BURKE COUNTY

INDIAN HILLS SEWER PUMP STATION FLOOD MITIGATION PROJECT

BENEFIT-COST ANALYSIS and METHODOLOGY

January 2, 2023

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A. Introduction

This Benefit-Cost Analysis (BCA) is to determine the value of the benefits provided by the proposed project, in relation to its capital and operations cost. The relation of benefits to costs is expressed as a ratio, the Benefit-Cost Ratio (BCR), which is used by FEMA in evaluating the justification of projects. The analysis presented in this report is based on publicly available information and information provided by Burke County staff.

B. Project Description (Scope of Work) and Analysis Approach

The Burke County government owns and operates a wastewater collection system in certain parts of the county. Municipalities provide most wastewater services in the county, but significant portions of eastern Burke County are served by the County government. This includes bulk wastewater collection from the towns of Rhodhiss and Hildebran. The Indian Hills Pump Station transfers all this wastewater to the City of Hickory Henry Fork WWTP for treatment and disposal.

The Indian Hills sewer pump station is located next to Drowning Creek and experiences frequent flooding. The flooding has prevented County personnel from properly operating the station, due to access being blocked by flood waters and sometimes due to flood waters coming up into the pump station building. Another issue is that increased flood frequency and flood intensity have caused erosion of the streambank adjacent to the pump station (Drowning Creek). This erosion is threatening to undermine the pump station site and infrastructure.

The proposed project will relocate equipment out of the flood plain and/or to an elevation 2' above the 500-year flood elevation (about 3' above BFE). The site and access road will also be raised to 2’ above the 500-year flood elevation, to ensure access at all times. The existing ground elevation of the pump station site and access road is 976 MSL. The BFE in this area varies from approximately 978 to 982 MSL. According to preliminary data on the FRIS website, the 500-year flood elevation at the pump station site is 979.8. Therefore, the site will be raised to 982 or higher. In anticipation of higher future flood elevations due to Climate Change, it is proposed to raise the site to elevation 984. The final determination will be made following the hydraulics and hydrology analysis in Phase One. To eliminate impacts to upstream and downstream properties, and to avoid the need for a CLOMR, the floodway will not be filled. Also, the structures currently on site will be removed and the area returned to natural conditions. This will provide additional flood plain area without obstructions.

The existing equipment will be kept in operation during construction so that service is not disrupted. Therefore, much of the equipment will be replaced, such as pumps, wet well, and pump enclosure/building. The standby generator set will be retained but will be moved to a new location adjacent to the new pump station enclosure/building.

The eroding bank of Drowning Creek next to the pump station site will be stabilized using Nature-Based methods such as woody vegetation and coir matting. No rock rip rap will be used.

A detailed breakdown of costs in Appendix 2 also describes the project scope. Maps and preliminary plans in Appendix 3 further show the existing conditions and the scope of work.

The project will be designed and built in compliance with all applicable federal, state, and local standards. Applicable regulations include, but are not limited to, the Clean Water Act sections 401 and 404, the NC wastewater collection and treatment rules (15A NCAC 02T), the NC Sedimentation Pollution Control Act, and the Burke County Flood Damage Prevention Ordinance. All work will be designed by qualified NC registered professional engineers using accepted engineering principles. Hydraulics and hydrology (H&H) engineering and permitting will be performed to ensure that the proposed project will not have adverse upstream or downstream impacts. For the streambank stabilization of Drowning Creek, this will include a CLOMR/LOMR process, if necessary. However, it is expected that the streambank can be stabilized using Nature-Based Solutions and without affecting the published BFE's.

The new wet well and pump building will still be partially within the floodplain and will be designed and constructed in accordance with ASCE 24-14 "Flood Resistant Design and Construction."

Preliminary design has not yet been performed, but the documents in the appendices and the notes in this BCA report show the feasibility of the proposed mitigation actions.

This Benefit-Cost Analysis (BCA) uses FEMA's Benefit-Cost Analysis Toolkit version 6.0 and uses default values provided by FEMA's BCA Guidance, unless otherwise stated. Descriptions and justifications for maintenance costs, estimated damages before and after mitigation, and recurrence intervals are described in the notes within the toolkit report, which is in Appendix 1.

C. Benefit-Cost Ratio Calculation

Using the FEMA BCA Toolkit, the calculated BCR is 2.38. Therefore, the proposed project is estimated to have a value of benefits that exceeds the costs (BCR greater than 1.00).

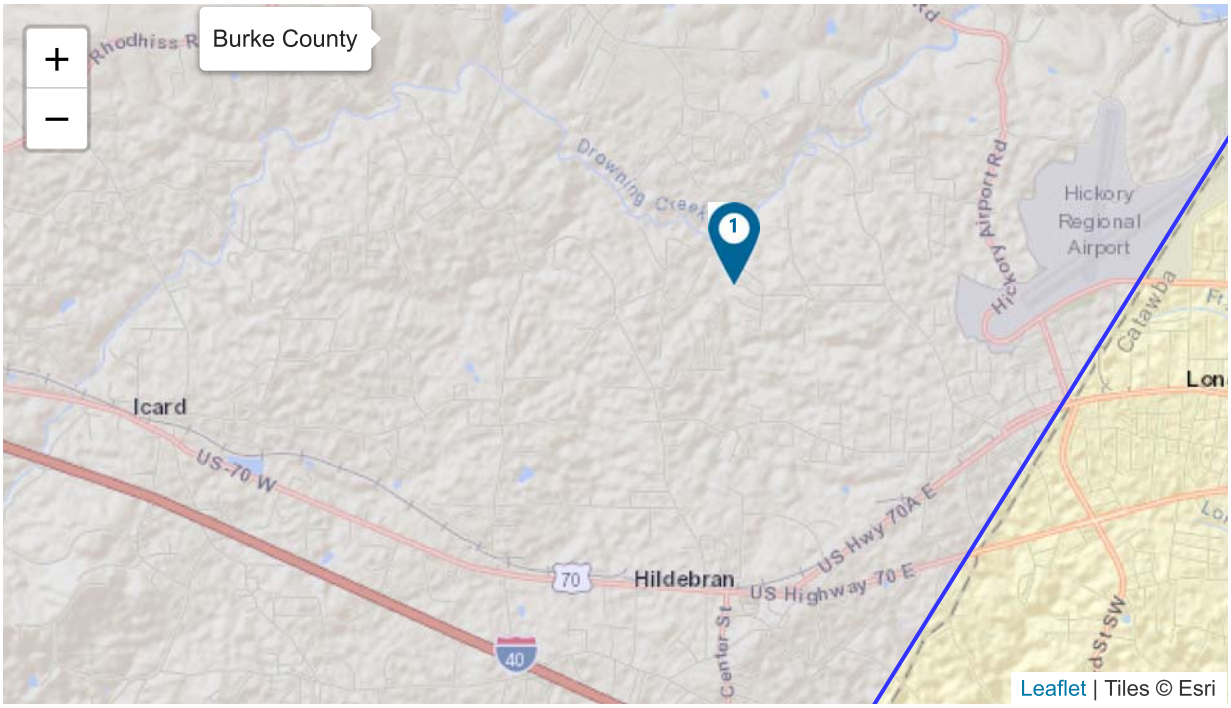
Appendix 1 - FEMA Benefit-Cost Analysis Toolkit Results

Benefit-Cost Calculator

V.6.0 (Build 20221028.1600 | Release Notes)

Benefit-Cost Analysis

Project Name: Burke County Indian Hills Sewer Pump Station Flood Mitigation



				Using 7% Discount Rate			Using 3% Discount Rate (For FY22 BRIC and FMA only)			
Map Marker ▲	Mitigation Title	Property Type	Hazard	Benefits (B)	Costs (C)	BCR (B/C)	Benefits (B)	Costs (C)	BCR (B/C)	
1	Other @ 2711 Indian Hills Cir, Hickory, North Carolina, 28601		DFA - Riverine Flood	$ 7,773,917	$ 3,266,941	2.38	$ 12,279,128	$ 3,305,630	3.71	
TOTAL (SELECTED)				**$ 7,773,917**	**$ 3,266,941**	**2.38**	**$ 12,279,128**	**$ 3,305,630**	**3.71**	
TOTAL				**$ 7,773,917**	**$ 3,266,941**	**2.38**	**$ 12,279,128**	**$ 3,305,630**	**3.71**	

Property Configuration

Property Title:	Other @ 2711 Indian Hills Cir, Hickory, North Carolina, 28601
Property Location:	28601, Burke, North Carolina
Property Coordinates:	35.73657498786949, -81.4222500034317
Hazard Type:	Riverine Flood
Mitigation Action Type:	Other
Property Type:	Utilities
Analysis Method Type:	Professional Expected Damages

Cost Estimation

Other @ 2711 Indian Hills Cir, Hickory, North Carolina, 28601

Project Useful Life (years):	30
Project Cost:	$3,200,180
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$5,380

Comments

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Project Useful Life:

Per Appendix D of the BCA Reference Guide ("pump stations"): 5 to 30 years. Use 30 years since reliable heavy-duty pumps are to be specified and concrete and masonry structures used.

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Mitigation Project Cost:

The Indian Hills sewer pump station is located next to Drowning Creek and experiences frequent flooding. The flooding has prevented County personnel from properly operating the station, due to access being blocked by flood waters and sometimes due to flood water coming up into the pump station. Another issue is that increased flood frequency and flood intensity have caused erosion of the streambank adjacent to the pump station (Drowning Creek). This erosion is threatening to undermine the pump station site and infrastructure. The proposed project will relocate equipment out of the flood plain and/or to an elevation 2' above the 500-year flood elevation (about 3' above BFE). The site and access road will also be raised to 2’ above the 500-year flood elevation, to ensure access at all times. The existing equipment will be kept in operation during construction so that service is not disrupted. Therefore, much of the equipment will be replaced, such as pumps, wet well, and pump enclosure/building. The standby generator set will be retained but will be moved to a new location adjacent to the new pump station enclosure/building. The eroding streambank will be stabilized using natural methods including woody vegetation. A detailed breakdown of costs is provided in Appendix 2.

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Annual Maintenance Cost:

The incremental maintenance cost will be for maintaining the restored/improved streambank of Drowning Creek. For the first five years, typical maintenance costs are 3% to 10% of the construction cost. Thereafter, costs for the restored stream would involve occasional removal of debris or invasive vegetation in the stream and along the bank. The estimated cost of the streambank improvement is $53,800. Therefore, use 10% = $5,380 per year. O&M costs for the pump station access road, site, and equipment would decrease due to the improved protection provided by the project.

Damage Analysis Parameters - Damage Frequency Assessment
Other @ 2711 Indian Hills Cir, Hickory, North Carolina, 28601

Year of Analysis was Conducted:	2022
Year Property was Built:	1995
Analysis Duration:	28 Use Default:Yes

Comments

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Year Built:

As-built drawings are dated October 1995. See Appendix 4.

Utilities Properties
Other @ 2711 Indian Hills Cir, Hickory, North Carolina, 28601

Type of Service:	Wastewater
Number of Customers Served:	5,261
Value of Unit of Service ($/person/day):	$60 Use Default:Yes
Total Value of Service Per Day ($/day):	$315,660

Comments

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Number of Customers Served:

The Indian Hills Sewer Pump Station serves most of the Town of Hildebran, 100% of the Town of Rhodhiss, and portions of the Icard and George Hildebrand communities. These areas include six public schools and a residential rehab/care facility that depend on the pump station for sewer service. The population is broken down as follows: 1. Hildebran: 90% of its population of 1,686 (per NC Office of State Management & Budget, July 1, 2021) = 1,517 2. Rhodhiss: 296 sewer customers x 3.29 persons per household (per the town's 2021 local water supply plan) = 974 3. 100 County residential customers in Icard and George Hildebran x 2.48 (Burke County persons per household per US Census) = 250 4. Carolina Rehab Center has 90 beds = 90 5. George Hildebrand Elem. School students = 294 6. East Burke High School students = 842 7. East Burke Middle School students = 651 8. Hildebran Elem. School students = 354 9. Icard Elem. School students = 278 10. Ray Childers Elem. School students = 438 Subtotal = 5,688 The schools serve students from areas inside and outside the sewer service area. Except for Hildebran Elementary, the majority of students do not live in homes that are connected to the sewer system. To prevent double-counting students who do live in homes connected to the sewer system, the student populations benefiting from the project are reduced by 50% for Hildebran Elem. and by 10% for all other schools. Then total estimated population = 5,688 less 427 = 5,261 Documentation is included in Appendix 5.

Professional Expected Damages Before Mitigation
Other @ 2711 Indian Hills Cir, Hickory, North Carolina, 28601

	WASTEWATER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
1	1	0	0	0	0	0	315,660
5	3	0	0	0	0	0	946,980

Comments

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Damages Before Mitigation:

According to Burke County personnel, the pump station is inaccessible at least one day per year due to flooding, and it is inaccessible for three days during major storm events such as the recent Tropical Cyclone Eta (November 12, 2020). The return interval (RI) = 1 for the shorter disruption of services, as noted by the County. For the longer (3-day) disruptions, the RI is estimated by comparing the NOAA Atlas 14 point-precipitation-frequency estimates table to the recorded precipitation on November 12, 2020. This data indicates an RI = 5 years (4.71" actual 24-hour rainfall compared to 4.62" associated with RI = 5 years on the NOAA table). Refer to the attached documentation. As confirmation of the County's statement that 1-day disruptions occur at least annually, the attached photograph showing water on the access road on October 9, 2021 is associated with an October 8, 2021 rain event of 2.36." The NOAA table shows 3.00" having an RI = 1 year. Refer to attached documentation. Furthermore, the effects of Climate Change are expected to increase the frequency of precipitation events that cause this site to flood. Refer to the attached report entitles "NOAA National Centers for Environmental Information - State Climate Summaries 2022 - North Carolina." Relavent statements include: "The number of landfalling hurricanes in North Carolina is highly variable from year to year. Hurricane-associated storm intensity and rainfall rates are projected to increase as the climate warms." (Key Message #2). In Figure 3 on page 3 it states, "Annual precipitation and the number of 3-inch extreme precipitation events show variability but were well above average during the 2015–2020 period. A typical reporting station experiences a 3-inch precipitation event about once every 1 to 2 years." The October 8, 2021 event was less than 3 inches. Documentation is included in Appendix 6.

Annualized Damages Before Mitigation

Other @ 2711 Indian Hills Cir, Hickory, North Carolina, 28601

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
1	315,660	437,391
5	946,980	189,396
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	1,262,640	626,787

Professional Expected Damages After Mitigation

Other @ 2711 Indian Hills Cir, Hickory, North Carolina, 28601

	WASTEWATER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
501	0.5	0	0	0	0	0	157,830

Comments

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Damages After Mitigation:

If flood waters exceed the 0.2% chance (500-year) elevation, there would be a shallow inundation of the access road. Access would be restored in less than a day as waters recede.

Annualized Damages After Mitigation

Other @ 2711 Indian Hills Cir, Hickory, North Carolina, 28601

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
501	157,830	315
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	157,830	315

Standard Benefits - Ecosystem Services

Other @ 2711 Indian Hills Cir, Hickory, North Carolina, 28601

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Benefits-Costs Summary

Other @ 2711 Indian Hills Cir, Hickory, North Carolina, 28601

Total Standard Mitigation Benefits:	$7,773,917
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$7,773,917
Total Mitigation Project Cost:	$3,266,941
Benefit Cost Ratio - Standard:	2.38
Benefit Cost Ratio - Standard + Social:	2.38

Appendix 2 - Project Cost Breakdown

Burke County

Indian Hills Sewer Pump Station Flood Mitigation Project

Budget

December 29, 2022

Construction Costs

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost	Phase I	Phase II
1	Mobilization	2	days	$6,000	$12,000		$12,000
2	Clearing & Grubbing	1.5	AC	$7,000	$10,500		$10,500
3	Demolition/Disposal (remove structures in floodplain, after new station operational)	1,000	SF	$25	$25,000		$25,000
4	Temporary Erosion Control - Sediment Ponds	2	EA	$9,000	$18,000		$18,000
5	Temporary Erosion Control - Silt Fence	1,500	LF	$10	$15,000		$15,000
6	Temporary Erosion Control - Temporary Stone	100	TN	$45	$4,500		$4,500
7	Temporary Erosion Control - Check Dams	30	EA	$150	$4,500		$4,500
8	Earthwork (Import Fill) - raise 900 LF of access road and 0.25 acre site above BFE	12,000	CY	$30	$360,000		$360,000
9	Earthwork - bad soil undercutting & replacement	2,000	CY	$40	$80,000		$80,000
10	Earthwork - mass rock excavation & replacement	300	CY	$60	$18,000		$18,000
11	Streambank Improvements (Nature-Based) - Coir Fiber Matting	1,500	SY	$10	$15,000		$15,000
12	Streambank Improvements (Nature-Based) - Toewood with Geolift	200	LF	$125	$25,000		$25,000
13	Streambank Improvements (Nature-Based) - Rock Cross Vane	3	EA	$4,000	$12,000		$12,000
14	Streambank Improvements (Nature-Based) - Live Stakes	300	EA	$6	$1,800		$1,800
15	Slope Matting (all cut and fill slopes)	4,500	SY	$5	$22,500		$22,500
16	Grassing	2	AC	$10,000	$20,000		$20,000
17	24" HDPE Storm Drain Pipe (cross pipes under raised access road)	400	LF	$80	$32,000		$32,000
18	Access Road Stone Base (6" to 8" thick; 14' x 1,000 LF)	700	TN	$45	$31,500		$31,500
19	Relocate Electrical Service Connection	1	EA	$20,000	$20,000		$20,000
20	Relocate Water Service Line	100	LF	$50	$5,000		$5,000
21	Relocate Yard Hydrant	1	EA	$2,500	$2,500		$2,500
22	Connect to Existing Force Main (tee and 2 valves with sleeves)	1	EA	$30,000	$30,000		$30,000
23	Adjust Sewer Manhole Rim Elevations (make flush with raised road)	4	EA	$2,500	$10,000		$10,000
24	Relocate 18" Sewer Main	80	LF	$325	$26,000		$26,000
25	Relocate Standby Diesel Generator Set & Auto Transfer Switch	1	EA	$40,000	$40,000		$40,000
26	Wet Well & Dry Well Structure (flood proof - reinforced concrete)	380	CY	$2,000	$760,000		$760,000
27	Influent Grinder with Lift System	1	EA	$115,000	$115,000		$115,000
28	Pump Station Piping & Fittings	150	LF	$400	$60,000		$60,000
29	Pump Station Valves	6	EA	$7,500	$45,000		$45,000
30	Suction Lift Pump Assembly (pump, motor, connections)	2	EA	$125,000	$250,000		$250,000
31	Pump Station Walls & Roof	1,100	SF	$200	$220,000		$220,000
32	Pump Station - Railing	200	LF	$100	$20,000		$20,000
33	Pump Station Electrical	1	EA	$150,000	$150,000		$150,000
34	Pumps - Control Panel, Liquid Level Sensing, Remote Monitoring (SCADA)	1	EA	$160,000	$160,000		$160,000
35	Pumps - Overhead Trolley/Lift/Rail System for Pump Removal	1	EA	$50,000	$50,000		$50,000
36	Pump Station - Ventilation & Heat	1	EA	$50,000	$50,000		$50,000
37	Relocate Fencing	400	LF	$60	$24,000		$24,000
38	Demobilization	2	days	$6,000	$12,000		$12,000
				Total Construction Cost	**$2,756,800**		

Other Costs

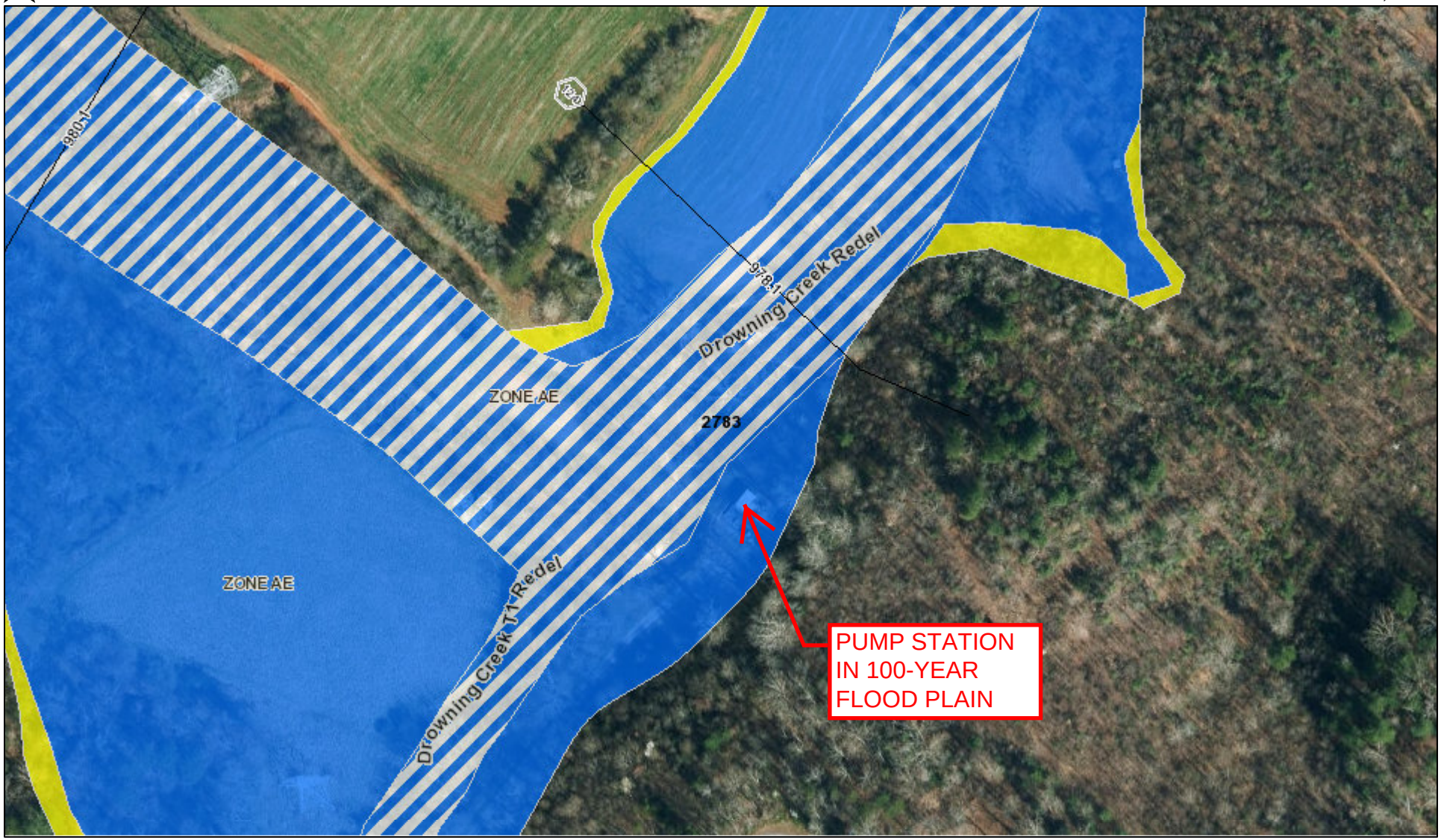
1	Pre-Award Planning (preliminary BCA, EHP, etc.)	170	HR	$100	$17,000	$17,000	
2	Feasibility Analysis & Final Benefit-Cost Analysis (BCA)	135	HR	$100	$13,500	$13,500	
3	Environmental Assessment Professional Services (EHP)	120	HR	$150	$18,000	$18,000	
4	Geotechnical Services pre-design investigation - borings	100	VF	$20	$2,000	$2,000	
5	Geotechnical Services pre-design investigation - lab analysis	5	EA	$300	$1,500	$1,500	
6	Geotechnical Services pre-design investigation - analysis & report	50	HR	$175	$8,750	$8,750	
7	Geotechnical Services construction-phase monitoring - technician	100	HR	$75	$7,500		$7,500
8	Geotechnical Services construction-phase monitoring - engineer	30	HR	$175	$5,250		$5,250
9	Geotechnical Services construction-phase monitoring - lab analysis	10	EA	$200	$2,000		$2,000
10	Land Surveying - field work	60	HR	$150	$9,000	$9,000	
11	Land Surveying - office work	40	HR	$100	$4,000	$4,000	
12	Civil Engineering Design - 30% Complete	339	HR	$100	$33,900	$33,900	
13	Civil Engineering Design - 60% Complete	339	HR	$100	$33,900	$33,900	
14	Civil Engineering Design - 90% Complete	339	HR	$100	$33,900	$33,900	
15	Civil Engineering Design - 100% Complete	113	HR	$100	$11,300	$11,300	
16	Electrical Engineering	100	HR	$150	$15,000	$15,000	
17	Hydrology & Hydraulics (H&H) Engineering	115	HR	$150	$17,250	$17,250	
18	Streambank Improvements Design and Permitting Professional Services	115	HR	$150	$17,250	$17,250	
19	CLOMR Based on New Streambank Geometry (if required)	1	EA	$6,500	$6,500	$6,500	
20	LOMR Based on As-Built Information Submitted as a Follow-up to a CLOMR (if required)	1	EA	$8,000	$8,000		$8,000
21	State Permit Fees - NCDEQ Erosion	2	AC	$200	$400	$400	
22	State Permit Fees - NCDEQ Sewer	1	EA	$480	$480	$480	
23	Legal Services (easement and right-of-way acquistion, construction contract review, etc.)	50	HR	$300	$15,000	$15,000	
24	Construction Administration by Project Engineer	12	months	$5,000	$60,000		$60,000
25	Construction Observation by Project Engineer (Part Time)	12	months	$6,000	$72,000		$72,000
26	Land Acquistion	1.5	AC	$20,000	$30,000	$30,000	
				Total Other Costs	**$443,380**		
	TOTAL PROJECT COST				**$ 3,200,180**	**$288,630**	**$2,911,550**

Appendix 3 – Maps and Plans

N

Indian Hills PS

Oct 13, 2021



Legend

- Panels
- Political Areas
- Stream Centerline
- Cross Sections
- Levee

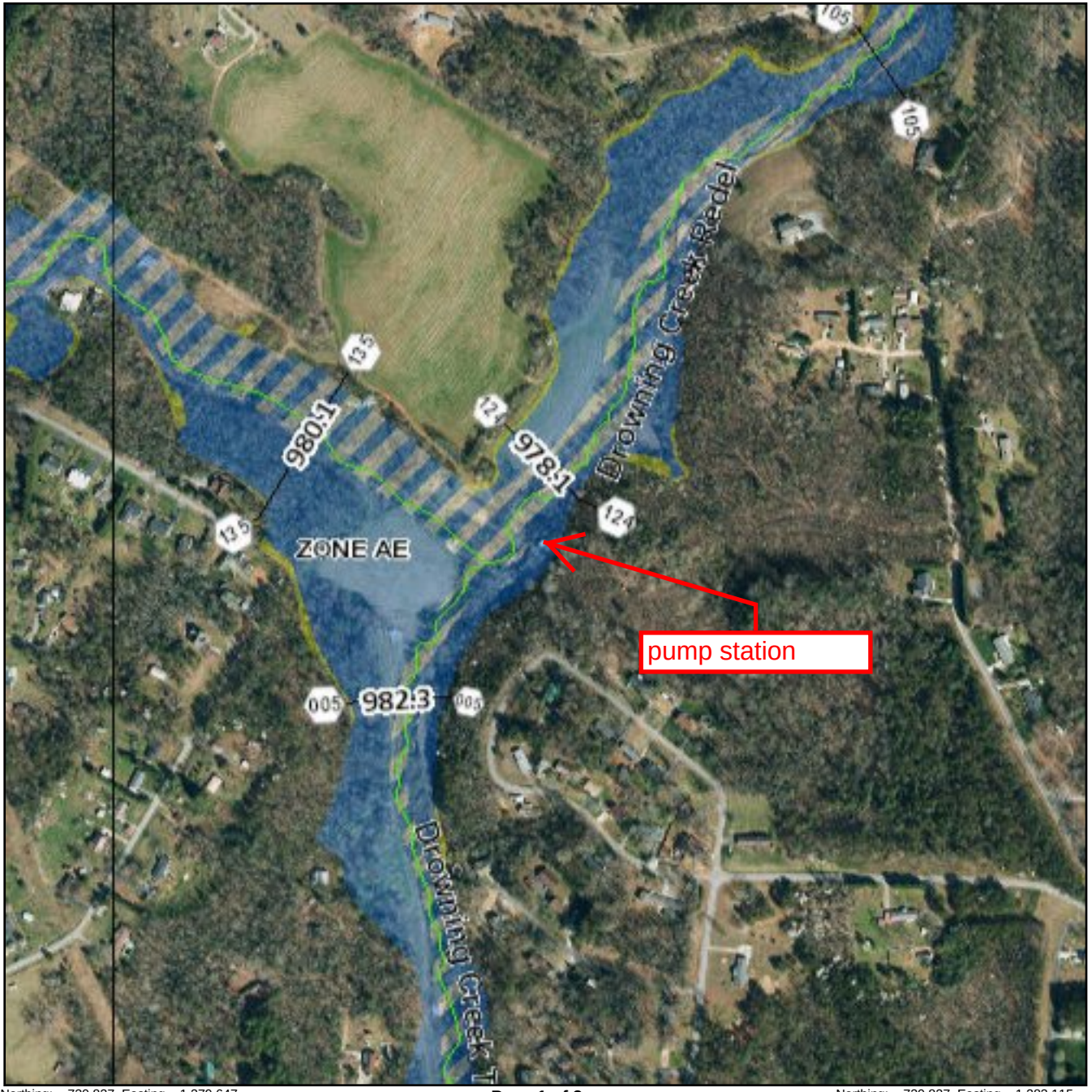
Flood Hazard Areas

- AE
- Floodway (AE)
- 0.2 % Chance Annual Flood Hazard
- Future Conditions 1% Annual Chance Flood Hazard

North Carolina Floodplain Mapping Program

Northing: = 734,295, Easting = 1,279,647

Northing: = 734,295, Easting = 1,283,115



Without Base Flood Elevation (BFE)
Zone A, V, A99
With BFE or Depth
Zone AE, AO, AH, VE, AR

Regulatory Floodway

0.2% Annual Chance Flood Hazard

Future Conditions 1% Annual Chance Flood Hazard *Zone X*

Areas Determined to be Outside the 0.2% Annual Chance Flood Hazard
Zone X

Jurisdiction Boundary

FIRM Panel Boundary

North Carolina State Plane Projection Feet (Zone 3200)
Datum: NAD 1983 (Horizontal), NAVD 1988 (Vertical)

1 inch = 500 feet 1:6000

0 125 250 500 Feet

0 25 50 100 Meters

FEMA National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

Panel(s):2773,2783

CONTAINS:

COMMUNITY	CID
BURKE COUNTY	370034

Notice to User: The Map Number(s) shown below should be used when placing map orders; the Community Number(s) shown above should be used on insurance applications for the subject community.

SELECTED PANELS:

MAP NUMBER	EFFECTIVE DATE
3710277300J	9/5/2007
3710278300K	7/7/2009

Northing: = 730,827, Easting = 1,279,647

Northing: = 730,827, Easting = 1,283,115

FEMA: National Flood Insurance Program

Panel(s):2773,2783

CONTAINS:

COMMUNITY	CID
BURKE COUNTY	370034

Notice to User: The Map Number(s) shown below should be used when placing map orders; the Community Number(s) shown above should be used on insurance applications for the subject community.

SELECTED PANELS:

MAP NUMBER	EFFECTIVE DATE
3710277300J	9/5/2007
3710278300K	7/7/2009

NOTES TO USERS

This is an official FIRMette of a portion of the effective panels listed in the Title Block shown on Page 1. The information represented on this FIRMette was extracted from the effective digital flood hazard data available at http://fris.nc.gov/fris.

Base flood elevation data, floodway, nonencroachment widths, information on certain areas no in the Special Flood Hazard Areas protected by flood control structures, and other pertinent data are available in the Flood Insurance Study (FIS) available at http://fris.nc.gov/fris. Users should be aware that flood elevations shown on this FIRMette represent elevations rounded to one tenth of a foot (0.1') and should be utilized in conjunction with data available in the FIS.

NOTES TO USERS

Base map information and geospatial data used to develop this FIRMette were obtained from various organizations, including the participating local community(ies), state and federal agencies, and/or other sources. The primary base for this FIRM is aerial imagery acquired by the State in 2010. Information and geospatial data supplied by the local community(ies) that met FEMA base map specifications were considered the preferred source for development of the base map.

See geospatial metadata for the associated digital FIRMette for additional information about base map preparation. Base map features shown on this FIRMette, such as corporate limits, are based on the most up-to-date data available at the time of publication. Changes in the corporate limits may have occurred since this map was published. Map users should consult the appropriate community official or website to verify current conditions of jurisdictional boundaries and base map features. This map may contain roads that were not considered in the hydraulic analysis of streams where no new hydraulic model was created during the production of this statewide format FIRM.

Flood elevations on this map are referenced to either or both the North American Vertical Datum of 1988 (NAVD 88) or National Geodetic Datum of 1929 (NGVD 29), and are labeled accordingly. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. To obtain current elevation, description, and/or location information for bench marks shown on this map, or for information regarding conversion between NGVD 29 and NAVD 88, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at http://www.ngs.noaa.gov/.

MORE INFORMATION

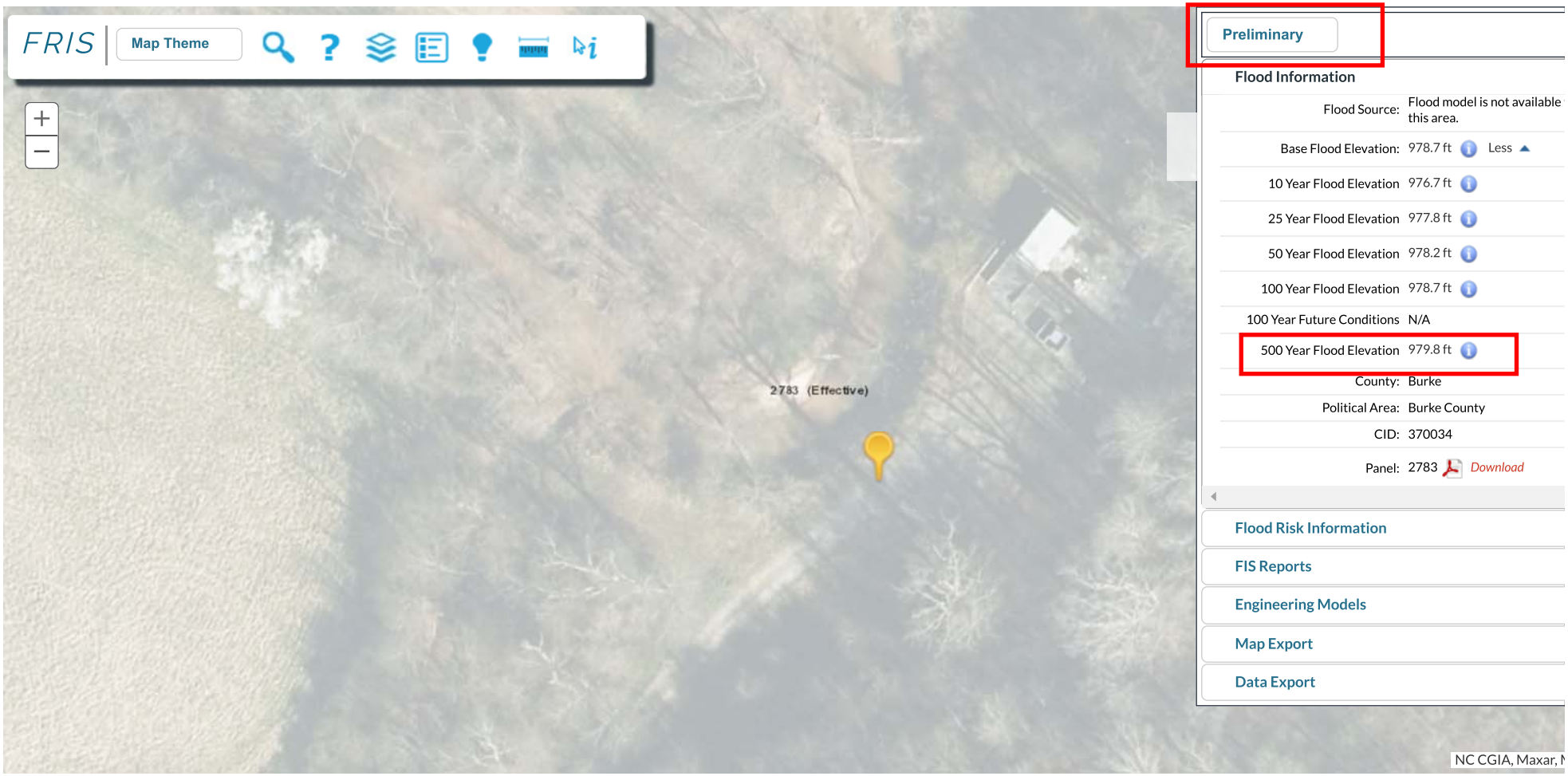
Letters of Map Amendment (LOMA)	1-877-336-2627 http://msc.fema.gov/
Letters of Map Revision (LOMR)	919-715-5711 www.ncfloodmaps.com
Flood Insurance Availability	
North Carolina Division of Emergency Management (NCDEM)	919-715-5711 http://www.nccrimecontrol.org/nfip
National Flood Insurance Program (NFIP)	1-877-638-6620 http://www.fema.gov/business/nfip
Questions about this FIRMette	1-877-336-2627 http://fema.gov

LEGEND

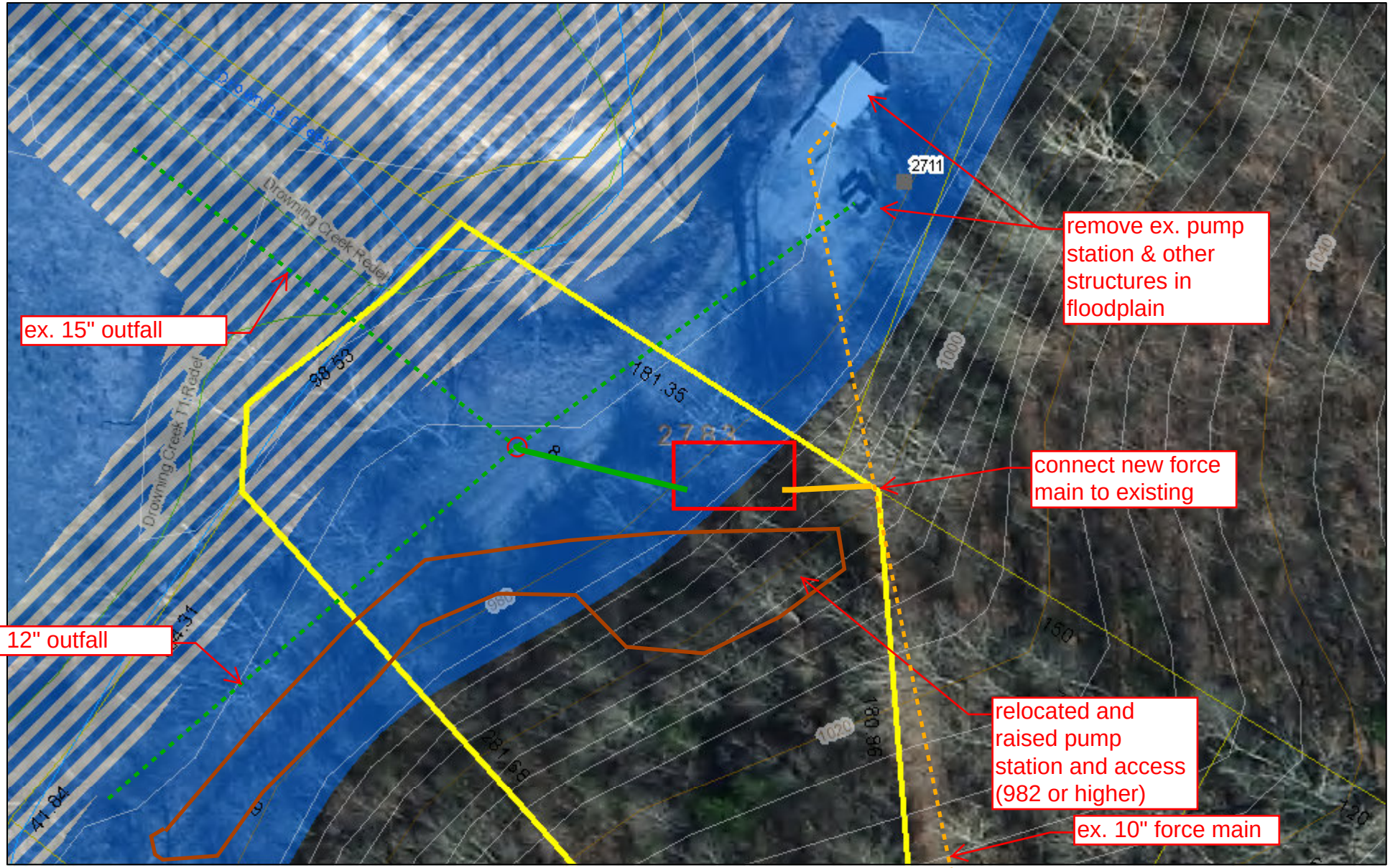
LEGEND

MAP REVISIONS

There are no map revisions for the selected area.


FRIS
Map Theme
2783 (Effective)
Preliminary
Flood Information
Flood Source: Flood model is not available this area.
Base Flood Elevation: 978.7 ft Less
10 Year Flood Elevation 976.7 ft
25 Year Flood Elevation 977.8 ft
50 Year Flood Elevation 978.2 ft
100 Year Flood Elevation 978.7 ft
100 Year Future Conditions N/A
500 Year Flood Elevation 979.8 ft
County: Burke
Political Area: Burke County
CID: 370034
Panel: 2783 Download
Flood Risk Information
FIS Reports
Engineering Models
Map Export
Data Export
NC CGIA, Maxar,

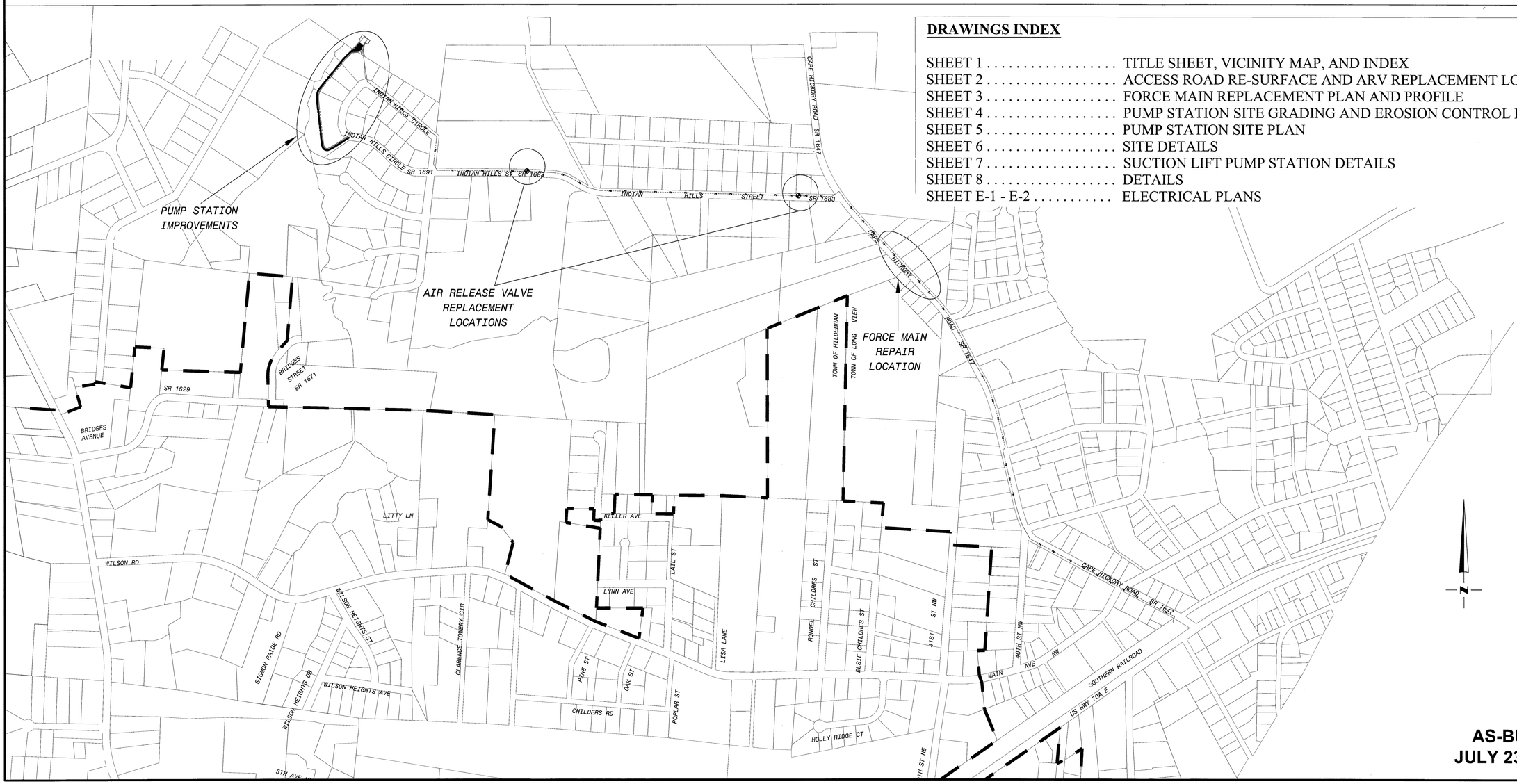
Burke County, NC



December 29, 2022

INDIAN HILLS SEWER PUMP STATION FLOOD MITIGATION PROJECT

BURKE COUNTY
COLLECTION SYSTEM REHABILITATION PROJECT
CONTRACT A: INDIAN HILLS PUMP STATION IMPROVEMENTS
BURKE COUNTY, NORTH CAROLINA



DRAWINGS INDEX

AS-BUILT
JULY 23, 2012

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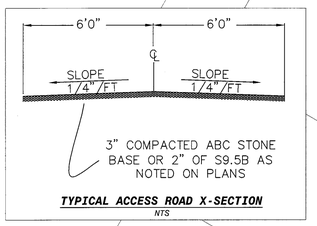
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20757 BENJAMIN R. THOMAS

TITLE SHEET, VICINITY MAP, AND INDEX

PROJECT NO.: 07037
SCALE: 1"=300'
DATE: JUNE 2011
DRAWN BY: RSL
REVISION:

BURKE COUNTY
COLLECTION SYSTEM REHABILITATION PROJECT
CONTRACT A: INDIAN HILLS
PUMP STATION IMPROVEMENTS
BURKE COUNTY, NORTH CAROLINA

SHEET
1 OF 8



TYPICAL ACCESS ROAD X-SECTION
NTS

RE-GRAVEL EX. 12' ACCESS ROAD AND PARKING AREA FROM END OF PAVED ACCESS TO PUMP STATION GATES W/ 3" OF ABC STONE (SEE TYP X-SECTION DETAIL)

PERMANENT EASEMENT (TYP)

20' EASEMENT (TYP)

APPROX. LOCATION OF RELOCATED/ NEW PUMP STATION

FROM ENTRANCE TO THIS POINT (285'), 12'ACCESS ROAD IS PAVED AND SHALL BE RE-PAVED W/ 2" OF S9.5B (SEE TYP X-SECTION DETAIL)

EX. GRAVEL ACCESS ROAD

ACCESS DRIVE AND SITE TO BE FILLED TO RAISE TO 2' ABOVE 500-YEAR FLOOD ELEV.

100 0 100 200
GRAPHIC SCALE – FEET
1"=100'

INDIAN HILLS CIRCLE

FM INDIAN HILLS CIRCLE FM

EX. 10" FORCE MAIN

SR 1691

INDIAN HILLS ST SR 1683

A A

NOTES:
1. POTHOLES TO BE FILLED W/ ABC STONE PRIOR TO RE-PAVING AND PLACEMENT OF FINAL 3" OF ABC.
2. ALL ROAD IMPROVEMENTS TO BE COMPLETED AFTER CONSTRUCTION (IN ORDER TO PREVENT DAMAGE DURING CONSTRUCTION).

100 0 100 200
GRAPHIC SCALE – FEET
1"=100'

CAPE HICKORY ROAD SR 1647

REPLACE AIR RELEASE VALVE INSIDE EXISTING MANHOLE

INDIAN HILLS STREET

SR 1683

EX. 10" FORCE MAIN

REPLACE AIR RELEASE VALVE INSIDE EXISTING MANHOLE

AS-BUILT
JULY 23, 2012

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 29075 KEITH BENJAMIN THOMAS

ACCESS ROAD RE-SURFACE AND ARV REPLACEMENT LOCATIONS

PROJECT NO.: 07037
SCALE: 1"=100'
DATE: JUNE 2011
DRAWN BY: RSL
REVISION:

BURKE COUNTY
COLLECTION SYSTEM REHABILITATION PROJECT
CONTRACT A: INDIAN HILLS
PUMP STATION IMPROVEMENTS
BURKE COUNTY, NORTH CAROLINA

SHEET
2 OF 8

100 YEAR FLOOD PLAIN ELEVATION = 979.25
FIRM MAP #3710278300K (7/7/09), PANEL #2783

DROWNING CREEK
CATAWBA RIVER BASIN
CLASS WS IV
STREAM INDEX #11-52-(1)

ERODING AREA TO BE RESTORED AND STABILIZED

AREA IN FLOOD PLAIN BUT OUTSIDE FLOODWAY TO BE FILLED TO ABOVE 500-YEAR FLOOD ELEV., TO PROVIDE ALL-WEATHER ACCESS. EQUIPMENT TO BE RELOCATED/RAISED AS REQUIRED.

SILT FENCE
STONE OUTLETS MUST BE PLACED AT A MAXIMUM EVERY 150' AS SHOWN IN DETAILS

25' MINIMUM SETBACK TO STRUCTURES AND SEWERS FROM CREEK TOP OF BANK (TYPICAL)

AS-BUILT (WALL BUILT AROUND PUMP STATION IN LIEU OF GRADING)

FLOODWAY (TYP.)

AS-BUILT WALL

SURVEY NAIL LOCATION (976.85)

TB-TOP OF BANK (TYP)

BB-BOTTOM OF BANK

FFE 981.25

AFTER NEW PUMP STATION OPERATIONAL, REMOVE ALL STRUCTURES IN FLOOD PLAIN AND RETURN TO A NATRURAL STATE.

LIMITS OF DISTURBANCE AND TEMPORARY CONSTRUCTION EASEMENT BOUNDARY (TYP)

18" PVC

10'

TOP OF WALL EL. 979.0 ×978.30

TOP OF WALL EL. 980.58× 977.0

NEW 8" THICK CONCRETE WALL

977.50 977.50 976.50 976.40 976.50 976.35 976.30

EX. METERING MH RIM-976.1 (RAISE TO 981.25 OR HIGHER)

EX. WET WELL TOP-978.30 (RAISE TO 981.25 OR HIGHER)

×976.25 ×976.50

10'

EXCAVATE SWALE AS SHOWN. MAINTAIN 2% SLOPE.

MOVE (REPLACE) PUMP STATION AWAY FROM CREEK AND ON HIGHER GROUND

RELOCATE GENERATOR TO BE ADJACENT TO NEW PUMP STATION

100 YEAR FLOOD PLAIN ELEVATION = 979.25

AS-BUILT NO GRADING

4' MINIMUM LEVEL @ CONTROLS END

3' MINIMUM

3' MINIMUM

×975.10 ×975.30

NEW 15" RCP STORM DRAIN PIPE (40 LF OR AS REQUIRED)

CONCRETE PAD (TOP ELEVATION 981.25)

NOTES:
1. CONTRACTOR SHALL PROVIDE AND PLACE FILL FROM OFF-SITE AT OWN EXPENSE
2. SITE SHALL BE GRADED AS SHOWN, INCLUDING ADJUSTMENT OF HUMPS AND VALLEYS THAT MAY EXIST, TO ACHIEVE POSITIVE SURFACE DRAINAGE AWAY FROM FENCED AREA.

AS-BUILT JULY 23, 2012

GRAPHIC SCALE - FEET
1"=5'

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WEST CONSULTANTS PLLC

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20767 BENJAMIN THOMAS HAMILTON

GRADING AND EROSION CONTROL PLAN

PROJECT NO.: 07037
SCALE: 1"=5'
DATE: JUNE, 2011
DRAWN BY: HSL AND BWS
REVISION:

BURKE COUNTY
COLLECTION SYSTEM REHABILITATION PROJECT
CONTRACT A: INDIAN HILLS
PUMP STATION IMPROVEMENTS
BURKE COUNTY, NORTH CAROLINA

SHEET
4 OF 8

CONSTRUCTION SEQUENCE:

1. KEEP EXISTING STATION OPERATIONAL AT ALL TIMES UNTIL NEW STATION IS COMPLETE, TESTED, AND ACCEPTED. CONTRACTOR SHALL PROVIDE AND INSTALL ANY TEMPORARY VALVES, FITTINGS, ETC. IF NEEDED FOR THIS PURPOSE AT NO ADDITIONAL CHARGE TO OWNER.
2. CONTRACTOR SHALL PROVIDE SEWER PUMPING AND HAULING WHEN DRAINING FORCE MAIN FOR THIS TIE IN, AT ANY OTHER TIMES IT IS NECESSARY TO TURN OFF THE EXISTING PUMPS, AND AS REQUIRED TO WORK AROUND WET WELL MODIFICATION, PIPING AND GRINDER WORK, ETC.
3. LOWER EX. MH TO GRADE
4. BUILD NEW PUMP STATION, INCLUDING GENERATOR SET.
5. ALL EX. EQUIPMENT TO BE ABANDONED (GENERATOR, PUMPS, CONTROL PANELS, ETC.) SHALL REMAIN PROPERTY OF BURKE COUNTY. CONTRACTOR SHALL COORDINATE REMOVAL W/ BURKE COUNTY WATER/SEWER DEPT. CONTRACTOR SHALL LOAD ABANDONED EQUIPMENT ONTO COUNTY TRUCK AT SITE. DURING THESE TIMES THE COUNTY WILL DISPOSE OF ALL OTHER ASSOCIATED ABANDONED EQUIPMENT (RACKS, WIRING, ETC.), I.E. ALL SCRAP METAL (NOT CONCRETE, VEGETATION, OR SOIL).
6. EX. DRY WELL AND EX. SURGE RELIEF MH SHALL BE FILLED W/ SAND OR #67 STONE.

NOTES:

*CONTRACTOR TO VERIFY EXACT LOCATION AND DEPTH OF EXISTING FORCE MAIN.

**EXISTING FLOAT ALARM UPSTREAM OF BAR SCREEN TO REMAIN AND BE CONNECTED TO NEW PUMP CONTROL PANEL ALARM CIRCUIT.

ALL FORCE MAIN FITTINGS AND VALVES TO BE RESTRAINED WITH RETAINER GLANDS. (IN ADDITION TO CONC. BLOCKING AT BENDS)

BID ITEM - "PUMP STATION, COMPLETE" SHALL INCLUDE ALL WORK AND COMPONENTS RELATED TO THE NEW PUMP STATION CONSTRUCTION, EXCEPT STANDBY GENERATOR SET AND GRINDER.

N.O. - NORMALLY OPEN
N.C. - NORMALLY CLOSED
MH - MANHOLE

NOTE:
1/ SEE SECTION DETAILS SHEET 8

DROWNING CREEK
CATAWBA RIVER BASIN
CLASS WS IV
STREAM INDEX #11-52-(1)

25' MINIMUM SETBACK TO STRUCTURES AND SEWERS FROM CREEK TOP OF BANK (TYPICAL)

FLOODWAY (TYP.)

PROPOSED PERMANENT EASEMENT

AS-BUILT WALL

NEW 4" WASHED STONE TO BE PLACED IN ALL LEVEL AREAS FENCED (APPROX. 2,800 SF)

NEW 4'x 7'x 4" THICK CONCRETE SLAB ON GRADE

NEW FENCE

EX. FENCE WITH DOUBLE GATES - RESET GATE AND REPLACE COMPONENTS AS REQUIRED TO PLACE IN NEW POSITION AND NEW ELEVATION AS SHOWN

AS-BUILT GATES

10"X8" CONCENTRIC REDUCER

8" PLUG VALVE

CONNECT REDUCER AND BEND W/ THREADED RODS

10" 45° BEND - APPROX. LOCATION

NEW 8" THICK CONCRETE WALL

NEW 22'x12' FIBERGLASS ENCLOSURE AND 10' Ø WET WELL FOR SUCTION LIFT PUMPS. ALL CONTROLS SHALL BE LOCATED INSIDE ENCLOSURE.

5'

5'

5

SECTION 2 1/

SECTION 1 1/

SECTION 1 1/

FOUNDATION WALL (TYP)

AS-BUILT NEW LIGHT POLE

AS-BUILT
SAFETY PROTECTION ADDED AROUND TOP OF METERING MH AND NEW WETWELL.

EX. 5' METERING MH
RIM-976.17
INV IN-967.77
INV OUT-967.97

CORE DRILL EX. CONCRETE WALL AND SEAL ALL VOIDS AROUND NEW PIPE.
NEW INVERT OUT-962.54

EX. 4' Ø WET WELL ACCESS W/ 2'X2' ACCESS COVER - RAISE TO EL. 981.25 OR HIGHER

EX. 10' Ø WET WELL
TOP-978.30
INV IN ACTIVE-967.9
INV IN ABANDONED-968.25
BOTTOM-957.45

RAISE EX. VENT PIPE TO BRING OPENING TO EL. 981.25 OR HIGHER

EX. 10'Ø DRY WELL FOR PUMP HOUSING
TOP-979.59
BOTTOM-958.29
(TO BE ABANDONED PER NOTE 6)

EX. CONTROL PANELS (ABANDON)

EX. POWER METER AND POLE

LOWER MH TO GRADE AND REPLACE EX. FRAME/COVER W/ WATER TIGHT FRAME/COVER

APPROX. LOCATION OF PREVIOUSLY ABANDONED GRAVITY LINE (REMOVE AS NEEDED)

CONCRETE BLOCKING PER DETAIL (TYP. ALL M.J. FITTINGS)

10" 22.5° BEND (APPROX. LOCATION)

ELASTOMERIC TRANSITION COUPLING (TYP) (FERNCO OR EQUAL)

EX. MH
RIM-977.58
INV IN-968.73
INV OUT-968.63

EX. 18" PVC SEWER PIPE

18" DIP WYE

NEW 18" PLUG VALVE W/ BOX (TYP)

EX. GRAVEL AREA TO BE IMPROVED W/ 6" THICKNESS OF COMPACTED ABC STONE

10" 11-1/4° BEND (APPROX. LOCATION)

NEW 10' GATE

APPROX. LOCATION OF EX. 4" SEWER SERVICE LINE. **KEEP IN SERVICE**, RE-ROUTE IF NEEDED TO AVOID CONFLICT WITH NEW 18" S.S.

EX. EDGE OF GRAVEL DRIVE (TYP)

AS-BUILT 10" PLUG VALVE

AS-BUILT EX. 10x10x8 TEE

AS-BUILT 10" GATE VALVE

EXISTING SOIL PATH

EX. UNDERGROUND POWER LINE

EX. WYE CONNECTION

EX. INV. AT WALL-968.44

**EXISTING ALARM FLOAT SWITCH

EX. MANUAL BAR SCREEN W/ CONTAINMENT WALL

EX. ISCO METER RELOCATED TO OUTSIDE OF METERING MH)

NEW 18" DIP

(N.C.)

(N.O.) 18" DIP

NEW CONCRETE SLAB

(N.O.)

NEW GRINDER CONTROL PANEL

18" 90° BEND

18" 45° BEND

NEW 24" CHANNEL AND GRINDER (SEE DETAIL SHEET 6)

NEW FLAT TOP W/ 24"X24" ALUMINUM ACCESS DOOR AND LOCK

ADD BACKFLOW PREVENTER W/ INSULATED ENCLOSURE AND HEAT TAPE TO EX. YARD HYDRANT. (CONTRACTOR TO VERIFY LOCATION OF EX. WATER SERVICE LINE)

REMOVE EX. GENERATOR AND CONCRETE PAD

AS-BUILT RELOCATED EXISTING 8" GATE VALVE AND BY-PASS CONNECTION

NEW CONCRETE STEPS (SEE DETAIL SHEET 8)

*APPROX. LOCATION OF EX. 10" PVC FORCE MAIN (APPROX. DEPTH = 5')

APPROX. LOCATION OF EX. 3/4" SDR-9 WATER SERVICE LINE

EX. 10" GATE VALVE

NEW GENERATOR AND CONCRETE PAD (PAD-TOP ELEVATION 981.25)

NEW CHAIN-LINK FENCE

REPLACE FENCING WHEREVER REQUIRED DUE TO ELEVATION CHANGE

EX. MH W/ SURGE RELIEF VALVE
TOP-978.07
TOP OF FM-970.87
(TO BE ABANDONED PER NOTE 6, REMOVE TOP SECTION TO GRADE)

LIMITS OF DISTURBANCE AND TEMPORARY CONSTRUCTION EASEMENT BOUNDARY (TYP)

PROPOSED PERMANENT EASEMENT (TYP)

AS-BUILT EXISTING FENCE EXTENDED 10' TO ENCLOSE EXISTING BY-PASS CONNECTION

* LENGTHS ARE APPROXIMATE

AS-BUILT
JULY 23, 2012

5 0 5 10
GRAPHIC SCALE – FEET
1"=5'

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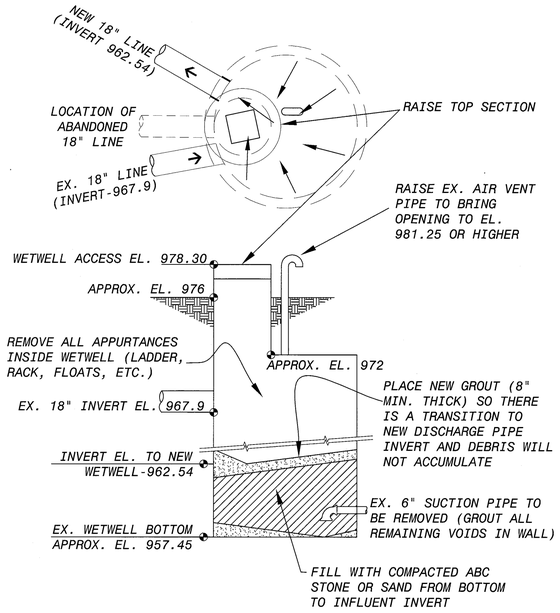
NORTH CAROLINA PROFESSIONAL SEAL 20765 ENGINEER BENJAMIN R. THOMAS

SITE PLAN

PROJECT NO.: 07037
SCALE: 1"=5'
DATE: JUNE, 2011
DRAWN BY: RSL
REVISION:

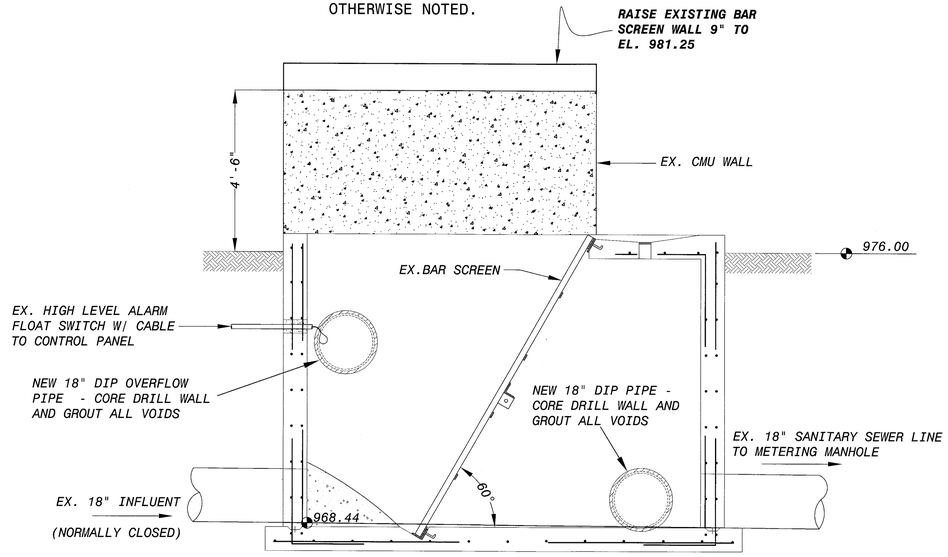
BURKE COUNTY
COLLECTION SYSTEM REHABILITATION PROJECT
CONTRACT A: INDIAN HILLS
PUMP STATION IMPROVEMENTS
BURKE COUNTY, NORTH CAROLINA

SHEET
5 OF 8

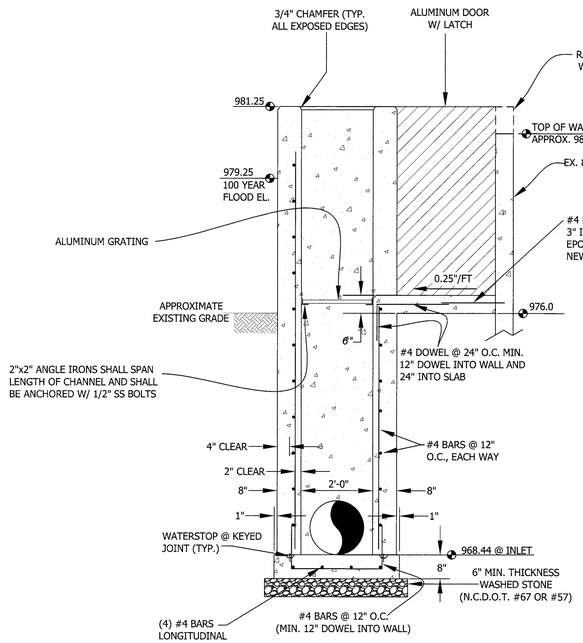


EXISTING WETWELL MODIFICATIONS
SCALE: 1"=5'

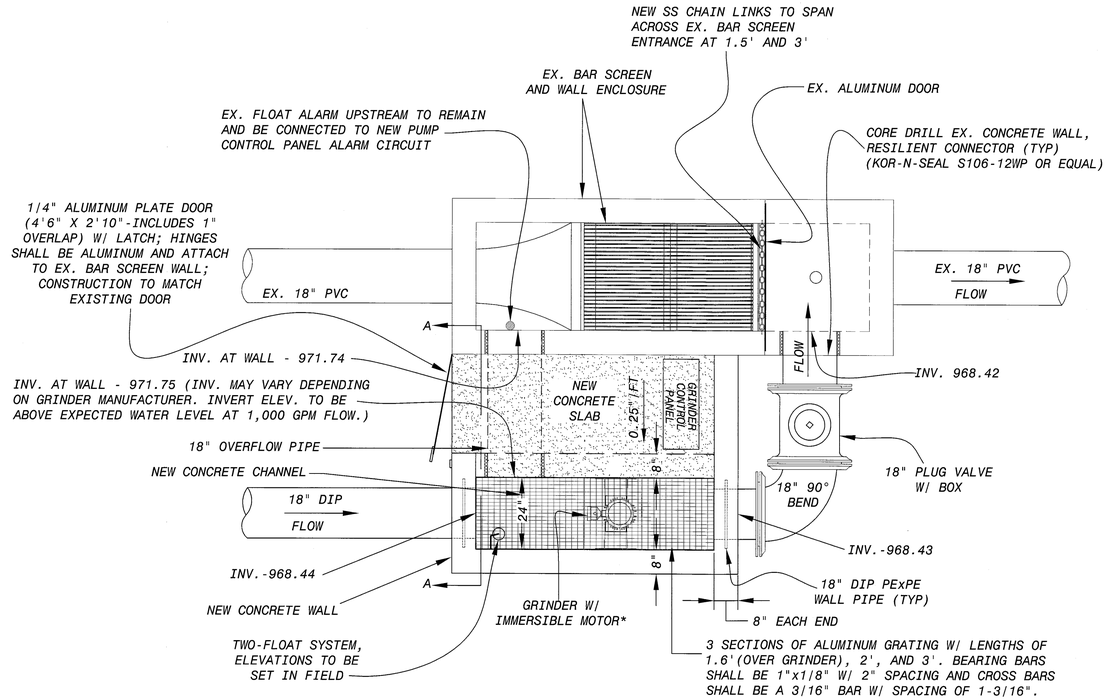
NOTE:
ALL NEW PIPE SHALL BE DIP UNLESS OTHERWISE NOTED.



EXISTING MANUAL BAR SCREEN DETAIL (FOR REFERENCE ONLY)
1"=2'0"



SECTION A-A
1"=2'



*GRINDER SHALL HAVE A GUIDE PLATE TO LIFT GRINDER IN AND OUT WITHIN BRACKETS W/ SLOTS. BRACKETS SHALL EXTEND THE FULL CHANNEL DEPTH. GUIDE PLATE, BRACKETS, AND BOLTS SHALL BE STAINLESS STEEL. OTHER MEANS OF GRINDER LIFT OUT AS SUGGESTED BY MANUFACTURERS MAY BE APPROVED BY ENGINEER W/ SHOP DRAWINGS.

NEW CHANNEL AND GRINDER PLAN VIEW
SCALE: 1"=2'

2 0 2 4
GRAPHIC SCALE – FEET
1"=2'

AS-BUILT
JULY 23, 2012

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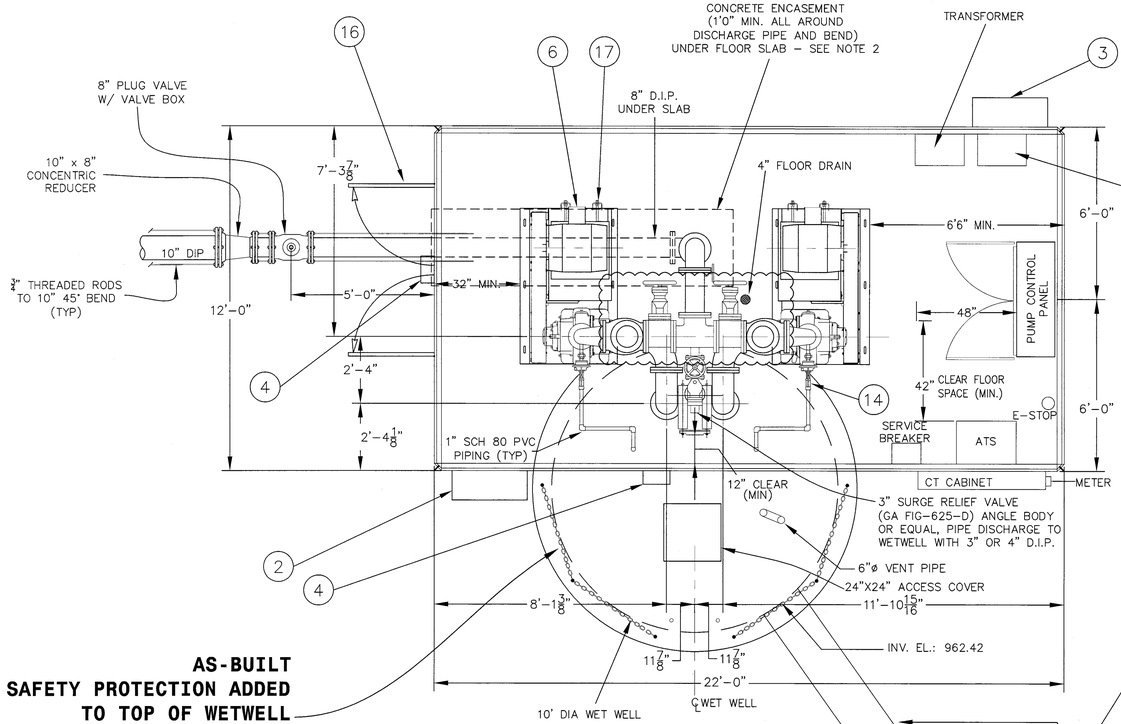
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 30242 BENJAMIN THOMAS

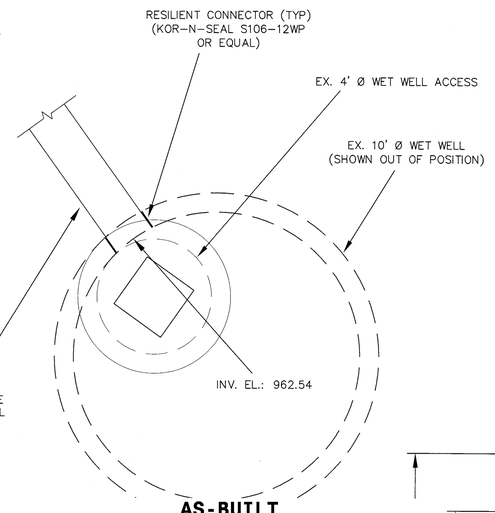
SITE DETAILS

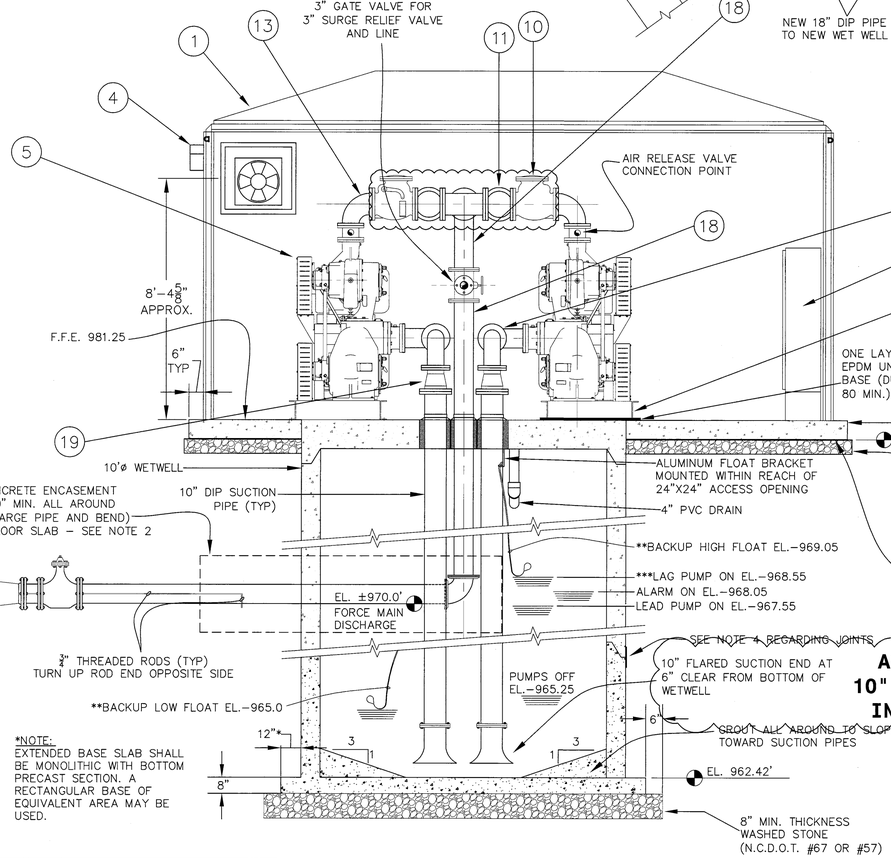
PROJECT NO.: 07037
SCALE: AS SHOWN
DATE: JUNE, 2011
DRAWN BY: RSL
REVISION:

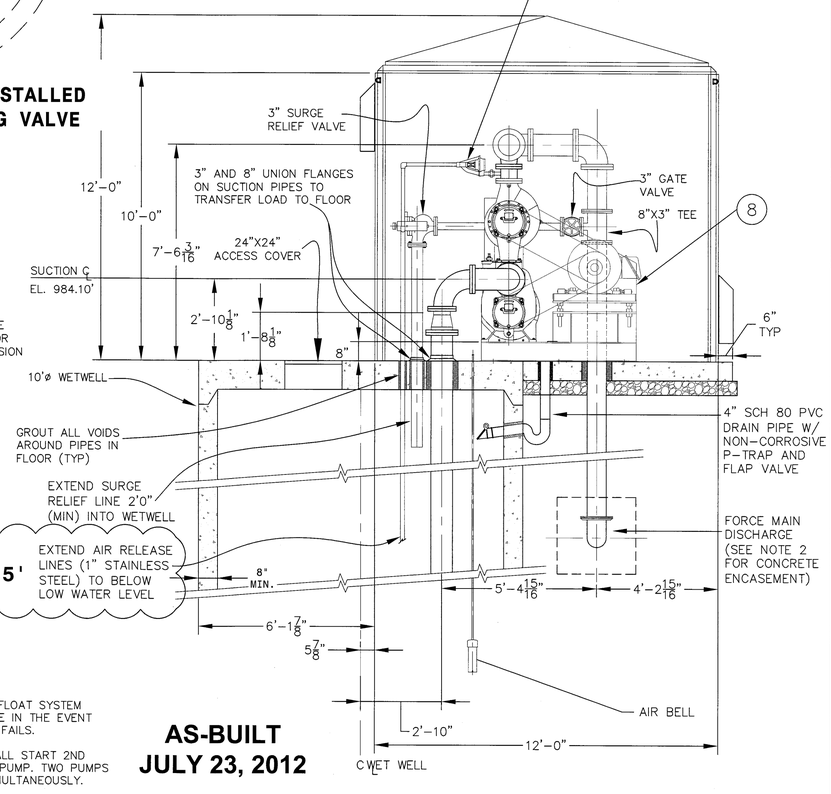
BURKE COUNTY
COLLECTION SYSTEM REHABILITATION PROJECT
CONTRACT A: INDIAN HILLS
PUMP STATION IMPROVEMENTS
BURKE COUNTY, NORTH CAROLINA

SHEET
6 OF 8









** NOTE: REDUNDANT INDEPENDENT FLOAT SYSTEM SHALL BE SET TO ACTIVATE IN THE EVENT THE AIR BUBBLER SYSTEM FAILS.

*** NOTE: LAG PUMP ACTIVATION SHALL START 2ND PUMP AND TURN OFF 1ST PUMP. TWO PUMPS SHALL NEVER OPERATE SIMULTANEOUSLY.

AS-BUILT
JULY 23, 2012

ITEM	DESCRIPTION	MATERIAL & SIZE
1	STATION ENCLOSURE	FIBERGLASS 12' X 22' X 10'
2	INTAKE VENT ASSY	ALUMINUM
3	EXHAUST FAN ASSY	CORROSION RESISTANT
4	EXTERIOR LIGHT	PHOTOCELL CONTROLLED
5	PUMP	CAST IRON VS6A-B
6	MOTOR	CAST IRON
7	PUMP & MOTOR BASE ASSY	STEEL
8	BELT GUARD ASSY	STEEL
9	CONTROL PANEL	STEEL
10	DISCHARGE CHECK VALVE	CAST IRON 8"
11	DISCHARGE PLUG VALVE	CAST IRON 8"
12	LR 90 DEG ELBOW	CAST IRON 8"
13	INCREASING 90 DEG ELBOW	CAST IRON 6" x 8"
14	AIR RELEASE VALVE	1" NPT
16	6'-0"x6'-8" DOUBLE DOOR	
17	BOLT TENSIONING ASSY	STEEL
18	SPOOL	8" D.I.P.
19	CONCENTRIC REDUCER	DUCTILE IRON 10"FL x 8"FL

NOTES:

1. *ALL ABOVE GROUND PIPING/FITTINGS/VALVE CONNECTIONS SHALL BE 125 LB ANSI B16.1 FLANGED WITH EPDM RUBBER GASKETS. BELOW GROUND CONNECTIONS SHALL BE MECHANICAL JOINT UNLESS OTHERWISE SHOWN.*

2. *CONCRETE ENCASEMENTS MUST BE CAST AGAINST UNDISTURBED EARTH, UNLESS CONTRACTOR ELECTS TO USE FORMS. IF FORMS ARE USED THEN ALL VOIDS BETWEEN CONCRETE AND UNDISTURBED EARTH MUST BE FILLED WITH SUITABLE MATERIAL (FREE OF ANY ORGANIC MATTER, CLAY, EXCESSIVE MOISTURE, ROCK, OR DEBRIS) AND COMPACTED IN 6" LAYERS TO 98% OF MAX. DRY DENSITY. IF STONE IS USED, IT MUST BE N.C.D.O.T. TYPE ABC. ALL SUCH BACKFILL MUST BE DONE IN THE PRESENCE OF THE ENGINEER AND THE CONTRACTOR SHALL PROVIDE VERIFICATION OF COMPACTION BY A N.C. LICENSED GEOTECHNICAL ENGINEER. ("UNDISTURBED EARTH" MAY INCLUDE SOIL THAT WAS PREVIOUSLY PLACED AS FILL FOR THE BUILDING PAD, AS LONG AS SUCH FILL HAS BEEN PLACED IN 6" LAYERS TO 98% OF MAX. DRY DENSITY AND VERIFIED BY A N.C. LICENSED GEOTECHNICAL ENGINEER).*

3. *ALL DIMENSIONS AND LAYOUT SHOWN ARE BASED ON THE GORMAN RUPP CO. PUMP MODEL VS6. CONTRACTOR IS RESPONSIBLE FOR ALL COSTS AND COORDINATION RESULTING FROM USING A DIFFERENT PUMP MODEL. (SEE SPECIFICATIONS).*

4. *ALL WETWELL JOINTS SHALL BE EXTERNALLY SEALED W/ A CORROSION RESISTANT WRAP (MIN. 8" WIDE).*

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20765 BENJAMIN R. WEST

LIFT PUMP STATION DETAILS

SUCTION LIFT

PROJECT NO.: 07037
SCALE: NONE
DATE: JUNE, 2011
DRAWN BY: RSL
REVISION:

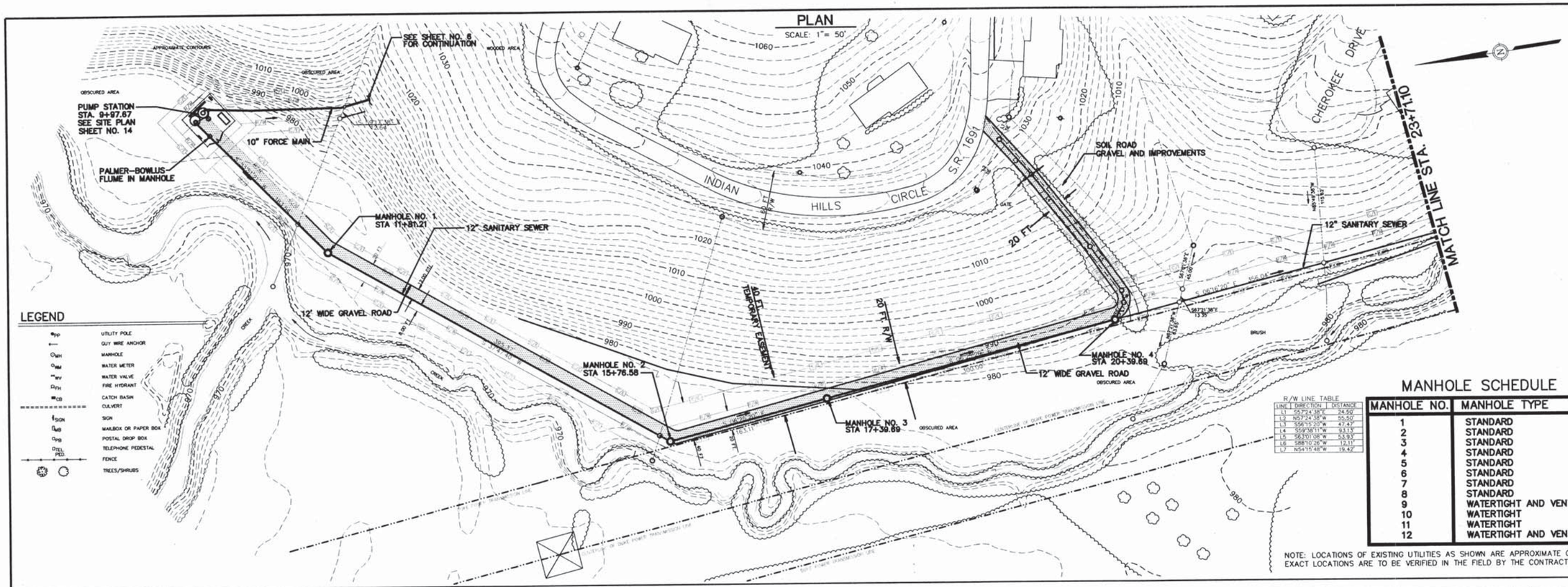
BURKE COUNTY
COLLECTION SYSTEM REHABILITATION PROJECT
CONTRACT A: INDIAN HILLS
PUMP STATION IMPROVEMENTS
BURKE COUNTY, NORTH CAROLINA

SHEET
7 OF 8

Appendix 4 - Record Drawing (Age of Infrastructure)

PLAN

SCALE: 1"= 50'



LEGEND

UTILITY POLE
GUY WIRE ANCHOR
MANHOLE
WATER METER
WATER VALVE
FIRE HYDRANT
CATCH BASIN
CULVERT
SIGN
MAILBOX OR PAPER BOX
POSTAL DROP BOX
TELEPHONE PEDESTAL
FENCE
TREES/SHRUBS

R/W LINE TABLE

LINE	DIRECTION	DISTANCE
L1	S5°24'18"E	74.50'
L2	N57°24'38"W	55.50'
L3	S56°19'20"W	47.47'
L4	S59°39'11"W	93.13'
L5	S63°01'08"W	53.93'
L6	S88°10'26"W	12.11'
L7	N54°15'48"W	19.42'

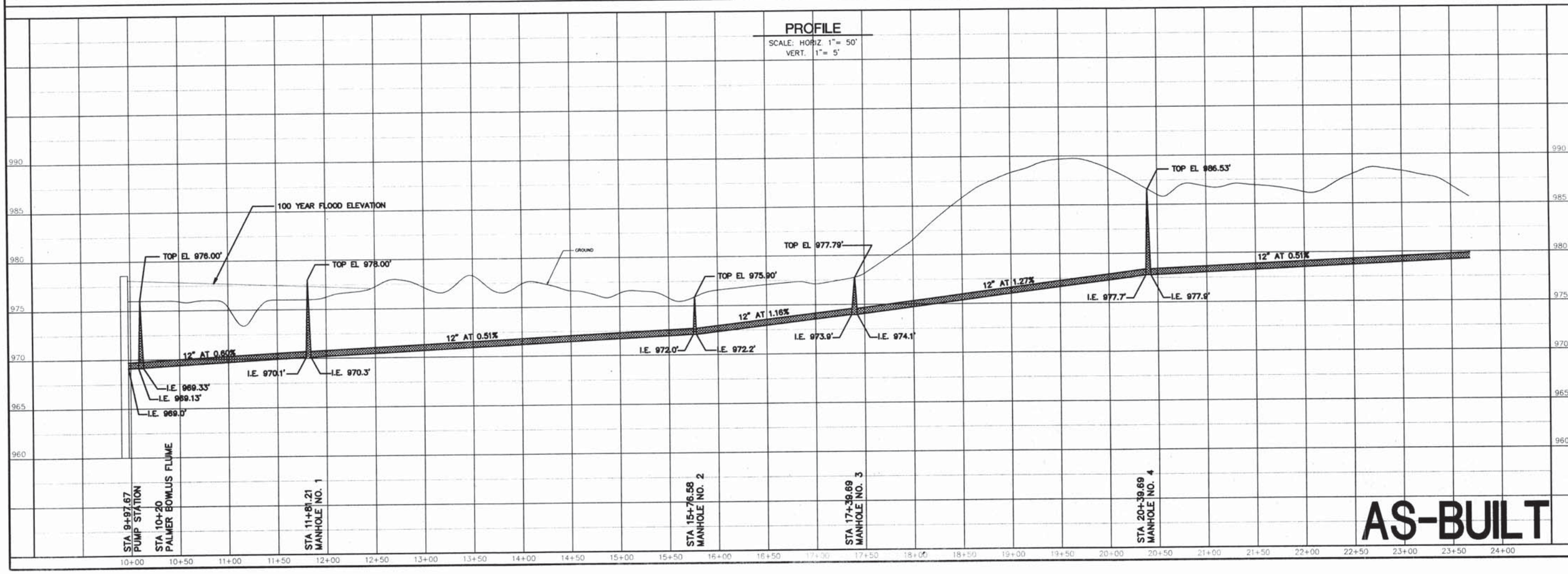
MANHOLE SCHEDULE

MANHOLE NO.	MANHOLE TYPE
1	STANDARD
2	STANDARD
3	STANDARD
4	STANDARD
5	STANDARD
6	STANDARD
7	STANDARD
8	STANDARD
9	WATERTIGHT AND VENTED
10	WATERTIGHT
11	WATERTIGHT
12	WATERTIGHT AND VENTED

NOTE: LOCATIONS OF EXISTING UTILITIES AS SHOWN ARE APPROXIMATE ONLY. EXACT LOCATIONS ARE TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR.

PROFILE

SCALE: HORIZ 1"= 50'
VERT. 1"= 5'



AS-BUILT

McGILL ASSOCIATES, P.A.
CONSULTING ENGINEERS
ASHEVILLE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 19732 DANNY B. BROWN

HENRY FORK REGIONAL SEWER PROJECT
BURKE COUNTY PORTION
BURKE COUNTY, NORTH CAROLINA

DRAWING NO: 91217.02
DATE: APRIL, 1993
SCALE: AS NOTED
REVISION: 91217G1
AS-BUILT DATE: 9/95

PROPOSED GRAVITY SEWER LINE
PLAN AND PROFILE
STA 9+97.67 TO STA 23+71.10

SHEET 3 OF 19

Appendix 5 – Population Information

CURVILLE FLUME

IN FROM RUTHERFORD COLLEGE (TYP.)

ISLAND CREEK PS

IN FROM CONNELLY SPRINGS (TYP.)

V A L D E S E

C O N N E L L Y S P R I N G S

R U T H E R F O R D

C O L L E G E

CONNELLY SPRINGS IN TO RUTHERFORD COLLEGE SYSTEM

FORCEMAIN FROM RHODHISS

INDIAN HILLS PS

IN FROM HILDEBRAN (TYP.)

L O N G V I E W

H I L D E B R A N

ECKARD CREEK PS

METERING MANHOLE

6" LINE BELONGING TO SCHOOL SYSTEM

EBBS FOOTBALL FIELD

IGARD ELEMENTARY SCHOOL

BALL FIELD

8" FORCEMAIN FROM GEORGE HILDEBRAND

COLLECTION SYSTEM TRIBUTARY TO INDIAN HILLS PUMP STATION

SEE INSET A

INSET A

SEE INSET B

1"=2000'

INSET B

GEORGE HILDEBRAND PS

1"=800'

SYSTEM	GRAVITY LENGTH MILES	FORCEMAIN LENGTH MILES
FLOWS TO VALDESE	3.4	1
FLOWS TO HICKORY	15.5	11

PUMP STATION TO VALDESE SYSTEM	PUMP STATIONS TO HICKORY SYSTEM
ISLAND CREEK	ECKARD CREEK GEORGE HILDEBRAND INDIAN HILLS

LEGEND:

- AIR RELEASE VALVE
- PUMPSTATION
- MANHOLE
- BFM — FORCEMAIN (SIZE VARIES)
- 18"ø — 18" SANITARY SEWER
- 15"ø — 15" SANITARY SEWER
- 12"ø — 12" SANITARY SEWER
- 8"ø — 8" SANITARY SEWER

NON-COUNTY SEWER LINES

- HBN — IN FROM HILDEBRAN
- CSP — IN FROM CONNELLY SPRINGS
- RCS — IN FROM RUTHERFORD COLLEGE
- RIVERS & STREAMS
- CNL — COULD NOT LOCATE

BURKE COUNTY, NC
SANITARY SEWER MAP

1250 0 1250 2500

GRAPHIC SCALE – FEET

1"=1250'

DATE: MARCH 2013
DRAWN BY: B. SHEETS / R.LYNN
rev: JULY 2014

WEST CONSULTANTS PLLC
405 South Sterling Street
Morganton, NC 28655
(828) 433-5661

2021 Standard Population Estimates

Information | Table | Map | Analyze | Export | API

	County	Municipality	Year	Population	Estimate Type	Multipart Flag	Year Incor
1	Burke	Hildebran	July 1, 2020	1,686	Revised Estimate	Located in Only 1 County	1973
2	Burke	Hildebran	April 1, 2020	1,679	2020 Base	Located in Only 1 County	1973
3	Burke	Hildebran	July 1, 2021	1,686	Standard Estimate	Located in Only 1 County	1973

Share | Embed | Widget

https://demography.osbm.nc.gov/explore/embed/dataset/2021-standard-population-estimates/table/?disjunctive.county&disjunctive.muni

NC OSBM STATE DEMOGRAPHER

Rhodhiss

2021

The Division of Water Resources (DWR) provides the data contained within this Local Water Supply Plan (LWSP) as a courtesy and service to our customers. DWR staff does not field verify data. Neither DWR, nor any other party involved in the preparation of this LWSP attests that the data is completely free of errors and omissions. Furthermore, data users are cautioned that LWSPs labeled **PROVISIONAL** have yet to be reviewed by DWR staff. Subsequent review may result in significant revision. Questions regarding the accuracy or limitations of usage of this data should be directed to the water system and/or DWR.

1. System Information

Contact Information

Complete

Water System Name:	Rhodhiss	PWSID:	01-14-035
Mailing Address:	PO Box 40 Rhodhiss, NC 28667	Ownership:	Municipality
Contact Person:	Rick Justice	Title:	Town Manager
Phone:	828-396-8400	Cell/Mobile:	828-493-2445
Secondary Contact:	Barbara Harmon	Phone:	828-396-8400
Mailing Address:	PO Box 40 Rhodhiss, NC 28667	Cell/Mobile:	828-493-2445

Distribution System

Line Type	Size Range (Inches)	Estimated % of lines
Polyvinyl Chloride	2-12	100.00 %

What are the estimated total miles of distribution system lines? 10 Miles

How many feet of distribution lines were replaced during 2021? 0 Feet

How many feet of new water mains were added during 2021? 0 Feet

How many meters were replaced in 2021? 23

How old are the oldest meters in this system? 4 Year(s)

How many meters for outdoor water use, such as irrigation, are not billed for sewer services? 2

What is this system's finished water storage capacity? 0.0000 Million Gallons

Has water pressure been inadequate in any part of the system since last update? *Line breaks that were repaired quickly should not be included.* No

no storage

Programs

Does this system have a program to work or flush hydrants? Yes, Quarterly

Does this system have a valve exercise program? Yes, Annually

Does this system have a cross-connection program? No

Does this system have a program to replace meters? No

Does this system have a plumbing retrofit program? No

Does this system have an active water conservation public education program? No

Does this system have a leak detection program? No

Water Conservation

What type of rate structure is used? Uniform

How much reclaimed water does this system use? 0.0000 MGD For how many connections? 0

Does this system have an interconnection with another system capable of providing water in an emergency? No

2. Water Use Information

Service Area

Sub-Basin(s)	% of Service Population	County(s)	% of Service Population
Catawba River (03-1)	100 %	Burke	55 %
		Caldwell	45 %

What was the year-round population served in 2021? 1,100

Has this system acquired another system since last report? No

Water Use by Type

Type of Use	Metered Connections	Metered Average Use (MGD)	Non-Metered Connections	Non-Metered Estimated Use (MGD)
Residential	334	0.0320	3	0.0000
Commercial	12	0.0021	0	0.0000
Industrial	0	0.0000	0	0.0000
Institutional	1	0.0002	0	0.0000

How much water was used for system processes (backwash, line cleaning, flushing, etc.)? 0.0001 MGD

3. Water Supply Sources

Monthly Withdrawals & Purchases

	Average Daily Use (MGD)	Max Day Use (MGD)		Average Daily Use (MGD)	Max Day Use (MGD)		Average Daily Use (MGD)	Max Day Use (MGD)
Jan	0.0449	0.0000	May	0.0293	0.0000	Sep	0.0401	0.0000
Feb	0.0404	0.0000	Jun	0.0293	0.0000	Oct	0.0440	0.0000
Mar	0.0288	0.0000	Jul	0.0362	0.0000	Nov	0.0511	0.0000
Apr	0.0296	0.0000	Aug	0.0340	0.0000	Dec	0.0677	0.0000

We had two significant leaks in October.

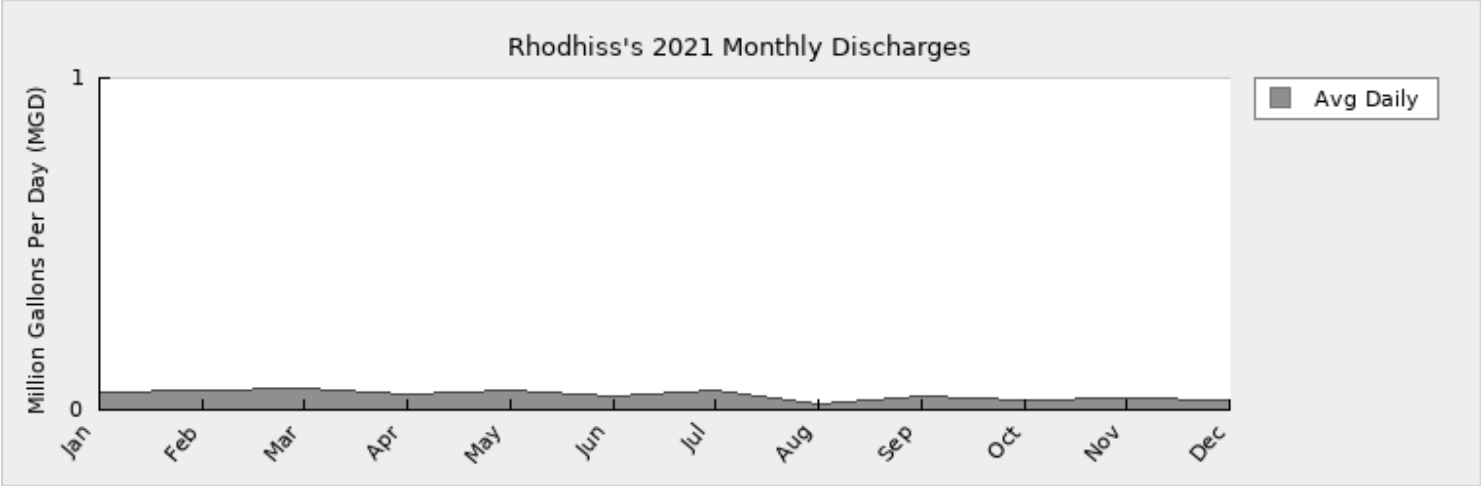
Water Purchases From Other Systems

Seller	PWSID	Average Daily Purchased (MGD)	Days Used	Contract MGD	Contract Expiration	Contract Recurring	Required to comply with water use restrictions?	Pipe Size(s) (Inches)	Use Type
Burke County	01-12-065	0.0038	365	0.0000		Yes	Yes	8	Regular
Granite Falls	01-14-030	0.0173	365	0.0500	2034	Yes	Yes	8	Regular
Icard Township WC	01-12-060	0.0167	365	0.1000	2018	Yes	Yes	8	Regular

4. Wastewater Information

Monthly Discharges

	Average Daily Discharge (MGD)		Average Daily Discharge (MGD)		Average Daily Discharge (MGD)
Jan	0.0534	May	0.0610	Sep	0.0419
Feb	0.0601	Jun	0.0437	Oct	0.0290
Mar	0.0643	Jul	0.0588	Nov	0.0342
Apr	0.0481	Aug	0.0184	Dec	0.0313



How many sewer connections does this system have? 296

How many water service connections with septic systems does this system have? 51

Are there plans to build or expand wastewater treatment facilities in the next 10 years? Yes

The Town of Rhodhiss will be asking to purchase more capacity and transfer in the future.

Wastewater Permits

Permit Number	Type	Permitted Capacity (MGD)	Design Capacity (MGD)	Average Annual Daily Discharge (MGD)	Maximum Day Discharge (MGD)	Receiving Stream	Receiving Basin
WQCS0042	CS	0.0660	0.0660	0.0000		Henry Fork River	Catawba River (03-1)

Rhodhiss land applied 0.0458 MGD of wastewater in 2021.

Wastewater Interconnections

Water System	PWSID	Type	Average Daily Amount		Contract Maximum (MGD)
			MGD	Days Used	
Burke County	01-12-065	Discharging	0.0458	365	0.0660

5. Planning

1100/334 = 3.29 persons/tap

Projections

	2021	2030	2040	2050	2060	2070
Year-Round Population	1,100	1,250	1,350	1,460	1,570	1,680
Seasonal Population	0	0	0	0	0	0
Residential	0.0320	0.0340	0.0360	0.0390	0.0420	0.0450
Commercial	0.0021	0.0022	0.0023	0.0024	0.0025	0.0026
Industrial	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Institutional	0.0002	0.0002	0.0002	0.0003	0.0004	0.0005
System Process	0.0001	0.0002	0.0003	0.0005	0.0006	0.0010
Unaccounted-for	0.0034	0.0036	0.0038	0.0042	0.0045	0.0049

Demand v/s Percent of Supply

	2021	2030	2040	2050	2060	2070
Surface Water Supply	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Ground Water Supply	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Purchases	0.1538	0.1538	0.1538	0.1538	0.1538	0.1538
Future Supplies		0.0000	0.0000	0.0000	0.0000	0.0000

Total Available Supply (MGD)	0.1538	0.1538	0.1538	0.1538	0.1538	0.1538
Service Area Demand	0.0378	0.0402	0.0426	0.0464	0.0500	0.0540
Sales	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Future Sales		0.0000	0.0000	0.0000	0.0000	0.0000
Total Demand (MGD)	0.0378	0.0402	0.0426	0.0464	0.0500	0.0540
Demand as Percent of Supply	25%	26%	28%	30%	33%	35%

The purpose of the above chart is to show a general indication of how the long-term per capita water demand changes over time. The per capita water demand may actually be different than indicated due to seasonal populations and the accuracy of data submitted. Water systems that have calculated long-term per capita water demand based on a methodology that produces different results may submit their information in the notes field.

Your long-term water demand is 29 gallons per capita per day. What demand management practices do you plan to implement to reduce the per capita water demand (i.e. conduct regular water audits, implement a plumbing retrofit program, employ practices such as rainwater harvesting or reclaimed water)? If these practices are covered elsewhere in your plan, indicate where the practices are discussed here. No Changes

Are there other demand management practices you will implement to reduce your future supply needs? None

What supplies other than the ones listed in future supplies are being considered to meet your future supply needs? None

How does the water system intend to implement the demand management and supply planning components above? N/A

Additional Information

Has this system participated in regional water supply or water use planning? No

What major water supply reports or studies were used for planning? None

Please describe any other needs or issues regarding your water supply sources, any water system deficiencies or needed improvements (storage, treatment, etc.) or your ability to meet present and future water needs. Include both quantity and quality considerations, as well as financial, technical, managerial, permitting, and compliance issues: None

All Topics

	Burke County, North Carolina
Population Estimates, July 1 2022, (V2022)	⚠ N
Population Estimates, July 1 2021, (V2021)	⚠ 87,6

United States Census Bureau

QuickFacts

Burke County, North Carolina

QuickFacts provides statistics for all states and counties, and for cities and towns with a ***population of 5,000 or more***.

Table

PEOPLE	
Population	
Population Estimates, July 1 2022, (V2022)	⚠ **NA**
Population Estimates, July 1 2021, (V2021)	⚠ **87,611**
Population estimates base, April 1, 2020, (V2022)	⚠ NA
Population estimates base, April 1, 2020, (V2021)	⚠ 87,570
Population, percent change - April 1, 2020 (estimates base) to July 1, 2022, (V2022)	⚠ NA
Population, percent change - April 1, 2020 (estimates base) to July 1, 2021, (V2021)	⚠ Z
Population, Census, April 1, 2020	87,570
Population, Census, April 1, 2010	90,912
Age and Sex	
Persons under 5 years, percent	⚠ 4.6%
Persons under 18 years, percent	⚠ 18.0%
Persons 65 years and over, percent	⚠ 21.2%
Female persons, percent	⚠ 49.7%
Race and Hispanic Origin	
White alone, percent	⚠ 85.7%
Black or African American alone, percent (a)	⚠ 6.8%
American Indian and Alaska Native alone, percent (a)	⚠ 1.0%
Asian alone, percent (a)	⚠ 3.8%
Native Hawaiian and Other Pacific Islander alone, percent (a)	⚠ 0.8%
Two or More Races, percent	⚠ 1.9%
Hispanic or Latino, percent (b)	⚠ 6.9%
White alone, not Hispanic or Latino, percent	⚠ 80.8%
Population Characteristics	
Veterans, 2017-2021	4,820
Foreign born persons, percent, 2017-2021	4.9%
Housing	
Housing units, July 1, 2021, (V2021)	39,889
Owner-occupied housing unit rate, 2017-2021	75.3%
Median value of owner-occupied housing units, 2017-2021	$128,300
Median selected monthly owner costs -with a mortgage, 2017-2021	$1,047
Median selected monthly owner costs -without a mortgage, 2017-2021	$348
Median gross rent, 2017-2021	$715
Building permits, 2021	402
Families & Living Arrangements	
Households, 2017-2021	34,376
Persons per household, 2017-2021	2.48
Living in same house 1 year ago, percent of persons age 1 year+, 2017-2021	89.3%
Language other than English spoken at home, percent of persons age 5 years+, 2017-2021	9.3%
Computer and Internet Use	
Households with a computer, percent, 2017-2021	86.6%
Households with a broadband Internet subscription, percent, 2017-2021	77.4%
Education	
High school graduate or higher, percent of persons age 25 years+, 2017-2021	83.3%
Bachelor's degree or higher, percent of persons age 25 years+, 2017-2021	18.7%

CAROLINA REHAB CENTER OF BURKE

Skilled Nursing Facility | Medicare and Medicaid Certified

90 Licensed Beds

Share on Facebook

3647 Miller Bridge Road

Connelly Spg, NC 28612

View Phone Number

Ratings Direct Care Jobs

East Burke High School

3695 East Burke Boulevard
Connelly Springs, NC 28612
(School attendance zone shown in map)
View full size Get directions
Rating
:
9/
10
Top 20%
Tel: (828) 397-5541

ebhs.burke.k12.nc.us
SAVE SCHOOL

East Burke High School serves 842 students in grades 9-12.
East Burke High School placed in the top 20% of all schools in North Carolina for overall test scores (math proficiency is top 10%, and reading proficiency is top 30%) for the 2018-19 school year.
The percentage of students achieving proficiency in math is 70-74% (which is higher than the North Carolina state average of 42%) for the 2018-19 school year. The percentage of students achieving proficiency in reading/language arts is 53% (which is higher than the North Carolina state average of 46%) for the 2018-19 school year.
The student:teacher ratio of 18:1 is higher than the North Carolina state level of 14:1.
Minority enrollment is 19% of the student body (majority Hispanic and Asian), which is lower than the North Carolina state average of 54% (majority Black).

Quick Stats (2022-23)

- Grades: **9-12**
- Enrollment: **842 students**
- Student:Teacher Ratio: **18:1**
- Minority Enrollment: **19%**
- Graduation Rate
  : **93% (Top 20% in NC)**
- Overall Testing Rank
  : **Top 20%**

East Burke Middle School

3519 Miller Bridge Road
Connelly Springs, NC 28612
(School attendance zone shown in map)
View full size Get directions
Rating
:
7/
10
Top 50%
Tel: (828) 397-7446

ebms.burke.k12.nc.us
SAVE SCHOOL
East Burke Middle School serves 651 students in grades 6-8.
East Burke Middle School placed in the top 50% of all schools in North Carolina for overall test scores (math proficiency is top 50%, and reading proficiency is top 30%) for the 2018-19 school year.
The percentage of students achieving proficiency in math is 45% (which is higher than the North Carolina state average of 42%) for the 2018-19 school year. The percentage of students achieving proficiency in reading/language arts is 53% (which is higher than the North Carolina state average of 46%) for the 2018-19 school year.
The student:teacher ratio of 18:1 is higher than the North Carolina state level of 14:1.
Minority enrollment is 23% of the student body (majority Asian and Hispanic), which is lower than the North Carolina state average of 54% (majority Black).

Quick Stats (2022-23)

- Grades: **6-8**
- Enrollment: **651 students**
- Student:Teacher Ratio: **18:1**
- Minority Enrollment: **23%**
- Overall Testing Rank
  : **Top 50% in NC**
- Math Proficiency
  : **45% (Top 50%)**
- Reading Proficiency

George Hildebrand Elementary School

8078 G Hildebrand Sch Road
Connelly Springs, NC 28612
(School attendance zone shown in map)
View full size Get directions
Rating
:
6/
10
Top 50%
Tel: (828) 879-9595

ghes.burke.k12.nc.us
SAVE SCHOOL

George Hildebrand Elementary School serves 294 students in grades Prekindergarten-5.
George Hildebrand Elementary School placed in the top 50% of all schools in North Carolina for overall test scores (math proficiency is bottom 50%, and reading proficiency is top 50%) for the 2018-19 school year.
The percentage of students achieving proficiency in math is 35-39% (which is lower than the North Carolina state average of 42%) for the 2018-19 school year. The percentage of students achieving proficiency in reading/language arts is 45-49% (which is approximately equal to the North Carolina state average of 46%) for the 2018-19 school year.
The student:teacher ratio of 16:1 is higher than the North Carolina state level of 14:1.
Minority enrollment is 14% of the student body (majority Asian), which is lower than the North Carolina state average of 54% (majority Black).

Quick Stats (2022-23)

- Grades: **Prekindergarten-5**
- Enrollment: **294 students**
- Student:Teacher Ratio: **16:1**
- Minority Enrollment: **14%**
- Overall Testing Rank
  : **Top 50% in NC**
- Math Proficiency
  : **35-39% (Btm 50%)**
- Reading Proficiency
  : **45-49% (Top 50%)**
- Source: **National Center for Education Statistics (NCES), NC Dept. of Education**

School Overview

George Hildebrand Elementary School's student population of 294 students has declined by 17% over five school years.
The teacher population of 18 teachers has declined by 21% over five school years.

Grades Offered
Grades Prekindergarten-5
Total Students
294 students

Hildebran Elementary School

703 Us Hwy 70 West
Hildebran, NC 28637
(School attendance zone shown in map)
View full size Get directions
Rating
:
6/
10
Top 50%
Tel: (828) 397-3181

hes.burke.k12.nc.us
SAVE SCHOOL
Hildebran Elementary School serves 354 students in grades Prekindergarten-5.
Hildebran Elementary School placed in the top 50% of all schools in North Carolina for overall test scores (math proficiency is bottom 50%, and reading proficiency is top 50%) for the 2018-19 school year.
The percentage of students achieving proficiency in math is 35-39% (which is lower than the North Carolina state average of 42%) for the 2018-19 school year. The percentage of students achieving proficiency in reading/language arts is 45-49% (which is approximately equal to the North Carolina state average of 46%) for the 2018-19 school year.
The student:teacher ratio of 15:1 is higher than the North Carolina state level of 14:1.
Minority enrollment is 21% of the student body (majority Asian), which is lower than the North Carolina state average of 54% (majority Black).

Quick Stats (2022-23)

- Grades: **Prekindergarten-5**
- Enrollment: **354 students**
- Student:Teacher Ratio: **15:1**
- Minority Enrollment: **21%**
- Overall Testing Rank

Icard Elementary School

3087 Icard School Road
Connelly Springs, NC 28612
(School attendance zone shown in map)
View full size Get directions
Rating
:
8/
10
Top 30%
Tel: (828) 397-3491

ies.burke.k12.nc.us
SAVE SCHOOL
Icard Elementary School serves 278 students in grades Prekindergarten-5.
Icard Elementary School placed in the top 30% of all schools in North Carolina for overall test scores (math proficiency is top 30%, and reading proficiency is top 30%) for the 2018-19 school year.
The percentage of students achieving proficiency in math is 50-54% (which is higher than the North Carolina state average of 42%) for the 2018-19 school year. The percentage of students achieving proficiency in reading/language arts is 50-54% (which is higher than the North Carolina state average of 46%) for the 2018-19 school year.
The student:teacher ratio of 14:1 is equal to the North Carolina state level of 14:1.
Minority enrollment is 24% of the student body (majority Asian), which is lower than the North Carolina state average of 54% (majority Black).

Quick Stats (2022-23)

Ray Childers Elementary School

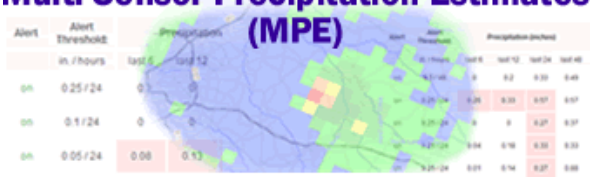
1183 Cape Hickory Road
Hickory, NC 28601
(School attendance zone shown in map)
View full size Get directions
Rating
:
6/
10
Top 50%
Tel: (828) 324-1340

childers.burke.k12.nc.us
SAVE SCHOOL
Ray Childers Elementary School serves 438 students in grades Prekindergarten-5.
Ray Childers Elementary School placed in the top 50% of all schools in North Carolina for overall test scores (math proficiency is top 50%, and reading proficiency is top 50%) for the 2018-19 school year.
The percentage of students achieving proficiency in math is 41% (which is lower than the North Carolina state average of 42%) for the 2018-19 school year. The percentage of students achieving proficiency in reading/language arts is 45% (which is lower than the North Carolina state average of 46%) for the 2018-19 school year.
The student:teacher ratio of 14:1 is equal to the North Carolina state level of 14:1.
Minority enrollment is 29% of the student body (majority Hispanic and Asian), which is lower than the North Carolina state average of 54% (majority Black).

Quick Stats (2022-23)

Appendix 6 - Recurrence Interval (RI) Documentation (incl. photos & Climate Change Information)

Multi-Sensor Precipitation Estimates (MPE)



Get More MPE Data for

Date Range: 2020-11-01 thru 2020-11-30

Latitude: 35.738152950534 **Longitude:** -81.422699158935

Observation Date & Time (EST)	Precipitation (inches)
2020-11-01 07:00:00	0.134
2020-11-02 07:00:00	0
2020-11-03 07:00:00	0
2020-11-04 07:00:00	0
2020-11-05 07:00:00	0
2020-11-06 07:00:00	0
2020-11-07 07:00:00	0
2020-11-08 07:00:00	0
2020-11-09 07:00:00	0
2020-11-10 07:00:00	0.012
2020-11-11 07:00:00	0.976
2020-11-12 07:00:00	4.709
2020-11-13 07:00:00	0.433
2020-11-14 07:00:00	0
2020-11-15 07:00:00	0
2020-11-16 07:00:00	0
2020-11-17 07:00:00	0
2020-11-18 07:00:00	0
2020-11-19 07:00:00	0
2020-11-20 07:00:00	0
2020-11-21 07:00:00	0
2020-11-22 07:00:00	0
2020-11-23 07:00:00	0
2020-11-24 07:00:00	0
2020-11-25 07:00:00	0
2020-11-26 07:00:00	0.276
2020-11-27 07:00:00	0
2020-11-28 07:00:00	0
2020-11-29 07:00:00	0
2020-11-30 07:00:00	1.492
TOTAL:	8.032

Multi-Sensor Precipitation Estimates (MPE)

Get More MPE Data for

Date Range: 2021-10-01 thru 2021-10-31

Latitude: 35.738152 **Longitude:** -81.42270

Observation Date & Time (EST)	Precipitation (inches)
2021-10-01 07:00:00	0
2021-10-02 07:00:00	0
2021-10-03 07:00:00	0
2021-10-04 07:00:00	0.031
2021-10-05 07:00:00	0.083
2021-10-06 07:00:00	0.169
2021-10-07 07:00:00	0.827
2021-10-08 07:00:00	2.358
2021-10-09 07:00:00	0.181
2021-10-10 07:00:00	0
2021-10-11 07:00:00	0
2021-10-12 07:00:00	0
2021-10-13 07:00:00	0
2021-10-14 07:00:00	0
2021-10-15 07:00:00	0
2021-10-16 07:00:00	0
2021-10-17 07:00:00	0
2021-10-18 07:00:00	0
2021-10-19 07:00:00	0
2021-10-20 07:00:00	0
2021-10-21 07:00:00	0
2021-10-22 07:00:00	0
2021-10-23 07:00:00	0
2021-10-24 07:00:00	0
2021-10-25 07:00:00	0
2021-10-26 07:00:00	0.039
2021-10-27 07:00:00	0
2021-10-28 07:00:00	0
2021-10-29 07:00:00	1.22
2021-10-30 07:00:00	0.012
2021-10-31 07:00:00	0.075
TOTAL:	4.995

NOAA Atlas 14, Volume 2, Version 3
Location name: Hickory, North Carolina, USA*
Latitude: 35.7384°, Longitude: -81.4222°
Elevation: 976.06 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.368** (0.338-0.401)	**0.436** (0.401-0.476)	**0.516** (0.472-0.563)	**0.578** (0.527-0.630)	**0.657** (0.594-0.718)	**0.716** (0.642-0.784)	**0.775** (0.688-0.852)	**0.834** (0.732-0.923)	**0.910** (0.785-1.02)	**0.971** (0.824-1.09)
10-min	**0.587** (0.540-0.641)	**0.698** (0.641-0.761)	**0.827** (0.756-0.902)	**0.925** (0.843-1.01)	**1.05** (0.946-1.14)	**1.14** (1.02-1.25)	**1.23** (1.09-1.35)	**1.32** (1.16-1.46)	**1.44** (1.24-1.61)	**1.53** (1.30-1.72)
15-min	**0.734** (0.675-0.801)	**0.877** (0.805-0.957)	**1.05** (0.957-1.14)	**1.17** (1.07-1.27)	**1.33** (1.20-1.45)	**1.44** (1.29-1.58)	**1.56** (1.38-1.71)	**1.67** (1.46-1.85)	**1.81** (1.56-2.03)	**1.92** (1.63-2.16)
30-min	**1.01** (0.926-1.10)	**1.21** (1.11-1.32)	**1.49** (1.36-1.62)	**1.70** (1.55-1.85)	**1.97** (1.78-2.15)	**2.17** (1.95-2.38)	**2.38** (2.12-2.62)	**2.60** (2.28-2.88)	**2.88** (2.49-3.22)	**3.11** (2.64-3.50)
60-min	**1.25** (1.15-1.37)	**1.52** (1.40-1.66)	**1.91** (1.74-2.08)	**2.21** (2.01-2.41)	**2.62** (2.37-2.86)	**2.95** (2.64-3.23)	**3.29** (2.92-3.61)	**3.64** (3.20-4.03)	**4.14** (3.57-4.62)	**4.54** (3.85-5.11)
2-hr	**1.46** (1.34-1.59)	**1.77** (1.62-1.94)	**2.25** (2.05-2.46)	**2.62** (2.38-2.87)	**3.16** (2.84-3.45)	**3.59** (3.20-3.94)	**4.05** (3.57-4.46)	**4.53** (3.95-5.03)	**5.23** (4.48-5.87)	**5.81** (4.89-6.57)
3-hr	**1.57** (1.43-1.72)	**1.89** (1.74-2.09)	**2.40** (2.19-2.64)	**2.81** (2.55-3.09)	**3.40** (3.06-3.75)	**3.89** (3.47-4.30)	**4.41** (3.89-4.90)	**4.98** (4.33-5.57)	**5.81** (4.94-6.57)	**6.50** (5.43-7.42)
6-hr	**1.94** (1.79-2.12)	**2.34** (2.15-2.56)	**2.94** (2.69-3.22)	**3.43** (3.13-3.75)	**4.13** (3.74-4.52)	**4.72** (4.23-5.17)	**5.34** (4.73-5.88)	**6.01** (5.27-6.67)	**6.99** (5.99-7.82)	**7.80** (6.57-8.80)
12-hr	**2.42** (2.23-2.63)	**2.91** (2.68-3.18)	**3.64** (3.34-3.97)	**4.22** (3.86-4.59)	**5.03** (4.58-5.48)	**5.69** (5.14-6.21)	**6.38** (5.70-6.97)	**7.10** (6.28-7.80)	**8.13** (7.08-8.98)	**8.95** (7.70-9.95)
24-hr	**3.00** (2.80-3.25)	**3.64** (3.39-3.94)	**4.62** (4.29-5.00)	**5.39** (4.99-5.82)	**6.44** (5.94-6.95)	**7.29** (6.69-7.87)	**8.15** (7.45-8.81)	**9.06** (8.24-9.80)	**10.3** (9.30-11.2)	**11.3** (10.1-12.2)
2-day	**3.59** (3.33-3.88)	**4.34** (4.03-4.70)	**5.45** (5.06-5.90)	**6.31** (5.84-6.82)	**7.49** (6.90-8.09)	**8.41** (7.72-9.09)	**9.35** (8.55-10.1)	**10.3** (9.40-11.2)	**11.6** (10.5-12.6)	**12.7** (11.4-13.8)
3-day	**3.82** (3.54-4.11)	**4.60** (4.27-4.96)	**5.74** (5.33-6.19)	**6.63** (6.13-7.14)	**7.83** (7.22-8.44)	**8.78** (8.06-9.46)	**9.74** (8.91-10.5)	**10.7** (9.79-11.6)	**12.1** (11.0-13.1)	**13.1** (11.9-14.2)
4-day	**4.04** (3.76-4.34)	**4.86** (4.52-5.23)	**6.04** (5.60-6.49)	**6.94** (6.43-7.46)	**8.18** (7.55-8.78)	**9.15** (8.41-9.83)	**10.1** (9.28-10.9)	**11.1** (10.2-12.0)	**12.5** (11.4-13.5)	**13.6** (12.3-14.7)
7-day	**4.67** (4.36-4.99)	**5.59** (5.23-5.98)	**6.81** (6.36-7.29)	**7.74** (7.22-8.29)	**8.99** (8.36-9.62)	**9.96** (9.23-10.7)	**10.9** (10.1-11.7)	**11.9** (11.0-12.8)	**13.2** (12.2-14.2)	**14.3** (13.1-15.4)
10-day	**5.34** (5.02-5.69)	**6.37** (5.98-6.78)	**7.66** (7.19-8.15)	**8.63** (8.08-9.19)	**9.91** (9.26-10.6)	**10.9** (10.1-11.6)	**11.9** (11.0-12.6)	**12.9** (11.9-13.7)	**14.2** (13.1-15.1)	**15.2** (14.0-16.2)
20-day	**7.11** (6.72-7.54)	**8.42** (7.95-8.93)	**9.95** (9.37-10.5)	**11.1** (10.5-11.8)	**12.7** (11.9-13.5)	**13.9** (13.0-14.7)	**15.1** (14.1-16.0)	**16.3** (15.2-17.3)	**17.9** (16.6-19.0)	**19.1** (17.7-20.4)
30-day	**8.80** (8.38-9.23)	**10.4** (9.86-10.9)	**11.9** (11.3-12.5)	**13.1** (12.4-13.7)	**14.5** (13.8-15.3)	**15.6** (14.8-16.4)	**16.7** (15.8-17.6)	**17.7** (16.8-18.7)	**19.1** (18.0-20.1)	**20.1** (18.9-21.2)
45-day	**11.1** (10.6-11.6)	**13.0** (12.4-13.6)	**14.7** (14.0-15.3)	**15.9** (15.2-16.6)	**17.5** (16.7-18.3)	**18.7** (17.8-19.5)	**19.8** (18.9-20.7)	**20.8** (19.8-21.8)	**22.2** (21.1-23.3)	**23.2** (22.0-24.4)
60-day	**13.2** (12.7-13.7)	**15.4** (14.8-16.0)	**17.2** (16.5-18.0)	**18.6** (17.9-19.4)	**20.4** (19.5-21.3)	**21.7** (20.8-22.6)	**22.9** (21.9-24.0)	**24.1** (23.1-25.2)	**25.7** (24.5-26.9)	**26.8** (25.5-28.1)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical

Aerial View of Site (non-flooded condition)

Drowning Creek – One Day After 2.4” Rain on Oct. 8, 2021)

Burke County Indian Hills Sewer Pump Station Flood Mitigation Project - Photos

Inside of Pump Station Enclosure/Building – Showing Water Stains from November 12, 2020 Flooding

Evidence of Flooding - Damage to Fencing and Floating Debris Deposits