have been surveyed using Survey Grade Global Positioning System (GPS) to calculate the most accurate horizontal and vertical location data possible. DWR was unable to get elevations at two monitoring stations, Beach Grove School Field Well (M93L) and Woody Creek (M93R), due to the inability to acquire a cell phone signal at the station's location. GPS surveying will be conducted again in the winter/spring of the FY 2021 to provide horizontal and vertical data on any newly installed and acquired monitoring well stations, as well as a select number of sites to obtain additional measurements.

Monument Installation
Smokemont Campground G1 Station, N 95G
Great Smoky Mountain National Park,
Swain County

Leveling, Four Mile Desert, E 13M
Perquimans County

6.0 Local Monitoring Well Network Information

6.1 Orange County Monitoring Well Cooperative Network

The creation of the Orange County Ground Water Observation Well Network, Orange Well Net (OWN), was proposed in May 2005. It was decided to utilize existing bedrock wells in lieu of installing new wells for monetary reasons. In March 2010, the OWN included six inactive bedrock wells for ground water data collection. In 2011, three regolith wells were added to the OWN as a result of a cooperative arrangement. In 2012, two bedrock wells, the Ray Road and Rocky Ridge wells were removed from the network and replaced with two bedrock wells, well 4D in Duke Forest and a well at the former Orange County 911 Center. The wells that were most recently added to the network are the Brumley East well, as the result of an agreement with the Triangle Land Conservancy, and the Duke Forest 4S and 4I wells, with the agreement (informal) of DWR and Duke Forest. Table 8 summarizes the OWN well information. Figure 7 is a map of the OWN well locations.

Ground water data is collected periodically from the OWN. This data is collected to assess ground water availability and concerns locally in Orange County. The data is formatted and uploaded to the DWR ground water database and is available to the public. Table 9 is a summary of the OWN statistics from March 2010 through June 30, 2020. The 2011, 2012, and 2013 OWN Annual Reports are available on the DWR website. Wesley Poole (Water Resources Coordinator for the Orange County Department of Environment, Agriculture, Parks and Recreation), the OWN Annual Reports, and information provided by the DWR database, are the sources for the Orange County Monitoring Well Network information provided herein.

6.2 Guilford County Monitoring Well Cooperative Network

The Guilford County ground water monitoring network was established in 2002 and includes eight monitoring well stations located on public properties owned by Guilford County or the City of Greensboro. Each well site was selected to represent an area of the county and to minimize the influence of any existing water supply wells nearby. Table 10 summarizes the Guilford County monitoring well information. In addition, NC A&T State University uses the Knox Road Station for their hydrology class and the students use the data from this station for their course project.

Water levels are collected manually on the same day of each month. Hourly data is collected using Global Water WL16 submersible transducers and are downloaded at the time of manual collection of depth to ground water levels. The data is formatted and uploaded to the DWR ground water database and is available to the public.

Table 11 summarizes the Guilford County monitoring well statistics from 2008 through June 30, 2020. Figure 8 is a site map of the Guilford County monitoring well locations. Gene Mao (Guilford County Department of Health and Human Services, Division of Environmental Health, Health, Environment, & Risk Assessment Unit), and information obtained from the DWR database, are the sources for the Guilford County Monitoring Well Network information provided herein.

6.3 Western Carolina Hydrological Research Station Cooperative Network

The Western Carolina Hydrological Research Station, (WCHRS), was established in 2010 in a partnership between Western Carolina University (WCU) and DEQ. The WCHRS is comprised of approximately 40 monitoring wells and is located within the Cullowhee Creek watershed. It was decided in 2017 that the WCHRS cooperative well network would be comprised of seventeen of these wells, including two wells acquired by DWR, Stillwell Building Station (Q 94J1) and the CC Old Well Station (Q 94I1), both active wells in the statewide monitoring well network. According to the WCU description of the WCHRS located in the DWR database, "the well network was designed to study ground water interaction with streams in a headwaters region typical of the southern Appalachians. Most ground water levels are measured weekly by student researchers at WCU. A few wells have computer sensors so water level data are collected continuously at 15-minute intervals."

Table 12 summarizes the WCHRS cooperative network well information. Figure 9 is a map of the WCHRS cooperative network well locations.

Ground water data is collected periodically from the WCHRS. Data from select wells are formatted and uploaded to the DWR ground water database and is available to the public. Table 13 is a summary of the WCHRS statistics from 2011 through June 30, 2019. Mark Lord and David Kinner, Professors of Geology with the Department of Geosciences and Natural Resources, WCU in Cullowhee, NC, the wcu.edu website, and information provided by the DWR database are the sources for the WCHRS information provided herein.

Grifton Station, P 24O, Pitt County

7.0 Planned Activities

7.1 New Well Installation

Monitoring well network expansion efforts for the FY 2021 will focus mainly on Sampson, Chowan, Currituck, Edgecombe and Robeson counties. Table 14 summarizes the potential upcoming expansion of the network in FY 2021.

7.2 Well Abandonment/Station Removal

Some wells throughout the network that cannot be used due to bad construction, screening in multiple aquifers, unsafe location, owner decision to no longer allow access, etc., may be abandoned during the FY 2021.

Five stations, Town Creek (DD 33Y), Fuquay Varina (N 41G3), Savannah School (P 26U), Lonnie Kelley (S 26B), and Farmville (M 27U) were removed from the active monitoring well network during the 2020 FY. The original Chinquapin Station was abandoned. Table 15 summarizes which wells were moved to inactive status or abandoned with an explanation as to why.

8.0 Water Quality

Since 2015 the Ground Water Management Branch has supported Tasks 5 & 6 of the North Carolina FY 2016 Workplan for the Clean Water Act Section 106 Groundwater Grant (EPA).

Task 5 - Characterize the State's Ground Water Resources, and Task 6 - Groundwater Monitoring Program

**Sample Collection (above),
Preserving Samples (Below)
Long Creek Station, AA32R, Pender County**

**Packing Samples on Ice for Delivery
Long Creek, AA 32R, Pender County**

The Division of Water Resources conducts an active program of ground water monitoring that advances the DWR mission by improving DWR's knowledge in the following areas:

1 Impacts of land-applied wastes, artificial infiltration practices, or other human activities, including:
- Potential impacts of these activities on the surficial aquifer and the secondary impacts to the deeper aquifers or surface waters;
- The occurrence of "emerging contaminants" related to these activities; and
- Effectiveness of regulations and permits for these activities.

2 Threats to ground water quality, including:
- The existence, nature, and scope of emerging or existing threats;
- Assessment of the causes and factors affecting naturally-occurring contamination, agricultural contamination, or contamination resulting from activities permitted by DWR; and
- Tracking the status of ground water quality across the state.

The goal of all characterization, monitoring, and investigation efforts is to improve DWR's understanding of the causes and extent of problems, to minimize human exposure to contaminants, and identify areas where regulations or best management practices can be improved to prevent contamination from occurring.

The state has an extensive network of ground water monitoring stations which can be utilized as an ambient ground water monitoring network. Prior to December 2015, the Piedmont-Mountain Resource Evaluation Program sampled wells annually from a well network installed and constructed for characterizing the relationship of water quality to underlying geology in the Piedmont and Mountain physiographic provinces. Less water quality monitoring occurred in the Coastal Plain in the last two decades.

The Ground Water Management Branch intends to collect samples from each active well in the statewide monitoring well network. In the FY 2020, samples were collected from 25 monitoring stations. The samples were analyzed for the following parameters:

- Standard private well parameters – arsenic (As), barium (Ba), cadmium (Cd), chromium (Cr), copper (Cu), fluoride (Fl), lead, (Pb) iron (Fe), magnesium (Mg), mercury (Hg), nitrates (NO_3), selenium (Se), silver (Ag), sodium (Na), zinc (Zn), pH, and bacterial indicators;
- Ammonium (NH_4), total Kjeldahl nitrogen (TKN), organic nitrogen, and phosphate (PO_4);
- Volatile organic compounds (VOCs), and pesticides (also consult with area agricultural experts on local practices);
- Major ions (Na, calcium (Ca), potassium (K), manganese (Mn), sulfate (SO_4), (carbon trioxide (CO_3), bicarbonate (HCO_3) and chlorides (Cl);
- Per- and polyfluoroalkyl substances (PFAS);
- Metals
  - Dissolved (filtered in field) (geochemistry applications require dissolved metals)

- Total (drinking water standards are based on total metals)
- Cu and Zn, (in both swine permits and the standard private well suite)
- Coal ash metals – this would incur only minor additional costs yet would increase our knowledge of naturally occurring contaminants of interest to the coal ash program.
    - Note, at this time chromium analysis performed by the DWR lab is not sufficiently precise enough to satisfy coal ash program needs. Analysis for hexavalent chromium would need to be sent to a private lab at some cost.
    - Note, at this time the DWR lab analyzes for total vanadium. The 2L standard for vanadium (V) is under review and will probably be based on particular species of V, not total V.

- Field parameters
    - Specific conductivity, pH, dissolved oxygen (DO), temperature (˚C), oxidation-reduction potential (ORP)

In addition to the referenced ground water sampling events, five ground water stations in New Hanover County were sampled specifically for per-and polyfluoroalkyl substances (PFAS), a group of man-made chemicals that includes perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), GenX and others. The wells were sampled using a high-

Water Quality Sampling Site
Long Creek, AA 32R, Pender County

density polyethylene (HDPE) Super/Skinny Sleeve. By using this method, a grab sample of ground water is collected from the screened interval (or any interval of interest) of the well with minimal disturbance and effort, thus eliminating the need for purging three well volumes.

Ground water sampling protocol is included in Appendix B. Field data information for the 2020 FY are included in Table 16. Laboratory analytical results received for the 2020 FY are available upon request. In the 2021 FY, ground water samples will continue to be collected from wells in the monitoring well network and analyzed for the parameters referenced above. Analytical data is now available to the public using the GWMB webpages.

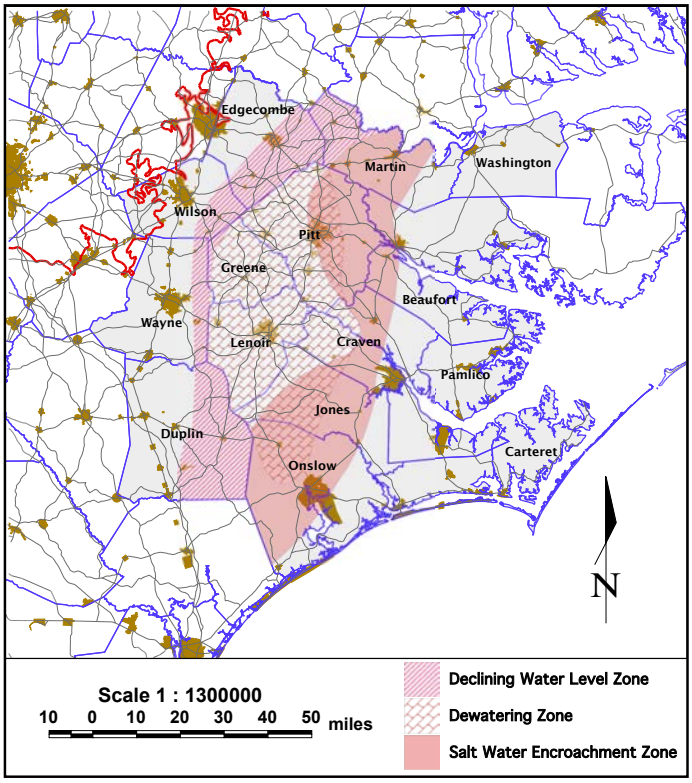
9.0 Central Coastal Plain Capacity Use Area

The Central Coastal Plain Capacity Use Area (CCPCUA) is a 15-county region in the coastal plain that is an example of a water overuse situation. On August 1, 2002, the CCPCUA rules came into effect because of significant ground water depletion problems. As stated in 15A NCAC 2E .0501, "the intent of this Section [the CCPCUA rules] is to protect the long term productivity of aquifers within the designated area and to allow the use of ground water for beneficial uses at rates which do not exceed the recharge rate of the aquifers…" For many years, water was withdrawn from the deep confined aquifers, which are a primary source of water in the CCPCUA, at a rate that was greater than they were naturally recharged. If this situation had been allowed to continue indefinitely, the aquifers could have been permanently damaged, impairing their ability to function as a water supply.

The goal of the DWR is to regulate water withdrawals in the Central Coastal Plain (CCP) under the authority of the Environmental Management Commission (EMC). The following summarizes how these withdrawals are regulated:

- Water withdrawal permits are required for ground water users who withdraw greater than 100,000 gallons of water per day;
- Annual registration and reporting of withdrawals is required for surface and ground water withdrawals greater than 10,000 gallons per day;
- Counties included in the CCPCUA are Beaufort, Carteret, Craven, Duplin, Edgecombe, Greene, Jones,

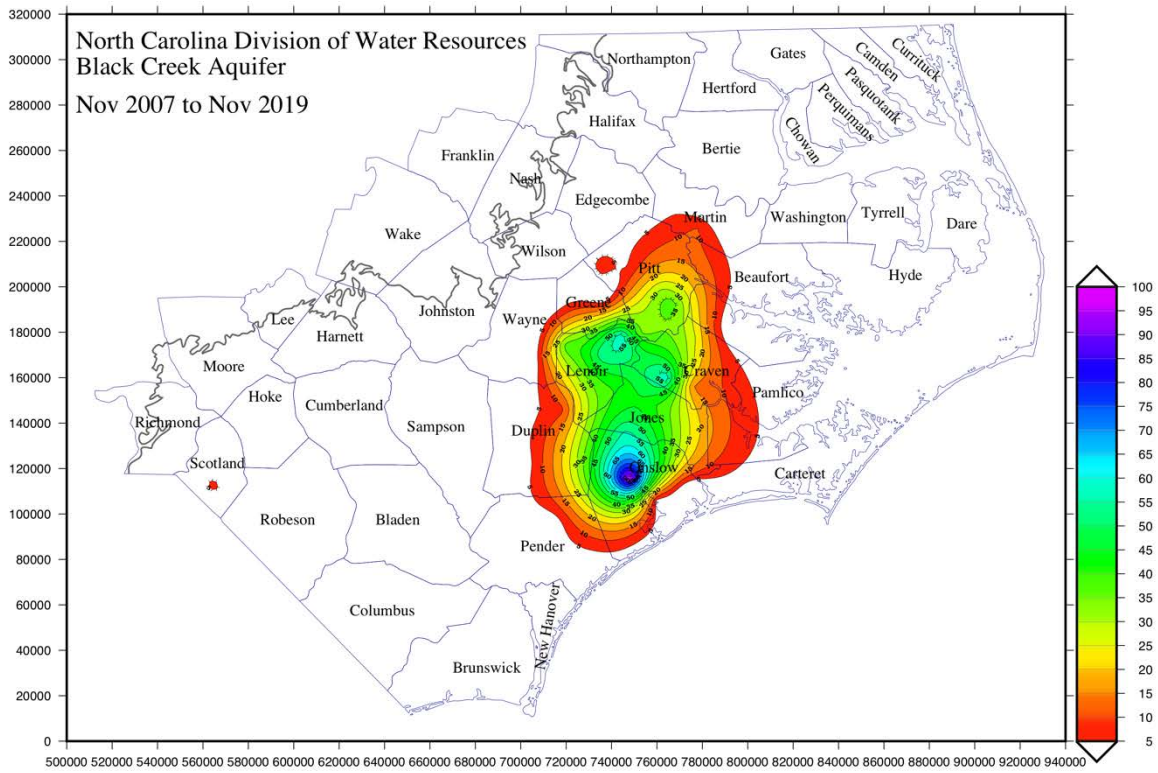
CCPCUA Cretaceous Aquifer Zones



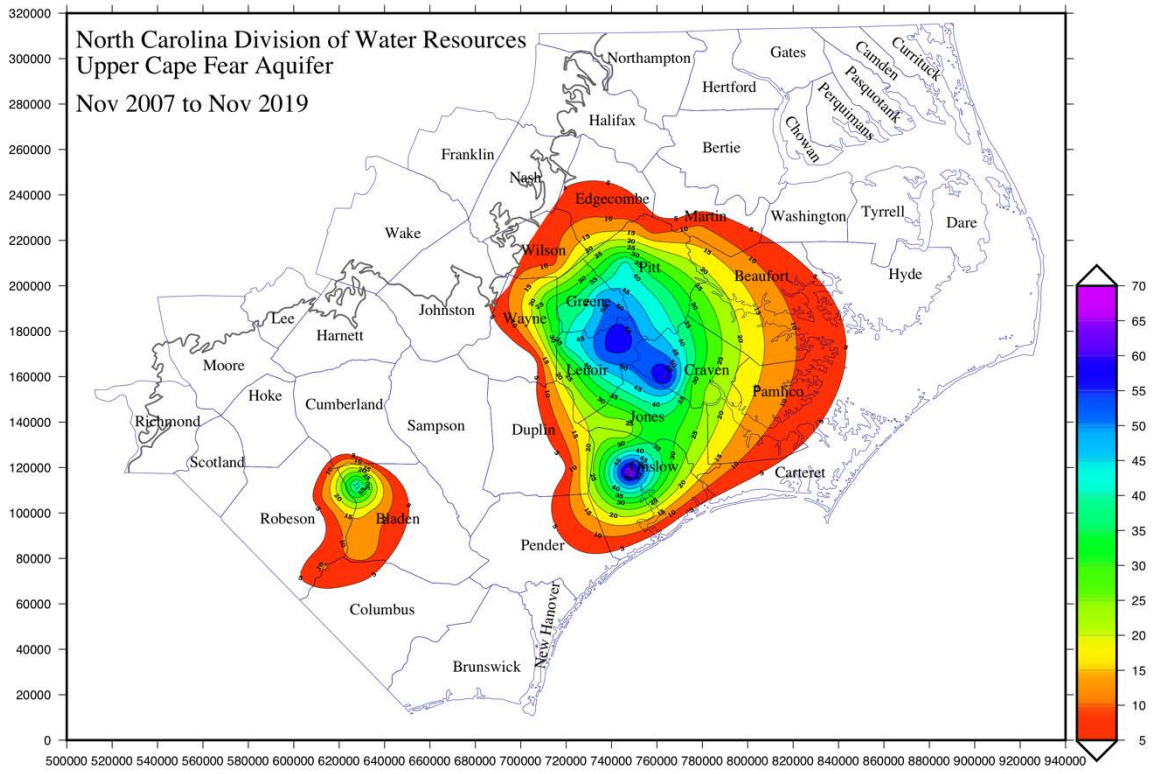
Lenoir, Martin, Onslow, Pamlico, Pitt, Washington, Wayne, and Wilson.

DWR collects depth to water level measurements and water quality sampling event data from monitor wells within the state's well network and CCPCUA permitted wells to assess aquifer conditions. 15A NCAC 2E .0503 requires that DWR assess aquifer conditions in 2008, 2013 and 2018 to determine if CCPCUA rule changes are necessary. Through the CCPCUA permitting system, large ground water users (>100,000 gpd) in some parts of the capacity use area are required to progressively reduce withdrawals in 2008, 2013, and 2018 to allow the aquifers to recover. The managed withdrawals from these aquifers have allowed the aquifers to recover as depicted in the following recovery maps of the Upper Cape Fear Aquifer and the Black Creek Aquifer.

The map of the Black Creek Aquifer shows the areas where ground water levels have risen between 5 feet (red) to more than 95 feet (purple) from November 2007 through November 2019. The largest recovery is observed in the Onslow County area where water users have made large investments in developing the Castle Hayne aquifer as an alternate water source.



The map of the Upper Cape Fear Aquifer shows the areas where ground water levels have risen between 5 feet (red) to more than 65 feet (blue) from November 2007 through November 2019. The largest recovery is observed in the Lenoir county area due to the development of a surface water treatment plant on the Neuse River in 2008 and Craven county area which developed wells in the Castle Hayne aquifer as an alternate water source.



Based on analysis of water level and water quality concentration data gathered through January 2013 in the CCPCUA, and a thorough review of aquifer conditions, DWR concluded that no action needed to be taken by the EMC to alter either the reduction zone boundaries or rule language in 15A NCAC 2E .0503, but recommended the use of temporary permits under rule .0502. This may give certain permit holders a stable withdrawal rate which is higher than indicated by their reduction schedule and reduction zone, provided that all well construction and reporting criteria are met as specified in the 2013 CCPCUA Assessment Report, which can be viewed at https:/www.ncwater.org/CCPCUA under the miscellaneous link.

DWR uses a series of criteria to judge each production well and aquifer conditions by individual permit in the permitting process. This enhanced permit application review allows the division to alter an individual permit holder's reduction requirements if the permit holder can demonstrate they are using the ground water at a sustainable rate. As of July 2020, the following twelve permit holders have acquired temporary permits: Greene County Regional Water System, Craven

County Water, Jones County Regional Water, City of New Bern, Town of La Grange, Town of Snow Hill, Town of Winterville, Belfast-Patetown Sanitary District, Northwestern Wayne Sanitary District, Southeastern Wayne Sanitary District, Fork Township Sanitary District, and Chinquapin Water Association, Inc.

Although the CCPCUA rules require assessments to be produced in 2008, 2013, and 2018, the DWR staff will continue to constantly track aquifer conditions so as to best serve the permit holders in the region and to provide awareness of potential ground water supply issues. The 2018 assessment concluded with the EMC's approval of the report on October 10, 2018. The assessment report reviewed aquifer data in a similar fashion to previous efforts in 2008 and 2013. Water levels in the Black Creek and Upper Cape Fear aquifers were found to be equilibrating to the lower rate of aquifer use as water systems continue to shift demand to other sources which include surface water and shallower aquifers. While water level data are consistent with sustainable use of the aquifer system, chloride concentrations are somewhat inconsistent. Smaller and static cones of depression have developed in the Peedee and Castle Hayne aquifers in response to new well fields and are only visible using the combined DWR and permit holder water level data.

Reports referencing the CCPCUA rules along with water use and permit holder information may be viewed by visiting the DWR's CCPCUA website, https:/www.ncwater.org/CCPCUA. A summary of water withdrawals reported by permit holders and registrants within the CCPCUA for 2019 is included in Appendix C. Historical years can be found on the CCPCUA website.

10.0 Summary and Conclusions

DWR and its predecessor agencies have maintained and monitored a statewide network of ground water monitoring wells used to assess North Carolina's ground water supply since the 1960s.

Data collected from the monitoring well network are available to the public through DWR's Internet website, https://www.ncwater.org/GWMB. These data include, but are not limited to, ground water levels, chloride measurements, well construction information, lithological and geophysical logs, ground water monitoring station locations, and well coordinates and elevations, and data from many non-DWR wells.

The monitoring well network consists of 687 monitoring wells at 229 individual stations. From July 2019 through June 2020, ground water level data were collected from 700 wells within the network. These data include manual measurements taken quarterly from wells plus hourly water levels collected using automatic data recorders from 586 wells.

Sixteen STS units have been installed as of FY 2020 on drought monitoring network wells. The addition of the STS units replace monthly site visits, allow access to current water level data, and provide positive economic impacts.

Chloride sampling was performed on 413 wells from September through November 2019. Sampling results indicated that there continues to be concern for salt water encroachment especially near larger pumping centers located near the fresh water – salt water interface. Chloride levels were collected in 45 Black Creek wells during the 2019 sampling event. Of these, eight wells showed chloride increases since 2017 and nine wells exceeded 250 mg/l. Chloride levels were collected in 52 Upper Cape Fear wells in the 2019 sampling event. Of these, five wells showed chloride increases since 2017 and eleven wells exceeded 250 mg/l. Chloride levels were collected in 27 wells from the Lower Cape Fear aquifer in 2019. Of these, five wells showed increases since 2017 and twelve wells had chloride levels exceeding 250 mg/l.

In FY 2020, six monitoring wells were installed at the Merchants Millpond State Park , Gates County, and six wells were installed at the Chinquapin Elementary School, Duplin County.

A joint effort between the Onslow Water Resources Group and Camp Lejeune resulted in three additional new monitoring stations at Camp LeJeune in Onslow County. These wells were added to the monitoring well network and include the Verona Loop (4 wells), Marines Road (5 wells), and Hwy 172 (4 wells). The same group also added one new well to the Paradise Point station and one new well to the Montford Point station.

Two monitoring well stations, Bean Shoals Access monitoring station, Surry County, and Ivy Bluffs Access monitoring station, Yadkin County, were acquired and added to the monitoring well network in FY 2020. Both acquired stations are located in Pilot Mountain State Park.

Three wells, Chinquapin (W 29D5, W 29D6, and W 29D9) were abandoned during the 2020 FY. Five stations, Town Creek (DD 33Y1, DD 33Y3), Fuquay Varina (N 41G3), Savannah School (P 26U4, P 26U5, P 26U6, P 26U7, P 26U8), and Farmville (M 27U7, M 27U8, M 27U11) were removed from the active well network.

There are three local networks whose water level data are currently being uploaded to the DWR database. The OWN in Orange County, the Guilford County network, and the WCHRS in Jackson County water level data can be viewed by the public on the DWR website.

Survey monuments have been installed at each of the well stations. Survey Grade GPS will be performed on the newly installed and acquired well stations, and select existing stations with installed monuments during FY 2021.

DWR has tentative plans to expand the monitoring well network by installing up to 25 wells at five sites in FY 2021.

Monitoring well network expansion efforts for FY 2021 will focus mainly on Sampson, Chowan, Currituck, Edgecombe, Scotland and Robeson counties.

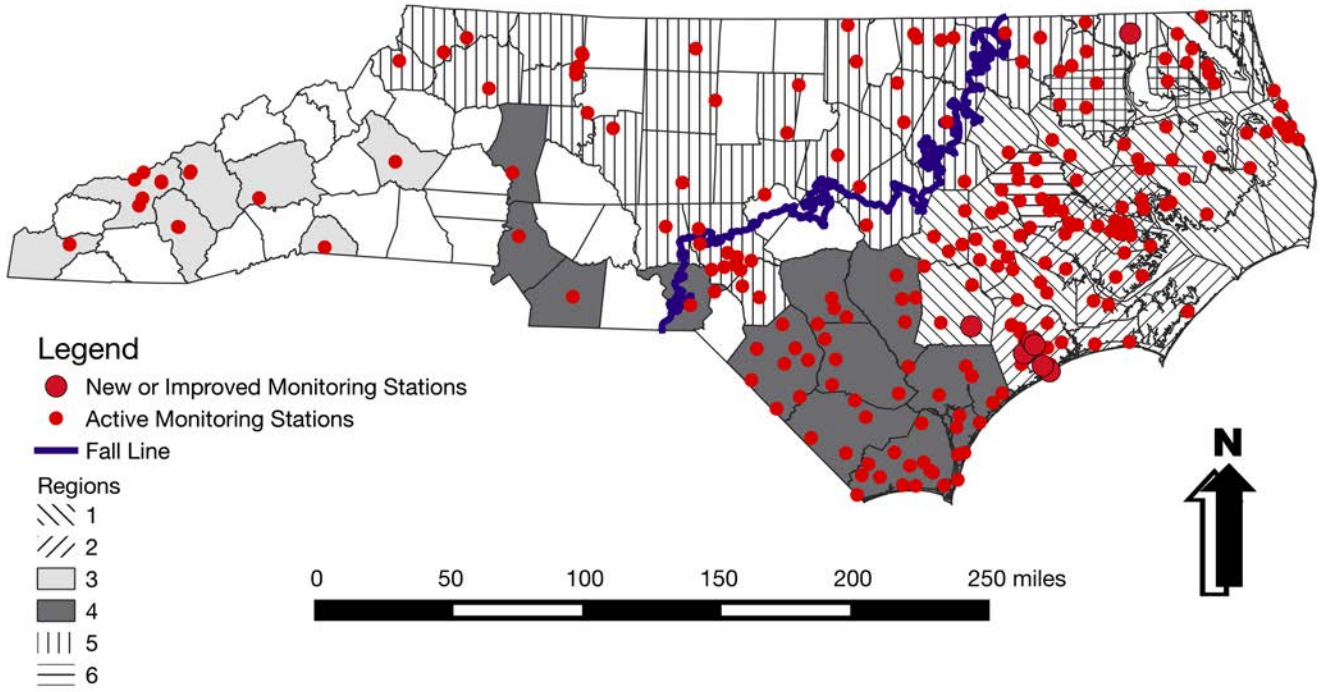
Ground water quality staff collected ground water samples from twenty-five monitoring stations in FY 2020. Samples were analyzed and results were added to the water quality database.

Fifteen counties in the Central Coastal Plain are governed by the Central Coastal Plain Capacity Use Area rules. Data collected from the monitoring well network is being used to assess aquifer conditions and determine whether or not changes to the rules are warranted. Based on the results of the 2018 assessment, concluding with the EMC's approval of the report on October 10, 2018, DWR will not pursue rule changes. Instead, DWR will continue issuing temporary permits under rule 15A NCAC 2E .0502 which can ease withdrawal reduction requirements for certain permit holders, but adds other permit conditions.

FIGURES

Figure 1
NCDWR – Ground Water Management Branch
Monitoring Well Station Locations
2020 Annual Report

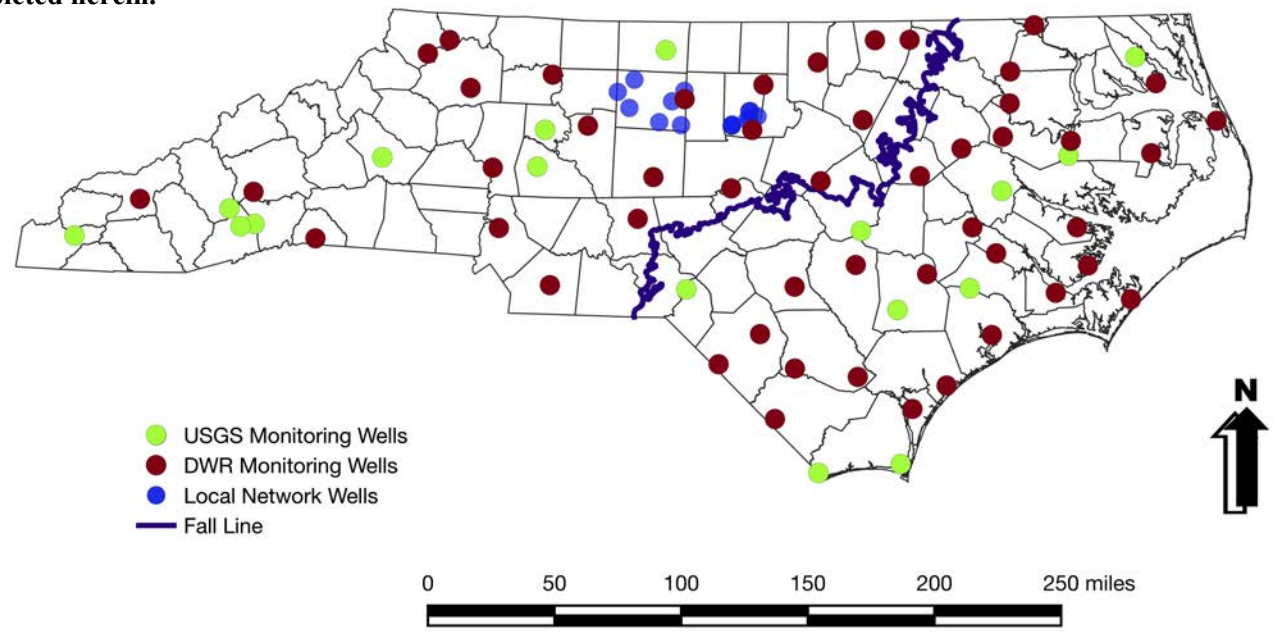
Note: This map is for informational purposes only. It does not authorize any party to enter onto any lands depicted herein.



08-18-2020

Figure 2
NCDWR – Ground Water Management Branch
Drought Indicator Well Network
2020 Annual Report

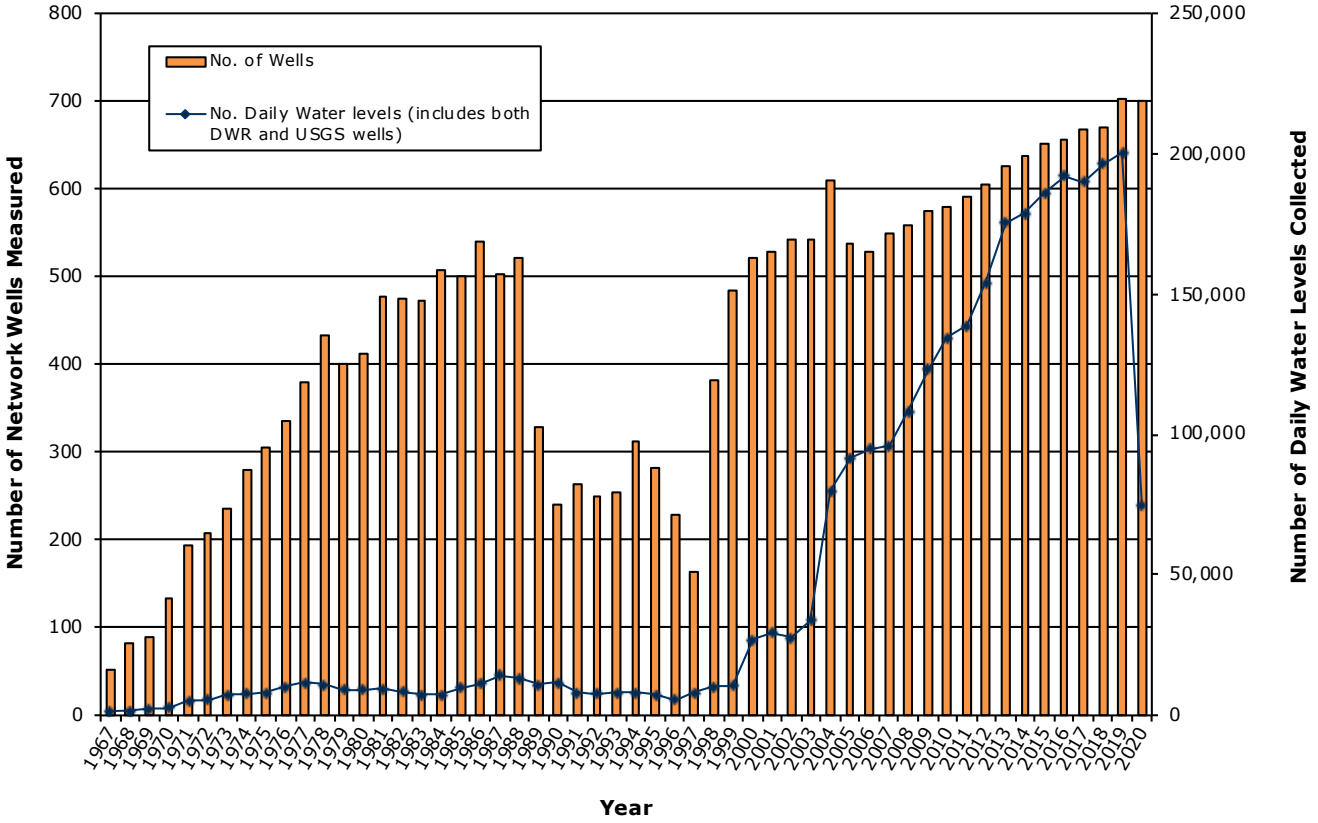
Note: This map is for informational purposes only. It does not authorize any party to enter onto any lands depicted herein.



08-18-2020

FIGURE 3

Water Level Data Collected from 1967-2018 (Plot includes both DWR and USGS Data)



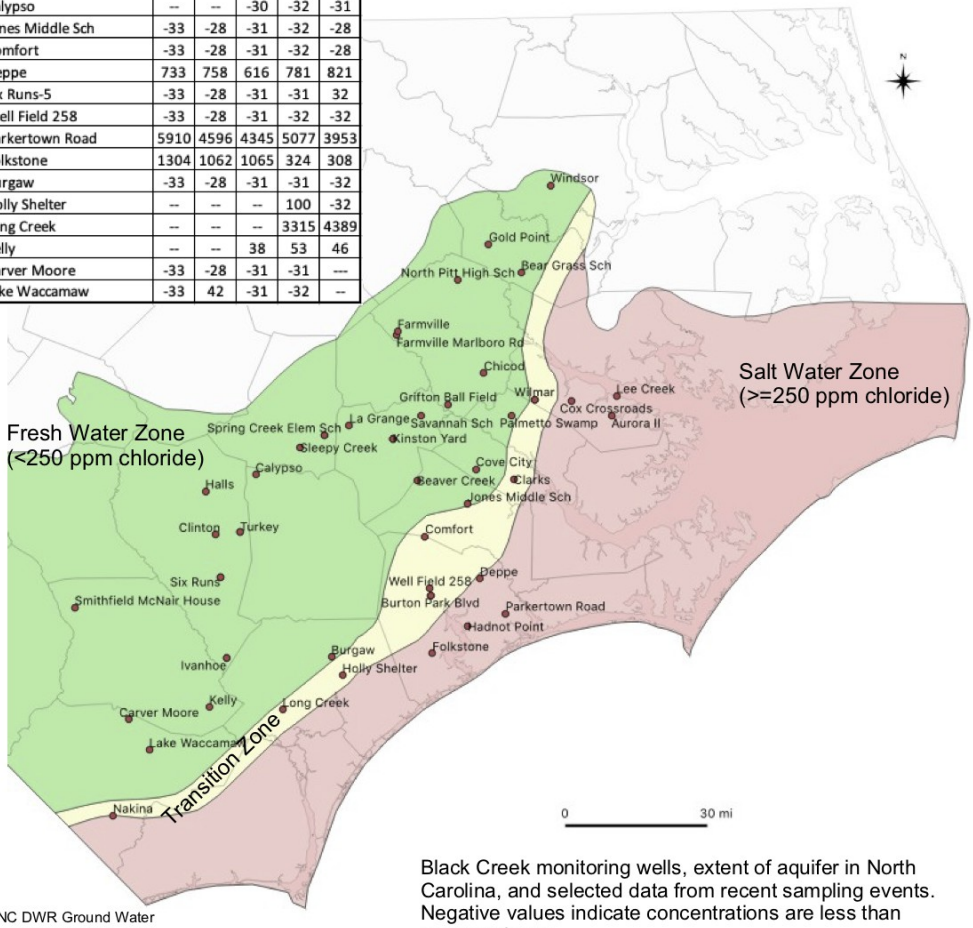
NCDEQ
Division of Water Resources

NC Ground Water Management Branch Monitoring Well Network
2018 Annual Report

MONITORING STATION	2010	2012	2015	2017	2019
	CHLORIDES (mg/l)				
Windsor	--	-28	-31	-26	-32
Gold Point	-33	-28	-31	-31	-32
Bear Grass Sch	-33	-28	-31	-26	61
Chicod	49	35	38	45	46
Lee Creek	6766	6888	7904	9056	7906
Wilmar-5	400	434	--	496	468
Wilmar-9	239	194	--	188	211
Palmetto Swamp	49	35	38	45	39
Grifton Ball Field	-28	-28	-31	-32	-32
Aurora II	6765	7562	9634	8124	9794
La Grange	--	-28	-31	-32	-32
Spring Creek Elem Sch-3	--	--	-31	-32	-32
Cove City	-33	-28	-31	-32	-28
Clarks	54	179	144	136	153
Beaver Creek	-33	-28	-31	-32	-28
Calypso	--	--	-30	-32	-31
Jones Middle Sch	-33	-28	-31	-32	-28
Comfort	-33	-28	-31	-32	-28
Deppe	733	758	616	781	821
Six Runs-5	-33	-28	-31	-31	32
Well Field 258	-33	-28	-31	-32	-32
Parkertown Road	5910	4596	4345	5077	3953
Folkstone	1304	1062	1065	324	308
Burgaw	-33	-28	-31	-31	-32
Holly Shelter	--	--	--	100	-32
Long Creek	--	--	--	3315	4389
Kelly	--	--	38	53	46
Carver Moore	-33	-28	-31	-31	---
Lake Waccamaw	-33	42	-31	-32	--

Figure 4
NCDWR
Ground Water Management Branch
Chloride Levels in the Cretaceous Black Creek Aquifer
2020 Annual Report

NOTE: This map is for informational purposes only. It does not authorize any party to enter lands depicted herein.



NC DWR Ground Water Monitoring Report, 2020

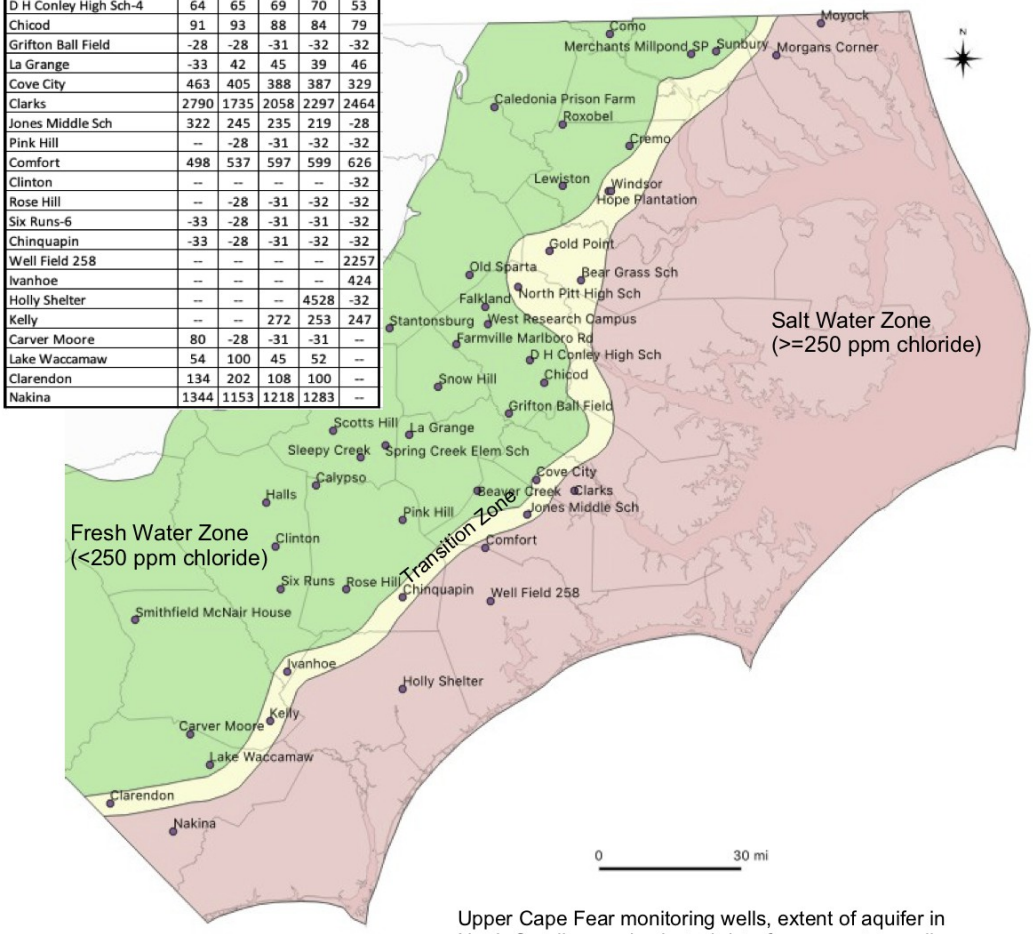
Black Creek monitoring wells, extent of aquifer in North Carolina, and selected data from recent sampling events. Negative values indicate concentrations are less than amount shown.

08-18-2020

MONITORING STATION	2010	2012	2015	2017	2019
	CHLORIDES (mg/l)				
Moyock	943	826	744	717	686
Morgans Corner	733	580	535	599	537
Merchants Millpond SP	--	--	--	--	53
Cremo-6	-33	28	-31	-26	-32
Roxobel	-33	-28	-31	-26	-32
Windsor	--	236	144	194	164
Lewiston	-33	-28	-31	-26	-32
Gold Point-3	54	172	186	164	136
Gold Point-7	372	343	362	416	331
Bear Grass Sch	-33	111	45	50	32
Old Sparta	-33	56	31	41	-31
North Pitt High Sch-4	463	284	293	314	267
North Pitt High Sch-5	400	327	--	337	331
Falkland	-33	-28	-31	-32	-32
West Research Campus-5	54	57	61	59	89
D H Conley High Sch-4	64	65	69	70	53
Chicod	91	93	88	84	79
Grifton Ball Field	-28	-28	-31	-32	-32
La Grange	-33	42	45	39	46
Cove City	463	405	388	387	329
Clarks	2790	1735	2058	2297	2464
Jones Middle Sch	322	245	235	219	-28
Pink Hill	--	-28	-31	-32	-32
Comfort	498	537	597	599	626
Clinton	--	--	--	--	-32
Rose Hill	--	-28	-31	-32	-32
Six Runs-6	-33	-28	-31	-31	-32
Chinquapin	-33	-28	-31	-32	-32
Well Field 258	--	--	--	--	2257
Ivanhoe	--	--	--	--	424
Holly Shelter	--	--	--	4528	-32
Kelly	--	--	272	253	247
Carver Moore	80	-28	-31	-31	--
Lake Waccamaw	54	100	45	52	--
Clarendon	134	202	108	100	--
Nakina	1344	1153	1218	1283	--

Figure 5
NCDWR
Ground Water Management Branch
Chloride Levels in the Cretaceous
Upper Cape Fear Aquifer
2020 Annual Report

NOTE: This map is for informational purposes only. It does not authorize any party to enter lands depicted herein.



NC DWR Ground Water Monitoring Report, 2020

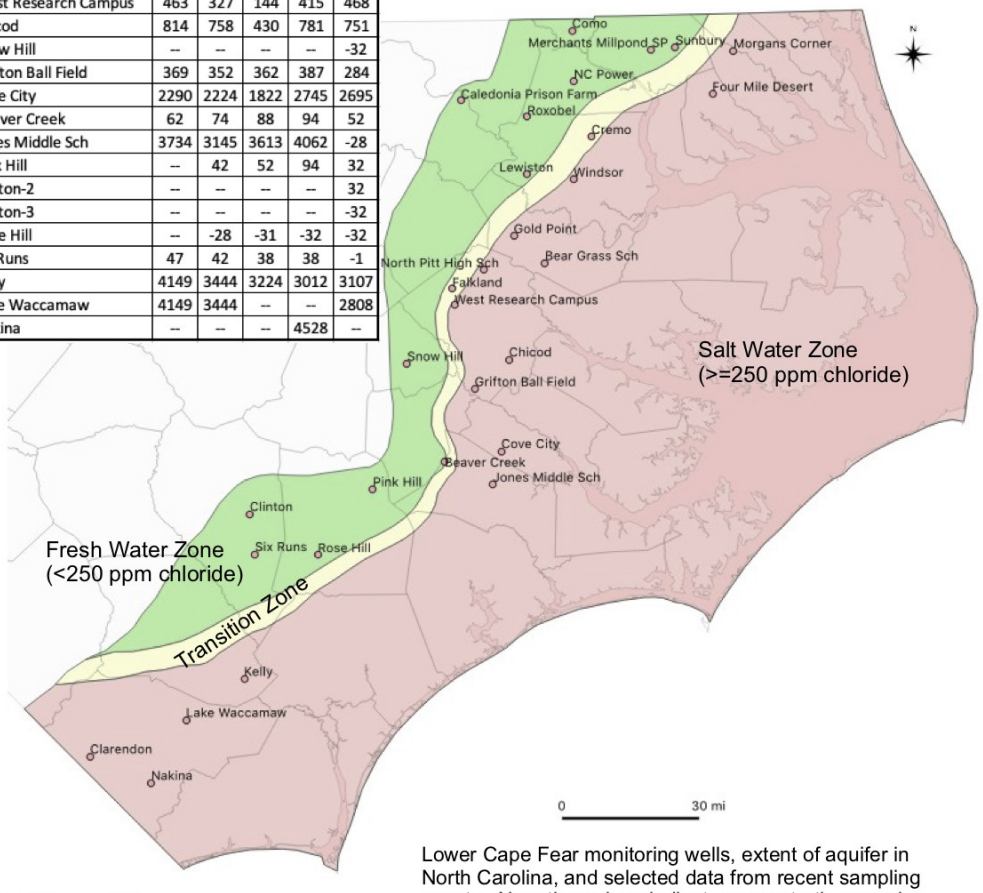
Upper Cape Fear monitoring wells, extent of aquifer in North Carolina, and selected data from recent sampling events. Negative values indicate concentrations are less than amount shown.

08-18-2020

MONITORING STATION	2010	2012	2015	2017	2019
	CHLORIDES (mg/l)				
Como-6	90	93	88	90	46
Como-7	-33	28	-31	-31	-32
Morgans Corner	5096	5095	3853	3662	3953
Sunbury	160	103	--	--	--
Merchants Millpond SP	--	--	--	--	308
NC Power	--	--	--	--	-32
Four Mile Desert	--	--	--	--	1748
Cremo	174	126	132	137	39
Roxobel	-33	28	-31	26	-32
Windsor	--	1220	430	449	381
Lewiston	40	35	-31	-26	-32
Gold Point	868	892	791	781	751
Bear Grass Sch	1023	2420	655	1283	--
North Pitt High Sch	798	758	655	645	751
Falkland	239	227	201	-32	89
West Research Campus	463	327	144	415	468
Chicod	814	758	430	781	751
Snow Hill	--	--	--	--	-32
Grifton Ball Field	369	352	362	387	284
Cove City	2290	2224	1822	2745	2695
Beaver Creek	62	74	88	94	52
Jones Middle Sch	3734	3145	3613	4062	-28
Pink Hill	--	42	52	94	32
Clinton-2	--	--	--	--	32
Clinton-3	--	--	--	--	-32
Rose Hill	--	-28	-31	-32	-32
Six Runs	47	42	38	38	-1
Kelly	4149	3444	3224	3012	3107
Lake Waccamaw	4149	3444	--	--	2808
Nakina	--	--	--	4528	--

Figure 6
NCDWR
Ground Water Management Branch
Chloride Levels in the Cretaceous Lower Cape Fear Aquifer
2020 Annual Report

NOTE: This map is for informational purposes only. It does not authorize any party to enter lands depicted herein.



NC DWR Ground Water Monitoring Report, 2020

Lower Cape Fear monitoring wells, extent of aquifer in North Carolina, and selected data from recent sampling events. Negative values indicate concentrations are less than amount shown.

08-18-2020

Figure 7
NCDWR - Ground Water Management Branch
Orange Well Net Cooperative Monitoring Well Network
Orange County, NC
2020 Annual Report

NOTE: This map is for informational purposes only. It does not authorize any party to enter onto any lands depicted herein.

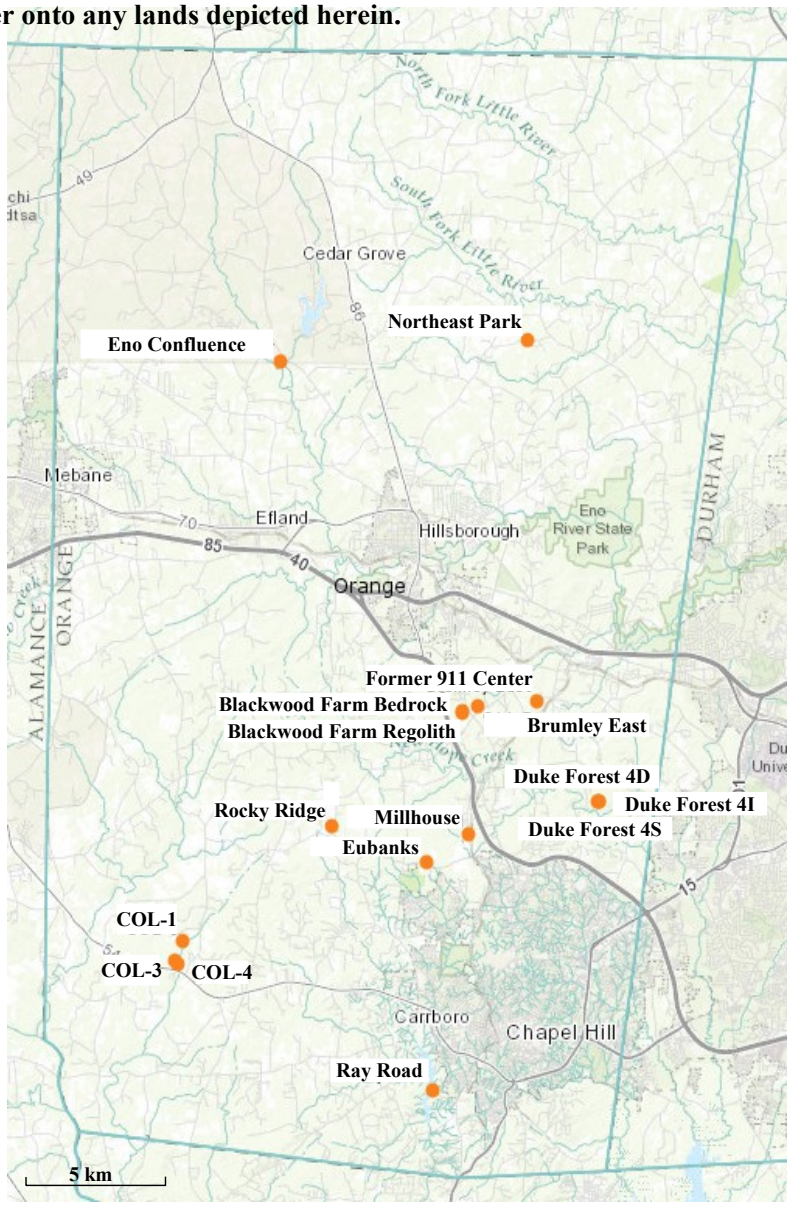


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Figure 8

NCDWR - Ground Water Management Branch
Guilford County Cooperative Monitoring Well Network
Guilford County, NC
2020 Annual Report

NOTE: This map is for informational purposes only. It does not authorize any party to enter onto any lands depicted herein.

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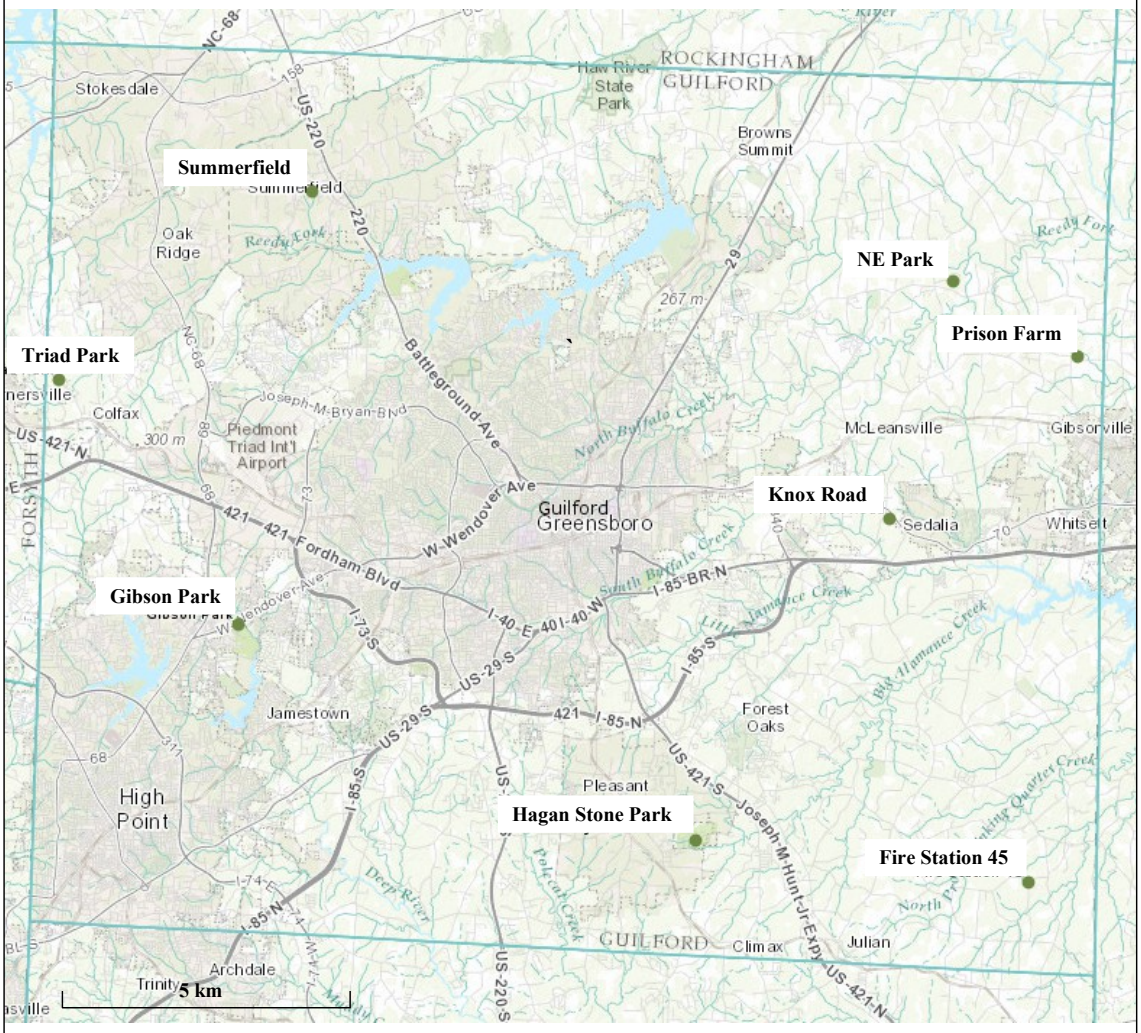

08-18-2020

Figure 9
NCDWR - Ground Water Management Branch
Western Carolina Hydrological Research Station
Cooperative Monitoring Well Network
Jackson County, NC
2020 Annual Report

N

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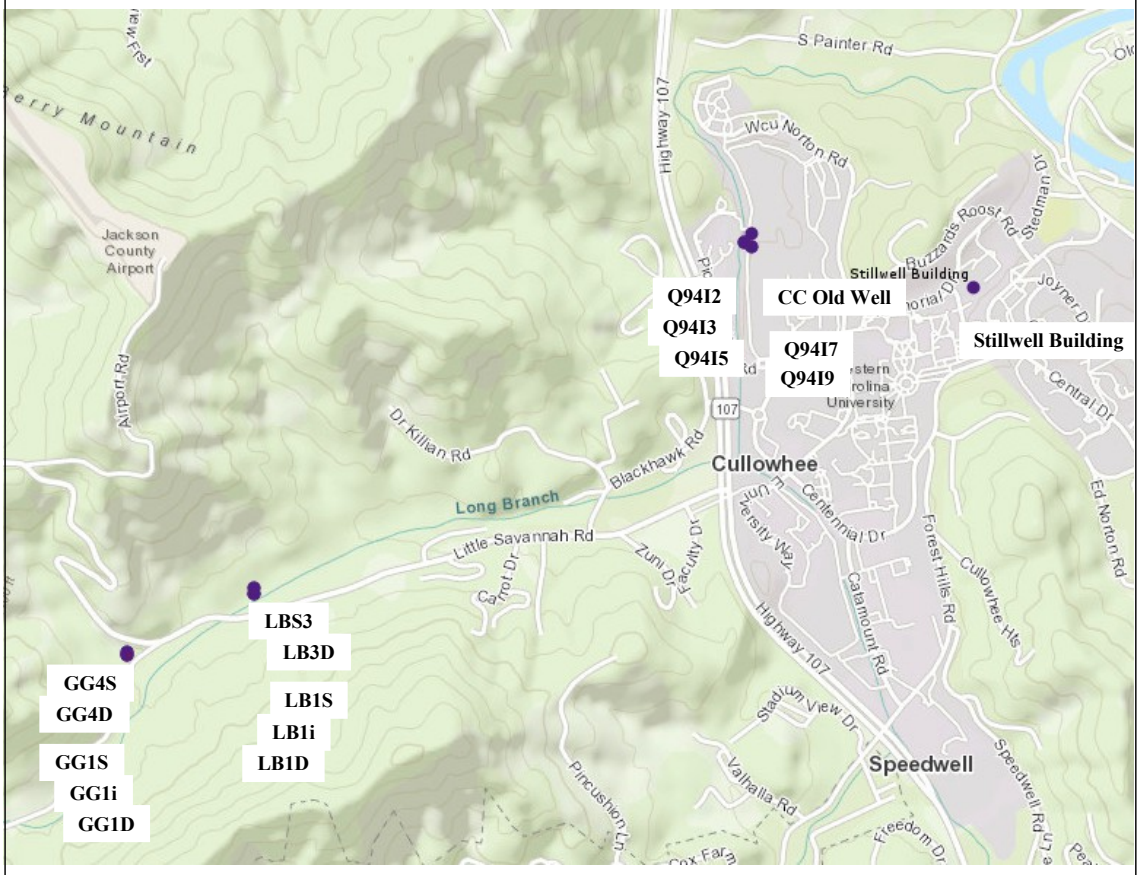


08-18-2020

TABLES

TABLE 1
Site Susceptibility Rating
North Carolina Division of Water Resources
Ground Water Management Branch
2020 Annual Report

Susceptibility Rating	Description
1	**Secure**—station is located on State or Federal government property
2	**Secure**—station is located on local government or school property
3	**Moderately secure**—station is located on private property, but landowner does not give any indication that land use or property ownership may change
4	**Tenuous**—station is located on public or private property and landowner is giving indications that land use or property ownership may change
5	**Imminent threat**—station is on public or private property and landowner desires abandonment of well station.

TABLE 2
Site and Recorder Distribution by Region as of 6/30/2020
North Carolina Division of Water Resources
Ground Water Management Branch
2020 Annual Report

Region	Parameter	Number	% of Region	% of Network
	Wells	167		24.3
1	Sites	48		21.0
	Hobo	142	85.0	20.7
	Solinst	1		
	Wells	172		25.0
2	Sites	39		17.0
	Hobo	160	93.0	23.3
	Solinst	0		
	Wells	15		2.2
3	Sites	15		6.6
	Hobo	12	80.0	1.7
	Solinst	2		
	Wells	179		26.1
4	Sites	54		23.6
	Hobo	134	74.9	19.5
	Solinst	6		
	Wells	103		15.0
5	Sites	60		26.2
	Hobo	90	87.4	13.1
	Solinst	7		
	Wells	51		7.4
6	Sites	13		5.7
	Hobo	48	94.1	7.0
	Solinst	0		

These are counts of the number of wells which have at least one recorder of the stated variety. These numbers do not indicate the total number of recorders deployed. For example, there are always two Solinst recorders on a well and only one is counted per well. In addition, Solinst recorders are always installed on wells with Hobos, so the number of Solinst recorders does not increase the total number of wells with recorders.

TABLE 3
Solinst Telemetry System (STS) Distribution by Region as of 6/30/2020
North Carolina Division of Water Resources
Ground Water Management Branch
2020 Annual Report

Region	Station Name	Well Number	Date Installed
1	Como	B 20U8	10/14/2014
1	Lewiston	H 22I3	06/20/2013
1	Manteo Airport	I 4W5	06/04/2014
1	Bunn	I 35K2	10/20/2016
2	Topsail Beach	BB 28J5	06/12/2014
3	Bryson City	O 97W2	02/18/2014
5	Clarendon	DD 42N1	04/24/2014
5	Rowland	Z 47R5	04/24/2014
5	Laurel Springs	C 71U1	10/11/2016
5	Gibsonville	G 50W2	09/26/2016
5	Wilkesboro	G 69J1	11/22/2016
5	Troutman	L 67U2	8/27/2014
5	NC Zoo	M 53L1	06/19/2014
5	Hornets Nest	Q 66C1	10/07/2014
5	Columbus	R 82I1	02/19/2014
5	Monroe	U 62A1	07/02/2014

TABLE 4
Monitoring Well Network Statistics (1/1/2005 through 6/30/2020)
North Carolina Division of Water Resources
Ground Water Management Branch
2020 Annual Report

Parameter	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Number of monitored wells	537	538	550	559	568	579	591	605	626	637
Manual water levels (tapedowns)	2,606	2,719	2,599	2,463	2,556	2906	2,624	2,952	3,265	2,703
Daily water levels (automatic recorders	89,088	92,038	93,145	105,708	120,694	131,317	136,208	150,912	172,111	176,111
Total hourly water levels	2,141,368	2,229,355	2,294,909	2,593,630	2,961,371	3,163,188	3,276,496	3,622,891	4,128,993	4,225,684
Chloride Samples	17	22	175	12	17	251	21	274	13	10
Geophysical & lithologic logs at new stations	2	1	3	1	1	0	2	1	1	1

TABLE 4 (Continued)
Monitoring Well Network Statistics (01/01-/005 through 06/30/2020)
North Carolina Division of Water Resources
Ground Water Management Branch
2020 Annual Report

Parameter	2015	2016	2017	2018	2019	2020
Number of monitored wells	651	655	667	671	702	700
Manual water levels (tapedowns)	3,140	2,996	3,477	3,890	4,084	1,923
Daily water levels (automatic recorders	182,907	189,302	185,558	192,646	200,395	103,151
Total hourly water levels	4,389,822	4,542,068	4,447,347	4,618,783	4,712,493	2,432,692
Chloride Samples	270	31	358	14	413	6
Geophysical & lithologic logs at new stations	2	2	3	1	3	5

TABLE 5
Well Construction Information for New Well Installation and Acquired Wells for the 2020 FY
North Carolina Division of Water Resources
Ground Water Management Branch
2020 Annual Report

Well ID	Station Name	Date Installed	Well Diameter (inches)	Well Depth (ft bls)	Screened Interval (x to y ft bls)	Measuring Pt (MP)(ft)	Aquifer	**Water Level Date Measured (from MP) (ft)
C 16S1		06/14/2019	4	467	440-450	2.91	Kucf	51.37 (05/04/2020)
C 16S2		06/26/2019	4	255	235-245	2.94	Tb	34.56 (05/04/2020)
C 16S3	Merchants Millpond	06/18/2019	4	205	190-200	2.88	Tch	34.67 (05/04/2020)
C 16S4	State Park	07/01/2019	4	60	40-50	2.81	Ty	19.13 (05/04/2020)
C 16S5		07/01/2019	4	30	10-20	2.76	S	10.94 (05/04/2020)
C 16S6		09/25/2019	4	870	815-825	2.78	Klcf	105.21 (05/04/2020)
X 25W1		07/28/2019	4	50	10-30	2.84	S	10.04 (05/12/2020)
X 25W2	Verona Loop	08/02/2019	4	70	45-65	2.80	Tch	33.74 (05/12/2020)
X 25W3		08/03/2019	4	220	195-215	2.95	Tch	39.71 (05/12/2020)
X 25W4		08/01/2019	4	515	490-510	2.72	Kpd	36.20 (05/12/2020)
Y 24T1		08/25/2019	4	35	10-30	2.82	S	13.56 (05/12/2020)
Y 24T2		08/28/2019	4	85	60-80	2.78	Tch	21.67 (05/12/2020)
Y 24Y3	Marines Road	09/01/2019	4	160	135-155	2.92	Tch	21.41 (05/12/2020)
Y 24T4		08/29/2019	4	365	340-360	2.81	Tch	23.45 (05/12/2020)
Y 24T5		08/24/2019	4	445	420-440	2.94	Tb	24.68 (05/12/2020)
Z 23C1		09-26-2019	4	397	372-392	2.74	Tch	4.81 (05/12/2020)
Z 23C2	Hwy 172	10/01/2019	4	177	152-172	3.00	Tch	8.35 (05/12/2020)
Z 23C3		09/27/2019	4	105	80-100	2.91	Tch	7.78 (05/12/2020)
Z 23C4		09/26/2019	4	50	25-45	2.89	S	7.65 (05/12/2020)
X 24G3	Paradise Point	10/03/2019	4	35	10-30	3.03	S	13.32 (05/12/2020)
X 24E3	Montford Point	10/06/2019	4	35	10-30	2.78	S	10.24 (05/12/2020)

TABLE 5 (continued)
Well Construction Information for New Well Installation and Acquired Wells for FY 2020
North Carolina Division of Water Resources
Ground Water Management Branch
2020 Annual Report

Well ID	Station Name	Date Installed	Well Diameter (inches)	Well Depth (ft bls)	Screened Interval (x to y ft bls)	Measuring Pt (MP)(ft)	Aquifer	**Water Level Date Measured (from MP) (ft)
W 29D10		05/22/2020	4	134	115-125	2.84	Tch	7.09 (06/10/2020)
W 29D11	Chinquapin	04/14/2020	4	34	19-29	2.71	S	6.51 (06/10/2020)
W 29D12	Elementary	05/01/2020	4	800	624-644	2.02	Klcf	-4.61 (06/10/2020)
W 29D13	School	05/11/220	4	465	450-460	2.86	Kucf	42.81 (06/10/2020)
W 29D14		05/15/2020	4	359	344-354	2.63	Kbc	41.66 (06/10/2020)
W 29D15		05/27/2020	4	180	165-175	2.82	Kpd	7.30 (06/10/2020)

Well Construction Information for Wells Acquired in the 2020 FY

Well ID	Station Name	Date Acquired	Well Diameter (inches)	Well Depth (ft bls)	Screened Interval (x to y ft bls)	Measuring Pt (MP)(ft)	Aquifer	**Water Level Date Measured (from MP) (ft)
E 61P1	Bean Shoals Well	02/27/2020	6	178	30-178	0.02	Br	55.35 (04/27/2020)
E 62U1	Ivy Bluffs Well	02/27/2020	8	117	59-117	1.09	Br	25.19 (04/27/2020)

**Water Levels Reported from the Most Recent Date Water Level Collected (2020 FY)
Note: E 62U1 Ivy Bluffs Well was completed on 01/11/1993 according to the well tag attached to the casing

TABLE 6
Well Development/Purging Information for FY 2020
North Carolina Division of Water Resources
Ground Water Management Branch
2020 Annual Report

Well ID	Station Name	Date Developed
C 16S1	Merchants Millpond State Park	Station Developed from 12/02/2019 through 12/04/2019
C 16S2	Merchants Millpond State Park	
C 16S3	Merchants Millpond State Park	
C 16S4	Merchants Millpond State Park	
C 16S5	Merchants Millpond State Park	
C 16S6	Merchants Millpond State Park	

TABLE 7
Automatic Water Level Recorders as of 6/30/2020
North Carolina Division of Water Resources
Ground Water Management Branch
2020 Annual Report

Recorder Type	Number in Service*
HOBO U20 Water Level Logger (including separate barometer per station installed	793 (includes 218 barometers)
Solinst Telemetry System (STS)	32 (includes 16 barologgers and 16 leveloggers)

***As of June 30, 2020**

Note: Due to the large number of recorders deployed by DWR, there are, at any given time, a number of units that are being serviced or replaced. These units are not reflected in the above totals.

TABLE 8
Orange Well Net Monitoring Well Information
Orange County, NC
North Carolina Division of Water Resources
Ground Water Management Branch
2020 Annual Report

Quad	Well Name	Total Depth (ft bgs)	Casing Depth (ft bgs)	Land Surface (ft)	Aquifer	Geology
G 44G1	Northeast Park NES	45	15	622	Bs	Epiclastics
G 45F1	Eno Confluence Property	192	37	611	Br	Felsic Tuff
H 44P1	Blackwood Farm Bedrock	302	100	556	Br	Felsic Lavas and Tuffs (Dacite)
H 44P2	Former 911 Center	400	85	581	Br	Altered Tuff
H 44P3	Blackwood Farm Regolith	45	15	556	Bs	Felsic Lavas and Tuffs (Dacite)
H 44R1	Brumley East	605	108	562.39	Br	Mafic Lavas and Tuffs
I 44B1	Duke Forest DF-4D	397.09	82.1	424.91	Br	Felsic Plutonics
I 44B2	Duke Forest DF-4S	25	15	428.81	Bs	Felsic Plutonics
I 44B3	Duke Forest DF-4I	41	26	426.77	Br	Felsic Plutonics
I 44F1	Millhouse Road	166	67	517	Br	Epiclastics
I 45G1	Rocky Ridge	Removed from network in 2012				
I 45J1	Eubanks Road	141	33	525		
I 46R1	Andrews Rd. (COL-1)	30	10	514	Bs	Felsic Tuff
I 46R2	Hwy 54 (COL-3)	40.5	25	516	Bs	Epiclastics
I 46W1	Orange Grove Rd (COL-4)	32	17	502	Bs	Epiclastics
J 45J1	Ray Road	Removed from network in 2012				

bgs – below ground surface
** Estimated Elevation

TABLE 9
Orange Well Net Network Statistics (2008 through 06/30/2020)
North Carolina Division of Water Resources
Ground Water Management Branch
2020 Annual Report

Parameter	2008	2009	2010	2011	2012	2013	2014	2015	2016
Manual water levels (tapedowns)	3	18	49	68	59	54	52	75	71
Daily water levels (automatic recorders	-	-	1,612	2,783	3,095	3,281	3,468	4,286	5,096
Total hourly water levels	-	-	38,802	66,689	74,065	78,636	83,090	102,643	121,985

TABLE 9 (continued)
Orange Well Net Network Statistics (2008 through 06/30/2020)
North Carolina Division of Water Resources
Ground Water Management Branch
2020 Annual Report

Parameter	2017	2018	2019	2020
Manual water levels (tapedowns)	80	65	54	45
Daily water levels (automatic recorders	4,865	4,744	4,721	2,214
Total hourly water levels	116,515	113,565	114,948	51,415

TABLE 10
Guilford County Monitoring Well Information
North Carolina Division of Water Resources
Ground Water Management Branch
2020 Annual Report

Quad	Station Name	Date Installed	Well Diameter (inches)	Well Depth (ft)	Casing Depth (ft)	Land Surface (ft)	Aquifer	City
F 54O1	Summerfield (Jack Dent Park)	10/2/02	6.25	103	81	858.5	Br	Summerfield
G 50H1	Prison Farm	5/14/04	6.25	120	45	685	Br	Gibsonville
G 51B1	Northeast Park	6/24/15	6.125	100	77	683	Br	Gibsonville
G 56L1	Triad Park	10/9/02	6.25	140	0	925	Br	Colfax
H 51D1	Knox Road	10/9/02	-	-	39	715	Br	McLeansville
H 55L1	Gibson Park	4/15/03	6.25	205	79	813	Br	Jamestown
I 50P1	Station 45 (Humble Road)	12/15/04	6.25	180	124	679.5	Br	Liberty
I 52N1	Hagan Stone Park	05/17/03	6.125	100	52	755	Br	Pleasant Garden

TABLE 11
Guilford County Monitoring Well Network Statistics (2005 through 06/30/2020)
North Carolina Division of Water Resources
Ground Water Management Branch
2020 Annual Report

Parameter	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Manual water levels (tapedowns)	-	28	14	28	35	77	77	56	63	49	69	71
Daily water levels (automatic recorders	2,106	1,884	1,922	1,892	2,000	2,592	2,561	2,474	2,585	2,562	2,592	941
Total hourly water levels	-	-	-	-	-	3	-	-	-	-	36,415	22,636

TABLE 11 (continued)
Guilford County Monitoring Well Network Statistics (2005 through 06/30/2020
North Carolina Division of Water Resources
Ground Water Management Branch
2020 Annual Report

Parameter	2017	2018	2019	2020
Manual water levels (tapedowns)	72	55	79	33
Daily water levels (automatic recorders)	432	134	1,258	858
Total hourly water levels	10,379	3,216	37,281	31,795

TABLE 12
Western Carolina Hydrological Research Station Network
Monitoring Well Information
North Carolina Division of Water Resources
Ground Water Management Branch
2020 Annual Report

Quad	Station Name	Date Installed	Well Depth (meters)	Casing Depth (meters)	Screen (meters)	MP (meters above land surface)	Land Surface (NED Elevation) (meters)	Geology	Aquifer
Q 94H1	GG1S	11/30/2009	2.41	0.88	0.88-2.4	1.02	683.26	colluvium/saprolite	Bs
Q 94H2	GG1i	11/30/2009	4.42	3.81	3.81-4.42	0.99	683.26	saprolite	Bs
Q 94H3	GG1D	11/30/2009	7.56	6.95	6.95-7.56	0.97	683.26	saprolite	Bs
Q 94H11	GG4S	11/30/2009	2.83	1.31	1.31-2.83	0.89	682.93	colluvium/saprolite	Bs
Q 94H13	GG4D	11/30/1999	7.80	7.19	7.19-7.8	1.01	682.93	saprolite	Bs
Q 94H14	LB3S	11/30/1999	2.65	1.13	1.13-2.65	1.02	667.35	colluvium/saprolite	Bs
Q 94H16	LB3D	11/30/2009	5.43	4.82	4.82-5.43	1.05	667.35	saprolite	Bs
Q 94H22	LB1S	11/30/2009	2.47	0.94	0.94-2.46	1.00	667.15	colluvium/saprolite	Bs
Q 94H23	LB1i	11/30/1999	3.87	3.26	3.26-3.87	1.00	667.15	saprolite	Bs
Q 94H24	LB1D	11/30/1999	5.67	5.06	5.06-5.67	0.96	667.15	saprolite	Bs
Q 94I1	CC Old Well	11/22/2004	6.28	0.30	0.30-6.40	0.82	634.00	saprolite	Bs
Q 94I2	CC1S	11/30/2009	2.53	1.01	1.01-2.53	1.01	633.07	alluvium/saprolite	Bs
Q 94I3	CC1i	11/30/1999	3.29	2.99	2.99-3.29	1.05	633.07	saprolite	Bs
Q 94I5	CC1D	11/30/1999	5.64	5.33	5.33-5.63	1.02	633.07	saprolite	Bs
Q 94I7	CC2S	11/30/1999	2.68	1.16	1.16-2.68	0.98	634.15	alluvium/saprolite	Bs
Q 94I9	CC2D	11/30/2009	6.31	5.70	5.70-6.31	0.99	634.15	saprolite	Bs
Q 94J1	Stillwell Building	-	61.27	25.91	25.91-61.27	0.65	655.45	-	Br

Note: All monitoring wells are located in Jackson County, NC

TABLE 13
Western Carolina Hydrological Research Station Network Statistics (2011 through 06/30-/020)
North Carolina Division of Water Resources
Ground Water Management Branch
2020 Annual Report

Parameter	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Manual water levels (tapedowns)	238	628	661	469	422	486	661	517	165	105

TABLE 14
Network Expansion FY 2021
North Carolina Division of Water Resources
Ground Water Management Branch
2020 Annual Report

Proposed Station	County	Proposed Well Screens (ft bls)	Aquifer
		20-30	Surficial
Near Intersection of		41-51	Black Creek
US Hwy 421 and US Hwy 13	Sampson	168-178	Upper Cape Fear
		347	Pilot Hole (Estimated top of basement)
		20-30	Surficial
Near	Sampson	58-68	Black Creek
Salemburg		129-139	Upper Cape Fear
		368	Pilot Hole (Estimated Top of Basement)
		20-30	Surficial
Near Valhalla	Chowan	130-140	Yorktown
		225-235	Castle Hayne
		30-40	Surficial
Near Moyock	Currituck	200-210	Yorktown
		530-540	Castle Hayne
		600-610	Beaufort
Red Bank	Robeson	71-81	Black Creek
		20-30	Surficial
Turkey	Sampson	318-328	Upper Cape Fear
		432-442	Lower Cape Fear
		20-30	Surficial
		60-70	Yorktown
Near Macclesfield	Edgecombe	120-130	Upper Cape Fear
		260-270	Lower Cape Fear
		292	Pilot Hole (Estimated top of basement)

TABLE 14 (continued)
Network Expansion FY 2021
North Carolina Division of Water Resources
Ground Water Management Branch
2020 Annual Report

Proposed Station	County	Proposed Well Screens (ft bls)	Aquifer
		20-30	Surficial
Near Laurinburg	Scotland	120-130	Black Creek
		332-342	Upper Cape Fear
		360	Pilot Hole (Estimated top of basement)

TABLE 15
Well Removal and Abandonment Information for FY 2020
Sorted by Well ID
North Carolina Division of Water Resources
Ground Water Management Branch
2020 Annual Report

Well ID	Station Name	Inactive Date	Comment
DD 33Y1 DD 33Y3	Town Creek	02/12/2020	Based on the hydrographs, the wells appear to be heavily influenced by rainfall and seasonal trends. DD 33Y1 was in a more confined portion of the Peedee, but it appears that the casing may have failed and it is a surficial aquifer well now. Both wells, DD 33Y1 and DD 33Y1, are showing the same water levels now (although there was a head difference early in their history).
N 41G3	Fuquay Varina	02/13/2020	Property owner decided to deny access to site. Removed box and recorders. Installed locking cap.
P 26U4, P 26U5, P 26U7, P 26U8	Savanah School	01/23/2020	Site was purchased by a salvage yard. The wells are located in the back of the property and due to ongoing hazardous conditions, it became unsafe for staff to collect data
S 26B1	Lonnie Kelley	02/07/2020	Monitoring well stations installed in the area and the data provided from those stations made it cost effective to place this well as inactive.
M 27U7, M 27U8, M 27U11	Farmville	10/26/2019	Data from the Farmville Marlboro Rd Station indicates that the Farmville Station is no longer needed due to issues with well construction. Farmville Marlboro Rd was originally installed with the hopes of replacing the Farmville station over time.
W 29D5, W 29D6 W 29D9	Chinquapin	05/20/2020	Each well was abandoned due to well construction issue and replaced with the new Chinquapin Elementary School station installed during the 2020 FY.

Table 16
Summary of Field Parameters (Sorted by Well) FY 2020
(Measured using a YSI ProDSS meters)
North Carolina Division of Water Resources
Ground Water Management Branch
2020 Annual Report

Well	Station Name	County	Date	Temp ºC	Conductivity (µS/cm)	DO (ppmv or mg/L)	pH	Salinity (ppt)
AA 32R1	Long Creek	Pender	06/03/2020	19.6	167.2	0.22	5.65	0.08
AA 32R2	Long Creek	Pender	06/09/2020	20.1	11742	0.21	7.36	6.72
AA 32R3	Long Creek	Pender	06/03/2020	18.9	1119	0.12	8.36	0.56
AA 32R4	Long Creek	Pender	06/03/2020	19.8	5559	0.11	7.70	3.02
C 31Y1	Vaughan Elementary School	Warren	08/21/2019	17.9	234.5	0.18	5.84	0.11
C 33Y1	Warren County High School	Warren	06/30/2020	19.7	88.0	6.46	4.88	0.04
C 34L1	Northside Elementary School	Warren	06/30/2020	18.2	81.6	6.06	5.29	0.04
CC 33O2	Maco	Brunswick	02/04/2020	19.6	127.2	0.71	5.94	0.06
CC 33O5	Maco	Brunswick	02/04/2020	17.4	154.5	0.88	3.90	0.07
FF 32Y1	Boiling Springs RS2	Brunswick	02/19/2020	17.7	606	0.22	6.83	0.30
FF 32Y2	Boiling Springs RS2	Brunswick	02/19/2020	15.6	140.8	0.52	5.97	0.07
FF 33S1	Boiling Springs RS1	Brunswick	02/19/2020	17.2	443.7	0.26	7.15	0.21
G 50W2	Gibsonville	Guilford	03/10/2020	16.1	234.6	3.09	6.27	0.11
I 31M1	Nash County Well No. 3	Nash	02/27/2020	17.9	208.2	0.29	6.11	0.10
I 35K2	Bunn	Franklin	02/26/2020	17.5	113.8	7.88	5.08	0.05
J 44D1	Chi Psi Fraternity., UNC	Orange	03/10/2020	17.0	510.0	6.34	5.76	0.25
K 40M1	Powell Drive	Wake	10/22/2019	18.0	99.3	0.04	6.54	0.05
L 15T1	D Canal Road	Hyde	08/01/2019	18.6	778	0.18	7.56	0.38
L 15T2	D Canal Road	Hyde	08/01/2019	17.0	19269	0.19	7.10	11.50
L 15T3	D Canal Road	Hyde	08/01/2019	20.5	435.3	0.27	7.18	0.21
L 15T4	D Canal Road	Hyde	08/01/2019	16.9	781	0.25	7.16	0.38
L 15T5	D Canal Road	Hyde	08/01/2019	17.4	682	0.14	7.12	0.33

Table 16 (continued)
Summary of Field Parameters (Sorted by Well) FY 2020
(Measured using a YSI ProDSS meters)
North Carolina Division of Water Resources
Ground Water Management Branch
2020 Annual Report

Well	Station Name	County	Date	Temp °C	Conductivity (µS/cm)	DO (ppmv or mg/L)	pH	Salinity (ppt)
L 24B3	North Pitt High School	Pitt	06/24/2020	20.0	5016	0.21	8.57	2.7
L 24B7	North Pitt High School	Pitt	06/24/2020	19.5	208	3.73	4.29	0.1
M 53L1	NC Zoo	Randolph	08/29/2019	19.9	62.8	4.57	5.33	0.03
O 28K3	Snow Hill	Greene	08/15/2019	19.5	61.8	0.10	5.97	0.03
O 28K4	Snow Hill	Greene	08/15/2019	18.9	75.7	0.11	6.77	0.04
O 28K5	Snow Hill	Greene	08/15/2019	21.3	82.9	4.55	6.42	0.04
O 28K6	Snow Hill	Greene	08/15/2019	23.4	240.6	0.24	6.22	0.11
R 48G2	Southern Pines Water Plant	Moore	11/14/2019	16.3	30.0	0.88	7.09	0.01
S 22J5	Clarks	Craven	11/19/2019	17.8	464.8	0.27	7.15	0.22
S 22J8	Clarks	Craven	02/05/2020	22.9	4724	0.22	8.63	2.53
S 22J9	Clarks	Craven	05/05/2020	20.1	4682	0.57	8.53	2.51
S 22J10	Clarks	Craven	11/19/2019	18.7	1997	0.26	8.58	1.02
S 22J12	Clarks	Craven	11/19/2019	18.5	7394	0.33	7.63	4.09
S 48H2	Weymouth Woods	Moore	01/16/2020	17.8	40.4	4.30	5.55	0.02
U 40Y1	Cedar Creek Fire Tower	Cumberland	11/13/2019	18.8	451.0	0.27	7.34	0.22
U 40Y2	Cedar Creek Fire Tower	Cumberland	10/23/2019	20.0	226.0	0.14	6.85	0.11
U 40Y3	Cedar Creek Fire Tower	Cumberland	10/23/2019	18.4	25.7	0.53	5.01	0.01
U 40Y4	Cedar Creek Fire Tower	Cumberland	10/23/2019	21.0	59.7	0.60	4.64	0.03
U 41A1	Seabrook School	Cumberland	11/12/2019	15.4	139.2	0.61	-	0.07
V 39O1	Bushy Lake	Cumberland	10/31/2019	20.1	342.2	0.28	7.59	0.16
V 39O2	Bushy Lake	Cumberland	10/31/2019	20.9	27.7	0.36	4.71	0.01
V 39O3	Bushy Lake	Cumberland	10/31/2019	19.1	134.7	0.17	6.92	0.06

Table 16 (continued)
Summary of Field Parameters (Sorted by Well) FY 2020
(Measured using a YSI ProDSS meters)
North Carolina Division of Water Resources
Ground Water Management Branch
2020 Annual Report

Well	Station Name	County	Date	Temp ^{0}C	Conductivity (µS/cm)	DO (ppmv or mg/L)	pH	Salinity (ppt)
Y 30S3	Burgaw	Pender	03/17/2020	18.1	581	0.23	7.18	0.28
Y 30S7	Burgaw	Pender	03/17/2020	18.6	655	0.17	8.37	0.32
Y 44O4	Robeson Correctional Center	Robeson	09/04/2019	21.5	63.2	0.24	5.52	0.03
Y 44O6	Robeson Correctional Center	Robeson	09/04/2019	20.5	660	0.1	8.22	0.32
Z 29N1	Holly Shelter	Pender	05/26/2020	18.0	247.3	0.27	7.51	0.12
Z 29N2	Holly Shelter	Pender	05/26/2020	19.7	55.7	0.10	5.06	0.02
Z 29N3	Holly Shelter	Pender	05/26/2020	18.6	445.4	0.20	6.84	0.21
Z 29N4	Holly Shelter	Pender	05/26/2020	18.8	60.0	0.25	5.31	0.03

APPENDICES

APPENDIX A

WELL CONSTRUCTION RECORDS

MERCHANTS MILLPOND STATE PARK
MONITORING STATION
C 16S1, C 16S2, C 16S3, C 16S4, C 16S5, C 16S6

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

Charles A Dozier
Well Contractor Name

4088-A
NC Well Contractor Certification Number

Todd Well & Pump Service Inc
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
☐Agricultural ☐Municipal/Public
☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)
☐Industrial/Commercial ☐Residential Water Supply (shared)
☐Irrigation ☐Wells > 100,000 GPD

Non-Water Supply Well:
☑Monitoring ☐Recovery

Injection Well:
☐Aquifer Recharge ☐Groundwater Remediation
☐Aquifer Storage and Recovery ☐Salinity Barrier
☐Aquifer Test ☐Stormwater Drainage
☐Experimental Technology ☐Subsidence Control
☐Geothermal (Closed Loop) ☐Tracer
☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 6-17-19 **Well ID#** _____

5a. Well Location:

NC DEQ / UPPER CAPE FEAR Wtlnd
Facility/Owner Name Facility ID# (if applicable)

Physical Address, City, and Zip

Cumberland
County Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

_____ N _____ W

6. Is(are) the well(s): ☑Permanent or ☐Temporary

7. Is this a repair to an existing well: ☐Yes or ☑No
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: _____

9. Total well depth below land surface: 467 **(ft.)**
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: _____ **(ft.)**
If water level is above casing, use "+"

11. Borehole diameter: _____ **(in.)**

12. Well construction method: Rotary
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
440 ft.	450 ft.	Sand
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	175 ft.	10 in.	Sch40	PVC

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	440 ft.	4.5 in.	SDR17	PVC
450 ft.	455 ft.	4.5 in.	SDR17	PVC

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
440 ft.	450 ft.	4 in.	.020	Sch40	Stainless
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
170 ft.	0 ft.	Bonseal	Pumped
435 ft.	0 ft.	quick grout	Pumped
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
467 ft.	435 ft.	Silica	Tremmie
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	
ft.	ft.	See Attached
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Signature of Certified Well Contractor

7-22-19
Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

Charles N Oozier
Well Contractor Name

4088-A
NC Well Contractor Certification Number

Todd Well & Pump Service Inc
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
☐Agricultural ☐Municipal/Public
☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)
☐Industrial/Commercial ☐Residential Water Supply (shared)
☐Irrigation ☐Wells > 100,000 GPD

Non-Water Supply Well:
☑Monitoring ☐Recovery

Injection Well:
☐Aquifer Recharge ☐Groundwater Remediation
☐Aquifer Storage and Recovery ☐Salinity Barrier
☐Aquifer Test ☐Stormwater Drainage
☐Experimental Technology ☐Subsidence Control
☐Geothermal (Closed Loop) ☐Tracer
☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed 6-26-2019 **Well ID#** _____

5a. Well Location:

NC DEQ BEAUFORT WELL #2
Facility/Owner Name Facility ID# (if applicable)

Physical Address, City, and Zip

GATES
County Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

_____ N _____ W

6. Is(are) the well(s): ☑Permanent or ☐Temporary

7. Is this a repair to an existing well: ☐Yes or ☑No
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: _____

9. Total well depth below land surface: 235 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: _____ (ft.)
If water level is above casing, use "+"

11. Borehole diameter: 10 (in.)

12. Well construction method: Rotary
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
235 ft.	245 ft.	Sand
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
100 ft.	0 ft.	10 in.	Sch 40	PVC

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3' ft.	235 ft.	4.5 in.	SDR17	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
235 ft.	245 ft.	4 in.	.020	Sch 40	Stainless
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
100 ft.	0 ft.	Bentseal	Tremmie / pumped
228 ft.	0 ft.	Bentseal	" "
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
253 ft.	235 ft.	Silica	Tremmie
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	See Attached
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

_____ 7-22-19
Signature of Certified Well Contractor Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

Charles A Dozier
Well Contractor Name

4088-A
NC Well Contractor Certification Number

Jamo well & Pump Service Inc
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
- ☐ Agricultural
- ☐ Geothermal (Heating/Cooling Supply)
- ☐ Industrial/Commercial
- ☐ Irrigation
- ☐ Municipal/Public
- ☐ Residential Water Supply (single)
- ☐ Residential Water Supply (shared)
- ☐ Wells > 100,000 GPD

Non-Water Supply Well:
- ☑ Monitoring
- ☐ Recovery

Injection Well:
- ☐ Aquifer Recharge
- ☐ Aquifer Storage and Recovery
- ☐ Aquifer Test
- ☐ Experimental Technology
- ☐ Geothermal (Closed Loop)
- ☐ Geothermal (Heating/Cooling Return)
- ☐ Groundwater Remediation
- ☐ Salinity Barrier
- ☐ Stormwater Drainage
- ☐ Subsidence Control
- ☐ Tracer
- ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 6-28-19 **Well ID#** _____

5a. Well Location:

NC DEQ/CASTLE HAYNE WELL #3
Facility/Owner Name

Facility ID# (if applicable)

Physical Address, City, and Zip

COLUMBUS
County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

_____ N _____ W

6. Is(are) the well(s): ☑ **Permanent** or ☐ **Temporary**

7. Is this a repair to an existing well: ☐ Yes or ☑ No
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: _____

9. Total well depth below land surface: 205 **(ft.)**
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: _____ **(ft.)**
If water level is above casing, use "+"

11. Borehole diameter: 10 **(in.)**

12. Well construction method: Rotary
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
190 ft.	200 ft.	Brown Limestone
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	100 ft.	10 in.	Sch 40	PVC

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	190 ft.	4.5 in.	SDR17	PVC
200 ft.	205 ft.	4.5 in.	SDR17	PVC

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
140 ft.	200 ft.	4" in.	.020	Sch 40	Stainless
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
183 ft.	0 ft.	Bentseal	Tremmie/Pumped
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
210 ft.	183 ft.	Silica	Tremmie
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	See attached
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Signature of Certified Well Contractor

7-22-19
Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

Charles A Dozier
Well Contractor Name

4088-A
NC Well Contractor Certification Number

Todd Well & Pump Service Inc
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
- ☐ Agricultural
- ☐ Municipal/Public
- ☐ Geothermal (Heating/Cooling Supply)
- ☐ Residential Water Supply (single)
- ☐ Industrial/Commercial
- ☐ Residential Water Supply (shared)
- ☐ Irrigation
- ☐ Wells > 100,000 GPD

Non-Water Supply Well:
- ☑ Monitoring
- ☐ Recovery

Injection Well:
- ☐ Aquifer Recharge
- ☐ Groundwater Remediation
- ☐ Aquifer Storage and Recovery
- ☐ Salinity Barrier
- ☐ Aquifer Test
- ☐ Stormwater Drainage
- ☐ Experimental Technology
- ☐ Subsidence Control
- ☐ Geothermal (Closed Loop)
- ☐ Tracer
- ☐ Geothermal (Heating/Cooling Return)
- ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 7-1-2019 **Well ID#** _____

5a. Well Location:

NC DEQ / Yorktown
Facility/Owner Name

Well #4
Facility ID# (if applicable)

Physical Address, City, and Zip

Gates
County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

_____ N _____ W

6. Is(are) the well(s): ☑ **Permanent** or ☐ **Temporary**

7. Is this a repair to an existing well: ☐ **Yes** or ☑ **No**
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: _____

9. Total well depth below land surface: 60 **(ft.)**
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: _____ **(ft.)**
If water level is above casing, use "+"

11. Borehole diameter: 10" **(in.)**

12. Well construction method: Rotary
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
40 ft.	50 ft.	Clay & Sand
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	40 ft.	4.5 in.	Sch 40	PVC
50 ft.	55 ft.	4.5 in.	Sch 40	PVC

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
40 ft.	50 ft.	4" in.	.020	Sch 40	Stainless
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
35 ft.	0 ft.	Benseal	Pumped / Trimmie
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
34 ft.	60 ft.	Silica	Trimmie
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	
ft.	ft.	See attached
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Signature of Certified Well Contractor

7-22-19
Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

Charles M Dozier
Well Contractor Name

4088-A
NC Well Contractor Certification Number

Todd Well & Pump Service Inc
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
- ☐ Agricultural
- ☐ Geothermal (Heating/Cooling Supply)
- ☐ Industrial/Commercial
- ☐ Irrigation
- ☐ Municipal/Public
- ☐ Residential Water Supply (single)
- ☐ Residential Water Supply (shared)
- ☐ Wells > 100,000 GPD

Non-Water Supply Well:
- ☑ Monitoring
- ☐ Recovery

Injection Well:
- ☐ Aquifer Recharge
- ☐ Aquifer Storage and Recovery
- ☐ Aquifer Test
- ☐ Experimental Technology
- ☐ Geothermal (Closed Loop)
- ☐ Geothermal (Heating/Cooling Return)
- ☐ Groundwater Remediation
- ☐ Salinity Barrier
- ☐ Stormwater Drainage
- ☐ Subsidence Control
- ☐ Tracer
- ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 7-1-19 **Well ID#** _____

5a. Well Location:

NC DEQ/ SURFICAL WELL #5
Facility/Owner Name | Facility ID# (if applicable)

Physical Address, City, and Zip

CATES
County | Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

_____ N _____ W

6. Is(are) the well(s): ☑ Permanent or ☐ Temporary

7. Is this a repair to an existing well: ☐ Yes or ☑ No
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: _____

9. Total well depth below land surface: 30' (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: _____ (ft.)
If water level is above casing, use "+"

11. Borehole diameter: 10 (in.)

12. Well construction method: Rotary
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
10 ft.	20 ft.	Sand
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	10 ft.	4" in.	Sch 40	Stainless
20 ft.	25 ft.	4" in.	Sch 40	Stainless

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
10 ft.	20 ft.	4" in.	Sch 40	.020	Stainless
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
~~8~~ 10 ft.	0 ft.	Bensear	Tremmie / Pumped
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
8 ft.	30 ft.	Silica	Poured
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	
ft.	ft.	See Attached
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Signature of Certified Well Contractor — Date: 7-22-19

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

For Internal Use Only:

1. Well Contractor Information:

CHARLES N. DOZIER, II
Well Contractor Name

NCWC 4088-A
NC Well Contractor Certification Number

TOANO WELL AND PUMP SERVICE, INC-
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
- ☐ Agricultural
- ☐ Municipal/Public
- ☐ Geothermal (Heating/Cooling Supply)
- ☐ Residential Water Supply (single)
- ☐ Industrial/Commercial
- ☐ Residential Water Supply (shared)
- ☐ Irrigation
- ☐ Wells > 100,000 GPD

Non-Water Supply Well:
- ☐ Monitoring
- ☐ Recovery

Injection Well:
- ☐ Aquifer Recharge
- ☐ Groundwater Remediation
- ☐ Aquifer Storage and Recovery
- ☐ Salinity Barrier
- ☐ Aquifer Test
- ☐ Stormwater Drainage
- ☐ Experimental Technology
- ☐ Subsidence Control
- ☐ Geothermal (Closed Loop)
- ☐ Tracer
- ☐ Geothermal (Heating/Cooling Return)
- ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 9/25/19 **Well ID#** 6

5a. Well Location:
MERCHANT'S MILLPOND
Facility/Owner Name

Lower Cape Fear
Facility ID# (if applicable)

STATE OF NORTH CAROLINA
Physical Address, City, and Zip

176 MILL POND ROAD, GATESVILLE, NC 27938

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

_____ N _____ W

6. Is(are) the well(s): ☑ **Permanent** or ☐ **Temporary**

7. Is this a repair to an existing well: ☐ **Yes** or ☑ **No**
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: _____

9. Total well depth below land surface: 870 **(ft.)**
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: _____ **(ft.)**
If water level is above casing, use "+"

11. Borehole diameter: _____ **(in.)**

12. Well construction method: Rotary mud
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	800 ft.	10 in.	SCH 40	PVC

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	815 ft.	4.5 in.	SDR 17	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
815 ft.	825 ft.	4 in.	.020		SS
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
802 ft.	0 ft.	Bentonite	Tremmie
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
870 ft.	802 ft.	Silica Sand	Tremmie
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	
ft.	ft.	See Attached
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Signature of Certified Well Contractor — Date: 10-24-2019

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

VERONA LOOP MONITORING STATION
X 25W1, X 25W2, X 25W3, X 25W4

WELL CONSTRUCTION RECORD (GW-1)

For Internal Use Only:

1. Well Contractor Information:

Francis Xavier Harrington
Well Contractor Name

4389A
NC Well Contractor Certification Number

Walker Hill Environmental
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
- ☐ Agricultural
- ☐ Geothermal (Heating/Cooling Supply)
- ☐ Industrial/Commercial
- ☐ Irrigation
- ☐ Municipal/Public
- ☐ Residential Water Supply (single)
- ☐ Residential Water Supply (shared)

Non-Water Supply Well:
- ☒ Monitoring
- ☐ Recovery

Injection Well:
- ☐ Aquifer Recharge
- ☐ Aquifer Storage and Recovery
- ☐ Aquifer Test
- ☐ Experimental Technology
- ☐ Geothermal (Closed Loop)
- ☐ Geothermal (Heating/Cooling Return)
- ☐ Groundwater Remediation
- ☐ Salinity Barrier
- ☐ Stormwater Drainage
- ☐ Subsidence Control
- ☐ Tracer
- ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 7/29/2019 **Well ID#** X25W-S

5a. Well Location:

Camp Lejeune
Facility/Owner Name

Facility ID# (if applicable)

Verona Loop, Jacksonville, 28540
Physical Address, City, and Zip

Onslow
County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

34.672123 N 77.463527 W

6. Is(are) the well(s): ☒ **Permanent** or ☐ **Temporary**

7. Is this a repair to an existing well: ☐ Yes or ☒ No
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: 1

9. Total well depth below land surface: 1-35' _____ _____ (ft.)
For multiple wells list all depths if different (example- 5@200' and 2@100')

10. Static water level below top of casing: 12 (ft.)
If water level is above casing, use "+"

11. Borehole diameter: 8 (in.)

12. Well construction method: Sonic
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	10 ft.	4 in.	Sch 40	PVC
30 ft.	35 ft.	4 in.	Sch 40	PVC

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
10 ft.	30 ft.	4 in.	.020	Sch 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	5 ft.	cement	Trimmie / 10 Gals
5 ft.	8 ft.	Pellets	Trimmie / 1.5 Buckets
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
8 ft.	35 ft.	#1 Sand	Trimmie
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	
ft.	ft.	Please See Attached
ft.	ft.	Soil Log
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Francis Xavier Harrington — 8/19/2019
Signature of Certified Well Contractor — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTRUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells: In addition to sending the form to the address in 24a above, also submit one copy of this form within 30 days of completion of well construction to the following:

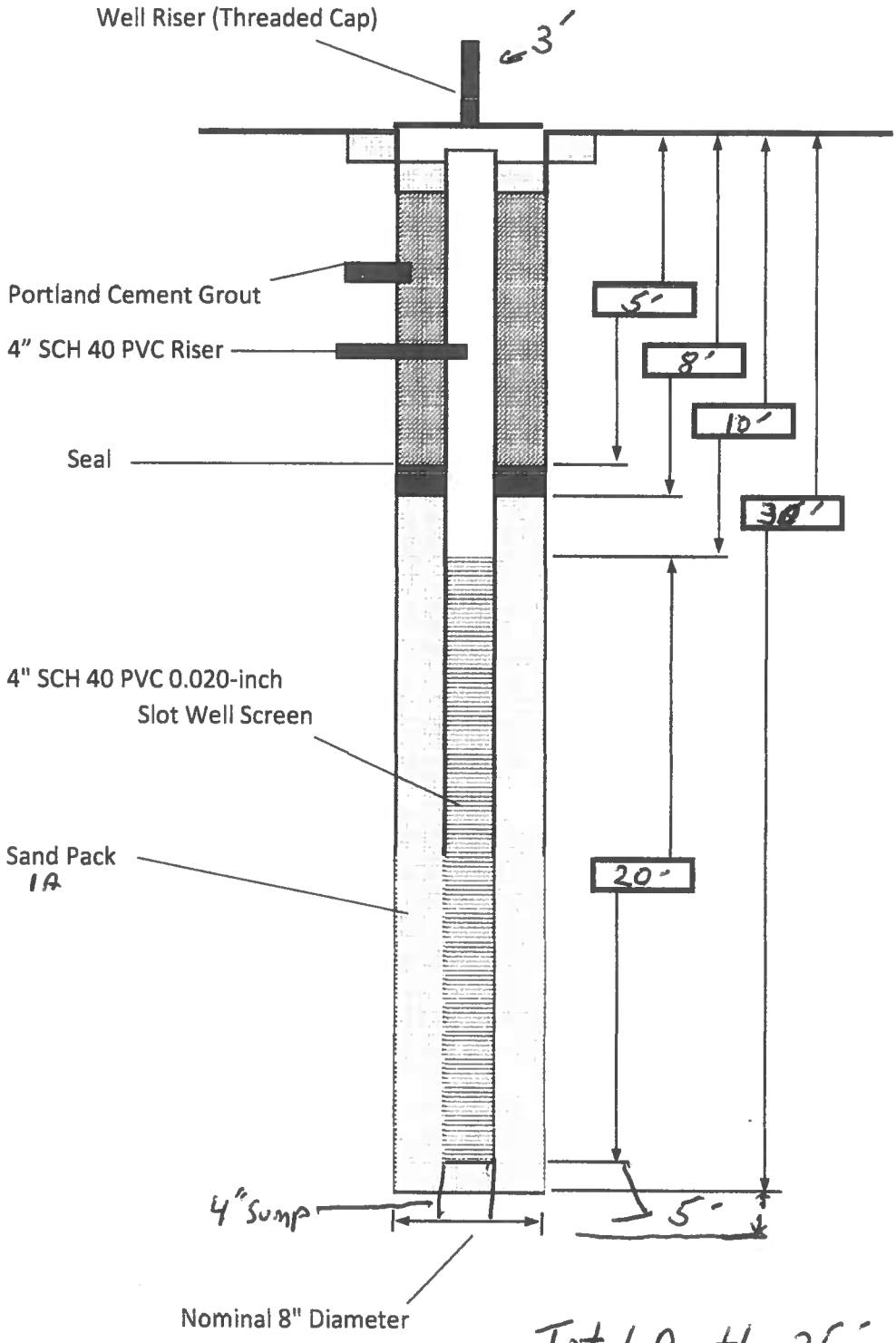
Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

Verona Loop

Surficial Monitoring Well (TYP)

X25W-S



NOTES:

FIGURE NOT TO SCALE
PVC = POLYVINYL CHLORIDE
SCH 40 = SCHEDULE 40

TIKIGAQ

No.	Date	Remarks

CONTRACT NO.: N40085-16-D-5517	D.O. NO: F6786
JOB NO: 7096	
CHECKED BY: Jason Chebetar	
DRAWN BY:	
DATE: APRIL 2019	

WELL CONSTRUCTION RECORD (GW-1)

For Internal Use Only:

1. Well Contractor Information:

Francis Xavier Harrington
Well Contractor Name

4389 A
NC Well Contractor Certification Number

Walker Hill Environmental
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
- ☐ Agricultural
- ☐ Geothermal (Heating/Cooling Supply)
- ☐ Industrial/Commercial
- ☐ Irrigation
- ☐ Municipal/Public
- ☐ Residential Water Supply (single)
- ☐ Residential Water Supply (shared)

Non-Water Supply Well:
- ☒ Monitoring
- ☐ Recovery

Injection Well:
- ☐ Aquifer Recharge
- ☐ Aquifer Storage and Recovery
- ☐ Aquifer Test
- ☐ Experimental Technology
- ☐ Geothermal (Closed Loop)
- ☐ Geothermal (Heating/Cooling Return)
- ☐ Groundwater Remediation
- ☐ Salinity Barrier
- ☐ Stormwater Drainage
- ☐ Subsidence Control
- ☐ Tracer
- ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 8/2/2019 **Well ID#** X25W-TCh-44

5a. Well Location:

Camp Lejeune
Facility/Owner Name

Facility ID# (if applicable)

Verona Loop, Jacksonville, 28540
Physical Address, City, and Zip

Onslow
County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

34.672099 N 77.463500 W

6. Is(are) the well(s): ☒ **Permanent** or ☐ **Temporary**

7. Is this a repair to an existing well: ☐ **Yes** or ☒ **No**
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: 1

9. Total well depth below land surface: 70 **(ft.)**
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 37.2 **(ft.)**
If water level is above casing, use "+"

11. Borehole diameter: 8 **(in.)**

12. Well construction method: Sonic
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	45 ft.	4 in.	Sch 40	PVC
65 ft.	70 ft.	4 in.	Sch 40	PVC

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
45 ft.	65 ft.	4 in.	.030	Sch 40	Stainless
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	40 ft.	Cement	Trimmie / 82 Gals
40 ft.	43 ft.	Pellets	Trimmie / 1.5 Buckets
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
43 ft.	70 ft.	#2 Sand	Trimmie
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	
ft.	ft.	Please See Attached
ft.	ft.	Soil Log
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Francis Xavier Harrington — 8/19/2019
Signature of Certified Well Contractor — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTRUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells: In addition to sending the form to the address in 24a above, also submit one copy of this form within 30 days of completion of well construction to the following:

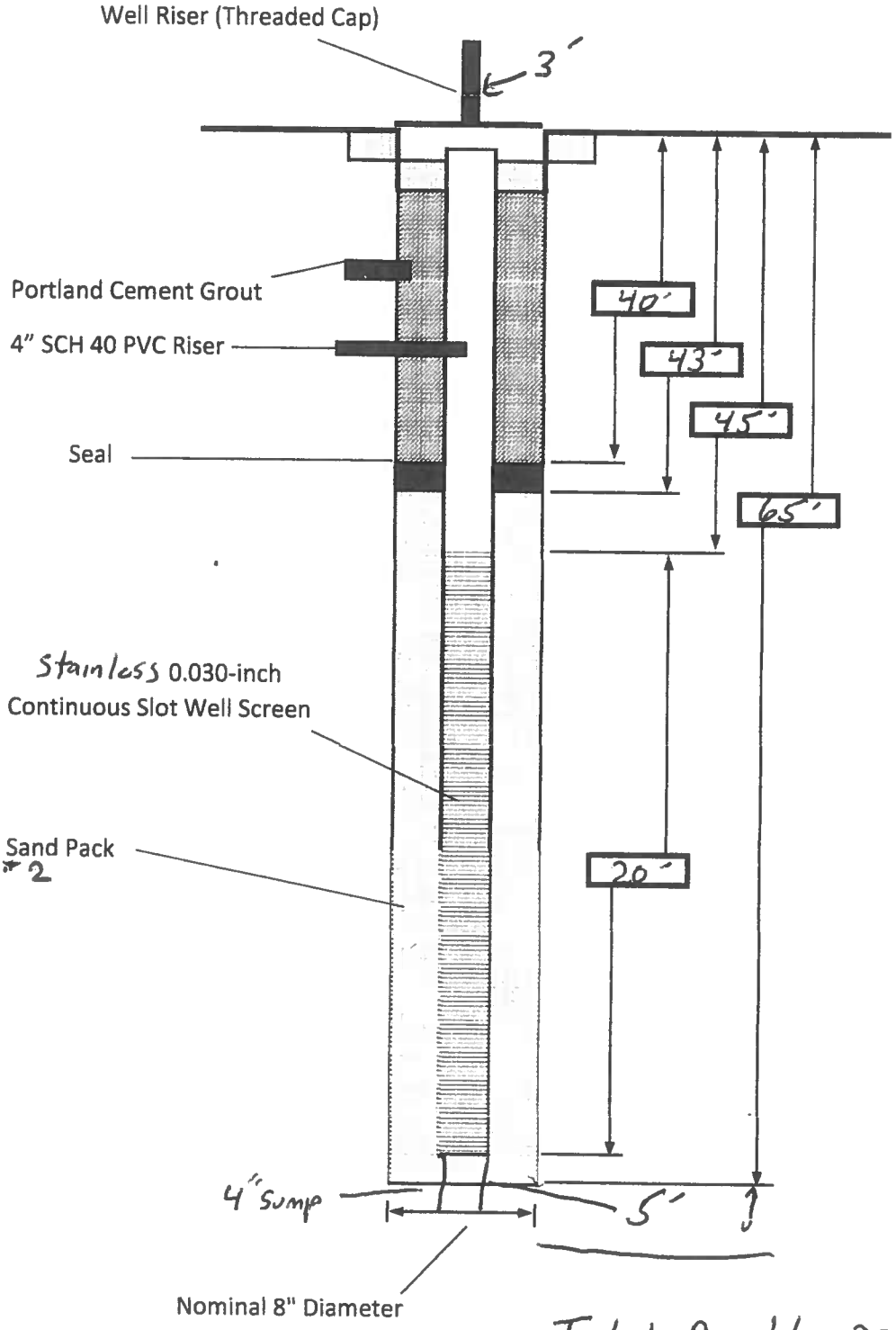
Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

Verona Loop

Deep Monitoring Well (TYP)

X25w-Tch-Uch



NOTES:

FIGURE NOT TO SCALE
PVC = POLYVINYL CHLORIDE
SCH 40 = SCHEDULE 40

TIKIGAQ

No.	Date	Remarks

CONTRACT NO.:	D.O. NO:
N40085-16-D-5517	F6786
JOB NO: 7096	
CHECKED BY: Jason Chebetar	
DRAWN BY:	
DATE: APRIL 2019	

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

Francis Xavier Harrington
Well Contractor Name

4389 A
NC Well Contractor Certification Number

Walker Hill Environmental
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
- ☐ Agricultural
- ☐ Geothermal (Heating/Cooling Supply)
- ☐ Industrial/Commercial
- ☐ Irrigation
- ☐ Municipal/Public
- ☐ Residential Water Supply (single)
- ☐ Residential Water Supply (shared)

Non-Water Supply Well:
- ☒ Monitoring
- ☐ Recovery

Injection Well:
- ☐ Aquifer Recharge
- ☐ Aquifer Storage and Recovery
- ☐ Aquifer Test
- ☐ Experimental Technology
- ☐ Geothermal (Closed Loop)
- ☐ Geothermal (Heating/Cooling Return)
- ☐ Groundwater Remediation
- ☐ Salinity Barrier
- ☐ Stormwater Drainage
- ☐ Subsidence Control
- ☐ Tracer
- ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 8/3/2019 **Well ID#** x25w-Tch-LCH

5a. Well Location:

Camp Lejeune
Facility/Owner Name

Facility ID# (if applicable)

Verona Loop, Jacksonville, 28540
Physical Address, City, and Zip

Onslow
County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

34.672058 N 77.463527 W

6. Is(are) the well(s): ☒ **Permanent** or ☐ **Temporary**

7. Is this a repair to an existing well: ☐ **Yes** or ☒ **No**
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: 1

9. Total well depth below land surface: 220 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 45.5 (ft.)
If water level is above casing, use "+"

11. Borehole diameter: 10 (in.)

12. Well construction method: rotary
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	195 ft.	4.5 in.	SDR 17	Shurlock PVC
215 ft.	220 ft.	4 in.	Sch 40	Stainless

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
195 ft.	215 ft.	4 in.	.030	Sch 40	Stainless
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0' ft.	182 ft.	Cement	Trimmie / 605 gals
182 ft.	185 ft.	Pellets	Trimmie / 2-Buckets
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
185 ft.	220 ft.	#2 Sand	Trimmie
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	
ft.	ft.	Please See Attached
ft.	ft.	Soil log
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Francis Xavier Harrington
Signature of Certified Well Contractor

8/19/2019
Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTRUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells: In addition to sending the form to the address in 24a above, also submit one copy of this form within 30 days of completion of well construction to the following:

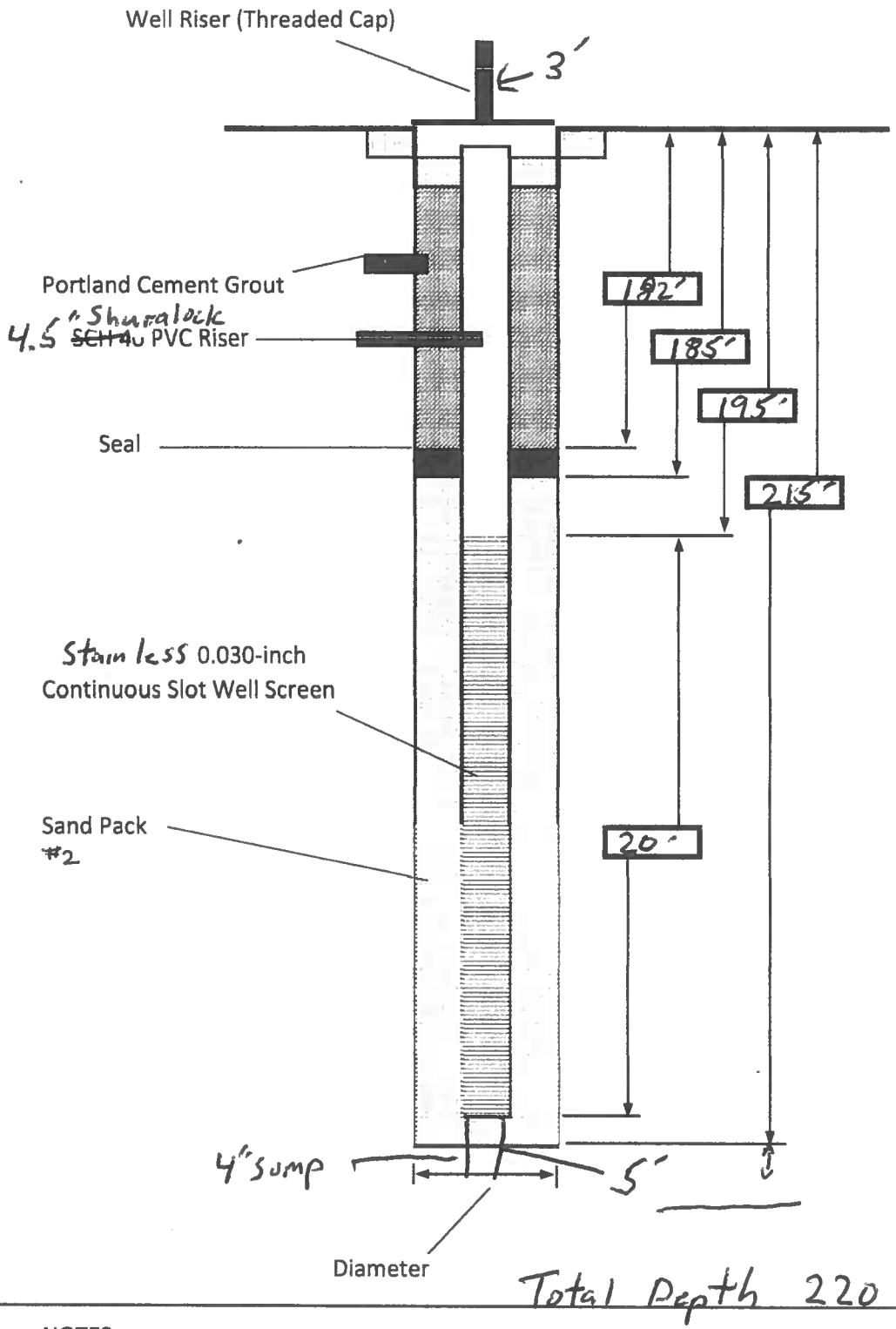
Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

Verona Loop

Deep Monitoring Well (TYP)

X25w-Tch-LCH



NOTES:

FIGURE NOT TO SCALE
PVC = POLYVINYL CHLORIDE

TIKIGAQ

No.	Date	Remarks

CONTRACT NO.:	D.O. NO:
N40085-16-D-5517	F6786
JOB NO: 7096	
CHECKED BY: Jason Chebetar	
DRAWN BY:	
DATE: APRIL 2019	

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

Francis Xavier Harrington
Well Contractor Name

4389
NC Well Contractor Certification Number

Walker Hill Environmental
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
- ☐ Agricultural
- ☐ Geothermal (Heating/Cooling Supply)
- ☐ Industrial/Commercial
- ☐ Irrigation
- ☐ Municipal/Public
- ☐ Residential Water Supply (single)
- ☐ Residential Water Supply (shared)

Non-Water Supply Well:
- ☒ Monitoring
- ☐ Recovery

Injection Well:
- ☐ Aquifer Recharge
- ☐ Aquifer Storage and Recovery
- ☐ Aquifer Test
- ☐ Experimental Technology
- ☐ Geothermal (Closed Loop)
- ☐ Geothermal (Heating/Cooling Return)
- ☐ Groundwater Remediation
- ☐ Salinity Barrier
- ☐ Stormwater Drainage
- ☐ Subsidence Control
- ☐ Tracer
- ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 8/1/2019 **Well ID#** X25W-KPD

5a. Well Location:

Camp Lejeune
Facility/Owner Name

Facility ID# (if applicable)

Verona Loop, Jacksonville, 28540
Physical Address, City, and Zip

Onslow
County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

34.672033 N 77.463560 W

6. Is(are) the well(s): ☒ **Permanent** or ☐ **Temporary**

7. Is this a repair to an existing well: ☐ **Yes** or ☒ **No**
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: 1

9. Total well depth below land surface: 515' (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 40 (ft.)
If water level is above casing, use "+"

11. Borehole diameter: 10 (in.)

12. Well construction method: rotary
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	40 ft.	12 in.	Sch 40	PVC

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	490 ft.	4.5 in.	SDR 17	Shurglock PVC
510 ft.	515 ft.	4 in.	Sch 40	Stainless

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
490 ft.	510 ft.	4 in.	.030	Sch 40	Stainless
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	476 ft.	cement	Trimmie / 1600 Gals
476 ft.	480 ft.	Pellets	Trimmie / 2-Buckets
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
480 ft.	515 ft.	#2 Sand	Trimmie
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	
ft.	ft.	Please See Attached
ft.	ft.	Soil log
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Francis Xavier Harrington
Signature of Certified Well Contractor

8/19/2019
Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTRUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells: In addition to sending the form to the address in 24a above, also submit one copy of this form within 30 days of completion of well construction to the following:

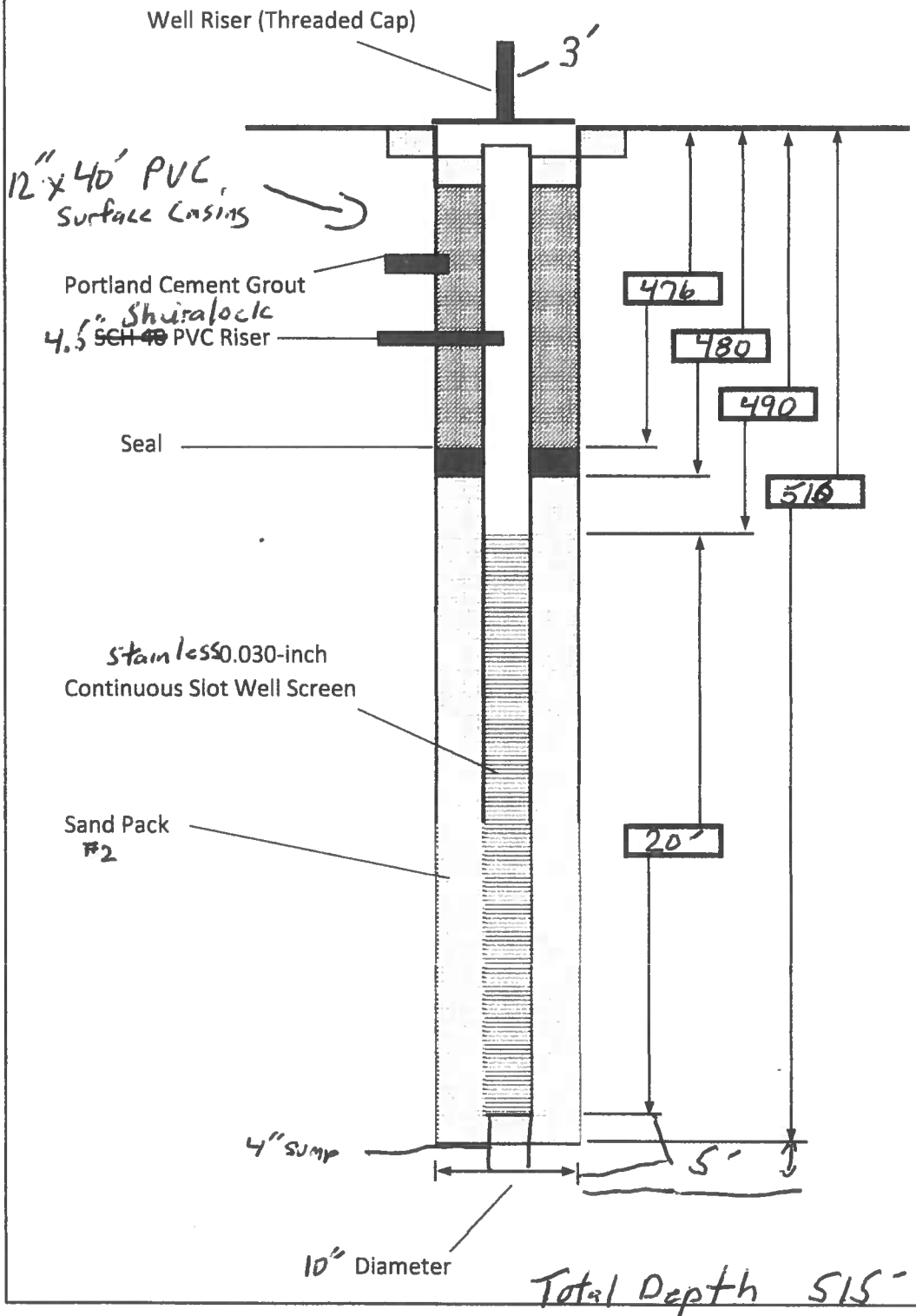
Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

Verona Loop

Deep Monitoring Well (TYP)

X25W-KPD



NOTES:

FIGURE NOT TO SCALE

PVC = POLYVINYL CHLORIDE

TIKIGAQ

No.	Date	Remarks

CONTRACT NO.: N40085-16-D-5517	D.O. NO.: F6786
JOB NO.: 7096	
CHECKED BY: Jason Chebetar	
DRAWN BY:	
DATE: APRIL 2019	

MARINES ROAD MONITORING STATION
Y 24T1, Y 24T2, Y 24T3, Y 24T4, Y 24T5

WELL CONSTRUCTION RECORD (GW-1)

For Internal Use Only:

1. Well Contractor Information:

Francis Xavier Harrington
Well Contractor Name

4389A
NC Well Contractor Certification Number

Walker Hill Environmental
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
- ☐ Agricultural
- ☐ Municipal/Public
- ☐ Geothermal (Heating/Cooling Supply)
- ☐ Residential Water Supply (single)
- ☐ Industrial/Commercial
- ☐ Residential Water Supply (shared)
- ☐ Irrigation

Non-Water Supply Well:
- ☒ Monitoring
- ☐ Recovery

Injection Well:
- ☐ Aquifer Recharge
- ☐ Groundwater Remediation
- ☐ Aquifer Storage and Recovery
- ☐ Salinity Barrier
- ☐ Aquifer Test
- ☐ Stormwater Drainage
- ☐ Experimental Technology
- ☐ Subsidence Control
- ☐ Geothermal (Closed Loop)
- ☐ Tracer
- ☐ Geothermal (Heating/Cooling Return)
- ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 8/25/2019 **Well ID#** Y24T-S

5a. Well Location:

Camp Lejeune
Facility/Owner Name

Facility ID# (if applicable)

Building# 1657S Marines Road
Physical Address, City, and Zip

Onslow
County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

34.601093 N 77.338360 W

6. Is(are) the well(s): ☒ **Permanent** or ☐ **Temporary**

7. Is this a repair to an existing well: ☐ **Yes** or ☒ **No**
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: 1

9. Total well depth below land surface: 35 **(ft.)**
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 33 **(ft.)**
If water level is above casing, use "+"

11. Borehole diameter: 8 **(in.)**

12. Well construction method: Sonic
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	10 ft.	4 in.	SCH40	PVC
30 ft.	35 ft.	4 in.	SCH40	PVC

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
10 ft.	30 ft.	4 in.	.020	SCH40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	5 ft.	Cement	Trimmie/10 Gallons
5 ft.	8 ft.	Pellets	Trimmie/1.5 Buckets
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
8 ft.	35 ft.	1A Sand	Trimmie
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	
ft.	ft.	PLEASE ATTACHED SOIL LOG
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Francis Xavier Harrington
Signature of Certified Well Contractor

9/9/2019
Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTRUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells: In addition to sending the form to the address in 24a above, also submit one copy of this form within 30 days of completion of well construction to the following:

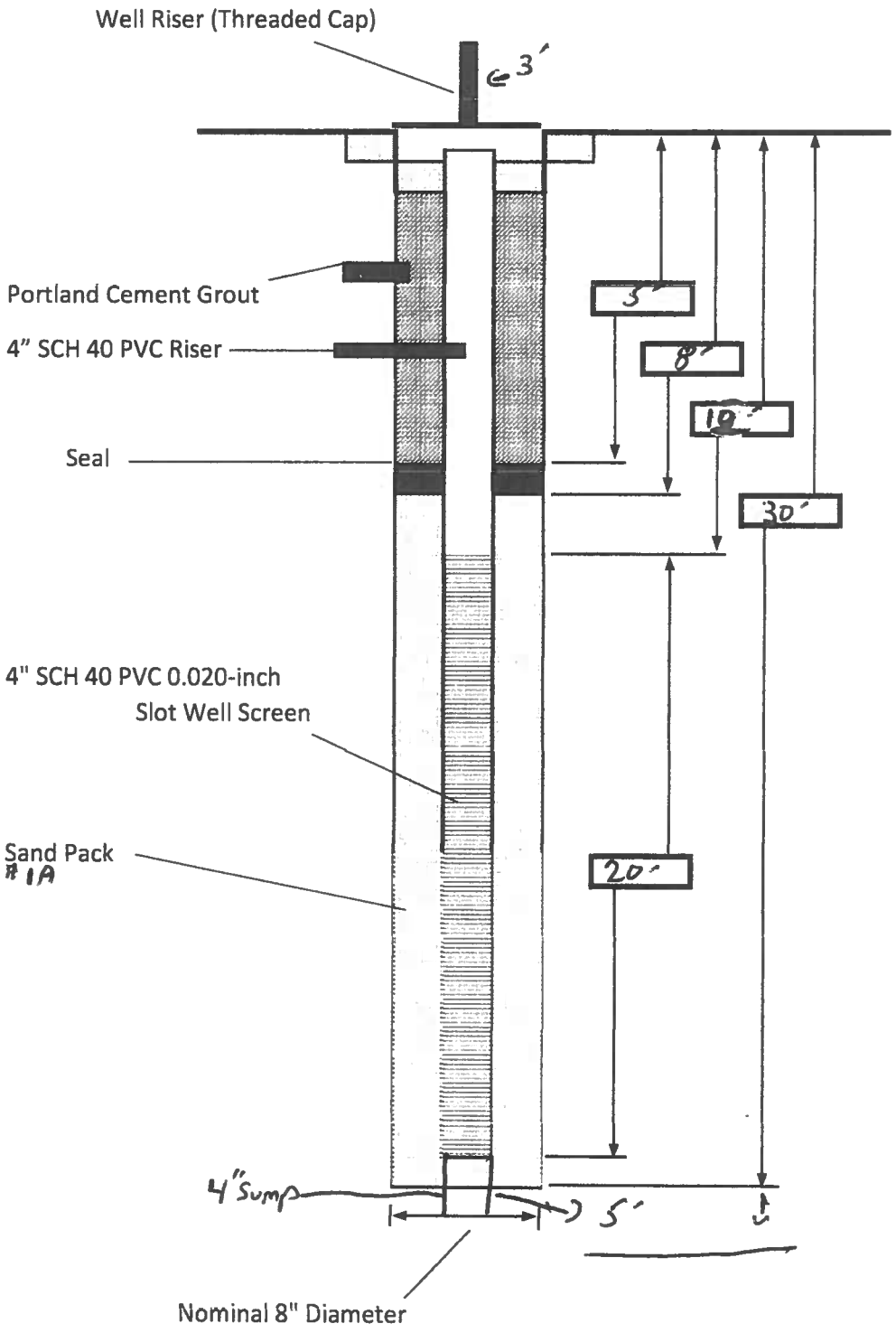
Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

Marines Road

Surficial Monitoring Well (TYP)

Y24T-S



NOTES:

FIGURE NOT TO SCALE
PVC = POLYVINYL CHLORIDE
SCH 40 = SCHEDULE 40

Total Depth 35'

TIKIGAQ

No.	Date	Remarks

CONTRACT NO.:	D.O. NO:
N40085-16-D-5517	F6786
JOB NO: 7096	
CHECKED BY: Jason Chebetar	
DRAWN BY:	
DATE: APRIL 2019	

WELL CONSTRUCTION RECORD (GW-1)

For Internal Use Only:

1. Well Contractor Information:

Francis Xavier Harrington
Well Contractor Name

4389A
NC Well Contractor Certification Number

Walker Hill Environmental
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
- ☐ Agricultural
- ☐ Municipal/Public
- ☐ Geothermal (Heating/Cooling Supply)
- ☐ Residential Water Supply (single)
- ☐ Industrial/Commercial
- ☐ Residential Water Supply (shared)
- ☐ Irrigation

Non-Water Supply Well:
- ☒ Monitoring
- ☐ Recovery

Injection Well:
- ☐ Aquifer Recharge
- ☐ Groundwater Remediation
- ☐ Aquifer Storage and Recovery
- ☐ Salinity Barrier
- ☐ Aquifer Test
- ☐ Stormwater Drainage
- ☐ Experimental Technology
- ☐ Subsidence Control
- ☐ Geothermal (Closed Loop)
- ☐ Tracer
- ☐ Geothermal (Heating/Cooling Return)
- ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 8/28/2019 **Well ID#** Y24T-TCH-UCH

5a. Well Location:

Camp Lejeune
Facility/Owner Name

Facility ID# (if applicable)

Building# 1657S Marines Road
Physical Address, City, and Zip

Onslow
County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

34.601085 N 77.338373 W

6. Is(are) the well(s): ☒ **Permanent** or ☐ **Temporary**

7. Is this a repair to an existing well: ☐ **Yes** or ☒ **No**
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: 1

9. Total well depth below land surface: 85 **(ft.)**
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 24.5 **(ft.)**
If water level is above casing, use "+"

11. Borehole diameter: 8 **(in.)**

12. Well construction method: Sonic
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	60 ft.	4 in.	SCH40	PVC
80 ft.	85 ft.	4 in.	SCH40	Stainless

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
60 ft.	80 ft.	4 in.	.030	SCH40	Stainless
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	55 ft.	Cement	Trimmie/115 Gallons
55 ft.	58 ft.	Pellets	Trimmie/1.5 Buckets
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
58 ft.	85 ft.	#2 Sand	Trimmie
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	
ft.	ft.	PLEASE ATTACHED SOIL LOG
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Francis Xavier Harrington
Signature of Certified Well Contractor

9/9/2019
Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTRUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

**Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617**

24b. For Injection Wells: In addition to sending the form to the address in 24a above, also submit one copy of this form within 30 days of completion of well construction to the following:

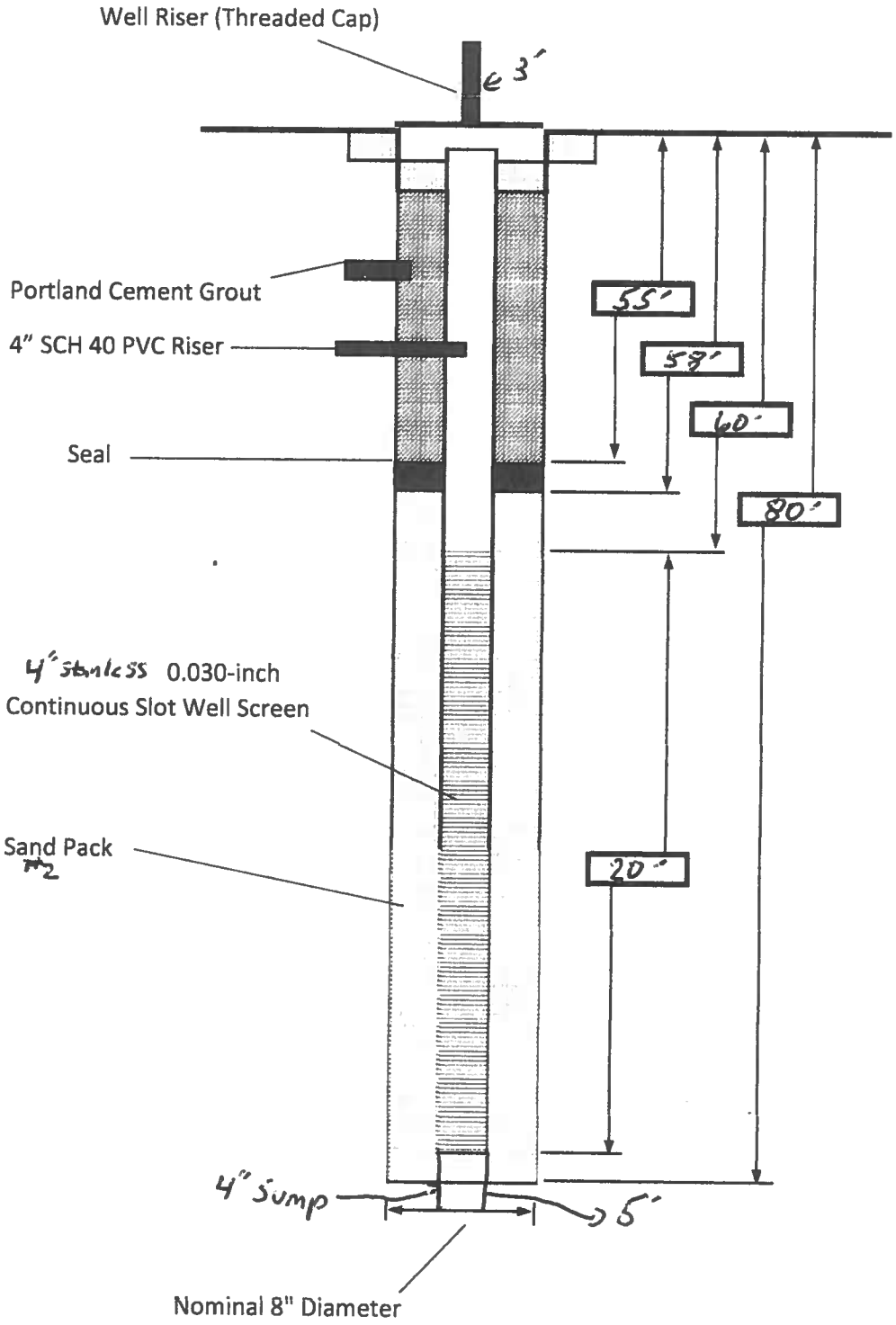
**Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636**

24c. For Water Supply & Injection Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

Marines Road

Y24T-Tch-UCH

Deep Monitoring Well (TYP)



NOTES:

FIGURE NOT TO SCALE
PVC = POLYVINYL CHLORIDE
SCH 40 = SCHEDULE 40

Total Depth 85'

TIKIGAQ

No.	Date	Remarks

CONTRACT NO.: N40085-16-D-5517	D.O. NO: F6786
JOB NO: 7096	
CHECKED BY: Jason Chebetar	
DRAWN BY:	
DATE: APRIL 2019	

WELL CONSTRUCTION RECORD (GW-1)

For Internal Use Only:

1. Well Contractor Information:

Francis Xavier Harrington
Well Contractor Name

4389A
NC Well Contractor Certification Number

Walker Hill Environmental
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
- ☐ Agricultural
- ☐ Municipal/Public
- ☐ Geothermal (Heating/Cooling Supply)
- ☐ Residential Water Supply (single)
- ☐ Industrial/Commercial
- ☐ Residential Water Supply (shared)
- ☐ Irrigation

Non-Water Supply Well:
- ☒ Monitoring
- ☐ Recovery

Injection Well:
- ☐ Aquifer Recharge
- ☐ Groundwater Remediation
- ☐ Aquifer Storage and Recovery
- ☐ Salinity Barrier
- ☐ Aquifer Test
- ☐ Stormwater Drainage
- ☐ Experimental Technology
- ☐ Subsidence Control
- ☐ Geothermal (Closed Loop)
- ☐ Tracer
- ☐ Geothermal (Heating/Cooling Return)
- ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 9/1/2019 **Well ID#** Y24T-TCH-MCH

5a. Well Location:

Camp Lejeune
Facility/Owner Name

Facility ID# (if applicable)

Building# 1657S Marines Road
Physical Address, City, and Zip

Onslow
County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

34.601044 N 77.338470 W

6. Is(are) the well(s): ☒ **Permanent** or ☐ **Temporary**

7. Is this a repair to an existing well: ☐ **Yes** or ☒ **No**
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: 1

9. Total well depth below land surface: 160 **(ft.)**
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 24 **(ft.)**
If water level is above casing, use "+"

11. Borehole diameter: 10 **(in.)**

12. Well construction method: Rotary
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	135 ft.	4.5 in.	SDR17	Shuralock PVC
155 ft.	160 ft.	4 in.	SCH40	Stainless

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
135 ft.	155 ft.	4 in.	.030	SCH40	Stainless
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	122 ft.	Cement	Trimmie/460 Gallons
122 ft.	125 ft.	Pellets	Trimmie/2 Buckets
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
125 ft.	160 ft.	#2 Sand	Trimmie
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	
ft.	ft.	PLEASE ATTACHED SOIL LOG
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Francis Xavier Harrington — 9/9/2019
Signature of Certified Well Contractor — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTRUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells: In addition to sending the form to the address in 24a above, also submit one copy of this form within 30 days of completion of well construction to the following:

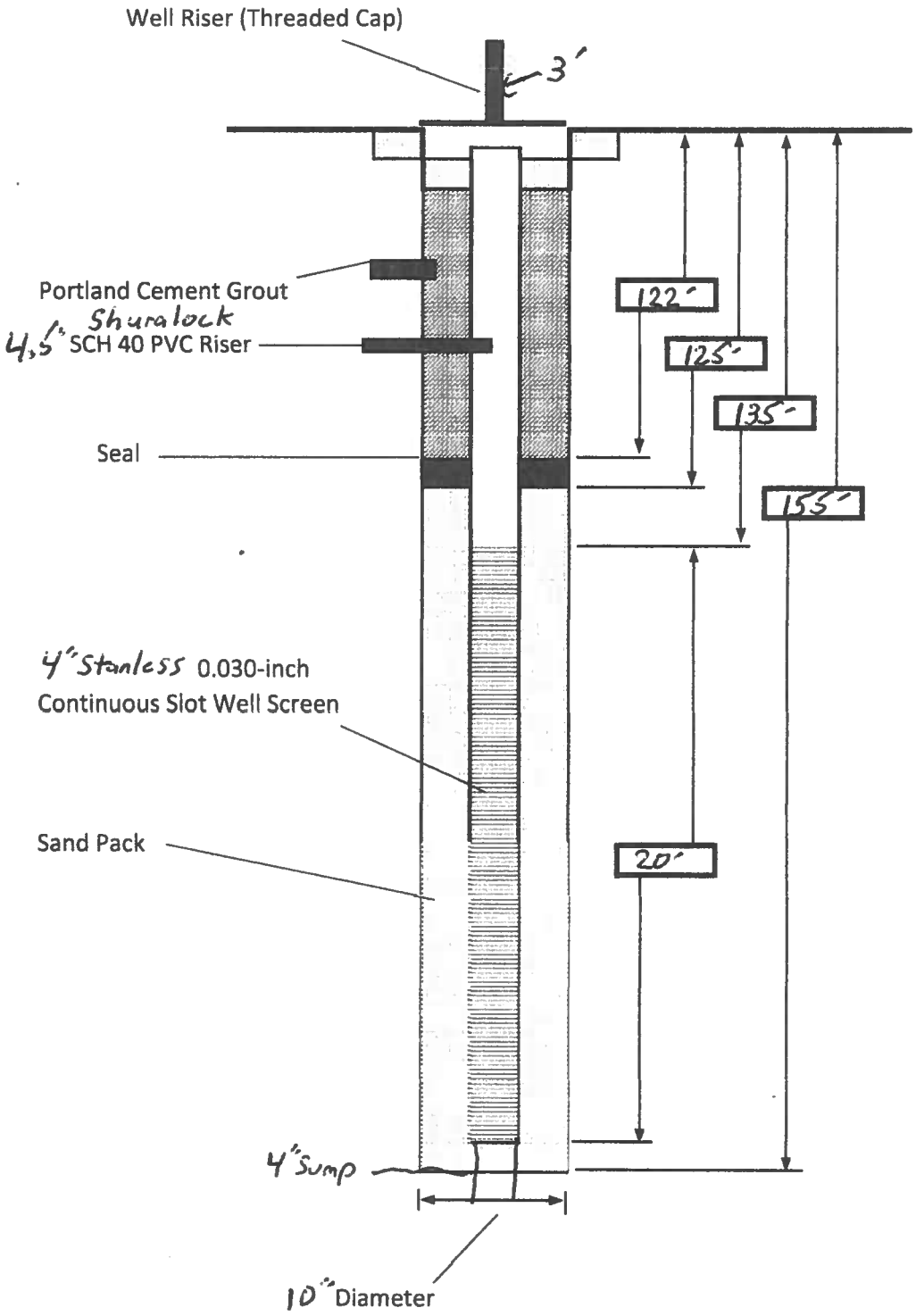
Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

marines Road

Deep Monitoring Well (TYP)

Y24T-Tch-mcH



NOTES:

FIGURE NOT TO SCALE
PVC = POLYVINYL CHLORIDE

Total Depth 160'

TIKIGAQ

No.	Date	Remarks

CONTRACT NO.:	D.O. NO:
N40085-16-D-5517	F6786
JOB NO: 7096	
CHECKED BY: Jason Chebetar	
DRAWN BY:	
DATE: APRIL 2019	

WELL CONSTRUCTION RECORD (GW-1)

For Internal Use Only:

1. Well Contractor Information:

Francis Xavier Harrington
Well Contractor Name

4389A
NC Well Contractor Certification Number

Walker Hill Environmental
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
- ☐ Agricultural
- ☐ Municipal/Public
- ☐ Geothermal (Heating/Cooling Supply)
- ☐ Residential Water Supply (single)
- ☐ Industrial/Commercial
- ☐ Residential Water Supply (shared)
- ☐ Irrigation

Non-Water Supply Well:
- ☒ Monitoring
- ☐ Recovery

Injection Well:
- ☐ Aquifer Recharge
- ☐ Groundwater Remediation
- ☐ Aquifer Storage and Recovery
- ☐ Salinity Barrier
- ☐ Aquifer Test
- ☐ Stormwater Drainage
- ☐ Experimental Technology
- ☐ Subsidence Control
- ☐ Geothermal (Closed Loop)
- ☐ Tracer
- ☐ Geothermal (Heating/Cooling Return)
- ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 8/29/2019 **Well ID#** Y24T-TCH-LCH

5a. Well Location:

Camp Lejeune
Facility/Owner Name

Facility ID# (if applicable)

Building# 1657S Marines Road
Physical Address, City, and Zip

Onslow
County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

34.601213 N 77.338377 W

6. Is(are) the well(s): ☒ **Permanent** or ☐ **Temporary**

7. Is this a repair to an existing well: ☐ **Yes** or ☒ **No**
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: 1

9. Total well depth below land surface: 365 **(ft.)**
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 25 **(ft.)**
If water level is above casing, use "+"

11. Borehole diameter: 10 **(in.)**

12. Well construction method: Rotary
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	60 ft.	12 in.	SCH40	PVC

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	340 ft.	4.5 in.	SDR17	Shuralock PVC
360 ft.	365 ft.	4 in.	SCH40	Stainless

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
340 ft.	360 ft.	4 in.	.030	SCH40	Stainless
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	327 ft.	Cement	Trimmie/1,200 Gallons
327 ft.	330 ft.	Pellets	Trimmie/2 Buckets
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
330 ft.	365 ft.	#2 Sand	Trimmie
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	
ft.	ft.	PLEASE ATTACHED SOIL LOG
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Francis Xavier Harrington
Signature of Certified Well Contractor

9/9/2019
Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTRUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells: In addition to sending the form to the address in 24a above, also submit one copy of this form within 30 days of completion of well construction to the following:

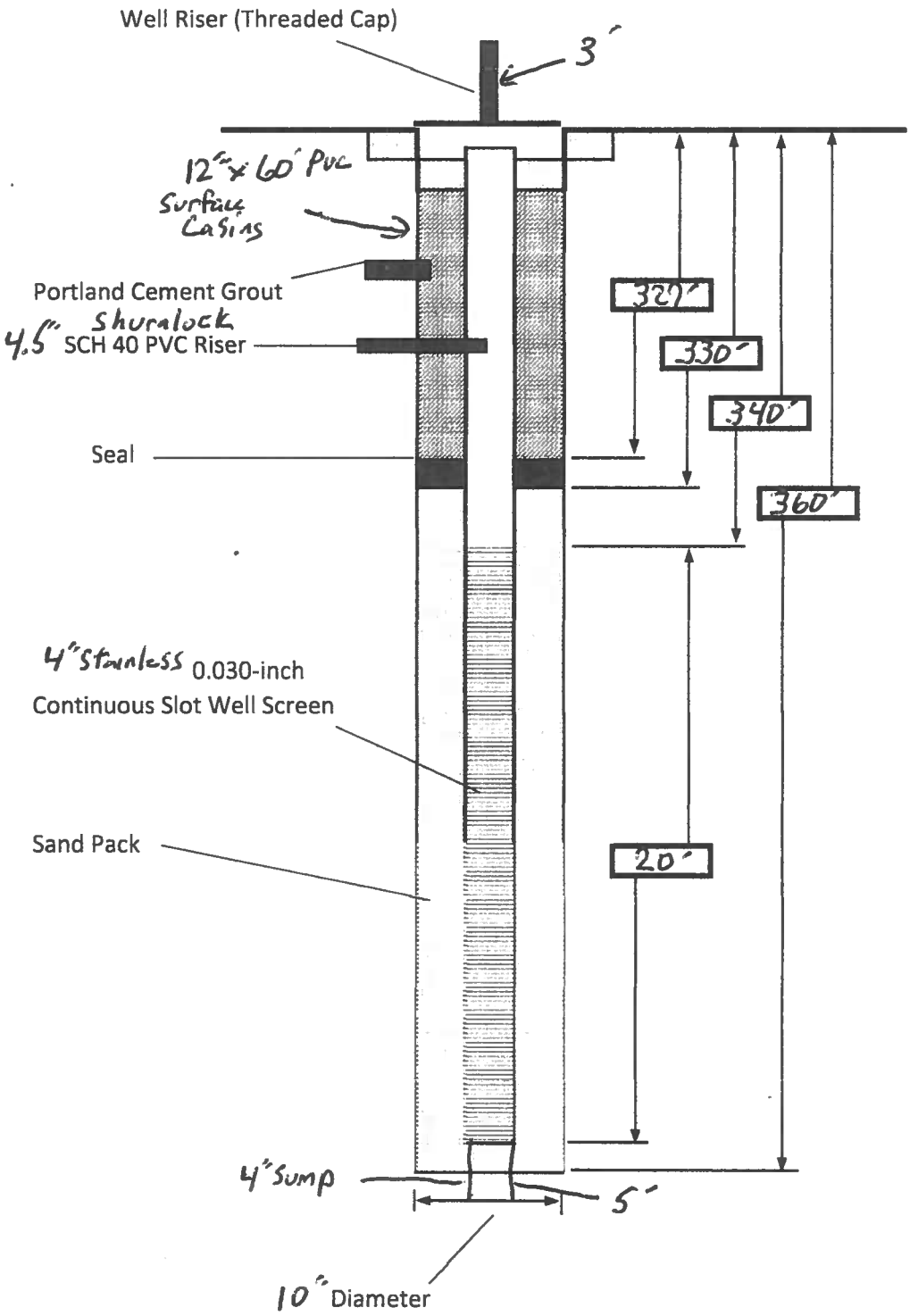
Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

Marines Road

Deep Monitoring Well (TYP)

424T-Tch-LCH



NOTES:

FIGURE NOT TO SCALE

PVC = POLYVINYL CHLORIDE

Total Depth 365'

TIKIGAQ

No.	Date	Remarks

CONTRACT NO.: N40085-16-D-5517	D.O. NO: F6786
JOB NO: 7096	
CHECKED BY: Jason Chebetar	
DRAWN BY:	
DATE: APRIL 2019	

WELL CONSTRUCTION RECORD (GW-1)

For Internal Use Only:

1. Well Contractor Information:

Francis Xavier Harrington
Well Contractor Name

4389A
NC Well Contractor Certification Number

Walker Hill Environmental
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
- ☐ Agricultural
- ☐ Municipal/Public
- ☐ Geothermal (Heating/Cooling Supply)
- ☐ Residential Water Supply (single)
- ☐ Industrial/Commercial
- ☐ Residential Water Supply (shared)
- ☐ Irrigation

Non-Water Supply Well:
- ☒ Monitoring
- ☐ Recovery

Injection Well:
- ☐ Aquifer Recharge
- ☐ Groundwater Remediation
- ☐ Aquifer Storage and Recovery
- ☐ Salinity Barrier
- ☐ Aquifer Test
- ☐ Stormwater Drainage
- ☐ Experimental Technology
- ☐ Subsidence Control
- ☐ Geothermal (Closed Loop)
- ☐ Tracer
- ☐ Geothermal (Heating/Cooling Return)
- ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 8/24/2019 **Well ID#** Y24T-BFA

5a. Well Location:

Camp Lejeune
Facility/Owner Name

Facility ID# (if applicable)

Building# 1657S Marines Road
Physical Address, City, and Zip

Onslow
County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

34.601222 N 77.338367 W

6. Is(are) the well(s): ☒ **Permanent** or ☐ **Temporary**

7. Is this a repair to an existing well: ☐ **Yes** or ☒ **No**
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: 1

9. Total well depth below land surface: 445 **(ft.)**
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 26.4 **(ft.)**
If water level is above casing, use "+"

11. Borehole diameter: 10 **(in.)**

12. Well construction method: Rotary
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	58 ft.	12 in.	SCH40	PVC

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	420 ft.	4.5 in.	SDR17	Shuralock PVC
440 ft.	445 ft.	4 in.	SCH40	Stainless

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
420 ft.	440 ft.	4 in.	.030	SCH40	Stainless
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	407 ft.	Cement	Trimmie/1,500 Gallons
407 ft.	410 ft.	Pellets	Trimmie/2 Buckets
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
410 ft.	445 ft.	#2 Sand	Trimmie
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	
ft.	ft.	PLEASE ATTACHED SOIL LOG
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Francis Xavier Harrington — 9/9/2019
Signature of Certified Well Contractor — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTRUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells: In addition to sending the form to the address in 24a above, also submit one copy of this form within 30 days of completion of well construction to the following:

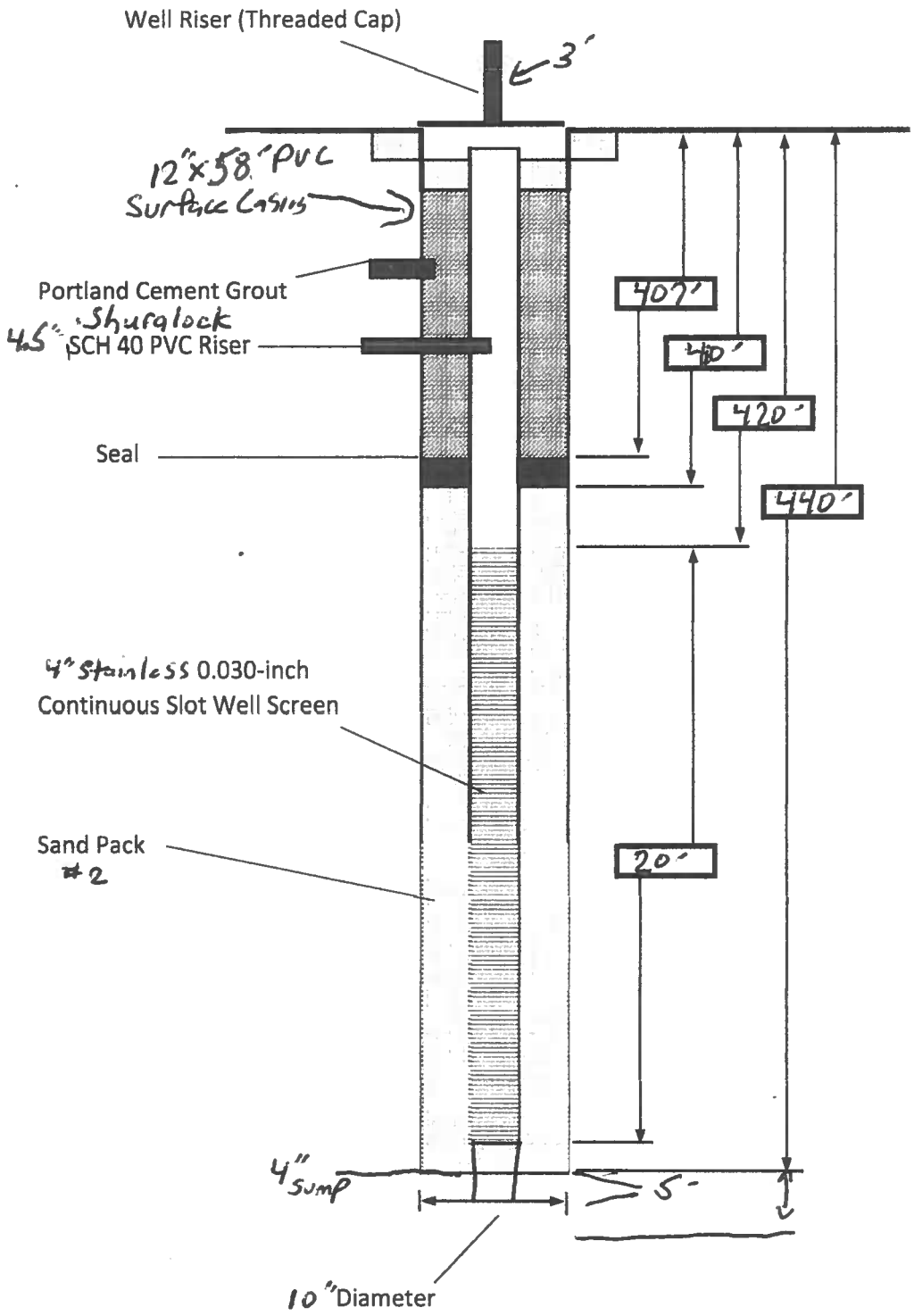
Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

Marines Road

Deep Monitoring Well (TYP)

424T-BFA



NOTES:

FIGURE NOT TO SCALE
PVC = POLYVINYL CHLORIDE

Total Depth 445'

TIKIGAQ

No.	Date	Remarks

CONTRACT NO.:	D.O. NO:
N40085-16-D-5517	F6786
JOB NO: 7096	
CHECKED BY: Jason Chebetar	
DRAWN BY:	
DATE: APRIL 2019	

HWY 172 MONITORING STATION
Z 23C1, Z 23C2, Z 23C3, Z 23C4

WELL CONSTRUCTION RECORD (GW-1)

For Internal Use Only:

1. Well Contractor Information:

Francis Xavier Harrington
Well Contractor Name

4389A
NC Well Contractor Certification Number

Walker Hill Environmental
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
- ☐ Agricultural
- ☐ Municipal/Public
- ☐ Geothermal (Heating/Cooling Supply)
- ☐ Residential Water Supply (single)
- ☐ Industrial/Commercial
- ☐ Residential Water Supply (shared)
- ☐ Irrigation

Non-Water Supply Well:
- ☒ Monitoring
- ☐ Recovery

Injection Well:
- ☐ Aquifer Recharge
- ☐ Groundwater Remediation
- ☐ Aquifer Storage and Recovery
- ☐ Salinity Barrier
- ☐ Aquifer Test
- ☐ Stormwater Drainage
- ☐ Experimental Technology
- ☐ Subsidence Control
- ☐ Geothermal (Closed Loop)
- ☐ Tracer
- ☐ Geothermal (Heating/Cooling Return)
- ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 9/26//2019 **Well ID#** Z23C-S

5a. Well Location:

Camp Lejeune
Facility/Owner Name

Facility ID# (if applicable)

GP-18 Highway 172
Physical Address, City, and Zip

Onslow
County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

34.569345 N 77.293019 W

6. Is(are) the well(s): ☒ **Permanent** or ☐ **Temporary**

7. Is this a repair to an existing well: ☐ **Yes** or ☒ **No**
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: 1

9. Total well depth below land surface: 50 **(ft.)**
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 9.5 **(ft.)**
If water level is above casing, use "+"

11. Borehole diameter: 8 **(in.)**

12. Well construction method: Sonic
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	25 ft.	4 in.	SCH40	PVC
45 ft.	50 ft.	4 in.	SCH40	PVC

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
25 ft.	45 ft.	4 in.	.020	SCH40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	20 ft.	Cement	Trimmie/45 Gallons
20 ft.	23 ft.	Pellets	Trimmie/1.5 Buckets
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
23 ft.	50 ft.	#1A sand	Trimmie
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	
ft.	ft.	PLEASE SEE ATTACHED SOIL LOG
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Francis Xavier Harrington
Signature of Certified Well Contractor

10/10/2019
Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTRUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells: In addition to sending the form to the address in 24a above, also submit one copy of this form within 30 days of completion of well construction to the following:

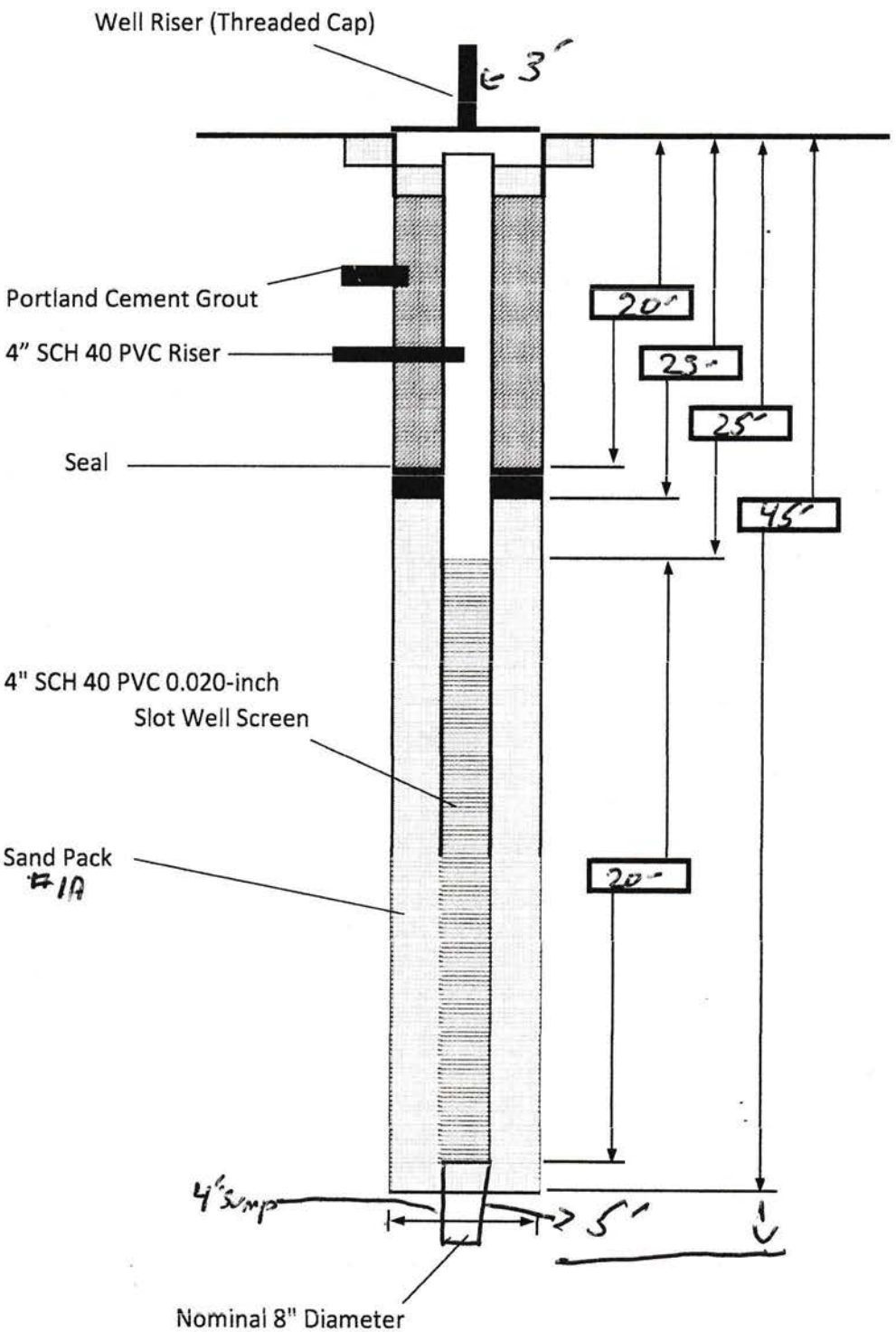
Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

Highway 122

223C-S

Surficial Monitoring Well (TYP)



NOTES:

FIGURE NOT TO SCALE
PVC = POLYVINYL CHLORIDE
SCH 40 = SCHEDULE 40

Total Depth 50'

TIKIGAQ

No.	Date	Remarks

CONTRACT NO.:	D.O. NO:
N40085-16-D-5517	F6786
JOB NO: 7096	
CHECKED BY: Jason Chebetar	
DRAWN BY:	
DATE: APRIL 2019	

WELL CONSTRUCTION RECORD (GW-1)

For Internal Use Only:

1. Well Contractor Information:

Francis Xavier Harrington
Well Contractor Name

4389A
NC Well Contractor Certification Number

Walker Hill Environmental
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
- ☐ Agricultural
- ☐ Municipal/Public
- ☐ Geothermal (Heating/Cooling Supply)
- ☐ Residential Water Supply (single)
- ☐ Industrial/Commercial
- ☐ Residential Water Supply (shared)
- ☐ Irrigation

Non-Water Supply Well:
- ☒ Monitoring
- ☐ Recovery

Injection Well:
- ☐ Aquifer Recharge
- ☐ Groundwater Remediation
- ☐ Aquifer Storage and Recovery
- ☐ Salinity Barrier
- ☐ Aquifer Test
- ☐ Stormwater Drainage
- ☐ Experimental Technology
- ☐ Subsidence Control
- ☐ Geothermal (Closed Loop)
- ☐ Tracer
- ☐ Geothermal (Heating/Cooling Return)
- ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 9/27//2019 **Well ID#** Z23C-TCH-UCH

5a. Well Location:

Camp Lejeune
Facility/Owner Name

Facility ID# (if applicable)

GP-18 Highway 172
Physical Address, City, and Zip

Onslow
County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

34.569348 N 77.293067 W

6. Is(are) the well(s): ☒ **Permanent** or ☐ **Temporary**

7. Is this a repair to an existing well: ☐ **Yes** or ☒ **No**
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: 1

9. Total well depth below land surface: 105 **(ft.)**
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 9.5 **(ft.)**
If water level is above casing, use "+"

11. Borehole diameter: 8 **(in.)**

12. Well construction method: Sonic
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	80 ft.	4 in.	SCH40	PVC
100 ft.	105 ft.	4 in.	SCH40	SS

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
80 ft.	100 ft.	4 in.	.030	SCH40	SS
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	74 ft.	Cement	Trimmie/45 Gallons
74 ft.	77 ft.	Pellets	Trimmie/1.5 Buckets
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
77 ft.	105 ft.	#2 sand	Trimmie
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	
ft.	ft.	PLEASE SEE ATTACHED SOIL LOG
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Francis Xavier Harrington
Signature of Certified Well Contractor

10/10/2019
Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTRUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

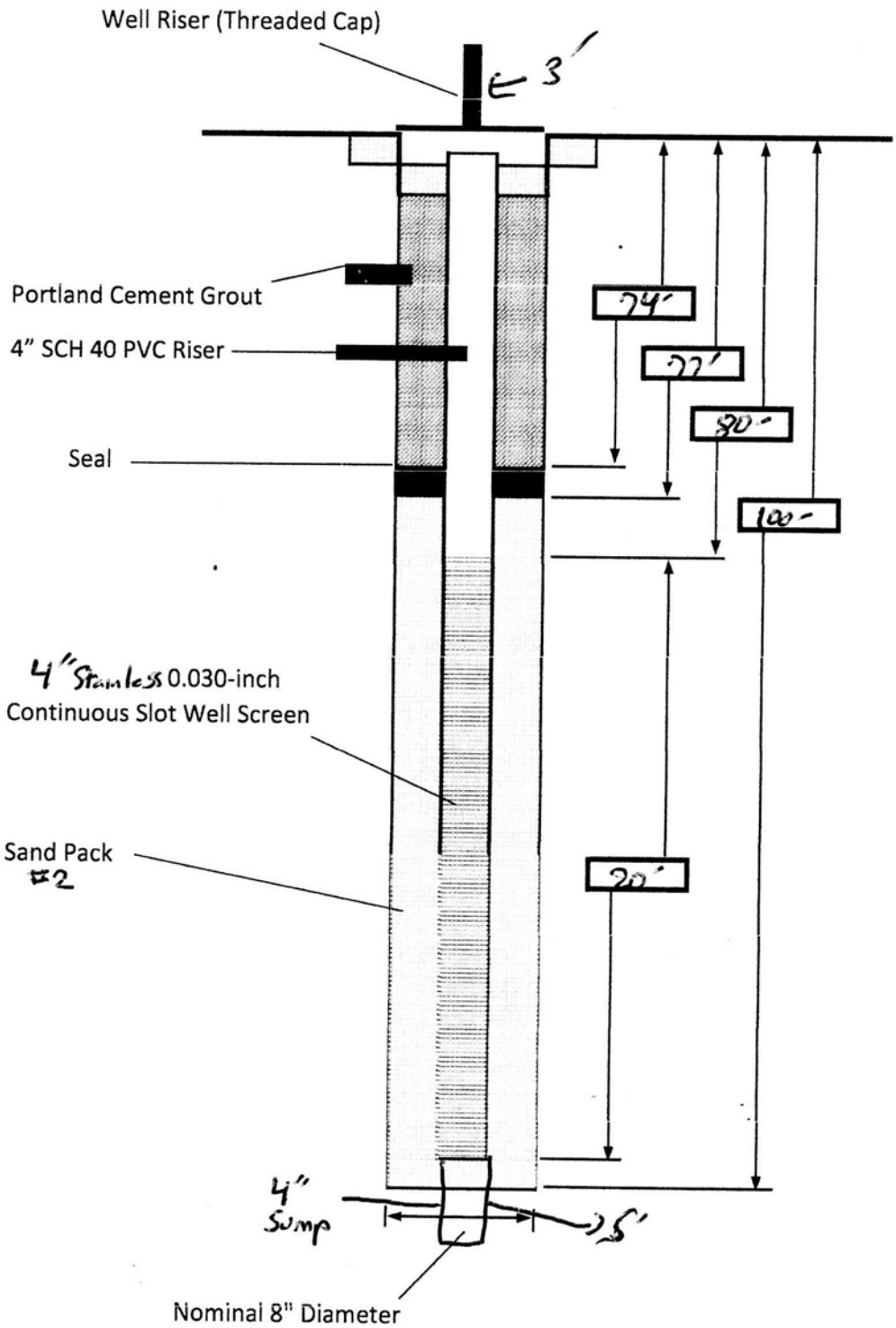
24b. For Injection Wells: In addition to sending the form to the address in 24a above, also submit one copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

Highway 172
223C-Tch-Uch

Deep Monitoring Well (TYP)



NOTES:

FIGURE NOT TO SCALE
PVC = POLYVINYL CHLORIDE
SCH 40 = SCHEDULE 40

Total Depth 105'

TIKIGAQ

No.	Date	Remarks

CONTRACT NO.: N40085-16-D-5517	D.O. NO.: F6786
JOB NO.: 7096	
CHECKED BY: Jason Chebetar	
DRAWN BY:	
DATE: APRIL 2019	

WELL CONSTRUCTION RECORD (GW-1)

For Internal Use Only:

1. Well Contractor Information:

Francis Xavier Harrington
Well Contractor Name

4389A
NC Well Contractor Certification Number

Walker Hill Environmental
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
- ☐ Agricultural
- ☐ Municipal/Public
- ☐ Geothermal (Heating/Cooling Supply)
- ☐ Residential Water Supply (single)
- ☐ Industrial/Commercial
- ☐ Residential Water Supply (shared)
- ☐ Irrigation

Non-Water Supply Well:
- ☒ Monitoring
- ☐ Recovery

Injection Well:
- ☐ Aquifer Recharge
- ☐ Groundwater Remediation
- ☐ Aquifer Storage and Recovery
- ☐ Salinity Barrier
- ☐ Aquifer Test
- ☐ Stormwater Drainage
- ☐ Experimental Technology
- ☐ Subsidence Control
- ☐ Geothermal (Closed Loop)
- ☐ Tracer
- ☐ Geothermal (Heating/Cooling Return)
- ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 10/1/2019 **Well ID#** Z23C-TCH-MCH

5a. Well Location:

Camp Lejeune
Facility/Owner Name

Facility ID# (if applicable)

GP-18 Highway 172
Physical Address, City, and Zip

Onslow
County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

34.569376 N 77.293085 W

6. Is(are) the well(s): ☒ **Permanent** or ☐ **Temporary**

7. Is this a repair to an existing well: ☐ **Yes** or ☒ **No**
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: 1

9. Total well depth below land surface: 177 **(ft.)**
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 9.5 **(ft.)**
If water level is above casing, use "+"

11. Borehole diameter: 10 **(in.)**

12. Well construction method: Rotary
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	60 ft.	12 in.	SCH40	PVC

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	152 ft.	4.5 in.	SCH40	PVC
172 ft.	177 ft.	4 in.	SCH40	SS

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
152 ft.	172 ft.	4 in.	.030	SCH40	SS
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	139 ft.	Cement	Trimmie/500 Gallons
139 ft.	142 ft.	Pellets	Trimmie/2 Buckets
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
142 ft.	177 ft.	#2 sand	Trimmie
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	
ft.	ft.	PLEASE SEE ATTACHED SOIL LOG
ft.	ft.	
ft.	ft.	.
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Francis Xavier Harrington
Signature of Certified Well Contractor

10/10/2019
Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTRUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells: In addition to sending the form to the address in 24a above, also submit one copy of this form within 30 days of completion of well construction to the following:

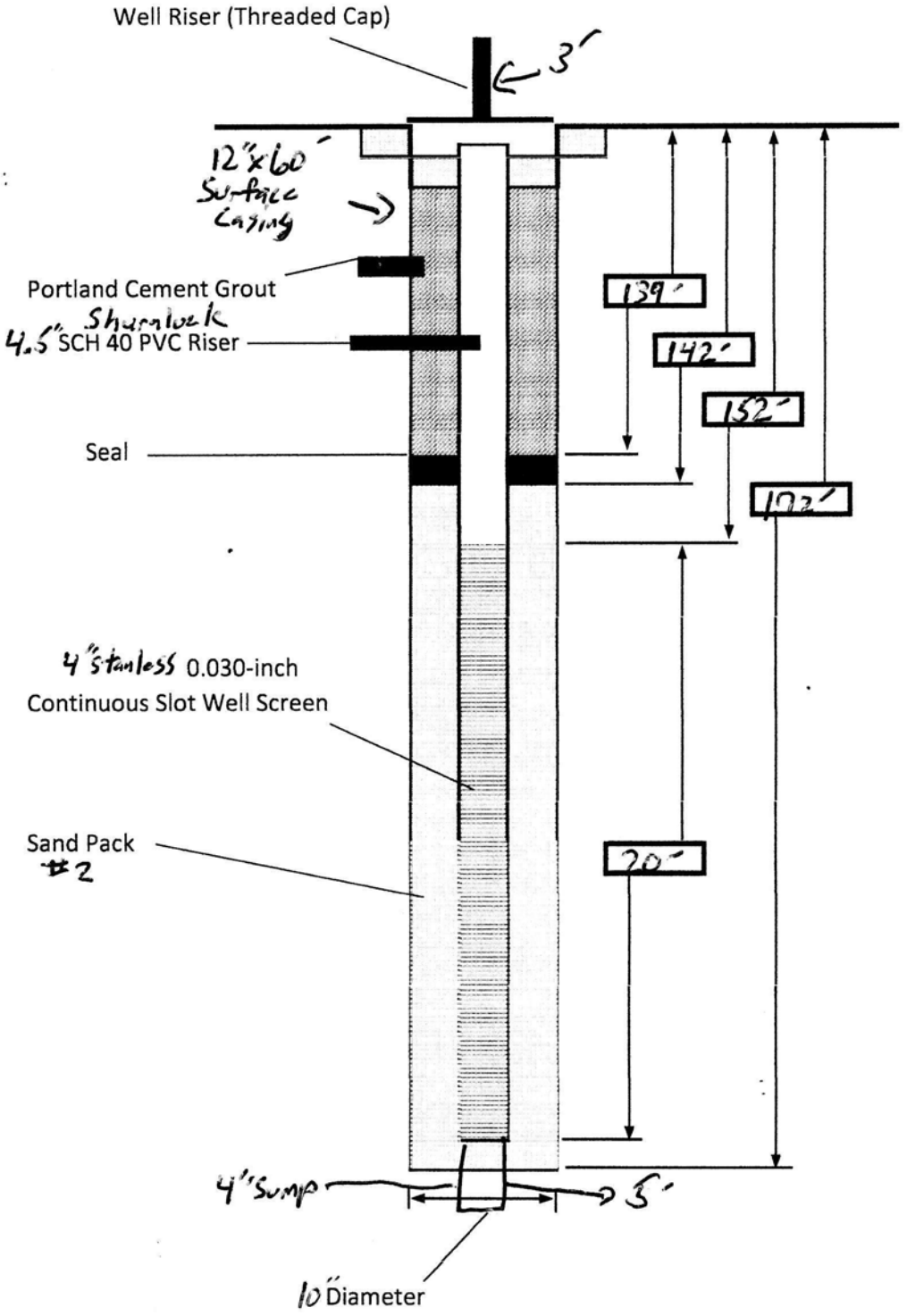
Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

Highway 172

Z23C-Tch-mch

Deep Monitoring Well (TYP)



NOTES:

FIGURE NOT TO SCALE
PVC = POLYVINYL CHLORIDE

Total Depth 197'

TIKIGAQ

No.	Date	Remarks

CONTRACT NO.:	D.O. NO:
N40085-16-D-5517	F6786
JOB NO: 7096	
CHECKED BY: Jason Chebetar	
DRAWN BY:	
DATE: APRIL 2019	

WELL CONSTRUCTION RECORD (GW-1)

For Internal Use Only:

1. Well Contractor Information:

Francis Xavier Harrington
Well Contractor Name

4389A
NC Well Contractor Certification Number

Walker Hill Environmental
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
- ☐ Agricultural
- ☐ Municipal/Public
- ☐ Geothermal (Heating/Cooling Supply)
- ☐ Residential Water Supply (single)
- ☐ Industrial/Commercial
- ☐ Residential Water Supply (shared)
- ☐ Irrigation

Non-Water Supply Well:
- ☒ Monitoring
- ☐ Recovery

Injection Well:
- ☐ Aquifer Recharge
- ☐ Groundwater Remediation
- ☐ Aquifer Storage and Recovery
- ☐ Salinity Barrier
- ☐ Aquifer Test
- ☐ Stormwater Drainage
- ☐ Experimental Technology
- ☐ Subsidence Control
- ☐ Geothermal (Closed Loop)
- ☐ Tracer
- ☐ Geothermal (Heating/Cooling Return)
- ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 9/26/2019 **Well ID#** Z23C-TCH-LCH

5a. Well Location:

Camp Lejeune
Facility/Owner Name

Facility ID# (if applicable)

GP-18 Highway 172
Physical Address, City, and Zip

Onslow
County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

34.569422 N 77.293105 W

6. Is(are) the well(s): ☒ **Permanent** or ☐ **Temporary**

7. Is this a repair to an existing well: ☐ **Yes** or ☒ **No**
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: 1

9. Total well depth below land surface: 397 **(ft.)**
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 6 **(ft.)**
If water level is above casing, use "+"

11. Borehole diameter: 10 **(in.)**

12. Well construction method: Rotary
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	40 ft.	12 in.	SCH40	PVC

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	372 ft.	4.5 in.	SCH40	PVC
392 ft.	397 ft.	4 in.	SCH40	SS

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
372 ft.	392 ft.	4 in.	.030	SCH40	SS
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	359 ft.	Cement	Trimmie/1,200 Gallons
359 ft.	362 ft.	Pellets	Trimmie/2 Buckets
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
362 ft.	397 ft.	#2 sand	Trimmie
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	
ft.	ft.	PLEASE SEE ATTACHED SOIL LOG
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Francis Xavier Harrington
Signature of Certified Well Contractor

10/10/2019
Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTRUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells: In addition to sending the form to the address in 24a above, also submit one copy of this form within 30 days of completion of well construction to the following:

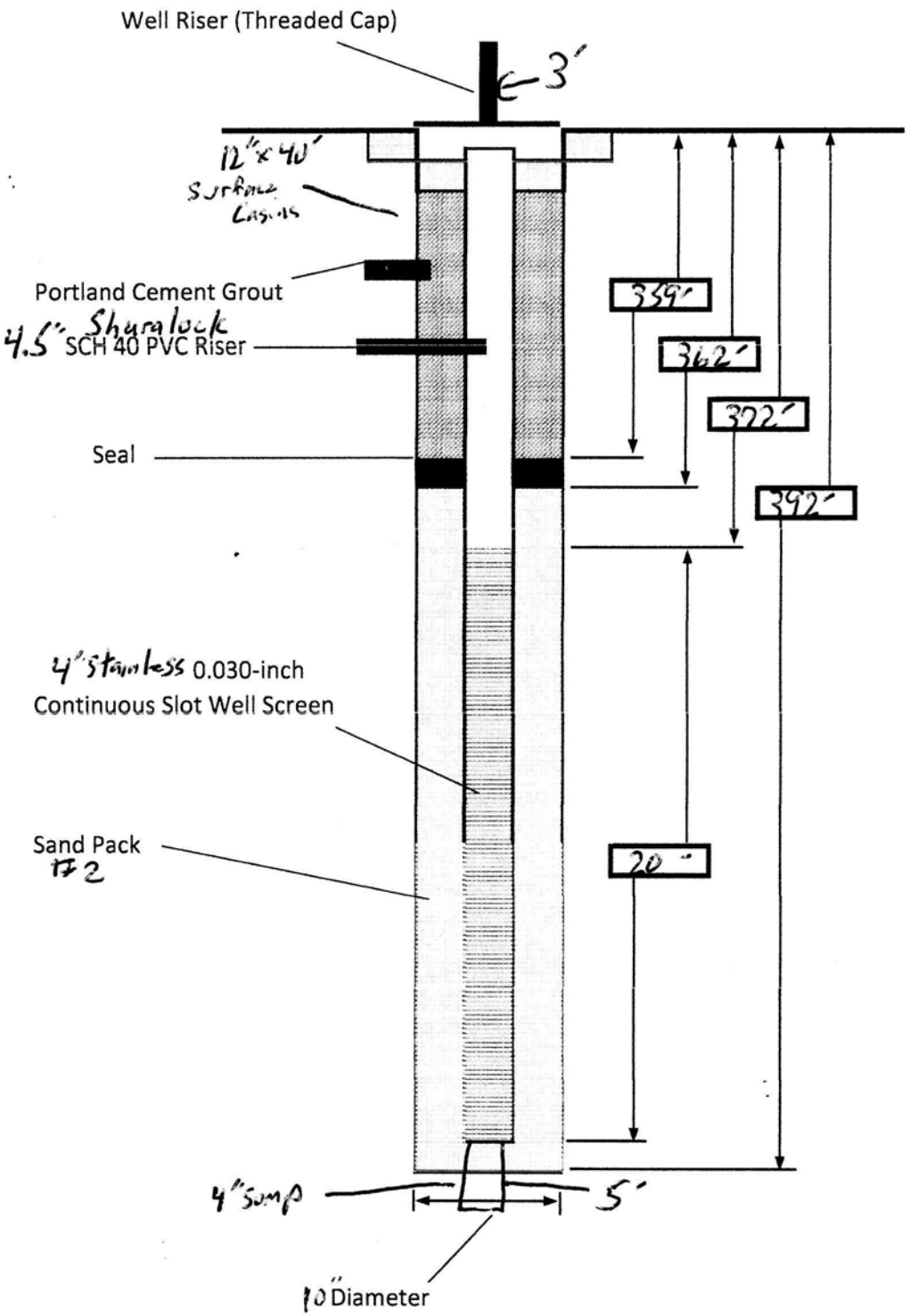
Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

Highway 172

Deep Monitoring Well (TYP)

223C-Tch-LCH



NOTES:

FIGURE NOT TO SCALE
PVC = POLYVINYL CHLORIDE

Total Depth 397'

TIKIGAQ

No.	Date	Remarks

CONTRACT NO.:	D.O. NO:
N40085-16-D-5517	F6786
JOB NO: 7096	
CHECKED BY: Jason Chebetar	
DRAWN BY:	
DATE: APRIL 2019	

PARADISE POINT MONITORING STATION
X 24G3

WELL CONSTRUCTION RECORD (GW-1)

For Internal Use Only:

1. Well Contractor Information:

Francis Xavier Harrington
Well Contractor Name

4389A
NC Well Contractor Certification Number

Walker Hill Environmental
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
- ☐ Agricultural
- ☐ Municipal/Public
- ☐ Geothermal (Heating/Cooling Supply)
- ☐ Residential Water Supply (single)
- ☐ Industrial/Commercial
- ☐ Residential Water Supply (shared)
- ☐ Irrigation

Non-Water Supply Well:
- ☒ Monitoring
- ☐ Recovery

Injection Well:
- ☐ Aquifer Recharge
- ☐ Groundwater Remediation
- ☐ Aquifer Storage and Recovery
- ☐ Salinity Barrier
- ☐ Aquifer Test
- ☐ Stormwater Drainage
- ☐ Experimental Technology
- ☐ Subsidence Control
- ☐ Geothermal (Closed Loop)
- ☐ Tracer
- ☐ Geothermal (Heating/Cooling Return)
- ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 10/3/2019 **Well ID#** X24G-S

5a. Well Location:

Camp Lejeune/Paradise Point
Facility/Owner Name

Facility ID# (if applicable)

Building 2015 Brewster BLVD
Physical Address, City, and Zip

Onslow
County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

34.717881 N 77.391981 W

6. Is(are) the well(s): ☒ **Permanent** or ☐ **Temporary**

7. Is this a repair to an existing well: ☐ **Yes** or ☒ **No**
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: 1

9. Total well depth below land surface: 35 **(ft.)**
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 13.5' **(ft.)**
If water level is above casing, use "+"

11. Borehole diameter: 8 **(in.)**

12. Well construction method: Sonic
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	10 ft.	4 in.	SCH40	PVC
30 ft.	35 ft.	4 in.	SCH40	PVC

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
10 ft.	30 ft.	4 in.	.020	SCH40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	5 ft.	Cement	Trimmie/10Gallons
5 ft.	8 ft.	Pellets	Trimmie/1.5 Buckets
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
8 ft.	35 ft.	#1A sand	Trimmie
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	4 ft.	Brown Fine Sand
4 ft.	10 ft.	Brown Very Silty Fine Sand
10 ft.	12 ft.	Gray Tan Fine Sand
12 ft.	14 ft.	Orange Brown Fine Sand
14 ft.	30 ft.	Gray Tan Fine Sand
30 ft.	35 ft.	Lite Gray Fine Sand
ft.	ft.	

21. REMARKS

22. Certification:

Francis Xavier Harrington — 10/10/2019
Signature of Certified Well Contractor — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTRUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells: In addition to sending the form to the address in 24a above, also submit one copy of this form within 30 days of completion of well construction to the following:

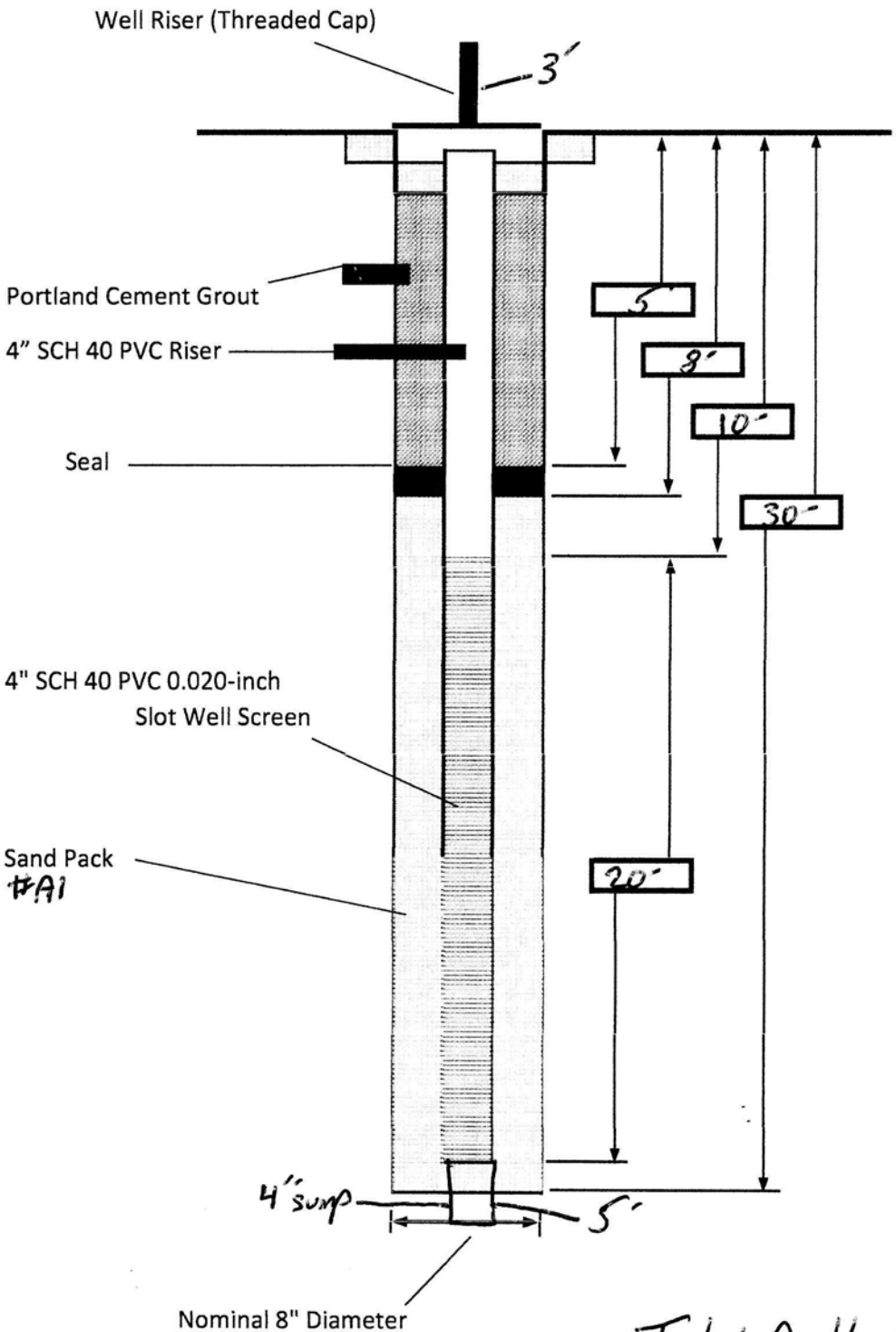
Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

Paradise Point

Surficial Monitoring Well (TYP)

X246-S



Total Depth 35'

NOTES:

FIGURE NOT TO SCALE
PVC = POLYVINYL CHLORIDE
SCH 40 = SCHEDULE 40

TIKIGAQ

No.	Date	Remarks

CONTRACT NO.:	D.O. NO:
N40085-16-D-5517	F6786
JOB NO: 7096	
CHECKED BY: Jason Chebetar	
DRAWN BY:	
DATE: APRIL 2019	

MONTFORD POINT MONITORING STATION
X 24E3

WELL CONSTRUCTION RECORD (GW-1)

For Internal Use Only:

1. Well Contractor Information:

Francis Xavier Harrington
Well Contractor Name

4389A
NC Well Contractor Certification Number

Walker Hill Environmental
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
- ☐ Agricultural
- ☐ Municipal/Public
- ☐ Geothermal (Heating/Cooling Supply)
- ☐ Residential Water Supply (single)
- ☐ Industrial/Commercial
- ☐ Residential Water Supply (shared)
- ☐ Irrigation

Non-Water Supply Well:
- ☒ Monitoring
- ☐ Recovery

Injection Well:
- ☐ Aquifer Recharge
- ☐ Groundwater Remediation
- ☐ Aquifer Storage and Recovery
- ☐ Salinity Barrier
- ☐ Aquifer Test
- ☐ Stormwater Drainage
- ☐ Experimental Technology
- ☐ Subsidence Control
- ☐ Geothermal (Closed Loop)
- ☐ Tracer
- ☐ Geothermal (Heating/Cooling Return)
- ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 10/6/2019 **Well ID#** X24E-S

5a. Well Location:

Camp Lejeune/Camp Johnson
Facility/Owner Name

Facility ID# (if applicable)

building M448 CO. Street B
Physical Address, City, and Zip

Onslow
County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

34.737932 N 77.409183 W

6. Is(are) the well(s): ☒ **Permanent** or ☐ **Temporary**

7. Is this a repair to an existing well: ☐ **Yes** or ☒ **No**
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: 1

9. Total well depth below land surface: 35 **(ft.)**
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 14.2' **(ft.)**
If water level is above casing, use "+"

11. Borehole diameter: 8 **(in.)**

12. Well construction method: Sonic
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	10 ft.	4 in.	SCH40	PVC
30 ft.	35 ft.	4 in.	SCH40	PVC

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
10 ft.	30 ft.	4 in.	.020	SCH40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	5 ft.	Cement	Trimmie/10 Gallons
5 ft.	8 ft.	Pellets	Trimmie/1.5 Buckets
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
8 ft.	35 ft.	#1A Sand	Trimmie
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	3 ft.	Dark Brown Silty Fine Sand w/Concrete depree
3 ft.	5 ft.	Medium Brown Silty Fine Sand
5 ft.	10 ft.	Gray Brown Sandy Clay
10 ft.	15 ft.	Gray Brown Silty Sand
15 ft.	18 ft.	Gray Green Silty Sand
18 ft.	25 ft.	Greenish Gray Silty Sand
25 ft.	35 ft.	Lite Gray silt w/rock Fragments

21. REMARKS

22. Certification:

Francis Xavier Harrington
Signature of Certified Well Contractor

10/10/2019
Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTRUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells: In addition to sending the form to the address in 24a above, also submit one copy of this form within 30 days of completion of well construction to the following:

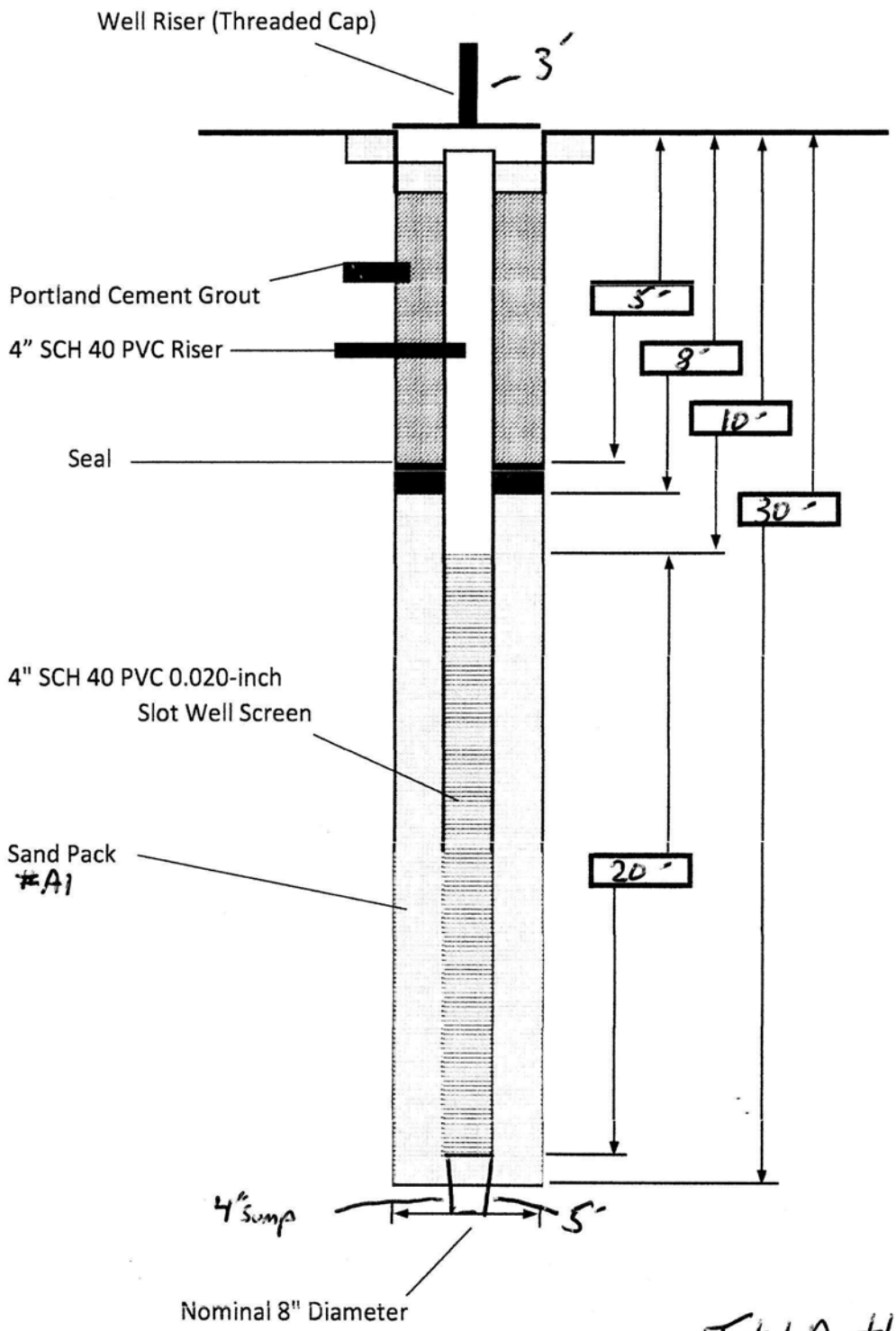
Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

Montford Point

Surficial Monitoring Well (TYP)

X24E-5



Total Depth 35'

NOTES:

FIGURE NOT TO SCALE
PVC = POLYVINYL CHLORIDE
SCH 40 = SCHEDULE 40

TIKIGAQ

No.	Date	Remarks

CONTRACT NO.:	D.O. NO.:
N40085-16-D-5517	F6786
JOB NO: 7096	
CHECKED BY: Jason Chebetar	
DRAWN BY:	
DATE: APRIL 2019	

CHINQUAPIN ELEMENTARY SCHOOL
MONITORING STATION
W 29D10, W 29D11, W 29D12, W 29D13, W 29D14, W 29D15

WELL CONSTRUCTION RECORD (GW-1)

For Internal Use Only:

1. Well Contractor Information:

Jeovany Gutierrez Bautista
Well Contractor Name

4125 A
NC Well Contractor Certification Number

A.C. Schultes of Carolina, Inc.
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
☐Agricultural ☐Municipal/Public
☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)
☐Industrial/Commercial ☐Residential Water Supply (shared)
☐Irrigation ☐Wells > 100,000 GPD

Non-Water Supply Well:
☑Monitoring ☐Recovery

Injection Well:
☐Aquifer Recharge ☐Groundwater Remediation
☐Aquifer Storage and Recovery ☐Salinity Barrier
☐Aquifer Test ☐Stormwater Drainage
☐Experimental Technology ☐Subsidence Control
☐Geothermal (Closed Loop) ☐Tracer
☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 5/22/2020 **Well ID#** W29D10

5a. Well Location:

NCDEQ - DWR
Facility/Owner Name

Chinquapin Elem. School
Facility ID# (if applicable)

3894 S. NC 50 Hwy, Chinquapin, NC
Physical Address, City, and Zip

Duplin
County

335900537011
Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

34.825978 N -77.816368 W

6. Is(are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: _____

9. Total well depth below land surface: 134 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 4.4 (ft.)
If water level is above casing, use "-"

11. Borehole diameter: 9-7/8 (in.)

12. Well construction method: Mud Rotary
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

14. WATER ZONES

FROM	TO	DESCRIPTION
115 ft.	125 ft.	Sand - limestone
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	0 ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	**115** ft.	4 in.	SDR17	PVC
125 ft.	130 ft.	4 in.	SCH 80	PVC

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
115 ft.	125 ft.	4 in.	.020		SS
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	98 ft.	BENTONITE	PUMPED
98 ft.	100 ft.	BENTONITE	POURED
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
100 ft.	134 ft.	#2 GRAVEL	POURED
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	See attached
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Jeovany Gutierrez Bautista
Signature of Certified Well Contractor

5-30-20
Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

For Internal Use Only:

1. Well Contractor Information:

Jeovany Gutierrez Bautista
Well Contractor Name

4125 A
NC Well Contractor Certification Number

A.C. Schultes of Carolina, Inc.
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:	
☐Agricultural	☐Municipal/Public
☐Geothermal (Heating/Cooling Supply)	☐Residential Water Supply (single)
☐Industrial/Commercial	☐Residential Water Supply (shared)
☐Irrigation	☐Wells > 100,000 GPD
Non-Water Supply Well:	
☑Monitoring	☐Recovery
Injection Well:	
☐Aquifer Recharge	☐Groundwater Remediation
☐Aquifer Storage and Recovery	☐Salinity Barrier
☐Aquifer Test	☐Stormwater Drainage
☐Experimental Technology	☐Subsidence Control
☐Geothermal (Closed Loop)	☐Tracer
☐Geothermal (Heating/Cooling Return)	☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 4/14/2020 **Well ID#** W29D11

5a. Well Location:

NCDEQ - DWR
Facility/Owner Name

Chinquapin Elem. School
Facility ID# (if applicable)

3894 S. NC 50 Hwy, Chinquapin, NC
Physical Address, City, and Zip

Duplin
County

335900537011
Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

34.825912 N 77.816403 W

6. Is(are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: _____

9. Total well depth below land surface: 34 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 6.75 (ft.)
If water level is above casing, use "+"

11. Borehole diameter: 9-7/8 (in.)

12. Well construction method: Mud Rotary
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

14. WATER ZONES

FROM	TO	DESCRIPTION
19 ft.	29 ft.	Sand
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	19 ft.	4 in.	SDR17	PVC
29 ft.	34 ft.	4 in.	SCH 80	PVC

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
19 ft.	29 ft.	4 in.			SS
ft.	19 ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	12 ft.	BENTONITE	POURED
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
34 ft.	12 ft.	#2 GRAVEL	POURED
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	12 ft.	CLAY
12 ft.	34 ft.	SAND
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

Geophysical Survey Conducted 4/28/20 Flowing Well

22. Certification:

Jeovany Gutierrez Bautista
Signature of Certified Well Contractor

5-8-20
Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

For Internal Use Only:

1. Well Contractor Information:

Jeovany Gutierrez Bautista
Well Contractor Name

4125 A
NC Well Contractor Certification Number

A.C. Schultes of Carolina, Inc.
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
☐Agricultural ☐Municipal/Public
☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)
☐Industrial/Commercial ☐Residential Water Supply (shared)
☐Irrigation ☐Wells > 100,000 GPD

Non-Water Supply Well:
☑Monitoring ☐Recovery

Injection Well:
☐Aquifer Recharge ☐Groundwater Remediation
☐Aquifer Storage and Recovery ☐Salinity Barrier
☐Aquifer Test ☐Stormwater Drainage
☐Experimental Technology ☐Subsidence Control
☐Geothermal (Closed Loop) ☐Tracer
☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 5/1/2020 **Well ID#** W29D12

5a. Well Location:

NCDEQ - DWR
Facility/Owner Name

Chinquapin Elem. School
Facility ID# (if applicable)

3894 S. NC 50 Hwy, Chinquapin, NC
Physical Address, City, and Zip

Duplin
County

335900537011
Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

34.825978 N 77.816368 W

6. Is(are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: _____

9. Total well depth below land surface: 800 **(ft.)**
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 0.75 **(ft.)**
If water level is above casing, use "+"

11. Borehole diameter: 9-7/8 **(in.)**

12. Well construction method: Mud Rotary Pilot Hole
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

14. WATER ZONES

FROM	TO	DESCRIPTION
624 ft.	644 ft.	Sand
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	40 ft.	10 in.	SCH 80	PVC

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	624 ft.	4 in.	SDR17	PVC
644 ft.	649 ft.	4 in.	SCH 80	PVC

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
624 ft.	644 ft.	4 in.	.020		SS
ft.	624 ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	608 ft.	BENTONITE	PUMPED
608 ft.	610 ft.	BENTONITE	POURED
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
610 ft.	800 ft.	#2 GRAVEL	POURED
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	SEE ATTACHED
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

Geophysical Survey Conducted 4/28/20 Flowing Well

22. Certification:

Jeovany Gutierrez Bautista
Signature of Certified Well Contractor

5-8-20
Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

For Internal Use Only:

1. Well Contractor Information:

Jeovany Gutierrez Bautista
Well Contractor Name

4125 A
NC Well Contractor Certification Number

A.C. Schultes of Carolina, Inc.
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
☐Agricultural ☐Municipal/Public
☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)
☐Industrial/Commercial ☐Residential Water Supply (shared)
☐Irrigation ☐Wells > 100,000 GPD

Non-Water Supply Well:
☑Monitoring ☐Recovery

Injection Well:
☐Aquifer Recharge ☐Groundwater Remediation
☐Aquifer Storage and Recovery ☐Salinity Barrier
☐Aquifer Test ☐Stormwater Drainage
☐Experimental Technology ☐Subsidence Control
☐Geothermal (Closed Loop) ☐Tracer
☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 5/11/2020 **Well ID#** W29D13

5a. Well Location:

NCDEQ - DWR
Facility/Owner Name

Chinquapin Elem. School
Facility ID# (if applicable)

3894 S. NC 50 Hwy, Chinquapin, NC
Physical Address, City, and Zip

Duplin
County

335900537011
Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

34.825912 N -77.816403 W

6. Is(are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: _____

9. Total well depth below land surface: 465 **(ft.)**
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 42.5 **(ft.)**
If water level is above casing, use "-"

11. Borehole diameter: 9-7/8 **(in.)**

12. Well construction method: Mud Rotary
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

14. WATER ZONES

FROM	TO	DESCRIPTION
450 ft.	460 ft.	Sand
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	40 ft.	10 in.	SCH 80	PVC

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	450 ft.	4 in.	SDR17	PVC
460 ft.	465 ft.	4 in.	SCH 80	PVC

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
450 ft.	460 ft.	4 in.	.020		SS
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	436 ft.	BENTONITE	PUMPED
436 ft.	438 ft.	BENTONITE	POURED
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
438 ft.	465 ft.	#2 GRAVEL	POURED
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	See attached
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Jeovany Gutierrez Bautista
Signature of Certified Well Contractor

5-30-20
Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

For Internal Use Only:

1. Well Contractor Information:

Jeovany Gutierrez Bautista
Well Contractor Name

4125 A
NC Well Contractor Certification Number

A.C. Schultes of Carolina, Inc.
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
☐Agricultural ☐Municipal/Public
☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)
☐Industrial/Commercial ☐Residential Water Supply (shared)
☐Irrigation ☐Wells > 100,000 GPD

Non-Water Supply Well:
☑Monitoring ☐Recovery

Injection Well:
☐Aquifer Recharge ☐Groundwater Remediation
☐Aquifer Storage and Recovery ☐Salinity Barrier
☐Aquifer Test ☐Stormwater Drainage
☐Experimental Technology ☐Subsidence Control
☐Geothermal (Closed Loop) ☐Tracer
☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 5/15/2020 **Well ID#** W29D14

5a. Well Location:

NCDEQ - DWR
Facility/Owner Name

Chinquapin Elem. School
Facility ID# (if applicable)

3894 S. NC 50 Hwy, Chinquapin, NC
Physical Address, City, and Zip

Duplin
County

335900537011
Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

34.825978 N -77.816368 W

6. Is(are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐Yes or ☑No
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: _____

9. Total well depth below land surface: 359 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 40.9 (ft.)
If water level is above casing, use "-"

11. Borehole diameter: 9-7/8 (in.)

12. Well construction method: Mud Rotary
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

14. WATER ZONES

FROM	TO	DESCRIPTION
344 ft.	354 ft.	Sand
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	40 ft.	10 in.	SCH 80	PVC

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	344 ft.	4 in.	SDR17	PVC
354 ft.	359 ft.	4 in.	SCH 80	PVC

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
344 ft.	354 ft.	4 in.	.020		SS
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	333 ft.	BENTONITE	PUMPED
333 ft.	335 ft.	BENTONITE	POURED
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
335 ft.	359 ft.	#2 GRAVEL	POURED
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	See attached
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Jeovany Gutierrez Bautista 5-30-20
Signature of Certified Well Contractor Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

For Internal Use Only:

1. Well Contractor Information:

Jeovany Gutierrez Bautista
Well Contractor Name

4125 A
NC Well Contractor Certification Number

A.C. Schultes of Carolina, Inc.
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
☐Agricultural ☐Municipal/Public
☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)
☐Industrial/Commercial ☐Residential Water Supply (shared)
☐Irrigation ☐Wells > 100,000 GPD

Non-Water Supply Well:
☑Monitoring ☐Recovery

Injection Well:
☐Aquifer Recharge ☐Groundwater Remediation
☐Aquifer Storage and Recovery ☐Salinity Barrier
☐Aquifer Test ☐Stormwater Drainage
☐Experimental Technology ☐Subsidence Control
☐Geothermal (Closed Loop) ☐Tracer
☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 5/27/2020 **Well ID#** W29D15

5a. Well Location:

NCDEQ - DWR
Facility/Owner Name

Chinquapin Elem. School
Facility ID# (if applicable)

3894 S. NC 50 Hwy, Chinquapin, NC
Physical Address, City, and Zip

Duplin
County

335900537011
Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

34.825978 N -77.816368 W

6. Is(are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐Yes or ☑No
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: _____

9. Total well depth below land surface: 180 **(ft.)**
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: _____ **(ft.)**
If water level is above casing, use " - "

11. Borehole diameter: 9-7/8 **(in.)**

12. Well construction method: Mud Rotary
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

14. WATER ZONES

FROM	TO	DESCRIPTION
165 ft.	175 ft.	Sand
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	40 ft.	10 in.	SCH 80	PVC

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
+3 ft.	**165** ft.	4 in.	SDR17	PVC
175 ft.	180 ft.	4 in.	SCH 80	PVC

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
165 ft.	175 ft.	4 in.	.020		SS
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	158 ft.	BENTONITE	PUMPED
158 ft.	160 ft.	BENTONITE	POURED
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
160 ft.	180 ft.	#2 GRAVEL	POURED
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	See attached
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Jeovany Gutierrez Bautista 5-30-20
Signature of Certified Well Contractor Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL ABANDONMENT RECORD

For Internal Use ONLY:

1. Well Contractor Information:

Jeovany Gutierrez Bautista
Well Contractor Name (or well owner personally abandoning well on his/her property)

4125 A
NC Well Contractor Certification Number

A. C. Schultes of Carolina, Inc.
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.) if known

3. Well use (check well use):

Water Supply Well:
- ☐ Agricultural
- ☐ Geothermal (Heating/Cooling Supply)
- ☐ Industrial/Commercial
- ☐ Irrigation
- ☐ Municipal/Public
- ☐ Residential Water Supply (single)
- ☐ Residential Water Supply (shared)

Non-Water Supply Well:
- ■ Monitoring
- ☐ Recovery

Injection Well:
- ☐ Aquifer Recharge
- ☐ Aquifer Storage and Recovery
- ☐ Aquifer Test
- ☐ Experimental Technology
- ☐ Geothermal (Closed Loop)
- ☐ Geothermal (Heating/Cooling Return)
- ☐ Groundwater Remediation
- ☐ Salinity Barrier
- ☐ Stormwater Drainage
- ☐ Subsidence Control
- ☐ Tracer
- ☐ Other (explain under 7g)

4. Date well(s) abandoned: 5/20/2020

5a. Well location:

NCDEQ - DWR
Facility/Owner Name

Chinquapin Elem. School
Facility ID# (if applicable)

3894 S. NC 50 Hwy, Chinquapin, NC
Physical Address, City, and Zip

Duplin
County

335900537011
Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

34.824016 N -77.812048 W

CONSTRUCTION DETAILS OF WELL(S) BEING ABANDONED
*Attach well construction record(s) if available. For multiple injection or non-water supply wells **ONLY** with the same construction abandonment, you can submit one form.*

6a. Well ID#: W29D5

6b. Total well depth: 160 (ft.)

6c. Borehole diameter: 3 7/8 (in.)

6d. Water level below ground surface: 7.6 (ft.)

6e. Outer casing length (if known): N/A (ft.)

6f. Inner casing/tubing length (if known): 100 (ft.)

6g. Screen length (if known): 60 (ft.)

WELL ABANDONMENT DETAILS

7a. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same well construction/depth, only 1 GW-30 is needed. Indicate TOTAL NUMBER of wells abandoned: _____

7b. Approximate volume of water remaining in well(s): .25 (gal.)

FOR WATER SUPPLY WELLS ONLY:

7c. Type of disinfectant used: Chlorine

7d. Amount of disinfectant used: 5gallons

7e. Sealing materials used (check all that apply):
- ■ Neat Cement Grout
- ☐ Sand Cement Grout
- ☐ Concrete Grout
- ☐ Specialty Grout
- ☐ Bentonite Slurry
- ☐ Bentonite Chips or Pellets
- ☐ Dry Clay
- ☐ Drill Cuttings
- ☐ Gravel
- ☐ Other (explain under 7g)

7f. For each material selected above, provide amount of materials used:

5yards

7g. Provide a brief description of the abandonment procedure:

Tremie pipe used to pump grout to fill bottom.
Topped off with neat cement

8. Certification:

Jeovany Gutierrez Bautista — 5-30-20
Signature of Certified Well Contractor or Well Owner — Date

By signing this form, I hereby certify that the well(s) was (were) abandoned in accordance with 15A NCAC 02C .0100 or 2C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

9. Site diagram or additional well details:
You may use the back of this page to provide additional well site details or well abandonment details. You may also attach additional pages if necessary.

SUBMITTAL INSTRUCTIONS

10a. For All Wells: Submit this form within 30 days of completion of well abandonment to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

10b. For Injection Wells: In addition to sending the form to the address in 10a above, also submit one copy of this form within 30 days of completion of well abandonment to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

10c. For Water Supply & Injection Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well abandonment to the county health department of the county where abandoned.

WELL ABANDONMENT RECORD

For Internal Use ONLY:

1. Well Contractor Information:

Jeovany Gutierrez Bautista

Well Contractor Name (or well owner personally abandoning well on his/her property)

4125 A

NC Well Contractor Certification Number

A. C. Schultes of Carolina, Inc.

Company Name

2. Well Construction Permit #: _____

List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.) if known

3. Well use (check well use):

Water Supply Well:	
☐Agricultural	☐Municipal/Public
☐Geothermal (Heating/Cooling Supply)	☐Residential Water Supply (single)
☐Industrial/Commercial	☐Residential Water Supply (shared)
☐Irrigation	
Non-Water Supply Well:	
■Monitoring	☐Recovery
Injection Well:	
☐Aquifer Recharge	☐Groundwater Remediation
☐Aquifer Storage and Recovery	☐Salinity Barrier
☐Aquifer Test	☐Stormwater Drainage
☐Experimental Technology	☐Subsidence Control
☐Geothermal (Closed Loop)	☐Tracer
☐Geothermal (Heating/Cooling Return)	☐Other (explain under 7g)

4. Date well(s) abandoned: 5/20/2020

5a. Well location:

NCDEQ - DWR — Facility/Owner Name

Chinquapin Elem. School — Facility ID# (if applicable)

3894 S. NC 50 Hwy, Chinquapin, NC — Physical Address, City, and Zip

Duplin — County

335900537011 — Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

34.824016 N -77.812048 W

CONSTRUCTION DETAILS OF WELL(S) BEING ABANDONED

Attach well construction record(s) if available. For multiple injection or non-water supply wells ONLY with the same construction abandonment, you can submit one form.

6a. Well ID#: W29D6

6b. Total well depth: 470 (ft.)

6c. Borehole diameter: 4.5 (in.)

6d. Water level below ground surface: 46.12 (ft.)

6e. Outer casing length (if known): N/A (ft.)

6f. Inner casing/tubing length (if known): 460 (ft.)

6g. Screen length (if known): 10 (ft.)

WELL ABANDONMENT DETAILS

7a. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same well construction/depth, only 1 GW-30 is needed. Indicate TOTAL NUMBER of wells abandoned: _____

7b. Approximate volume of water remaining in well(s): 76. (gal.)

FOR WATER SUPPLY WELLS ONLY:

7c. Type of disinfectant used: Chlorine

7d. Amount of disinfectant used: 3gallons

7e. Sealing materials used (check all that apply):

■ Neat Cement Grout	☐ Bentonite Chips or Pellets
☐ Sand Cement Grout	☐ Dry Clay
☐ Concrete Grout	☐ Drill Cuttings
☐ Specialty Grout	☐ Gravel
☐ Bentonite Slurry	☐ Other (explain under 7g)

7f. For each material selected above, provide amount of materials used:

2 yards

7g. Provide a brief description of the abandonment procedure:

Tremie pipe used to pump grout to fill bottom.

Topped off with neat cement

8. Certification:

Jeovany Gutierrez Bautista — Signature of Certified Well Contractor or Well Owner

5-30-20 — Date

By signing this form, I hereby certify that the well(s) was (were) abandoned in accordance with 15A NCAC 02C .0100 or 2C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

9. Site diagram or additional well details:
You may use the back of this page to provide additional well site details or well abandonment details. You may also attach additional pages if necessary.

SUBMITTAL INSTRUCTIONS

10a. For All Wells: Submit this form within 30 days of completion of well abandonment to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

10b. For Injection Wells: In addition to sending the form to the address in 10a above, also submit one copy of this form within 30 days of completion of well abandonment to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

10c. For Water Supply & Injection Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well abandonment to the county health department of the county where abandoned.

WELL ABANDONMENT RECORD

For Internal Use ONLY:

1. Well Contractor Information:

Jeovany Gutierrez Bautista

Well Contractor Name (or well owner personally abandoning well on his/her property)

4125 A

NC Well Contractor Certification Number

A. C. Schultes of Carolina, Inc.

Company Name

2. Well Construction Permit #: _____

List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.) if known

3. Well use (check well use):

Water Supply Well:	
☐Agricultural	☐Municipal/Public
☐Geothermal (Heating/Cooling Supply)	☐Residential Water Supply (single)
☐Industrial/Commercial	☐Residential Water Supply (shared)
☐Irrigation	
Non-Water Supply Well:	
■Monitoring	☐Recovery
Injection Well:	
☐Aquifer Recharge	☐Groundwater Remediation
☐Aquifer Storage and Recovery	☐Salinity Barrier
☐Aquifer Test	☐Stormwater Drainage
☐Experimental Technology	☐Subsidence Control
☐Geothermal (Closed Loop)	☐Tracer
☐Geothermal (Heating/Cooling Return)	☐Other (explain under 7g)

4. Date well(s) abandoned: 5/20/2020

5a. Well location:

NCDEQ - DWR — Facility/Owner Name

Chinquapin Elem. School — Facility ID# (if applicable)

3894 S. NC 50 Hwy, Chinquapin, NC — Physical Address, City, and Zip

Duplin — County

335900537011 — Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

34.824016 N -77.812048 W

CONSTRUCTION DETAILS OF WELL(S) BEING ABANDONED

*Attach well construction record(s) if available. For multiple injection or non-water supply wells **ONLY** with the same construction abandonment, you can submit one form.*

6a. Well ID#: W29D9

6b. Total well depth: 10 (ft.)

6c. Borehole diameter: 7 5/8 (in.)

6d. Water level below ground surface: 5.6 (ft.)

6e. Outer casing length (if known): N/A (ft.)

6f. Inner casing/tubing length (if known): 6 (ft.)

6g. Screen length (if known): 4 (ft.)

WELL ABANDONMENT DETAILS

7a. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same well construction/depth, only 1 GW-30 is needed. Indicate TOTAL NUMBER of wells abandoned: _____

7b. Approximate volume of water remaining in well(s): 2.6 (gal.)

FOR WATER SUPPLY WELLS ONLY:

7c. Type of disinfectant used: Chlorine

7d. Amount of disinfectant used: 1gallon

7e. Sealing materials used (check all that apply):

■ Neat Cement Grout	☐ Bentonite Chips or Pellets
☐ Sand Cement Grout	☐ Dry Clay
☐ Concrete Grout	☐ Drill Cuttings
☐ Specialty Grout	☐ Gravel
☐ Bentonite Slurry	☐ Other (explain under 7g)

7f. For each material selected above, provide amount of materials used:

10 yards

7g. Provide a brief description of the abandonment procedure:

Tremie pipe used to pump grout to fill bottom to top

8. Certification:

Jeovany Gutierrez Bautista — Signature of Certified Well Contractor or Well Owner

5-2020 — Date

By signing this form, I hereby certify that the well(s) was (were) abandoned in accordance with 15A NCAC 02C .0100 or 2C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

9. Site diagram or additional well details:
You may use the back of this page to provide additional well site details or well abandonment details. You may also attach additional pages if necessary.

SUBMITTAL INSTRUCTIONS

10a. For All Wells: Submit this form within 30 days of completion of well abandonment to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

10b. For Injection Wells: In addition to sending the form to the address in 10a above, also submit one copy of this form within 30 days of completion of well abandonment to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

10c. For Water Supply & Injection Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well abandonment to the county health department of the county where abandoned.

APPENDIX B

GROUND WATER SAMPLING PROTOCOL

Ground Water Sampling Protocol

Samples for the ambient monitoring program were collected in accordance with DWR procedures outlined in NCDWQ/APS 2006 to ensure that high quality, defensible data was collected. To ensure that only newly recharged ground water was being sampled, wells were pumped until three well volumes had been removed. Where a well's total volume was too high to feasibly pump out three volumes, wells were purged until water quality parameters (temperature, pH, specific conductance, and dissolved oxygen) of purge water stabilized. Both submersible and peristaltic pumps were used in the field at the sampler's discretion depending on the total depth of the well and the hydraulic head difference to be overcome when pumping from the water table to the surface. To prevent contamination introduced while sampling, nitrile gloves were worn during all sampling events. Pumps were decontaminated after each use. In addition, blanks and duplicate samples were collected to provide quality assurance/quality control information. Trip blanks were taken on each sampling trip, and equipment blanks were taken from all equipment then analyzed. Field duplicates were taken to comprise 10% of the total samples collected.

The ground water was analyzed for a broad suite of water quality and water chemistry parameters (see table below). Data from the ambient monitoring program may be used to characterize ground water throughout the state as well as to address the concerns other programs and projects. Within DWR these concerns include for example salt water intrusion due to over-pumping, the source of organic nitrogen found in surface water bodies, the impact of concentrated farming activities on drinking water supplies, and the levels of naturally occurring contaminants such as metals. Since most of these wells are somewhat geographically isolated from human activities, the water collected is more likely to represent ambient conditions and not contamination.

Table of Sampling Parameters

Parameter Group	Parameters
Private Well Analytes (15A NCAC 18A .3803)	arsenic, barium, cadmium, chromium, copper, fluoride, lead, iron, magnesium, manganese, mercury, nitrate, nitrite, selenium, silver, sodium, zinc, pH
Nutrients*	Ammonia, total kjeldahl nitrogen, organic nitrogen, phosphorus
Metals (Dissolved and Total)*	Aluminum, antimony, beryllium, boron, calcium, cobalt, lithium, molybdenum, nickel, potassium, strontium, thallium, tin, titanium, vanadium
Major Ions	Bromide, chloride, fluoride, sulfate, carbonate, bicarbonate
PFAS	Per-and Polyfluoroalkyl compounds
Field Parameters	Specific conductivity, pH, dissolved oxygen (DO), oxidation-reduction potential (ORP), temperature
Organic Compounds	Volatile organic compounds, Semi-volatile organic compounds, Pesticides, select Per- and Polyfluoroalkyl Substances (PFAS)
Other	Alkalinity, total organic carbon, turbidity, total dissolved solids, silica, sulfide

*In addition to those required by 15A NCAC 18A .3803

References:

DCDWQ/APS, 2006, Quality Assurance/Quality Control and Standard Operating Procedures Manual for Sample Collection, December 2006

15a NCAC 18a Section .3800 - Private Drinking Water Well Sampling, .3803 - Sample Analysis

APPENDIX C

CENTRAL COASTAL PLAIN CAPACITY USE AREA
2019 WATER WITHDRAWAL
SUMMARY TABLES

Choose a year...

2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019

return to CCPCUA page

Central Coastal Plain Capacity Use Area 2019 Water Withdrawal Summary Tables

Tables compiled 07-29-2020, units are gallons per day

Permitted				Reported for 2019					
Current Permit Limits				Ground Water					Surface Water
County	max daily	yearly (ABRs)	yearly (2018)	by all permits	# of permits	% reported	by yearly permits	by registrations	by registrations
Beaufort	179,624,400			41,296,130	40	60		7,163	94,172
Carteret	27,428,080			7,253,007	19	74		158,839	
Craven	74,816,800	6,956,526	1,814,132	22,305,774	35	74	2,968,146	9,387	16,887,539
Duplin	69,952,325	2,805,747	2,297,255	8,540,366	57	81	1,894,362	99,924	3,635
Edgecombe	12,564,000	527,697	429,388	1,164,774	11	91	274,022	11,951	1,357,348
Greene	191,000	3,058,197	914,551	1,059,090	4	100	1,037,882	48,462	577,184
Jones	48,929,600	679,282	169,821	14,330,809	11	82	329,018		
Lenoir	9,805,320	13,522,312	3,522,953	4,952,474	16	81	3,121,852		
Martin	4,440,000	4,895,506	2,226,326	1,379,013	14	79	759,642	115,330	27,062,547
Onslow	62,650,600	9,845,143	2,461,286	23,911,331	19	79	3,881,964	134,227	
Pamlico	34,028,000			2,080,334	12	67			
Pitt	7,718,080	8,651,572	2,521,003	1,964,965	22	86	1,316,270	58,882	14,359,655
Washington	65,628,000			2,170,780	35	71			
Wayne	19,129,200	4,340,026	2,010,532	4,853,266	23	87	1,133,321		12,013,903
Wilson	7,164,160	658,883	491,218	1,028,290	6	83	354,050	136,961	9,593,158
Totals:	624,069,565	55,940,891	18,858,465	138,290,404	324**	77	17,070,528	781,126	81,949,140

Yearly permit limits are linked to withdrawals from the Cretaceous aquifers where reductions are mandated. As phased reductions occur, annual limits allow permit holders more flexibility to plan when withdrawals are made. ABR refers to "Approved Base Rate" and is the annual rate calculated based on 1997 or August 1, 1999 through July 31, 2000 withdrawals. The ABR is the annual rate from which reductions take place (see CCPCUA FAQs). "Yearly (2018)" is the final rate of withdrawal if all three phases of reduction are administered. Figures in the "by all permits" columns are total withdrawals reported by all permit holders (max day and yearly).

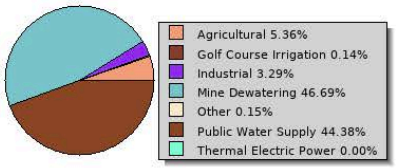
** A few permits have sources in two counties, so those permits are counted twice.

Permitted				Reported for 2019					
Current Permit Limits				Ground Water					Surface Water
Type of Use	max daily	yearly (ABRs)	yearly (2018)	by all permits	# of permits	% reported	by yearly permits	by registrations	by registrations
Agricultural	204,248,125	620,612	400,004	7,286,307	128	64	109,177	164,526	1,323,321
Golf Course Irrigation	3,954,000	85,589	85,589	149,305	11	64		39,774	83,577
Industrial	15,643,200	4,473,115	2,471,853	4,386,875	14	100	1,203,729	182,190	47,951,183
Mine Dewatering	254,218,080			64,882,794	65	75		49,388	1,253,476
Other	8,858,480	368,561	300,003	209,714	12	75	116,699		
Public Water Supply	137,147,680	50,393,015	15,601,016	61,375,408	87	95	15,640,923	345,247	31,337,583
Thermal Electric Power									
Totals:	624,069,565	55,940,891	18,858,465	138,290,404	317	77	17,070,528	781,126	81,949,140

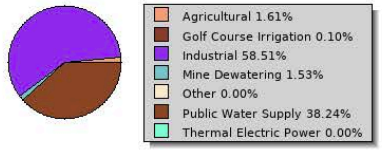
Permitted				Reported for 2019				
Current Permit Limits				Ground Water				
Aquifer	max daily	yearly (ABRs)	yearly (2018)	by all permits	# of permits	% reported	by yearly permits	by registrations
Basement rock	14,306,060			1,812,528	11	91		219,694
Black Creek	33,085,363	21,884,121	7,173,409	12,709,238	66	88	9,203,800	148,566
Peedee	20,380,050	6,877,228	1,785,236	1,633,043	21	78	128,890	61,755
Upper Cape Fear	47,835,362	27,129,542	9,849,819	13,271,254	86	87	7,727,119	115,035
Lower Cape Fear		50,001	50,001	62,751	1	100	10,719	
Surficial	131,631,630			24,317,530	75	69		174,886
Castle Hayne	339,624,850			83,646,881	129	66		343,126
Beaufort	3,495,250							63,152
Upper Tertiary								
Yorktown	33,711,000			837,178	18	60		32,451
Totals:	624,069,565	55,940,891	18,858,465	138,290,404	406**	76	17,070,528	781,126

** Many permits use multiple aquifers, so those permits are counted more than once.

CCPCUA Reported Ground Water Withdrawals by Type of Use



CCPCUA Reported Surface Water Withdrawals by Type of Use



CCPCUA Reported Ground Water Withdrawals by Aquifer